The Effect of Fiscal Policy on Inflation Volatility in Malawi

BONGEKILE NKUNA

(STUDENT NUMBER: NKNBON006)

A dissertation submitted in partial fulfilment for the degree of Master of Commerce in Applied Economics

School of Economics

FACULTY OF COMMERCE

UNIVERSITY OF CAPE TOWN

Supervisor: Dr Trust Mpofu

February 2024

ACKNOWLEDGEMENTS

Firstly, I would like to thank the Almighty God for the strength and wisdom provided during this journey. I would like to express my gratitude to my family, thank you for your undying support and believing in me even when I did not. Thank you for teaching me to trust in God and providing me with the opportunity to study towards a master's degree. To my brother, I am beyond blessed to have a sibling like you, thank you for always having my back. I would also like to extend my deepest gratitude to my supervisor Dr Trust Mpofu; thank you for accepting to become my supervisor. Thank you for your invaluable insight and for steering me in the right direction. Thank you to the School of Economics staff for their constant support academically and administratively.

Table of Contents

Tables

Figures

ABTSRACT

The relationship between inflation and fiscal deficit has created a lot of interest among researchers; however, the results remain inconclusive. Malawi is a country that has rarely had stable inflation but at the same time fiscal policy has been one of the tools that has been constantly used to help the economy grow. The study thus examines the effect of government balance, the measure of fiscal policy used, on inflation volatility in Malawi from 1980 to 2022. Yearly inflation volatility is modelled using the Moving Average Standard Deviation methodology on monthly inflation data. An Autoregressive Distributed Lag (ARDL) process is used to find the long run relationship between inflation volatility and the fiscal variables while the Error Correction Model (ECM) is used to find the short run relationship. The results show that fiscal balance does have an impact on inflation volatility in both the long run and the short run. Results also show that the exchange rate has a significant impact but only in the short run.

PLAIGERISM DECLARATION

COMPULSORY DECLARATION:

1. This dissertation has been submitted to Turnitin (or equivalent similarity and originality checking software) and I confirm that my supervisor has seen my report and any concerns revealed by such have been resolved with my supervisor.
2. I certify that I have received Ethics approval (if applicable) from the Commerce Ethics Committee.
3. This work has not been previously submitted in whole, or in part, for the award of any degree in this or any other university. It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works of other people has been attributed, and has been cited and referenced.

Student number	NKNBON006
Student name	Bongekile Nkuna
Signature of Student	Signed by candidate
Date:	24 November 2024

1.0. INTRODUCTION

High or volatile inflation is an economic problem that several countries around the world have faced and continue to struggle with in the present day. Economists believe that stable inflation encourages stable interest rates, which in turn encourage investment and saving and promote efficient allocation of resources (Hossian and Raghavan, 2019). On the other hand, inflation volatility increases inflation instability, which in turn increases the risk premia of an economy in the long run. This, therefore, causes economic agents to hedge against inflation uncertainty that creates an unanticipated redistribution of income, which can lead to an economic downturn (Mujahid et al, 2021:3).

Milton Freidman states that inflation is a consequence of monetary actions alone (Mishkin, 1984:2). However, some literature has argued against the view that inflation is only caused by large increases in money supply. For example, Totonchi (2011) states that in developing countries, inflation is not just a monetary problem but is also affected by other factors including fiscal imbalances. Fiscal policy is said to affect inflation volatility through different channels. For instance, fiscal policy changes can influence aggregate demand leading to changes in price levels. In addition, changes in tax rates can affect marginal costs while changes in wages can also spill over into prices. Fiscal policy can also affect inflation through public expectations on government's ability to pay back the debts incurred. This said, the relationship between fiscal policy and inflation has been explained by several theories. One of these are Keynesian economists, who do not believe that fiscal policy can cause inflation hence encourages the use of fiscal policy to stabilise the economy. However, post Keynesian economists explain that fiscal policy can cause inflation through increased spending by government, which increases nominal income and in turn influences prices in an economy to increase. Similarly, Orthodox economists argue against the use of fiscal policy, as it is believed that if the deficit from fiscal policy is monetised it will lead to inflation. Another theory is that of Fiscal dominance, under which fiscal policy influences a central bank to follow inflationary monetary policy.

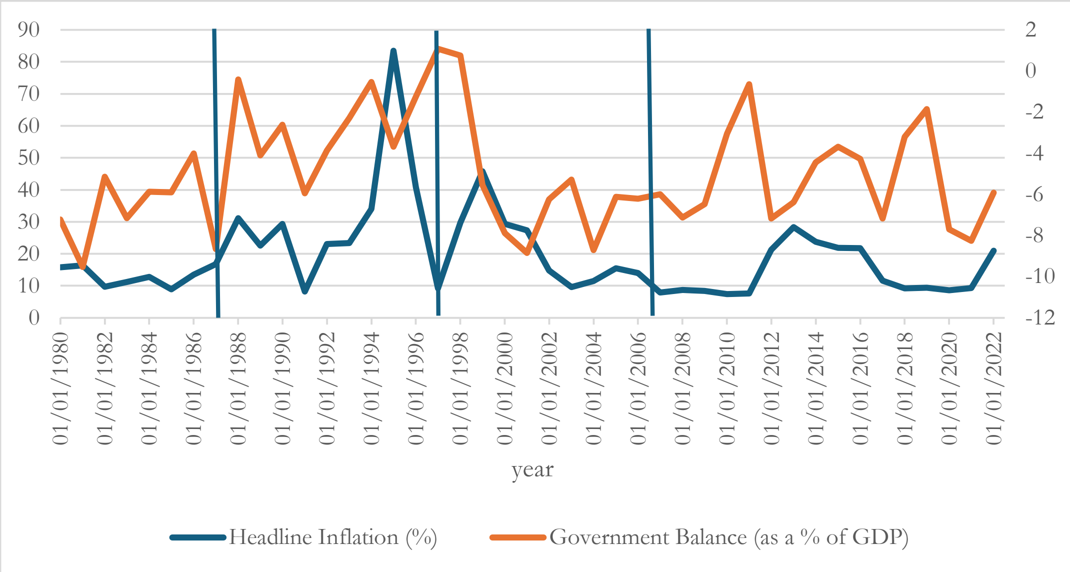
In Malawi, since 1980 inflation has been rarely stable as shown in Figure 1 below. During the period from 1980 to 2022, there were times when inflation would accelerate and remain high but there were also times when inflation would decline. The longest period of stability seems to have lasted for about four years, from 2007 to 2011. The graph further shows that even the pattern of volatility was different during the study period, for instance, between 1980 and 2000 the volatility was uneven than during the period 2001 to 2022. Figure 1 further illustrates trends in government balance and is broken into the four periods, following the turning points of the government balance; 1980 to 1987; 1988 to 1997; 1998 to 2007 and 2008 to 2022.

During the period 1980 to 1987, the government balance was on average rising. This was partly due to the countercyclical policies government undertook, following an economic slump the country was experiencing on account of a number of factors including failing international trade terms, rising transport costs due to war in Mozambique, droughts and increases in oil prices. On the other hand, inflation decreased temporarily but rose again sharply particularly in the year the deficits significantly rose. Thereafter, during the period 1988 and 1998, the graph shows that both the government balance and inflation were at historical high levels and very volatile, and this was due to several mixed factors. These included excessive budgetary expenditures leading up to the 1994 elections, high lending to government by local banks, and an expansionary monetary policy, leading to periods of deterioration in the fiscal balance. Later, Government embarked on several fiscal policy reforms which included measures to curtail expenditure and improve the administration and collection of taxes. Consequently, the fiscal balance improved to a surplus position. The tight fiscal policy stance at that time allowed the adoption of a tight monetary policy by the central bank. This, in addition to declining food prices on account of two successive good harvests, led to periods of decline in inflation.

From 1998 to 2007, the fiscal balance position improved significantly and was less volatile, despite some slippages in the earlier years of the period that were made worse with the increasing interest bill. Later, a major initiative aimed at restricting public spending and borrowing helped to improve the fiscal performance. Consequently, Malawi qualified for the Highly Indebted Poor Country–Multilateral Debt Relief Initiative (HIPC-MDRI) in 2006, which helped in further increasing the county's fiscal space. This coupled with favourable weather conditions and subdued monetary pressures, to some extent, helped inflation to continually decline reaching a record low of 7.4% in 2010.

The later period of 2009 to 2022 was characterised by a number of factors leading to government balance mostly worsening. These included; the withdrawal of external budget support following derailment of the IMF programme on account of governance related issues; significant devaluations of the exchange rate, adverse weather conditions, and the impact of the covid-19 pandemic in the recent years, to mention a few. Except in the aftermaths of devaluations of 2012 and 2022, inflation was declining and stable partly due to introduction of better monetary policies and stable exchange rates. However, in recent years, there has been increasing concern about fiscal dominance (Mangani, 2021; IMF, 2023:30; Wu, 2017).

Figure 1: Headline Inflation and Government Balance, 1980 - 2022



Source: National Statistics Office, Reserve Bank of Malawi

From the above, a number of questions can be raised. First, has inflation been indeed volatile in Malawi? Secondly, what has been causing this volatility? Have fiscal balance been the main cause of inflation volatility in Malawi? Therefore, the objectives of the study are:

(i) To determine the volatility of inflation in Malawi.

(ii) To examine the long and short run relationship between inflation volatility and the fiscal variable.

It is important to examine inflation volatility in Malawi for a number of reasons. Firstly, because it affects the consumption patterns and livelihood of the majority of the Malawian population, hence has redistribution income effects. Most of this population live in rural areas where food make up a greater proportion of the consumption basket, yet at the same time food inflation constitutes a big component (of 53.7 percent) in the headline inflation of the country. This, therefore, means that inflation volatility would negatively affect the majority of citizens' spending patterns, therefore, pushing more people into poverty as most of them would not be able to afford food commodities. Secondly, as indicated earlier expansionary fiscal policy in Malawi has often been used as the main policy to foster the country's economic growth but has also been used to counter shocks like during the economic slumps of early 80s and Covid-19 shocks. These important government actions certainly had some effects on inflation as they are expansionary in nature. It is against this background that this study wants to examine the impact of fiscal balance on inflation, as this would help in formulating appropriate monetary policies for price stability.

While there is work done on inflation volatility in developed countries (Backe, 2004; Rother, 2004), research work in developing countries on the same is thin. To the best of our knowledge, no study has been done in Malawi that examines the impact of fiscal balance on inflation volatility. Studies by Simwaka et al (2012), Wu (2017), Moyo and Dunga (2020) focus on the impact of fiscal policy on the level of inflation and not inflation volatility.

Therefore, to add to the literature, this research looks at the effect of fiscal policy on inflation volatility in Malawi, following Rother (2004), who is often cited by researchers looking at inflation volatility. This study therefore makes two contributions to the existing economic literature in Malawi: Firstly, it documents the inflation volatility in Malawi using the Moving Average Standard Deviation method. Secondly, it attempts to add to the literature of inflation volatility and fiscal policy in Malawi, which is lacking, yet would help policy makers construct appropriate policies to achieve stability.

To achieve the objective of the study, Autoregressive Distributed Lag (ARDL) and Error Correction Model (ECM) methodologies are used on yearly data from 1980 to 2022. The ARDL was chosen as it works with variables of different orders, unlike other methods of cointegration like Johansen (1988). The ARDL methodology was also chosen as it addresses endogeneity as long as the appropriate lag levels are chosen. Monthly data is used to create monthly volatility applying the moving average standard deviation. After this the 12 monthly average is used to find annual volatility. The results show that fiscal policy does have an impact on inflation volatility in both the long run and the short run. The exchange rate also has an impact on inflation volatility but only in the short run.

The rest of the thesis is organised as follows: section 2 reviews the literature on fiscal policy and its relation to inflation. Section 3 discusses the methodology of the study. Section 4 presents the empirical analysis of the results and section 5 presents the conclusion, limitations and ideas for further research.

2.0. LITERATURE REVIEW

2.1. Theoretical Literature

Standard economic theory argues that inflation is largely a monetary phenomenon with monetarists like Milton Freidman stating that inflation is always a monetary problem everywhere (Mishkin, 1984:2). Monetarists believe that money supply is the main cause of inflation in the long run (Jahan and Papageorgiou, 2014:38). Under this monetarist view, increasing money supply that is greater than the growth of output results in inflation. Therefore, inflation in this case represents the past and current values of monetary expansion. However, recent economic theory and research has shown that other factors like trade unions, supply related factors (like droughts or increase in input prices), speculation of prices by economic agents and more importantly government policies can also play a significant role in creating inflation. For instance, Montiel (1981) argues that factors such as fiscal imbalances, exchange rate depreciation due to balance of payment crises dominate in causing inflation in the developing countries. Other economists like Mortaza (2006:4) also argue that inflation is not purely monetary phenomena in developing countries but is linked to a lack of good economic policies, particularly fiscal imbalances. So, what are the theories behind inflation and fiscal policy? Different theories provide different explanations of this relationship. The first is early Keynesian economics and how inflation can occur under such models. The second is orthodox economics; the third is fiscal dominance of monetary policy. This section outlines the three theories explaining the relationship between fiscal policy and inflation.

Popular textbook definition of Keynesian economics is represented by deficit spending. Keynes defended deficit spending but did emphasise it was important to maintain a balanced budget in the long term. It is for this reason that Keynesians argue that fiscal policy is the most important tool needed to deal with the faults of the economy (Cunha et al, 2011). During an economic downturn, government spending and borrowing should increase to encourage economic activity (Neto and Vernengo 2004). However, during the debt crisis of the early 1980's, an emphasis on the negative role that fiscal policies played on economic development rose. This idea and the policies that were created to deal with this crisis became known as the Washington consensus. There were concerns that fiscal deficits were creating economic instability, generating inflation and were leading to balance of payments problems.

The question, therefore, is: what is the transmission from fiscal policy to inflation under Keynes? Bordo and Levy (2021) explain that it is possible for inflation to occur under Keynesian theory. The popular relationship between fiscal deficits and inflation originates from the post-World War II Keynesian models where an increase in aggregate demand due to larger spending by government leads to an increase in nominal income. The extent of this increase in nominal income leads to an increase in prices but this increase depends on the shape of the aggregate supply curve. The early Keynesians put forward a reverse L-shaped supply curve. With this reverse L-shaped supply curve, a shift in aggregate demand leads to an increase in economic activity and an increase in employment. Reaching full employment leads to an increase in demand and in turn a rise in prices.

The possibility of fiscal policy leading to inflation is the reason why orthodox economics, which is the opposite of Keynesian economics, believe that fiscal policy should be disciplined. Orthodox economics does not have a specific originator but is a term usually used to encompass mainstream economics usually stemming from classical and neoclassical economics (Waterman, 2019). Fiscal policy under orthodox economics is driven by ideas such as stability and insists on austerity measures (Seelkopf and Haffart, 2024). The fear of fiscal deficits creating inflation comes about due to the macroeconomic concern of the deficits financing. Orthodox economics believe that if this deficit is monetised then it will surely lead to inflation. Several arguments and proposals, accepted by economists and policy makers in developing countries have blamed fiscal deficits for their macroeconomic problems like inflation (Ezeabasil et al, 2012). This is because most developing countries have political instability, less efficient tax collection and limited access to external borrowing. As such, these factors reduce the relative cost of seigniorage and hence increase in the economy's dependent on inflation tax (Alesina and Drazen, 1991; Cukierman et al., 1992; Calvo and Ve´gh, 1999 cited in Catao and Terrones, 2005). There are two main transmissions of how fiscal deficits cause inflation under the orthodox view. The first is that high money financed debts would mean that economic agents end up having a surplus in money balances. Because of this, they would spend on domestic goods causing inflation. The second is that with the surplus money balances they would demand more imports implying that local currencies would be exchanged for foreign currencies resulting in a depreciation. If the purchasing power parity is held then the domestic prices will increase (Vera, 2009). However, monetarists like Akcay et al (1996) explain that this link between fiscal policy and inflation can be cut if the central bank refuses to monetise the deficit (Ezeabasil et al, 2012). Despite this, the Orthodox further argue that it is still possible for such deficits to be inflationary without necessarily being monetised as deficits could place both demand and supply side pressures on prices. On the demand side, if for example, all resources are employed, any extra spending by government would increase input prices. This increase in input prices would be passed down to the consumers in the form of higher prices. While on the supply side, fiscal deficits could lead to crowding out of private investment through higher interest rates, leading to a decrease in capacity and productivity. Should demand remain the same or grow, it will be greater than supply resulting in inflation (Wray, 1997:547).

Another literature that relates fiscal policy and inflation is the fiscal dominance of monetary policy. Rother (2004) explains that inflationary pressures of persistent deficits have different channels through which they can affect inflation. One of these channels is the fiscal dominance hypothesis, where fiscal policy forces influence the central bank to follow inflationary monetary policy (Bordo and Levy, 2021). Sargent and Wallace (1981) also explain that under certain circumstances, the control that monetary authorities have over inflation in a monetarist economy could be very limited. Even though the monetary base and the price level are connected, the monetary authorities could be constrained by the government debt. In this case, when fiscal authorities do not adjust taxes or expenditures (both at current or in future) in response to increases in the outstanding debt, following issuance of government bonds, then monetary authorities are forced to fully or partially back the increase in government debt (Sanusi, 2020).

However, since the monetary authority affects the way seigniorage is used as a revenue source then it means that fiscal and monetary policy are supposed to be coordinated. However, depending on which authority moves first, would determine the degree of fiscal dominance. It is suggested that in developing countries growth in debt is usually followed up by money growth. This is usually because most central banks in developing countries are under the control of the minister of finance more especially as capital markets are undeveloped. An independent central bank could be free of such pressures. However, developing countries tend to have young central banks that are not fully or properly developed, making it hard for independence. In addition, commercial banks tend to dominate the financial sector in many developing countries with home banks being owned by government. This makes them willing to provide credit to the government. Although not all the banks will do so since some banks in developing countries are international branches and will be less affected by politics (De Haan and Zelhorst, 1990).

Within the fiscal dominance theory, other economists bring up the Fiscal Theory of the Price Level (FTPL). In this modern theory there seems to be "an immediate impact of fiscal policies on the price level independent of monetary variables" (Rother, 2004). Created by Leeper (1991), Woodford (1994,1995) and Sims (1994) who argue that the price level is determined by fiscal policy through the budget constraint that is associated with the debt policy, spending and taxation (Surjaningsih et al, 2012). The budget constraint is as a long-term solvency condition for public sector finances. Under the FTPL, the government budget constraint is assumed to be in equilibrium and Ricardian equivalence does not occur. Thus, any imbalances in the budget constraint must be adjusted using moving prices. Therefore, fiscal authorities decide future expenditure and revenues exogenously. This means that if the discounted value primary surplus is lower than the pre-determined nominal debt, the price level has to increase for the government budget constraint to reach equilibrium. The larger the government nominal liabilities through fiscal actions, the higher that prices will have to jump (Lozano-Espitia, 2008). The FTPL sounds similar to the fiscal dominance theory in the sense that fiscal policy plays a role in influencing price levels. Both theories acknowledge that debt incurred by government spending can be monetised and that expectations play a role leading to inflation. Though it is important to note what makes them separate theories. Under the FTPL prices are determined by governments budget constraint and so it is a relationship between fiscal policy and price levels in the country. Under the fiscal dominance theory monetary policy is constrained by fiscal policy and so the concentration is the relationship between fiscal policy and monetary policy.

This study adopts the post-World War II Keynesian model to study the impact of fiscal policy on inflation volatility. Under this model, an increase in the use of fiscal policy means an increase in government expenditure, this leads to an increase in aggregate demand in the economy. As aggregate demand increases so does nominal income which then influences the price levels in the economy. The magnitude of the change in prices will depend on the shape of the aggregate supply curve.

2.2. Empirical Literature

The relationship between fiscal deficits and inflation has created a lot of interest in the economic world. Theoretically, it seems that fiscal deficits would cause inflation but empirically there does not seem to be a concrete conclusion. Existing studies do not really specify what the best variable for analysis of the relationship between inflation and fiscal policy is. Levine and Renelt (1992) argued that none of the three fiscal variables commonly used (expenditure, tax revenue and fiscal deficit) were robust when used together. They argued that one variable could not properly capture a country's fiscal stance. An example provided was that a country might be seen as expanding its fiscal policy when its spending is financed by balance deficit increases. However, an increase in the deficit could be seen as the opposite if it is financed by increase in taxes. So to get the best outcome all these variables would need to be used in combination in the equation. Fatas and Mihov (2003) explain that the minimum variables needed to analyse the impact of fiscal policy are real government expenditure, real tax revenue, real GDP, CPI and 3- month deposit rate. In addition, the data they used in their inflation volatility equations were inflation volatility (moving average of standard deviations 4 quarters), discretionary fiscal policy volatility (mean of standard deviation 4 quarters), and volatility of the Rupiah, output gap and inflation.

De Haan and Zelhorst (1990) used a panel data analysis to investigate the relationship between government deficits and money growth in 17 developing countries over the period 1961 to 1985. These countries consisted of low-income, lower-middle-income and upper-middle-income countries. Five of these countries were highly indebted. At the first analysis of the data, it seemed that it was possible for countries to have large deficits but low inflation rates. The countries were also ranked based on the size of the government budget deficit and the money growth rate using the Spearman and Kendall rank correlation rank. The coefficients were found to be negative and significant at 10%. This result was against the hypothesis that government's deficits influence money supply growth. They further estimated a vector auto regression. In a three-variable system with reserve money as the dependant variable, budget deficits seemed to have significant impact on money growth in five countries. When the current account and inflation were added as other explanatory variables, government budget deficit ended up having a temporary effect on money growth in four countries, and long run effect in four other countries. However, two of those long run effects of government budget deficits were to reduce money growth. When the growth rate of narrow money (M1) was used as the dependant variable, the variable was found to be against the hypothesis that budget deficits lead to money growth even more. When inflation and the current account were again added as explanatory variables, government deficits only affected money growth in two countries. Even when the equation was run with the current values of the explanatory variables, the same conclusions were reached. To see if it was possible that different regimes influenced the results, two subsamples were run and they found similar results. It was therefore concluded that there was not enough evidence that supported the theory that government deficits influenced money growth.

Rother's (2004) research suggests that fiscal policies play an important role on CPI inflation volatility. They used panel estimation of a single equation for 15 OECD countries over 35 years from 1967 to 2001. They argued that the advantages of using panel data included a more accurate inference of model parameters and a larger ability to capture complex human behaviours. The drawback, however, is the lack of control of the impact of unobserved heterogeneity (Hsiao, 2007). To get more accurate results, two different measures of inflation volatility were used on the variable representing fiscal policy, and these were conditional and unconditional volatility of inflation. Conditional volatility being the standard deviation over a year of month-to-month inflation based on the CPI and obtained from GARCH models. This was said to be better for GARCH than quarterly data. Unconditional volatility being the measure of short-term changes in inflation. The reason for this consideration was that fiscal policy could affect the reaction of inflation directly or indirectly thus making it volatile in the short run. Volatility in discretionary policy was the year-by-year change in the adjusted primary balance relative to GDP. Other variables included were the output gap, share of government in GDP and monetary policy, which was also represented by the volatility of the ratio of broad money to GDP. Impact of foreign prices was represented by volatility in nominal exchange rate and the share of imports relative to GDP. The level of inflation was also included to show high inflation is associated with volatility. Standard deviation was used to obtain the independent volatility variables broad money and nominal exchange rate. The results showed that volatility in discretionary fiscal policy has contributed to inflation volatility between 1967 and 2001. There were also significant and positive coefficients found for annual and five-year average data and the shorter sample starting in 1980. Similar results were found for inflation uncertainty measured using conditional variances from the country specific GARCH models. An increase in fiscal policy by one standard deviation seems to increase unconditional inflation by about 10% and conditional by 17%.

Ramona and Dezsi (2011) looked at the impact of fiscal policy on inflation volatility in Romania. Different variables for fiscal policy were used to include the aspects of fiscal policy in Romania. These variables included the share of public expenditures in GDP and the share of public revenues in GDP to represent the global tax burden. They based the paper on Rother (2004) whose research was robust when concerning the specification of inflation volatility; sample period, methodology and data frequency. A vector autoregression model (VAR) was used to determine the relationship between real and expected inflation volatility while a GARCH (p, q) was used to determine expected inflation volatility. The variables used were quarterly and spanned from the first quarter of 2007 to the fourth quarter of 2010 to capture the behaviour of the variables during the financial crises. The results suggested that increasing the tax burden and VAT was not a good solution during this crisis as their measures had a large impact on inflation. Their research was, however, limited as there were only 16 observations for the variables.

Ezeabasili et al, (2012) analysed fiscal deficits and inflation in Nigeria using yearly data from 1970 to 2006, since it was a period of persistent inflationary trends in Nigeria. Hence, such a period was said to be the best time to look at variables affecting inflationary trends. They used error correction modelling that included cointegrating techniques and structural analysis. The results revealed a positive but an insignificant relationship between the two variables. The model used in their research followed the work done by Romer (1993), Lane (1995), Akcay et al (1996), Catao and Terrones (2003), Magbabeola and Adelokun (2003) and Perrotti (2004). Variables used were the inflation rate, fiscal deficit, money supply, exchange rate depreciation and gross domestic product. The exchange rate depreciation variable was included due to the work done by Romer (1993) and Lane (1995). Due to the problems associated with the Engle-Granger methodology, the results were validated using the Johansen (1988) approach. Consistency in the results from the two methodologies implied that there was a long run relationship.

Surjaningsih et al (2012) examined the impact of fiscal policy on output and inflation as well as how discretionary fiscal policy affects the volatility of output and inflation on quarterly data between 1990 and 2009 in Indonesia. They used VECM for the analysis of fiscal policy on output and inflation while a linear regression was used for the effects of discretionary fiscal policy on output and inflation. The conclusion was that increase in government spending positively affected GDP and taxes negatively affected GDP. This is in line with Keynes theory about government's role to influence the economy. However, with regard to inflation they found a result different from most empirical work as they found that increasing government spending decreased inflation while increases in taxes increased inflation. The explanation of how government spending could have a negative effect on inflation is due to larger multiplier effects of spending on investments than routine spending. Spending money on infrastructure improves the distribution of goods and services leading to a decrease in inflation. While increases in taxes leads to increase in production costs thus leading to inflation. It was also concluded that there did not seem to be any discretionary policies during the time.

A similar research by Oseni and Sanni (2016) was carried out to find out the direction of causality between inflation volatility and fiscal policy in Nigeria from 1981 to 2014, using quarterly data. The volatility of the data was obtained using a GARCH (1, 1) model and the direction of the relationship was obtained using the Pairwise Granger Causality test. The basis of the study for analysing the direction between the two variables was Keynesian theory. Error correction results showed that fiscal deficits had a positive impact on inflation volatility but was insignificant. The Bivariate Granger Causality test showed that there was bi-directional causality with both variables having a significant effect on the other.

In Malawi, a similar research had been done by Mangani (2021) who looked to see if the mainstream view that when government spending is greater than revenue, the deficit would compromise the aim of price stability applied to Malawi. The study modelled inflation as an autoregressive distributed lag and used the two stage least squares estimation as well as ordinary least squares estimation. Two measures for the fiscal stance were applied thus fiscal deficit and net domestic credit to the public. Four different inflation models were created that depended on the measure of fiscal stance used in the ARDL process and the external effects on inflation were captured by variables like the exchange rate or trade openness. The results showed that only one model supported the idea that fiscal stance affects inflation at a significance level of 10%. This led to the conclusion that fiscal deficits are not inflationary in Malawi. The Reserve Bank of Malawi (RBM) (2021) also came up with a policy brief on fiscal dominance and inflation in Malawi. By plotting seigniorage, which is an indicator of fiscal dominance against inflation, it showed that when seigniorage was growing so was inflation. In the same vein, when seigniorage was decreasing so was inflation showing a relationship during the estimated period. This relationship seemed to be negative in 2020 where other factors seemed to have interfered. Plotting fiscal deficit and inflation also seemed to show a generally positive relationship until 2018 where the relationship seemed to have become negative. An Ordinary Least Squares estimation was also employed where fiscal dominance was represented by seigniorage and the budget deficit. Results showed that inflation was positively correlated with both variables, suggesting that a 1% increase in the fiscal budget leads to a 0.13% increase in inflation. Also, a 1% increase in seigniorage increases inflation by 0.23%. Further, the study found that a 28% R-squared that implies that both variables jointly explain 28% of the variations in inflation. Our research differs from these just mentioned in that our study concentrates on inflation volatility and not just inflation. Emphasis on volatility is made due to the various changes observed in the inflation data in Malawi over the period of study. Such volatility could have a negative impact on the country's economy. In addition, our study looks to examine both the long run and the short run relationship between the two by employing both Autoregressive Distributive Lag (ARDL) and Error Correction Model (ECM) methodologies.

3.0. METHODOLOGY

This study examines the effect of fiscal policy on inflation volatility in Malawi using yearly data for the period 1980 to 2022. Yearly inflation volatility data is generated by using monthly inflation data and employing the Moving Average Standard Deviation method. Studies like Mangani (2021) and the policy brief from the Reserve Bank of Malawi (RBM) (2021) are on fiscal policy and inflation level in Malawi but not on inflation volatility, hence this study. The time period selection is therefore motivated by the volatility seen in the data from the beginning of 1980 as well as the availability of the data for the variables used. The variables are analysed using an Autoregressive Distributive Lag (ARDL) and Error Correction Model (ECM) methodologies. All results are obtained using Eviews 13.

3.1. Variables and Sources

The variables chosen for the study follow those of Surjaningsih et al (2012) while the measure of volatility used follows the work of Kim and Lin (2012). Surjaningsih et al (2012) used discretionary fiscal volatility, volatility of the exchange rate, output gap and inflation rate itself as control variables. Kim and Lin (2012) used the moving average standard deviation to create their inflation volatility variable. Both studies used a fiscal variable, a variable to take into account the outside economies and a variable to take into account an economy's output. Thus, the variables used in our study are inflation volatility, government balance, exchange rate, and the output gap. We do not include inflation itself to avoid problems of endogeneity.

a. Headline Inflation Moving Average Standard Deviation

The Moving Average Standard Deviation of headline inflation is the inflation volatility variable. This is the dependant variable in the model. The data was obtained from the IMF database. The formula is expressed as:

$$Volatility_{t+m} = \left[\frac{1}{m}\sum_{i=1}^{m}(p_{t+i-1} - p_{t+i-2})^2\right]^{\frac{1}{2}} \text{.......................................(1)}$$

Where p is headline inflation and m is the order of the moving average. Our study employs the order $m = 12$ as we consider a 12-month rolling window.

b. Government Balance

This is the variable used to measure Malawi's fiscal stance. It is the log of the difference between government expenditure and government revenue. The data was obtained from the

Reserve Bank of Malawi's statistical bulletins (several issues). Its relationship with inflation volatility is expected to be positive. Malawi's government balance is on average negative, which means government is often spending more than the revenue available. Large spending will spill over into the economy raising aggregate demand. This will lead to an increase in domestic prices thus positively influencing inflation volatility.

c. Nominal Exchange Rate

This is the log of the value of the domestic currency (Malawi kwacha) per US dollar (an increase represents a devaluation/depreciation depending on the exchange rate regime(s) followed by Malawi between 1980 and 2022). Exchange rate data was obtained from the Reserve Bank of Malawi database. It is expected that exchange rate will have a positive impact on inflation volatility. Exchange rate is expected to have a positive impact on inflation volatility. The exchange rate is the price of international goods. A depreciation of the domestic currency will increase the prices of foreign goods. An import reliant country like Malawi who uses some of these imports as inputs in production will be influenced by any changes in the exchange rate.

d. Output Gap

This is the difference between potential GDP and actual GDP divided by potential GDP expressed as a percentage. The potential GDP was obtained by using HP filter. Since the variable is on average negative, an increase indicates that the output gap is shrinking. Such an increase is expected to increase volatility. If demand for output is greater than actual production, it will lead to an increase in the prices. An increase in prices of goods and services will positively affect inflation volatility.

e. 2012 Dummy

This is a dummy variable that takes into account the 50% depreciation that occurred in 2012. It takes the value 0 from 1980 to 2011 and 1 from 2012 to 2022.

3.2. Descriptive Statistics

Table 1 below provides the summary statistics of the variables used in the study. All the variables are used in their raw state for the summary statistics. The results show that the moving average standard deviation of the headline inflation (hinfmastd) has a standard deviation of 0.93, which is low meaning that the data does not vary greatly from the mean. The data is positively skewed meaning the values are more concentrated towards the right side of the mean. Kurtosis and probability show that this variable is normally distributed. The mean of the Government balance (bal) is negative indicating expenditure is often greater than revenue. Skewness of 0.47 and a kurtosis close to 3 indicates the data is normally distributed. The standard deviation of the exchange rate (exch) is high indicating that the data varies greatly in the study period. It is also positively skewed implying that there are a few periods when the exchange rate was high than the average. Output gap (outputgap) is calculated as the difference between potential and actual output expressed as a percentage of potential output. The average output gap is negative, which indicates that the country is often not reaching its potential in terms of output. A standard deviation of 1.11 is low which means the data does not deviate much from the mean. Results also indicate that output gap is negatively skewed and is leptokurtic.

Table 1: Summary Statistics

	hinfmastd	bal	exch	outputgap
Mean	2.885685	-4.935364	203.0141	-0.040490
Median	2.913015	-5.706607	74.44197	-0.005575
Maximum	5.084214	1.087016	949.0390	2.700318
Minimum	1.036998	-9.537351	0.895299	-3.743206
Std. Dev.	0.927361	2.713663	284.8022	1.109567
Skewness	0.524945	0.470076	1.365216	-0.818785
Kurtosis	2.989736	2.458366	3.356053	5.762403
Jarque-Bera	1.929151	2.060197	13.26855	18.04688
Probability	0.381145	0.356972	0.001315	0.000121
Sum	121.1988	-207.2853	8526.592	-1.700597
Sum Sq. Dev.	35.25993	301.9227	3325604.	50.47668
Observations	42	42	42	42

Note: hinfmastd is the moving average standard deviation of headline inflation, bal is the government balance, exch is the exchange rate, outputgap is the value of the output gap.
Source: Author's analysis

3.3. Unit Root Tests

Firstly, the variables are tested for unit roots to find out if a series is stationary or non-stationary to avoid spurious results (Sjo, 2008). The Augmented Dickey-Fuller (ADF) and the Philip Peron (PP) tests are used. We did not use the normal Dickey-Fuller tests, as it assumes that that the error term is uncorrelated. As such, to account for the possibility that the error terms might be correlated the ADF test is used. It augments the three equations that are estimated for the DF test by lagging the dependant variable. The null hypothesis states that there is no unit root and so the series is stationary. We would fail to reject the null hypothesis if the test statistic is greater than the critical value. Unlike the ADF tests, the Phillips-Perron test uses nonparametric statistical methods to deal with serial correlation in the error terms without adding lagged difference terms. It should be noted that the ARDL model does not really need the testing of variables beforehand since the orders do not matter, as long as they are not of order 2 or above.

Table 2 below shows the results of the ADF test for variables used in the model. The order of integration is decided using the Intercept and trend probability results. The results show that the variables are a mixture of order 0 and order 1 variables.

Table 2: Augmented Dickey Fuller Unit Root Test

Variable		Intercept	Intercept & trend	Order
hinfmastd	Level	0.0846	0.0164	I(0)
	First difference	0.0003	0.0016	
lbal	Level	0.0000	0.0000	I(0)
	First difference	0.0000	0.0000	
lexch	Level	0.7652	0.6837	I(1)
	First difference	0.0013	0.0083	
outputgap	Level	0.0049	0.3450	I(1)
	First difference	0.0000	0.0000	

Note: hinfmastd is the moving average standard deviation of headline inflation, lbal is the log of the government balance, lexch is the log of exchange rate, outputgap is the value of the output gap. The values shown are the p-values.
Source: Author's analysis

We further used the Philip Peron (PP) test for variables used in the model and the results are in Table 3 below. The order of integration is decided using the Intercept and trend probability results. The results also show that the variables are a mix of order 0 and order 1. This indicates it is safe to proceed with the ARDL bounds test.

Table 3: Phillips-Perron Unit Root Test

Variable		Intercept	Intercept & trend	Order
hinfmastd	Level	0.0035	0.0191	I(0)
	First difference	0.0000	0.0000	
lexch	Level	0.7921	0.8536	I(1)
	First difference	0.0011	0.0056	
outputgap	Level	0.0063	0.0428	I(0)
	First difference	0.0000	0.0000	
lbal	Level	0.0000	0.0000	I(0)
	First difference	0.0000	0.0000	

Note: hinfmastd is the moving average standard deviation of headline inflation, lbal is the log of the government balance, lexch is the log of exchange rate, outputgap is the value of the output gap.
Source: Author's analysis

3.4. Correlation Matrix

Table 4 below contains the correlation matrix of the variables. The independent variables have the expected positive impact on the dependant variable (the moving average standard deviation of headline inflation).

Table 4: Correlation Matrix

	hinfmastd	lbal	lexch	outputgap
hinfmastd	1.000000	0.026300	0.069552	0.047947
lbal	0.026300	1.000000	0.171704	-0.106610
lexch	0.069552	0.171704	1.000000	0.120839
outputgap	0.047947	-0.106610	0.120839	1.000000

Variables: hinfmastd is headline inflation moving average standard deviation, lbal is the log of the government balance, lexch is the log of the exchange rate and outputgap it the output gap.
Source: Author's analysis

3.5. Model Specification

The basis of this study follows the work of Kim and Lin (2012) and Surjaningsih et al (2012) for variable choices and volatility measures. Malawi's inflation data for the period 1980 to 2022 shows high volatility and that there are only two periods where monthly inflation rate stayed the same for two months, hence use of inflation volatility in our model. The research uses Autoregressive Distributed Lag (ARDL) process to find the long run relationship between inflation volatility and the fiscal variables while the Error Correction Model (ECM) is used to find the short run relationship.

There is no agreement on how volatility should be measured hence there are several methods used in the literature. The most commonly used are the Generalised Autoregressive Conditional Heteroscedasticity (GARCH) which allows for time varying conditional variance, volatility clustering, standard deviation and moving sample standard deviation. Uncertainty is usually measured by the GARCH methodology, as it is better at capturing it. However, the measurement of uncertainty needs specific forecasting model. In addition, since annual inflation are not autocorrelated the two approaches are unlikely to differ greatly from one another (Kim and Lin, 2012). There are, however, good reasons to look at volatility rather than uncertainty.

The Bounds test for cointegration was used to determine whether there is a long run relationship between the variables. Johansen (1988) cointegration test could not be used since the variables in this study are found to be of different orders. Other methodologies such as Ordinary Least Squares (OLS) and Vector Autoregressive (VAR) models were considered but both these methodologies have requirements not suitable for the data used in the study. OLS and VAR require all variables to be stationary as problems can arise when they are of a mixed order. In addition, VAR requires that the variables be stationary in first difference but this could lead to the loss of long run relationships between the level variables. The ARDL was chosen for a number of reasons. Firstly, most researchers have used it to model a relationship between variables in a single-equation time series as it allows one to include in an equation variables of different order. The ARDL was chosen mainly as it allows one to include variables of different order. This is important as variables that are included in the model have different characteristics hence order of integration. Secondly, the ARDL model can disentangle long run relationships from short run dynamics. An ARDL model is an ordinary least square (OLS) based model, which is applicable for series with different orders of integration. The model takes sufficient lags to find the data generating process in a general to specific modelling framework (Shrestha and Bhatta, 2018). If a long-run relationship is found, a further step is taken by estimating an Error Correction Model (ECM). A dynamic ECM can be derived from an ARDL model. The ECM adds the short-run relationship with the long run equilibrium without losing long-run data and avoids problems such as spurious relationship which arise due to non-stationary data.

3.6. ARDL Bounds Test for Cointegration

Cointegration is used to determine whether a long run relationship exists between our dependant and independent variables. To do so we make use of the ARDL Bounds test for cointegration. Other tests such as the Johansen (1988) and Engle and Granger (1987) cointegration techniques exists but they require all the variables be integrated of order one. The advantage of the ARDL bounds test is that it can be used irrespective of whether the variables are of order one or zero. The null hypothesis is that there is no cointegration thus no long run relationship. In other words if the variables are of order one but not cointegrated, then the lagged variables in level terms will fail to explain changes in inflation volatility (Montenegro, 2019). This procedure can be applied to level or order one variables. If the regressors are level then OLS can be applied and the F-statistic will have the usual distribution. If they are of order one then they will not have the normal distribution. Two critical values are provided between the two extremes. A lower bound when the regressors are level and an upper bound for when the regressors are of order one. If the F-statistic is above the upper bound we will reject the null making a long run relationship probable. If the F-statistic is below the lower bound then we fail to reject the null. If it falls between the two the result is inconclusive and we can conclude that there is no long run relationship. ARDL bounds test works best with small samples.

The model specified therefore is as follows:

$$\Delta hinfmastd_t = \beta_0 + \sum_{i=1}^{p} \gamma_{1i} \Delta hinfmastd_{t-i} + \sum_{i=1}^{p} \gamma_{2i} \Delta lbal_{t-i} + \sum_{i=1}^{p} \gamma_{3i} \Delta lexch_{t-i} + \sum_{i=1}^{p} \gamma_{4i} \Delta outputgap_{t-i} + \sum_{i=1}^{p} \gamma_{5i} \Delta dum12_{t-i} + \theta_1 hinfmastd_{t-1} + \theta_2 lbal_{t-1} + \theta_3 lexch_{t-1} + \theta_4 outputgap_{t-1} + \theta_5 dum12_{t-1} + e_t \text{..........................(2)}$$

Where, hinfmastd is the moving average standard deviation of headline inflation, lbal is the log of the government balance, lexch is the log of exchange rate, outputgap is the value of the output gap, dum12 is dummy for 2012, γ_1 - γ_5 are the short run coefficients and θ_1- θ_5 are the long run coefficients.

If a long run relationship is established the error correction model below is estimated:

$$\Delta hinfmastd_t = \beta_0 + \sum_{i=1}^{p} \gamma_{1i} \Delta hinfmastd_{t-i} + \sum_{i=1}^{p} \gamma_{2i} \Delta lbal_{t-i} + \sum_{i=1}^{p} \gamma_{3i} \Delta lexch_{t-i} + \sum_{i=1}^{p} \gamma_{4i} outputgap_{t-i} + \sum_{i=1}^{p} \gamma_{5i} \Delta dum12_{t-i} + \theta_1 hinfmastd_{t-1} + \theta_2 lbal_{t-1} + \theta_3 lexch_{t-1} + \theta_4 outputgap_{t-1} + \theta_5 dum12_{t-1} + \alpha ECM_{t-1} + e_t \text{ ....(3)}$$

Where ECM_{t-1} is the error correction term.

4.0. RESULTS

4.1. Lag Length Selection

Before testing for cointegration, we chose the optimal lag length using VAR. We use the Akaike Information Criterion (AIC) to decide on the lag length, following the use of the AIC in the unit root tests. The results of the test are shown in Table 5 below. The lag length advised from the AIC is one (1) and so we follow by setting the maximum lag length to one. Ang (2010) also uses the same lag length.

Table 5: VAR lag length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-50.03731	NA	0.986066	2.822426	3.035703	2.898948
1	-47.00032	5.139512*	0.889186*	2.717965*	2.973898*	2.809792*
2	-46.56625	0.712319	0.916715	2.746987	3.045575	2.854118
3	-46.28551	0.446304	0.953038	2.783872	3.125116	2.906308

Source: Author's assessment

4.2. ARDL Bounds Test for Cointegration Results

We test for cointegration on the variables inflation volatility, government balance, exchange rate, output gap and the dummy variable, as listed in Equation 2. The results in Table 6 below shows that the F-Statistics for the Model exceeds the upper bound hence the null hypothesis is rejected and therefore presents evidence of cointegration at the 5% level of significance. This therefore implying that there is a long run relationship.

Table 6: ARDL Bounds Test for Cointegration

Model	F-statistic	I(0) at 5%	I(1) at 5%
		Asymptotic	
Model	7.277554	3.230	4.350

Source: Author's assessment

4.3. Long-run Estimates

Once a long run relationship has been established, it is important to examine the marginal effects that the independent variables have on inflation volatility (moving average standard deviation). Table 7 lists the long run coefficients for Equation 2. According to the results, the fiscal variable is found to have a positive and significant impact on inflation volatility, suggesting that the government balance does have a long run impact on inflation volatility in Malawi. A percentage increase in the government balance, which is a worsening of the fiscal deficit leads to a 0.57% increase in inflation volatility at the 10% level of significance, holding all else constant.

These findings are slightly similar to those of Oseni and Sanni (2016) who looked to see if fiscal deficits cause inflation impulsiveness in Nigeria, using the GARCH (1,1) method for inflation volatility and fiscal deficit for the fiscal variable. Under the Error Correction Mechanism, fiscal deficit was found not to have a positive but insignificant impact on inflation volatility. They further conducted a granger causality test and the results showed that there was bi-directional causality between fiscal deficit and inflation volatility, implying that inflation volatility also influenced fiscal deficits. Our results are also similar to those of Afonso and Jalles (2020) who used a panel of 54 countries to find if changes in the fiscal policy stance has an effect on inflation volatility using Ordinary Least Squares methodology. Their results showed that an increase in discretionary fiscal policy volatility by one standard deviation led to an increase in inflation volatility by 6%. In addition, using other measures of inflation volatility resulted in a similar conclusion. However, we find that in the long run the exchange rate and output gap have positive but insignificant impact.

Table 7: Long run Estimates for Equation 2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lbal(-1)	0.565228	0.318821	1.772872	0.0843
lexch(-1)	0.161440	0.119955	1.345836	0.1863
outputgap(-1)	0.267901	0.209966	1.275921	0.2097

Source: Author's assessment

4.4. Short Run Estimates

An error correction model is estimated and the results are shown in Table 8. The results indicate that even in the short run, the government balance has a significant impact on inflation volatility. A percentage growth in the government balance leads to a 0.31% change in the growth rate of inflation volatility, ceteris paribus. In addition, the exchange rate also seem to have a significant impact on inflation volatility. The coefficient of exchange rate indicates that a percentage growth rate in this variable (thus a depreciation/devaluation) will lead to a 1.73% change in the growth rate of inflation volatility, ceteris paribus. Similarly, the dummy variable to capture the 50% depreciation of the currency in 2012 has a significant impact on inflation volatility. The results seem to suggest that the impact on inflation volatility by exchange rate changes is greater than the impact of the government balance in the short run.

This is not surprising as Malawi is heavily reliant on imports. Thus, any changes on the exchange rate will immediately have consequences on domestic prices as a depreciation of the currency makes imports more expensive. Before 2011 Malawi was under the fixed exchange rate, this created an overvaluation of the currency. Such an overvaluation led to forex shortages. To remedy this, Malawi transitioned to the flexible exchange rate regime with a 50% devaluation in the middle of 2011. However, such a devaluation does not only affect the imported final products but every other key sectors like the agricultural sector, like the transport sector, considering that the economy also relies on imported fertilisers and fuel. This will in turn result into an increase in the food and non-food prices.

The error correction term has a negative sign and is less than 1 which confirms that the system is stable and will converge to the long-run equilibrium. The rate of convergence is -0.7255, which means that 72.55% of the disequilibrium in inflation volatility caused by changes in the independent variables is corrected each year. This implies that it would take only about 1.38[1] years to get back to the equilibrium.

The results from both the long term and the short term suggest that Malawi's fiscal policy stance does have an effect on inflation volatility. This differs from similar research done in Malawi. Since there is to our understanding, no research done on inflation volatility, we compare our results to those that looked at fiscal policy and inflation. Under Mangani's (2021) research, fiscal policy does not affect inflation. However, the results do fall in line with those of the Reserve Bank of Malawi Policy Brief where increases in the fiscal budget and seigniorage both led to increases in inflation. Our results also support the emphasis on fiscal discipline in Malawi made by Wu (2017).

[1] This is calculated by dividing 1 by the error correction term.

Table 8: Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
cointeq*	-0.725519	0.128578	-5.642632	0.0000
d(lbal)	0.308594	0.093824	3.289091	0.0023
d(lexch)	1.729296	0.747145	2.314538	0.0266
d(outputgap)	0.022058	0.109684	0.201109	0.8418
dum12	-0.651199	0.293941	-2.215411	0.0333
c	2.903326	0.561456	5.171070	0.0000

Source: Author's assessment

4.5. Diagnostic Checks

We tested for heteroscedasticity of residuals by using the ARCH test for heteroscedasticity and the results suggest that all our models are homoscedastic at the 5% level of significance. Results are shown in table 9 below.

Table 9: Heteroskedasticity Test

Heteroskedasticity Test: ARCH			
F-statistic	1.894945	Prob. F(1,38)	0.1767
Obs*R-squared	1.899935	Prob. Chi-Square(1)	0.1681

Source: Author's assessment

We also test for autocorrelation using Breusch-Godfrey LM test and the results suggest that the models are free from autocorrelation. The results are shown in table 10 below.

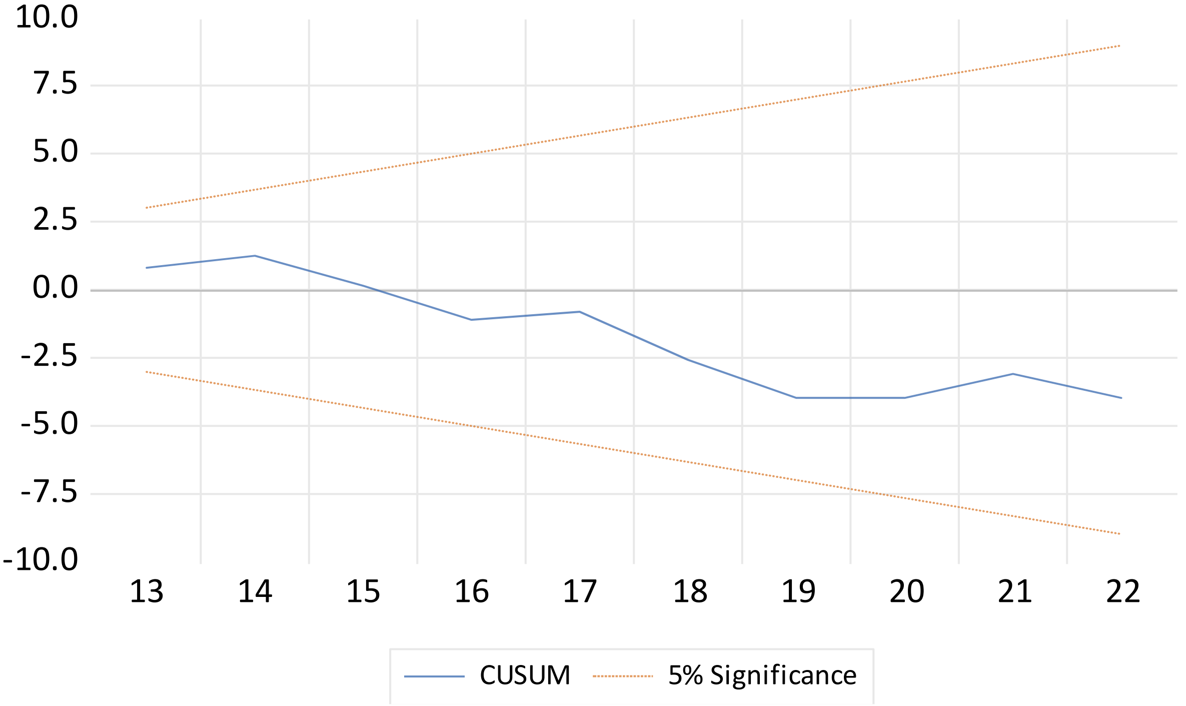
Table 10: Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.841130	Prob. F(1,29)	0.1761
Obs*R-squared	4.482260	Prob. Chi-Square(1)	0.1063

Source: Author's assessment

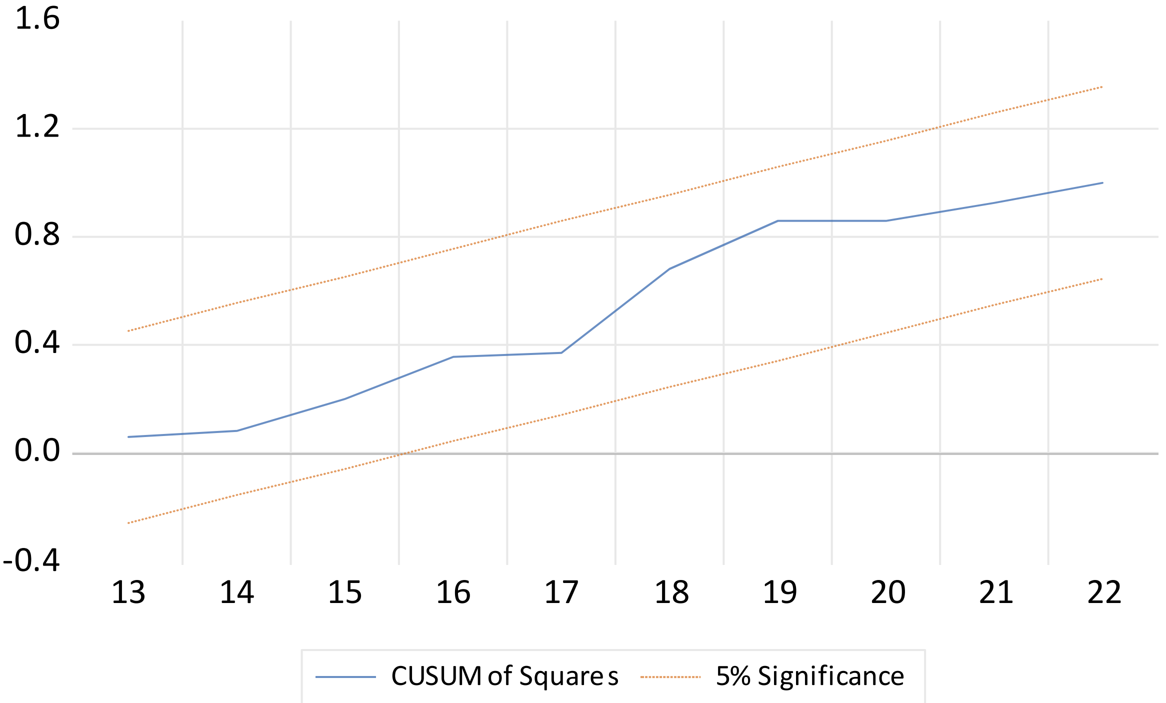
Stability was also tested using the CUSUM and CUSUM squared tests which showed that the model is stable. The results are shown in Figure 2 and 3 below. Based on the diagnostic tests, we can make statistical inference with greater certainty and have credible analysis.

Figure 2: CUSUM Test



Source: Author's assessment

Figure 3: CUSUM Squared Test



Source: Author's assessment

4.6. Robustness Checks

To ensure that our results are robust, we subject Equation 2 to alternate estimators. To do so we change the measure of volatility as well as the measure of fiscal policy. The alternative measure of inflation volatility uses a AR(1) GARCH(1,1) model as done by Afonso and Jalles (2020). The alternative measure of fiscal policy stance is government expenditure as suggested by Surjaningsih et al (2012). We therefore estimate three equations, and the results are shown in Appendix 1-Estimates with GARCH (1,1) variance as the alternative measure of volatility; Appendix 2-Estimates with Government expenditure as alternative measure of fiscal variable; and Appendix 3- Estimates with GARCH (1,1) variance as the alternative measure of volatility and Government expenditure as the alternative measure of fiscal variable. We do not observe consistent results across the different equations. When an alternative measure of volatility is used, the GARCH (1,1) variance, the results from this model (Appendix 1B) show that government balance still has a positive and significant impact at the 1% level on inflation volatility in the short run. However, in the other two equations the fiscal variable is found to be insignificant. This could be due to the fact that in these two equations a narrow definition of fiscal balance, which is government expenditure, is used. This definition is not comprehensive as only captures expenditure policies but not revenue policies. It could also be due to measurement sensitivity; different measures of volatility may capture different aspects of volatility leading to change in significance and stability in some results.

5.0. CONCLUSION

The purpose of this study was to investigate the effect of fiscal policy on inflation volatility in Malawi from 1980 to 2022. Specifically, the study aimed to determine the volatility of inflation in Malawi and to examine the long and short relationship between the fiscal variable and inflation volatility. To create the yearly volatility data the study uses the Moving Average Standard Deviation methodology with monthly inflation data. To accomplish the goal of finding the long and short run relationship between inflation volatility and the fiscal variables, the ARDL and ECM methodologies are employed. A dummy variable is included to take into account the 50% devaluation of the currency in 2012. The existence of a long-run relationship between the variables is tested using the ARDL analysis. To check for robustness different variables are employed.

The results obtained confirmed a cointegrating or long run relationship between inflation volatility and the explanatory variables of government balance, exchange rate and the output gap. However, only the government balance has a significant impact on inflation volatility in the long term. Meanwhile, in the short run both government balance and the exchange rate play a significant role on inflation volatility. The results from the error correction model indicate that it only takes about 1.38 years for the economy to reach equilibrium again, which is quite fast.

Fiscal policy does seem to play a significant role in inflation volatility in both the long and short run. This is similar to some research conducted in Malawi on fiscal policy and inflation but also disagrees with other research done on the same topic. It is not surprising that the exchange rate is significant in the short term only as Malawi is heavily reliant on imports and thus any changes on the exchange rate will have an immediate impact on domestic prices. This could be the reason why the system equilibrium is quickly reached, as once economic agents have adapted to a new exchange rate, its influence on prices fades away. However, since results from our robustness checks differ we cannot provide policy recommendations.

5.1. Limitations of the study

One of the setbacks of the study is that not all the structural breaks could be accounted for as there were too many to account. Despite this limitation, our tests prove that the model results are statistically credible. Another limitation is availability of data. For instance, monthly GDP which could have been used to obtain monthly output gap is not available. Better results could have been obtained if monthly data was used.

5.2. Directions for further research.

Further research could consider using more control variables to take into account the full picture of Malawi's economy. Variables that could be added include maize production or yearly rainfall in the inflation volatility equation. Since Malawi is dependent on agriculture, such variables could be important in explaining inflation volatility in Malawi.

REFERENCES

Afonso, A. and Jalles, J.T., 2020. A note on inflation dynamics, price volatility, and fiscal activism. *Macroeconomic Dynamics*, *24*(5), pp.1299-1313.

Akcay, O.C., Alper, C.E. and Ozmucur, S., 1996. Budget deficit, money supply and inflation: Evidence from low and high frequency data for Turkey. *Bogazici University Research Papers*, *12*.

Backé, P., 2004. *Fiscal policy and inflation volatility* (No. 317).

Bordo, M.D. and Levy, M.D., 2021. Do enlarged fiscal deficits cause inflation? The historical record. *Economic Affairs*, *41*(1), pp.59-83.

Cammack, D., 2004. Poorly performing countries: Malawi, 1980-2002. *Background Paper*, *3*.

Hossain, A.A. and Raghavan, M., 2019. Drivers of inflation and inflation volatility and their effects on macroeconomic fluctuations in Indonesia and Thailand. *Available at SSRN 3450965*.

Catao, L.A. and Terrones, M.E., 2005. Fiscal deficits and inflation. *Journal of Monetary Economics*, *52*(3), pp.529-554.

Cunha, A.M., Prates, D.M. and FerrariFilho, F., 2011. Brazil responses to the international financial crisis: a successful example of Keynesian policies?. *Panoeconomicus*, *58*(5), pp.693-714.

De Haan, J. and Zelhorst, D., 1990. The impact of government deficits on money growth in developing countries. *Journal of International Money and Finance*, *9*(4), pp.455-469.

Ezeabasili, V.N., Mojekwu, J.N. and Herbert, W.E., 2012. An empirical analysis of fiscal deficits and inflation in Nigeria. *International Business and Management*, *4*(1), pp.105-120.

Fatás, A. and Mihov, I., 2003. The case for restricting fiscal policy discretion. *The Quarterly Journal of Economics*, *118*(4), pp.1419-1447.

Hsiao, C., 2007. Panel data analysis—advantages and challenges. *Test*, *16*(1), pp.1-22.

International Monetary Fund (IMF). 2002. Malawi 2002 Article IV Consultation and Economic Programme for 2002– Staff Report. Washington, DC: IMF.

Jahan, S. and Papageorgiou, C., 2014. What is monetarism. *Finance and Development*, *51*(1), pp.38-39.

Kim, D.H. and Lin, S.C., 2012. Inflation and inflation volatility revisited. *International finance*, *15*(3), pp.327-345.

Levine, R. and Renelt, D., 1992. A sensitivity analysis of cross-country growth regressions. *The American economic review*, pp.942-963.

Lozano-Espitia, I., 2008. Budget deficit, money growth and inflation: evidence from the Colombian case. *Borradores de Economía; No. 537*.

Mangani, R., 2021. On fiscal dominance in Malawi. *African Review of Economics and Finance*, *13*(1), pp.29-53.

Mishkin, F.S., 1984. The causes of inflation.

Montenegro, A., 2019. The Ardl Bounds Cointegration Test: Tips for Application and Pretesting. *Available at SSRN 3425994*.

Montiel, P.J., 1989. Empirical analysis of high-inflation episodes in Argentina, Brazil, and Israel. *Staff Papers*, *36*(3), pp.527-549.

Mortaza, M.G., 2006. Sources of inflation in Bangladesh: Recent macroeconomic experience. *Policy Analysis Unit. Working Paper Series: WP*, *704*.

Moyo, D. and Dunga, H.M., 2020. The Introduction of Higher Banknotes and Inflation in Malawi: A Test of Bi-Causality. *African Journal of Business & Economic Research*, *15*(1).

Mujahid, H., Uddin, I., Tabash, M., Ayubi, S. and Asad, M., 2021. Inflation Volatility, Quality Of Institutions, And Openness.

Neto, A.F.C. and Vernengo, M., 2004. Fiscal policy and the Washington consensus: a Post Keynesian perspective. *Journal of Post Keynesian Economics*, *27*(2), pp.333-343.

Oseni, I.O. and Sanni, H.Y., 2016. Does Fiscal Deficit Granger Cause Impulsiveness in Inflation Rate in Nigeria?. *Acta Universitatis Danubius. Œconomica*, *12*(4).

Ramona, M. and Dezsi, E., 2011. Fiscal Policy Impact on inflation volatility in Romania in the economic crisis context. *Babes-Bolyai University*, *13*, pp.181-187.

Rother, P., 2004. Fiscal policy and inflation volatility. *Available at SSRN 515081*.

Sanusi, K.A., 2020. Fiscal dominance and inflation: Evidence from Nigerian and South African's experiences. *Cogent Economics & Finance*, *8*(1), p.1814508.

Sargent, T.J. and Wallace, N., 1981. Some unpleasant monetarist arithmetic. *Federal reserve bank of minneapolis quarterly review*, *5*(3), pp.1-17.

Seelkopf, L. and Haffert, L., 2024. Breaking with orthodoxy? German fiscal policy in the shadow of Covid-19. *German Politics*, *33*(2), pp.297-317.

Shrestha, M.B. and Bhatta, G.R., 2018. Selecting appropriate methodological framework for time series data analysis. *The Journal of Finance and Data Science*, *4*(2), pp.71-89.

Simwaka, K., Ligoya, P., Kabango, G. and Chikonda, M., 2012. Money supply and inflation in Malawi: An econometric investigation. *Journal of Economics and International Finance*, *4*(2), p.36.

Sjö, B., 2008. Testing for unit roots and cointegration. *Lectures in Modern Econometric Time series Analysis*.

Surjaningsih, N., Utari, G.A. and Trisnanto, B., 2012. The impact of fiscal policy on the output and inflation. *Bulletin of Monetary Economics and Banking*, *14*(4), pp.367-396.
Totonchi, J., 2011, July. Macroeconomic theories of inflation. *International conference on economics and finance research*. Vol. 4, No. 1, pp. 459-462.
Vera, L., 2009. Reassessing fiscal policy: perspectives from developing countries. *Development and Change*, *40*(4), pp.611-643.
Waterman, A.M.C., 2019. The Evolution of" Orthodoxy" in Economics: From Adam Smith to Paul Samuelson. *The Independent Review*, *24*(3), pp.325-345.
World Bank. 2019. Malawi Public Expenditure Review 2019: Putting Fiscal Policy on a Sustainable Path. World Bank, Washington,
Wray, L.R., 2001. Money and Inflation,[w:] Holt RPF, Pressman S.(red.), A New Guide to Post Keynesian Economics.
Wu, D.F., 2017. *Understanding inflation in Malawi: A quantitative investigation*. International Monetary Fund.

APPENDICES

Appendix 1: Estimates with GARCH (1,1) variance as the alternative measure of volatility

Appendix 1A: Long run estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lbal(-1)	1.332701	0.987517	1.349547	0.1851
lexch(-1)	-0.185129	0.378868	-0.488635	0.6279
outputgap(-1)	0.811427	0.692392	1.171918	0.2485

Source: Author's assessment

Appendix 1B: Short run estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
cointeq*	-0.717728	0.133195	-5.388533	0.0000
d(lbal)	0.702410	0.248456	2.827102	0.0077
d(lexch)	3.158986	2.246007	1.406490	0.1684
d(outputgap)	-0.061406	0.341256	-0.179941	0.8582
dum12	-0.710228	0.884619	-0.802864	0.4275
c	4.997853	1.170455	4.270009	0.0001

Source: Author's assessment

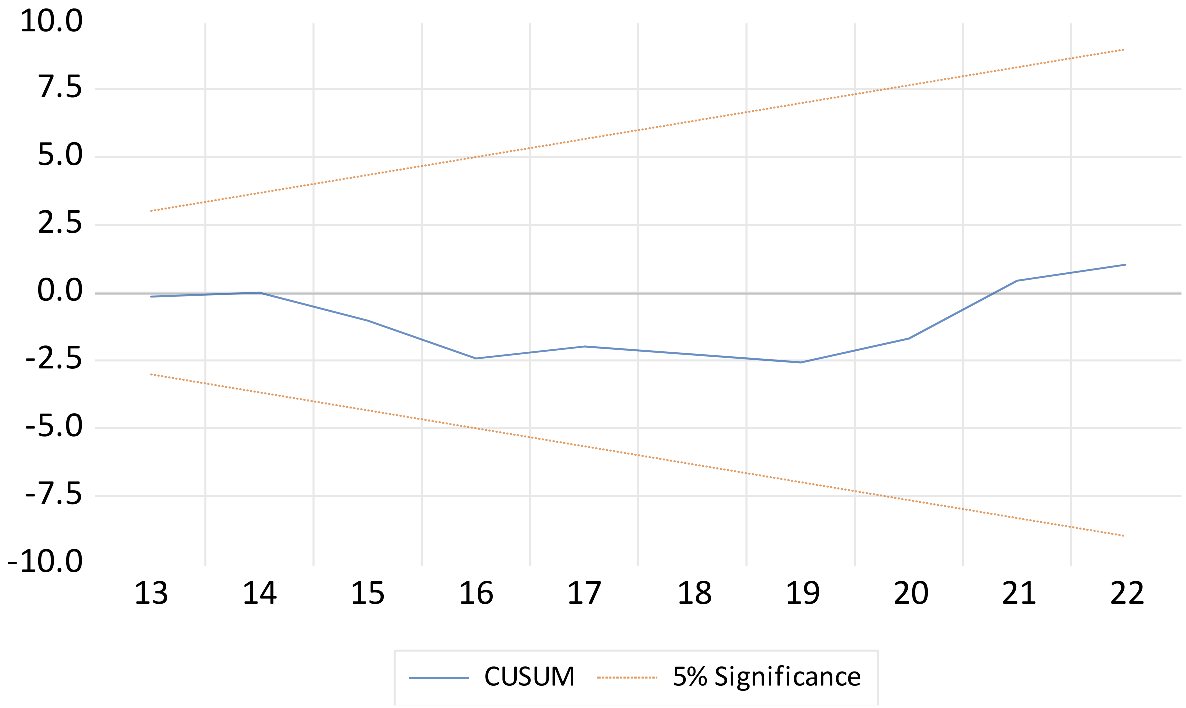
Appendix 1C: Diagnostic Checks

Heteroskedasticity Test: ARCH			
F-statistic	0.029610	Prob. F(1,38)	0.8643
Obs*R-squared	0.031145	Prob. Chi-Square(1)	0.8599

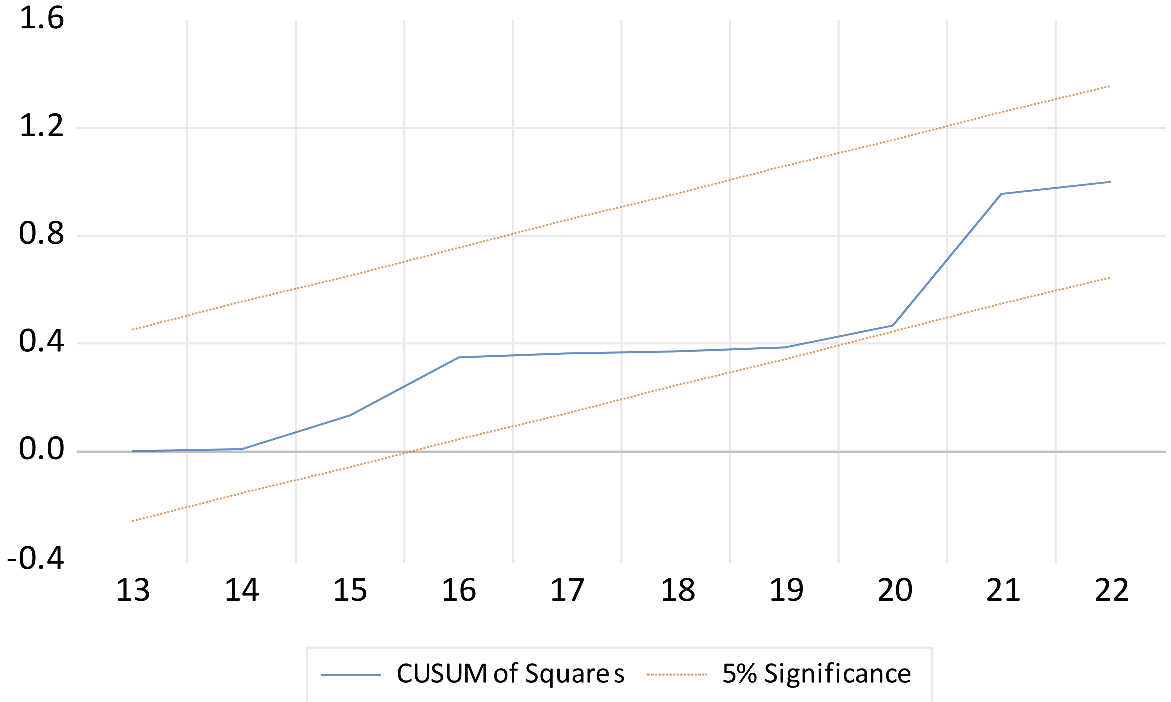
Source: Author's assessment

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.757780	Prob. F(1,29)	0.1897
Obs*R-squared	4.300628	Prob. Chi-Square(1)	0.1164

Source: Author's assessment



Source: Author's assessment



Source: Author's assessment

Appendix 2: Estimates with Government expenditure as alternative measure of fiscal variable

Appendix 2A: Long run estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lgvtexp(-1)	-2.192384	1.313979	-1.668507	0.1034
lexch(-1)	0.118659	0.116000	1.022922	0.3128
outputgap(-1)	0.139569	0.207814	0.671606	0.5059

Source: Author's assessment

Appendix 2B: Short run estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
cointeq*	-0.756297	0.138214	-5.471912	0.0000
d(lgvtexp)	-0.568142	0.593441	-0.957368	0.3449
d(lexch)	1.017402	0.761262	1.336469	0.1900
d(outputgap)	-0.008501	0.114445	-0.074280	0.9412
dum12	-0.369160	0.292015	-1.264182	0.2145
C	-1.207823	0.281832	-4.285618	0.0001

Source: Author's assessment

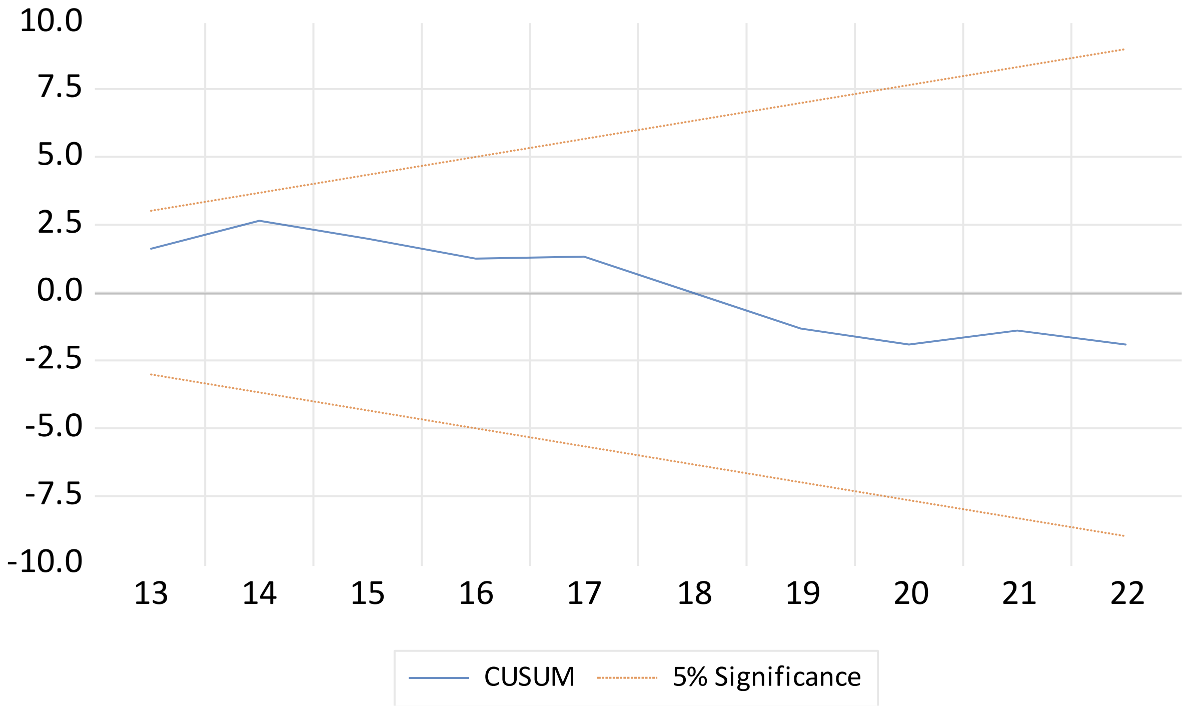
Appendix 2C: Diagnostic Checks

Heteroskedasticity Test: ARCH			
F-statistic	4.311501	Prob. F(1,38)	0.0447
Obs*R-squared	4.075961	Prob. Chi-Square(1)	0.0435

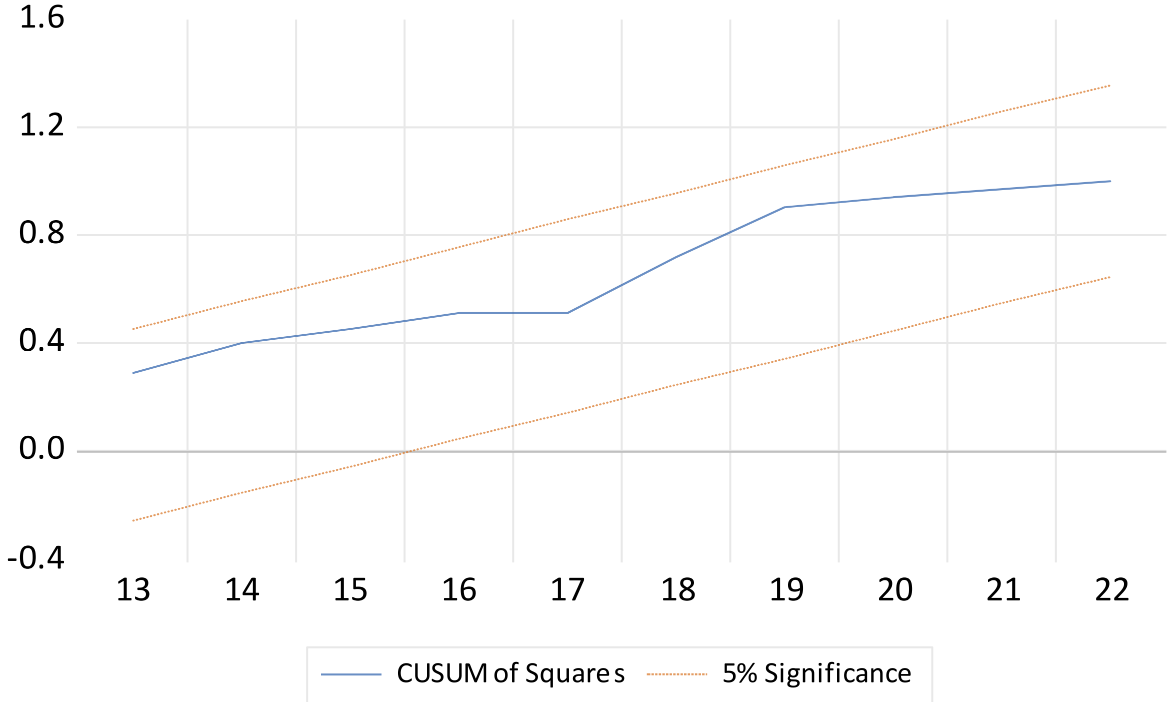
Source: Author's assessment

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.620289	Prob. F(1,29)	0.2147
Obs*R-squared	3.997034	Prob. Chi-Square(1)	0.1355

Source: Author's assessment



Source: Author's assessment



Source: Author's assessment

Appendix 3: Estimates with GARCH (1,1) variance as the alternative measure of volatility and Government expenditure as the alternative measure of fiscal variable

Appendix 3A: Long run estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lgvtexp(-1)	-3.702764	4.259671	-0.869260	0.3902
lexch(-1)	-0.240692	0.394674	-0.609850	0.5456
outputgap(-1)	0.674832	0.747218	0.903125	0.3721

Source: Author's assessment

Appendix 3B: Short run estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
cointeq*	-0.699140	0.146695	-4.765931	0.0000
d(lgvtexp)	-2.477312	1.867604	-1.326466	0.1933
d(lexch)	2.876943	2.380368	1.208613	0.2349
d(outputgap)	-0.158418	0.359968	-0.440090	0.6626
dum12	-0.108280	0.907306	-0.119342	0.9057
c	-2.870948	0.772220	-3.717782	0.0007

Source: Author's assessment

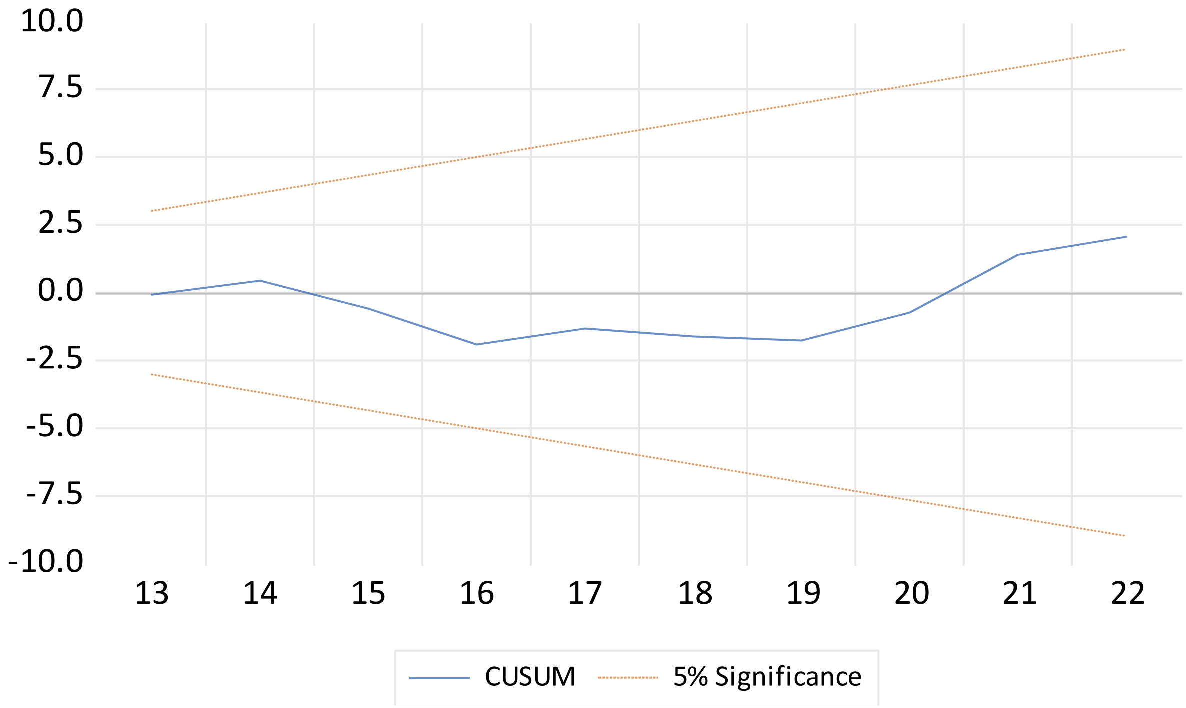
Appendix 3C: Diagnostic Checks

Heteroskedasticity Test: ARCH			
F-statistic	0.053186	Prob. F(1,38)	0.8188
Obs*R-squared	0.055907	Prob. Chi-square(1)	0.8131

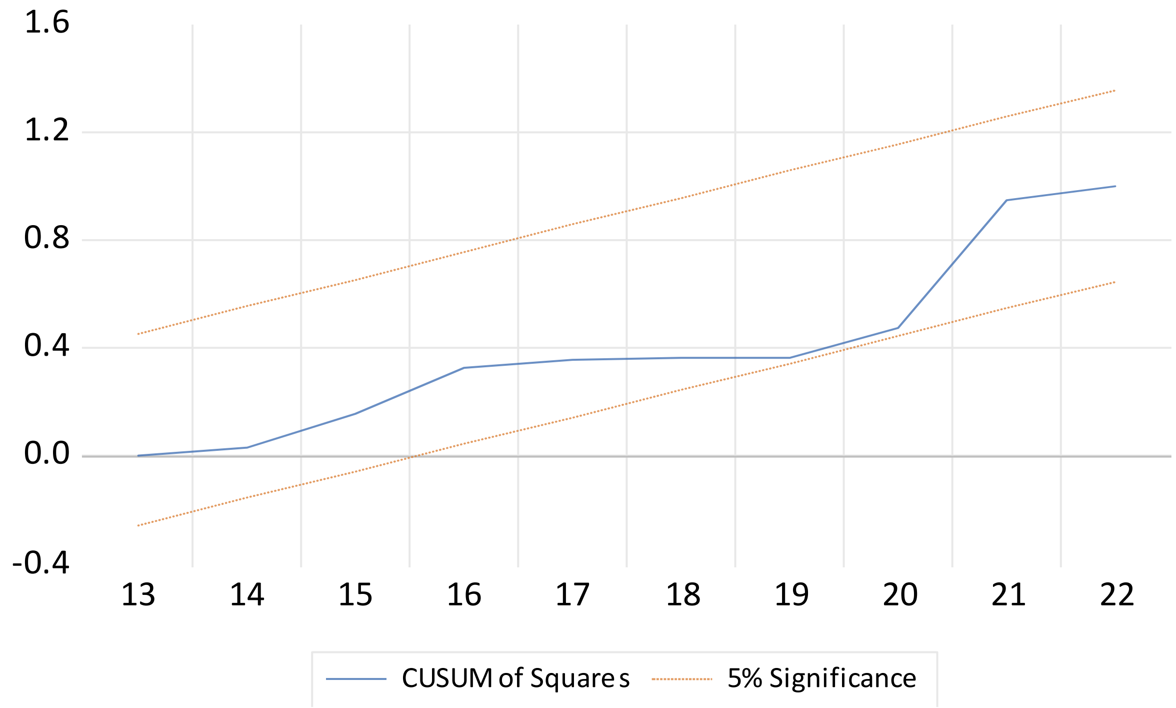
Source: Author's assessment

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.564941	Prob. F(1,29)	0.5743
Obs*R-squared	1.488126	Prob. Chi-Square(1)	0.4752

Source: Author's assessment



Source: Author's assessment



Source: Author's assessment