Chapter

Will Malawi's Inflation Continue Declining?

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Abstract

The main objective of this chapter is to examine and determine the main factors that have driven inflation rate in Malawi since 2001, with a special focus on the period 2013–2019, during which inflation rate has continuously declined reaching 9% in 2019, from 36% in 2013. The chapter also tries to assess whether this decline will continue as per the performance of the underlying economic fundamentals both in the short- and the long-run. The study employs the autoregressive distributed lag (ARDL) model framework to examine the drivers of inflation both in the short- and the long-run using quarterly data, over the period of 2001–2019. The results reveal that reduction in headline inflation has mainly been driven by money supply growth, fiscal deficits, and output growth in the short-run, while only output has driven inflation decline in the long-run. The results also show that after floating exchange rate in 2012, inflation decline has mainly been driven by output growth despite inflationary pressures from the exchange rate and import prices. Model forecasts show that inflation may increase up to 19.4% by December 2020, if money supply growth, fiscal deficits, and exchange rate movements are not taken care of.

Keywords: monetary policy, ARDL, unit root, co-integration, forecasts

1. Introduction

Malawi is a small country located in the Southern part of Africa, with a surface area of 118,484 square kilometres, total length of 853 km and a maximum width of 257 km. It is a former British colony that gained independence in 1964. Its economy is mainly dependent on agriculture which employs about 65% of the workforce in the country, and contributing about 36% to the economy's gross domestic product (GDP). More than 90% of the country's export revenues come from the agriculture sector. The sector is one of the main contributors to the country's building of inflationary pressures as it occupies the largest proportion of the country's inflation basket designed by the country's National Statistical Office (NSO).

High inflation and fluctuation in prices is not preferred as it leads to uncertainty and cost push shocks which affect the stability and performance of economies [1]. This being the case, maintaining relatively low inflation and price stability has been one of the core objectives targeted by the monetary authorities in designing and implementing monetary policy in Malawi. Before 2012, Malawi operated a de facto pegged exchange rate regime with periodic devaluations. The national currency was pegged to the US dollar and kept an overvalued exchange rate. However, in 2012 Malawi implemented a floating exchange rate regime where prices and exchange

rates move based on economic fundamentals [1]. During the same period, the country adopted an automatic fuel pricing mechanism, which together with the newly implemented floating exchange rate regime was aimed at addressing the country's balance of payments problems.

As has been the case with most developing countries in Africa, the main objective of the monetary policy in Malawi has been to achieve low and stable prices that preserve the value of the Kwacha (the local currency), and encourages investment needed to achieve sustainable economic growth and create employment as stipulated in the Reserve Bank of Malawi Act of 1989 [2]. This is because price stability enhances investors' confidence as it reduces uncertainty in an economy and, thereby creating a favorable environment for growth and employment creation. Furthermore, low inflation contributes to the protection of the purchasing power of all households, particularly the poor who have no means of defending themselves against continually rising prices. However, the implementation of such a broad mandate could be practically challenging, since some of the policy objectives could be in conflict with each other [3]. Nonetheless, monetary policy pursued by most developing countries has managed to bring down inflation over the past two decades, with significant growth being experienced in most countries in the past decade or so [4].

In Malawi, monetary policy implementation continues to be underpinned by inflation dynamics especially by the dominance of the agricultural sector activities and the country's reliance on donor funding which contributed about 40% of the country's budget before the "Cash-gate scandal"[1] which led to withdrawal of donor funding in 2013. With the economy's dependence on agriculture, inflation in Malawi normally improves with improved food availability and tobacco sales, mostly from April to September every year. It then accelerates with food scarcities and excessive demand for foreign exchange from October to March [5]. However, it is claimed that the country's monetary policy does not seek to address these dynamics but rather to achieve a balance between output growth and monetary aggregates as well as smoothening of exchange rate movements. With the belief that these inflation dynamics will improve over time as production structures respond to macroeconomic stability in the context of a market-determined exchange rate [2]).

Figure 1 shows that interest rates reached as high as 52% in 2000, mainly driven by increased deficit financing as the IMF stopped aid disbursements due to corruption concerns in December 2000, and many individual donors followed suit, resulting in an almost 80% drop in Malawi's development budget. The continued deficit financing led to an increase in liquidity in the economy, exerting pressure on both interest rates and domestic prices. Since then both interest rates and inflation declined significantly due to improved fiscal management and increased real growth, with interest rates, inflation, money supply and GDP growth averaging 24.3%, 10.9%, 1.9% and 6.3% respectively over the period 2005–2009.

However, since 2005, Malawi enjoyed price stability as inflation declined from 16% to 7.2% in March 2011. Overall, inflation remained moderate and in single digits since 2007, mainly due to a relentless adherence to a tight monetary policy, heavily buttressed by fiscal discipline and stable exchange rate up-to January 2012 when it jumped to 10.3% (**Figure 1**). However, inflation remained persistently high since 2012, mainly due to the country's switch from a fixed to a floating exchange rate regime, which led to a sharp depreciation of the exchange rate which was further exacerbated by the withdrawal of external budget support following the

[1] "Cashgate" is a financial scandal involving looting, theft and corruption that happened at Capital Hill the seat of Government of Malawi.

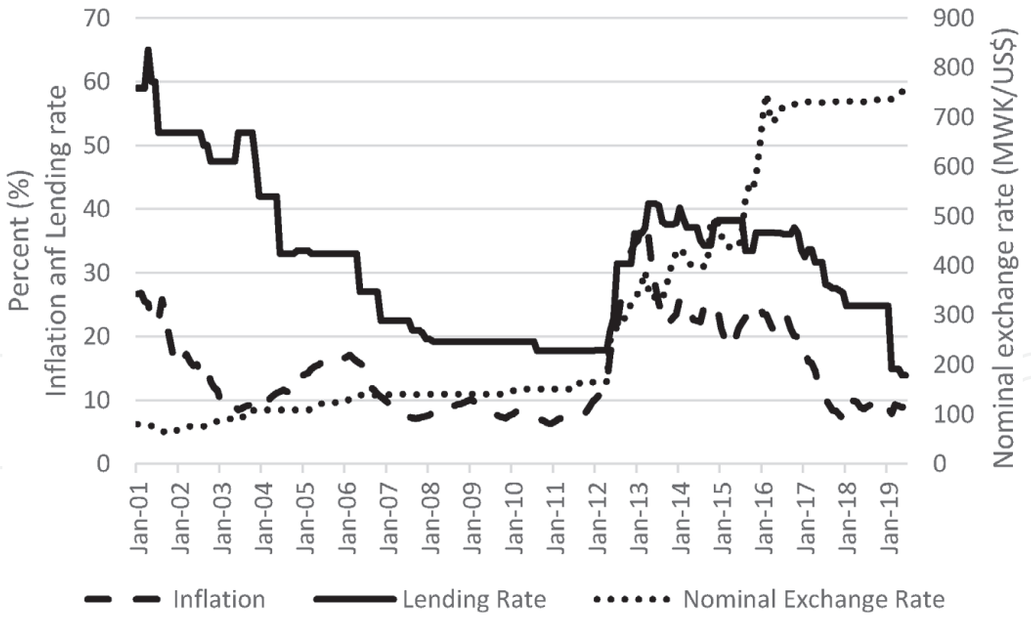

Figure 1.
Inflation, exchange rate and interest rate dynamics, January 2001–June 2019. Source: [6].

large scale theft of public funds coined the "cash-gate scandal". These developments exerted inflationary pressures in the economy, with inflation hovering to as high as 37.9% by February 2013, mainly driven by food prices, especially maize prices following poor agricultural performance and depreciation of the exchange rate [2]. Furthermore, financing of the fiscal deficits in the aftermath of the scandal was done through printing of money and the issuing of government securities to the private sector. In addition, the economy suffered from the effects of a combination of droughts and floods resulting in a reduction in agricultural production leading to a sharp increase in food inflation [1].

During this period, in May 2012, the exchange rate depreciated by 49% against the major currencies leading to a significant increase in inflation rate. As a consequence, interest rates increased to contain the inflationary pressures induced by the depreciation of the local currency, and also to contain inflationary expectations pressure accumulated over the preceding period. Furthermore, apart from the inflationary expectations arising from the continued uncertainty in the exchange rate policy, increasing food prices, especially maize prices, exacerbated the situation [2]. Inflation rates, interest rates and nominal exchange rates reached their highest levels over the period May 2012 to May 2013. Rising as high as 38%, 41% and 355 Kwacha per US/$ respectively, the highest levels after a long time. **Figure 1** shows that after this period both inflation and interest rates begun to decline, while the exchange rate continued to depreciate.

Continued exchange rate depreciation and relatively tight monetary policy have further resulted into inflationary pressures, exacerbated by the substantial increase in government domestic borrowing due to donor suspension of direct budget support to the Malawi Government due to the Cashgate scandal [2]. This raised domestic financing requirements by government, hence creating more liquidity in the economy. This also heightened pessimistic inflation expectations by the public and precipitated exchange rate depreciation. These developments led to an increase in money supply growth and inflation [2]. It should also be noted that despite the continued decline in the global oil prices during the period, its impact has not fully been translated into the Malawian economy because the automatic pricing mechanism on energy prices adopted since 2012 has not consistently been reflecting this decline [2]. Food prices especially maize during the harvesting seasons were also not

significantly declining to have an impact on inflation during the period January 2013 to February 2016. However, inflation in Malawi has continued to decline since early 2013, declining by 29 percentage points from 36% in February 2013 down to 9% in June 2019 (**Figure 1**). This is despite the theoretical economic fundamentals behaving to the contrary as fiscal balances widened from −1.9% of GDP in 2011 to −7.2% in 2018; and the country switched from a de facto pegged exchange rate regime to a floating exchange rate regime, leading a 33% devaluation of the local currency in 2012. Authorities' adoption of the automatic fuel pricing mechanism during the period meant that fuel prices should reflect the recent increases in global fuel prices. However, on the contrary, money supply grew at an average of 1.6% between February 2013 and September 2019, while policy rate declined from 25% in 2013 to 13.5% in 2019, theoretically easing the inflationary pressures in the economy.

Since Wu [1], there has been no study (to the author's knowledge) that has looked at inflation dynamics in Malawi over the period 2000–2019 as carried out in this study. However, the most recent study by Wu [1] focused mainly on the period up to 2015, investigating mainly the effects of the exchange rate regime change in 2012 and the switch to an automatic fuel pricing mechanism. This study, however, focuses on a relatively much longer period investigating the factors behind inflation movements in Malawi noting that a number of policy and structural changes have taken place over the period 2000–2019, which might not have been fully captured by Wu [1]. Authorities claim that most of these policy and structural changes have contributed to the recent continuous decline in headline inflation in the country. The main objective of this chapter is therefore to examine the factors that have led to inflation movements in the Malawian economy with a special focus on the recent continuous decline, and assessing whether it is a reflection of the performance of the country's economic fundamentals and whether it is something that will persist in the short to medium term.

The rest of the chapter is organized as follows. The next presents a brief literature review of some previous studies in the area. Section 3 presents the methodology employed in the chapter, while Section 4 presents the results of the analysis and Section 5 concludes the chapter.

2. Literature review

A number of studies have looked at the effectiveness of monetary policy in Malawi or the effect of selected monetary policy variables on the economy, but very few (if any) have focuses on inflation in the past few years. For example, Wu [1] looked at the causal relationship between food and non-food inflation in Malawi before examining the exchange rate pass-through process to headline inflation and how it has evolved during the pre- and post-exchange rate regime change in 2012. The paper further investigates the possible drivers of headline inflation in Malawi over the period 2001–2015 [1]. However, the period 2012–2015 could not have offered longer enough time horizon for the exchange rate policy regime change implemented in 2012 to have had a significant impact on inflation. This study, with a much longer time span, covering the period 2012–2019, is expected to provide more insights on the impact of both structural and policy changes on inflation in the country. Ngalawa and Viegi [7] uses the structural vector autoregressive model to investigate the transmission mechanism through which monetary policy affects domestic prices and output growth in Malawi. The results of the study reveal that the bank rate remained a more effective measure of monetary policy than reserve money over the period of the study. The results also support the narrative that price

stability remains the main objective of monetary policy in Malawi, despite revealing that monetary authorities also put emphasis on increasing economic growth and employment in the country. The results show also that the responses of exchange rate changes to monetary policy are stronger than those of consumer prices, suggesting that monetary factors may not be the dominant determinants of inflation in Malawi.

As is the case with Ngalawa and Viege [7], Mangani [8] examines the effectiveness of monetary policy in Malawi, but using bank rate and reserve money as measures of monetary policy stance, while using lending rate and broad money as intermediate targets. The results show that changes in the bank rate have an instantaneous impact on the lending rate and also the results reveal that the lending rate had an impact on changes in money supply. However, it was further observed that these effects were hardly transmitted to prices, indicating the ineffectiveness of the Keynesian interest rate view of the monetary policy transmission mechanism [8]. The results showed also that changes in exchange rate and money supply had a significant impact on prices, which is contrary to the classical view of the policy transmission mechanism, while the exchange rate itself was in turn affected by changes in money supply. Hence, it could be argued that the changes in consumer prices are more attributable to the exchange rate channel of the monetary policy transmission mechanism. However, further analysis shows that monetary policy played no role in the effects of the exchange rate movements on domestic prices over the period under study.

Jombo et al. [9] employs the augmented Phillips curve and vector autoregressive approaches to estimate the exchange rate pass-through to domestic inflation in Malawi over the period 1990–2013. The results show that exchange rate movements had a modest impact on domestic prices. However, it is argued that the dynamic exchange rate pass-through elasticity of 0.2 signifies that exchange rate still stood as a potential important source of inflation over the period of the study, hence the need for monetary authorities to pay attention to its movements. Mwabutwa et al. [10] uses the time varying parameter (TVP) VAR model with stochastic volatility that allows for the capturing of the variation of macroeconomic structure and changes in the transmission mechanism overtime, to examine the impact of bank rate, exchange rate and private credit shocks on output and price level. The model is used to simulate the impulse responses of output and price levels to financial and monetary policy shocks. The results reveal that by demarcating the analysis to focus on the period before and after financial reforms carried out between 1988 and 1994. The results indicate that changes in the transmission mechanism became clearer only after 2000, with monetary policy transmission performing in tandem with economic theory predictions without price surprises in the period after reforms especially after 2000, while it performed with price surprises in the period before the financial reforms carried out between 1988 and 1994. However, the results found a weak transmission mechanism through the credit channel especially through loans supply, calling for more financial strategies to improve the credit market system.

As per the results of other studies mentioned earlier, the findings from both Mangani [11] and Ngalawa [12] show that an increase in money supply leads to a decrease in price levels, which contradicts with the conventional monetary policy theory of inflation in Malawi, where an increase in money supply leads to an increase in price levels. In fact, in most of the periods an increase in money supply is associated with periods of falling inflation most of the times. In addition, and in line with the findings of Jombo et al. [9], these studies also reveal that while lending rate instantaneously responds to bank rate adjustments and though the lending rate somewhat influences money supply, the effects are hardly transmitted to prices. So

they also observe that the Keynesian interest rate view of the monetary policy transmission mechanism does not apply to Malawi. Interest rates are found to affect inflation through the cost of production effect rather than through money supply effects. Also as is the case with Mangani [8] and Jombo et al. [9], these studies show that exchange rates have a much stronger effect on price levels in Malawi, reflecting the country's high level of openness and import dependence, making it highly vulnerable to foreign reserve situation due to the country's reliance on a narrow range of sources, most notably foreign aid and tobacco exports [13]. Matchaya [14] looks at the possible sources of inflation in Malawi and finds out that changes in money supply, exchange rates, past values of inflation, recessions and booms were the main determinants of inflation. These results are further supported by the findings from Simwaka et al. [15] where the results indicate that monetary and supply side factors drove inflation in Malawi over the period January 1995–March 2011. The study finds that money supply growth, exchange rate adjustments and decreases in output growth had a significant positive impact on inflation over the period. This result is also supported by Lungu et al. [16] which found that output gap has a negative impact on inflation over the period to some extent signifying the dominance of food prices in the consumer price index in Malawi.

3. Methodology

3.1 Model specification and estimation techniques

The main purpose of this chapter is to examine the drivers of inflation the Malawian economy, with a special focus on its recent continuous decline since 2013, and also to assess whether this decline is a reflection of the economic fundamentals performance and whether this decline will persist in the short- to medium-term.

It makes use of the Phillips curve (aggregate supply) or a price-setting model that evaluates the effect of past and expected inflation, fiscal deficits, import prices, output gap (measured as output relative to its potential output[2]) and exchange rate to capture the external effects of an open economy. Furthermore, the proposed model encompasses both the monetarists' and the structuralists' approach in determining factors that affect inflation, for instance the conventional output gap term is included to capture the rigidity of the labor market [17]. An increase in output will lead to a rise in labor demand as firms will need to hire more workers to further expand production. This increase in labor demand will lead to an increase in inflation as real wages and marginal costs rise. However, if labor supply is highly elastic, then the rise in real wages will be small, marginal cost will not rise significantly, and inflation will not move a lot in response to changes in output gap [18]. The model also takes into consideration full and immediate pass-through of imported prices (and hence exchange rate changes) into consumption prices. The exchange rate reflects the price effects of exchange rate changes on imported goods in the consumption basket which is common in small open economies like that of Malawi.

With reference to the effects of changes in money supply, literature reveals that one of the basic tenets of the quantity theory of money is that a change in the growth rate of money induces an equal change in the rate of price inflation [19]. Since nominal interest rates are based on real return and the expected rate of inflation, it suggests that the level of nominal interest rates should be positively correlated with average rates of inflation in the long-run. Furthermore, nominal

[2] Potential output was estimated using the Hodrick-Prescott (HP) filter.

interest rates and money growth rates are also expected to be positively correlated because of the positive correlation between average inflation rates and average money supply growth rates [18].

Fiscal deficits are one of the main factors that have been exerting inflationary pressures in most African countries. Especially when a country implements a regime of fiscal dominance or active fiscal policy, and passive monetary policy where monetary policy adjusts to deliver the level of seignorage required to balance the government's intertemporal budget [18]. In this case, the monetary authority is forced to generate enough seigniorage to satisfy the intertemporal budget balance condition. This will have an effect on prices and inflation since the changes in seignorage affect the current and future money supply.

An increase in the bank rate by the monetary authorities induces a rise in short term rates such as interbank rate and treasury bill rates which have an impact on other long-term lending rates. As a result of the rise in lending rates, both households and firms reduce their consumption and investment expenditures respectively, as real cost of borrowing increases. Households will mostly reduce their expenditures on consumption of luxury or durables goods due to the increased costs of borrowing. This leads to a decline in aggregate demand and consequently easing the inflationary pressures in the economy (see [20–22] among others for more details). Furthermore, when domestic interest rates increase relative to foreign interest rates, assuming uncovered interest rate parity, domestic currency depreciates in order to maintain equilibrium in the foreign exchange market of the domestic economy. This expected future depreciation induces an initial appreciation of the domestic currency making domestically produced goods more expensive than foreign-produced goods. Hence leading to a decline in net exports and aggregate demand as well as inflationary pressures. Also, the rise in domestic interest rates above foreign interest rates could also attract capital inflows, leading to an appreciation of the local currency. Thus, the precise impact of changes in exchange rate may be uncertain.

The general form of the model to be estimated can be represented as:

$$inf_t = f\left((m2_t), (i_t), \left(fd_t\right), (e_t), (m_t)\left(y_t\right)\right) + \varepsilon_t \tag{1}$$

where inf_t is the inflation rate, i_t is the interest rate, fd_t is the fiscal deficit, y_t is the output gap, e_t is the nominal exchange rate, and $\varepsilon_t$is the error term. It is important to note that there could theoretically be interrelationships between the chosen explanatory variables in the model hence having an impact on inflation through different channels. For instance, based on the conventional real interest rate channel, interest rates could affect the output gap $\left(y_t\right)$ and hence having an impact on inflation. The exchange rate would have a direct impact on domestic prices through its impact on the cost of imported goods and through wages, but also indirectly through its impact on output and net exports, hence affecting the inflation rate.[3] In this regard, this calls for caution in taking care of instances of autocorrelation and heteroscedasticity in the model.

Since the objective of the chapter is to examine the drivers of inflation both in the short- and the long-run, the ARDL framework is deemed appropriate for this analysis because of the advantages it has over other methodologies. Contrary to the traditional error correction methodology, where it is imperative to carry out and establish the stationarity of the variables to be used in the short- and long-run analysis to establish their order of integration, the ARDL methodology, while

[3] See [23] for more details.

utilizing the Bounds Test, does not require this pre-testing of the order of integration. It uses the F- and t-statistics to test the significance of the lagged variables in a univariate error correction system without establishing the order of integration of the data generation process underlying the series. However, it is important to establish the order of integration beforehand to ensure the absence of I(2) series since their presence would violate the properties of an ARDL model which requires variables to be only I(0), I(1) or they should be mutually integrated. The ARDL methodology also has an advantage over other methodologies in that the its parameters can be estimated consistently without invoking exogeneity and residual serial correlation, especially if the order of the ARDL is appropriately augmented by the suitable specification of the lag structure of the variables [25].

This being the case the objective of the chapter could therefore be investigated by using the ARDL model and Error Correction Model (ECM) frameworks. In this regard Eq. (1) can mathematically be specified as an ARDL model with p lags of inf and q lags of $\boldsymbol{X}$ (where $\boldsymbol{X}$ is a $kx1$ vector of independent variables, which include in this case money supply growth, lending rate, nominal exchange rate, import prices, fiscal deficits and output gap), ARDL (p, q) as:

$$inf_t = \sum_{i=1}^{p} \theta_i \left(inf_{t-i}\right) + \sum_{i=0}^{q} \boldsymbol{\alpha}_i' \boldsymbol{X}_{t-i} + \varepsilon_t \tag{2}$$

where t is the time period, θ_i are $kx1$ coefficient vectors; α_i are scalars and ε_t is a disturbance term with a zero mean and constant variance. Eq. (2) can be re-parameterized and expressed in error correction model form as:

$$inf_t = \varnothing inf_{t-1} + \gamma' \boldsymbol{X}_t \sum_{i=1}^{p} \theta_i \left(\Delta inf_{t-i}\right) + \sum_{i=0}^{q} \boldsymbol{\alpha}_i' \Delta \boldsymbol{X}_{t-i} + \varepsilon_t, \tag{3}$$

where $\varnothing$ is the speed of adjustment and Δ is the difference operator.

3.2 Data

The paper uses quarterly time series data for analysis for the period January 2001-June 2019. The data for all the variables is obtained from Malawi's Central Bank, the Reserve Bank of Malawi, except import price index which is obtained for the Economist Intelligence Unit database [24]. Real GDP were in annual frequency and had to be interpolated to transform them into quarterly data frequency.

4. Model estimation and results

The estimation of the model starts with the examination of the time series properties of the data, using the Augmented Dickey-Fuller test to test for stationarity of the variables. The results of the unit root tests indicate that all the variables, except output gap and money supply growth are integrated of order 1 (I(1)) at below 5% significance level (**Table 1**). This means that in this model some variables have integration of zero order, I(0), and others have integration of the first order, I(1). This result satisfies the requirement for the application of the ARDL methodology which is further supported by the results of the Bounds test (**Table 2**). The result of the Bounds test for co-integration proposed by Pesaran et al. [25] within the ARDL framework, shows that the null hypothesis of no

Augmented Dickey-Fuller test results				
Variable	**Test statistics**			
	Levels (I(0))		**First difference (I(1))**	
	t statistics	**P-value**	**t-statistics**	**P-value**
Inflation	2.5932	0.0991	5.1882	0.0000
log(M2)	growth)	3.1711	0.0261	
Lending rate	2.3613	0.1563	6.554	0.0000
Log(Import price)	0.8814	0.7884	3.5046	0.0107
Fiscal deficit	2.467	0.1277	12.2825	0.0000
Nominal exchange rate	1.1499	0.9976	6.9521	0.0000
Output_gap	6.1783	0.0000		

Note: Values in parentheses are P-values.

Table 1.
The results of the augmented Dickey-Fuller unit root test.

F-bounds test	**Null hypothesis: no levels relationship**			
Test statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	8.956687	10%	1.99	2.94
K	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Notes: k=no. of explanatory variables.

Table 2.
Bounds test results for co-integration relationship.

equilibrium level relationship is rejected at below 1% error level by the F-test statistic (**Table 2**).

The Bounds test results in **Table 2** show that F-statistic has the computed value of 8.96 which exceeds the upper bound value of, I(1) which is 3.99 at 1% level of significance, implying that inflation rate and its determinants in the model are co-integrated and approach the long-run equilibrium, calling for the application of the ARDL approach [25]. The implication of this is that the parameters of the model can be estimated consistently without invoking exogeneity and residual serial correlation. The parameter stability test based on the plot of the cumulative sum of recursive residuals squares (CUSUM test) and the plot of the cumulative sum of squares of recursive residuals show that the estimated parameters of the ARDL specification are stable at least over the study period (**Figures 1A(a)** and **(b)** in the Appendix).

4.1 Estimation results

The short-run analysis results in **Table 3** reveal that all the variables, except import prices, have a significant impact on inflation in the short-run. Money supply growth and fiscal deficits are found to have a significant negative impact on inflation, contrary to what the theoretical literature stipulates. However, this could be due to the tight monetary policy being exercised by monetary authorities in Malawi,

Variable	Coefficient	Std. error	P-value
Δinf_{t-1}	0.522715	0.090417	0.0000
$\Delta m2_t$	−0.121076	0.050711	0.0211
$\Delta m2_{t-1}$	−0.378424	0.065234	0.0000
$\Delta m2_{t-2}$	−0.267229	0.056639	0.0000
$\Delta m2_{t-3}$	−0.220042	0.050737	0.0001
Δi_{t-2}	0.118637	0.065816	0.0780
Δfd_t	5.31E−05	1.33E−05	0.0002
Δfd_{t-1}	−6.01E−05	2.06E−05	0.0054
Δfd_{t-2}	−4.56E−05	1.51E−05	0.0041
Δe_{t-2}	0.024740	0.006614	0.0005
Δe_{t-1}	0.016306	0.008573	0.0634
Δe_{t-2}	0.015709	0.007222	0.0348
Δe_{t-3}	0.025733	0.006304	0.0002
Δy_t	0.000295	0.000371	0.4308
Δy_{t-1}	−0.000582	0.000179	0.0021
ect_{t-1}	−0.775206	0.085318	0.0000
R-squared: 0.744337			
Breusch-Godfrey serial correlation LM Test: F-statistic 0.226575 (0.7982)			
Durbin-Watson stat:		2.132180	2.132180
Heteroskedasticity test: ARCH: F-statistic		1.4387 (0.2345)	

Table 3.
Short-run ARDL error correction regression results.

signified by the decline in average monthly growth of money supply from 2.3% over 2001–2011 to 1.6% over the period 2012–2019, and the fiscal consolidation efforts exacerbated by the withdrawal of donor funding. In line with the findings of Mangani [8] and Chavula [5], the results from this study indicate that the quantity theory of money to some extent does not seem to hold in Malawi, as the rising money supply seem to lead to a decline in consumer prices. Further analysis of the relationship between money supply growth and inflation rate shown that since 2000 the growth in money supply has persistently been lower than growth in overall inflation, averaging 3.8% and 15.5%, respectively over the period 2015Q1–2019Q2 to some extent contributing to the forces dragging down inflation over the period. While fiscal deficits have had very minimal but significant impact on inflation over the period, with a positive impact in the first quarter before turning to having a negative impact in the second quarter. With the fiscal consolidation efforts being put in place, the time lag in affecting inflation could be suggesting that the funds have been directed towards some productive sectors which could have had a negative impact on inflation over the period. However, lending rates and exchange rates seem to be the main factors exerting positive inflationary pressures in the Malawian economy in the short run, while output initially exerts a negative impact before having a positive impact on inflation after a certain period conforming to economic theory.

Table 4 presents results of the long-run coefficients computed from the dynamic model shown above. The findings reveal that money supply growth, lending rate and

Variable	Coefficient	Std. error	P-value
$\Delta m2_t$	0.473708	0.170419	0.0079
Δi_t	0.319709	0.127466	0.0157
Δfd_t)	0.000172	0.000104	0.1038
Δe_t	−0.013703	0.019788	0.4921
Δm_t	0.374323	2.060464	0.8566
Δy_t	−0.000771	0.000241	0.0025
c	−2.438828	1.025090	0.0216
Breusch-Godfrey serial correlation LM test: 0.226575 (0.7982)			
Heteroskedasticity test: ARCH: 1.439651 (0.2345)			

Note: Values in parentheses are P-values.

Table 4.
Long run ARDL estimation results.

fiscal deficit appear to have a positive and statistically significant impact on inflation in the long-run. Money supply growth and lending rate are found to have a positive and statistically significant impact at below 1% level of significance, whereas fiscal deficits are found to be significant at 10% level. To some extent signifying the negative effects of increased fiscal deficits due to the weakening of the country's fiscal consolidation efforts in the long run and also the impact of county's spending on its early 2019 elections. Output gap is found to have a negative and significant impact on inflation at below 1% level of significance, which conforms to the existing theoretical literature.

The chapter further examines whether there has been any change with regards to what has been driving inflation before and after the exchange rate regime change in 2012. The study again uses the same ARDL model framework based on Eq. (2) applied over the two separate periods, 2001–2011 and 2012–2019. The short-run results covering the period 2001–2011 (the period before the regime change), show that money growth, lending rate, fiscal deficit, output and import price had an instantaneous positive impact on inflation over the first few months, before rebounding and absorbing the shock soon after, especially through increases in output and money growth. On the other hand, fiscal deficits and import prices had an instantaneous negative impact on inflation before exerting inflationary pressures soon after the first quarter. While nominal exchange rate had a significant negative impact on inflation, to some extent reflecting the impact of price controls as they weakened its impact in the short-run over the period.

The long-run estimation results show that between 2001 and 2011 money supply growth exerted significant inflationary pressures in the Malawian economy, while import prices had had a negative and significant impact on inflation as monetary authorities operated a de facto pegged exchange rate regime over the period (see **Table A1** in the Appendix).[4] This result to some extent could be attributed to the capital management and price controls operated before 2012 by monetary authorities (see [1] for more details). However, the exchange rate is found to have a positive but insignificant impact on inflation, while output gap has a negative but insignificant impact on inflation in the long-run.

After floating the exchange rate and implementing the oil price automatic adjustment mechanism covering the period 2012–2019, the short-run estimation

[4] Though not reported, kindly not that the model estimation methodology followed all the necessary analytical and evaluation tests assessing its suitability for analysis.

results show that inflation was mainly affected by changes in the nominal exchange rate, with a 1% depreciation leading to a 0.01 percentage increase in inflation rate. However, increases in output are found to have outweighed inflationary pressures as output led to a significant decline in inflation over the period, with a 1% increase in output leading to a 0.004% decline in inflation rate with a 3-month time lag.

The long-run results in **Table A2** show that inflation rate was found to have mainly been influenced by import prices over the period, reflecting the removal of price controls and floatation of the exchange rate. Analysis results show that between 2012 and 2019, a 1% increase in import prices led to a 0.2% increase in inflation. While over the short-run, results show that inflation was mainly affected by changes in the nominal exchange rate, with a 1% depreciation leading to a 0.01% increase in inflation rate. However, increases in output are found to have outweighed inflationary pressures as output led to a significant decline in inflation over the period.

Lastly, the analysis carried out earlier was used to provide the basis in providing the answer to the main question asked in the title of this paper, "Will Malawi's inflation rate continue to decline? To answer this question, we use the model estimated for the results in **Table 3** to produce forecasts based on the fundamentals that have been driving inflation in Malawi over the period 2001–2019. The model is firstly evaluated for its suitability for forecasting and its predictability power using the Theil Inequality Coefficient. The results of the evaluation (in **Figure A2(a)**) show that the model's predictive power is good since the value of the Theil Inequality Coefficient is close to zero. We also employed the CUSUM and CUSUM square tests to validate the stability of the model, and the results show that the plot of the CUSUM statistics stay within the 5% significance level, meaning that the estimates from the model are stable over the period under consideration, and could produce reliable forecasts. The model performance is also further evaluated by comparing the actual and the fitted values from the model. **Figure A2(b)** shows that the simulated values track the actual values well, thereby justifying the model's suitability for forecasting.

The results from the forecasting process (**Figure 2**) reveal that inflation rate might not continue declining as has been the case over the past few years if the status quo stays as it is currently. Inflation rate may increase up to 19.4% by the end of 2020 mainly driven by exchange rate variability, import prices and money supply as they are projected to rise significantly in the short- to medium term. Monetary authorities should therefore continue to put in place measures that will continue controlling money supply growth, import prices and maintain exchange rate stability as these seem to be the main drivers of inflation in the short- to medium-term.

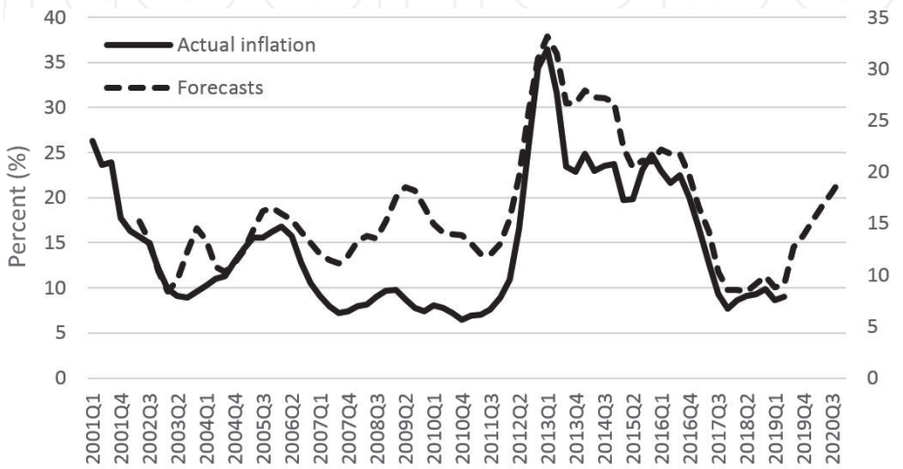

Figure 2.
Inflation forecasts, 2001Q1–2020Q4.

5. Conclusions

In this paper we have tried to examine the main factors behind the country's inflation dynamics since 2001, putting emphasis on the factors behind its continuous decline since early 2013. We have also tried to assess if at all this decline will persist as per the performance of the underlying economic fundamentals both in the short- and long-run amidst the existing opposing forces.

The results of the study show that based on the full sample (2001–2019), money supply, fiscal deficits and output growth had a significant negative impact on inflation in the short-run, while exchange rate movements and interest rates exerted inflationary pressures in the economy over the period. However, results reveal that only output had a significant negative impact on inflation in the long-run over the same period, while money supply, interest rates and fiscal deficits exerted significant inflationary pressures in the economy.

Inflation dynamics in the period before the change in exchange rate regime are found to have been influenced mainly by money supply, interest rates, exchange rate movements and import prices in the short-run while in the long-run inflation was mainly influenced by changes in import prices. The results based on the subsample (2012–2019), capturing the period after the exchange rate regime change, the decline in inflation is found to have been mainly influenced by output growth in the short-run while exchange rate movements exerted inflationary pressures in the economy over the period. However, in the long-run, import prices continued to have significant positive effects on inflation.

The results from the forecasting process reveal that inflation rate might not continue declining as has been the case over the past few years if the status quo stays as it is currently. The forecasts show that inflation rate may increase up to 19.4% by the end of 2020. Monetary authorities should therefore continue to put in place measures that will control money supply growth, import prices and maintain exchange rate stability as these seem to be the main drivers of inflation in the short- to medium-term in the country.

The results seem to suggest that, while price stability remains the principal objective of monetary authorities in the country [7], they should not only place more emphasis on the objective of stabilization and achieving low inflation, but also focus on supporting strong, sustained and shared growth, as output seems to play a significant role in bringing down inflation in the country. As they continue to put money supply, fiscal deficits and exchange rates in check, they should ensure that the strategies being implemented and the associated transmission mechanisms aim at increasing the country's output growth. In line with the findings of Simwaka et al. [15], these results may be suggesting that the movement and relationship between inflation and money growth could be further suggesting that while monetary and fiscal policy tightening remain central to lowering inflation, structural measures to boost productivity and growth in the economy remain necessary in ensuring a more sustainable disinflation growth path.

Noting very well that cutting of interest rates that the country has undertaken recently could not bear fruits if the economy does not produce enough goods and services to meet the existing demand, lack of supply would lead to a rise in inflation, which force monetary authorities to raise interest rates again.

In line with the findings of Mangani [8] and Chavula [5], an increase in money supply seems to lead to a decline in inflation and the increase in interest rates seem to lead to a decline in prices. These results to some extent indicate that the quantity theory of money does not seem to hold in Malawi. To some extent suggesting the need for the continued use of reserve money and money supply to control inflation.

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I would like to thank Dr Kisiyawo Simwaka, Ms Marietta Kaval0, and Mr Wyton Jombo, all from the Reserve Bank of Malawi for making the data available in coming up with this chapter.

Conflict of interest

The authors declare no conflict of interest.

Notes/Thanks/Other declarations

The views expressed in this paper do not in any way represent the views of the United Nations Economic Commission for Africa (ECA). All the remaining errors and omissions are my responsibility.

A. Appendix

See **Figures A1** and **A2** and **Tables A1** and **A2**.

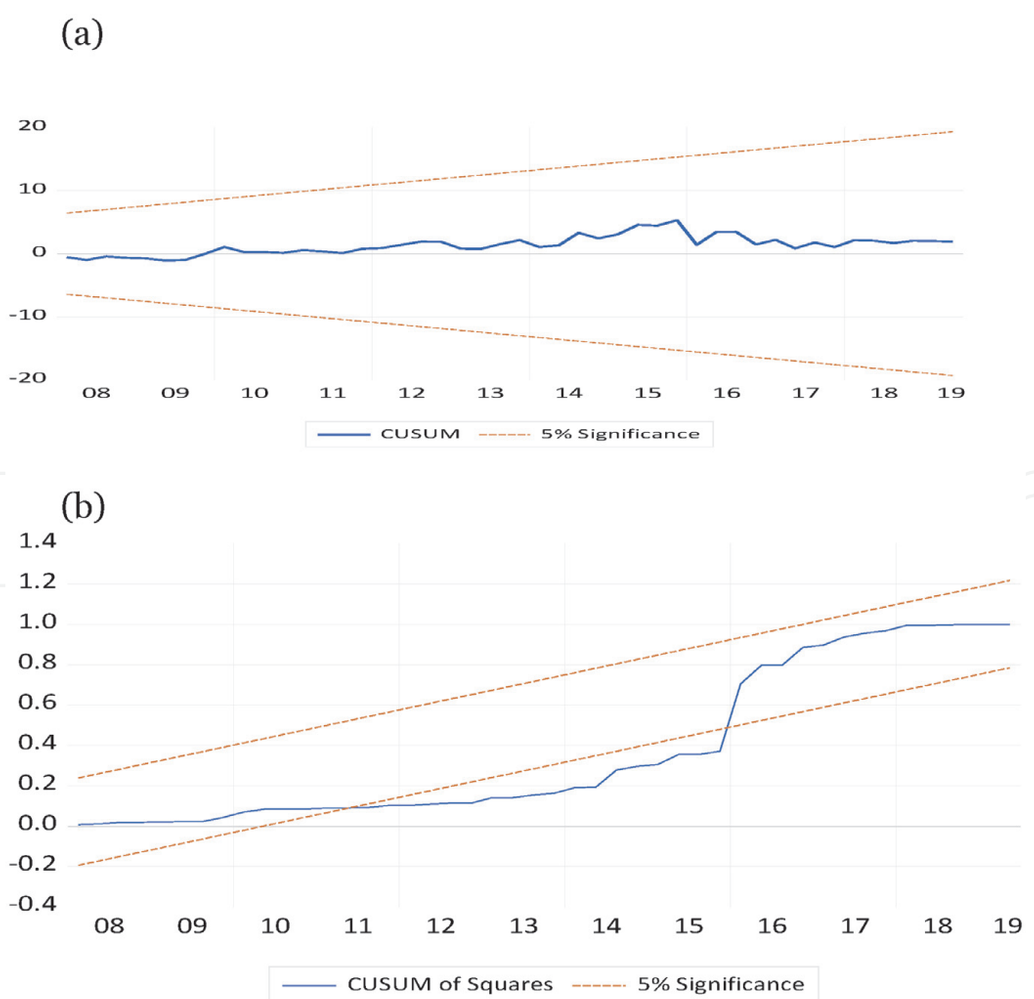

Figure A1.
Stability tests: (a) CUSUM test results for model stability and (b) CUSUM square test results for model stability.

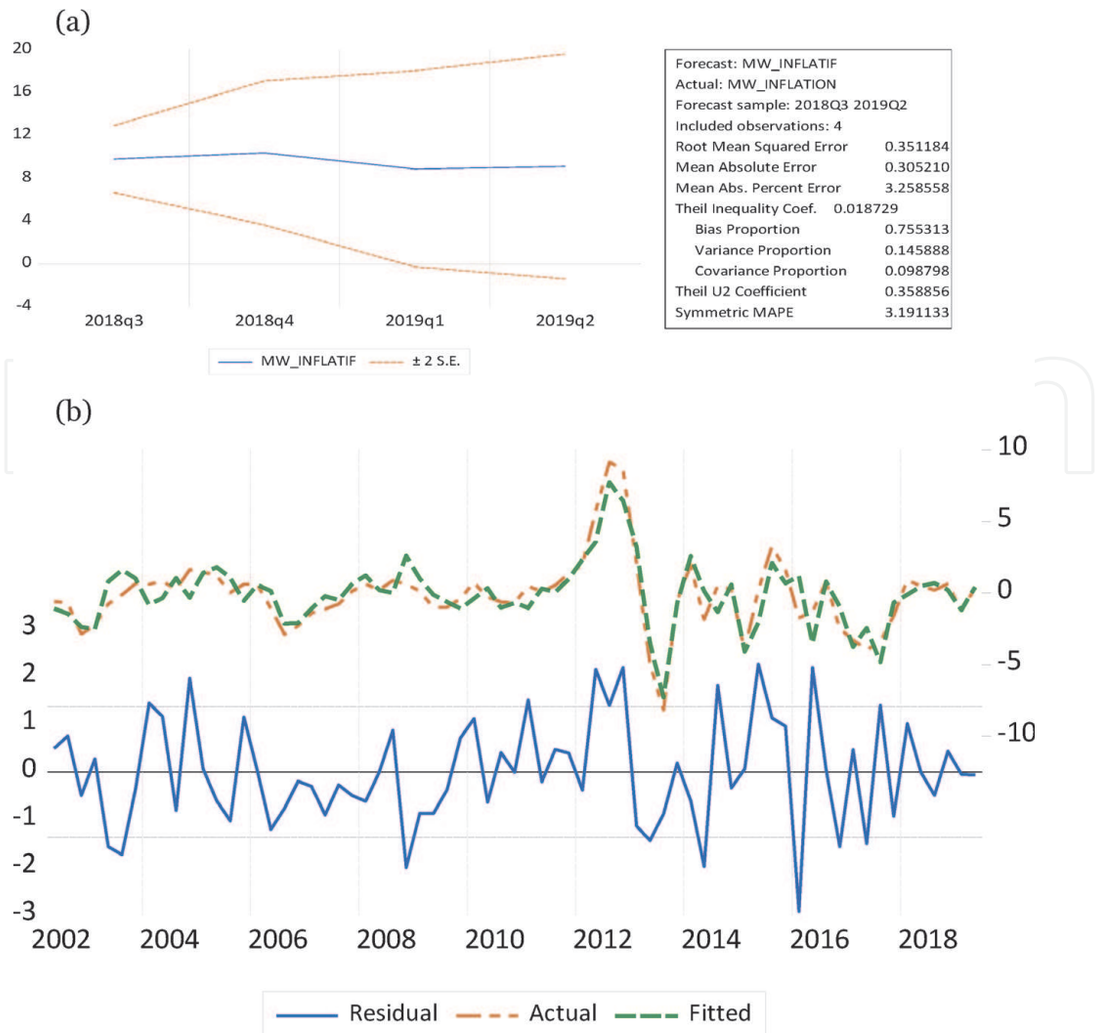

Figure A2.
Model forecasting performance tests. (a) The Theil Inequality Coefficient test and (b) comparing the actual and fitted or estimated values from the model.

ARDL short-run results				ARDL Long-run results			
Variable	**Coefficient**	**Std. error**	**P-value**		**Coefficient**	**Std. error**	**P-value**
Δinf_{t-1}	0.093212	0.043127	0.0589	$m2_t$	1.454819	0.440133	0.0092
Δinf_{t-2}	−0.350365	0.034636	0.0000	i_t	−0.071854	0.049039	0.1769
$\Delta m2_t$	0.212724	0.015561	0.0000	fd_t	−0.000180	0.000102	0.1125
$\Delta m2_{t-1}$	−0.251965	0.015112	0.0000	Δe_t	0.523396	0.327125	0.1441
Δi_t	0.145083	0.023975	0.0002	Δm_t	−0.429097	0.095834	0.0015
Δi_{t-1}	−0.059094	0.027057	0.0568	y_t	−0.000370	0.000350	0.3188
Δi_{t-2}	0.047333	0.027611	0.1206	C	−7.675094	2.359756	0.0100
Δi_{t-3}	−0.036347	0.025592	0.1892				
Δfd_t	−6.85E−05	8.90E−06	0.0000				
Δfd_{t-1}	6.75E−05	8.92E−06	0.0000				
Δe_t	−0.021708	0.018230	0.2642				
Δe_{t-1}	−0.184993	0.017992	0.0000				
Δe_{t-2}	−0.195165	0.018680	0.0000				

	ARDL short-run results			ARDL Long-run results		
Variable	**Coefficient**	**Std. error**	**P-value**	**Coefficient**	**Std. error**	**P-value**
Δe_{t-3}	−0.031946	0.015896	0.0754			
Δm_t	−0.050171	0.004835	0.0000			
Δm_t	0.070395	0.004778	0.0000			
Δm_t	0.051798	0.004011	0.0000			
Δm_t	0.051419	0.004266	0.0000			
Δy_t	−5.67E−05	7.73E−05	0.4820			
Δy_{t-1}	1.07E−05	5.22E−05	0.8416			
Δy_{t-2}	0.000108	4.19E−05	0.0302			
Δy_{t-2}	−0.000286	3.21E−05	0.0000			
ect_{t-1}	−0.322544	0.018502	0.0000			
R-squared: 0.978508						
Breusch-Godfrey Serial Correlation LM Test: F-statistic 0.3274 (0.7313)						
Heteroskedasticity test: Breusch-Pagan-Godfrey: F-statistic 1.9140 (0.1538)						
Note: Values in parentheses are P-values.						

Table A1.
ARDL results for the period 2001–2011.

	ARDL short-run results			ARDL long-run results			
Variable	**Coefficient**	**Std. Error**	**P-value**	**Variable**	**Coefficient**	**Std. error**	**P-value**
$\Delta\, inf_{t-1}$	0.526685	0.112450	0.0003	$m2_t$	−0.019378	0.142288	0.8935
Δe_t	0.012223	0.006129	0.0646	Δi_t	−0.074744	0.278291	0.7919
Δy_t	−0.001064	0.000987	0.2977	Δfd_t	4.91E−05	2.98E−05	0.1205
Δy_{t-1}	−0.003913	0.000962	0.0010	Δe_t	−0.015466	0.023154	0.5143
ect_{t-1}	−0.782070	0.105332	0.0000	m_t	0.205028	0.087456	0.0332
				y_t	−0.000472	0.000913	0.6122
				c	−9.288554	4.007864	0.0350
R-squared: 0.794218							
Breusch-Godfrey serial correlation LM test: F-statistic 2.4729 (0.1230)							
Heteroskedasticity test: Breusch-Pagan-Godfrey: F-statistic 1.0836 (0.4326)							
Note: Values in parentheses are P-values.							

Table A2.
ARDL results for the period 2012–2019.

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