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MODELLING MONETARY STABILITY IN ZIMBABWE: GOING FORWARD OR BACKWARDS

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Abstract: This study sought to determine the relationship between government expenditure and inflation in Zimbabwe. Unemployment, FDI, and Real GDP augmented the estimation model of the study. The study used Vector Error Correction Model which is key in determining relationship between variables, as well as the speed at which adjustments takes effect. ECM was found plausible for the study given that all variables' data became stationary at first difference. Annual time series data for the period 1990 to 2019 were used. The results of the study confirmed a positive relationship between inflation and government expenditure for Zimbabwe, suggestive to a backward movement towards monetary stability. The study, recommends that since Zimbabwe is a developing economy, where government expenditure is more pronounced, expenditure should be directed towards productive sectors of the economy, such as manufacturing and agriculture, rather than recurrent expenditure. Reserve Bank of Zimbabwe must come up with monetary policies that enhance monetary stability. These includes policies that eliminates speculation in the stock exchange market, as well as contractionary monetary policy. Exchange rate policies must be solely determined by the Reserve Bank of Zimbabwe, with emphasis on revitalisation of Bureau Du Changes, by incentivising people to exchange their money in the formal financial platforms. Lastly, government should come up with punitive punishment on those violating exchange rate laws.

Keywords: Monetary stability, Government Expenditure, Vector Error Correction Model, Inflation

1. INTRODUCTION

Earlier than the great depression, government activities in an economy were seen as source of economic instability. The classical school believed that government

intervention in economic activity in any way will disrupt the smooth functioning of the economic system, and possibly lead to crisis. Based on that premise, the Classicals advocated for laissez fair economic system in which the market directs the type of goods an economy can produce and consume. In the classical economic system, the role of the government is limited to the maintenance of law and order needed to ensure that free market functions well for equilibrium to be maintained. The failure of the market to restore the economies of Europe to equilibrium in the 1930s put serious question mark on the laissez fair economic thought of the Classicals. Keynesian revolution and the subsequent emergence of the Keynesian economics in the later part of 1930s revealed that government expenditure is a source of macroeconomic stability. Keynes in his general theory was able to convince even the classical scholars that government expenditure at a time of economic down turn can increase the tempo of economic activities, and thereby bring the economy back to growth part. Keynesian revolution divided economic reasoning and economic scholars along the lines of private and public interest thinking, which is the case for this study. Because none of the schools had an upper hand till today, the debate on the effect of government expenditure on macroeconomic stability has continued.

1.1. BACKGROUND OF THE STUDY

Inflation and Government Expenditure in Zimbabwe

Critics have it that most hyperinflations experienced in Zimbabwe were preceded by a combination of high public expenditures, low tax revenues, large debt service payments on a large stock of debt and the inability of government to continue borrowing from external sources (Sachs 1986; Cardoso 1989; Dem et al. 2001; Reinhart et al. 2003; Bittencourt 2010). The initial shock emanated from a fall in tax revenue, following the decline in world commodity prices of gold and tobacco, the country's main export commodities, coupled with an increase in the import price of oil (RBZ, 2000). Plainly, hyperinflation episode in Zimbabwe began when the month-on-month inflation peaked at 50.5 percent in March 2007, conforming to the Cagan (1956:25) arbitrary definition which characterises hyperinflation as;

> *…hyperinflation as beginning in the month the rise in prices exceeds 50 percent and as ending in the month before the monthly rise in price drops below that amount and stays there for at least a year…*

The onset of the hyperinflation episode followed an economic crisis which began during the last quarter of 1997. A combination of entrenched economic structural rigidities, which were not successfully addressed during the ESAP and other successive economic reform programmes, as well as inherent inconsistencies in macro-economic policies,

particularly in fiscal issues, in large part, triggered the economic crisis (IMF, 1999). The economic crisis was exacerbated by external sector imbalances. Consequently, gross domestic product declined by about 30 percent during the period 1999-2007 (Munoz, 2007; Moss &Patrick, 2007), and by more than 50 percent between 1999 and 2008 (RBZ, 2009; IMF, 2009). Acute balance of payments pressures began to be experienced in Zimbabwe during the last quarter of 1997, as export earnings declined (IMF, 1999). The external imbalance was worsened by the suspension of balance of payments support by the IMF (RBZ, 2006).

Again, the Government of Zimbabwe gave in to the demands for pay-outs by the veterans of the country's war of liberation and decided to meet the pay-outs through raising income taxes in the 1998 fiscal year. The plan of financing the pay-outs through an increase in income taxes was abandoned after the main labour union, the Zimbabwe Congress of Trade Unions, vehemently resisted it. This resulted in the unbudgeted expenditure being financed by the central bank, through printing, to the tune of Z$2 billion or about US$180 million (Kairiza, 2012). These large and unbudgeted pay-outs to veterans of the war of liberation subjected the local currency to speculative attacks (IMF, 1999; Kairiza, 2012).

The Zimbabwe dollar (Z$) came under severe pressure in late 1997, following the huge injection of liquidity into the economy, coupled with uncertainties pertaining to the implementation of the land reform programme (IMF 2001; Kovanen 2004; Kairiza 2012). Consequently, the Z$ depreciated to Z$18.6 per US$ by December 1997, from Z$12.5 at the end of October 1997 and Z$10.8 at the beginning of 1997 (IMF, 1999). The country's foreign currency reserves fell from three months of import cover in 1996 to 0.8 months by the end of 1997, as the central bank tried to prop up the depreciating local currency (Coomer & Gstraunthaler, 2011).

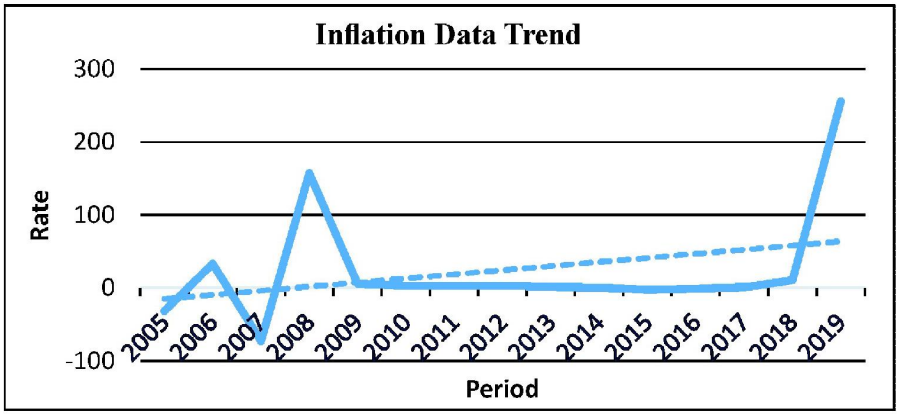
Government expenditure increases was also partly explained by the way the country implemented its land reform programme (IMF, 2001; Sachikonye, 2002; Raftopoulos & Phimister, 2003). The land reform programme was meant to address the historical imbalance in land ownership, where the minority white commercial farmers owned large tracts of productive land, while the indigenous black majority were largely peasant farmers who owned small and unproductive pieces of land (GOZ, 1983; 1986 and 1998; Moyo & Skalness, 1990; Human Rights Watch, 2002; Chitiyo, 2000; UNDP, 2002; Richardson, 2005; Embassy of Zimbabwe, 2009).

In the recent past, the Zimbabwean government has been criticised over increased government expenditure, which was said not to be proportionate to its budget. The accusations ranged from the fact that increased government expenditure fuelled instability in the financial sector, thus, caused the total suffering of the general populace.

On one hand, with government spending still on the rise in many economies, and monetary stability variability on the other hand, the debate on whether government spending has a positive, negative or neutral impact on monetary is still raging today. Some studies have, however, gone an extra mile in determining the relationship between the variables, still, the outcome has been largely inconclusive.

Table 1.1 below depicts trend followed by inflation rate during the period 2005 to 2009.

Table 1.1: Inflation Data Trend for Zimbabwe

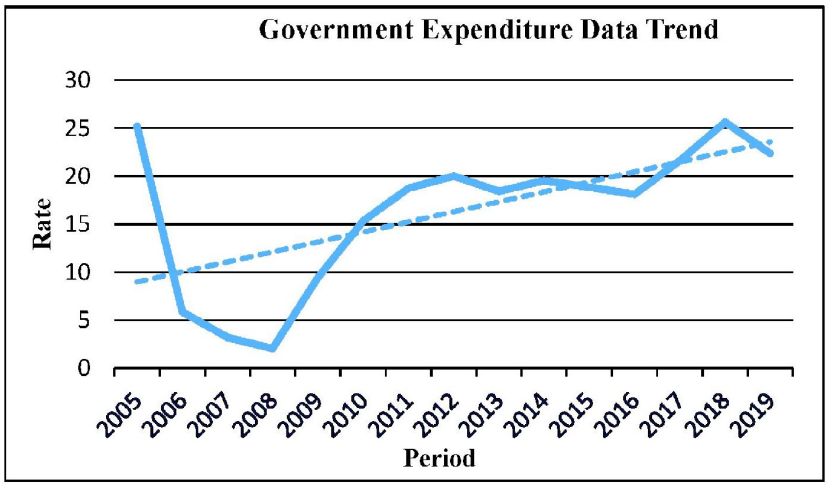


Source: Eviews Output (2020)

The trend shown on table 1.1 shows that during the period 2005 to 2019, Zimbabwe experienced a steady increase in inflation. However, the data for the period 2005 to 2017, the rate was almost constant. This could be as a result that the country had adopted a stable currency in the form of United States Dollars. The implication of the currency was that it is relatively strong when compared to some other economies' currency. The study goes further by showing data trend for government expenditure which critics allege fuelled monetary instability in Zimbabwe. The government expenditure trend is depicted in table 1.2.

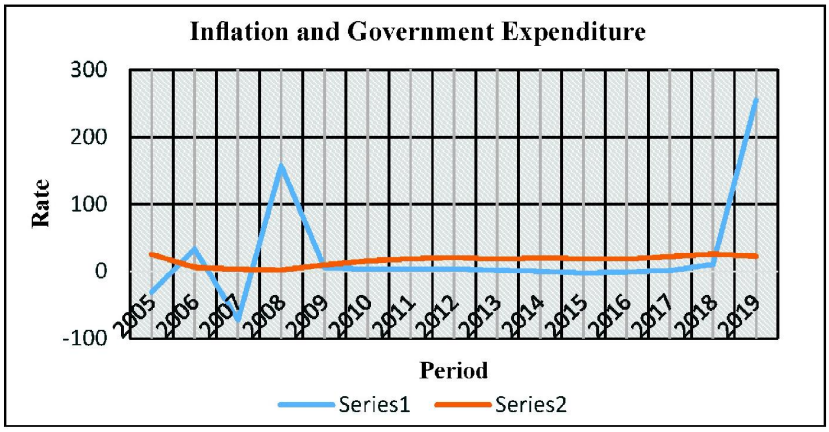
The data trend suggest that government expenditure has been increasing since 2005. In 2017, the government embarked on arresting the wage bill and this can be seen in the trend increasing at a decreasing rate. The increasing trend in government expenditure could also be that Zimbabwe is a developing economy, hence the need to fund productive sectors of the economy such as the manufacturing and the agricultural sectors, as well as the need to upgrade the country's infrastructure. Table 1.3 below depicts the possible relationship in data trends between inflation and government expenditure.

Table 1.2: Government Expenditure Data Trend for Zimbabwe



Source: Eviews Output (2020)

Table 1.3: Inflation and Government Expenditure Data Trends for Zimbabwe



Source: Eviews Output (2020)

The data trend for the two economic indicators shows that during the 2005 to 2008, both variables data exhibited a random walk. There was no direct link to explain how the variables could be related. However, during the period 2009 to 2018, there seem to be an association between the variables. This association motivates this study to determine how Zimbabwe government expenditure could relate to monetary stability, with inflation as a proxy variable.

2. REVIEW OF RELATED LITERATURE

Magazzino (2011) in a study in Mediterranean countries found different effects of government expenditure on inflation in Italy, France and Portugal. In a study in Nigeria by Ayo et al. (2012), the causality that ran from government expenditure to inflation in the short-run did not persist in the long-run. However, Ezirim et al. found a bidirectional relationship between government expenditure and inflation in United States. Their result suggests that if government is interested in reducing inflation, she has to cut its expenditure. In a cross country research of 22 OECD counties, Gali (1994) tested the automatic stabilization of government tax and purchases according to the Keynesian model. Result from the study was in line with Keynesian theory that government expenditure is an important economic stabilization tool.

Many other researchers used disaggregated government expenditure to assess the effectiveness of government spending on macroeconomic stability in different countries. Some revealed negative relationship between government expenditure and output growth and volatility (Attari and Javed, 2013; Mohanty and Zampolli, 2009; Chamorro-Narvaez, 2012). Okoro (2010) found capital expenditure to have positive effect on output in the log-run while the effect of recurrent expenditure was negative. On causality, Okoro (2010) and Udoka and Anyingang (2015) found government capital and recurrent expenditure to cause economic growth in Nigeria. Unfortunately, the causal relationship between government capital and recurrent expenditure in Nigeria was not found in a later study by Ojarikre *et al.* (2015).

Study by Fan and Rao (2003) revealed that the pattern of government expenditure matters in bringing macroeconomic stability. In a cross-country study, they discovered that government expenditure on agriculture and health is good for growth in Africa, and in Asia, spending on education and agriculture can promote economic growth, but in Latin America, it is health spending that increases growth. However, study in Pakistan by Attari and Javed (2013) revealed that there is a negative relationship between government recurrent spending and economic growth. Hence, how government expenditure bring economic stability differs according to country.

In Nigeria, many studies have been done assessing the power of government expenditure to bring economic stability. They include Olayungbo (2013), Taiwo and Agbatogun (2011), Ayo *et al.* (2012), and Udoka and Anyingang (2015). We are more interested in the work of Udoka and Anyingang (2015) because of the detailed disaggregation of government expenditure in their work. The disaggregation is important in public finance policy in developing countries if source of instability of government spending is to be tackled effectively. However, their work was on consequences of government expenditure on output growth. We deviated and decided to concentrate

on inflation, which is the greatest enemy to growth. We tried to find out how shock in any of the components of government expenditure will be responded to by domestic inflation.

After observing that government expenditure has been on the rise while economic growth has slowed substantially, Landau (1983) empirically examined the relationship between government spending and economic growth in 65 under-developed countries. Based on government spending that was disaggregated into capital and investment spending; and using panel data analysis techniques, the study revealed that though the effect was minute, government capital spending had a positive impact on economic growth. Aschauer (1989) investigated the impact of aggregated and disaggregated public expenditure on economic growth in the United States of America (US) during the period from 1949 to 1985 using annual data. The empirical results revealed that in the US, the non-military public capital stock has a more significant positive impact on economic growth than its military counterpart.

Further, Aschauer found that the core infrastructure of streets, highways, airports, mass transit, sewers and water systems, has the most explanatory power for productivity. Easterly and Rebelo (1993) examined the impact of fiscal policy variables on the level of development and rate of growth for a sample of 28 countries during the period from 1970 to 1988. Using cross-sectional methodology, the study revealed that government investment expenditure on transport and the communication sector has a positive impact on economic growth. Barro (1999) carried out an empirical investigation into the determinants of economic growth for a panel of 100 countries using data from 1960 to 1995. Government consumption expenditure and government investment spending were some of the key variables included in the study. Among other findings, the results of the study showed that government investment expenditure had a positive impact on economic growth and it was concluded that investment spending by a government should be encouraged in order to boost economic growth. Yasin (2000) re-examined the effect of government spending on economic growth in 26 sub-Saharan African (SSA) countries from 1987 to 1997.

The examination was based on a model derived from an aggregate production function. Based on the application of both fixed-effects and random-effects estimation techniques, the results of the study showed that government expenditure has a positive effect on economic growth in Bose, Haque and Osborn (2007) concluded that the impact of public expenditure on economic growth is positive, based on a sample of developing countries. In their paper, they examined the growth effects of government expenditure for a panel of 30 developing countries over the 1970s and 1980s, with a particular focus on disaggregated government expenditures. Using a methodology that

takes into consideration the role of government budget constraints and the possible biases arising from omitted variables, they found that government capital expenditure is positively and significantly correlated with economic growth. Further, at the disaggregated level, government investment in education and total expenditures on education were the only outlays that had a positive impact on economic growth after a budget constraint and omitted variables had been taken into consideration.

Ghosh and Gregoriou (2008) also investigated the relationship between disaggregated government expenditure and economic growth in 15 developing countries' general methods of moment (GMM). The results were found to vary depending on the type of government expenditure under consideration-capital or current. The Keynesian view was found to dominate when government expenditure was proxied by current government spending. The results further showed that government expenditure on operations and maintenance had a stronger positive impact on economic growth than their education and health counterparts.

Alexiou (2009) empirically investigated the relationship between economic growth and government expenditure in the South Eastern European (SEE) economies from 1995 to 2005, using both the fixed effects model and the random coefficient model. The results confirmed that government expenditure has a positive impact on economic growth in the study countries. Nurudeen and Usman (2010) empirically assessed the impact of disaggregated government spending on economic growth in the case of Nigeria during the period from 1979 to 2007. Government expenditure was disaggregated into capital expenditure, recurrent expenditures, expenditure on education, expenditure on transport and communication, and expenditure on health. Using the co-integration and error correction methodology, the results of the study revealed that government expenditure on transport and communication, and on health, leads to an increase in economic growth in Nigeria.

Wahab (2011) used a worldwide sample in examining the impact of both aggregated and disaggregated government spending on economic growth using two samples – one sample for aggregated government spending in 97 developing and developed countries during the 1960–2004 period; and the other sample for disaggregated government spending in 32 countries using the 1980–2000 data. Based on the symmetric and asymmetric model specifications, the study revealed that aggregate spending by a government has both a positive impact on economic growth and positive output growth effects. From the disaggregated sample, the study further showed that government investment spending has positive output growth effects. Shahid *et al.* (2013) examined the impact of government expenditure on economic growth in Pakistan during the period from 1972 to 2009. They further split government expenditure into development

expenditure and current expenditure components. Using the autoregressive distributed lag (ARDL) model, the study revealed that in Pakistan, development expenditure positively affects economic growth.

Attari and Javed (2013) empirically explored the relationship between government expenditure and economic growth in Pakistan using time series data stretching from 1980 to 2010. The study further splits government expenditure into two categories - current expenditure and development expenditure. Based on time-series econometrics tools, the results of the study revealed that both types of government expenditure have a positive impact on economic growth in the study country, both in the short run and in the long run.

Egbetunde and Fasanya (2013) empirically analysed the impact of public expenditure on economic growth in Nigeria based on annual time series data from 1970 to 2010. Government spending was further disaggregated into two categories, capital and recurrent spending. Using the ARDL estimating techniques, the study showed that in Nigeria, both the recurrent and capital expenditure have a positive impact on economic growth. Alshahrani and Alsadiq (2014) investigated the long- and short-run impact of government expenditure on economic growth in the economy of Saudi Arabia during 1969-2010. The study further divided government expenditure into various types. Using different econometric techniques, the findings of the study indicated that healthcare expenditure and expenditure on domestic investment have a positive impact on economic growth. The same findings also confirmed that in Saudi Arabia, housing sector expenditure has the same effect on economic growth, however, in the short run.

Al-Fawwaz (2016) examined the impact of government expenditure-and its disaggregated components-on economic growth in Jordan during a period from 1980 to 2013. Using the multiple linear regression model and the OLS model, the results confirmed the existence of a positive relationship between government expenditure and economic growth in the study country. Thus, both total government expenditure and current government expenditure, were found to have a positive impact on economic growth. This result lent support to the Keynesian view that places importance on government expenditure in propelling economic growth.

Guandong and Muturi (2016) examined the relationship and dynamic interactions between government expenditure and economic growth in South Sudan from 2006 to 2014. However, government expenditure was further divided into various components. Using the regression model for panel data, including a random effect to analyse the data, the findings showed that public expenditure on infrastructure, the productive sector and security are positive determinants of economic growth in the study country. Asghari and Heidari (2016) revisited the government spending-economic growth nexus

as they empirically examined the impact of government size on economic growth. The study was based on a sample of selected Organisation for Economic Cooperation and Development-Nuclear Energy Agency (OECD-NEA) countries based on data stretching from 1990 to 2011. Using the Panel Smooth Transition Regression (PSTR) model in the form of a Cobb-Douglas equation function, the results of the study rejected the linearity hypothesis.

Kimaro *et al.* (2017) empirically assessed the impact and efficiency of government expenditure on economic growth in 25 low income SSA countries, covering the period from 2002 to 2015. Using the GMM, the results of the study showed that government expenditure and economic growth were positively related in the study countries. Leshoro (2017) also put government spending and economic growth to an empirical test in the case of South Africa using annual data covering the period from 1976 to 2015. Government spending was further disaggregated into various components - government investment spending and government consumption spending. Using the autoregressive distributed lag (ARDL) estimation procedure, the results of the study showed that government spending has a positive impact on economic growth in the study country, irrespective of the government expenditure component under consideration – investment or consumption expenditure. These results were found to hold irrespective of whether the estimation was in the long run or in the short run.

Lupu *et al.* (2018), in their recent study, put the impact of disaggregated public expenditure on economic growth to the test, in the case of 10 selected Central and Eastern European countries using data stretching from 1995 to 2015. Using the ARDL approach, the results of the study revealed that public expenditures on education and health care have a positive impact on economic growth in the study countries. Okoye *et al.* (2019) examined the relationship between government expenditure both-aggregated and disaggregated - and economic growth in an effort to determine the extent to which output growth in Nigeria is affected by government spending, during the-period from 1981-2017. They found that in Nigeria, capital expenditure has a positive impact on economic growth.

3. MATERIALS AND METHOD

3.1.1. Sample of the Study

The sample period of 1990 to 2019 for data collection was chosen on the basis that it gives the key dynamic economic fundamentals which are important in explaining the current as well as future economic trends regarding government expenditure and inflation for Zimbabwe. The period of data gathered therefore, represent the remaining period in their economic effects, which may be relevant in determining the relationship between

the two variables of interest. Infact, data for the study were collected from World Bank Databases.

3.1.3. Methodological Orientation

This section explores the methodology applied in the study to determine government expenditure and inflation connection. The study employed the ECM. Data were transformed into their natural logarithmic form. Some diagnostic tests that comprises of normality, correlation, and unit root tests were undertaken. Before conducting cointegration test, lag length were determined in unrestricted VAR using the Akaike information Criterion. Lag length determination is deemed credible during the cointegration, model estimation and residual diagnostic testing (Magazzino, 2011). After conducting the cointegration test, ECM model was adopted as the data for the variables became stationary at first differencing.

Furthermore, residual diagnostic testing were considered to determine the specificity of the model, and these comprised of the Jarque-Bera: Cholesky Lutkepohl Normality, Breusch-Godfrey Serial Correlation Langrage Multiplier and the Breusch-Pagan-Godfrey Heteroskedasticity tests.

(a) Normality Test

Normality tests were undertaken to determine normal distribution of the data. The underlying assumption is that data have to be normality distributed for them to be used for informed projections.

Table 3.1: Normality Test Results

	LNFDI	*LNREAL GDP*	*LNGVTEXP*	*LNINFLAT*	*LNUNEMPL*
Mean	-0.059343	0.378141	1.193116	0.507058	0.710872
Median	0.023013	0.204391	1.254426	0.065167	0.710104
Maximum	0.841359	1.294025	1.408579	2.407034	0.840733
Minimum	-1.522879	-0.207608	0.311754	-0.420220	0.579784
Std. Dev.	0.496892	0.465997	0.247304	0.740599	0.052735
Skewness	-1.199555	0.647429	-2.427782	1.244839	0.199725
Kurtosis	4.585486	1.966951	8.284442	3.570684	3.734507
Jarque-Bera	10.33687	3.429809	64.37729	8.155217	0.873827
Probability	0.005693	0.179981	0.000000	0.016948	0.646027
Observations	29	29	29	29	29

Source: Secondary data: Eviews Version (8) Statistical Package Output Eviews Output (2020)

Using the Jacque-Berra Probability technique to determine if the data are normally distributed, the results show that out of the five variables, only real GDP and unemployment are normally distributed as depicted by their Jarque-Bera p-values greater than 0.05. However, data for FDI, government expenditure and inflation were not normally distributed as shown by the Jarque Bera p-value of less than 0.05. Given these results, the study proceeded to test for the correlation between the variables.

(b) Correlation Test

The study conducted correlation tests to determine the degree of association between the variables of the study.

Table 3.2: Correlation Test Results Eviews Output (2020)

	FDI	*REAL GDP*	*GVT EXP*	*INFLAT*	*UNEMPL*
FDI	1.000000	0.145799	-0.049150	0.016495	0.285414
REAL GDP	0.145799	1.000000	0.136758	-0.156072	0.128272
GVT EXP	-0.049150	0.136758	1.000000	-0.275987	0.234660
INFLAT	0.016495	-0.156072	-0.275987	1.000000	-0.131988
UNEMPL	0.285414	0.128272	0.234660	-0.131988	1.000000

Starting with the Foreign Direct Investment (FDI), the results show a positive linear association with real GDP as indicated by the co-efficient 0.145799. There is a negative linear association between FDI and government expenditure (Gvt Exp), as indicated by the coefficient -0.049150. A positive association was recorded between FDI and inflation as depicted by coefficients of 0.016495. Furthermore, FDI had a positive association with unemployment as indicated by the co-efficient 0.285414. However, the variables of interest, government expenditure and inflation recorded a negative association as shown by the coefficient -0.275987. This result is contrary to the researchers' untested imagination as well as economic theory which suggests that increased government expenditure results in inflationary. Also, of interest to note is that the coefficients recorded are weak.

(c) Unit Root Tests

The underlying assumption is that working with non-stationary time series data result in spurious research results. To that end, Augmented Dickey Fuller (ADF) was used to test for data stationarity.

Table 3.3: Unit Root Test Results (Augmented Dickey Fuller)

Variable	*t-ADF Statistic*	*Critical Value 1%*	*Critical Value 5%*	*Critical Value 10%*	*Conclusion*
FDI	-3.528315	-3.679322	2.967767**	-2.622989	I(1)
lnfat	-9.119799	-3.689194*	-2.971853	-2.625121	I(1)
Unempl	-5.673142	-3.752946*	-2.998064	-2.638752	I(1)
Gvt Exp	-4.551379	-3.711457*	-2.981038	-2.629906	I(1)
Real GDP	-3.746448	-3.679322*	-2.967767	-2.622897	I(1)

*, **, *** Indicates Significance at 1%, 5% and 10%: Eviews Output (2020)

Source: Secondary data: Eviews Version (8) Statistical Package Output

Table 3.3 shows that all the variables became stationary after first differencing. These results have serious implications on the type of estimation model a study has to adopt. If the data are stationary at levels, OLS is adopted. Also, when data are stationary at first difference ECM is adopted. Again, if data are stationary at second differencing ARDL model is invoked. Given that the data for this study became stationary at first differencing ECM was adopted to determine reality on the government expenditure and inflation for Zimbabwe. Before conducting cointegration test to determine if the variables' data move together in the long-run, the study conducted an unrestricted VAR tests to find out the optimal lag length for the model. Econometrics has it that if the lags are many, there tend to be lose of degrees of freedom, resulting in statistically insignificant coefficients and multicollinearity. Again, when lags are too few, specification errors are experienced. The results are presented below.

(d) Vector Autoregression Estimates

Table 3.4: Unrestricted VAR Lag Order Selection Criteria

Lag	*LogL*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
0	-410.2041	NA	5221004.	29.65743	29.89533	29.73016
1	-361.4498	76.61384*	989592.2*	27.96070*	29.38806*	28.39706*
2	-340.4048	25.55464	1586412.	28.24320	30.86003	29.04319

* indicates lag order selected by the criterion

Source: Secondary data: Eviews Version (8) Statistical Package Output

This study's lag order selection was premised on the Akaike Information Criterion which was chosen ahead of the other five techniques. To that end, basing on the information shown in table 3.4 above, lag of one informed the study as shown by the asterisked coefficient 27.96070 below the AIC technique.

(e) Cointegration Test

Johansen Cointegration test as informed by Trace Statistic technique was used to determine the long-run relationship among variables of the study. A lag of one as alluded to in the preceding sections of this study guided the cointegration process. The results of the cointegration testing are shown in table 3.5 below.

Table 3.5: Johansen Cointegration Test

Hypothesized No. of CE(s)	*Trace Statistic*	*0.05 Critical Value*	*Prob.***
None *	83.11190	69.81889	0.0030
At most 1	45.50218	47.85613	0.0818
At most 2	23.48687	29.79707	0.2230
At most 3	11.41415	15.49471	0.1873
At most 4	2.271648	3.841466	0.1318

* denotes rejection of the hypothesis at the 0.05 level: **MacKinnon-Haug-Michelis (1999) p-values
Source: Secondary data: Eviews Version (8) Statistical Package Output

The null hypothesis of no cointegration amongst variables is tested against alternative hypothesis of existence of cointegration. The results for the study confirms the existence of cointegration amongst variables, as supported by trace value of 83.11190, with a calculated p-value of 0.0030, falling within the 5 percent significance level, making it statistically significant. The results of the normalisation are depicted in table 3.6 below;

Table 3.6: Normalization Cointegration Coefficients
Johanesen Normalisation Coefficients

INFLAT	*GVT EXP*	*REAL GDP*	*UNEMPL*	*FDI*
1.000000	0.663231	0.249877	20.71816	-14.91148
	(0.62838)	(0.49707)	(6.17272)	(3.80345)

*Standard error in parentheses
Source: Secondary data: Eviews Version (8) Statistical Package Output

Results in table 3.6 suggest that there is a negative normalisation coefficient between the variable of interest inflation and government expenditure, real GDP and unemployment. However, the study recorded a positive normalisation relationship with foreign direct investment. These results are supported by an implied t-statistic value for the variables which is lower than two. The t-statistic is determined by dividing the

cointegration coefficient by the standard error values. In a nutshell, the null hypothesis of no cointegration is rejected against the alternative of a cointegrating relationship in the model. The existence of the long-run relationship, with an optimal normalization effect, necessitates the estimation of the Vector Error Correction Model. An error correction model allows us to determine the long-run relationship, as well as the speed of adjustment of the relationships. Zero lag was used in the modelling of the VECM, which is a less one lag which was determined by the AIC, a requirement in the error correction modelling and the results are depicted in table 3.7 below.

(f) Model Estimation

Table 3.7: ECM Regression Results
Inflat (-1)

Variables	*Coefficient*	*Standard Error*	*t-Statistic*
Gvt Exp (-1)	0.487081	0.37892	6.56356
FDI (-1)	-0.20088	2.38607	-8.88529
Real GDP(-1)	0.084694	0.30554	9.31780
Unempl (-1)	-0.071051	3.34422	5.89390
Constant	-0.0761		

R-squared = 0.563307

Source: Secondary data: Eviews Version (8) Statistical Package Output

Basing on the R-squared value, the independent variables are relatively adequate enough to explain the variations in the dependent variable. The results can be presented by the following model;

$$\Delta \text{ Log Inflat}_{t-i} = \beta_0 + \beta_1 \Delta \text{ Log Gvt Exp}_{t-i} + \beta_2 \Delta \text{ Log FDI}_{t-i} + \beta_3 \Delta \text{ Log Real GDP}_{t-i} + \beta_4 \Delta \text{ Log Unempl}_{t-i} + \varepsilon_t$$

$$\Delta \text{ Log Inflat}_{t-i} = -0.0761 + 0.487081 \Delta \text{ Log Gvt Exp}_{t-I} - 0.20088 \Delta \text{ Log FDI}_{t-i} + 0.084694 \Delta \text{ Log Real GDP}_{t-i} - 0.071051 \Delta \text{ Log Unemp}_{t-i} + \varepsilon_t$$

The coefficient of government expenditure has a positive sign and is statistically significant. This means that an increase in government expenditure result in 49 percent increase in inflation. The result suggest that, government expenditure in Zimbabwe is not directed towards productive sectors of the economy, but to recurrent expenditure, hence the realisation of the positive large coefficient.

Foreign Direct Investment has a coefficient with a negative sign. This means that a one percent increase in FDI lead to a decrease in inflation by more than 20 percent.

This is probably that Zimbabwe is a developing economy with a restrained supply side. The coming in of the FDI would improve the availability of goods, hence driving down the prices of goods and services.

Real GDP has a coefficient with positive sign. This means that a one percent increase in real GDP in Zimbabwe will lead to positive rate of inflation of eight percent. The results are reasonable in that growth of an economy is as a result of some other policies which are expansionary. This is the case in Zimbabwe, when sometime demand is stimulated through expansionary monetary policies and contractionary fiscal policies.

Unemployment has a negative sign. This means that increasing unemployment with one percent would result in more than seven percent decrease in inflation rate. This theory back dates to Phillips Curve of 1956 that posits an inverse relationship between the two variables. Table 3.8 below depicts the speed of adjustments accompanying relationships between the variables alluded to in table 3.7.

Table 3.8: Error Correction Term

D(INFLAT)	*D(GVT_EXP)*	*D(FDI)*	*D(REAL_GDP)*	*D(UNEMPL)*
-1.041367	-0.052781	0.035659	-0.310390	0.001709
(0.98313)	(0.06749)	(0.01719)	(0.08831)	(0.00360)
[-1.05924]	[-0.78211]	[2.07488]	[-3.51488]	[0.47408]

* Standard errors in ( ) & t-statistics in [ ]

Source: Secondary data: Eviews Version (8) Statistical Package Output

The results in table 3.8 suggests that all error correction coefficients are of the appropriate sign, given that they are less than 1 in its absolute value, thus, not explosive. The negative inflation rate of -1.041367 entails that a change in inflation rate falls when there is a positive cointegration error. The coefficient indicates that the annual adjustments of inflation will be 100 percent of the deviation of its first lag. This is a faster rate of adjustment. On the same note, the negative government expenditure rate of -0.052781 entails that a change in government expenditure falls when there is a positive cointegration error. The coefficient indicates that the annual adjustments of government expenditure will be about five percent of the deviation of its first lag. This is a relatively slow in the adjustment rate as compared to inflation rate. However, FDI rate has a positive coefficient entailing that foreign direct investment increases when there is a positive cointegration error. The coefficient indicates that the annual adjustments of foreign direct investment will be four percent of adjustment of the deviation of its first lag. This is the same with unemployment rate whose speed of adjustment is almost zero percent, suggesting a permanent inverse relationship with

inflation. However, real GDP recorded a negative coefficient of -0.310390, suggesting that real GDP decreases when there is a positive cointegration error. The result shows that the annual speed adjustment of real GDP will be 31 percent of the deviation of its first lag. The speed of adjustment is, therefore, relatively high. These results have serious implications on the prioritisation of policies. Policies that require a considerable time frame for results to be realised require early implementation, relative to those that require less time. Table 3.9 presents stability tests.

(g) Residuals Diagnostic Tests

Table 3.9: Normality Test Results: Jarque-Bera: Cholesky Lutkepohl

	Jarque-Bera	*df*	*Prob.*
Joint Test	67.60337	10	0.0000

*Jarque-Bera Joint P-Value was used for interpreting the Results

Source: Secondary data: Eviews Version (8) Statistical Package Output

The results failed to reject the null hypothesis of non-normality distribution of the residuals as the joint p-value of the Jarque-Bera statistic is 0.0000, which is less than 0.05. Thus, the residuals are not normally distributed. The study went further to test for serial correlation. Using the Breusch-Godfrey Serial Correlation LM test to determine the presence of the serial correlation of successive error terms. The results are shown in table 3.10 below:

Table 3.10: Breusch-Godfrey Serial Correlation Langrage Multiplier Test

	Lags	*LM-Stat*	*Prob*
Joint Test	1	16.39066	0.9027

P-Value was used for interpreting the Results

Source: Secondary data: Eviews Version (8) Statistical Package Output

Results in Table 3.10 show that the null hypothesis of serial correlation is rejected since the p-value of 0.9027 is greater than 0.05, suggesting that there is no serial correlation on the residuals. The study went further to test for heteroscedasticity. The Breusch-Pagan-Godfrey was used to test for heteroscedasticity. We reject the null hypothesis of heteroscedasticity if the p-value is greater than 5 percent. Table 3.11 below shows the heteroscedasticity test results;

Table 3.11: Heteroscedasticity Test Results

	Chi-sq	*df*	*Prob.*
Joint Test	345.7595	330	0.2644

P-Value was used for interpreting the Results

Source: Secondary data: Eviews Version (8) Statistical Package Output

Results in Table 3.11 show that there is homoscedasticity since p-value of 0.2644, which is greater than 0.05. It follows, therefore, that the model that this study used is well-specified.

CONCLUSION

The aim of this paper was to determine the relationship between government expenditure and inflation for Zimbabwe. The Error Correction Model (ECM) was applied to investigate the relationship between the variables. The unit root properties of the data were examined using the Augmented Dickey Fuller (ADF), after which the cointegration was informed by Johansen using the Trace values. The results showed that the variables' data were stationary at first differencing. The cointegration test confirmed that the variables of interest are cointegrated, indicating an existence of long-run equilibrium relationship as confirmed by the Johansen cointegration test results. The ECM test confirmed that there exists a relationship between the variables of the study. The stability tests conducted confirmed that the ECM is well specified. The study concluded by positing that there is a going backwards in as far as managing monetary stability in Zimbabwe.

RECOMMENDATIONS

This study suggest the following recommendations. The development model developed by Musgrave and Rostow points out that government expenditure must change in line with the stage of economic growth and level of economic development. The argument of the model is that the level of government expenditure is a function of the state of economic growth which the economy finds itself. For that reason, government expenditure is expected to be higher at the early stage of economic development when it is important to put in place essential infrastructure that will facilitate industrialization. It follows, therefore, that;

- Since Zimbabwe seeks to attain an upper middle economy by 2030, its government expenditure should be directed towards productive sectors of the economy such as, manufacturing and agriculture.

- Reserve Bank of Zimbabwe must come up with monetary policies that enhance monetary stability. These includes policies that eliminates speculation in the stock exchange market. The point being that trends in the stock market must be stochastic or exhibit a random walk.
- Exchange rate policies must be solely determined by the Reserve Bank of Zimbabwe, with emphasis towards revitalisation of Bureau Du Changes, so as to incentivise people to exchange their money in formal financial institutions.
- Lastly, government should come up with punitive punishment on those who violates exchange rates laws.

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