Imported inflation vis-à-vis domestic inflation in a multicurrency system in Zimbabwe

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Abstract

Purpose – This paper examines the impact of imported inflation in a multicurrency economy, focusing on Zimbabwe from February 2009 to February 2019.

Design/methodology/approach – The study employs the autoregressive distributed lag modelling approach and is structured into two distinct phases. These phases occur before and after the implementation of the bond notes, which served as Zimbabwe's fiat currency.

Findings – The results demonstrate a significant impact of external variables on Zimbabwe's inflation. Specifically, South African inflation and international oil prices were key positive drivers of domestic inflationary pressures. The positive relationship with South African inflation highlights the spillover effects from a major trading partner. Similarly, Zimbabwe's reliance on imported fuel makes it highly susceptible to global oil price fluctuations, which significantly contribute to local inflation. While import prices generally showed a positive association with domestic inflation, some individual effects were not statistically significant.

Originality/value – This study enhances the understanding of imported inflation dynamics in multicurrency economies by highlighting both the long-term and short-term effects of foreign inflation and commodity prices on domestic inflation. It also provides valuable insights for policymakers, emphasising the importance of regional inflation linkages and the limitations of multicurrency systems in shielding economies from external price shocks.

Keywords Inflation, Multicurrency, Dollarisation

Paper type Research article

1. Introduction

Globalisation has meant that economies are now more interdependent than in the past. In most developing countries, international trade is seen as an important factor for economic development. In many developing countries, imports provide important raw materials that are not readily available in local markets, thus supporting domestic production (Ngoma, 2020). In addition, imports create competition for local producers, which can benefit consumers through lower prices and higher-quality products. Furthermore, most developing countries struggle to produce enough goods and services to meet national demand, so imports are an essential part of economic sustainability.

As a small open economy, Zimbabwe is highly vulnerable to international shocks that affect the commodities it imports for both consumption and production. In recent years, the country's industry and agriculture have faced challenges, leading to increased dependence on imports of essential goods, such as oil, food and machinery. In March 2023, for example, imports consisted mainly of diesel (11.3%), petrol (5.6%), crude soybean oil (2.9%) and electricity (2.5%) (RBZ, 2023). This dependency emphasises the need for strategies to increase domestic productivity and reduce vulnerability to external economic fluctuations (RBZ, 2023).

Like many developing countries, Zimbabwe relies on imported oil to meet its energy needs. The industrial sector is highly dependent on these imports, especially as oil serves as an

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alternative source of energy during frequent power cuts. In addition, the country has faced significant natural disasters, such as droughts and floods, which have severely impacted the agricultural sector (ERSA, 2016). Despite these challenges, insufficient investment in agriculture has meant that the country has been unable to meet its national food needs for years (World Bank, 2019).

Products such as maize, wheat, soya beans and crude oil are imported into Zimbabwe on a large scale. Wheat is an important ingredient for the bakery industry, while soya oil is essential for the production of cooking oil. As maize is the country's staple food, maintaining large reserves is critical to meeting national demand. However, Zimbabwe is still largely dependent on imports, as domestic production is not sufficient to meet the needs of the population, not even for staple foods.

Price fluctuations in key imported goods have a significant impact on local prices, as these goods are a daily necessity for Zimbabweans. An important question for economists is to analyse how international developments and the prices of imported goods affect the domestic inflation rate. This paper contributes to a deeper understanding of the dynamics of imported inflation, especially in economies with multi-currency systems, by shedding light on both the short-run and long-run effects of foreign inflation and commodity prices on domestic inflation. The study makes a novel contribution by focusing on Zimbabwe's unique multi-currency system and dividing the analysis into two distinct periods: a pre-bond period (February 2009 to November 2014) and a post-bond period (December 2014 to February 2019). This approach enables a detailed analysis of how the introduction of a pseudo-currency affects inflation dynamics and the transmission of external shocks.

Previous studies, such as those by Makena (2017), Nyarota *et al.* (2016) and Kavila and Le Roux (2016), while analysing the impact of external factors on inflation in Zimbabwe after the introduction of the multi-currency system, only focused on the first years of use and did not examine in detail the period after the introduction of the bonds. This study fills this gap and provides new evidence on how multicurrency systems and currency conversions affect domestic inflation. The remainder of this paper is organised as follows. Section 2 presents the theoretical framework and literature review, and examines the landscape of imported inflation, particularly in developing, import-dependent countries. Section 3 describes the methodology used in the study. Section 4 contains the empirical analysis. Finally, Section 5 presents the conclusions and policy recommendations derived from the study.

2. Literature review

2.1 Theoretical literature

The impact of international developments and the prices of imported goods on domestic prices for goods and services has attracted considerable attention from central banks and economists worldwide. Imported inflation refers to the overall increase in domestic prices caused by rising costs of imported goods, which may result from higher foreign prices or the depreciation of the domestic currency.

External shocks, such as fluctuations in global commodity prices, can have a significant impact on the domestic price level via various transmission channels. In small, open economies, which are usually price takers on the world market, changes in international prices for key commodities such as oil and basic foodstuffs can have a direct impact on local consumer prices. This direct impact is often referred to as a first-round effect, where increased import costs lead to higher retail prices for consumers. In addition, these shocks can have an indirect effect on domestic prices by increasing production costs for businesses (Tiedemann *et al*., 2024). When input costs rise, companies can pass these expenses on to consumers through higher prices for goods and services, contributing to further inflationary pressures. This phenomenon is consistent with the cost-push theory of inflation, where rising input costs, particularly imported costs, drive up the general price level (Mankiw, 2021). Early contributions in the literature emphasised the direct link between import prices and domestic inflation. Miller (1976) examined the impact of rising import prices on inflation and deflation trends in the UK in the early 1970s and found a significant relationship between increased import prices and an increase in domestic prices.

Similarly, Turnovsky and Kaspura (1974) showed that in a small open economy, an increase in external inflation rates leads to higher domestic prices in the short run. More modern theories extend these basic findings and focus in particular on the pass-through effect of exchange rate fluctuations and import prices. When the prices of goods and services that a country imports rise, especially if they are used as inputs for local production, the costs of local production increase. To protect their profit margins, producers often pass these increased costs on to consumers, raising the price of the final product and leading to inflation (Obstfeld and Rogoff, 2000). An apt example is the rise in fuel prices, which has both direct and indirect effects. Directly, it leads to higher transport costs throughout the economy. Indirectly, an increase in fuel prices leads to higher production costs, as fuel is an important input for various production processes, which ultimately leads to higher prices for the final products and creates a ripple effect throughout the economy Ferroni and Santoro (2023).

The extent to which import price changes affect domestic prices is a central topic of current research. New Open Economy Macroeconomics (NOEM) models, which build on the work of Obstfeld and Rogoff (1995), emphasise the role of pricing decisions at the firm level and market structure in determining pass-through. These models assume that firms' expectations regarding the durability of import price changes, the elasticity of demand and the competitive environment influence their pricing strategies. If firms expect import prices to remain high, they are more likely to adjust their domestic prices to protect their profit margins than to absorb the costs. In particular, Taylor (2000) has emphasised that the pass-through of import prices is likely to be higher in countries that exhibit greater persistence of exchange rate fluctuations, pointing to the importance of exchange rate volatility in multi-currency economies. In addition, Local Currency Pricing (LCP) and Producer Currency Pricing (PCP) under NOEM provide different predictions of the extent and speed of pass-through. LCP, where exporters set prices in the importer's currency, tends to imply a lower and slower pass-through than PCP, where prices are set in the exporter's currency (Betts and Devereux, 2000).

The second-round effects of the pass-through theory occur when initial price changes, caused by first-round effects, influence the inflation expectations of economic agents. If an external shock persistently increases the public's long-term inflation expectations, this can push inflation up further (Gali, 2008; Yunculer, 2009).

In modern macroeconomic theory, there are two main theories related to expectations: adaptive expectations and rational expectations. The theory of adaptive expectations, which goes back to the work of Cagan (1956) and Friedman (1968), assumes that economic agents form their inflation expectations on the basis of past inflation trends and the current inflation situation and are therefore backward-looking. In contrast, the theory of rational expectations, which was founded by Muth (1961) and further developed by Lucas (1972) and Sargent *et al*. (1973), assumes that economic agents base their expectations on their human rationality, all available information and previous experience. This theory states that, with perfect information and foresight, economic agents can predict the future without making systematic errors (Brannon, 2006). This means that outcomes based on this theory are consistent with market equilibrium outcomes, as all available information is used to make predictions (IMF, 2021).

Dohner's (1984) study, while older than some of the more recent NOEM developments, offered important insights into how consumers adapt to price changes. His price model, based on forward-looking, competitive, profit-maximising exporters, suggests that consumers' expectations about the duration and impact of exchange rate fluctuations, and their adjustments, play a key role in determining the extent of pass-through of changes in foreign prices.

This complexity is compounded in the context of a multi-currency economy like Zimbabwe. The coexistence of multiple currencies, often alongside a volatile local currency, means that exchange rate fluctuations become a direct and powerful channel for imported inflation. The pass-through of international price changes and exchange rate devaluations to domestic prices can be rapid and significant, especially for essential goods. In addition, the interaction between different currencies can influence pricing strategies and inflation expectations, further complicating the transmission mechanisms of imported inflation.

2.2 Empirical literature

The concept of imported inflation, especially in emerging markets, has attracted considerable attention due to its crucial role in shaping domestic inflation dynamics. Numerous empirical studies have examined the relationship between imported inflation and domestic price levels, focusing on external factors such as global commodity prices, exchange rates and food prices. A common theme in the literature is the impact of global commodity prices, particularly oil and food, on domestic inflation. Developing countries are frequent importers of key commodities, and consequently, price fluctuations have a significant impact on domestic inflation (Lafrogne-Joussier *et al.*, 2023). Studies that have examined the relationship between oil prices and inflation, for example, have found notable effects. Bari and Adali (2020) examined oil price changes in Turkey and found that both crude oil and petrol prices had asymmetric effects on the Consumer Price Index (CPI). Petrol prices had a stronger impact, suggesting that the pass-through effect varies by oil product. This is consistent with Mukhtarov *et al.* (2019), who observed a positive and significant impact of oil prices on inflation in Azerbaijan. Abaidoo and Agyapong (2023) conducted a panel study of 32 emerging economies and found that fluctuations in the currency-adjusted prices of crude oil, gold, and cocoa had a significant positive impact on inflation.

Another key issue is the role of exchange rates in the transmission of imported inflation. The literature emphasises the importance of exchange rate stability in controlling inflation in developing countries. Liu and Chen (2016) investigated the relationship between imported prices, inflation and exchange rates in China using a vector error correction (VEC) model. Their results showed a short-term pass-through channel from the exchange rate to inflation via the import and producer price indices, and confirmed that import prices have a positive and significant effect on the CPI.

Despite these findings, a common limitation of studies on imported inflation is the tendency to focus on broad commodity indices when analysing the impact of food import prices on domestic inflation. The direct impact of specific commodities on imported inflation needs further investigation. Many developing economies, especially in Africa, are highly dependent on food imports. For instance, Okpe and Ikpesu (2021) confirmed a long-term relationship between inflation and food imports in Nigeria. Similarly, Carluccio *et al.* (2023) found that consumption imports have a positive impact on inflation in low-income countries. These findings emphasise the vulnerability of many African countries to fluctuations in global food prices. The focus on food imports and their impact on domestic inflation is particularly relevant in economies that cannot produce enough food locally to meet demand.

Ibrahim (2015) analysed inflation dynamics in Sudan, highlighting the role of exchange rates and external shocks as drivers of domestic inflation. The study found that while money supply growth was an important determinant of inflation in Sudan, the parallel market for foreign exchange and imported inflation were also important factors, which increased the sensitivity of the economy to external shocks.

The case of Zimbabwe provides a unique context for analysing the relationship between imported inflation and monetary systems. In a study of inflation dynamics in Zimbabwe, Kavila and Le Roux (2016) found that the effects of crude oil and petrol prices were asymmetric in the short run but became symmetric over time. This finding highlights a potential area for future research on how these effects evolve from asymmetric to symmetric.

Makena (2017) attempted to bridge this gap by analysing the impact of world grain prices on inflation in Zimbabwe individually. His study found that price levels were influenced by the ZAR/USD exchange rate, South African CPI, world grain prices and international crude oil prices in the long run.

A notable gap in the literature concerns the dynamics of imported inflation in countries operating under a multi-currency system or that have undergone a currency redenomination. Makena (2017), Nyarota *et al.* (2016) and Kavila and Le Roux (2016) examined the impact of external factors, such as the ZAR/USD exchange rate and world grain prices, on inflation in Zimbabwe following the introduction of the multi-currency regime. These studies essentially found that local inflation was primarily driven by external factors such as international oil prices, world food prices and the USD/ZAR exchange rate. However, it is important to point out that these studies only focused on the early years of multi-currency use, i.e. the period before the introduction of fiat notes (bonds). The use of multiple foreign currencies in Zimbabwe and the subsequent introduction of bonds as a pseudo-currency have therefore not yet been extensively studied in the literature. This context provides a unique opportunity for further research on how multi-currency systems and currency redenominations affect inflation in the country.

3. Research methodology

3.1 Data sources and characteristics

This study used data from publicly available sources, including the Reserve Bank of Zimbabwe (RBZ), the South African Reserve Bank, the World Bank and the International Monetary Fund. The data sets include the CPI for Zimbabwe and South Africa, as well as global commodity prices for key food items, such as wheat, rice, maize, soya beans and fuel oil. The data, which consist of monthly data points, cover the period from February 2009 to February 2019, but potential limitations include data gaps, reporting inconsistencies, different calculation methods for CPI figures across countries, and the possibility of revisions to inflation and commodity price data. To address these challenges, additional sources such as ZIMSTAT have been cross-referenced, missing data have been interpolated where necessary, and all CPI series have been standardised to percentage changes to ensure comparability.

3.2 Analytical framework

The study period was divided into two phases to analyse the impact of the independent variable on the dependent variable. Firstly, in February 2009, Zimbabwe introduced a multi-currency system in which only foreign currencies are included in the currency basket. The US Dollar (USD) and the South African Rand (ZAR) were the most commonly used currencies. However, in 2014, Zimbabwe introduced its pseudo-currency, the “bond note”, into the currency basket, claiming it was on par with the USD. This move distorted the economy as the government controlled the money supply. For this study, the research was divided into two periods: a period before the “bond” (February 2009 to November 2014) and a period after the “bond” (December 2014 to February 2019), during which the “bond” was still officially valued at the same value as the USD. From March 2019, the monetary authorities announced that the bond currency would no longer be valued at parity with the USD but would become a legal tender valued against other currencies.

The theoretical basis of the study is based on the theories of expectations and rational expectations. The theory of adaptive expectations states that individuals form inflation expectations based on past inflation. This is reflected in the empirical model by using lagged values of domestic inflation. In contrast, rational expectations theory assumes that economic agents use all available information, including the current economic situation and international prices, to form their inflation expectations. This means that foreign inflation and the prices of imported commodities, such as food and fuel, have a direct impact on domestic inflation.

In this study, the autoregressive distributed lag (ARDL) model is used to analyse whether Zimbabwe suffered from imported inflation during the period of multi-currency use. In the ARDL model, the relationships are captured by lagged terms, which show how past inflation, foreign inflation and the prices of imported goods affect domestic inflation. This approach reflects both adaptive and rational expectations. The ARDL model is particularly well-suited to analysing both short-term and long-term dynamics. It provides insight into how past inflation and external shocks, such as fluctuations in import prices, influence domestic inflation. The empirical frameworks proposed by Miller (1976) and Turnovsky and Kaspura (1974) were modified to meet the objectives of this study. The basic model is as follows:

$$cpi = f(oil, wheat, soybean, maize, rice, cpisa), \tag{1}$$

where *cpi* is the domestic inflation rate, *oil* is the international oil price per barrel, *wheat* is the international wheat price/tonne, *rice* is the international rice price/tonne, *soybean* is the international price of crude soybean oil/ tonne, and *cpisa* is the South African monthly inflation rate. The model shown above was used in its log-linear form. The definitions of the variables and the justifications for their inclusion are presented in Table 1 below.

The ARDL model is based on the OLS model and can be used for both non-stationary and mixed-order integration time series, which is an advantage. The ARDL model can be represented as follows:

$$lncpi_t = \alpha + \varnothing_1 lncpi_{t\text{-}1} + ... + \varnothing_p lncpi_{t\text{-}p} + \beta_0 lnx_t + ... + \beta_q lnx_{t\text{-}q} + \epsilon_t, \tag{2}$$

where *cpi* is the dependent variable, and depends on p lags of itself, *cpi* also depends on the current value of the explanatory/independent variable X, and on q lags of X. X represents the independent variables, and *T* is the deterministic trend.

The model assumptions are as follows:

$$Cov\left(\epsilon_t, \epsilon_{t\text{-}p}\right) = 0, and\ Var(\epsilon_t) = \sigma^2.$$

A dynamic error correction model (EC) can be derived from a basic ARDL model by means of a simple linear transformation. As such, the EC model integrates both the short-term and long-term equilibria. This allows for the preservation of the model's long-run information and helps to avoid problems with spurious regressions arising from non-stationary time series data (Shrestha and Bhatta, 2018). The model can also display both the short-term and long-term parameters simultaneously:

$$\Delta lncpi_t = \alpha_0 + \sum_{k=1}^{p} \forall_j \Delta ln\ cpi_{t\text{-}k} + \sum_{k=1}^{q} \beta_j \Delta ln\ x_{t\text{-}k} + \sum_{k=1}^{p} \varepsilon_i \Delta z_{t\text{-}1} + \lambda_1 ln\,cpi_{t\text{-}1} + \lambda_2 ln\,x_{t\text{-}1} + \lambda_3 z_{t\text{-}1} + \mu_t, \tag{3}$$

The first section of the equation with α, β and ε exemplifies the short-run dynamics of the model, while the second section with the λ represents the long-run dynamics of the model. Equation (3) can then be reparametrized as an ECM and results in the following:

$$\Delta lncpi_t = \alpha_0 + \sum_{k=1}^{p} \forall_j \Delta ln\ cpi_{t\text{-}k} + \sum_{k=1}^{q} \beta_j \Delta ln\,x_{t\text{-}k} + \sum_{k=1}^{p} \varepsilon_i \Delta z_{t\text{-}1} + \lambda EC_{t\text{-}1} + \varepsilon_t. \tag{4}$$

In Equation (4), the error correction coefficient (λ) is the speed of adjustment and the EC are the residuals that are obtained from the estimated cointegration model of Equation (4). To imply a cointegration relation, λ it is expected to be less than zero and also negative.

A prerequisite for the ARDL model is that the variables must be either stationary at level I (0) or integrated first order I (1) or a combination of both. This means that unit root tests must be performed before the ARDL model can be estimated. The Phillips-Perron (PP) test was

Table 1. Variable definitions and justifications

Variable name	Measurement	Expected sign	Justification for inclusion
Consumer Price Index (CPI)	Monthly CPI values	+	The CPI is the endogenous variable in this study, representing the general price level of goods and services in Zimbabwe. It serves as the main measure of inflation and is central to understanding the dynamics of the economy
International oil price	International crude oil price per US Dollar/ barrel of oil	+	Oil is a critical import for Zimbabwe, significantly affecting inflation through cost-push effects. Rising oil prices impact production and transportation costs, contributing to an increase in overall inflation. This variable captures the extent to which international oil price fluctuations influence domestic price levels in Zimbabwe (Mukhtarov *et al.*, 2019; Bass, 2019; Bari and Adali, 2020)
International food prices (maize/tonne, wheat/tonne, rice/tonne and soybean crude oil/tonne)	US dollars (USD) per tonne	+	Zimbabwe's dependence on food imports, particularly staples such as maize, wheat, rice and soybeans, leads to cost-push inflation. Rising international food prices directly elevate the cost of imports and domestic retail prices. These goods are critical food items and serve as inputs in producing other goods, thus amplifying inflationary pressures across sectors (Kavila and Le Roux, 2016; Ansari, 2020)
South Africa Inflation Rate	Consumer Price Index (CPI)	+	South Africa, Zimbabwe's primary trading partner, utilizes the South African Rand, which is widely used in Zimbabwe. Therefore, fluctuations in South African inflation directly impact Zimbabwean inflation. Given the high volume of imports from South Africa, these inflationary effects are anticipated to be positive, with time lags reflecting the adjustment process (Kavila and Le Roux, 2016; Pindiriri, 2012)

Source(s): Authors' computations

used to test for the presence of a unit root. The data were first analysed to determine whether a trend or a constant should be included in the unit root tests. These tests were essential as they confirmed the stationarity of the variables, as I(2) variables are not compatible with this model.

A bounds test for cointegration was then performed to determine the long-term relationship. This test was used to determine whether there was cointegration and/or a long-term relationship between the dependent and independent variables. The Akaike Information Criterion (AIC) was used to determine the optimal lag length for the long-run estimates. This test was used to determine whether there was cointegration and/or a long-run relationship between the dependent and independent variables. The ECM was performed to determine how quickly the dependent variable returns to equilibrium after a shock. This is also referred to as the speed of adjustment. Several diagnostic tests were then performed to assess the robustness of the econometric model and to account for possible sensitivities in the results. The cumulative sum test (CUSUM) was used to assess the stability of the model, whereby the model is considered stable if the CUSUM line remains within the critical limits. The Breusch–Godfrey test for serial correlation with the Lagrange multiplier (LM) was applied to detect serial correlation in the residuals and to ensure that the error terms are not correlated, which is crucial for the validity of the results. The Breusch–Pagan–Godfrey test was performed to check for heteroscedasticity and to confirm that the residuals have a constant variance.

Although the ARDL model is suitable for analysing imported inflation, it reaches its limits in Zimbabwe due to problems such as non-stationarity, structural breaks (e.g. the introduction of a pseudo currency) and potential endogeneity or errors in model specification. These challenges, which include the risk of spurious results and unstable relationships, were mitigated by using diagnostic tests to ensure the robustness and accuracy of the analysis. The estimation techniques used were identical and were applied in the same order for both the pre-“bond” period (February 2009 to November 2014) and the post-“bond” period (December 2014 to February 2019).

4. Results and discussions

4.1 Stationarity test (Phillips-Peron tests)

Table 2 shows that, for the period from February 2009 to November 2014, only LOIL is integrated with order zero I (0). The other variables are stationary after the first differentiation, i.e. they are integrated with order one. For the period from December 2014 to February 2019; however, all variables are integrated with order one I (1). This mixed order of integration is an important reason for estimating an ARDL model.

4.2 Cointegration test

Table 3 shows that the calculated F-statistic exceeds the critical values for both periods. This leads to the rejection of the null hypothesis that there is no cointegration, which indicates a long-run relationship between the variables. Given this cointegration between inflation (the dependent variable) and the independent variables, an Error Correction Model (ECM) was estimated. The presence of this long-run relationship ensures that the model effectively captures the impact of the independent variables on inflation in Zimbabwe in both the short and long run.

Table 2. Stationarity test

	Feb. 2009 to Nov. 2014			Dec. 2014 to Feb. 2019		
Variable	Level	First difference	Order of integration	Level	First difference	Order of integration
LCPI	−1.916	−10.219**	I (1)	−2.224	−3.904**	I (1)
LOIL	−4.283**	−6.160**	I (0)	−2.606	−6.227**	I (1)
LWHEAT	−1.859	−5.729**	I (1)	−2.417	−7.378**	I (1)
LSOYBEAN	−1.133	−6.624**	I (1)	−1.645	−5.883**	I (1)
LMAIZE	−0.886	−6.164**	I (1)	−2.810	−6.993**	I (1)
LRICE	−1.902	−5.152**	I (1)	−2.995	−5.276**	I (1)
LCPISA	−2.168	−7.731**	I (1)	−1.866	−6.145**	I (1)

Note(s): **H_0 rejected at 5% level of significance
Source(s): Authors’ computations

Table 3. Bounds test for cointegration

Test statistic	Value	Significance	I (0)	I (1)
F-statistic	*5.535* – (for the period Feb. 2009 – Nov. 2014) *6.592* – (for the period Dec. 2014 – Feb. 2019)	10%	2.53	3.59
K	6	5%	2.87	4
		2.5%	3.19	4.38
		1%	3.6	4.9

Source(s): Authors' computations

4.3 Long-run estimation

The AIC was used to determine the optimal lag length for the study. First, a maximum of two lags was set for all exogenous and endogenous variables to allow for automatic selection. Based on the AIC, an ARDL model (1, 1, 0, 2, 1, 0, 2) was selected for the first period (February 2009 to November 2014) and an ARDL model (4, 3, 4, 0, 4, 3, 4) for the second period (December 2014 to February 2019).

The study found that inflation in Zimbabwe is strongly influenced by its own past inflation trends. This is evidenced by the significant positive coefficient for the Lagged Consumer Price Index, LCPI (−1), which rose from 0.817 in the first period to 1.132 in the second period, reflecting increased inflation persistence. The South African inflation rate, LCPISA, also had a statistically significant and stronger impact in the later period, with a coefficient of 4.461, indicating that the transmission of inflation from South Africa was more pronounced. A comprehensive analysis of the entire period shows that earlier inflation rates have a positive influence on current inflation rates. This can be explained by the tendency of profit-maximising companies to monitor the economy and adjust prices based on expectations of future trends. When profit-maximising firms observe that commodity prices are rising or falling, they tend to hedge against possible losses by adjusting their current prices relative to those of the previous period (Dohner, 1984). This phenomenon was also observed by Pindiriri (2012).

The study also suggests that external shocks, such as fluctuations in commodity prices, have a dampening effect on inflation in Zimbabwe due to the stabilising influence of the multi-currency system, which reduces the pass-through effect. In addition, the introduction of bonds in late 2014 is likely to have increased inflation expectations, making Zimbabwe more sensitive to foreign inflationary pressures, particularly from South Africa.

The finding that most food commodities such as maize, rice and soya beans have an insignificant or negative relationship with local inflation (Table 4) challenges the typical

Table 4. ARDL long-run estimated coefficients

Variable	Feb. 2009 to Nov. 2014	Dec. 2014 to Feb. 2019
LCPI (−1)	0.817	1.132
LCPISA	*0.281*	*4.461*
LMAIZE	−0.004	−0.119
LOIL	0.017	0.065
LRICE	−0.003	*−0.218*
LSOYBEAN	−0.003	−0.215
LWHEAT	−0.008	0.080
C	0.879	−3.815

Source(s): Authors' computations

assumption that international commodity prices have a strong pass-through effect on inflation. This finding can be attributed to several factors in Zimbabwe's economy. For example, the country produces a significant amount of maize, its staple food and government subsidies for inputs such as seed and fertiliser can increase local supply, which helps to insulate the domestic market from international price increases. This support can also lead to lower local prices and a negative correlation with international prices. For a product such as rice, the negative relationship with inflation in the second period could also be due to the fact that rice can easily be substituted by other staple foods such as maize. The stabilising influence of the multi-currency system, in particular the use of the US dollar, also reduces the pass-through effect of international commodity prices, as the foreign currency serves as a buffer against fluctuations. In this context, domestic and regional factors, particularly South African inflation and the use of foreign currencies, played a more important role in shaping inflation dynamics. This is consistent with findings from other economies with multiple currencies or dollars, such as Ecuador (Cristo and Gómez-Puig, 2013), where regional inflation and currency stability reduce the impact of global price changes on local inflation.

The positive impact of South African inflation on local rates can be attributed to increased trade and regional integration. Throughout the study period, Zimbabwe used the South African rand as legal tender and was heavily dependent on imports from South Africa, one of its largest trading partners. Both formal and informal traders were dependent on these imports, so that changes in the South African price level could quickly affect local prices. This finding is also confirmed by Makena (2017), who observes that South African inflation had a positive impact on inflation in Zimbabwe from 2010 to 2015.

In contrast, international commodity prices (maize, oil, rice, soya beans, wheat) show a weak or negative relationship with inflation in Zimbabwe, with limited pass-through effects. While oil prices show a modest positive relationship in both periods, this effect is dampened by the use of foreign currencies, particularly the US dollar, which acts as a buffer against commodity price fluctuations. However, Zimbabwe's dependence on imported fuel makes the country vulnerable to global oil price fluctuations, which still contribute significantly to local inflation. Similarly, wheat prices, which were initially negative, turned positive in the second period, probably due to increased dependence on wheat imports, but the overall impact remained small and insignificant.

In the second period, international rice prices had a significant, albeit negative, impact on inflation rates. This could be due to the easy substitution of rice with other staple foods such as maize. Zimbabwe produces a considerable amount of maize, which many subsistence farmers focus on growing. In times of sufficient rainfall, the country can meet most of its maize needs. In addition, the Zimbabwean government has often subsidised maize production by providing farmers with inputs such as seed and fertiliser. This support may lead to increased local maize supply, potentially shielding the domestic market from international price increases or even leading to lower local prices, thus explaining the weak or negative correlation observed.

Local supply fluctuations also play a role, especially for products such as soya oil. Fluctuations in local production can offset the effects of international price movements. When local harvests are good, dependence on imports decreases, and international price increases may not fully feed through to domestic inflation. Conversely, a local oversupply could lead to lower domestic prices, creating a negative correlation with international prices.

4.4 Error correction model (ECM)

The term ECM-1 represents the delayed error correction component, which indicates how quickly deviations from the long-term equilibrium are corrected in the short term. For the period from February 2009 to November 2014, the ECM results show that only 18.3% of deviations from the long-term equilibrium are corrected within one period (Table 5). This slow adjustment speed means that it takes longer for the inflation shocks to dissipate. In the short run, South African inflation has a significant positive effect on Zimbabwean inflation, which

Table 5. Error correction model (February 2009 to November 2014)

Variable	Coefficient	Std. Error	*t*-statistic	Prob
C	0.880	0.133	6.588	0.000
D(LCPISA)	*0.281*	0.121	2.312	*0.025*
D(LOIL)	0.017	0.008	2.257	*0.028*
D(LRICE)	−0.003	0.009	−0.396	0.693
D(LWHEAT)	−0.008	0.005	−1.371	0.176
ECM (−1)	−0.183	0.028	−6.567	*0.000*

Source(s): Authors' computations

emphasises the existence of imported inflation due to Zimbabwe's economic dependence on South Africa. Oil prices also have a statistically significant positive impact, highlighting the sensitivity of local inflation to global energy costs. However, rice and wheat prices have no significant impact, suggesting that fluctuations in these commodity prices had a limited short-term impact.

For the second period (see Table 6), the ECM results show that 70% of deviations from the long-term equilibrium are corrected within one period. The introduction of debt securities at the end of 2014 probably increased inflation expectations and undermined confidence in the local quasi-currency. This increased the sensitivity of the economy to price signals or shocks and caused domestic prices to adjust faster to restore equilibrium after a disturbance. In addition, the post-bond period was characterised by significant currency volatility and potential weaknesses in monetary policy. In such an environment, economic agents (businesses and consumers) tend to react quickly to perceived inflationary pressures in order to preserve their value, leading to faster price adjustments.

As far as the independent variables are concerned, South African inflation has a significant positive impact, which emphasises the existence of imported inflation due to Zimbabwe's economic dependence on South Africa. In contrast, international commodity prices show mixed effects. Rice prices have a significant negative relationship with inflation, as can also be seen in the long-term model, which could be due to substitution effects or supply adjustments in response to global price movements. Soya prices also show a negative, albeit only marginally significant, effect. These results suggest that the short-term impact of these specific commodity prices on inflation in Zimbabwe is limited, which is likely due to a combination of local supply dynamics and the buffer effect of the multi-currency system.

The regression analysis confirms that Zimbabwe was vulnerable to foreign price fluctuations during the multi-currency era, especially after the introduction of its pseudo-currency. This is in line with economic theory, which states that small, open economies, such as a multi-currency economy, are vulnerable to international shocks that affect imported goods.

Table 6. Error correction model (December 2014 to February 2019)

Variable	Coefficient	Std. error	*t*-statistic	Prob
C	−3.815	0.482	−7.912	0.000
D (LCPISA)	*4.461*	0.920	4.850	*0.000*
D(LMAIZE)	−0.119	0.077	−1.542	0.142
D(LRICE)	−0.218	0.073	−2.985	0.008
D(LSOYBEAN)	−0.215	0.104	−2.065	0.055
D(LWHEAT)	0.080	0.054	1.488	0.155
ECM (−1)	−0.700	0.089	−7.901	0.000

Source(s): Authors' computations

4.5 Residual diagnostic tests

In the study, tests for stability, serial correlation, and heteroscedasticity were conducted to assess the reliability of the model. The results confirmed the robustness of the model and ensured the validity of the results. The Cumulative Sum of Recursive Residuals (CUSUM) test (Figure 1) and the CUSUM of Squares (CUSUMSQ) test (Figure 2) were used to assess the stability of the model's parameters over time. The results indicate that the model is stable at the 5% significance level, which shows that the relationships between the variables have not changed significantly over the entire study period.

The Breusch-Godfrey test was used to test for serial correlation. For both time periods, the *p*-values for the F-statistic (0.910 and 0.255) and chi-square (0.8823 and 0.020) are both greater than the significance level of 0.05, confirming that the null hypothesis of no serial correlation is not rejected and that there is no significant serial correlation in the residuals.

Finally, the Breusch–Pagan–Godfrey test was performed to determine heteroscedasticity. For both time periods, the *p*-values for the F-statistic (0.103 and 0.199), the chi-square (0.117 and 0.251) and the scaled explained SS (0.5412 and 1.000) are all greater than 0.05, indicating that the null hypothesis of homoscedasticity is not rejected and that there is no significant heteroscedasticity in the residuals. Overall, these diagnostic checks confirm that the model is well specified, reliable and valid for drawing conclusions.

To eliminate possible endogeneity problems, a crucial assumption for the validity of the ARDL and ECM models, Granger causality tests were performed. The results provide clear evidence that the independent variables are not endogenous to the model, meaning that the past values of these variables can predict future inflation (CPI) and are not simultaneously determined.

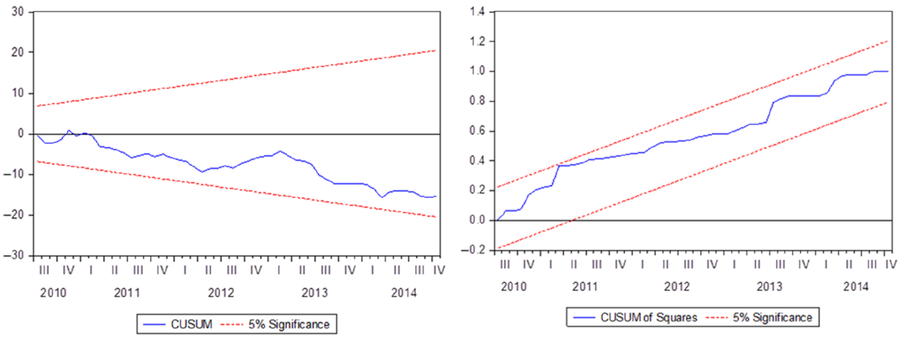

Figure 1. Stability tests (February 2009 – November 2014). **Source:** Authors' compilation

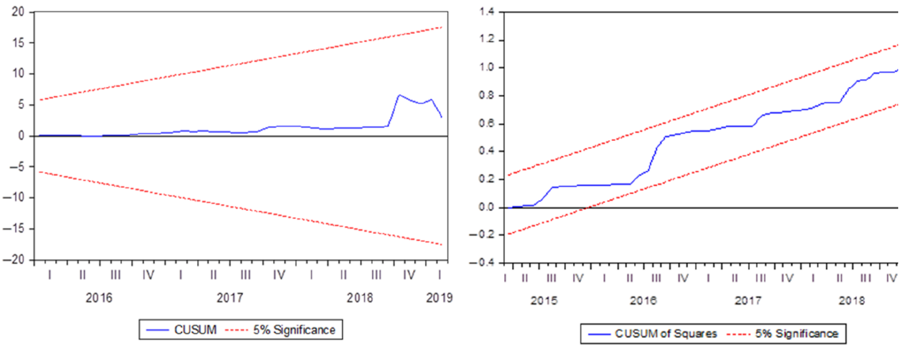

Figure 2. Stability tests (December 2014 – February 2019). **Source:** Authors' compilation

In particular, the Granger causality tests for the first period (February 2009 to November 2014) show a clear causal relationship between all independent variables and the consumer price index. The prices of oil, maize, rice, wheat, soya beans and the South African CPI (CPISA) all show significant predictive power for inflation in Zimbabwe, either immediately or with a short lag. This confirms that these variables act as true predictors and are not co-determined by local inflation. This strengthens the validity of our ARDL model and mitigates the endogeneity bias.

For the second period (December 2014 to February 2019), the causal relationships are less pronounced, but still provide valuable support. While some commodity prices (oil, rice, soybeans) show no significant Granger causality, others, such as corn, wheat and especially CPISA, still show a significant predictive relationship at certain lags. The strong and persistent Granger causality of CPISA emphasises its role as an important exogenous driver of Zimbabwean inflation, especially in a period of heightened currency instability. Overall, these results support the assumption that the independent variables are largely exogenous, underpinning the reliability of our model's estimates (Supplementary Table 1A and 1B shows the results of the Granger causality test).

5. Conclusions and recommendations

This study examines the impact of imported inflation on domestic inflation in Zimbabwe during the multi-currency era. It uses the international prices of oil, rice, wheat, maize and soya beans and South African inflation rates as independent variables. Zimbabwe's consumer price index served as a measure of domestic inflation. The ARDL regression model was used to analyse these relationships, with the study period divided into two periods for comparative analysis.

The results showed a long-term relationship between the imported inflation variables and domestic inflation. The direction of this relationship remained largely consistent across the two periods, with South African inflation and oil prices consistently found to have a significant positive impact on Zimbabwean inflation. Although a positive relationship was also observed for wheat prices, the result was not statistically significant. Overall, the study concludes that Zimbabwe experienced imported inflation during the era of multiple currencies, with foreign prices and inflation rates playing a key role in shaping domestic inflation trends.

By analysing the complex monetary environment in Zimbabwe, the study provides new insights into how multi-currency systems and currency shifts influence inflation dynamics. These insights contribute to a broader understanding of international economics and monetary policy, especially in small, open economies. The study illustrates how small, import-dependent economies, especially those with limited monetary policy autonomy, are vulnerable to external economic shocks and fluctuations in global commodity prices. To mitigate these effects, countries in a similar situation should prioritise increasing domestic production in various sectors to reduce their dependence on imported goods and mitigate the impact of external price fluctuations on domestic inflation. Building and maintaining diverse trade relationships can help cushion the economy against shocks from a single country.

The study also looks at the challenges associated with the multi-currency system, in particular the impact of the US dollar and the South African rand on inflation in Zimbabwe. In general, economies operating under official multi-currency regimes need to carefully consider the impact of foreign currency dependence on their inflation control mechanisms and policy space. Such economies need to regain their monetary sovereignty and adopt policies that favour the use of their own currency. However, this transition requires a solid economic foundation to ensure the stability and credibility of the local currency. Although Zimbabwe now recognises both the US dollar and its newly introduced local currency, the Zimbabwe Gold Currency (ZiG), there is still a significant need to control inflation.

Prudent macroeconomic management is essential for any small, open economy facing imported inflation. Zimbabwe needs to adopt a prudent monetary policy that effectively manages money supply growth and interest rates. This includes strengthening the central bank's ability to act as lender of last resort and ensuring that monetary policy is transparent and credible. Before reintroducing a national currency as the sole legal tender, Zimbabwe needs to address its fundamental economic problems, such as budget deficits, low foreign exchange reserves and structural economic weaknesses. Without addressing these fundamental problems, the country runs the risk of repeating the mistakes of the past, such as the hyperinflationary period that led to the abolition of the Zimbabwean dollar.

The implementation of these policies is critical for Zimbabwe and serves as a blueprint for other developing countries seeking to stabilise inflation in the face of global price volatility. By reducing dependence on imported goods, diversifying trade partnerships, promoting the use of local currency and strengthening economic fundamentals, such economies can better protect themselves from external shocks and create more resilient economic environments. These strategies are supported by the findings of the study and are in line with international best practises for dealing with imported inflation and promoting economic resilience. Future research could investigate the causes of persistent inflation in Zimbabwe despite the introduction of a new currency.

Supplementary material

The supplementary material for this article can be found online.

References

Abaidoo, R. and Agyapong, E.K. (2023), "Inflation uncertainty, macroeconomic instability and the efficiency of financial institutions", *Journal of Economics and Development*, Vol. 25 No. 2, pp. 134-152, doi: 10.1108/jed-09-2022-0166.

Ansari, S. (2020), "Inflation", *Economics Online*, available at: https://www.economicsonline.co.uk/global_economics/inflation-3.html/ (accessed 22 January 2024).

Bari, B. and Adali, Z. (2020), "How oil prices drive inflation in Turkish economy: two different channels", *Fiscaoeconomia*, Vol. 4 No. 3, pp. 705-721, doi: 10.25295/fsecon.786956.

Bass, A. (2019), "Do oil shocks matter for inflation rate in Russia: an empirical study of imported inflation hypothesis", *International Journal of Energy Economics and Policy*, Vol. 9 No. 2, pp. 288-294.

Betts, C. and Devereux, M.B. (2000), "Exchange rate dynamics in a model of pricing-to-market", *European Economic Review*, Vol. 44 No. 5, pp. 1007-1021.

Brannon, I. (2006), "Remembering the man behind rational expectations", *Regulation*, Vol. 29 No. 1, pp. 1-22.

Cagan, P. (1956), "The monetary dynamics of hyperinflation", in Friedman, M. (Ed.), *Studies in the Quantity Theory of Money*, The University of Chicago Press, Chicago, pp. 25-117.

Carluccio, J., Gautier, E. and Guilloux-Nefussi, S. (2023), "Dissecting the impact of imports from low-wage countries on inflation", *European Economic Review*, Vol. 160, 104613, doi: 10.1016/j.euroecorev.2023.104613.

Cristo, M.L.M. and Gómez-Puig, M. (2013), "Pass-through in dollarized countries: should Ecuador abandon the U.S. dollar?", *Applied Economics*, Vol. 45 No. 31, pp. 4395-4411, doi: 10.1080/00036846.2013.786166.

Dohner, R.S. (1984), "Export pricing, flexible exchange rates, and divergence in the prices of traded goods", *Journal of International Economics*, Vol. 16 Nos 1-2, pp. 79-101, doi: 10.1016/0022-1996(84)90044-8.

ERSA (2016), *What Price Level Data Tells Us About Consumer Price Rigidity in Zimbabwe*, ERSA Research Brief, ERSA, Harare.

Ferroni, F. and Santoro, S. (2023), "The pass-through to inflation of gas price shocks in the Euro area", European Central Bank Working Paper No. 2968, European Central Bank, Frankfurt.

Friedman, M. (1968), "The role of monetary policy", *The American Economic Review*, Vol. 58 No. 1, pp. 1-17.

Gali, J. (2008), *Monetary Policy, Inflation, and the Business Cycle: an Introduction to the New Keynesian Framework*, Princeton University Press, Princeton and Oxford.

Ibrahim, O. (2015), "Modeling inflation dynamics in a conflict economy", MPRA Paper 63527, University Library of Munich, Germany.

International Monetary Fund (IMF) (2021), "Inflation scares", in International Monetary Fund (Ed.), World Economic Outlook, October 2021, International Monetary Fund, Washington, DC, pp. 45-64.

Kavila, W. and Le Roux, P. (2016), "Inflation dynamics in a dollarised economy: the case of Zimbabwe", *Southern African Business Review*, Vol. 20 No. 1, pp. 91-117, doi: 10.25159/1998-8125/6045.

Lafrogne-Joussier, R., Martin, J. and Méjean, I. (2023), "Cost pass-through and the rise of inflation", Institut National de la Statistique et des Études Économiques, Working Paper No. 2023-13, (INSEE), Montrouge.

Liu, H. and Chen, X. (2016), "The imported price, inflation and ex63hange rate pass-through in China", *Cogent Economics and Finance*, Vol. 5 No. 1, pp. 127-148.

Lucas, R.E. Jr (1972), "Expectations and the neutrality of money", *Journal of Economic Theory*, Vol. 4 No. 2, pp. 103-124, doi: 10.1016/0022-0531(72)90142-1.

Makena, P. (2017), "Determinants of inflation in a dollarized economy: the case of Zimbabwe", Working Papers, African Economic Research Consortium, Harare.

Mankiw, N.G. (2021), *Macroeconomics*, 10th ed., Worth, New York.

Miller, M. (1976), "Can a rise in import prices be inflationary and deflationary?", *The American Economic Review*, Vol. 66 No. 4, pp. 501-519, doi: 10.2105/ajph.66.5.501-a.

Mukhtarov, S., Aliyev, S. and Zeynalov, J. (2019), "The effect of oil prices on macroeconomic variables: evidence from Azerbaijan", *International Journal of Energy Economics and Policy*, Vol. 10 No. 1, pp. 72-80, doi: 10.32479/ijeep.8446.

Muth, J.F. (1961), "Rational expectations and the theory of price movements", *Econometrica: Journal of the Econometric Society*, Vol. 29 No. 3, pp. 315-335, doi: 10.2307/1909635.

Ngoma, G. (2020), "What determines import demand in Zimbabwe? Evidence from a gravity model", *Cogent Economics and Finance*, Vol. 8 No. 1, 1782129, doi: 10.1080/23322039.2020.1782129.

Nyarota, S., Kavila, W., Mupunga, N. and Ngundu, T. (2016), *An Empirical Examination of Negative Inflation in Zimbabwe*, Reserve Bank of Zimbabwe, Harare.

Obstfeld, M. and Rogoff, K. (1995), "Exchange rate dynamics redux", *Journal of Political Economy*, Vol. 103 No. 3, pp. 624-660, doi: 10.1086/261997.

Obstfeld, M. and Rogoff, K. (2000), "New directions for stochastic open economy models", *Journal of International Economics*, Vol. 50 No. 1, pp. 117-153, doi: 10.1016/s0022-1996(99)00034-3.

Okpe, A.E. and Ikpesu, F. (2021), "Effect of inflation on food imports and exports", *The Journal of Developing Areas*, Vol. 55 No. 4, pp. 1-10, doi: 10.1353/jda.2021.0075.

Pindiriri, C. (2012), "Monetary reforms and inflation dynamics in Zimbabwe", *International Research Journal of Finance and Economics*, Vol. 90, pp. 207-222.

RBZ (2023), *Monthly Economic Review*, Reserve Bank of Zimbabwe, Harare.

Sargent, T.J., Fand, D. and Goldfeld, S. (1973), "Rational expectations, the real rate of interest, and the natural rate of unemployment", *Brookings Papers on Economic Activity*, Vol. 1973 No. 2, pp. 429-472, doi: 10.2307/2534097.

Shrestha, M.B. and Bhatta, G.R. (2018), "Selecting appropriate methodological framework for time series data analysis", *The Journal of Finance and Data Science*, Vol. 4 No. 2, pp. 71-89, doi: 10.1016/j.jfds.2017.11.001.

Taylor, J. (2000), "Low inflation pass through and pricing power of firms", *European Economic Review*, Vol. 44 No. 7, pp. 1389-1408, doi: 10.1016/s0014-2921(00)00037-4.

Tiedemann, J., Bizimana, O., Dalmau, L. and Ambassa, M. (2024), "Understanding inflation dynamics: the role of global shocks in CEMAC", International Monetary Fund Working Paper No. 055, International Monetary Fund, Washington DC.

Turnovsky, S. and Kaspura, A. (1974), "An analysis of imported inflation in a short-run macroeconomic model", *Canadian Journal of Economics*, Vol. 7 No. 3, pp. 355-380, doi: 10.2307/134035.

World Bank (2019), *Zimbabwe: Agriculture Sector Disaster Risk Assessment*, World Bank Group, Washington DC.

Yunculer, C. (2009), "Pass-through of external factors into indicators in Turkey", *Central Bank of the Republic of Turkey,* Vol. 11 No. 2, pp. 71-84.

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