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Distortions in the foreign exchange market in Zimbabwe

By

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Thesis submitted in fulfilment of the requirements for the degree of Master of Management in Finance & Investment

in the

FACULTY OF COMMERCE LAW AND MANAGEMENT

WITS BUSINESS SCHOOL

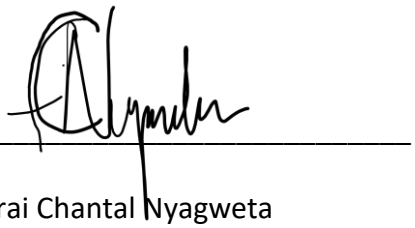
At the

UNIVERSITY OF WITSWATERSRAND

SUPERVISOR: PROFESSOR ERIC SCHALING

DECLARATION OF AUTHORSHIP

I, ***Farai Chantal Nyagweta***, that work included in this dissertation is my own unless explicitly stated. This dissertation has been submitted as part of the Master of Management in Finance and Investment program in Wits Business School. This thesis has not been submitted for any other degree or universities.



Farai Chantal Nyagweta

On the 27th Day of February 2025

ABSTRACT

The existence of the parallel market in Zimbabwe has been a prevailing issue for policymakers for many years. The parallel market rate premium has continued to increase which has caused significant price distortions in the real economy. This quantitative study used monthly data to examine the determinants of the parallel market rate premium in Zimbabwe for the period 2019 to 2023 using the monetarist approach. The ARDL methodology was used to investigate the effect that inflation rate, money supply, and expected rate of devaluation have on the parallel market rate premium. The empirical results showed that all three variables had a long run relationship with the parallel market rate premium whilst only money supply, and inflation rate had a short run relationship with the premium. The inflation rate and expected rate of devaluation both had positive effects on the premium in the long run. Whilst money supply, unexpectedly had a negative relationship with the premium in the long run. In the short run the inflation rate had a negative impact on the premium, and money supply had a positive effect. The paper concluded that the government policy that aims to reduce inflationary pressures in the economy is vital in narrowing the parallel market rate premium.

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Firstly, all glory to God the Almighty who is merciful and good always. To my family who have shown me unconditional love, patience and support. I do not think there are enough words in the world to tell you what you mean to me.

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CHAPTER ONE
Introduction

1.1 Background and Motivation

Parallel markets for foreign exchange have attracted the attention of researchers for many decades, particularly in the 1980s and 1990s when many developing countries underwent trade liberalization programs. There are two types of parallel markets: the dual exchange rate system and the illegal parallel market for foreign exchange, commonly referred to as the black market. Dual exchange rate systems are often introduced by governments as a response to balance of payments crises (Kiguel & O'Connell, 1995). These legally sanctioned markets aim to insulate domestic prices from the short-term effects of currency depreciation by maintaining an overvalued official exchange rate (Kiguel & O'Connell, 1995). In contrast, black markets emerge when governments impose excessive exchange controls to limit capital outflows and protect foreign reserves.

Such government interventions can distort the foreign exchange market by sustaining an overvaluation of the domestic currency—especially under fixed or managed float regimes. Foreign exchange distortions occur when a currency's market value is persistently kept above or below its equilibrium or "fair" value. This fair value is defined as the exchange rate that would emerge in a competitive market, where prices are freely determined by supply and demand. Therefore, it can be argued that foreign exchange market distortions are persistent deviations of a currency from its fundamental value (Westerhoff, 2003).

In Zimbabwe, the black market for foreign exchange arose primarily due to chronic shortages of foreign currency, resulting in excess demand for the U.S. dollar. The origins of this parallel market can be traced back to 1965, when the Prime Minister of Southern Rhodesia (now Zimbabwe) unilaterally declared the country's independence from Britain in an act known as the Unilateral Declaration of Independence (UDI). Following the UDI, Britain sought and obtained United Nations sanctions against Rhodesia in 1966, which were only lifted in 1979 (Britannica, 2023). While the parallel market existed during this period, it was not as integral to the economy as it is today. Post-independence, as macroeconomic instability increased, so too did the importance of the parallel market.

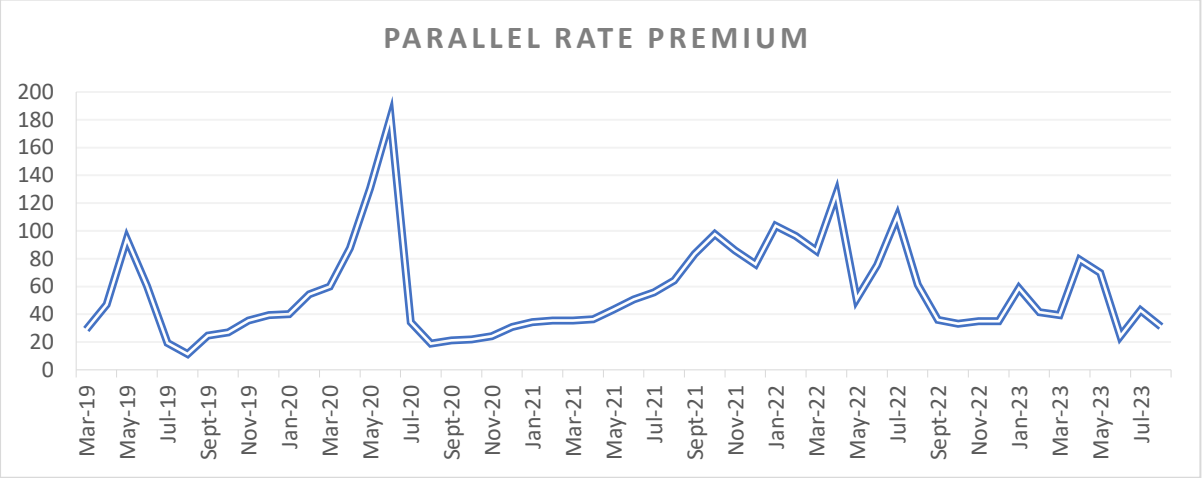
Although literature on Zimbabwe's parallel market remains limited, it is evident that market activity fluctuates in response to political developments, exchange rate policy changes, and

other major macroeconomic events. The market itself lacks formal organization but can be loosely understood by observing its participants. Due to the scarcity of foreign exchange, not all economic agents can access the official market. To preserve foreign currency reserves, the government implemented a priority list that ranks sectors by their perceived importance—high, medium, or low—determining the order in which they can access foreign exchange at the official rate. As a result, households and businesses not ranked as high priority are effectively pushed toward the black market.

This structure results in two broad classes of parallel market participants: households and institutions. Households engage in small, irregular transactions to meet immediate consumption needs—such as school fees, groceries, or informal sector purchases. In contrast, institutions require larger and more regular transactions to import raw materials and capital goods. The parallel market exchange rate is determined by supply and demand. Due to the informal nature of the market, multiple exchange rates exist depending on the form of Zimbabwean dollar being traded. There are currently three major forms: mobile money, hard cash, and Real Time Gross Settlement (RTGS). This paper focuses on the RTGS form of the Zimbabwean dollar, referred to here as ZWL, and uses these terms interchangeably. Since the ZWL is not internationally recognized, it must be converted to foreign currency—typically the U.S. dollar—to facilitate imports.

Black market activities are unregulated and decentralized. Most households hold their savings in U.S. dollars or other stable currencies as a hedge against the rapidly depreciating ZWL. The Zimbabwean dollar is primarily used for immediate transactions, often when the seller applies an official exchange rate that makes Zimbabwean dollar pricing more favourable for the buyer. However, in many cases—especially in tourism, restaurants, and private service industries—goods and services are priced directly in U.S. dollars. This dual pricing mechanism contributes to price distortions in the economy.

Figure 1: Parallel market rate premium



Source: Author's compilation

The graph illustrates the fluctuations in the parallel market rate premium in Zimbabwe from 2019 to 2023. It reveals significant volatility, characterized by notable peaks and troughs, particularly during the hyperinflationary period of 2020, when the parallel market premium surged due to rampant inflation and a lack of confidence in the official ZWL/USD exchange rate (Chirume, 2021). Spikes in the parallel market rate often coincide with economic challenges, prompting individuals and businesses to resort to unofficial currency exchanges. For instance, the premium reached alarming heights in mid-2021, reflecting ongoing distrust in monetary policy (Mlambo, 2022). These dynamics underscore the challenges faced by the Zimbabwean economy, where the parallel market serves as a barometer for economic sentiment. Recent trends in 2022 and 2023 may indicate attempts at stabilization through government reforms; however, persistent volatility in the premium suggests that restoring trust in the official currency remains a critical hurdle for policymakers (Makoni, 2023).

According to Lizondo (1987), dual exchange rate regimes distort relative prices in the economy, leading to misallocation of resources, as some economic agents gain preferential access to foreign currency at below-market rates. These distortions encourage rent-seeking behavior, reduce price transparency, and complicate economic planning. Eichengreen et al. (1994) further argue that the divergence between official and parallel exchange rates undermines monetary policy, increases inflation expectations, and can erode trust in the domestic currency. In Zimbabwe, this dynamic is evident in both the real sector—where local prices for similar goods differ depending on the currency of transaction—and the financial sector, where exchange rate expectations are factored into asset pricing and investment behavior.

1.2 Statement of Research Problem

This study seeks to identify and assess the factors driving the persistent rise in the parallel market rate premium in Zimbabwe over the past three years, applying a monetarist framework. The growing divergence between the official and parallel exchange rates has resulted in significant price distortions in both the real economy and financial markets. These distortions create uncertainty, reduce allocative efficiency, and pose a challenge for monetary and fiscal policy. According to Damodaran (2021), fluctuations in equity risk premiums are shaped by macroeconomic instability, monetary policy uncertainty, and investor sentiment—all of which are intensified in environments where multiple exchange rates coexist. Jordà et al. (2018) note that global financial cycles, particularly those involving sudden capital flow reversals, tend to exacerbate exchange rate volatility in economies with weak monetary institutions. In such settings, the existence of a parallel exchange rate acts as both a symptom and amplifier of broader macroeconomic dysfunction. Empirical evidence suggests that sustained deviations between official and parallel exchange rates amplify inflationary pressures, distort market prices, and disrupt capital allocation (Lizondo, 1987; Quirk et al., 1987). In Zimbabwe, businesses often set prices based on the parallel market rate, particularly in sectors where access to foreign currency through official channels is limited. This creates an economy in which goods are priced differently depending on the form of currency used—undermining consumer confidence and increasing price volatility.

This research will quantitatively examine the relationship between key macroeconomic indicators—such as inflation (CPI), money supply, and exchange rate expectations—and the parallel market premium. By exploring how these variables influence both the premium and associated price distortions, the study aims to offer evidence-based policy recommendations to mitigate the destabilizing effects of dual exchange rate regimes.

1.3 Purpose of the study

The purpose of this research is to determine and analyse the determinants of the parallel market rate premium between the U.S Dollar and Zimbabwean dollar. There is limited research on why the unofficial and official exchange rate in Zimbabwe continues to diverge from one another. This paper aims to fill this research gap.

1.4 Significance of the research

Implications for monetary and fiscal policy formulation

The findings of this research will be instrumental in guiding monetary and fiscal policy decisions aimed at stabilizing Zimbabwe's exchange rate system. A misaligned exchange rate often forces central banks to adopt restrictive monetary policies, such as high interest rates, to curb inflation and stabilize the currency. However, such policies can have adverse effects on credit availability and economic growth, necessitating a balanced approach. This study will provide empirical data to help policymakers assess whether the current monetary policy stance effectively addresses exchange rate distortions or exacerbates them. By doing so, it will contribute to the formulation of evidence-based policies that promote long-term economic stability.

Enhancing investor confidence and market efficiency

Foreign exchange market distortions create uncertainty for investors, making it difficult to plan long-term investments and business operations. When exchange rate volatility persists, businesses face challenges in pricing goods and services, leading to reduced profitability and economic stagnation. This research will highlight the risks associated with an unstable exchange rate environment and propose solutions to enhance market efficiency. By addressing these distortions, Zimbabwe can attract more foreign direct investment (FDI) and restore confidence in its financial markets. Improved market transparency and stability will create a conducive environment for economic growth and job creation.

Policy recommendations for sustainable exchange rate management

This research will attempt to provide policy recommendations to mitigate the negative effects of exchange rate distortions and promote stability in Zimbabwe's foreign exchange market. Potential solutions may include exchange rate unification, improved foreign currency management, and structural reforms to enhance economic resilience. A stable and predictable exchange rate system will support sustainable economic growth, improve investor sentiment, and foster a more inclusive financial system.

1.5 Research question

1. What are the determinants of the parallel market rate premium in Zimbabwe for the period January 2019 and December 2023.
2. What impact does the inflation rate, money supply and expected devaluation have on the parallel rate premium in Zimbabwe for the period January 2019 and December 2023

1.6. Objectives of research

- To investigate the short-run determinants of the parallel market rate premium
- To examine the long-run determinants of the parallel market rate premium

1.7 Limitations of study

Since the period of study is only over 3 years, the monthly data was used. However, this limited the range of independent variables that could be used because some data for variables were not available at a monthly frequency.

1.8 Delimitations

This study focuses on identifying and assessing the factors driving distortions in Zimbabwe's foreign exchange market, specifically analysing the parallel market rate premium using the monetarist approach. The research is limited to the period of the last three years, allowing for a focused examination of recent economic trends and policy impacts. It primarily considers macroeconomic variables such as inflation, money supply, and exchange rate policies, while excluding micro-level factors such as firm-specific financial strategies. Additionally, the study relies on secondary data from financial reports, central bank publications, and international economic databases, which may limit the scope of real-time market dynamics. The research does not extend to a comparative analysis with other countries, as the primary objective is to provide context-specific insights relevant to Zimbabwe's economic environment.

1.9 The structure of the report

The study is spilt into 5 chapters. Chapter 1 gave an overview of the study. Chapter 2 is literature review which consists of theoretical review of literature, and empirical review of literature and finally, the gaps, and contributions of this paper will be discussed. The theoretical

review in section 2. 2 focuses on the real trade model, the portfolio approach, and the monetary approach. Chapter 3 discusses the methodology and data used in this study. Chapter 4 shows the results of the methodology in chapter 3 and discusses the results. Lastly, chapter 5 concludes the report and offers policy implications.

CHAPTER TWO
Literature review

2.1 Introduction

The parallel market rate premium in Zimbabwe, which refers to the percentage difference between the official and parallel exchange rates, has become a central issue in the country's economic challenges, reflecting persistent foreign exchange shortages, inflation, and currency instability. This chapter explores the determinants of the parallel market rate premium through three key theoretical frameworks: real trade models, portfolio balance models, and the monetary approach to exchange rate determination. These models offer insights into how government policies, fiscal deficits, inflation, and market expectations influence exchange rate dynamics, particularly in countries like Zimbabwe, where economic instability has distorted official markets. While some studies have examined the parallel market rate premium, significant gaps remain in the literature, especially regarding the evolving macroeconomic conditions and their impact on Zimbabwe's economy. This chapter aims to bridge these gaps by bringing together theoretical and empirical perspectives to better understand the role of the parallel market in Zimbabwe's economy and highlight the need for contemporary research to inform effective policy interventions.

2.2 Theoretical review

There are three main theories that underpin the analytical framework for parallel market rate premium namely real trade models, portfolio balance models and monetary approach. These three theories are used to understand what economic and monetary factors increase or decrease the premium between the official market rate, and the parallel market.

2.2.1 Real trade model

Real trade models are one of the earliest models that have been used to analyse the parallel market for foreign exchange. Real trade models are partial equilibrium models that do not consider the interactions of the parallel market with the wider economy, a key flaw of the framework. Instead, real trade models mainly attribute the emergence of parallel exchange market to government inventions on trade, and policies that restrict exchange rate movement to preserve foreign exchange reserves (Ebaidalla 2019).

The supply and demand for foreign currency from the parallel market differs on a country basis depending on type of exchange restrictions a government has put in place (Agenor 1992).Generally, in real trade models the supply of foreign exchange in parallel markets mainly come from illegal sources of supply such as smuggling of exports, under-invoicing of exports, over-invoicing of imports, and diversion of foreign exchange from official channels to the parallel market (Agenor 1992; Kiguel & O'Connell, 1995). These actions are undertaken due to the scarcity of foreign exchange, as well as to evade taxes, and controls or costs associated with official channels (Ogun, 2015).

Real trade models have been widely used to examine the dynamics of the parallel foreign exchange market. These partial equilibrium models focus on the supply and demand for foreign currency in the parallel market without considering the broader economic implications. A significant shortcoming of the real trade model is its neglect of the interactions between the parallel market and the wider economy (Ebaidalla, 2019). The emergence of parallel exchange markets is often attributed to government interventions, such as trade restrictions and policies aimed at maintaining foreign exchange reserves (Agenor, 1992). The supply of foreign currency in these parallel markets generally stems from illicit sources, including export smuggling, under-invoicing of exports, over-invoicing of imports, and the diversion of funds from official channels (Agenor, 1992; Kiguel & O'Connell, 1995). As foreign exchange becomes scarce, individuals and entities often resort to illegal methods, avoiding taxes and regulations associated with official transactions (Ogun, 2015).

In the context of Zimbabwe, the distortions in the foreign exchange market have been exacerbated by stringent trade policies and heavy governmental restrictions, pushing the demand for foreign currency into informal channels. The restricted access to foreign exchange from official sources has led to an increase in parallel market activities, such as smuggling and over-invoicing, thus deepening the country's foreign exchange crisis. In Zimbabwe's case, the policies restricting exchange rate movement and trade have amplified the gap between the official and parallel market rates, as analyzed by Ebaidalla (2019). The demand for foreign currency in these markets also arises from current account transactions, currency substitution, and capital flight (Agenor, 1992). Notably, the supply from illegal activities incurs higher costs, as actors engage in bribery or face other risks to evade official scrutiny, thus leading to high parallel market rate premiums. The real trade model provides a useful framework for

understanding these long-term determinants but fails to address the short-term fluctuations in the parallel market rates.

2.2.2 Portfolio Balance Model

The portfolio balance model suggests that foreign exchange markets can be influenced by changes in the demand for foreign assets, where investors allocate their portfolios across different asset types, including domestic and foreign currencies. This model assumes that individuals seek to maximize their wealth and minimize risk by diversifying their asset holdings in both domestic and international markets. The theory asserts that the supply and demand for foreign exchange depend on the preferences of economic agents, who balance their portfolios by shifting between currencies based on returns, risks, and other economic factors (Hester, 2018). In the case of Zimbabwe, the portfolio balance model can explain the shifts in currency demand due to the high inflation rate, the depreciation of the local currency, and capital flight as investors attempt to hedge against economic instability. Albertazzi et al. (2018) discuss how large-scale asset programs, such as quantitative easing, can also influence the foreign exchange market by altering the supply of assets and changing the relative appeal of domestic versus foreign currencies. In Zimbabwe's context, such mechanisms have often been overshadowed by the overwhelming effects of government policies that restrict exchange rate flexibility, which distorts portfolio decisions and further drives the demand for foreign currency in informal markets.

The Zimbabwean case demonstrates the significant role that policy-induced distortions play in influencing the portfolio choices of foreign investors and the local population. The country's foreign exchange restrictions, along with the depreciation of the Zimbabwean dollar, have led to a shift in portfolio allocations, driving demand for more stable foreign currencies. Shah et al. (2019) suggest that portfolio rebalancing due to these distortions may result in changes in the demand for foreign exchange as agents attempt to preserve wealth through alternative channels. In Zimbabwe, currency substitution is prevalent, with the population shifting to the US dollar or other stable currencies as a means of protecting their assets. Thus, the portfolio balance model helps in understanding how external and internal factors, including government policies, can affect foreign exchange markets and influence the behavior of economic agents in situations of heightened uncertainty.

2.2.3 Monetary Approach

The monetary approach to exchange rate determination posits that the exchange rate is influenced by the relative supply of money between countries and their corresponding inflation rates. This approach focuses on the long-term relationship between money supply, domestic inflation, and exchange rates, asserting that currency values are primarily driven by changes in a country's monetary base (Frenkel, 2019). According to the monetary model, an increase in the domestic money supply relative to foreign currencies leads to depreciation of the domestic currency, while a rise in foreign money supply causes an appreciation of the domestic currency (Kouri, 2019). In Zimbabwe, the excessive printing of money by the government to finance budget deficits and the resultant hyperinflation directly impacted the value of the Zimbabwean dollar, leading to significant devaluation and the emergence of parallel exchange markets. The monetarist view underscores the importance of monetary discipline, as seen in Zimbabwe's struggle to stabilize its currency and avoid further inflationary pressures.

In examining Zimbabwe's exchange rate distortions, the monetary approach highlights the pivotal role of government monetary policies in driving foreign exchange volatility. The expansion of the money supply without corresponding economic growth led to a sharp depreciation of the Zimbabwean dollar, prompting demand for foreign exchange in both formal and informal markets. As emphasized by Mushendami et al. (2017), this monetary approach is relevant for analyzing the persistence of exchange rate misalignments in Zimbabwe, where inflationary pressures have created a significant gap between official and parallel exchange rates. The central bank's inability to curb money supply growth during periods of economic instability exacerbated the foreign exchange crisis, creating a volatile environment that drives citizens and businesses to seek foreign currency through parallel market channels. In this light, the monetary approach offers a critical lens for understanding Zimbabwe’s exchange rate dynamics and the factors contributing to its parallel market distortions.

2.3 Empirical literature review

2.3.1 Overview

The issue of the parallel market in Zimbabwe has been a persistent and critical challenge for the country’s economy, which has been characterized by high inflation, currency depreciation, and foreign exchange shortages. This situation has been exacerbated by a history of economic instability, political uncertainty, and structural deficiencies in economic policies. This phenomenon has far-reaching consequences for Zimbabwe’s macroeconomic performance, as it distorts price levels, undermines the stability of the currency, and inhibits economic growth

(Mlambo & Mupfumi, 2017). While the government has made several attempts to address this issue, the premium persists, largely due to the country's fiscal mismanagement, monetary policies, and a lack of investor confidence. This paper explores the causes and consequences of the parallel market rate premium in Zimbabwe, focusing on the role of fiscal deficits, inflation, political instability, and the broader economic environment. The analysis seeks to demonstrate how the continued existence of the parallel market undermines the country's efforts to stabilize its economy.

Zimbabwe's exchange rate policy has undergone significant transformations in response to ongoing economic challenges. In the 1980s and 1990s, the government implemented a dual exchange rate system, where an official exchange rate and a parallel rate existed simultaneously. However, this system became unsustainable as the country faced mounting fiscal deficits and high inflation (Chagonda, 2016). By the 2000s, hyperinflation forced the government to abandon the Zimbabwe dollar and adopt a multi-currency system, which further deepened the reliance on foreign currency in the economy (Mlambo, 2018). The gap between the official exchange rate and the parallel market rate widened during this period, and the Zimbabwean government's inability to address the underlying causes of the gap led to an increased dependence on informal currency markets. While the country's adoption of the US dollar in 2009 helped stabilize the economy in the short term, the return to the Zimbabwean dollar in 2019 has reignited the parallel market crisis (Ncube & Ndlela, 2021).

In addition to the instability of the official exchange rate, the parallel market rate premium in Zimbabwe is influenced by several key factors. A prominent determinant is the fiscal deficit, as Zimbabwe has consistently faced budgetary shortfalls. The government's attempts to finance deficits by printing money and increasing domestic debt have contributed to inflation and currency devaluation (Chirisa, 2017). Inflation, in turn, has further distorted the exchange rate, as businesses and consumers look for alternative sources of foreign currency through the parallel market. The supply of foreign exchange has also been limited by factors such as a shrinking export sector and reduced direct foreign investment, which have exacerbated foreign currency shortages (Mlambo & Mupfumi, 2017). Political instability, including controversial land reform policies and weak governance structures, has eroded confidence in the Zimbabwean economy, leading to a further reliance on informal markets for foreign exchange (Mlambo, 2018).

The parallel market has also become a significant channel of foreign exchange for many Zimbabweans, particularly those living in the diaspora who send remittances to their families. However, these remittances are often transferred through informal channels due to the restrictions on official remittance services. This has contributed to the liquidity crisis in the formal economy and perpetuated the parallel market rate premium (Nyoni, 2021). Despite various government interventions to curb the parallel market, such as the re-introduction of the Zimbabwean dolla and currency controls, these measures have been largely unsuccessful in stabilizing the currency. This situation reflects broader structural weaknesses in the Zimbabwean economy, including a lack of effective monetary policy and persistent macroeconomic imbalances (Ncube & Ndlela, 2021).

2.3.2 Determinants of the parallel market rate premium

Several key factors that contribute to the persistence of the parallel market rate premium in Zimbabwe. One of the primary determinants is the persistent fiscal deficit, which is often financed by money creation, leading to inflationary pressures (Mlambo & Mupfumi, 2017). Zimbabwe's government has historically struggled with balancing its budget, and this has led to a loss of confidence in the local currency. As inflation rises and the value of the Zimbabwean dollar decreases, the demand for foreign currency increases, leading to a widening of the gap between the official exchange rate and the parallel market rate. The country's fiscal mismanagement is a major contributor to the devaluation of the Zimbabwe dollar, which directly affects the parallel market rate premium.

Inflation, which has remained high in Zimbabwe for several decades, is another significant factor influencing the parallel market rate premium. During periods of hyperinflation, such as the late 2000s, the government printed money to meet its budgetary needs, resulting in extreme devaluation of the currency (Chirisa, 2017). While inflation has slowed since the country adopted the US dollar in 2009, it has remained volatile following the return of the Zimbabwe dollar in 2019. High inflation creates uncertainty in the economy, leading to a loss of confidence in the local currency and an increased demand for foreign currency, thereby fueling the parallel market. As businesses and consumers seek more stable currencies like the US dollar, the demand for foreign exchange drives up the parallel market rate premium.

The country's foreign currency shortages also contribute to the growth of the parallel market. Zimbabwe's export sector, once a significant source of foreign exchange, has dwindled due to economic mismanagement and political instability (Mlambo & Mupfumi, 2017). With reduced

foreign currency inflows, the government has been unable to meet the demand for foreign exchange in the formal market. This scarcity has created a thriving parallel market, where individuals and businesses turn to informal channels to obtain the foreign currency, they need for transactions. The Reserve Bank of Zimbabwe has attempted to address these shortages by introducing measures such as bond notes and foreign exchange auctions, but these initiatives have largely failed to bridge the gap between the official and parallel exchange rates (Ncube & Ndlela, 2021).

Political instability has played a crucial role in shaping the parallel market rate premium in Zimbabwe. The country has faced frequent changes in leadership, corruption scandals, and a lack of institutional reforms, all of which have contributed to economic uncertainty (Mlambo, 2018). As political risks remain high, businesses and individuals seek to protect themselves from instability by turning to the parallel market to secure foreign currency. Political instability erodes trust in the local currency, creating a demand for more stable foreign currencies and exacerbating the parallel market rate premium. Furthermore, the introduction of controversial policies such as the land reform program in the early 2000s disrupted the agricultural sector and further weakened the economy, contributing to the decline in the value of the Zimbabwean dollar (Chagonda, 2016).

Specific studies on the determinants of the parallel market premium were popular in the 1980s and 1990s when many countries were undergoing trade liberalization. Although, recent studies on the parallel market premium determinants are fairly scant now, it remains a key issue in developing countries.

Ebaidalla (2019) studied the determinants of the parallel exchange rate premium and its macroeconomic impact in Sudan. The author used a model based on the portfolio balance approach on annual data for the period 1979 to 2014. The ARDL co-integration technique was used to estimate the long run and short run relationship between the parallel market premium and its determinants. The determinants used by the author are real exchange rate, trade openness, money supply, GDP growth, expected rate of devaluation, budget deficit. And foreign aid. The results of the study show that all variables except aid had a significant impact on the parallel market premium in Sudan in the long run and short run. Real exchange rate, GDP growth, trade openness and international reserves all had a negative impact. While money supply, budget deficit, terms of trade and expected rate of devaluation had a positive impact. An interesting finding was that the unification that took place from 1992 to 1993 only had a

short run impact on the parallel market premium. This suggest that unifications in isolation is ineffective, policymakers need to address macroeconomic stability, fiscal discipline, and export performance.

Fardamanesh & Douglas (2003) uses the reduced form method on monthly data to establish the determinants of the black market premium. The study found that exchange rate controls, expansionary fiscal and monetary policy, and changes in government have a positive effect on the black market premium. Furthermore, the lagged value of the premium, and exchange controls had the largest effect on the parallel market. Empirical studies support the notion that monetary and fiscal policy have a key role to play in determining the parallel market premium. Fardmanesh and Douglas (2008) found that large adjustments to the official exchange rate contributed to the increase in the parallel market premium, particularly if the official rate is protected. The results of this study suggest that expansionary fiscal and monetary policy, excessive exchange rate controls, and expansionary fiscal and monetary policy all contribute to an increase in the parallel market premium when the official rate is protected (Farmanesh & Douglas, 2008). An important finding from this study is that active policy, where the official rate is adjusted frequently and gradually, was more useful in preventing distortions in the foreign exchange market than passive policy that made large adjustments to the official rate (Fardmanesh & Douglas, 2008).

Kubo (2007) did not do a study on the parallel market, but on the determinants of the parallel market rate in Myanmar. However, this study had some interesting results that may be applied in the to studies on the parallel market premium. The author used monthly data from January 1996 to August 2016 to study the relationship between the parallel market rate, and the determinants: money supply, inflation, foreign reserves, and index of aggregated deposits. The main focus of the study was on the relationship among parallel market rate, inflation, and inflation to test the monetary approach hypothesis that chronic currency depreciation is mainly due to monetary factors. The author found that parallel market rate and inflation has a long run relationship, whilst aggregate deposits affected the parallel market rate in the short run. Foreign reserves have a negligible effect on the parallel market rate due to the fact that the private sector was shut off from international reserves.

Diamandis, Kouretas and Zarangas (2005) focused their study on expectation and the black market premium in Greece. The authors used monthly data on the two-step procedure to study the impact of anticipated and unanticipated shocks to the official exchange rate on the parallel

market premium. In line with the portfolio balance models, the study found that the expectations of devaluation was an important determinant of the parallel market. Makochekanwa (2007) also found expected devaluation to be a short run determinant of the parallel market period. Additionally, using the stock flow model adapted from Kiguel and O'Connell (1994) the author found that the determinants of the black market for foreign exchange are international reserves, inflation, money supply, and the lagged variable of the parallel rate premium for the period 1980-2007. The also found that inflation and the parallel market premium granger cause each other.

2.3.3 The impact of the parallel market rate premium on macroeconomic performance

The parallel market rate premium has significant implications for Zimbabwe's macroeconomic performance. One of the most immediate consequences is its effect on inflation. The premium drives up the cost of imported goods, which are essential for both businesses and consumers. As the cost of imports rises due to the higher parallel exchange rate, inflation accelerates, diminishing the purchasing power of the local currency (Mlambo & Mupfumi, 2017). This inflationary pressure creates a cycle in which businesses continually raise prices to keep up with the rising cost of inputs, further eroding the purchasing power of ordinary Zimbabweans. The result is a persistent rise in the cost of living, making it difficult for many people to afford basic goods and services.

The parallel market rate premium also undermines Zimbabwe's export sector. As the cost of importing raw materials and machinery increases, the cost of production for Zimbabwean businesses rises, making their products less competitive in international markets. This reduces export earnings, which in turn exacerbates the foreign exchange shortage and further increases the parallel market rate premium. The resulting decline in exports limits the country's ability to generate foreign currency, which is crucial for stabilizing the economy and meeting the demand for imports. As a result, Zimbabwe faces a growing trade deficit, which further contributes to economic instability (Chirisa, 2017).

Another significant impact of the parallel market rate premium is its effect on government revenues. As the parallel market continues to grow, much of the economic activity shifts to the informal sector. Businesses operating in the informal economy are not subject to the same taxes and regulations as those in the formal sector, leading to a reduction in tax revenues for the

government. This creates a vicious cycle in which the government is unable to fund public services and infrastructure, further exacerbating the fiscal deficit and increasing the reliance on the parallel market (Ncube & Ndlela, 2021). The informalization of the economy reduces the government's ability to implement effective economic policies, further hindering efforts to stabilize the economy.

Furthermore, the continued reliance on the parallel market has led to the dollarization of Zimbabwe's economy. As citizens lose faith in the Zimbabwean dollar, they increasingly turn to foreign currencies, particularly the US dollar, for transactions, savings, and investment. This informal dollarization further weakens the Zimbabwean dollar and limits the government's ability to control inflation and stabilize the currency. While dollarization provides a temporary hedge against inflation, it undermines the country's ability to maintain an independent monetary policy, as the government loses control over the money supply and interest rates (Mlambo, 2018). This leaves Zimbabwe vulnerable to external shocks, such as fluctuations in global commodity prices, which can further destabilize the economy.

2.3.4 Government response and policy interventions

The Zimbabwean government has made several attempts to address the parallel market rate premium through various policy interventions. One such intervention was the introduction of bond notes in 2016, which were meant to serve as a quasi-currency to ease foreign currency shortages. However, these bond notes were met with skepticism and were quickly devalued in the parallel market, leading to a further widening of the premium. Similarly, the government has implemented foreign exchange auctions and currency reforms in an attempt to stabilize the official exchange rate. While these measures have had some limited success, they have been unable to resolve the underlying issues of fiscal mismanagement, inflation, and foreign currency shortages (Chagonda, 2016).

The Reserve Bank of Zimbabwe has also attempted to curb the growth of the parallel market by implementing measures such as limiting the amount of foreign currency available for certain types of transactions. However, these restrictions have only made it more difficult for businesses and consumers to access foreign currency, further driving demand in the parallel market (Ncube & Ndlela, 2021). The government's approach to controlling the parallel market has largely been reactive, rather than proactive, and has focused on short-term solutions rather than addressing the root causes of the problem. Without significant reforms to fiscal policy,

monetary policy, and the broader political environment, the parallel market rate premium is likely to persist.

Political instability has also complicated efforts to stabilize the exchange rate. The lack of a clear and consistent economic policy has made it difficult for the government to build trust with both domestic and international investors. The failure to implement effective economic reforms has led to continued reliance on the parallel market, as businesses and individuals seek more stable foreign currencies. While there have been some attempts to attract foreign investment through reforms such as the Zimbabwe Investment Authority, these efforts have been hampered by the ongoing political and economic uncertainty (Mlambo, 2018).

2.4 Contribution and gaps

The review of the literature reveals gaps in the existing research on the determinants of the parallel market rate premium, particularly in the context of Zimbabwe. While the parallel market rate premium has been widely recognized as a key economic issue in Zimbabwe, there are limited studies that delve deeply into its specific determinants and impacts. To the best of my knowledge, only one other study, conducted by Makochekanwa (2007), has examined this issue in the Zimbabwean context. However, this study predates the current macroeconomic environment in Zimbabwe, where the parallel market has become more fundamental to the overall functioning of the economy. Over the years, the situation has evolved, with the parallel market becoming a significant source of foreign exchange due to the continued shortage of foreign currency in the formal market. This evolution calls for a more contemporary analysis of the factors influencing the parallel market rate premium in Zimbabwe, considering the drastic shifts in monetary policies, inflation rates, and political instability that have occurred since the earlier study.

CHAPTER 3
Methodology

3.1 Introduction

This chapter presents the research methodology, procedural steps, and econometric techniques employed in the study. It begins with a discussion of the dataset, followed by the introduction of a theoretical model that explores the relationship between movements in the parallel market exchange rate premium (EX) and the consumer price index (CPI), framed within a suitable theoretical context. The chapter then outlines the econometric tests conducted to validate the data and assess the reliability of the model. It concludes with an explanation of the estimation procedures applied

3.2. Study Design

This study employs monthly time series data spanning the period from January 2019 to December 2023, which is a total of 60 observations per variable. The selected timeframe corresponds to a pivotal phase in Zimbabwe's monetary evolution. Following the abandonment of the Zimbabwean dollar in 2009 due to hyperinflation, the country adopted a multicurrency regime dominated by the United States dollar. During this period, there was little to no black market activity in Zimbabwe. Although iterations of the Zimbabwean dollar were reintroduced in 2014 and 2016 to alleviate challenges with a shortage of small notes, 2019 marked the real reintroduction of the Zimbabwean dollar. In 2019 the Zimbabwean dollar was reintroduced in the form of the Real Time Gross Settlement (RTGS) dollar sparking a re-emergence of the parallel (black) market for foreign exchange, which had largely dissipated during the dollarisation era. The study period is thus strategically selected to capture the economic dynamics following the reintroduction of the local currency and the resurgence of exchange rate distortions. The scope is also informed by the availability and consistency of relevant data.

The empirical investigation aims to examine both long-run and short-run relationships among key macroeconomic variables—namely, the parallel market exchange rate premium, money supply, the consumer price index (CPI), and expected currency devaluation—within the context of Zimbabwe's post-dollarisation monetary framework.

3.3. Data Collection Framework

The data that is used in this study only comprises of secondary data. Data pertaining to expected devaluation was obtained from the International Financial Statistics (IFS). CPI figures were likewise sourced from the IFS. However, data on money supply, as well as parallel and official exchange rates for the US dollar, were collected from the Reserve Bank of Zimbabwe (RBZ).

3.4 Theoretical model

This research is grounded in the monetarist approach to exchange rate determination as articulated by classical economists. To analyse the contribution of the CPI in determining the parallel market rate premium, the research assumes a linear relationship between the parallel market rate premium and the CPI in the Zimbabwean context. The parallel market rate premium is considered to be linearly dependent on key macroeconomic variables: money supply (MS), expected rate of devaluation (DV), and the CPI.

Equations

Domestic Country

$$p = m - \alpha\gamma + \beta i \quad \text{(i)}$$

Foreign Country

$$p* = m* - \alpha\gamma* + \beta i* \quad \text{(ii)}$$

The monetary approach indicates that the exchange rate is determined not only by monetary variables but also by supply-side factors, including the CPI. Introducing the CPI into the model leads to the following equation:

$$\partial e/e = \partial A/A + \alpha p* + \alpha 1 + \partial p/p \quad \text{(iii)}$$

This equation illustrates how changes in the parallel market rate premium relate to fluctuations in both external and internal monetary variables as a result of changes in the CPI.

3.5 Empirical Model

Building on the theoretical foundations outlined in Section 3.2, the empirical model is based on the framework established by Pilbeam (2013), which analyzes exchange rate determination in relation to macroeconomic fundamentals such as inflation, expectations, and monetary

variables. This model underscores the significance of the Consumer Price Index (CPI) in determining the ZWL/USD parallel market rate premium.

Thus, the parallel market rate premium (EX) can be expressed as a function of the CPI, expected devaluation (DV), and money supply (MS):

$$EX = f(CPI, MS, DV) \quad \text{(iv)}$$

To ensure consistency with the theoretical model, the left side of equations (v) and (vi) represents the exchange rate, and the right side must include both domestic and foreign variables. Therefore, the empirical model specification is specified as follows:

$$PE = \beta 0 + \beta 1(CPI/CPI*) + \beta 2(MS/MS*) + \beta 3DV + \mu \quad \text{(v)}$$

In this formulation, CPI* and MS* represent the CPI and money supply in the foreign country, respectively, ensuring that the model captures relative prices and money supplies, which is consistent with the purchasing power parity principle.

Where:

$lnEX$ = the log of parallel market rate premium

$lnCPI$= log of consumer price index

$lnMS$= log of Money Supply

$lnDV$= log of expected devaluation

β_0 Representing the intercept.

β_1Up to $\beta_3$represents the slope coefficients;

μ is the stochastic term or the error term or residuals

3.6 Testing for Stationarity

Using time series data analysis in a study requires treating certain properties of time series data such as stationarity. Stationarity in time series refers to statistical properties of a process generating a time series data that do not change over time. Stationarity test is important in

determining the methodology to be used, if the variables are integrated of the same order, theoretically according to Muril (2016), the Johansen cointegration test is the most appropriate. Nevertheless, given different order of stationarity, the ARDL model is the most appropriate. Stationarity test is crucial because the Autoregressive Distributed Lag (ARDL) approach requires that none of the variables should be integrated of order two I (2) to avoid misleading results and spurious regressions with no economic meaning (Pesaran, Shin, & Smith, 2001). Even though the methodology (ARDL) does not bother having both I (1) and I(0) stationary in 1(0) or I(1) unit root tests are necessary to avoid including variables which are stationary after second difference. In this regard it important to ensure that all the variables are either I(0) or 1(1) for effective implementation of our approach and avoid variables which are stationary in 1(2) which may provide the problem of spurious regression, which leads to unreliable results. According to Kinde, (2012), using I(2) variables in ARDL approach is likely to inflate the results and result in a low Durbin Watson (DW) statistic.), Signifying the presence of negative autocorrelation which violate the OLS assumptions.

For unit root test this study used the Phillips Peron Test and confirming with Augmented Dickey-Fuller (ADF) Test to test for stationarity. A variable is regarded as stationary if the p-value of the ADF and Philips Peron test is less than 5% (0.05). If data is nonstationary then we cannot conduct multiple regression analysis, therefore there is need to adjust either on test equation, the test type or level of significance so that the ADF will be greater than critical values (or probability value to be less than 5%). The equation for the ADF test is given as follows:

$$\Delta yt = \beta_0 + \beta_{1+}\beta_0\, \lambda yt - 1 + \sum pj - 1\delta j \Delta yt - j + \mu_t \qquad \text{(vi)}$$

Where;

$yt - 1$ Is the lagged value of yt at first difference

$\Delta yt - j$ is a change in lagged value

δ Is a measure of lag length

Δyt Is the first difference operator

μt Is the error term

After stationarity test, the next step is to confirm the existence of a long-run relationship among parallel market rate premium, consumer price index, money supply and expected devaluation.

3.7 Estimation technique and procedure

The study used secondary data for empirical testing, and ARDL syntax was coded using STATA version 15.0 in which empirical analysis was carried out. The study focuses on ZWL/USD parallel market rate premium the focus on parallel market rate premium is mainly because Zimbabwe has faced several problems in maintaining a desirable exchange rate over the past decades. Monthly time series data from 2019 to 2023 was confronted to analyse the determinants and establishing the relationship between parallel market rate premium and consumer price index. The data on parallel market rate premium was obtained from the reserve bank of Zimbabwe. The data on consumer price index was obtained from the International financial statistics.

The Autoregressive Distributive Lag (ARDL) method also known as the bounds testing approach proposed by Pesaran-Shin-Smith (2001) is used to determine the relationship and impact of the selected explanatory variables to the explained variable premium exchange rate.

3.8 Justification and limitation of ARDL Bound Test Method

The ARDL approach was chosen for this study due to its numerous advantages, which facilitate efficient outcomes and reliable estimates at the conclusion of the research. First, the sample size is small, making it challenging to draw definitive conclusions regarding the research questions. As noted by Shahbaz (2013), the Johansen cointegration tests are subject to small sample bias and simultaneity bias among the regressors. In contrast, the ARDL approach is not limited by these issues, offering robust results that are particularly reliable for small samples compared to the Johansen cointegration test. Additionally, running an ARDL model does not require all variables to be integrated of the same order (Pesaran et al. 2001). Its bounds testing technique also yields unbiased estimates of the long-run model, even when the variables are regarded as endogenous.

The bounds test approach was selected because some of the variables exhibit an endogeneity issue. This estimation procedure addresses not only the endogeneity of the variables but also their interactions, provided there is no serial correlation among the model variables. The ARDL method is performed in two stages. First, it tests for the existence of a long-run relationship among the variables by constructing an unrestricted error correction model (ECM), using each variable as the dependent variable in turn. This involves testing whether the lagged levels of the variables in each error correction equation are statistically significant, thereby assessing whether the null hypothesis of no long-run relationship can be rejected. The model computes an F-statistic to evaluate the joint significance of the lagged levels of the variables in each specified error-correction form of the estimation.

In reference to the information above, the calculated F-statistic is compared to two asymptotic critical values. If the test statistic exceeds the upper critical value, the null hypothesis of no long-run relationship can be rejected, regardless of whether the variables are I(0) or I(1). Conversely, if the test statistic falls below the lower critical value, the null hypothesis is not rejected, irrespective of the variable types. If the test statistic lies between the lower and upper bounds, the results are considered inconclusive, which may necessitate conducting unit root tests on the variables.

Regarding the implications of the F-statistics, if all F-statistics across the equations are insignificant, it indicates that the null hypothesis of no long-run relationship among the variables cannot be rejected. However, if at least one F-statistic in the error-correction estimation is significant, the null hypothesis can be rejected, suggesting a long-run relationship among the variables. When the calculated F-statistic is significant, the corresponding dependent variable is considered endogenous; when it is insignificant, the dependent variable is exogenous, often referred to as a "long-run forcing variable."

Once the long-run relationship is established, the second stage of the analysis involves estimating the long-run coefficients after selecting the optimal lag length for the variables using the AIC or SBC criteria. This is followed by estimating the associated error correction model to determine the adjustment coefficients of the error-correction term. Given that the data are annual time series, the researcher opted for a maximum lag order of one in the ARDL model. Due to the numerous advantages the ARDL approach provides for data analysis, this method has been selected. By applying the ARDL technique in this study, confidence is gained in obtaining unbiased estimates of the long-run model.

3.9 ARDL Model specification.

The functional relationship between, consumer price index $lnCPI$,Money supply $lnMS$, Expected devaluation $lnDV$, and parallel market rate premium being the dependent variable is illustrated below.

$$\Delta lnEX = \beta_0 + \beta_1 lnEX_{t-1} + \beta_2 lnCPIt - 1 + \beta_3 lnMS_{t-1} + \beta_4 lnDV_{t-1} + \sum_{i=0}^{n} \beta_7 \Delta lnEX_{t-1} + \sum_{i=0}^{n} \beta_8 \Delta lnCPI_{t-1} + \sum_{i=0}^{n} \beta_9 \Delta lnMS_{t-1} + \sum_{i=0}^{n} \beta_{10} \Delta lnDV_{t-1} + \mu_t \quad \text{(vii)}$$

ARDL bound testing approach to cointegration allows us to model both I (0) and I(1) variables together. The ARDL approach to cointegration involves estimating the unrestricted error correction model version of the ARDL model for the log of parallel market rate premium and its determinants and the error correction version specified as follows:

$$dlnEX_{t-1} = \beta_0 + \sum_{i=0}^{n} \beta_1 dlnEX_{t-1} + \sum_{i=0}^{n} \beta_2 dlnCPI_{t-1} + \sum_{i=0}^{n} \beta_3 dlnMS_{t-1} + \sum_{i=0}^{n} \beta_4 dlnDV_{t-1} + \beta_7 ECT_{t-1} \quad \text{(viii)}$$

Where, $dlnEX, dlnCPI, dlnMS, dlnDV$ are variables at first difference and ECT_{t-1} is lagged error correction term. The hypothesis that is being tested testing is the 'non-existence of the long-run relationship' as defined by;

$$H_0: \ \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6$$

Against: the existence of long run relationship

$$H_1: \ \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6$$

As discussed earlier, the following variables will be used for the lead-lag analysis. To achieve stationarity in variance, all variables have been transformed into logarithmic form. The next

step is to assess the stationarity of these variables, which is essential before proceeding with cointegration testing. The differenced form of each variable will be created by calculating the difference between their logarithmic representations. Following this, the Augmented Dickey-Fuller (ADF) and Phillips-Perron tests will be conducted on each variable, examining both their level and differenced forms.

3.10 Definition and Justification of Variables

Premium Exchange rate

This is the dependent variable of the study. It is defined as the difference between the parallel market rate and the official market rate expressed as a percentage of the official exchange rate. This study focuses on the exchange rate between the United States Dollar and Zimbabwean Dollar (USD/ZWL). Official and parallel market rates were obtained from the Reserve Bank of Zimbabwe

Inflation rate – measured by the consumer price index.

It measures the change in price of a basket of goods and services over a period of time. Inflation rate is expected to have a positive relationship with the parallel market rate premium. As inflation increases it erodes purchasing power of the official exchange rate and causes the official exchange rate to depreciate. The demand for foreign currency therefore increases which causes the parallel market rate premium rate to increase as more economic agents turn to the parallel market for foreign currency.

Money supply – measured by M2.

Money supply is expected to have a positive relationship with the parallel market rate premium. Increased money supply during periods of expansionary monetary policy increases inflationary pressure in the economy which in turn erodes the value of the local currency. Economic agents are incentivised to hold private assets in foreign currency to hedge against inflation. When foreign currency is not readily available through official channels due to limited foreign currency and insulation of foreign currency reserves, activity on the parallel market increases which ultimately causes the parallel market rate premium to rise.

Expected rate of devaluation

Calculated as $\left(\frac{1+\pi_a}{1+\pi_b} - 1\right) \times 100$ where $\pi_a$domestic inflation rate (Zimbabwe) is and π_b is foreign inflation rate (United States of America). This measures purchasing power parity which assumes that higher inflation in a country relative to another will result in currency depreciation. This variable is often used in place of interest parity differential since dynamics in the parallel market suggest economic agents are not influenced by domestic and international interest rates due to the atomicity of transactions in the parallel market (Nkurunziza, 2002). It is expected to have a positive relationship with parallel market rate premium as an increase in devaluations (or decrease in the purchasing power of the Zimbabwean dollar) increases diversion of foreign currency to the parallel market and increases the parallel market rate premium.

3.11 Descriptive statistics

Descriptive statistics displays a summary statistics for the raw data. It contains basic statistics by classification. The most used descriptive statistics used in our study are the mean which shows the average value of the series, obtained by adding up the series and dividing by the number of observations, the standard deviation which shows a quantity how much the data points differ from the mean value for our data samples. The research also found it fit to reflect also reflect the maximum and minimum values of the series in the current sample and the years in which they were recorded.

3.12 Diagnostic tests

3.12.1 Heteroscedasticity test

The study tested for heteroscedasticity using the Godfrey Breusch-Pagan. Specifically, heteroscedasticity is a systematic change in the spread of the residuals over the range of measured values. This might be caused by the existence of outliers. Rigobon, (2013), heteroscedasticity is a problem because ordinary least squares (OLS) regression assumes that all residuals are drawn from a population that has a constant variance (homoscedasticity). It is estimated under the null hypothesis that there is no heteroscedasticity. The probability values of the Chi-square should be greater than 5% in order to rule out the issue of heteroscedasticity

3.12.2 Autocorrelation

Autocorrelation can be defined as serial correlation which exists between members of series observations ordered over a time period. According to Asteriou et al (2015) it can also be

defined as a characteristic of data which shows the degree of similarity between the values of the same variables over successive time intervals. Nevertheless, the Classical Linear Regression Model assumes that scenario of autocorrelation do not exist in disturbances. In this study, autocorrelation is tested using the Breusch-Godfrey serial Correlation LM test. This test compares the Prob. Chi-Square (2) computed from the test and compare it with 0.05. If the probability exceeds the 0.05 there is no autocorrelation. If the probability of chi-square given is less than 0.05 there is autocorrelation. The researcher also confirmed the results using the Durbin Watson test. According to Watson (2023) as a rule of thumb the D-Watson statistic must be on or around 2, with a t-statistic above 2.5 signifying negative autocorrelation and test statistics of less than 1.5 signifying positive autocorrelation.

3.12.3 Multicollinearity

The model passed through multicollinearity test. Severe multicollinearity is a problem because it can increase the variance of coefficient estimates and make them very sensitive to minor model changes. The result is that the coefficient estimates are unstable and difficult to interpret. Multicollinearity undermines the statistical power of analysis, can cause coefficients to change sign and make it more difficult to specify the correct model. The study used variance inflation factor (VIF) to test for multicollinearity. Variance inflation factor (VIF) measures the correlation among independent variables and quantifies how much variance is inflated in our model. It provides an index that measures how much the variance (the square of the estimate's standard deviation) of an estimated regression coefficient is increased because of collinearity. According to Gujarati (2007), a rule of thumb for interpreting, a variance inflation factor of 1 shows that variables are not correlated, between 1 and 5 moderately correlated and if VIF is greater than 5, then we can conclude that variables are highly correlated and a VIF above 10 needs attention.

3.12.4 Normality test

The Classical Linear Regression Model (CLRM) assumes that each stochastic or the error term is normally distributed with a mean variance $Ŏ^2$ of zero. It can be compactly stated as that the error term u_t follows a normal distribution with parameters μ and $Ŏ^2$. There are various normality tests that can be employed, and these include the histogram of residuals, normal probability plot, a graphical device and the Jarque-Bera test. The model uses the Jaquebera (Jb6) test to test for the normality of the residuals. This is done by commanding Stata to generate the ARDL residuals. The null hypothesis for Jb6 is that the residuals are normally

distributed. The decision criteria is to reject the null hypothesis if the chi2 for the Jb test is less than 0.05.

3.12.5 Stability test

The study used the cumulative sum test for the parameter stability test to test for the model's stability and the presence of a structural break. The null hypothesis for the test is that there are no structural breaks. In this case the rejection criterion of the null hypothesis is based on the graph. The line shows the cumulative sum. Therefore, we reject the null hypothesis if the West graph is seldom in the shaded area.

3.12.6 Model specification tests

The p-values are used in testing the significance of variable coefficients in which it shows that when a rho value is less than or equal to the significance level, we reject the null hypothesis thus 0.05 while the F-statistic was used in checking for the whole model validity. The R-squared (R^2) was used in establishing the goodness of fit of the model, while the adjusted R^2 was used in checking the reliability of the model.

3.13 Chapter summary

The chapter describes the type of data used, model and methodology to be employed. It also looks at the tests to be carried out in answering research questions. Chapter 4 discusses the research findings and interpretation of results from the estimation models with reference to the literature review.

CHAPTER FOUR
DATA ANALYSIS AND PRESENTATION

4.1 Introduction

Having provided the empirical background on the research problem and the methodology used in this study, this chapter presents research findings and results. This chapter focus on data analysis, the presentation and manifestation of the models and analysis methods discussed in the preceding chapter. Firstly, the descriptive statistics of data samples are provided. Unit root test for stationarity is performed before the optimal lag length selection using the Akaike information criteria (AIC). After that, the chapter presents ARDL bound test to cointegration results and coefficients of variables, post-estimation tests to check reliability of the model and interpretation of the ARDL model before rounding up the discussion by showing results of the model reliability tests.

4.2 Descriptive statistics analysis

This section focuses on the features of variables in the model through by the use of a descriptive statistical summary table compiled using data in its original form. The variables are the ZWL/USD parallel market rate premium(EX), consumer price index (CPI),, Money suply(MS), and expected devaluation (DV)

4.3 Summary statistics

Table 1: Descriptive statistics

Variables	EX	CPI	MS	DV
Observations	60	60	60	60
Mean	52.72386	8072.537	2.50e+09	110.3609
Std. Dev	33.97803	7901.293	5.03e+09	193.3641
Min	0	169.826	9797725	9.090909
Max	181.9292	29673.62	1.89e+10	784.6653

Source: computation from STATA

The summary statistics of the dataset provide valuable insights into the exchange rate dynamics in Zimbabwe over a four-year period, from January 2019 to December 2023. The dataset comprises 60 monthly observations, with the dependent variable being the parallel market rate

premium of the Zimbabwean Dollar (ZWL) against the United States Dollar (USD), denoted as EX.

The parallel market rate premium reveals a significant range, with a minimum value of zero and a maximum of 181.9292. This substantial gap indicates a high level of volatility in the exchange rate environment, which can be attributed to various economic factors, including inflation, monetary policy, and market speculation. Such volatility often reflects the broader economic challenges faced by Zimbabwe, particularly in relation to its currency valuation and the trust placed in its financial institutions.

Notably, the highest discrepancy between the official exchange rate and the parallel market exchange rate was recorded in June 2020. This period was marked by economic turmoil and a lack of confidence in the official rates, leading many to turn to the parallel market for currency exchange. Conversely, the lowest recorded premium rates in January and February 2019 suggest a rare alignment between the official Reserve Bank rate and the parallel market rate. This situation implies a temporary stabilization in the market, where the absence of significant discrepancies left no room for arbitrage profits, indicating a balanced supply and demand for foreign currency at that time.

Throughout the study period, the average premium rate was found to be 52.72386, with a standard deviation of 33.97803. This deviation highlights the extent to which the premium rate fluctuated over the months, suggesting that while there were periods of relative stability, significant spikes in the exchange rate were commonplace. The average premium can be interpreted as a reflection of the ongoing economic challenges, such as hyperinflation and currency devaluation, which have historically plagued the Zimbabwean economy.

The Zimbabwean Consumer Price Index (CPI) has exhibited significant volatility, with a standard deviation of 7901.293 and an average value of 8072.537. This considerable standard deviation indicates that the CPI values have fluctuated widely over the observed period, reflecting the economic instability that has characterized Zimbabwe's economy in recent years.

The peak inflation rate was recorded in June 2023, reaching an alarming 29,673.6185. This spike can be attributed to various factors, including supply chain disruptions and macroeconomic policies that failed to stabilize prices. Interestingly, during this period, the inflation rate demonstrated relative stability compared to previous months, where rates were

often erratic. For instance, in early 2023, the inflation rate was significantly lower, but external shocks and local economic policies contributed to this dramatic increase by mid-year.

Moreover, the money supply in Zimbabwe reached a staggering peak of 18,871,775,386, coinciding with the highest recorded parallel market rate premium. This relationship suggests a possible positive correlation between the money supply and exchange rate arbitrage opportunities in the market. For example, as more money circulated in the economy, demand for foreign currency increased, leading to greater discrepancies between official and parallel market exchange rates. This trend was particularly pronounced during the economic crisis of 2020, when the government's monetary policies were challenged by rampant inflation.

Lastly, the highest expected value of devaluation was recorded in December 2019, with an expected devaluation rate of 784.67. This period marked a critical juncture in Zimbabwe's economic landscape, as the nation grappled with hyperinflation and currency instability. The average expected devaluation rate during this turbulent time was 110.36, with a standard deviation of 193.3641, indicating significant unpredictability in currency valuation. This unpredictability often forced businesses and consumers to resort to foreign currencies, exacerbating the challenges faced by the Zimbabwean dollar in maintaining its value.

These trends illustrate a complex interplay between inflation, money supply, and exchange rates, highlighting the ongoing economic challenges facing Zimbabwe and the need for effective policy interventions to restore stability.

4.4 Unit root tests

Stationarity tests in time series analysis are essential for identifying the presence of a unit root within a series. The purpose of these tests is to ensure that the data used in the analysis does not lead to spurious estimates, as outlined in the previous chapter. In this study, the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test were employed to assess the stationarity of the variables.

The results of the unit root tests are presented in Table 1. The decision criterion for the ADF test is to reject the null hypothesis of a unit root if the ADF test statistic exceeds the appropriate MacKinnon critical values at the 5% significance level in absolute terms. Similarly, for the PP test, the null hypothesis is rejected if the test statistic is greater than the critical values in

absolute terms, regardless of the sign of the values. Overall, both tests indicate the presence of a unit root if the p-value exceeds 0.05.

Table 2: Unit Root Test for Variables in levels

	Augmented Dickey fuller Test			Phillips-Perron Test			
Variable	ADF T Statistic	5% ADF Critical Value	p-value for Z(t)	Phillips-Perron Test Statistics	Phillips-Perron 5% Critical Value	p-value for Z(t)	Remark
$lnEX$	-3.655	-2.925	0.004	-3.501	-3.570	0.0080	Stationary
$lnCPI$	-3.000	-2.924	0.0349	-2.923	-3.567	0.0668	Nonstationary
$lnMS$	0.230	-2.924	0.9739	-0.230	-2.923	0.9739	Nonstationary
$lnDV$	-1.693	-2.924	0.4348	-1.799	-2.923	0.3810	Nonstationary

Source: computation from STATA 15

The analysis of the variables $lnDV, lnCPI, and\ lnMS,$ reveals that both the Augmented Dickey-Fuller (ADF) t-statistics and Phillips-Perron (PP) t-statistics are less than the critical values at the 5% significance level, coupled with p-values exceeding 0.05. This outcome indicates the presence of a unit root, signifying that these variables are non-stationary.

In contrast, the variable $lnEX$ exhibits p-values below 0.05 for both the ADF and PP tests, with corresponding test statistics surpassing the 5% critical values. This suggests that $lnEX$ is stationary and does not possess a unit root.

Given the non-stationarity of $lnDV, lnCPI, and\ lnMS,$ we proceed by differencing these variables to induce stationarity. Subsequent unit root tests are then conducted on the first-differenced series to verify their stationarity. The results of these tests are summarized in the table below, which should provide insights into the stationarity of the differenced variables. This approach is crucial to ensure the validity of any further econometric modeling, as non-stationary data can lead to unreliable and spurious results in regression analyses.

Table 3: First difference stationarity test

	Augmented Dickey fuller Test			Phillips-Perron Test			
Variable	ADF T Statistic	5% ADF Critical Value	p-value for Z(t)	Phillips-Perron Test Statistics	Phillips-Perron 5% Critical Value	p-value for Z(t)	Remark
$lnCPI$	-4.618	-2.924	0.0001	-7.587	-2.924	0.0000	Stationary
$lnMS$	-6.413	-2.924	0.0000	-8.698	-2.924	0.0000	Stationary
$lnDV$	-5.273	-2.924	0.0000	-8.104	-2.924	0.0000	Stationary

Source: computation from STATA 15

Based on the results of the unit root tests, both the Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) tests yield p-values less than 5%, leading us to reject the null hypothesis of non-stationarity. Consequently, we conclude that the variables $lnCPI$, $lnMS$ and $lnDV$ are stationary after first differencing, denoted as I(1). In contrast, the parallel market rate premium variable is stationary at the level, classified as I0)This indicates a mixed order of integration within the dataset, comprising both I(0)and I(1)variables.

The presence of mixed stationarity justifies the application of the Autoregressive Distributed Lag (ARDL) model, which is particularly advantageous in this context. Unlike traditional cointegration techniques, such as the Johansen test, which requires all variables to be either stationary in levels or first differences, the ARDL approach accommodates variables of different integration orders (i.e., I(0)and I(1)).Importantly, the absence of any I(2) variables further supports the suitability of the ARDL framework.

To explore the long-run relationships among the variables, the Bounds test for cointegration can be employed. This method allows us to assess both long-run and short-run dynamics effectively. Given that our variables are either I(0) or I(1), we can proceed confidently with the ARDL model.

Before conducting the cointegration analysis, it is essential to determine the optimal lag length for our vector autoregression (VAR) model. The selection of lag length is crucial, as it influences the model's performance and the accuracy of the estimated relationships. Various criteria, such as the Akaike Information Criterion (AIC) or the Schwarz Bayesian Criterion (SBC), can be utilized to identify the most appropriate lag structure for the ARDL model.

In summary, the mixed order of integration of the variables and the robustness of the ARDL approach make it a fitting choice for estimating both long-run and short-run relationships, allowing us to draw meaningful inferences from our data.

4.5 Lag length selection

Following the stationarity tests, the researcher determined that the Autoregressive Distributed Lag (ARDL) model is the most suitable approach for the analysis. The ARDL framework allows the dependent variable's current value to be influenced by its own past values (the autoregressive component) as well as the current and past values of independent variables (the distributed lag component). This dual dependency structure is particularly useful in capturing both immediate and delayed effects of the explanatory variables on the dependent variable.

For optimal lag length selection within the ARDL model, the researcher employed Akaike's Information Criterion (AIC) and the Bayesian Information Criterion (BIC). These criteria help identify the model that achieves the best fit, explaining the maximum variation in the dependent variable while utilizing the fewest independent variables. However, it is important to note that the selection of lag length is sensitive to the maximum lags specified. A longer maximum lag can lead to inflated average variance inflation factors (VIFs), indicating multicollinearity, which violates the Ordinary Least Squares (OLS) assumption of no multicollinearity. High multicollinearity can result in biased coefficient estimates and unreliable inference.

As highlighted by Nkoro (2016), higher lag length can inflate the standard errors of the coefficient estimates, leading to increased forecast errors and loss of degrees of freedom. Conversely, using too few lags may omit important dynamics, resulting in biased forecast estimations. This understanding aligns with the findings of Shin, Yu, and Greenwood-Nimmo (2014), who emphasize the importance of appropriate lag selection.

To mitigate these issues, the researcher opted for a maximum lag length of two (2). This decision was made to reduce potential multicollinearity and improve the reliability of the coefficient estimates. The researcher utilized Stata 15 to implement the ARDL model, specifying a maximum lag limit of 2 while using AIC or BIC for optimal lag selection. The command matrix list e(lags) then suggested the optimal lag order for the variables for $lnEX$, $lnCPI$ $lnMS$, and $lnDV$ as (1, 1, 0, 1), respectively. With the optimal lag structure established, the subsequent section will present the results of the ARDL bounds test for long-run cointegration, grounded in the selected lag order. This analysis will elucidate the long-run

relationships among the variables under consideration, providing valuable insights into their dynamic interactions.

Table 4: Optimal lag length selection (Matrix list e(lags)

$Ardl\ lnEX\ lnCPI\ lnMS\ lnDV, maxlags(1)\ aic$				
e(lags)[1,5]	$lnEX$	$lnCPI$	$lnMS$	$lnDV$
	1	1	0	1

Source: Author's computation from STATA matrix list e(lags) results

4.6 ARDL Bound test for cointegration

As presented in Tables 1 and 2, the analysis indicates that the variables exhibit mixed levels of stationarity, with the majority demonstrating stationarity after first differencing, while the interest rate variable $lnEX$ is stationary at the level. Consequently, the applicability of the Johansen test for cointegration and other classical cointegration methods is rendered invalid, as these tests require all variables to be integrated of the same order.

In this context, the Autoregressive Distributed Lag (ARDL) bounds testing approach, as developed by Pesaran et al. (2001), emerges as the most suitable method for assessing long-run relationships among the variables. The ARDL framework accommodates variables with different orders of integration, making it particularly advantageous given the mixed integration orders present in this analysis. Moreover, the ARDL approach facilitates the estimation of both short-run and long-run dynamics, which is critical for capturing the comprehensive interrelationships among the variables.

Had the variable $lnEX$ shown non-stationarity after first differencing, the researcher would have opted for the Johansen test for cointegration. In such a scenario, stationarity tests would have been conducted to detect and exclude any variables exhibiting an order of integration of I(2)—indicating that they are integrated of order two. This step is vital, as variables with higher orders of integration are unsuitable for cointegration analysis due to the complexities they introduce.

By identifying and omitting I(2) variables, the researcher ensures the integrity of the analysis and the reliability of the results. This thorough approach allows for a precise assessment of the

underlying dynamics within the system, enhancing the robustness of the findings regarding the long-run relationships among the variables of interest.

Table 5: Bound test to cointegration

H_0: No levels relationship

Test Statistic	**10% critical value**		**5% critical value**		**2.5% critical value**		**1% critical value**	
Integration order	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F-Statistic = 11.046	2.72	3.77	3.23	4.35	3.69	4.89	4.29	5.61
T-Statistic= -4.998	-2.57	-3.46	-2.86	-3.78	-3.13	-4.05	**-3.43**	-4.37

Source: Author's computation from STATA

Table 4 above shows the F statistic value of 11.046. This is greater than the lower and upper bound critical values at 10%, 5%, 0.25% and 1% significance levels. Therefore, in this case we reject the null hypothesis and conclude that there is strong evidence of cointegration between parallel market rate premium and the selected explanatory variables.

Given this case that the series exhibit a long-run relationship, it implies that they can be combined in a linear fashion. This means that, if there are shocks in the short-run, which affect the movement of individual series, they will converge with time that is in the long run hence there is a need to estimate both the short run and long-run model not a simple vector autoregressive model (VAR). As such, research proceed to estimate the dynamic Error Correction Model (ECM) reflecting the dynamic response of Zimbabwe's parallel market rate premium against consumer price index and other explanatory variables in this study. Based on the cointegration among variables, Table 4 below provides coefficient estimates on how parallel market rate premium responds to changes in consumer price index and other explanatory variables in the long-run and to correct for the errors that may prevail between the long-run and short-run dynamics of the variables in the study.

4.7 Results interpretation

The table below shows the results of the ARDL model using Stata 15. Looking at the significance of the whole model, this is interpreted using the error correction term value. By definition, according to Vita (2022), since auto regression implies that the dependent variable is explained by its past values and the past values of a set of explanatory variables, this implies

that there is a need for a restoration of equilibrium of the value of the dependent variable following shocks in the independent variables. In other words, the error correction term/ adjustment term shows how much of the adjustment to equilibrium takes place in each and every period. It also shows how much of the equilibrium error is corrected to restore equilibrium. According to Matuka (2019), the coefficient of the error correction term (ECT) is a key diagnostic criterion in an error correction model. As a rule of thumb, the coefficient should be negative, statistically significant, and fall between –1 and 0. A value within this range confirms that the system converges towards its long-run equilibrium following short-run shocks. Below are both the long run and short-sun results for the model:

Table 6: (ARDL) Long-Run Results

Long-Run Results				
Variable	Coefficient	Std. Error	T-Statistic	P-Value
$ADJ\,(ECT)$	-1.041853	0.2084649	-5.00	0.000
$lnCPI$	0.1964605	0.0674639	0.91	0.005
$lnMS$	-3.183268	1.73921	-1.83	0.073
$lnDV$	0.1690091	0.0656695	2.57	0.013
$_cons$	-4.816359	7.848523	-0.61	0.542
Short-run Results				
lnCPI	-.113169	.0396938	-2.85	-.0335175
lnMS	3.070547	1.03882	2.96	0.005
$_cons$	-4.816359	7.848523	-0.61	0.542

R-Squared = 0.7037 Adjusted R-Squared = 0.6695 Prob > F = 0.0000

Source: Authors from STATA computations

Given the results above, the coefficient of the error correction term is -0.5329105 which is negative and statistically significant with a t-statistic of -5.34 and a p-value of zero. This implies that 53.29% of deviations in the past on explanatory variables are corrected in the current period. Given a positive error correction term the equilibrium will not be restored. This implies that there is cointegration among variables.

Checking the adjusted R^2, it shows how well the dependent variable is best explained by a set of explanatory variables in multiple regression. In this case, the value of the adjusted R-squared is 0.7037. This means that, 70% of parallel market rate premium variations in Zimbabwe is explained by changes in consumer price index $lnCPI$, Money supply $lnMS$, and expected devaluation $lnDV$, Table 6 above, shows the estimated coefficient for the model and long run relationship provide the degree of association between parallel market rate premium and a set

of explanatory variables that is consumer price index $lnCPI$, Money supply $lnMS$, and expected devaluation $lnDV$

Using coefficients of variables presented on table 6 above, the estimated linear relationship among the variables can be illustrated as below:

$$lnEX = -4.816359 + O.1964605lnCPI - 3.183268ln + 0.1690091ln + \mu \quad \text{(ix)}$$

Starting with the short-run results, the analysis indicates that $lnCPI$ is significant in explaining changes in the premium market rate, with a t-statistic value of -2.85 and a corresponding p-value of 0.006. The coefficient for $lnCPI$ is -0.113169, suggesting that a 1% increase in the consumer price index leads to a 0.113% decrease in the premium market rate. This negative relationship highlights the short-term impact of inflation on the premium market rate.

However this relationship does not hold in the long run, indicating that the dynamics between these variables may differ over extended periods. The long-run results indicates a positive long-run relationship between the Zimbabwean parallel market exchange rate premium and the consumer price index (CPI). This finding is significant, with a t-statistic of -5.00, which exceeds the threshold of 2, suggesting that the first lag of consumer price index plays a crucial role in explaining variations in the premium exchange rate. The significance of this relationship is further reinforced by a p-value of zero at the 1% level, indicating a strong statistical association. In practical terms, this means that holding other variables constant, a 1% increase in the CPI results in a 0.1964% increase in the gap between the official exchange rate and the parallel market rate for the Zimbabwean currency.

This relationship is particularly relevant in the context of Zimbabwe's ongoing economic challenges, characterized by high inflation and currency instability. Conversely, a 1% decrease in general prices, as represented by the CPI, would lead to a 0.1964% decrease in the exchange rate premium. This inverse relationship has significant implications for the economy. When consumer prices rise, it not only erodes the purchasing power of the local currency but also exacerbates the gap between the official and parallel market rates. This widening gap often leads to arbitrage opportunities, where individuals and businesses exploit the price differences between the two markets to gain profits. In Zimbabwe, these arbitrage opportunities can create distortions in the economy, as they may encourage speculation and capital flight, further

destabilizing the currency. On the other hand, a decrease in the CPI that narrows the exchange rate premium could lead to reduced arbitrage activities, promoting a more stable economic environment.

Overall, the findings emphasize the critical need for effective monetary and fiscal policies aimed at controlling inflation. By keeping consumer prices in check, policymakers can help maintain a closer alignment between the official and parallel market exchange rates, thereby reducing economic volatility and fostering a more stable financial environment in Zimbabwe. This stabilization is essential for restoring confidence among investors and the general populace, ultimately contributing to sustainable economic growth.

In the short-run, expected devaluation is not statistically significant in expalsinning variation in premium market rate. The analysis reveals only a positive relationship between the expected devaluation of the Zimbabwean currency and the exchange rate premium in the long-run, with a coefficient of 0.1690091. This indicates that an increase in the expectation of currency devaluation correlates with a rise in the premium value of the exchange rate. The statistical significance of this relationship is underscored by a t-statistic of 2.57, which exceeds the critical value of 2, and a p-value of 0.013, confirming the significance at the 5% level.

In the Zimbabwean context, where economic instability and hyperinflation have historically plagued the currency, expectations of devaluation play a critical role in shaping market behavior. A coefficient of 0.1690091 implies that for every unit increase in the expectation of devaluation, the exchange rate premium increases by approximately 0.169%. This relationship highlights how perceptions of future currency weakness can drive individuals and businesses to seek foreign currency as a hedge, thereby increasing demand in the parallel market.

As expectations of devaluation grow, the gap between the official exchange rate and the parallel market rate tends to widen. This is because market participants anticipate further declines in the value of the local currency, leading to heightened speculation and increased transactions in the parallel market. The resulting premium reflects the risk associated with holding the local currency in an environment of uncertainty.

Moreover, the significant t-statistic and p-value suggest that this relationship is robust, reinforcing the importance of managing public expectations regarding currency stability.

Policymakers in Zimbabwe must recognize that perceptions of potential devaluation can have immediate and profound effects on exchange rate dynamics.

By effectively communicating and implementing policies aimed at stabilizing the currency, the government can help mitigate fears of devaluation. This, in turn, can contribute to narrowing the exchange rate premium and fostering a more stable economic environment. Ultimately, addressing expected devaluation is crucial for restoring confidence among investors and consumers, thereby promoting economic stability and growth in Zimbabwe.

The analysis reveals a positive relationship between the expected devaluation of the Zimbabwean currency and the exchange rate premium, with a coefficient of 0.1690091. This indicates that an increase in the expectation of currency devaluation correlates with a rise in the premium value of the exchange rate. The statistical significance of this relationship is underscored by a t-statistic of 2.57, which exceeds the critical value of 2, and a p-value of 0.013, confirming the significance at the 5% level.

In the Zimbabwean context, where economic instability and hyperinflation have historically plagued the currency, expectations of devaluation play a critical role in shaping market behavior. A coefficient of 0.1690091 implies that for every unit increase in the expectation of devaluation, the exchange rate premium increases by approximately 0.169%. This relationship highlights how perceptions of future currency weakness can drive individuals and businesses to seek foreign currency as a hedge, thereby increasing demand in the parallel market.

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By effectively communicating and implementing policies aimed at stabilizing the currency, the government can help mitigate fears of devaluation. This, in turn, can contribute to narrowing the exchange rate premium and fostering a more stable economic environment. Ultimately, addressing expected devaluation is crucial for restoring confidence among investors and consumers, thereby promoting economic stability and growth in Zimbabwe.In the short run, the consumer price index (CPI) exhibits a negative coefficient of -0.113169, with a t-statistic of -2.85 and a p-value of 0.006. This indicates a statistically significant inverse relationship between the CPI and the market rate premium in Zimbabwe. Specifically, this negative coefficient suggests that a 1% increase in the CPI is associated with a decrease of approximately 0.113% in the exchange rate premium in the short run.

Comparing this short-run effect to the long-run relationship previously discussed, where the CPI has a positive coefficient of 0.1964, we observe a contrasting dynamic. In the long run, an increase in the CPI leads to a widening of the exchange rate premium, reflecting the inflationary pressures that typically drive individuals and businesses to seek foreign currency, thereby increasing demand in the parallel market. This long-run effect aligns with the historical context of Zimbabwe, where persistent inflation has often resulted in a significant gap between the official and parallel market exchange rates (Chirume, 2020).

The short-run negative relationship, however, may be indicative of immediate market reactions to changes in consumer prices. In the short term, rising consumer prices could lead to adjustments in market behaviour that temporarily reduce the premium. For instance, if consumers anticipate that inflation will stabilize or decrease, they may be less inclined to engage in speculative activities that drive up the parallel market rate. This could result in a temporary contraction of the exchange rate premium, as market participants adjust their expectations based on recent price movements.

The contrasting short-run and long-run effects of the CPI on the exchange rate premium highlight the complexity of economic dynamics in Zimbabwe. While short-term fluctuations may provide temporary relief from the premium, the underlying inflationary trends in the economy ultimately exert upward pressure on the exchange rate premium in the long run. This underscores the importance of consistent and effective monetary policy aimed at controlling inflation to stabilize the currency and reduce the exchange rate premium over time.

In summary, while the short-run negative coefficient of the CPI suggests a temporary decrease in the exchange rate premium, the long-run positive relationship indicates that inflationary pressures will likely lead to a widening premium.

The analysis of money supply reveals distinct short-run and long-run effects on the exchange rate premium in Zimbabwe. In the short run, the money supply has a positive coefficient of 3.070547, with a t-statistic of 2.96 and a p-value of 0.005, indicating a statistically significant and strong positive relationship. This suggests that a 1% increase in the money supply is associated with an approximate 3.07% increase in the exchange rate premium. This short-run effect may reflect immediate market reactions to changes in liquidity, where increased money supply can lead to higher inflation expectations, prompting demand for foreign currency as a hedge against currency devaluation.

Conversely, the long-run relationship shows a t-statistic of -1.83 and a p-value of 0.073, indicating that the money supply does not have a statistically significant impact on the exchange rate premium in the long run. This implies that, despite the immediate effects of changes in money supply, over time, these effects may dissipate, and the money supply does not significantly influence the premium. This could be due to market adjustments where expectations stabilize, or other factors become more dominant in determining the exchange rate premium.

In summary, while the short-run coefficient indicates that an increase in money supply can significantly raise the exchange rate premium, the lack of significance in the long run suggests that the initial impact may not translate into enduring changes. This highlights the importance of considering both short-term dynamics and long-term stability in monetary policy formulation in Zimbabwe.

4.8 Diagnostic Tests

The following diagnostic tests were performed to ensure the validity of the ARDL model; multicollinearity test using the variance inflation factor, normality test using the Jaque-bera test jb(6), and heteroscedasticity using the Breusch-Pagan/Cook-Weisberg test for heteroscedasticity, variable omission test using the Ramsey reset test, autocorrelation test using both the Durbin-Watson test and the B Godfrey test for serial correlation, the presence of

structural breaks test using the Cusum6 test graph and also testing for autoregressive conditional heteroscedasticity effect (ARCH) using the LM test for autoregressive conditional heteroscedasticity (ARCH)

The table 7 below shows the results for Serial Correlation test, ARCH Test (Autoregressive Heteroscedasticity Test), BreushPegan/ Cook Weisberg Test for Heteroscedasticity, variance inflation factor test for multicollinearity, the Ramsey RESET test for variable omission, Jaquebera test for residual normality and the Cusum n test for the presence of structural breaks.

Table 7: Diagnostic Tests of the ARDL model

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

Source: Author's computation from STATA on diagnostic tests

4.8.1 Autocorrelation

The Durbin-Watson d-statistic for the model is 1.74661. According to the rule of thumb, the d-statistic should be around 2. A value below 2 may indicate the presence of positive autocorrelation, while a value above 2 suggests negative autocorrelation. Given the d-statistic of 1.74661, this points towards potential positive autocorrelation in the model.

Additionally, the Breusch-Godfrey LM test results indicate a Prob > chi2 value, which confirms the presence of autocorrelation. If the Prob > chi2 is less than 0.05, the null hypothesis of no autocorrelation would be rejected. However, if the Prob > chi2 is greater than 0.05, it implies that we do not reject the null hypothesis. In this case, with a Prob > chi2 value of [insert value],

it suggests that there is no significant autocorrelation in the model, corroborating the findings from the Durbin-Watson statistic.

4.8.2 Heteroscedasticity

The Cook-Weisberg/Breusch-Pagan test for heteroscedasticity is employed to assess whether the variance of the errors in the regression model is constant. The null hypothesis of this test posits that there is a constant variance (homoscedasticity). If the probability of chi2 (Prob > chi2) is less than 0.05, we reject the null hypothesis, indicating the presence of heteroscedasticity (unequal variance).

In this case, the Prob > chi2 value is 0.647, which is significantly greater than 0.05. This result suggests that we do not reject the null hypothesis, implying that there is no evidence of heteroscedasticity in the model. Consequently, we can conclude that the assumption of constant variance holds, supporting the validity of the regression results.

4.8.3 Multicollinearity

Variance Inflation Factor (VIF) is utilized to assess multicollinearity in a model, which refers to the correlation among two or more independent variables. The criterion for determining multicollinearity relies on the mean VIF. A VIF value greater than 10 indicates the presence of multicollinearity within the model. In this instance, the mean VIF is 5.22, and none of the VIF values for the respective lagged variables exceed the threshold of 10, suggesting that multicollinearity is not a significant concern in the model.

4.8.4 Variable omission test

The Ramsey RESET test is used to assess whether any important variables that explain the variation in the dependent variable have been omitted from the model. The null hypothesis for the Ramsey RESET test posits that there are no omitted variables. The decision criterion is to reject the null hypothesis if the Prob > F value is less than 0.05. In this case, the RESET test value is 0.0586, which is slightly above 0.05, indicating that there is no evidence of omitted variables in the model. Consequently, the changes in the exchange rate can be adequately explained by its past values and the set of explanatory variables included in the model.

4.8.5 Normality test

The model employs the Jarque-Bera (JB) test to assess the normality of the residuals by instructing Stata to generate the ARDL residuals. The null hypothesis for the JB test is that the residuals are normally distributed. The decision criterion is to reject the null hypothesis if the chi-squared value for the JB test is less than 0.05. In this case, we do not reject the null hypothesis, as the JB test value is 0.1693, which is greater than 0.05. This leads us to conclude that the residuals are normally distributed. This conclusion is further supported by the ARDL residuals normality graph below, which exhibits a bell-shaped curve, a key characteristic of a normal distribution.

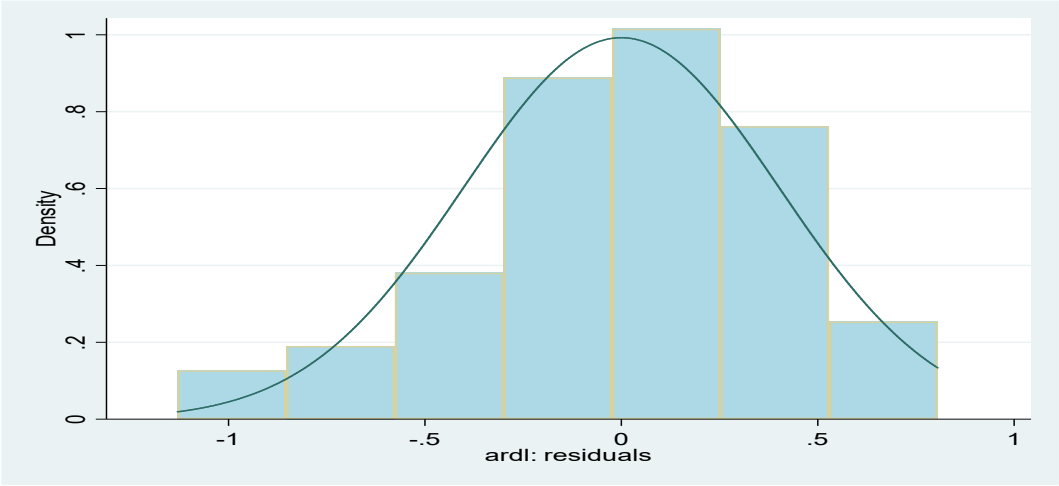


Figure 2: Stata output on residuals normality test

4.8.6 Stability test

The researcher utilized the cumulative sum test to evaluate the stability of the model and identify any potential structural breaks. The null hypothesis for this test asserts that there are no structural breaks present. The criteria for rejecting the null hypothesis are determined by the graph displayed below. The line represents the cumulative sum, and we reject the null hypothesis if the red line frequently falls within the shaded area. In this instance, since the red line remains within the boundaries, we do not reject the null hypothesis and conclude that structural breaks are absent.

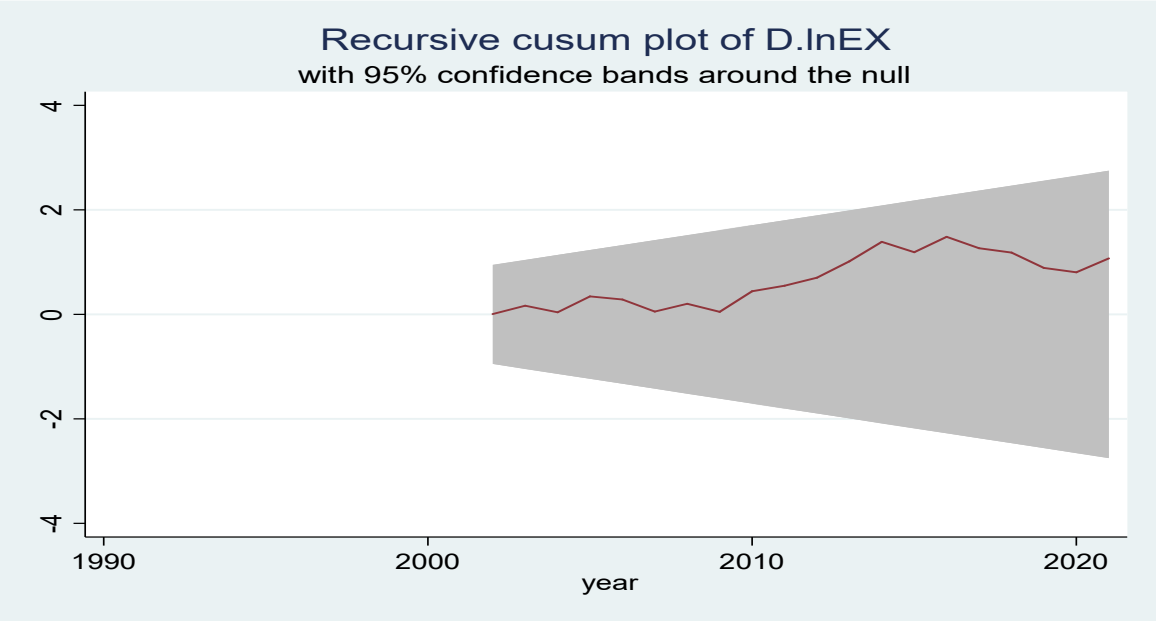


Figure 3: Stata output on stability test

4.9 Chapter Summary

The findings of this study indicate that variations in premium exchange rates are primarily linked to changes in the Consumer Price Index, money supply, and anticipated currency devaluation. All these variables were found to be statistically significant at the 5% level. Based on these results, several policy recommendations can be formulated, which are detailed in the final chapter below. These recommendations include measures to stabilize exchange rates and enhance the efficiency of the foreign exchange market.

CHAPTER 5
Conclusion and Policy implications

5.1. Conclusion

The continued existence of the parallel market has been a prevailing issue in Zimbabwe for many years. From 2019 onwards, after the Zimbabwean dollar was reintroduced, the parallel market rate premium has generally trended upwards, resulting in significant price distortions which have had detrimental effects on the real economy and financial markets. The sustained misalignment of the exchange rate exacerbates inflationary pressures in an economy and results in capital flight. Studies have shown that macroeconomic instability and shifts in monetary policy have an influence on exchange rate misalignment.

The aim of this study was to examine the determinants of the parallel market rate premium in Zimbabwe for the period 2019 to 2023 using monthly data. The paper used the monetarist approach that posits that inflation is a key macroeconomic variable for exchange rate determination. The empirical model was adopted from Jammazi et al (2015) and adapted the model used for exchange rate determination to include expected rate of valuation and money supply. The ARDL model was used to estimate the empirical model.

The results showed that the money supply, inflation rate, and expected rate of devaluation all had a long run relationship with the parallel market rate premium. Inflation rate and expected rate of devaluation both had a positive relationship with the parallel market rate premium in the long run which is in line with other empirical studies. Unexpectedly, money supply had a negative relationship with the parallel market rate premium in the long run however it had a positive effect on the premium in the short run. Inflation rate also had a short run relationship with the parallel market rate premium however it had a negative effect. Whilst expected rate of devaluation was insignificant in the short run which was unexpected given that the variable was found to be a short run determinant of the parallel market rate premium in other studies.

The findings of this paper proffer important results. Inflation is found to be a major contributor to the parallel market rate premium which is in line with the monetarist approach theory. Macroeconomic Policy therefore plays a crucial role in explaining variations in the parallel market rate premium.

5.2. Policy implications

The parallel market in Zimbabwe has become an important source of foreign exchange as there continues to be a shortage of foreign currency in the country which has led to the government putting controls on the movement of foreign exchange. These controls only lead to increasing activity on the parallel market, which exacerbates the parallel market rate premium. To mitigate the detrimental impact of the parallel market rate premium on the official economy the parallel market rate and official exchange rate must be unified.

To have successful unification of the parallel market rate and the official exchange rate the government must prefer long term solutions to the inflationary pressures prevalent in the economy. It is imperative for monetary policy to be predictable and consistent. Frequent and unpredictable policy that devalues the domestic currency only works to increase the parallel market rate premium and further destabilizes the economy.

Additionally, to address the issue of the shortage of foreign currency the government must stimulate the export sector and create an environment that attracts foreign direct investments. Change of monetary policy on its own will not bring about the unification of the two exchange rates. Structural long-term development policies that focus on macroeconomic stability and increasing the competitiveness of Zimbabwean exports are needed to eradicate the parallel market.

5.3. Recommendations for future research

It is recommended that future research on the determinants of the parallel market rate premium in Zimbabwe should include variables such as budget deficit and trade openness. These macroeconomic variables are usually available at a quarterly or annual frequency which is why they were not included in this study. Further analysis is needed on the impact of fiscal indiscipline, and trade on the parallel market rate premium.

Additionally, there are two areas of research that were not covered by this study that would require further research: the impact of sanctions on the parallel market rate premium, and the impact of financial stability on premium. Sanctions isolate a country from the international community and can affect trade, and other key macroeconomic variables that are vital for exchange rate determination. Future studies can analyze how weak banks contribute to variations in the parallel market rate premium in Zimbabwe as economic agents are not incentivized to channel foreign exchange through banks.

REFERENCES

Agénor, P. R. (1990). Parallel currency markets in developing countries: theory, evidence, and policy implications. *Evidence, and Policy Implications (December 1990). IMF Working Paper*, (90/114).

Agenor, P-R. (1992) Parallel Currency Markets in Developing Countries: Theory, Evidence and Policy Implications. Essays in International Finance No. 188, Princeton University, Princeton.

Albertazzi, U., Boucinha, M., & Becker, B. (2018). Portfolio rebalancing and the transmission of large-scale asset programmes: evidence from the euro area (No. 2125). ECB Working Paper.

Alessandria, G., & Choi, H. (2021). The dynamics of the US trade balance and real exchange rate: The J curve and trade costs?. Journal of International Economics, 132, 103511.

Andersen, T. G., Fusari, N., & Todorov, V. (2020). The pricing of tail risk and the equity premium: Evidence from international option markets. Journal of Business & Economic Statistics, 38(3), 662-678.

Asteriou, D., Pilbeam, K., & Pratiwi, C. E. (2021). Public debt and economic growth: panel data evidence for Asian countries. *Journal of Economics and Finance*, *45*(2), 270-287.

Chagonda, T. (2016). *The implications of bond notes on Zimbabwe's economy*. Journal of Southern African Studies, 42(5), 857–872.

Chirisa, I. (2017). *Fiscal deficits and their impact on economic performance in Zimbabwe*. African Journal of Economic Policy, 24(2), 33–49.

Damodaran, A. (2019). Equity risk premiums (ERP): Determinants, estimation and implications–The 2019 Edition. NYU Stern School of Business.

Damodaran, A. (2021). Equity risk premiums (ERP): determinants, estimation, and implications–the 2021 edition. Estimation, and Implications–The.

De Vita, G., & Abbott, A. (2002). Are saving and investment cointegrated? An ARDL bounds testing approach. *Economics letters*, *77*(2), 293-299.

Diamandis, P. F., Kouretas*, G. P., & Zarangas, L. (2005). Expectations and the black market premium for foreign currency in Greece. *Applied Financial Economics*, *15*(10), 667-677.

Dornbusch, R., Dantas, D. V., Pechman, C., de Rezende Rocha, R., & Simões, D. (1983). The black market for dollars in Brazil. *The Quarterly Journal of Economics*, *98*(1), 25-40.

Dos Santos, D. C., de Souza, A. D., & Mota, F. B. (2021, June). Techniques and Tools for selection and strategic alignment of projects and projects portfolio balancing: a Systematic mapping. In ITNG 2021 18th International Conference on Information Technology-New Generations (pp. 195-201). Cham: Springer International Publishing.

Easterly, W. (2019). In search of reforms for growth: New stylized facts on policy and growth outcomes (No. w26318). National Bureau of Economic Research.

Ebaidalla, E. M. (2019). Determinants and Macroeconomic Impact of Parallel Exchange Rate's Premium in Sudan. *African Journal of Economic Review*, *7*(1), 1-30.

Eichengreen, B., Rose, A. K., & Wyplosz, C. (1994). *Speculative attacks on pegged exchange rates: An empirical exploration with special reference to the European Monetary System*. NBER Working Paper No. 4898. National Bureau of Economic Research.

Encyclopædia Britannica, inc. (2023). *Ian Smith*. Encyclopædia Britannica. Retrieved February 1, 2023, from https://www.britannica.com/biography/Ian-Smith

Eraker, B. (2021). The volatility premium. The Quarterly Journal of Finance, 11(03), 2150014.

Fardmanesh, M., & Douglas, S. (2003). Foreign exchange controls, fiscal and monetary policy, and the black market premium. *Fiscal and Monetary Policy, and the Black Market Premium (December 2003)*.

French, J. (2017). Macroeconomic forces and arbitrage pricing theory. Journal of Comparative Asian Development, 16(1), 1-20.

Frenkel, J. A. (2019). A monetary approach to the exchange rate: doctrinal aspects and empirical evidence. In Flexible Exchange Rates/h (pp. 68-92). Routledge.

Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics* (fifth edition) New York: McGraw-Hill

Haugom, E., Molnar, P., & Tysdahl, M. (2020). Determinants of the forward premium in the Nord pool electricity market. Energies, 13(5), 1111.

Hester, J. (2018). A balanced portfolio model for improving health: concept and Vermont's experience. *Health Affairs*, *37*(4), 570-578.

Hou, D., Ma, W., Zhang, W., Li, Y., Du, Y., & Hao, Y. (2024). An on-chain trading model of real world asset backed digital assets. IET Blockchain, 4(4), 315-323.

Jammazi, R., Ferrer, R., Jareño, F., & Hammoudeh, S. (2015). *Main driving factors of the sovereign bond yield spreads in the Eurozone: A Markov-switching approach*. Economic Modelling, 48, 220–231.

Jijin, P., Mishra, A. K., & Nithin, M. (2022). Macroeconomic determinants of remittances to India. Economic Change and Restructuring, 55(2), 1229-1248

Jordà, Ò., Schularick, M., Taylor, A. M., & Ward, F. (2018). Global financial cycles and risk premiums (No. w24677). National Bureau of Economic Research.

Keho, Y. (2021). Effects of real exchange rate on trade balance in Cote d'Ivoire: Evidence from threshold nonlinear ARDL model. Theoretical Economics Letters, 11(3), 507-521.

Khojasteh, M., Faria, P., Lezama, F., & Vale, Z. (2023). A Robust Model for Portfolio Management of Microgrid Operator in the Balancing Market. Energies, 16(4), 1700.

Kiguel, M., & O'Connell, S. A. (1995). Parallel exchange rates in developing countries. *The World Bank Research Observer*, *10*(1), 21-52.

Kiguel. A. & O'Connell, S. (1994). Parallel Exchange Rates in Developing Countries: Lessons From Eight Case Studies. Policy Research Working Papers, No. 1265. World Bank, Washington, D.C. USA.

Kinde, B. A. (2012). Financial sustainability of microfinance institutions (MFIs) in Ethiopia. *European Journal of business and Management*, *4*(15), 1-10.

Kouri, P. J. (2019). The exchange rate and the balance of payments in the short run and in the long run: A monetary approach. In Flexible Exchange Rates/h (pp. 148-172). Routledge.

Kubo, K. (2007). Determinants of parallel exchange rate in Myanmar. *ASEAN Economic Bulletin*, 289-304.

Lizondo, J. S. (1987). *Unification of dual exchange markets*. IMF Staff Papers, 34(3), 457–488.

Maio, P., & Santa-Clara, P. (2017). Short-term interest rates and stock market anomalies. Journal of Financial and Quantitative Analysis, 52(3), 927-961.

Makochekanwa, A. (2007). *A dynamic enquiry into the causes of parallel market exchange rate in Zimbabwe*. University of Pretoria Working Paper Series.

Matuka, A. (2019). Bank credit to the private sector: VECM approach for Albania. *Journal of economics and political economy*, *6*(2), 159-171.

Mlambo, K. (2018). *Dollarization and macroeconomic management in Zimbabwe*. African Development Bank Policy Briefs, 6(2), 45–61.

Mlambo, K., & Mupfumi, R. (2017). *Economic governance and exchange rate instability in Zimbabwe*. African Journal of Economic Review, 5(1), 101–118.

Mpapalika, J., & Malikane, C. (2019). The determinants of sovereign risk premium in African countries. Journal of Risk and Financial Management, 12(1), 29.

Mullet, G. M. (1976). Why regression coefficients have the wrong sign. *Journal of Quality Technology*, *8*(3), 121-126.

Muravyev, D., Pearson, N. D., & Pollet, J. M. (2022). Is there a risk premium in the stock lending market? Evidence from equity options. The Journal of Finance, 77(3), 1787-1828.

Mushendami, P., Manuel, V., Shifotoka, H., & Nakusera, F. (2017). Empirical analysis of the monetary approach to the balance of payment in Namibia. International Review of Research in Emerging Markets and the Global Economy (IRREM), 3(1), 1088-1104.

Nanayakkara, M., & Colombage, S. (2019). Do investors in green bond market pay a premium? Global evidence. Applied Economics, 51(40), 4425-4437.

Nkoro, E., &Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) cointegration

Pesaran, M. H., Shin, Y., & Smith, R. P. (2001). Pooled estimation of long-run relationships in dynamic heterogeneous panels.

Rigobon, R. (2013). A method for identifying aggregate credit supply and demand parameters using heteroskedascity: An application for Brazil. *Unpublished. http://www. econ. pucrio. Br/mgarcia/Heteroskedasticity_Credit_Demand_Supply_Mar_2017. pdf*.

Sachs, J. D. (2018). External debt and macroeconomic performance in Latin America and East Asia. In Modern Political Economy And Latin America (pp. 209-216). Routledge.

Schiumerini, L., & Steinberg, D. A. (2020). The black market blues: The political costs of illicit currency markets. The Journal of Politics, 82(4), 1217-1230.

Shah, I. H., Schmidt-Fischer, F., Malki, I., & Hatfield, R. (2019). A structural break approach to analysing the impact of the QE portfolio balance channel on the US stock market. International Review of Financial Analysis, 64, 204-220.

Shahbaz, M., Afza, T., & Shabbir, M. S. (2013). Does defence spending impede economic growth? Cointegration and causality analysis for Pakistan. *Defence and Peace Economics*, *24*(2), 105-120.

Sheikh, M. A. (1976). Black market for foreign exchange, capital flows and smuggling. *Journal of Development Economics*, *3*(1), 9-26.

Watson, D. (2023). The relationship between unemployment and wellbeing: an updated meta-analysis of longitudinal evidence. *European Journal of Work and Organizational Psychology*, *32*(1), 128-144.

Westerhoff, F. H. (2003). Expectations driven distortions in the foreign exchange market. *Journal of Economic Behavior & Organization*, *51*(3), 389-412.

Wooldridge, J. M. (2015). *Introductory econometrics: A modern approach*. Cengage learning.

World Bank. (1994). *Adjustment in africa world bank reforms, results, and the road ahead.* Oxford University Press

Appendix A

Descriptive Statistics

```
*Descriptive statistics

summarize EX CPI MS DV
```

Variable	Obs	Mean	Std. Dev.	Min	Max
EX	60	52.72386	33.97803	0	181.9292
CPI	60	8072.537	7901.293	169.826	29673.62
MS	60	2.50e+09	5.03e+09	9797725	1.89e+10
DV	60	110.3609	193.3641	9.090909	784.6653

Stationarity tests

```
.
. pperron lnEX, lags(1)

Phillips-Perron test for unit root                 Number of obs    =        57
                                                   Newey-West lags  =         1

                                 ---------- Interpolated Dickey-Fuller ----------
                    Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(rho)          -21.268           -19.026           -13.356          -10.742
 Z(t)             -3.501            -3.570            -2.924           -2.597
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0080

.
. dfuller lnEX, lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs    =        56

                                 ---------- Interpolated Dickey-Fuller ----------
                    Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)             -3.655            -3.572            -2.925           -2.598
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0048
```

```
. *lnCPI (LEVEL) Consumer price index

.
. pperron lnCPI, lags(1)

Phillips-Perron test for unit root                 Number of obs   =        59
                                                   Newey-West lags =         1

                                                   Interpolated Dickey-Fuller
                 Test         1% Critical         5% Critical         10% Critical
               Statistic         Value               Value               Value
------------------------------------------------------------------------------
 Z(rho)         -1.842          -19.062             -13.372             -10.754
 Z(t)           -2.744           -3.567              -2.923              -2.596
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0668

.
. dfuller lnCPI, lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        58

                                                   Interpolated Dickey-Fuller
                 Test         1% Critical         5% Critical         10% Critical
               Statistic         Value               Value               Value
------------------------------------------------------------------------------
 Z(t)           -3.000          -3.569              -2.924              -2.597
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0349

.

. pperron dlnCPI, lags(1)

Phillips-Perron test for unit root                 Number of obs   =        58
                                                   Newey-West lags =         1

                                                   Interpolated Dickey-Fuller
                 Test         1% Critical         5% Critical         10% Critical
               Statistic         Value               Value               Value
------------------------------------------------------------------------------
 Z(rho)        -59.213          -19.044             -13.364             -10.748
 Z(t)           -7.587           -3.569              -2.924              -2.597
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000

.
. dfuller dlnCPI, lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        57

                                                   Interpolated Dickey-Fuller
                 Test         1% Critical         5% Critical         10% Critical
               Statistic         Value               Value               Value
------------------------------------------------------------------------------
 Z(t)           -4.618          -3.570              -2.924              -2.597
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0001

.
```

```
. pperron lnMS, lags(1)

Phillips-Perron test for unit root                Number of obs   =        59
                                                  Newey-West lags =         1

                                                  ---------- Interpolated Dickey-Fuller ----------
                 Test                 1% Critical       5% Critical      10% Critical
               Statistic                 Value             Value            Value
------------------------------------------------------------------------------
 Z(rho)          0.165                  -19.062           -13.372          -10.754
 Z(t)            0.230                   -3.567            -2.923           -2.596
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.9739

. dfuller lnMS, lags(1)

Augmented Dickey-Fuller test for unit root        Number of obs   =        58

                                                  ---------- Interpolated Dickey-Fuller ----------
                 Test                 1% Critical       5% Critical      10% Critical
               Statistic                 Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            0.230                   -3.569            -2.924           -2.597
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.9739

. pperron lnMS, lags(1)

Phillips-Perron test for unit root                Number of obs   =        58
                                                  Newey-West lags =         1

                                                  ---------- Interpolated Dickey-Fuller ----------
                 Test                 1% Critical       5% Critical      10% Critical
               Statistic                 Value             Value            Value
------------------------------------------------------------------------------
 Z(rho)        -65.873                  -19.044           -13.364          -10.748
 Z(t)           -8.698                   -3.569            -2.924           -2.597
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000

.
. dfuller dlnMS, lags(1)

Augmented Dickey-Fuller test for unit root        Number of obs   =        57

                                                  ---------- Interpolated Dickey-Fuller ----------
                 Test                 1% Critical       5% Critical      10% Critical
               Statistic                 Value             Value            Value
------------------------------------------------------------------------------
 Z(t)           -6.413                   -3.570            -2.924           -2.597
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

```
. pperron lnDV, lags(1)

Phillips-Perron test for unit root                Number of obs   =        59
                                                  Newey-West lags =         1

                                                  ---------- Interpolated Dickey-Fuller ----------
                 Test                             1% Critical       5% Critical      10% Critical
               Statistic                             Value             Value            Value
------------------------------------------------------------------------------------------------
 Z(rho)         -6.393                            -19.062           -13.372          -10.754
 Z(t)           -1.799                             -3.567            -2.923           -2.596
------------------------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.3810

. dfuller lnDV, lags(1)

Augmented Dickey-Fuller test for unit root        Number of obs   =        58

                                                  ---------- Interpolated Dickey-Fuller ----------
                 Test                             1% Critical       5% Critical      10% Critical
               Statistic                             Value             Value            Value
------------------------------------------------------------------------------------------------
 Z(t)           -1.693                             -3.569            -2.924           -2.597
------------------------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.4348

. pperron dlnDV, lags(1)

Phillips-Perron test for unit root                Number of obs   =        58
                                                  Newey-West lags =         1

                                                  ---------- Interpolated Dickey-Fuller ----------
                 Test                             1% Critical       5% Critical      10% Critical
               Statistic                             Value             Value            Value
------------------------------------------------------------------------------------------------
 Z(rho)        -62.722                            -19.044           -13.364          -10.748
 Z(t)           -8.104                             -3.569            -2.924           -2.597
------------------------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller dlnDV, lags(1)

Augmented Dickey-Fuller test for unit root        Number of obs   =        57

                                                  ---------- Interpolated Dickey-Fuller ----------
                 Test                             1% Critical       5% Critical      10% Critical
               Statistic                             Value             Value            Value
------------------------------------------------------------------------------------------------
 Z(t)           -5.273                             -3.570            -2.924           -2.597
------------------------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

Optimum lag length selection

```
.
. *Optimum lag length selection

.
. ardl lnEX lnCPI lnDV lnMS , maxlags(1) aic

ARDL(1,1,1,0) regression
```

Bound Test to Cointegration

```
note: estat btest has been superseded by estat ectest
      as the prime procedure to test for a levels relationship.
      (click to run)

Pesaran/Shin/Smith (2001) ARDL Bounds Test
H0: no levels relationship              F =  2.121
                                        t = -2.463

Critical Values (0.1-0.01), F-statistic, Case 3
```

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_3	2.72	3.77	3.23	4.35	3.69	4.89	4.29	5.61

```
accept if F < critical value for I(0) regressors
reject if F > critical value for I(1) regressors

Critical Values (0.1-0.01), t-statistic, Case 3
```

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_3	-2.57	-3.46	-2.86	-3.78	-3.13	-4.05	-3.43	-4.37

```
accept if t > critical value for I(0) regressors
reject if t < critical value for I(1) regressors

k: # of non-deterministic regressors in long-run relationship
Critical values from Pesaran/Shin/Smith (2001)
```

ARDL Results

```
. ardl lnEX lnCPI lnDV lnMS , lags(1,1,0,1) ec btest

ARDL(1,1,0,1) regression

Sample:  2019m4 - 2023m12                       Number of obs     =         57
                                                R-squared         =     0.2250
                                                Adj R-squared     =     0.1320
Log likelihood = -28.428932                     Root MSE          =     0.4254
```

D.lnEX	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ADJ						
lnEX L1.	-.2737469	.1111412	-2.46	0.017	-.4969805	-.0505132
LR						
lnCPI	.3102885	.5655295	0.55	0.586	-.825611	1.446188
lnDV	.1691846	.2309269	0.73	0.467	-.2946458	.633015
lnMS	-.2121497	.330318	-0.64	0.524	-.875613	.4513136
SR						
lnCPI D1.	-.6957706	.4623256	-1.50	0.139	-1.624379	.2328376
lnMS D1.	-.1326409	.2882273	-0.46	0.647	-.7115625	.4462808
_cons	1.398299	.9564768	1.46	0.150	-.5228408	3.31944

Multicollinearity test

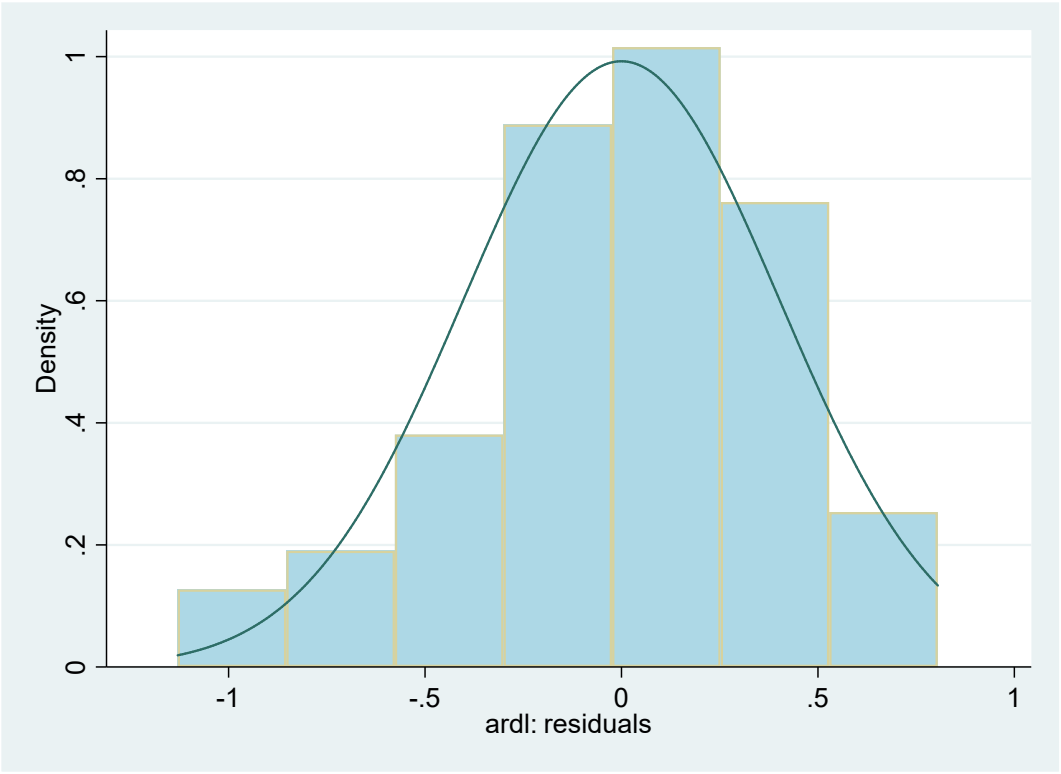
```
*Multicollinearity

estat vif
```

Variable	VIF	1/VIF
lnCPI	13.73	0.072850
lnMS	11.86	0.084288
lnDV	1.91	0.523991
lnCPI D1.	1.38	0.727268
lnMS D1.	1.25	0.802201
lnEX L1.	1.22	0.816717
Mean VIF	5.22	

Autocorrelation and stability test

Normality Test



Stability Test

