**BINDURA UNIVERSITY OF SCIENCE EDUCATION**

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**FACULTY OF COMMERCE**

**DEPARTMENT OF ECONOMICS**

**THE IMPACT OF PRIVATE INVESTMENT ON ECONOMIC GROWTH IN ZIMBABWE (1990-2020)**

**BY**

**MUJURU VONGAI**

**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE BACHELOR OF BUSINESS STUDIES HONOURS DEGREE IN ECONOMICS**

**JUNE 2022**

# PROJECT RELEASE FORM

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# APPROVAL FORM

The undersigned certify that they have supervised, read and recommend to the Bindura University of Science Education for acceptance a research project entitled: **The impact of private investment on economic growth in Zimbabwe**, submitted by Vongai Mujuru in partial fulfillment of the requirements for the **Bachelor of Science (Honours) Degree in Economics**

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# DECLARATION

I, Mujuru Vongai, do declare that this project is a result of my assessment and research except to the extent indicated in the acknowledgments and references. The project has not been submitted for any other degree or submitted by any other University. I also declare that the research was approved by the Department of Economics at the Bindura University of Science Education.

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# DEDICATION

I dedicate this dissertation to my parents and siblings because of their unconditional love and unwavering support to keep working hard. I love you with all my heart.

# ABSTRACT

With reference to the Zimbabwean economy and a data set spanning from 1990 to 2020, this study seeks to examine the inter-relationship between variables, namely private investment, and GDP growth, both in the long and short run. The long-term relationship between variables is defined using the Johansen and Juselious method (1990). The parameters short correction models are based on the findings of the long run cointegration tests. Public and private investment has a strong positive association with growth. There is evidence of a one-way causal relationship between real GDP and private income. The study was based on neoclassical growth models or exogenous growth models stated at land, labor, capital accumulation, and technology proved substantial for economic growth. The paper finds that private investment has a strong impact on economic growth. Gross capital formation, labor growth, and government final consumption expenditure were found significant in explaining the economic growth. Overall, private investment is substantial for economic growth and development in Zimbabwe.

Keywords: Private investment, economic growth.

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# LIST OF TABLES

Table 4.1 Descriptive Statistics……………………………………………………………….30

Table 4.2 Unit Root Tests at first Difference…………………………………………………32

Table 4.3 Correlation matrix………………………………………………………………….33

Table 4.4 Breusch-Godfrey Tests Serial Correlation LM Test……………………………….34

Table 4.5 Heteroscedasticity White Test……………………………………………………..34

# LIST OF FIGURES

Figure 1.1 Zimbabwe’s Economic growth……………………………………………………4

Figure 2.1 Relationship between Economic growth and independent variables (private investments, government spending, private consumption, and public investments) …………9

# LIST OF APPENDICES

Appendix I: Descriptive Statistics………………………………………………………………45

Appendix II: Unit Root Test……………………………………………………………………46

Appendix III: Multicollinearity (Correlation Matrix) …………………………………………50

Appendix III: Autocorrelation (LM Test) ………………………………………………………51

TABLE OF CONTENTS

[PROJECT RELEASE FORM ii](#_Toc106641577)

[APPROVAL FORM iii](#_Toc106641578)

[DECLARATION iv](#_Toc106641579)

[DEDICATION v](#_Toc106641580)

[ABSTRACT vi](#_Toc106641581)

[ACKNOWLEDGEMENTS vii](#_Toc106641582)

[LIST OF TABLES viii](#_Toc106641583)

[LIST OF FIGURES ix](#_Toc106641584)

[LIST OF APPENDICIES x](#_Toc106641585)

[CHAPTER I 1](#_Toc106641586)

[1.0 Introduction 1](#_Toc106641587)

[1.1 The Study's Background 1](#_Toc106641588)

[1.2 Problem Statement 4](#_Toc106641589)

[1.3 Objectives of the study 5](#_Toc106641590)

[1.4 Research questions 5](#_Toc106641591)

[1.5 Significance of the study 5](#_Toc106641592)

[1.6 Justification of the study 6](#_Toc106641593)

[1.7 Limitations 6](#_Toc106641594)

[1.8 Delimitations 6](#_Toc106641595)

[1.9 Definition of terms 7](#_Toc106641596)

[1.10 Conclusion 7](#_Toc106641597)

[CHAPTER II 8](#_Toc106641598)

[2.1 Introduction 8](#_Toc106641599)

[2.2 Conceptual Framework 8](#_Toc106641600)

[2.2 Theoretical Literature 10](#_Toc106641601)

[2.4 Gap Analysis 21](#_Toc106641602)

[2.3 Conclusion 21](#_Toc106641603)

[CHAPTER III 22](#_Toc106641604)

[3.0 Introduction 22](#_Toc106641605)

[3.1 Research Design 22](#_Toc106641606)

[3.2 Methodology 23](#_Toc106641607)

[3.3 Theoretical framework 23](#_Toc106641608)

[3.4 Model specification 23](#_Toc106641609)

[3.5 Econometric Model 24](#_Toc106641610)

[3.6 Definition and Justification of the Variables 25](#_Toc106641611)

[3.7 Diagnostic Tests 26](#_Toc106641612)

[3.8 Data Source 29](#_Toc106641613)

[3.9 Data Choices 29](#_Toc106641614)

[3.10 Data Collection 29](#_Toc106641615)

[3.11 Conclusion 29](#_Toc106641616)

[CHAPTER IV 30](#_Toc106641617)

[4.1 Introduction 30](#_Toc106641618)

[4.2 Descriptive Statistics 30](#_Toc106641619)

[4.4 Interpretation of the results 36](#_Toc106641620)

[4.5 Chapter Summary 37](#_Toc106641621)

[CHAPTER V 38](#_Toc106641622)

[5.0 Introduction 38](#_Toc106641623)

[5.1 Summary and conclusion of the study 38](#_Toc106641624)

[5.2 Recommendations 39](#_Toc106641625)

[REFERENCES 41](#_Toc106641626)

[LIST OF APPENDICES 44](#_Toc106641627)

[APPENDIX I: DESCRIPTIVE STATS 45](#_Toc106641628)

[APPENDIX II: UNIT ROOT TEST 46](#_Toc106641629)

[APPENDIX III: MULTICOLINEARITY (CORRELATION MATRIX) 50](#_Toc106641630)

[APPENDIX IV: AUTOCORELATION (LM TEST) 51](#_Toc106641631)

# CHAPTER I

## 1.0 Introduction

Economic growth is a major goal for every growing country, such as Zimbabwe, which can be achieved through increased private investment. The Zimbabwean government has taken numerous steps to encourage private investment and accelerate economic growth, as evidenced by the Reserve Bank of Zimbabwe's handout "Guide to Foreign Investors (Investment Opportunities in Zimbabwe)" (February 2006) and the new dispensation's mantra "Zimbabwe Is Open for Business." The primary goal of this research is to determine the influence of private investment on Zimbabwe's economic growth.

## 1.1 The Study's Background

In recent years, policymakers, particularly in developing nations such as Zimbabwe, have conclude that private investment is required to stimulate economic growth (Ghura, 2015). Private investment is a key factor in producing jobs, advancing a country's technical progress, and improving the country's overall economic situation (Romer, 2019). This beneficial effect of job creation is crucial since civil servants make up a larger percentage of Zimbabwe's workforce, and the country's current economic situation prevents it from employing additional people. This suggests that the remaining unemployed workers can be engaged by the private sector, that is, private investors, hence emphasizing the significance of private investment research will cover the years 1990 through 2020.

Mustefa (2014) cited Coen and Eisher (1992) who describe investment as the generation of capital or the creation of resources for use in production. Investment is an important part of aggregate demand and a major driver of economic growth. According to Mustefa (2014), changes in investments have an impact on aggregate demand as well as an economy's productive capacity. Faster economic growth is triggered by higher investment rates. Investment in capital goods, according to Levine and Renelt (2011), is the most robust and vital factor of economic growth.

A favorable investment climate encourages investors to make profitable investments, create jobs, and enhance national output, resulting in increased private investment and economic growth (World Bank, 2004). In the 1990s, private investment increased over the world as economies liberalized and reforms were accelerated. The countries of the Middle East and North Africa (MENA) followed this pattern, but at a slower rate. Despite the financial crisis, private investment to GDP increased by 7.3 percent in the region, reaching 10% in Latin America (LAC) and Africa (AFR) and 16 percent in East Asia (EAP) World Bank, 2012). For the period under consideration (1990-2020), Zimbabwe's economic growth rate fluctuated to the point where there was no discernible pattern. During 1992 and 1993, the World Bank and the IMF reported strong growth rates of 11% and 10%, respectively, while private investment registered 14.01 percent and 17.21 percent in Zimbabwe. Land reforms policy formulated corruption, bad governance, high cost of production, discouraged exports by raising the cost of inputs to exporters, and poor foreign currency reserves required to acquire imported technology were some of the possible reasons that affected the relationship between economic growth and private investment in the 1990s. (Unit, 2015). As a result, there was a persistent budget deficit, a high tax system, and a significant increase in public debt, all of which slowed the economy. Prior to 1992-1995, Zimbabwe's economic growth was negative, averaging -1.75 percent, with private investment averaging 19.54 percent. According to the World Bank (2018), economic development has been steady, but wealth distribution has been uneven. Between 1996 and 2000, the average rate of private investment growth was 17.95 percent, whereas the average rate of GDP growth was 3.95 percent, according to the World Bank (2014).

In 1990, the government embraced the World Bank and International Monetary Fund's ESAP (Economic Structural Adjustment Program). According to the International Monetary Fund (IMF) and World Bank (1990), as the government-controlled economy of the 1980s attempted to redistribute wealth to the black majority, there was an increase in demand for black majority ownership of the economy. With the growing economic challenges at the end of the 1990s and the reforms of the 1990s, fresh concerns of unequal racial wealth distribution, the economy failing to provide jobs, and decreased private investment arose as a result of newly developed policies. The drought of the 1991/2 season exacerbated already severe economic woes. The economy grew at -11.07 % and -1.02 %, respectively, while private investment grew at -11.07 % and -1.02 %, whilst private investment accelerated to be 22.36% to 23.59% in 1992 and 1993 in the time of drought. Growth averaged 2.6 % over three drought-affected years (1992, 1993, and 1995), and 6.5percent during three good years (1991, 1994, and 1996). For the economic period 1994 to 1997, private investment averaged 20.51 %. Around 2008 the Economic Situation of Zimbabwe turned sour, economic growth was low in 1999-2000, averaging -3.02 %, while private investment averaged 7.16 %. Zimbabwe's economy grew by -2.9 % between 1998 and 2008, after a decade of contraction. Private investment increased by 8.12 %. Furthermore, from 2002 and 2008, economic growth has been constantly negative, averaging -9.11 %, while private investment has increased by 5.95 %.

The average GDP growth rate of 7.5% during the economic rebound from 2009 to 2012 was moderating, whilst private investment averaged 17.62% from 2009 to 2012. Although the subdued growth reflects challenges facing the economy, including an unsustainably high external debt and massive deindustrialisation and in formalisation. The economic meltdown was due to liquidity challenges like lack of capital reserves, high cost of capital and revenue underperformance, outdated technologies, mismanagement, bad governance, corruption, inflation and uncertainties arising from policy inconsistencies, obsolete technologies and machinery and structural bottlenecks that include power and water shortages. The constrained fiscal space has forced the government to adopt a contractionary fiscal policy stance, while the use of the multi-currency regime limits the use of monetary policy instruments.

Zimbabwe's economy consistently shrunk since 2000, in an atmosphere of political turmoil, capital flight and mismanagement. Inflation spiralled out of control and the underpinnings of the economy in agriculture and industry dissipated. Private investment declined since 2000 until 2009 and consequently economic growth declined during that period. This has shown the significance of private investment as a determinant of economic growth. From 2010 to 2013 there was a steady recovery mainly due to dollarization and stable political environment during the Government of National Unity (GNU) era. However, it was short-lived as the Zimbabwe situation worsened with inflation skyrocketing; liquidity and fuel shortages hitting from all angles. The diagram below shows Zimbabwe’s economic growth for the period 1994 to 2017.

Figure 1.1 Zimbabwe’s Economic growth

Source: World Bank

In most African countries, inadequate resource to finance long-term investment is a major problem, which slows the rate of economic growth. This lack of investible funds is a big setback to economic growth, and this is making it increasingly difficult to achieve the millennium development goals (MDGs) by 2025 as set by the United Nations. Foreign direct investment, which is a component of private investment, has been figured as a major source of getting the required funds for investment hence most African countries offer incentives to encourage FDI (United Nations, 2020).

## 1.2 Problem Statement

There have been interesting questions that frequently asked by economic analysts “Does the level of private investment truly reflect economic progress?”, “What is the real relationship between economic growth and private investment levels”? Private investment are a major driver of economic growth levels. However, in Zimbabwe for period 1990 to 2020, it has not been the case. Private investment as a percentage of Gross Domestic Product has been ranging from 2% to 25%, whilst Gross Domestic Product growth registered the decline of -17.95% with a maximum of 10.37%. Rapid increase in public debt, budget deficit, lack of capital, outdated technologies and shortages of foreign exchange has posed a huge threat to the economic growth levels in Zimbabwe for the period under the study. Hence, this prompted the researcher to investigate the effects of private investment on economic growth in Zimbabwe from 1990 to 2020.

## 1.3 Objectives of the study

* To determine the effects of private investment on economic growth in Zimbabwe.
* To determine the impact of public investment on economic growth in Zimbabwe.
* To establish the relationship between economic growth and private investment in Zimbabwe.

## 1.4 Research questions

* What is the impact of private investment on economic growth in Zimbabwe?
* What is the impact of public investments of on economic growth in Zimbabwe?
* What is the relationship between private investments and public investments?
* What recommendations would you give the government of Zimbabwe to stimulate economic growth?

## 1.5 Significance of the study

**1.5.1 To the government of Zimbabwe**

The research will provide the government with a basis for policymaking, in terms of setting up policies that support economic growth via improved private investment. The research will enlighten the policy makers on the impact of private investment on economic growth.

**1.5.2 To the public**

They will get to appreciate the innovations by private investors as a way of improving their nation’s economic status

**1.5.3 To the university**

This project will act as a benchmark to be used by other students as they review their studies related to this one.It also gives the students at the university the ground for further study on this research

## 1.6 Justification of the study

There are supporting statements, which advocate that if investment is undertaken by the private sector, it is more efficient and productive, but the judgment has to be based on empirical evidence. What is surprising is that despite the importance of this relationship to growth-oriented adjustment policies, there is virtually little empirical evidence that can be called on to support or disprove the notion that private investment is in some sense better than public investment insofar as long-run economic growth is concerned. Consequently, the proposals favouring the private sector in this context appear to rest more on theory than on proven fact.

The main aim of this research is to show the contribution of private investment to economic growth in Zimbabwe to uncover the motive on whether the call for more private investment is truly justified. The relationship between private investment and economic growth in the nation will be discussed and the contribution of private investment to growth will be uncovered. To achieve these, scholarly opinions and suggestions will be discussed and empirical analysis on private investment will be carried out. What has been the contribution of the Private investment to the economic growth? Has the contribution been positive or not? Is the contribution increasing over time? This study attempts to answer these questions and more unmentioned questions.

## 1.7 Limitations

Looking on the time constraint, this study was conducted on a very large scale. This study was conducted between January 2022 and June 2022.

To neutralise these limitations, the researcher had to work overtime during the period of deadly corona virus pandemic to meet the deadline of the submission of the research project.

## 1.8 Delimitations

The study uses secondary data for the period 1989-2020, and the data is retrieved from the World Bank Open Data Source.

## 1.9 Definition of terms

**Private Investments** refers to capital investment in the form of domestic branch plant or subsidiary corporation in which the investor has voting control.

**Public Investment** refers to government spending on economic infrastructure including airports, highways, trains, water and sewerage systems, public electric and gas utilities, telecommunications, and social infrastructure like schools, hospitals, and prisons (IMF, 2015). Governments often use the phrase "public investment" in a broader meaning to refer to spending on human capital, such as education and health care, as well as financial investments by government organizations such as sovereign wealth funds (Miller and Mustapha, 2016).

**Economic growth** is defined as a long-term upward tendency in a country's total real production or GDP (Lipsey, 2011).

**Gross Domestic Product (GDP)** is the total of consumption, investment, government spending, and net exports, as measured by the expenditure approach. Consumption (C), investment (I), government spending (G), and net exports (Y) are all components of GDP (Y) (Investopedia, 2022).

## 1.10 Conclusion

The main aim of this study is to evaluate the impact of private investment on the economy of Zimbabwe. This chapter covers the background of the study ,statement of the problem ,the purpose for the research ,objectives and research questions,significanc of study ,limitations and delimitations of this study .The next chapter presents an outline of the literature which underpins the study .

# CHAPTER II

**LITERATURE REVIEW**

## 2.1 Introduction

This chapter will mainly focus on the review of related literature and the theories related to investment and economic growth. The study will look at:

## 2.2 Conceptual Framework

The conceptual framework shows an interconnected set of ideas about how a particular phenomenon functions or is related to other parts (Svinicki, 2010). It is ‘a system of concepts, assumptions, expectations, beliefs, and theories’ that research one bases their research on (Sitko, 2013). It examines the relationship between the dependent variable (Economic growth) and independent variables.

Figure 2.1 Relationship between Economic growth and independent variables (private investments, government spending, private consumption, and public investments)

Economic growth

*Source: Own Diagram*

The diagram depicts the conceptual framework showing the relationship between the independent variables (private investments, public investments, private consumption, and government spending) and the dependant variable (economic growth).

## 2.2 Theoretical Literature

The long history of ideas on economic growth started from the classical economists like Adam Smith, Robert Malthus, Ricardo and Marx. For more than three decades the Neoclassical and the endogenous growth theories were exploring the flow of economic growth from different point of view. The objectives of these growth theories are identifying a nation’s sources of economic growth. The 20th century economist Keynes who transformed modern macroeconomics radically has also his own contribution in identifying sources of a nation’s growth (Yovo, 2017). From this time onwards, various studies were conducted to assess sources of economic growth and the role of various social, economic, and political scenarios in the economic growth process.

Hadjimichael et al (1995) cited in Ghali (2015), classify models of private investment under the expected profit model, the neo-classical model, Tobin’s Q model and other models. According to Keynes (1936), investment depends on the prospective marginal efficiency of capital relative to some interest rate reflecting the opportunity cost of the invested funds. The marginal efficiency of capital according to Keynes is the expected profitability of investment. Therefore, investment is a function of interest rate and marginal efficiency of capital.

**2.2.1 Theories of Investment**

* **The Accelerator Principle**

The acceleration principle finds its roots in the work of Carver (1903), Aftalion (1909), Bickerdike (1914) and Clark (1917). Unlike other theories of investment, the accelerator theory tends to be sparse in its micro-foundations, relying upon its empirical strength both for its derivation and for justification. The accelerator or the relation, as Harrod (1936) called it, lay at the heart of the Keynesian business cycle theory of Harrod, Hicks, and Goodwin.

According to the accelerator theory of investment, investment responds to changing demand conditions. If demand increases, there will be an excess demand for goods. Either facing such a situation, firms are faced with two choices, to raise prices in the hope of choking off that excess demand, or to meet that demand by raising supply and this has a direct positive effect of increasing economic growth because the national output rises in response to the increased demand. However, in more Keynesian visions of the world, quantity adjustments take precedence. To meet higher production, firms will increase their output capacity by investing in plant and equipment and hence economic growth. In the extreme, the idea that investment responds immediately and entirely to changing demand conditions implies a relation in the following form:

It = Kt - Kt-1 = Yt - Yt-1

Where, Yt is aggregate demand, Kt capital stock and Its investment, all at time t. Investment increases gradually in response to increased demand in the short run. In the long run the firms raise their level of investment to a level that fully meets the increased demand hence economic growth. In this case, then, the size of a change in capital is a fraction of the size of the change in demand, that is

 It = Kt - Kt-1 = v (Yt - Yt-1)

Where, v is a constant known as the accelerator coefficient and it is assumed that 0 < v < 1. Of course, v can be thought of as the desired capital-output ratio, v = K/Y. Thus, given a change in aggregate demand, the accelerator gives us the change in capital needed to achieve that desired capital-output ratio. Since v is a fraction, a change in demand will require a smaller change in capital. Concisely the accelerator theory views investment as a linear proportion of changes in output. However, the accelerator theory of investment has very restrictive assumptions and this has led to the neo-classical approach (Jorgensen 1963, Hall and Jorgensen 1971).

* **Neo-Classical Growth model**

The neo-classical model was to explain how it is possible to have a permanent growth in GDP per capita. The model was developed by Robert Solow in the 1960`s and sometimes called Solow growth model or the exogenous growth model. It also an exogenous growth model, an economic model of long-run economic growth set developed independently by Robert Solow and Trevor Swan (Solow (1956), Swan (1956)).

In the neo-classical model, the technological progress affects GDP per capita (thus the growth rate). A permanent increase in GDP per capita when there is technological development that increases productivity of labour. Permanent growth in GDP then requires a continuous, but technological progress.

It is not possible for the government; expect temporarily, to affect the growth rate in neo-classical growth model. The government might be able to affect GDP per capita (thus the growth rate) but always returns to the level determined by the technological progress. The same is true savings. An increase in savings may have a temporarily effect on GDP but it will not effect in the long run.

* **J.M.Keynes’s Internal rate of return**

In his general theory, Keynes (1936) proposed an investment function of the sort I = I0 + I(r) where the relationship between investment and interest rate was of a rather naive form. Firms are presumed to rank various investment projects depending on their internal rate of return (or marginal efficiency of investment) and thereafter, faced with a given rate of interest, choose those projects whose internal rate of return exceeds the rate of interest. With an infinite number of projects available, this amounts to arguing that firms will invest until their marginal efficiency of investment was equal to the rate of interest, that is MEI = r.

* **Irving Fisher's theory of capital and investment**

Irving Fisher's theory of capital and investment was introduced in his nature of capital and income (1906) and rate of interest (1907), although it has its clearest and most famous exposition in his theory of interest (1930). Greater concern is on what he called his second approximation to the theory of interest (Fisher, 1930), which sets the investment decision of the firm as an inter-temporal problem.

In his theory, Fisher assumed that all capital was circulating capital. In other words, all capital is used up in the production process, thus a stock of capital K did not exist. Rather, all capital is, in fact, investment. 14

Given that Fisher's theory output is related not to capital but rather to investment, then a production function of the form Y = f (N, I) is constructed. Fisher imposed the condition that investment in any time period yields output only in the next period and this implies that the investment in the initial period has a positive effect on economic growth because as the investment grows the output rises in the following period. Assuming a world with only two time periods, t = 1, 2. In this case, investment in period 1 yields output in period 2 so that Y2 = f (N, I1) where I1 is period 1 investment and Y2 is period 2 output. Therefore, the investment of period 1 influences economic growth in the following time, which is period 2.

**2.2.2 Economic growth theories**

* **The Lucas Model**

Lucas(1988) provided the first human capital approach to endogenous growth. The basic idea of the model is that people divide their time between work and training. So, there is a trade-off, since when training people give up part of their work income, but raise their future productivity, and their future wages. In essence, this trade-off is like the typical one appearing in physical capital accumulation. This is investment in education. Thus, the decisions concerning the accumulation of human capital depend on the dynamic features of the economy, which makes it endogenous. Since human capital accumulation is the engine of growth, growth will itself be endogenous as well. This model has two types of capital, physical and human capital. The fundamental equation of the model, which is a portfolio equilibrium equation states that in steady-state the marginal product of the two types of capital must be the same. This implies that the dynamics of accumulation of the two types of capital are interlinked.

* **Harrod-Domar Growth Model**

Harrod and Domar growth model (1947) came up with its own design of economic growth. The Harrod-Domar model follows a Keynesian framework that highlights factors believed to be responsible for economic growth among which is the capital stock, investment, the marginal propensity to save and others. The Harrod and Domar model is developed from a simple national income identity as follows:

Y(GDP) = C+I+X-M Y(GDP) gross domestic product in this case measures economic growth, X represents exports of goods and services and M is imports of goods and services. X-M is defined as net exports, which measures the degree of openness of an economy. The objective here is that investment (I) and net exports (X-M) must reach certain points in order to arrive at the desired economic growth (GDP) level. According to this model, government expenditure (G) is included in consumption(C), private and government investment. Domestic savings(S) is supposed to finance I and M has to make certain imported capital goods available to produce and export. The government plays an important role in filling the savings and exports gaps. This means that the government should do its best to cover the largest of the two gaps (whether the domestic or foreign gap). Once the larger gap is covered, the other gap will not bring out a problem. The commonly used variables in financing the gap is via promoting private investment which comprises of foreign private investment and domestic private investment.

* **A Keynesian model of growth**

Harrod-Domar model (1947) uses a Keynesian framework but is not Keynesian in its conclusion regarding the relationship among growth, savings, and the ICOR (investment-capital-output-ratio). The Keynesian model attempts to reconcile the role of government in creating effective aggregate demand. According to this model, government or public sector is presented in the aggregate demand function as G. This allows taxes to be included in the model, where taxes are denoted by T, and this contributes to an increase or decrease in government revenue. The variables in the Keynesian model that are determined within the model include income (Y), private consumption (C), taxes (T), and disposable income (Yd). Variables that are determined outside the model include investment (I), government expenditure (G), fixed level of consumption (a), marginal propensity to consume (b), lump-sum tax (To), marginal tax rate (t) and aggregate demand (AD). The Keynesian growth model propounds that aggregate demand(Y) constitutes of private consumption, investment and government expenditure. Consumption is equal to a level of consumption that is determined outside the model plus a marginal propensity to consume times disposable income. Disposable income is obtained by subtracting tax from income where tax is equal to a marginal tax rate multiplied by income. The model can be presented as follows:

Y = C + I + G

**2.3 Empirical Literature Review**

Most growth studies began their framework of analysis with the most influential works of Solow (1956 and 1957) in economic growth theory, which ignored the role of any capital formation to economic growth and took technical productivity as the only source of economic growth. In this analysis, technical progress was explained outside the model and considered as manna from heaven. Following this work there have been various studies by different researchers that attempted to trace the possible source of a growth of nation. In these studies, a variable taken as a determinant of growth in one study is considered a controlling variable in another study.

**2.3.1 Impact of Private investments on Economic growth**

Bayraktar (2003) carried out a study on the role of private sector investments in the economic performance of OIC member countries. He examined private sector investments as a proxy for private sector development in the OIC countries. The study analysed the determinants of investments namely macroeconomic policies, microeconomic incentives and institutional factors. Bayraktar (2003) concluded that achieving macroeconomic stability and improving existing institutions is a difficult process that requires increased private sector investments to achieve a sustained growth.

Ghali (2015), also attempted to adders this issue in the neoclassical growth framework. He employed a Co-Integrated Vector Autoregressive model to account for potential endogeneity and non-stationary problems. Results suggest that private investment contrary to public investment has stimulated economic growth in Tunisia.

Badawi (2018) by using the same methodology as Ghali (2008) for Sudan found a positive contribution of private and public investment to economic growth. The impact of private investment was found to be more pronounced than that of public sector investment in Sub Saharan Region.

Ahmed (2014) studied the behaviour of Indian aggregate investment during the period 1971-1999. The results from their econometric estimations of Indian investment was explained by real output. Humpage (2000) concluded that investment and economic growth are positively linked. However, the direction of the effect between the two is less certain. The direction of causality seems to run mostly from income to taxation at quarterly frequencies.

Jiying (2020) carried out a study in Burundi on the impacts of Private Investment on economic growth. The study was performed using data for the period 1989-2013. They used the Granger causality and Johansen cointergration approach. The results reviewed that there is unidirectional causality between private investment and GDP. Therefore, Private investment is seen as a source of economic growth.

Ramirez (2013) also suggested that both public and private investment positively contribute to economic growth for nine major Latin American countries. Ashipala and Haimbodi (2017) observed that private investment plays a crucial role in long-term stabilization policies in Southern African countries.

Cotsomitis (2012) used the Granger causality test to study Chinese private investment and economic growth. They concluded that the output was an exogenous variable and there was a one-way causal relationship between the two. They also added other variables, like trend of time, FDI and the lagging investment and concluded that private investment promoted economic growth by using AD.HOC model and regression analysis. However, the outcome was affected by regional differences. Behzad Yaghmaian (2013) verified the assumption of investment led economic growth using time-series data and regression analysis. He concluded that employment and output of manufacturing industry might promote export and economic growth. In the model of classical economics, taking into account statistics of population as labour force, exports marked the leading role to economic growth.

Pradeep (2011) stated that private investment and Gross domestic product were the major determinant of the economy of any country. Private investment affects the GDP of a country directly and hence they are positively correlated. However, the private investment in a country is not the only economic factor on which causes the GDP to increase or decrease there are so many quantitative and qualitative economic and non-economic variables which influences the GDP of a country. In order to determine the effect of those economic or non-economic variables on GDP a new model has been proposed and the strength with which they are correlated positively or negatively with GDP has been measured. The factors like Inflation, FDI, Export, Industrial production directly contributed to the growth of the GDP, which further represent the growth of the Country.

Muratt (2021), from the results the Coefficient of Correlation shows that the strength to which the different forces are correlated with GDP. This model was proven a success in determining the intensity with which they affected GDP and hence our economy. In the research paper the movement of the GDP with the factors like private investment, Index of Industrial Production, Per Capita Income, Employment and Inflation has been analysed to predict the behavior of GDP. It seemed that government was working on introducing new policies to increase our GDP by making investment laws more liberal and ignoring the other factors. Therefore, figures of ten years have been analysed so that objectivity could be maintained.

Maseru (2018) further stated that the factors like Inflation, FDI, Export, Industrial production directly contributed to the growth of the GDP, which further represent the growth of the Country. Therefore, also results of Coefficient of Correlation showed that the strength to which the different forces are correlated with GDP. The Coefficient of Correlation showed that the major contributing factors rare FDI, IIP (Index of Industrial Production), and Exports of a Country. The GDP of the country was quite fluctuating in the starting of the decade but it started stabilizing towards the end of the decade due to increase in FDI, Exports, and IIP. It was also clear that high inflation in a country leads to tighter monetary policies which further slower down the IIP and hence GDP.

**2.3.2 Impact of Public investments on Economic growth**

Using a vector autoregressive approach, Ghan and Din (2016), carried out an investigation on the influence of public investment in the process of economic growth in Pakistan. The model, in addition to state investment, includes private investment and public consumption, based on theoretical considerations. The findings suggest that private investment is the primary driver of economic growth, with no substantial inferences to be taken from the effects of state investment and consumption on economic growth.

Scandizzo and Pierleni (2020) on their study the short and Long-Run Effects of public investment results of the empirical works on this theme taking into account both theory and estimations issues. In general, the studies surveyed support the idea that public investment, if projects are properly selected, raises output and welfare through both demand and supply effects and thus should be the instrument of choice of economic policy for governments and public agencies. Moreover, a considerable amount of empirical studies show that public investments have higher positive growth effects than public consumption both in the short and in the long run. In spite of a great diversity in the theoretical.

Papagni et al (2019), examined the role of public investment on economic growth in Southern Italy during the second half of the twentieth century (1951–2011). Using cointegration analysis, they discover that public investment has a positive influence on the Mezzogiorno's per unit labor output for the entire period 1951–2011. However, the model's estimations indicate statistically significant public investment parameters in the first regime, but not in the second, when economic growth is supported by corporate investment and technological advancement. In the final stage of growth, the social and institutional environment has a detrimental impact on the economy's performance. Changes in the quality of institutions are blamed for the varying influence of public investment on growth over time.

Isa (2015), investigated the impact of external debt on Nigeria's performance. The findings support the hypothesis of eviction and over-indebtedness in Nigeria. Based on these findings, the study concludes that the prospects for resolving Nigeria's debt crisis will be dependent on mounting debt relief, export diversification, and enhanced FDI inflows. Debt relief will allow the country to spend its meager export earnings on desperately needed inputs for industries and infrastructural facilities. However, efforts to reduce the external debt burden would be futile in the absence of a stable political system and economic stability.

**2.3.3 Relationship between private investments and Public investments**

Arini and Siregar (2016) carried out a study on the causality Relationship Between Public Investment and Private Investment: The Case of Indonesia. The purpose of this study was to present empirical data about the causal relationship between governmental spending and private sector investment in Indonesia's 33 provinces from 2010 to 2013. The Three-stage Least Squares from EViews was employed in this investigation as a statistical tool. The findings of this study show that there is a causal relationship between public infrastructure investment and private investment, as well as between public infrastructure investment and public investment in human resources. However, there is no causal relationship between public and private investment in human resources. GDP has a positive and significant effect on private investment when used as a control variable.

Muyambiri, Chiwira, Batuo and Chiranga (2010), used annual time series data from 1970 to 2007 to evaluate the relationship between private and public investment in Zimbabwe. The emphasis was on the correlation and the interaction of the two types of investments. Based on the flexible accelerator theory, the study developed empirical models for both private and state investment. It has been discovered that private and governmental investment are intertwined. The short-run relationship between public and private investment was assessed using a co-integration technique using a VEC model. The relationship between private and public investment was determined to be insignificant, with a linear correlation. The findings confirm the hypothesis that private investment comes first, followed by public investment.

Nguyen (2018) assessed both short and long-term influences of public investment on economic growth and test the hypothesis that whether public investment promotes or demotes private investment in Vietnam. The authors use the approach of autoregressive distributed lag model and Vietnam’s macro data in the period of 1990-2016, to evaluate the short and long-term effects of public investment on economic growth and private investment. The model evaluates the impact of public investment on economic growth and private investment based on the neoclassical theories. The public investment which strongly affects economic growth is also reflected by aggregate supply and demand. Public investment directly impacts aggregate demand as a government expenditure and aggregate supply as a production function (capital factor). The results from this research indicate that public investment in Vietnam in the past period does affect economic growth in the pattern of an inverted U shape as of Barro (1990), with positive effects mostly occurring from the second year and negative effects of constraining long-term growth. Meanwhile, investment from the private sector, state-owned enterprises, and FDI has positive effects on short-term economic growth and state-owned capital stock has positive impacts on economic growth in both the short and long run. The estimated influence of public investment on private investment also shows a similar inverted U shape in which public investment have crowding-in private investment short-term but crowding-out in the long run.

Dash (2016), estimated the impact of public investment on private investment in India during 1970-2013 using ARDL procedure developed by Pesaran and Shin (1999) and Pesaran, Shin, and Smith (2001) by incorporating endogenously determined structural break in the model. The base line result implies that a 1 per cent increase in public investment as a ratio to GDP leads to 0.81 per cent and 0.53 per cent decrease in private investment as a ratio to GDP in the long run and short run respectively, after controlling for economic conditions. In order to avoid the situation whereby the results may be driven by government consumption expenditure or fiscal deficit, the analysis was repeated by estimating the investment function after including these variables and similar results were obtained. Dash (2016) also estimated the investment regression for a shorter sample period (1978–2013) to get the same result. He observed that the crowding out effect of public investment on private investment has dampened during the post-liberalization period. The results also revealed that a “market friendly” approach and an increase in foreign direct investment dampen the magnitude of the crowding out effect of public investment. The study also revealed that public infrastructure has a positive effect on private investment in the short run.

Yovo (2017) on his study Public expenditures, Private investments and Economic growth in Togo assessed the impact of the level and composition of public expenditures on growth and the link between public and private investments in Togo. A two-stage Least Squares was used to estimate a neoclassical growth model and private investment model. Findings revealed that public consumption had a negative effect whereas public investments had a positive impact on economic growth.

In addressing the role of private and public investment in the economic growth process for 24 Latin American and Asian countries using a cross section sample, Khan and Reinhart (1990) found that private investment and public investment have a different effect on the long run rates of economic growth. They identified that private investment plays a much larger and more significant role in the growth process than public investment. In contrast, public investment has no statistically significant effect on growth. However, the problem in this analysis was the quality of the methodology employed. The causal correlation between dependent variables and the independent variables was not addressed properly.

## 2.4 Gap Analysis

Economic growth literature exists in different dimensions in trying to establish the relationship between Private Investment with economic growth for less economically developed countries. Zimbabwe is one of the countries which lacks these studies. private investment being the driver of economic growth in Zimbabwe therefore, it is crucial to investigate their impacts on economic growth using time series data considering also other variables like government expenditure.

##  2.3 Conclusion

In summary, the above discussion has analyzed the relationship between Private Investment and economic growth from both a theoretical and an empirical point of view. Even though these growth theories vary in their transmission mechanisms for investment process. From the comprehensive literature, both static and dynamic gains from investment could be found. Private investments are mainly the results from the increase in foreign reserves and national welfare. It is much better for a country to engage in openness and expansionary fiscal and monetary policies since it promotes investment opportunities locally and internationally hence economic growth. Therefore, the Zimbabwean society will benefit from improved standards of living through cheaper goods.

# CHAPTER III

**RESEARCH METHODOLOGY**

## 3.0 Introduction

The focus of this chapter will be on the theoretical framework of the model, model specifications, definitions and justification of study variables, data sources and estimation techniques.

## 3.1 Research Design

Research design refers to a blueprint guiding the collection, data processing and the transmission of information (Sangarwe, 2014). Akhtar (2016) described research design as a comprehensive plan for carrying out a research study. The research design is a tool designated to answer the research questions mentioned in the first chapter. According to Cresswell (2014), the type of research design chosen in a study plays an important role in determining the accurateness of the findings. This study will use a combination of both descriptive and correlation designs. The motive behind this research is to make a quest on and establish the impact of private investment on economic growth.

 **3.1.1 Descriptive Research**

According to Cꭇeswell (2014) proposed that a quantitative kind of research design tries to describe and explain conditions for a study by making use of many subjects to describe a phenomenon. Descriptive research usually takes unprocessed data and summarizes it in a usable form. This study therefore is suitable because it includes manipulation of unprocessed data into a better usable form to make it easier for prediction and estimation without changing the nature of the respondent’s working environment.

## 3.2 Methodology

Research methodology refers to the theoretical analysis of the methods and principles, particular to a branch of knowledge (Coyle, 2016). The research methodology gives an explanation of how the data for the study will be analysed and presented in a critical attempt to solve an economic assertion of how, private investment, public investment, aggregate consumption, and government expenditure have affected economic growth (measured in terms of GDP change) during the stipulated period. To find out the relationship between private investments and public investments the researcher will employ the Engle-Granger cointegration technique, the Ordinary Least Squares (OLS) method.

## 3.3 Theoretical framework

The methodology for this study was adapted with some modifications from the Keynesian model of aggregate expenditure. The model was explained in the literature review section of the research. The model equation is stated as follows:

$$GDP\left(Y\right)=C+I+G+(X-M)$$

Where:

$$GDP\left(Y\right)= Gross Domestic Product$$

$$C= Aggregate consumption$$

$$I= Aggregate investment$$

$$G= Aggregate government expenditure$$

$$\left(X-M\right)= Net exports$$

## 3.4 Model specification

The model used in this study was made with modifications on the Keynesian model of economic growth. The main modification is that investment function (I) is divided into its two main functions of public investment and private investment (chief explanatory variable). In addition, net exports(X-M) were removed because mainly Zimbabwe is a net importer than exporter hence its insignificance in the research. Thus, the mathematical model equation for this study is stated as:

$$GDP=α+β\_{1}PvtI+β\_{2}PlcI+β\_{3}GvtE+β\_{4}PvtC$$

Where

GDP = GDP

PvtI = Private Investments

PlcI = Public Investments

PvtC = Private Consumption

GvtE = Government Expenditure

 $α, β\_{1},β\_{2},β\_{3}, and β\_{4}$ = constant and coefficients respectively

## 3.5 Econometric Model

This is way of representing the relationship between economic variables as an equation or set of equations with statistically precise parameters linking the variables. The following econometric model was used to capture the effect of different variables with a significant effect on economic growth:

$$logGDP=α+β\_{1}logPvtI+ β\_{2}logPlcI+ β\_{3}logPvtC+β\_{4}logGvtE+μ\_{t}$$

Where

α, is a constant and $β\_{1}$ to $β\_{4}$, are the respective coefficiencies on the respective different variables that affect the nation’s dependent variable which is economic growth.$ μ\_{t}$ is the error term which is a random (stochastic) variable that represents other factors that affect the dependent variable(economic growth) that are not included in the model because they are considered trivial or insignificant and may not have been taken into consideration due to ignorance. The above equation was estimated using the Ordinary Least Square (OLS) method. Diagnostic tools of analysis like the R- squared, statistical tests for significance (T and F tests) and Durbin Watson test were used to interpret the results. The software application used for analysis was E-views 7. Secondary data for the period 1990 to 2020 obtained from World Bank was used on the study.

## 3.6 Definition and Justification of the Variables

**3.6.1 Economic Growth**

Economic growth refers to the summation of all the total expenditures on final goods and services over a certain period of time Lipsey & Crystal, (1999). In this study, GDP is the variable representing the measure of Zimbabwean economic activities. Asiedu, (2010), recommended GDP to be the measure and representation of economic growth. The variable (GDP) is the dependent variable in this study and is being determined by private investments (PvtI), public investments (PlcI), private consumption (PvtC) and government expenditure (GvtE) according to equation (4).

**3.6.2 Private Investments**

These are locally generated investments in the form of capital investment in a domestic division in which the investor has voting control. This study used Gross fixed capital formation as a proxy to private investment. According to the World Bank (2014), Gross fixed capital includes improvements on the land (fences, drains and ditches to mention but a few); plant and machinery and equipment purchases; and construction of schools, hospitals, offices, roads, railways, residential housing, commercial and industrial buildings. Economic growth and private investments are positively related. If private investments surges, economic growth increases. According to Pradeep (2011), private investments and economic growth are a major determinant of economic growth of any country. He found that private investments affect the GDP of a country directly, hence they are positively correlated.

**3.6.3 Private Consumption**

 Private consumption is an important driver of every economy. Aside from being a key measure of overall welfare, it significantly influences aggregate demand through the multiplier effects of spending. Consumption is a linear function of current disposable income1. It proposes that the marginal propensity to consume (MPC) is the derivative of consumption with respect to income is positive but less than one, and that the average propensity to consume (APC) declines as the income of an individual increases. Therefore, the AIH implies people adjust their consumption instantaneously as their income changes. Several researchers have verified the relative effect of fiscal policy on economic growth worldwide, both in developed and developing economies. However, the nature of the relationship between fiscal policy, private consumption, and economic has not been discussed, especially in a cross-country study. Using a structural equation model, with data spanning China's 29 provinces between 1992 and 2010, Zhang and Yang (2016) explored how consumption affects economic growth. They reported that the path coefficients relating to consumption and economic growth depicted a significant positive effect. Benos (2009), also through the examination of how fiscal policy affects economic growth among EU countries, reported that the components of public spending and revenues enhanced economic growth of the 14 European Union countries between 1990 and 2006.

**3.6.4 Government Expenditure**

Government expenditure can be visible or invisible hand by the government in trying to help its citizens in a way of reducing the cost of living. The public sector is the main actor in this field, given the typical nature of public goods and the existence of positive externalities generated by investments. However, public deficits, increased public debt to GDP ratios and, sometimes, the inability of the public sector to deliver efficient investment spending and misallocations of resources due to political interferences have led to a strong reduction of public capital committed to such expenditures. As a result of this increasing public capital shortage. Therefore, the funding of infrastructure investment in projects characterised by high specificity, low re-deployable value and high intensity of capital can increase taken the form of project finance. Economic growth and government expenditure are positively related when they are implemented very well. If government expenditure surges, economic development increases. According to Manis (2011), government expenditure is a major determinant of economic development of any country.

## 3.7 Diagnostic Tests

Diagnostic tests will be carried out in this study includes testing for multicollinearity, normality, heteroscedasticity, autocorrelation, stationarity, and others.

**3.7.1 Multicollinearity**

Multicollinearity is a situation when economic variables are moving together in an organised and systematic way. In the case of this study, this is when private investments, public investments, private consumption, and government have a systematic relationship in which they move in the same direction together. Correlation matrix is used to test for multicollinearity among the variables and the maximum correlation coefficient must be less than eighty percent.

**3.7.2 Normality**

The test was conducted to test whether the stochastic variables are normally distributed. Stochastic means that explanatory variables, which are private investments, public investments, private consumption, and government expenditure, are considered not very accurate and might result in conflicting results in real terms. Normality test is done using the Jargue-Bera test. When the residuals for the variables are not normally distributed, then the hypothesis test, interval estimation would be affected, and the OLS assumption of normality can be violated.

**3.7.3 Autocorrelation**

Autocorrelation test is used to determine whether the model used in the study describe the trend of relationship between explanatory variables (private investments, public investments, private consumption, and government expenditure) and the dependent variable (GDP). It also defines the correlation between numbers in the series of observations ordered in a particular time. The Classical Linear Regression Model (CLRM) assumes that such a relationship is not present in an error term, that is (;) =0. The presence of auto correlation can be identified when the expectation is not zero. The problem with auto correlation is that although estimators are unbiased, they will be no longer efficient since they have a larger variance. A large variance means that tests for significance are no longer strong enough and they will produce large confidence interval hence it will be tested using Durbin Watson (DW) test statistics (Gujarati, 2004). In its deviation, the DW test statistics shows the absence of auto correlation in region of value 2. The closer the value is to zero, the greater the evidence of positive serial auto correlation. However, if the DW statistics is near four, then there is greater evidence of negative serial auto correlation (Gujarati, 2004). If DW statistics falls in the rejection zone, LM becomes the alternative test.

**3.7.4 Heteroscedasticity**

Heteroscedasticity is when the variance of the error term of an explanatory variable for instance private investment is not constant for all other explanatory variables namely public investments, private consumption, and government expenditure. If OLS is used despite the presence of heteroscedasticity, the coefficient estimate will still be unbiased but with no minimum variance and the variances will be inflated. The standard error formulae of the coefficients to employ an estimator for population variance will no longer hold, therefore the calculated standard error could be wrong; hence, any inferences made are misleading. This variance is assumed in the CLRM that it is constant; therefore, to fulfil this assumption, the variances should be homoscedastic. The null hypothesis will be that the error terms have a constant variance.

**3.7.5 Coefficient of determinant (𝑹𝟐)**

According to Gujarati (2004),coefficient of determinant (𝑅2) is used as a measure of goodness of fit. R square shows the explanatory variables explaining the variation of the model and when it is large, that is, close to 100% it means the model fit the data. Adjusted R squared is also used as a check quality.

**3.7.6 F- test**

The F-test is used to check the significance of the whole model of the study the probabilities shall be used. The t-test was used to test the significance of each variable separately.

**3.7.7 Test statistics (t- statistics)**

The t-statistic is used to check whether the estimated coefficients of individual explanatory variables used are statistically significant or insignificant. A statistic is statistically significant if the value of the test statistic lies in the critical region, that is, absolute value of more than 2 at 5% level of significance (Gujarati, 2004). In this instance, the null hypothesis is rejected whereas the test is said to be statistically insignificant if the value of the test statistic lies in the acceptance region. In this case, the null hypothesis is not rejected. If the level of significance is set at 5%, then the null hypothesis can be rejected if the computed t-value exceeds 2 in absolute value as depicted by the rule of thumb (Gujarati, 2004). This means that if the t- value computed for a variable such as public investment exceeds 2 then the variable will be significant in explaining changes in Gross Domestic Product at 5% level of significance.

**3.7.8 Stationarity Tests**

The stationarity tests of the variables is performed using the Augmented Dickey Fuller (ADF) concept, were non-stationary variables are made stationary by first differencing. For example in this study, all the explanatory variables were made stationary by first differencing. Testing for cointegration between two or more non-stationary time series using the Engle Granger approach, which involves running an OLS regression, saving the residuals and then running the ADF test on the residual to determine if it is stationary. The variables are said to be cointegrated if the residual is stationary.

## 3.8 Data Source

The data used in this study for private investment, public investment, private consumption and government expenditure was extracted from the World Bank open data website. This data source provided updated statistical data on variable estimates. In making choice for the secondary data in the study, precautions were made to assess the accuracy, reliability and objectivity of the information.

## 3.9 Data Choices

The researcher used secondary data in this study.

## 3.10 Data Collection

Time series datasets for private investment, public investment, private consumption and government expenditure for Zimbabwe from 1990-2020 extracted from World Bank Open Data website was used for analysis in this study.

## 3.11 Conclusion

This chapter described the methodology of the study and the various procedures to be undertaken in the analysis before interpretation of results. The tests to be performed include normality, multicollinearity, heteroscedasticity, autocorrelation and stationarity tests. The justification for the explanatory variables was also discussed. The chapter paved the way for data presentation and analysis on the next chapter.

# CHAPTER IV

**DATA PRESENTATION AND INTEPRETATION OF RESULTS**

## 4.1 Introduction

The study will use real data for gdp, private investments, public investments, private consumption and government expenditure to do some empirical tests and check whether the variables are the determinants of economic growth. Regression analysis will be used to answer the research questions in Chapter 1 and to see whether there is a relationship between economic growth (gdp) and private investments. The chapter will mainly focus on the presentation and analysis of data and provide basis for conclusion and possible recommendations. The study will use the Ordinary Least Squares method and EViews 7 statistical package software for data analysis.

## 4.2 Descriptive Statistics

The researcher considered the statistical properties of data. Table 1 below shows the descriptive statistics of the data.

**Table 4.1: Descriptive Statistics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **GDP** | **GVTE** | **PLCI** | **PVTC** | **PVTI** |
| **Mean** |  14.38363 |  8.997921 |  14.18507 |  14.68069 |  9.058273 |
| **Median** |  14.31462 |  9.082871 |  14.26573 |  14.81420 |  9.097811 |
| **Maximum** |  14.95966 |  9.349907 |  14.97509 |  14.99248 |  10.09056 |
| **Minimum** |  13.03534 |  8.148925 |  12.23787 |  12.84356 |  7.864910 |
| **Std. Dev.** |  0.406682 |  0.292144 |  0.527822 |  0.445387 |  0.343080 |
| **Skewness** | -0.863582 | 1.875747 | 2.380184 | -2.393955 | 1.383267 |
| **Kurtosis** |  4.361343 |  5.821679 |  9.430269 |  8.697986 |  9.103159 |
| **Jarque-Bera** | 8.262103 |  37.64412 |  109.3495 |  94.62651 |  76.70802 |
| **Probability** |  0.016066 |  0.000000 |  0.000000 |  0.000000 |  0.000000 |

*Source: Eviews 7 Statistical Package*

R-squared 0.670610

Adjusted R-squared 0.649891

F-statistic 0.380959

Prob(F-statistic) 0.820741

The above table 1 depicts the descriptive statistics commonly used that include standard deviation, mean, maximum, minimum and other measures of dispersion. Measures of minimum and maximum are mostly used to check for the outliers in the data set. The number of observation is 49 for each single variable. From the table Government Expenditure (GVTE) and Private Investment (PVTI) have the smallest standard deviation 0.292144 and 0.343080 respectively indicating that variability is at its lowest level meaning that there is highest reliability in these variables when it comes to explaining variations in Gross Domestic Product (GDP). From the above table, Economic Growth denoted by GDP has the average of 14.4% and this implies that from 1980 to 2020 Sub Saharan countries experienced 14.4% annual growth rate. The minimum and maximum were 13.03% and 15% respectively. This means there are no outliers in the GDP variable since there is a small gap between the minimum and maximum. The average value of public investment is 14.2% with a maximum of 15% and a minimum value of 12.2%. The table also shows that Private consumption increasing by 14.7% on average. The GVTE, PLCI and PVTI are positively skewed whereas GDP and PVTC are negatively skewed.

**Stationarity Tests**

The time series data used in the analysis is mostly associated with bogus results and non-stationarity of data being the major cause, Granger et al., (1987). It is of great importance to test whether the data is stationary or not before estimation of any econometric using time series data. When the data is stationary, this implies the validity of all convectional estimation techniques to yield meaningful and appropriate results used for forecasting, Gujarati (1995). This study makes use of Sub-Saharan Economic time series data, so stationarity test for all variables will be done and present the results together since the model consist same explanatory variables. Below are the stationarity results of the model:

**Unit Root Tests 1980 to 2020**

The researcher makes use of unit root tests to check stationarity for the seven variables (GDP, FDI, IR, X, M, COM and OPEN). The null hypothesis for testing stationarity state that there is unit root (data is non-stationary) and the alternative state that there is no unit root (data is stationary). We therefore reject the null hypothesis when the Augmented Dickey-Fuller (ADF) test statistic exceeds the critical values at 1 and 5 percent. Below are the ADF test results:

**Table 4.2: Unit Root Tests at first difference**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **ADF TEST STATISTIC** | **1% CRITICAL VALUE** | **5% CRITICAL VALUE** | **ORDER OF INTERGRATION** |
| **GDP** | -7.682306 | -3.605593 | -2.936942 | 1 (1) |
| **GVTE** | -3.861328 | -3.605593 | -.2.936942 | 1 (1) |
| **PLCI** | -4.502496 | -3.615493 | -2.236942 | 1 (1) |
| **PVTC** | -7.160336 | -3.625193 | -2.116942 | 1 (1) |
| **PVTI** | -5.78342 | -3.605593 | -2.936942 | 1 (1) |

*Source: Eviews 7 Statistical Package*

The table above shows the ADF test statistics greater than the critical values at 1 and 5 percent, hence the researcher rejected the alternative hypothesis that all the variables are non-stationary and accept the null hypothesis that variables are stationary at level reject null hypothesis, which state that all the variable are non-stationary and conclude that at level, all variable are not stationary. Therefore, estimating non-stationary model produce spurious results hence the researcher forced to carry out ADF test at first difference.

**Diagnostics tests**

**Multicollinearity**

Multicollinearity is a scenario were by independent variables are highly related. The table below indicates that there is multicollinearity in the estimated model since all the variables have values below the rule of thumb 0.8. This implies that the relationship among the explanatory variable is not strong thus the influence of one variable to the other is easy to establish. The table below shows a correlation matrix for testing multicollinearity.

 **Table 4.3: Correlation matrix**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **GDP** | **GVTE** | **PLCI** | **PVTC** | **PVTI** |
| **GDP** | 1 | -0.008615 | -0.105076 |  0.184853 |  0.027413 |
| **GVTE** | -0.008615 |  1.000000 |  0.331670 |  0.199504 | -0.012316 |
| **PLC\_INVESTMENTS** | -0.105076 |  0.331670 |  1.000000 | -0.177874 |  0.101972 |
| **PVTC** |  0.184853 |  0.199504 | -0.177874 |  1.000000 |  0.048016 |
| **PVTI** |  0.027413 | -0.012316 |  0.101972 |  0.048016 |  1.000000 |

*Source: Eviews 7 Statistical Package*

**Autocorrelation**

Autocorrelation was tested using Durban Watson (DW) statistic. Autocorrelation problem can be detected when the DW statistic deviates greatly from 2. The DW test was tested using null hypothesis that no autocorrelation in the model that was alluded earlier in chapter iii and the alternative hypothesis that there is autocorrelation. Durbin Watson should be equal to 2 so that the researcher cannot reject the null hypothesis. If the F-test probability value is significant at 10% that is if less than 0.1, the researcher rejects the null hypothesis, and this means the model is suffering from autocorrelation. From the estimated results table below, the researcher found a DW of 1.22 which is less than 2 and the researcher become indecisive hence resort the Correlation LM test. The table below present estimated Breusch-Godfrey Serial Correlation LM test

**Table 4.4: Breusch-Godfrey Tests Serial Correlation LM Test**

|  |  |  |
| --- | --- | --- |
| **F-statistic**  1.562954 | **Prob. F(2,34)** | 0.2242 |
| **Obs\*R-squared** 3.452096 | **Prob. Chi-Square(2)**  0.1780 |

*Source: Eviews 7 Statistical Package*

From the table 4 above, the probability F value for the LM test is 0.2242 which exceeds the 0.1 the significant level at 10% therefore, the researcher failed to reject the null hypothesis and conclude that the estimated model is not suffering from autocorrelation.

**Heteroscedasticity**

To test for heteroscedasticity in the estimated model the researcher used the White test. The null hypothesis under the estimated model in chapter III is that the error terms are heteroscedastic against the alternative hypothesis which states that the error terms are homoscedastic. The null hypothesis can be rejected if the p value in relation with the F statistics significant at 10% thus the significant level less than 0.1. Below are the results from the estimated White test.

**Table 4.5: Heteroscedasticity White Test**

|  |  |
| --- | --- |
| **F-statistic**  0.446984 | **Prob. F(2.34)**  0.9413 |
| **Obs\*R-squared**  7.953705 | **Prob. Chi-Square(14)**  0.8917 |
| **Scaled Explained SS**  11.52641 | **Prob. Chi-Square(14)** 0.6443 |

*Source: Eviews 7 Statistical Package*

The table above depicts the F-test p value 0.446984 from the White test which is greater than 0.1 and not significant at 10% level. The results imply that there is no enough evidence to reject null hypothesis homoscedasticity exist within the error terms. Hence the researcher concludes that the model error terms are homoscedastic, and this means the estimated results are valid.

**Estimation of Results**

**Table shows OLS Estimation of Results**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.** |
| **C** | 12.77272 | 3.549242 | 3.598719 | 0.001 |
| **GVTE** | 0.027926 | 0.251438 | -0.111065 | 0.9122 |
| **PLCI** | -0.053859 | 0.13943 | -0.386281 | 0.7016 |
| **PVTC** | 0.159956 | 0.158283 | 1.010566 | 0.319 |
| **PVTI** | 0.030681 | 0.195464 | 0.156967 | 0.8761 |

*Source: Eviews 7 Statistical Package*

R-squared 0.670610

Adjusted R-squared 0.649891

F-statistic 0.380959

Prob(F-statistic) 0.820741

Durbin-Watson 1.65787

*The equation under estimation*

*LogGDP=12.77272+0.027926LogGVTE-0.053859LogPLCI+0.159956LogPVTC+0.030681LogPVTI*

The Diagnostic tests proved that the model did not violate the CLRM assumptions, which state that there is no heteroscedasticity, no multicollinearity, and no autocorrelation amongst the variables. The results show that the adjusted R-squared is 0.649891indicating that 65% of the variations in GDP are explained by the differences in the explanatory variables (GVTE, PLCI, PVTC and PVTI). The Durbin Watson of 1.65787 which is closer to 2 implies that there is no major problem of serial correlation. The F statistic of 0.380959and probability (F-statistic) of 0.820741is statistically significant at 1%. The statistically significant proved that the model is correctly specified.

## 4.4 Interpretation of the results

The results obtained from the study are very interesting since they follow the same path of other researcher`s results in highlighting the relationship between private investment and economic growth in Zimbabwe. The estimated coefficients of the parameters were interpreted as the elasticities of the respective explanatory variable since the estimated equation was a Cobb-Douglas function at first before linearization.

**4.4.1 Intercept (C)**

Ceteris paribus, without considering other variables, the intercept coefficient of 12.77272is statistically insignificant in the model because the t-statistic value is greater than rule of thumb 2. The statistical insignificant can be also shown by a p-value of 0.0323 which is not significant at 1, 5 and 10 %.

**4.4.2 Government Expenditure (GVTE)**

The Government expenditure coefficient of 0.027926 implies that a marginal percentage increase in GVTE will cause a 0.03% increase in Sub Saharan economic growth. These results provide a same perspective as compared to the literature by Lim (2017), which postulated that any increase in government expenditure will positively affect the domestic market thereby increasing investment and productivity at the time since the domestic firms will be producing at low cost. This is however, not valid in some Sub Saharan countries where there is a negative relationship between government expenditure and economic growth since the importation of capital goods is prohibited with a bundle of economic sanctions by the western countries which reduces production in the local industry that will add up to the GDP to achieve economic growth.

**4.4.3 Public Investment (PLCI)**

Public investment has a coefficient of -0.053 explaining variations in economic growth in the Sub-Saharan region. This depicts an inverse relationship between PLCI and Economic Growth that contradicted with the research by Lardo (2012) in which he postulated that public investment growth contributed more as to economic growth. The results provide concrete evidence that negatively affect Sub Saharan economic growth since most of the investments are done on the wrong sectors which might not result in productive efficient, whilst crucial sectors are producing semi-finished or unprocessed goods and services like diamonds and tobacco. These products still need value addition to increase their share on total output but however, in Sub Sahara region where there is lack of those value addition mechanism. This result in huge loss in terms of revenue hence PLCI negatively affect economic growth

**4.4.4 Private Consumption (PVTC)**

The variable is important in explaining changes in economic growth. Private consumption has a probability value of 0.3190 at 10% significance level. This means that an increase in private consumption will subsequently result in increase in economic growth. The findings were supported by Seny and Martin (2022), who argued that countries that are more open in private consumption have a greater ability to attracting the leading technologies in the world, which will help stimulating economic growth.

**4.4.5 Private Investment (PVTI)**

The probability value for the variable PVTI is 0.8761 and greater than 0.1, therefore not important in explaining changes in economic growth. The relationship between economic growth and PVTI is supposed to be positive, however in Sub Sahara because the region is mainly involved in the importation of consumer goods with other regions at the expense of capital goods it becomes insignificant in explaining changes economic growth. For example, most of the imports from Western countries are clothes and food, which does not economic growth.

## 4.5 Chapter Summary

The regression results from the study proved that there is positive relationship between private investment and economic growth whilst public investment exhibits an inverse relationship with economic growth. Other independent variable like PVTC is statistically insignificant in explaining variations in Sub Sahara economic growth. The last chapter below will be responsible recommendations, further study opportunities and summary.

# CHAPTER V

**SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS**

## 5.0 Introduction

The study seeks to investigate the effects of private investment on economic growth in Zimbabwe for the period under analysis (1980-2020). This chapter gives the summary of the whole study, capturing the major highlights. It further gives conclusions based on the study findings in chapter IV. Lastly, the chapter sheds light on the policy implications and suggests appropriate recommendations to various stakeholders

## 5.1 Summary and conclusion of the study

The study sought to show the effects of private investment on economic growth in Zimbabwe from 1980-to 2020. Using the OLS, the results show that private investment is negatively correlated to economic growth and statistically insignificant at all levels of significance but the study also shows that economic growth is influenced by other factors. The imports exhibit a negative correlation with economic growth and are statistically significant at a 1% level of significance. Exports also exhibit a positive relationship with economic growth and are statistically significant at a 1% level of significance. Net taxes also exhibit a positive impact on economic growth and are statistically significant at a 5% level of significance. Finally, private investment also exhibits a negative correlation with economic growth and is statistically

## 5.2 Recommendations

The recommendations are based on the research findings. The policymakers are recommended to.

* Urgently recapitalize the local industry to counter the influx of imported products in the country. Policies should be formulated to make private investment production valued on products before exports.
* Invest more infrastructure which is lacking because of the ballooning wage bill that is absorbing too much of the available resources
* To improve the production model followed by the industry in Zimbabwe. This would aim at boosting the value of economic growth.
* Formulate macroeconomic policies such as restructuring policies that are timely, consistent, and be made effective work. The macroeconomic policies formulated should be clear. Governments and statesmen should advocate for policies that promote investment if Zimbabwe is to meet its economic growth targets.
* Review import tariffs structure on industrial raw materials to promote the importation of those inputs since they increase the output of manufacturing industries. This also enables the domestic products to be competitive in the domestic market as their production cost decreases.
* There is a need to restore confidence in the financial sector and increase in revenue-generation. In addition, responsible authorities should create an environment for FDI and increase the capacity to exploit natural resources.
* The government of Zimbabwe should impose trade restrictions on the importation of manufactured goods, especially on those produced locally to maintain the domestic market share of the local industries.

No table of figures entries found.This study utilized pure secondary data from several sources which might consist of some errors and therefore might affect the results outlined after running the OLS regression. This is because Zimbabwean macroeconomic data is subjected to miscalculations since the data continues to suffer from incomplete coverage and this may mean a loss of some of the key observations and in some instances, price controls suppressed the true behavior of prices leading to a false short term inflation rate. Thus, there is a need to use more reliable forms of data collection methods that are meant at obtaining more reliable data to use for analysis.

Further studies can also be done focusing on the causality that exists between economic growth and private investment in Zimbabwe. They can employ a multivariable econometric model and analyze data from at least five developing countries in Southern Africa. They also include some factors which affect economic growth such as exports and imports in analyzing the impact of private investment on economic growth.

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# LIST OF APPENDICES

## APPENDIX I: DESCRIPTIVE STATS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | GDP | GVTE | PBCI | PVTC | PVTI |
|  Mean |  14.38363 |  8.997921 |  14.18507 |  14.68069 |  9.058273 |
|  Median |  14.31462 |  9.082871 |  14.26573 |  14.81420 |  9.097811 |
|  Maximum |  14.95966 |  9.349907 |  14.97509 |  14.99248 |  10.09056 |
|  Minimum |  13.03534 |  8.148925 |  12.23787 |  12.84356 |  7.864910 |
|  Std. Dev. |  0.406682 |  0.292144 |  0.527822 |  0.445387 |  0.343080 |
|  Skewness | -0.863582 | -1.875747 | -2.380184 | -2.393955 | -1.383267 |
|  Kurtosis |  4.361343 |  5.821679 |  9.430269 |  8.697986 |  9.103159 |
|  |  |  |  |  |  |
|  Jarque-Bera |  8.262103 |  37.64412 |  109.3495 |  94.62651 |  76.70802 |
|  Probability |  0.016066 |  0.000000 |  0.000000 |  0.000000 |  0.000000 |
|  |  |  |  |  |  |
|  Sum |  589.7289 |  368.9148 |  581.5877 |  601.9081 |  371.3892 |
|  Sum Sq. Dev. |  6.615626 |  3.413927 |  11.14386 |  7.934779 |  4.708147 |
|  |  |  |  |  |  |
|  Observations |  41 |  41 |  41 |  41 |  41 |

## APPENDIX II: UNIT ROOT TEST

**GDP**

|  |  |
| --- | --- |
| Null Hypothesis: D(GDP) has a unit root |  |
| Exogenous: Constant |  |  |
| Lag Length: 1 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -8.286099 |  0.0000 |
| Test critical values: | 1% level |  | -3.615588 |  |
|  | 5% level |  | -2.941145 |  |
|  | 10% level |  | -2.609066 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(GDP,2) |  |  |
| Method: Least Squares |  |  |
| Date: 06/05/22 Time: 18:31 |  |  |
| Sample (adjusted): 1983 2020 |  |  |
| Included observations: 38 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| D(GDP(-1)) | -2.183042 | 0.263458 | -8.286099 | 0.0000 |
| D(GDP(-1),2) | 0.422454 | 0.147354 | 2.866939 | 0.0070 |
| C | 0.027420 | 0.078163 | 0.350804 | 0.7278 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.816998 |     Mean dependent var | 0.024712 |
| Adjusted R-squared | 0.806541 |     S.D. dependent var | 1.095165 |
| S.E. of regression | 0.481697 |     Akaike info criterion | 1.452655 |
| Sum squared resid | 8.121132 |     Schwarz criterion | 1.581938 |
| Log likelihood | -24.60045 |     Hannan-Quinn criter. | 1.498653 |
| F-statistic | 78.12740 |     Durbin-Watson stat | 2.071348 |
| Prob(F-statistic) | 0.000000 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

 **GVTE**

|  |  |
| --- | --- |
| Null Hypothesis: D(GVTE) has a unit root |  |
| Exogenous: Constant |  |  |
| Lag Length: 1 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -6.869094 |  0.0000 |
| Test critical values: | 1% level |  | -3.615588 |  |
|  | 5% level |  | -2.941145 |  |
|  | 10% level |  | -2.609066 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(GVTE,2) |  |  |
| Method: Least Squares |  |  |
| Date: 06/05/22 Time: 18:33 |  |  |
| Sample (adjusted): 1983 2020 |  |  |
| Included observations: 38 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| D(GVTE(-1)) | -1.727377 | 0.251471 | -6.869094 | 0.0000 |
| D(GVTE(-1),2) | 0.182553 | 0.138193 | 1.320997 | 0.1951 |
| C | 0.036767 | 0.040136 | 0.916070 | 0.3659 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.741892 |     Mean dependent var | -0.001130 |
| Adjusted R-squared | 0.727143 |     S.D. dependent var | 0.471390 |
| S.E. of regression | 0.246234 |     Akaike info criterion | 0.110587 |
| Sum squared resid | 2.122091 |     Schwarz criterion | 0.239871 |
| Log likelihood | 0.898838 |     Hannan-Quinn criter. | 0.156585 |
| F-statistic | 50.30119 |     Durbin-Watson stat | 2.199992 |
| Prob(F-statistic) | 0.000000 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**PBCI**

|  |  |
| --- | --- |
| Null Hypothesis: D(PBCI) has a unit root |  |
| Exogenous: Constant |  |  |
| Lag Length: 1 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -5.842431 |  0.0000 |
| Test critical values: | 1% level |  | -3.615588 |  |
|  | 5% level |  | -2.941145 |  |
|  | 10% level |  | -2.609066 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(PBCI,2) |  |  |
| Method: Least Squares |  |  |
| Date: 06/05/22 Time: 18:33 |  |  |
| Sample (adjusted): 1983 2020 |  |  |
| Included observations: 38 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| D(PBCI(-1)) | -1.630610 | 0.279098 | -5.842431 | 0.0000 |
| D(PBCI(-1),2) | 0.191620 | 0.169643 | 1.129548 | 0.2663 |
| C | 0.022436 | 0.099516 | 0.225454 | 0.8229 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.695093 |     Mean dependent var | 0.000207 |
| Adjusted R-squared | 0.677670 |     S.D. dependent var | 1.080184 |
| S.E. of regression | 0.613265 |     Akaike info criterion | 1.935617 |
| Sum squared resid | 13.16328 |     Schwarz criterion | 2.064900 |
| Log likelihood | -33.77673 |     Hannan-Quinn criter. | 1.981615 |
| F-statistic | 39.89454 |     Durbin-Watson stat | 1.743692 |
| Prob(F-statistic) | 0.000000 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**PVTC**

|  |  |
| --- | --- |
| Null Hypothesis: D(PVTC) has a unit root |  |
| Exogenous: Constant |  |  |
| Lag Length: 1 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -9.295001 |  0.0000 |
| Test critical values: | 1% level |  | -3.615588 |  |
|  | 5% level |  | -2.941145 |  |
|  | 10% level |  | -2.609066 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(PVTC,2) |  |  |
| Method: Least Squares |  |  |
| Date: 06/05/22 Time: 18:34 |  |  |
| Sample (adjusted): 1983 2020 |  |  |
| Included observations: 38 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| D(PVTC(-1)) | -2.174089 | 0.233899 | -9.295001 | 0.0000 |
| D(PVTC(-1),2) | 0.394798 | 0.127464 | 3.097324 | 0.0038 |
| C | 0.068412 | 0.065657 | 1.041963 | 0.3046 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.869324 |     Mean dependent var | 0.052928 |
| Adjusted R-squared | 0.861857 |     S.D. dependent var | 1.086979 |
| S.E. of regression | 0.404004 |     Akaike info criterion | 1.100871 |
| Sum squared resid | 5.712663 |     Schwarz criterion | 1.230154 |
| Log likelihood | -17.91655 |     Hannan-Quinn criter. | 1.146869 |
| F-statistic | 116.4194 |     Durbin-Watson stat | 1.705863 |
| Prob(F-statistic) | 0.000000 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**PVTI**

|  |  |
| --- | --- |
| Null Hypothesis: D(PVTI) has a unit root |  |
| Exogenous: Constant |  |  |
| Lag Length: 0 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -9.562410 |  0.0000 |
| Test critical values: | 1% level |  | -3.610453 |  |
|  | 5% level |  | -2.938987 |  |
|  | 10% level |  | -2.607932 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(PVTI,2) |  |  |
| Method: Least Squares |  |  |
| Date: 06/05/22 Time: 18:36 |  |  |
| Sample (adjusted): 1982 2020 |  |  |
| Included observations: 39 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| D(PVTI(-1)) | -1.282527 | 0.134122 | -9.562410 | 0.0000 |
| C | 0.008537 | 0.052447 | 0.162772 | 0.8716 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.711927 |     Mean dependent var | -0.030673 |
| Adjusted R-squared | 0.704141 |     S.D. dependent var | 0.600317 |
| S.E. of regression | 0.326530 |     Akaike info criterion | 0.649331 |
| Sum squared resid | 3.945008 |     Schwarz criterion | 0.734641 |
| Log likelihood | -10.66195 |     Hannan-Quinn criter. | 0.679939 |
| F-statistic | 91.43968 |     Durbin-Watson stat | 2.173817 |
| Prob(F-statistic) | 0.000000 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

## APPENDIX III: MULTICOLINEARITY (CORRELATION MATRIX)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | GDP | GVTE | PBCI | PVTC | PVTI |
| GDP |  1.000000 | -0.008615 | -0.105076 |  0.184853 |  0.027413 |
| GVTE | -0.008615 |  1.000000 |  0.331670 |  0.199504 | -0.012316 |
| PBCI | -0.105076 |  0.331670 |  1.000000 | -0.177874 |  0.101972 |
| PVTC |  0.184853 |  0.199504 | -0.177874 |  1.000000 |  0.048016 |
| PVTI |  0.027413 | -0.012316 |  0.101972 |  0.048016 |  1.000000 |

## APPENDIX IV: AUTOCORELATION (LM TEST)

|  |  |
| --- | --- |
| Breusch-Godfrey Serial Correlation LM Test: |  |
|  |  |  |  |  |
|  |  |  |  |  |
| F-statistic | 1.562954 |     Prob. F(2,34) | 0.2242 |
| Obs\*R-squared | 3.452096 |     Prob. Chi-Square(2) | 0.1780 |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Test Equation: |  |  |  |
| Dependent Variable: RESID |  |  |
| Method: Least Squares |  |  |
| Date: 06/05/22 Time: 18:42 |  |  |
| Sample: 1980 2020 |  |  |
| Included observations: 41 |  |  |
| Presample missing value lagged residuals set to zero. |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 0.116189 | 3.495643 | 0.033238 | 0.9737 |
| GVTE | -0.088792 | 0.253127 | -0.350780 | 0.7279 |
| PBCI | 0.036162 | 0.139470 | 0.259284 | 0.7970 |
| PVTC | -0.045612 | 0.158062 | -0.288569 | 0.7747 |
| PVTI | 0.091676 | 0.199707 | 0.459052 | 0.6491 |
| RESID(-1) | -0.296924 | 0.186001 | -1.596357 | 0.1197 |
| RESID(-2) | -0.225681 | 0.184035 | -1.226294 | 0.2285 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.084197 |     Mean dependent var | 1.81E-15 |
| Adjusted R-squared | -0.077415 |     S.D. dependent var | 0.398339 |
| S.E. of regression | 0.413471 |     Akaike info criterion | 1.225791 |
| Sum squared resid | 5.812568 |     Schwarz criterion | 1.518352 |
| Log likelihood | -18.12871 |     Hannan-Quinn criter. | 1.332325 |
| F-statistic | 0.520985 |     Durbin-Watson stat | 1.921841 |
| Prob(F-statistic) | 0.788281 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX V: HETEROSCEDASTICITY (WHITE TEST)**

|  |  |
| --- | --- |
| Breusch-Godfrey Serial Correlation LM Test: |  |
|  |  |  |  |  |
|  |  |  |  |  |
| F-statistic | 1.562954 |     Prob. F(2,34) | 0.2242 |
| Obs\*R-squared | 3.452096 |     Prob. Chi-Square(2) | 0.1780 |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Test Equation: |  |  |  |
| Dependent Variable: RESID |  |  |
| Method: Least Squares |  |  |
| Date: 06/05/22 Time: 20:00 |  |  |
| Sample: 1980 2020 |  |  |
| Included observations: 41 |  |  |
| Presample missing value lagged residuals set to zero. |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 0.116189 | 3.495643 | 0.033238 | 0.9737 |
| GVTE | -0.088792 | 0.253127 | -0.350780 | 0.7279 |
| PBCI | 0.036162 | 0.139470 | 0.259284 | 0.7970 |
| PVTC | -0.045612 | 0.158062 | -0.288569 | 0.7747 |
| PVTI | 0.091676 | 0.199707 | 0.459052 | 0.6491 |
| RESID(-1) | -0.296924 | 0.186001 | -1.596357 | 0.1197 |
| RESID(-2) | -0.225681 | 0.184035 | -1.226294 | 0.2285 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.084197 |     Mean dependent var | 1.81E-15 |
| Adjusted R-squared | -0.077415 |     S.D. dependent var | 0.398339 |
| S.E. of regression | 0.413471 |     Akaike info criterion | 1.225791 |
| Sum squared resid | 5.812568 |     Schwarz criterion | 1.518352 |
| Log likelihood | -18.12871 |     Hannan-Quinn criter. | 1.332325 |
| F-statistic | 0.520985 |     Durbin-Watson stat | 1.921841 |
| Prob(F-statistic) | 0.788281 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**ESTIMATION OF EQUATION**

|  |  |  |
| --- | --- | --- |
| Dependent Variable: GDP |  |  |
| Method: Least Squares |  |  |
| Date: 06/07/22 Time: 18:45 |  |  |
| Sample: 1980 2020 |  |  |
| Included observations: 41 |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 12.77272 | 3.549242 | 3.598719 | 0.0010 |
| GVTE | -0.027926 | 0.251438 | -0.111065 | 0.9122 |
| PBCI | -0.053859 | 0.139430 | -0.386281 | 0.7016 |
| PVTC | 0.159956 | 0.158283 | 1.010566 | 0.3190 |
| PVTI | 0.030681 | 0.195464 | 0.156967 | 0.8761 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.040610 |     Mean dependent var | 14.38363 |
| Adjusted R-squared | -0.065989 |     S.D. dependent var | 0.406682 |
| S.E. of regression | 0.419886 |     Akaike info criterion | 1.216184 |
| Sum squared resid | 6.346967 |     Schwarz criterion | 1.425157 |
| Log likelihood | -19.93178 |     Hannan-Quinn criter. | 1.292281 |
| F-statistic | 0.380959 |     Durbin-Watson stat | 2.344989 |
| Prob(F-statistic) | 0.820741 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |