The Nexus between Gross Capital Formation and Economic Growth: Evidence from Zimbabwe

Alexander Maune[1], Ephraim Matanda[2]

Abstract: This article examined the nexus between gross capital formation and economic growth in Zimbabwe. Secondary data collected from World Bank`s World Development Indicators database, was used to empirically examine the nexus between the two variables, from 1960-2020. The autoregressive distributed lag technique was used. The findings show both unidirectional and bidirectional causality links between gross capital formation and economic growth during the three periods under study. Gross capital formation was positive, but not significant to influence economic growth in Zimbabwe. The period before dollarization was negative and significant to influence economic growth in Zimbabwe. The error correction had a negative and statistically significant relationship with economic growth in Zimbabwe. This article has practical implications especially for policy formulation and implementation at individual, corporate and government. The article closed the gap in knowledge by drawing attention to nexus of gross capital formation and economic growth in Zimbabwe during three different economic cycles.

Keywords: Gross Capital Formation; Economic Growth; Domestic Investment; Zimbabwe

JEL classification: E22; F43; O16; O47; P45

1. Introduction

Rodrik (2000) calls capital accumulation as the proximate source of economic growth. Rodrik (2000) further argues that physical investment is generally the most robust correlate of long-run growth, even though the relationship between investment and growth tends to be weak in the short run. Gross capital formation formerly domestic investment has been pitched as the most critical component of economic growth and development the world over. A number of studies have been devoted to the role of gross capital formation (GCF) in economic growth in the past decades (Levine & Renelt, 1992; Kumo, 2012; Mordecki & Ramirez, 2014; Maune, 2018; Meyer & Sanusi, 2019; Zahir & Rehman, 2019;). However, there are no studies to the best of our knowledge dedicated to GCF and economic growth in Zimbabwe. Although a number of studies have been carried out on the subject, there is no consensus amongst researchers on the direction of causality between GCF and economic growth. Findings are divided into bi-directional (two directions) and uni-directional (single direction). This study is therefore of great importance in Zimbabwe as it examined the relationship of these particular variables, that is, GCF and economic growth.

[1] Research Associate: UNISA, Pretoria, South Africa, Address: Preller St, Muckleneuk, Pretoria, 0002, South Africa, and Lecturer: BUSE, Zimbabwe, Corresponding author: alexandermaune6@gmail.com.
[2] Senior Lecturer: GZU, Masvingo, Zimbabwe, Address: P.O Box 1235, Masving, Zimbabwe, eematanda@gmail.com.

Globally, GCF as a percentage of GDP reached a maximum of 28.76% (1974) and a minimum of 22.82% (2002) since 1970 (World Bank, 2022) (see Figure 2). In sub-Saharan Africa, GCF as a percentage of GDP reached a maximum of 44.25% (1983) (the highest among all regions since 1970) and a minimum of 19.18% in 1993 (World Bank, 2022). Zimbabwe recorded the maximum GCF as a percentage of GDP in 1974 (24.74%) and the lowest in 2005 (1.53%). The GCF trend in Zimbabwe seems to follow the economic cycles that were experienced since 1970. The country experienced a huge drop from an average of 18.52% (1970-1999) to an average of 6.29% (2000-2008) before picking up to an average of 16.30% (2009-2011) before experiencing another significant drop to an average of 9.21% (2012-2020). This trend theoretically shows some association between GCF and economic growth. Figure 1 show how GCF was leading since 1960 before remittances picked in 2009 and since then the two have shown some association and their contribution more significant than FDI even though the government has embarked on the engagement and re-engagement programme since the new administration came into power in 2017. The efforts have, however, not achieved the much anticipated results.

Theoretically, argues Rodrik (2000), countries that undergo growth transitions – arising from improved terms of trade, increased GCF, or other sources – do end up with more permanent high saving rates. Savings will result in re-investment into the economy, thereby creating employment, more products produced, high exports, foreign currency generation, and at the end economic growth and development, high standards of living etc. This article will therefore examine the causal direction between the two empirically. In addition, an increase in GCF is expected to boost employment which in turn results in high economic growth. Employment creation results from entrepreneurship and SMEs as more capital becomes available through savings as well as boosting production capacity of major companies to meet high demand for the products due to high disposable incomes. However, investments in state of the art technologies by big companies also results in massive retrenchments, as was witnessed in the banking sector in Zimbabwe, thereby reducing demand as many people would be rendered jobless.

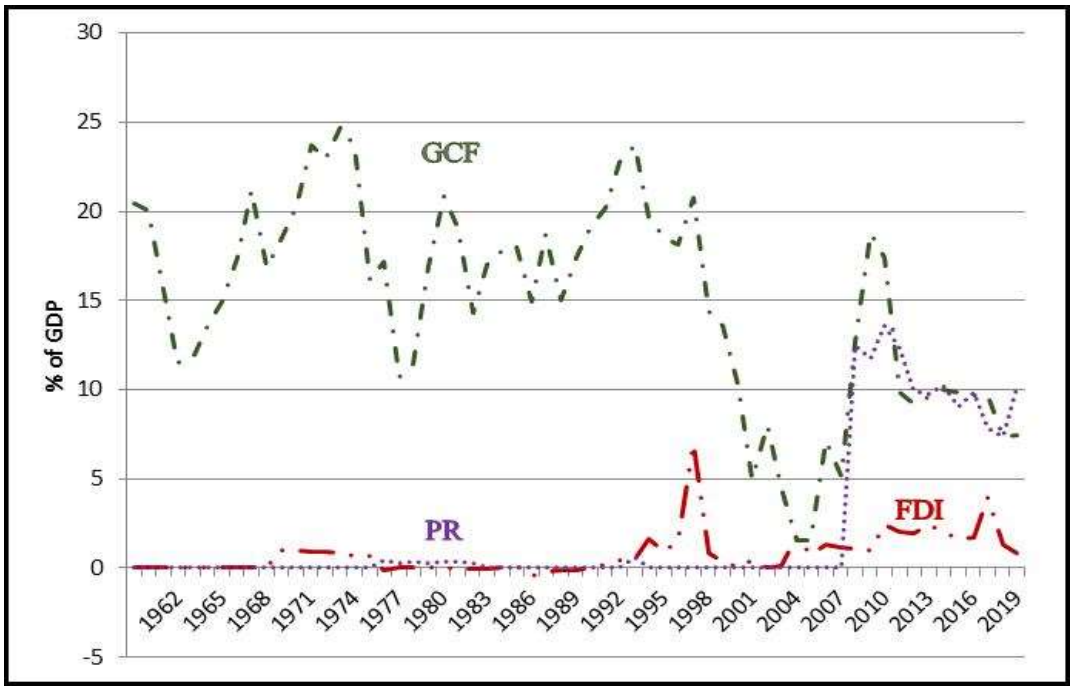

Figure 1. Gross capital formation, personal remittances, and foreign direct investment in Zimbabwe, 1960-2020

Source: Data collected from World Bank world development indicators (2022)

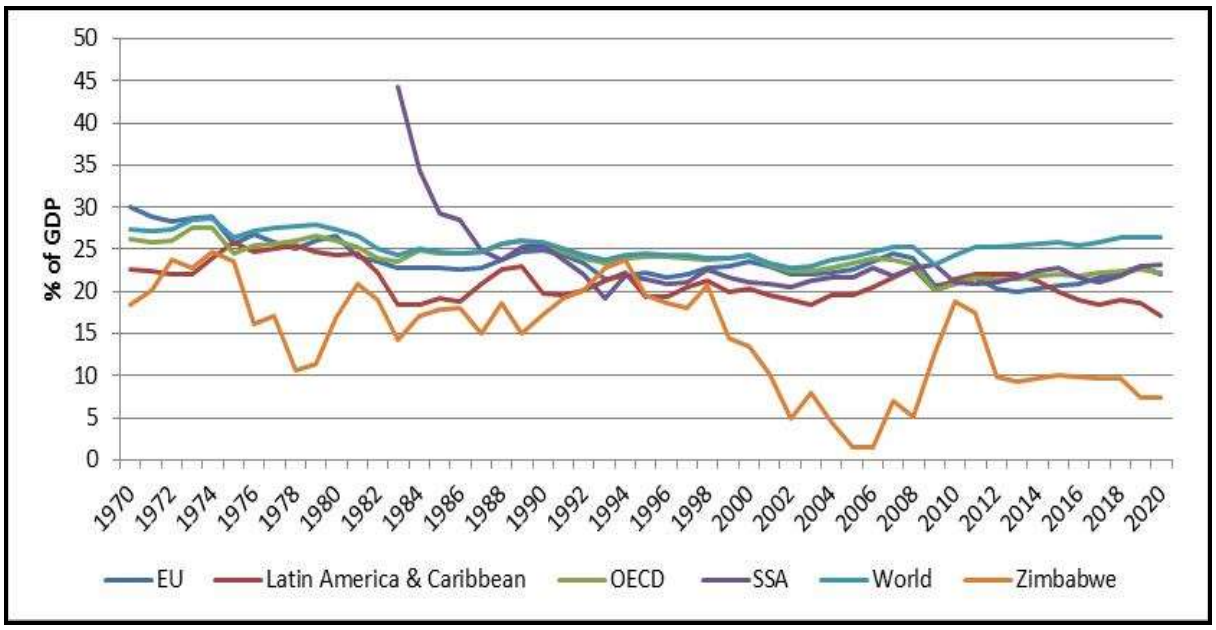

Figure 2. Gross capital formation for selected regions, 1970-2020

Source: Data collected from World Bank world development indicators (2022)

Empirically, there seems to be no consensus amongst researchers regarding the direction of the relationship between GCF and GDP. Our empirical review shows that causal link between GCF and

GDP can take any direction. For example, findings by Meyer and Sanusi (2019) show causality running from GDP to GCF and not the other way round.

Table 1. Causality direction between gross capital formation and economic growth

GCF to GDP	*GDP to GCF*
Levine & Renelt (1992), Mankiw et al. (1992), De long & Summers (1992), Antelo & Valverde (1994), Jones (1995), Attanasio et al. (2000), Podrecca & Carmeci (2001), Bond et al. (2004), Bekhet & Othman (2011), Bakare (2011), Cheung et al. (2012), Kumo (2012), Karim, Karim & Zaidi (2012), Ugochukwu & Chinyere (2013), Ongo & Vukenkeng (2014), Adegboyga & Odusanga (2014), Kanu & Ozurumba (2014), Shuaib & Dania (2015), Neanywa & Makhenyane (2016), Ali (2017), Zahir & Rehman (2019).	Kuznet (1973), Summers & Heston (1991), Blomstrom et al. (1996), Ibarra & Moreno-Brid (2004), Mordecki & Ramirez (2008), Mckinnon (2010), Mordecki & Ramirez (2014), Meyer & Sanusi (2019).

Although the number of articles showing causal link between GCF and GDP are more than the ones showing causal link between GDP and GCF, there is no consensus regarding causality direction. This article seeks to close this gap in knowledge by examining the relationship between GCF and GDP in Zimbabwe from 1960 to 2020.

The reminder of the article will be as follows; Section 2 shows the research methodology used. Section 3 estimates and discuss the results using ARDL technique. Section 4 model diagnosis and long run results. Section 5 concludes and provides recommendations.

2. Research Methodology

The research study employed an autoregressive distributed lag (ARDL) model to examine the impact of gross capital formation (GCF) formerly gross domestic investment (GDI) on gross domestic product (GDP) in Zimbabwe for the period under investigation. The ARDL test is an ordinary least squares (OLS) based approach which is applicable for both time series and non-stationary time series data with mixed order of integration. Multiple Linear Regression (MLR) models based on ARDL have been in use for many decades, but of late have been shown to provide a very valuable vehicle for testing for the presence of long-run relationships between time-series data. ARDL models are useful when data have only one independent series, that is an ARDL model of order p and q is usually denoted by ARDL (p;q). Hence the model consists of p and q lags of independent and dependent series panel data variables respectively. The lags of the dependent series of the variables make the model autoregressive.

The panel ARDL method can be utilised to account for long- and short-run relationships among dependent and independent variables, and even for the case of non-stationary variables but without co-integration. The ARDL model allows us to perform tests on both stationary and non-stationary variables (endogenous and exogenous variables) as long as the data do not exceed integrated 2, or I (2) after differencing if the data are non-stationary. We would then check the stationarity of every variable of the model with the root tests. The main advantages of the ARDL tests are that they are more robust and perform better for small samples of data, making them suitable for most quantitative economic and financial researches. The study on the impact of gross capital formation (GCF) on the gross domestic product (GDP) of Zimbabwe was carried out under the following hypothesis:

Null hypothesis (H_0): Gross capital formation (GCF) has no impact on GDP.

Alternative hypothesis (H_1): Gross capital formation (GCF) has impact on GDP.

3. Estimation Results using ARDL Technique and Discussion

The estimated model results show that the lag of the dependent variable was positive and significant at the 1% level of significance. Gross capital formation was positive, but not significant to influence economic growth in Zimbabwe. The period before dollarization was negative and significant to influence economic growth in Zimbabwe, suggesting that this period reduced the economic growth prospects for Zimbabwe. The period during dollarization had a positive and statistically significant relationship with economic growth in Zimbabwe. This suggested that dollarization improved the economic prospects for the Zimbabwean economy. The period after dollarization had a negative affect the economic prospects for the Zimbabwean economy. However, this effect was not statistically significant. As if that is not enough, the constant term had a positive and statistically significant relationship with economic growth in Zimbabwe.

Table 2. Estimation results using Autoregressive Distributed Lag Technique

Dependent Variable: LGDPC
Method: ARDL
Date: 03/28/22 Time: 10:49
Sample (adjusted): 2 44
Included observations: 43 after adjustments
Dependent lags: 1 (Fixed)
Dynamic regressors (0 lag, fixed): LGCF LPRR PBD PDD PAD
Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LGDPC(-1)	0.568947	0.068843	8.264386	0.0000
LGCF	0.050479	0.034968	1.443569	0.1575
PBD	-0.158309	0.087292	-1.813561	0.0781
PDD	0.651601	0.100891	6.458450	0.0000
PAD	-0.030497	0.068514	-0.445118	0.6589
C	9.712554	1.475384	6.583070	0.0000
R-squared	0.956459	Mean dependent var		22.87245
Adjusted R-squared	0.949202	S.D. dependent var		0.464750
S.E. of regression	0.104747	Akaike info criterion		-1.526639
Sum squared resid	0.394989	Schwarz criterion		-1.239932
Log likelihood	39.82274	Hannan-Quinn criter.		-1.420910
F-statistic	131.8018	Durbin-Watson stat		1.580395
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent tests do not account for model selection.

4. Model Diagnosis

4.1 Stability test

The Ramsey RESET test was used for testing the stability of our econometric model and the results suggests that the model was stable, even in the long-run as suggested by the non-significant result of the statistical test (Table 3).

Table 3. Ramsey Reset Test

Equation: UNTITLED
Specification: LGDPC LGDPC(-1) LGCF LPRR PBD PDD PAD C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.932022	35	0.3577
F-statistic	0.868664	(1, 35)	0.3577

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.009566	1	0.009566
Restricted SSR	0.394989	36	0.010972
Unrestricted SSR	0.385423	35	0.011012

Unrestricted Test Equation:
Dependent Variable: LGDPC
Method: ARDL
Date: 03/28/22 Time: 10:51
Sample: 2 44
Included observations: 43
Dependent lags: 1 (Fixed)
Dynamic regressors (0 lag, fixed):
Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LGDPC(-1)	5.524710	5.317666	1.038935	0.3060
LGCF	0.459125	0.439848	1.043826	0.3037
PBD	-1.465133	1.404864	-1.042900	0.3041
PDD	6.272387	6.031593	1.039922	0.3055
PAD	-0.279108	0.275433	-1.013340	0.3179
C	-6.044530	16.97084	-0.356172	0.7239
FITTED^2	-0.188566	0.202319	-0.932022	0.3577

R-squared	0.957514	Mean dependent var	22.87245
Adjusted R-squared	0.949016	S.D. dependent var	0.464750
S.E. of regression	0.104939	Akaike info criterion	-1.504643
Sum squared resid	0.385423	Schwarz criterion	-1.176978
Log likelihood	40.34983	Hannan-Quinn criter.	-1.383811
F-statistic	112.6849	Durbin-Watson stat	1.578562
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection

4.2 Normality tests

As a precondition, the residuals of the estimated model should be normally distributed; hence the results in this figure are indicating that they are normally distributed as indicated by the non-significant probability of the Jarque-Bera test of normality (Fig. 3). This result accepts the null hypothesis that the residuals of our model are normally distributed.

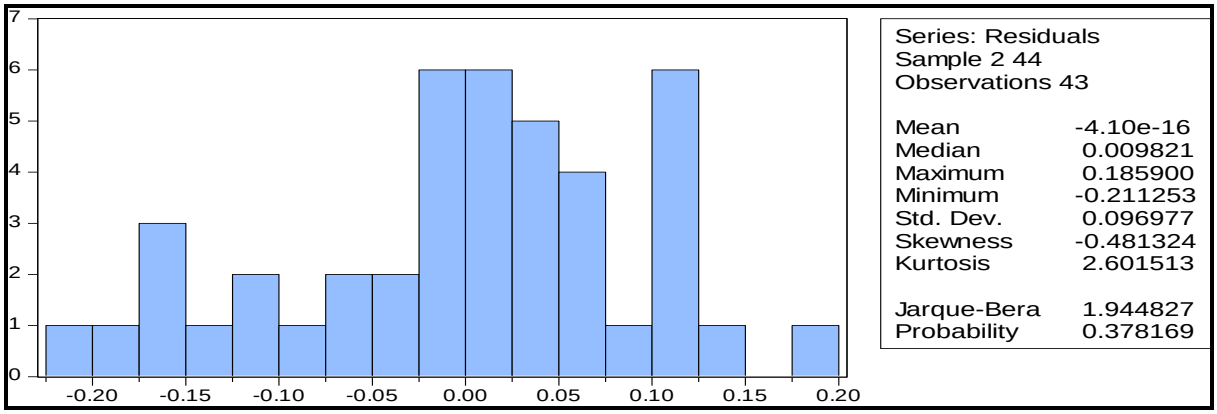

Figure 3. Jarque-Bera test of normality

4.3 Serial Correlation Tests

In order for the estimated model to be reliable, the residuals should not be serially correlated, hence our results suggests that the residuals are not serially correlated, making the results reliable for decision making. The non-significant F-Statistic suggests that the residuals are not serially correlated.

Table 4. Breusch-Godfrey serial correlation LM test

F-statistic	1.499748	Prob. F(2,34)	0.2376
Obs*R-squared	3.485949	Prob. Chi-Square(2)	0.1750

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 03/28/22 Time: 10:54
Sample: 2 44
Included observations: 43
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDPC(-1)	-0.020975	0.076830	-0.273009	0.7865
LGCF	0.009027	0.034884	0.258758	0.7974
PBD	-0.008095	0.087768	-0.092232	0.9271
PDD	0.015283	0.105885	0.144332	0.8861
PAD	0.004019	0.068441	0.058717	0.9535
C	0.410150	1.652748	0.248163	0.8055
RESID(-1)	0.219321	0.185715	1.180954	0.2458
RESID(-2)	-0.233189	0.172629	-1.350810	0.1857
R-squared	0.081069	Mean dependent var		-4.10E-16

Adjusted R-squared	-0.135151	S.D. dependent var	0.096977
S.E. of regression	0.103322	Akaike info criterion	-1.518160
Sum squared resid	0.362968	Schwarz criterion	-1.149536
Log likelihood	41.64043	Hannan-Quinn criter.	-1.382223
F-statistic	0.374937	Durbin-Watson stat	1.986965
Prob(F-statistic)	0.926562		

4.4 Heteroskedasticity Test

Further, the results indicate that the residuals of the estimated model are homoskedastic, which suggests that there is no problem of heteroskedasticity on the residuals of this model, meaning that the results are reliable, even for forecasting purposes.

Table 5. Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.417483	Prob. F(6,36)	0.2349
Obs*R-squared	8.217311	Prob. Chi-Square(6)	0.2226
Scaled explained SS	4.612095	Prob. Chi-Square(6)	0.5944

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/28/22 Time: 10:57
Sample: 2 44
Included observations: 43

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.092262	0.160944	0.573251	0.5700
LGDPC(-1)	-0.003044	0.007510	-0.405390	0.6876
LGCF	0.005006	0.003815	1.312238	0.1977
PBD	0.001598	0.009522	0.167842	0.8676
PDD	0.000912	0.011006	0.082901	0.9344
PAD	0.002778	0.007474	0.371693	0.7123

R-squared	0.191100	Mean dependent var	0.009186
Adjusted R-squared	0.056284	S.D. dependent var	0.011762
S.E. of regression	0.011426	Akaike info criterion	-5.957868
Sum squared resid	0.004700	Schwarz criterion	-5.671161
Log likelihood	135.0942	Hannan-Quinn criter.	-5.852140
F-statistic	1.417483	Durbin-Watson stat	2.277791
Prob(F-statistic)	0.234889		

4.5 The Long-Run Results

In the long-run, the results indicate that gross fixed capital formation had a positive and statistically insignificant relationship with economic growth in Zimbabwe. The period before dollarization had a negative and statistically significant relationship with economic growth in Zimbabwe in line with findings by Cheung et al. (2012). This suggests that the events before dollarization were damaging the Zimbabwean economic prospects. Further, the results indicated a positive and statistically significant relationship with economic growth, a result which meant that dollarization supported the economic

prospects even into the long-run reflecting findings by Meyer and Sanusi (2019), Mordecki and Ramirez (2008), Antelo and Valverde (1994), Karim, Karim and Zaidi (2012), Shuaib and Dania (2015), and Bakare (2011). The period after dollarization had a negative and statistically insignificant relationship with economic growth in Zimbabwe. Interestingly, the error correction had a negative and statistically significant relationship with economic growth in Zimbabwe. The results suggest that in the long-run, this system will go back to equilibrium, hence in the event of structural shocks the system will go back to equilibrium as shocks die away. Further, the error correction model suggests that there is the possibility of some co-integration relationship among the variables employed in our model.

Table 6. ARDL cointegrating and long run form

Dependent Variable: LGDPC
Selected Model: ARDL(1, 0, 0, 0, 0, 0)
Date: 03/28/22 Time: 11:01
Sample: 1 44
Included observations: 43

Cointegrating Form:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGCF)	0.050479	0.034968	1.443569	0.1575
D(PBD)	-0.158309	0.087292	-1.813561	0.0781
D(PDD)	0.651601	0.100891	6.458450	0.0000
D(PAD)	-0.030497	0.068514	-0.445118	0.6589
CointEq(-1)	-0.431053	0.068843	-6.261370	0.0000

Cointeq = LGDPC - (0.1171*LGCF -0.0110*LPRR -0.3673*PBD + 1.5116*PDD -0.0707*PAD + 22.5322)

Long Run Coefficients:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGCF	0.117107	0.077280	1.515348	0.1384
PBD	-0.367261	0.196164	-1.872218	0.0693
PDD	1.511650	0.248100	6.092899	0.0000
PAD	-0.070750	0.163762	-0.432028	0.6683
C	22.532160	0.785373	28.689759	0.0000

4.6 Bounds Tests

In order to determine the existence of some long-run relationship among our variables, the F-statistic from the ARDL bounds tests was compared with the critical values of the lower and upper bounds. The results suggested the existence of some co-integration at the 5% level of significance as the F-statistic was between the lower and upper bounds at that level of significance. The results indicated that there is some long-run association among the variables.

Table 7. ARDL bounds test

Date: 03/28/22 Time: 11:06
Sample: 2 44
Included observations: 43
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	3.436307	5

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Test Equation:
Dependent Variable: D(LGDPC)
Method: Least Squares
Date: 03/28/22 Time: 11:06
Sample: 2 44
Included observations: 43

4.7 Residuals Graph

The graphs for the residuals confirms that there is a long-run association among the residuals of our model as both fitted and actual residual are moving together in the long-run.

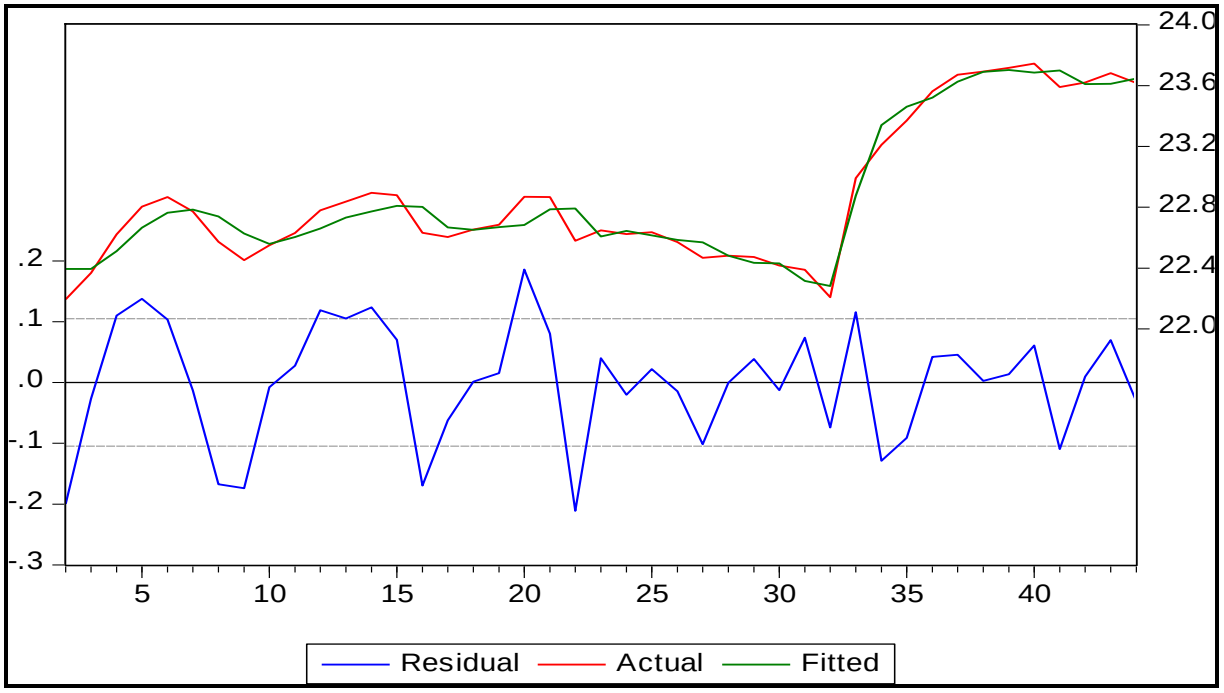

Figure 4. Residuals graphical presentation

4.8 Granger Causality Tests

In order to craft robust policy recommendations, Dumitrescu-Hurlin Granger causality tests were performed. These causality results suggested that there is a unidirectional causality between the period before dollarization and real GDP per capita; real GDP per capita and the period during dollarization; real GDP per capita and the period after dollarization; gross fixed capital formation and the period before dollarization; the period before dollarization and the period during dollarization; the period during dollarization and the period after dollarization. The findings were reflective of findings by Attanasio et al. (2000) and Bond et al. (2004) who found that domestic investment granger causes economic growth. There was also bidirectional causality with respect to real GDP per capita and the period during dollarization in line with findings by Podrecca and Carmeci (2001), Bekhet and Othman (2011), Kumo (2012), and Rajni (2013) who found bidirectional causality existing between domestic investment and GDP.

Table 8. Granger Causality Test

Pairwise Granger Causality Tests
Date: 03/28/22 Time: 12:04
Sample: 1 44
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LGCF does not Granger Cause LGDPC	42	0.24065	0.7873
LGDPC does not Granger Cause LGCF		0.37752	0.6882
LPRR does not Granger Cause LGDPC	42	NA	NA
LGDPC does not Granger Cause LPRR		NA	NA
PBD does not Granger Cause LGDPC	42	33.2084	6.E-09

LGDPC does not Granger Cause PBD		0.36929	0.6937
PDD does not Granger Cause LGDPC	42	7.81366	0.0015
LGDPC does not Granger Cause PDD		3.58573	0.0377
PAD does not Granger Cause LGDPC	42	0.37894	0.6872
LGDPC does not Granger Cause PAD		4.38342	0.0196
PBD does not Granger Cause LGCF	42	2.06549	0.1411
LGCF does not Granger Cause PBD		16.0627	1.E-05
PDD does not Granger Cause LGCF	42	0.80776	0.4536
LGCF does not Granger Cause PDD		0.97903	0.3852
PAD does not Granger Cause LGCF	42	0.20194	0.8180
LGCF does not Granger Cause PAD		0.07212	0.9305
PDD does not Granger Cause PBD	42	0.00000	1.0000
PBD does not Granger Cause PDD		1.2E+33	0.0000
PAD does not Granger Cause PBD	42	0.00000	1.0000
PBD does not Granger Cause PAD		2.08647	0.1385
PAD does not Granger Cause PDD	42	0.00000	1.0000
PDD does not Granger Cause PAD		3.11579	0.0562

5. Conclusion and Recommendations

Based on the estimated ARDL model results we conclude that the lag of the dependent variable has a positive and significant effect on the country's GDP at the 1% level of importance. Gross capital formation (GCF) has a positive, but not significant impact on Zimbabwe's economic growth or GDP. The study also concludes that the period before dollarization (PBD) had a negative and significant influence on GDP or economic growth, suggesting that it substantially reduced the growth prospects for Zimbabwe. The study also concludes that the period during dollarization (PDD) had a strong positive and statistically significant relationship with the country's economic growth and development. This shows the fact that GCF and dollarization impacted positively on the economic growth prospects for the Zimbabwe as a country. The period after dollarization (PAD) has negatively affected the country's economic prospects although the effect was not statistically significant.

The constant term of the ARDL model used by the study had a positive and statistically significant relationship with GCF and economic growth (GDP) in Zimbabwe in the period under review. The study ends by recommending that the Government of Zimbabwe should separate party and economic activities in order to lure both domestic and foreign direct investment (FDI). The Government of Zimbabwe should not politicise economic fundamentals such as the currency system, demand and supply policies to be able to attract new capital formation and injection needed to finance the development process to attain realistic economic growth and sustainable development. Finally, the Reserve Bank of Zimbabwe (RBZ) and its affiliates such as banks and similar financial institutions must make collective effort to lobby the Government through the parent Ministry of Finance and Economic Development for autonomy, democratisation and liberalisation of the financial system if the

country is to be achieve efficiency and effectiveness in its mandate of service delivery to the citizens and corporate world.

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APPENDICES

Appendix 1. Data Collected from World Bank Indicators, 1977 to 2022

T	Year	GDP	PRR	GDPC	GDPG	GCF	PDD	PBD	PAD
1	1977	5.19E+09	1232820	4.36E+09	-6.8607	17.1857	0	0	0
2	1978	5.35E+09	1472026	4.35E+09	-2.70692	10.69518	0	0	0
3	1979	5.52E+09	1757645	5.18E+09	3.297035	11.40963	0	0	0
4	1980	5.69E+09	2098684	6.68E+09	14.42068	16.93698	0	0	0
5	1981	5.87E+09	2505894	8.01E+09	12.52542	20.8159	0	0	0
6	1982	6.06E+09	2992117	8.54E+09	2.634297	19.05374	0	0	0
7	1983	6.25E+09	3572682	7.76E+09	1.585305	14.30516	0	0	0
8	1984	6.44E+09	4265895	6.35E+09	-1.90736	17.0355	0	0	0
9	1985	6.65E+09	5093613	5.64E+09	6.944388	17.81998	0	0	0
10	1986	6.86E+09	6081934	6.22E+09	2.099029	18.05636	0	0	0
11	1987	7.07E+09	7262021	6.74E+09	1.150737	14.93616	0	0	0
12	1988	7.3E+09	8671082	7.81E+09	7.552375	18.70172	0	0	0
13	1989	7.53E+09	10353545	8.29E+09	5.199766	15.03798	0	0	0
14	1990	7.76E+09	12362459	8.78E+09	6.988553	17.37694	0	0	0
15	1991	8.01E+09	14761166	8.64E+09	5.531782	19.1034	0	0	0
16	1992	8.26E+09	17625297	6.75E+09	-9.01557	20.23726	0	0	0
17	1993	8.52E+09	21045160	6.56E+09	1.051459	22.77489	0	0	0
18	1994	8.79E+09	25128584	6.89E+09	9.235199	23.72906	0	0	0
19	1995	9.07E+09	30004322	7.11E+09	0.158026	19.66019	0	0	0
20	1996	9.35E+09	35826106	8.55E+09	10.3607	18.54194	0	0	0
21	1997	9.65E+09	42777499	8.53E+09	2.680594	18.1339	0	0	0
22	1998	9.95E+09	51077682	6.4E+09	2.885212	20.75046	0	0	0
23	1999	1.03E+10	60988361	6.86E+09	-0.81782	14.39628	0	0	0
24	2000	1.06E+10	72822025	6.69E+09	-3.05919	13.56942	0	0	0
25	2001	1.09E+10	86951793	6.78E+09	1.439615	10.26647	0	0	0
26	2002	1.13E+10	1.04E+08	6.34E+09	-8.89402	5	0	0	0
27	2003	1.16E+10	1.24E+08	5.73E+09	-16.9951	7.999999	0	0	0
28	2004	1.2E+10	1.48E+08	5.81E+09	-5.80754	4.509115	0	0	0
29	2005	1.24E+10	1.77E+08	5.76E+09	-5.71108	1.525177	0	0	0
30	2006	1.28E+10	2.11E+08	5.44E+09	-3.4615	1.571161	0	0	0
31	2007	1.32E+10	2.52E+08	5.29E+09	-3.65333	7.109753	0	1	0
32	2008	1.36E+10	3.01E+08	4.42E+09	-17.6689	5.127906	0	1	0
33	2009	1.4E+10	3.59E+08	9.67E+09	12.01956	12.7468	1	1	0
34	2010	1.44E+10	4.29E+08	1.2E+10	19.67532	18.7633	1	1	0
35	2011	1.49E+10	5.12E+08	1.41E+10	14.19391	17.39777	1	1	0
36	2012	1.54E+10	6.12E+08	1.71E+10	16.66543	9.856977	1	1	0
37	2013	1.59E+10	7.3E+08	1.91E+10	1.989493	9.209479	1	1	0
38	2014	1.64E+10	8.72E+08	1.95E+10	2.376929	9.639224	1	1	0
39	2015	1.69E+10	1.04E+09	2E+10	1.779873	10.03564	1	1	0
40	2016	1.74E+10	1.24E+09	2.05E+10	0.755869	9.861371	1	1	1
41	2017	1.79E+10	1.48E+09	1.76E+10	4.709492	9.700147	1	1	1
42	2018	1.85E+10	1.77E+09	1.81E+10	4.824211	9.687734	1	1	1
43	2019	1.91E+10	2.12E+09	1.93E+10	-6.14424	7.408702	1	1	1
44	2020	1.97E+10	2.53E+09	1.81E+10	-6.24875	7.45147	1	1	1