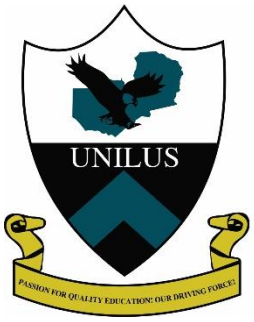

UNIVERSITY OF LUSAKA

School of Postgraduate Studies

Master of Science in Economics and Finance

AN INVESTIGATION OF THE RELATIONSHIP BETWEEN POPULATION GROWTH AND ECONOMIC GROWTH IN ZAMBIA (1970-2021)

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Declaration

I, Tito Manseli, hereby declare that this thesis is my own work. It has not been submitted before for any other degree or examination at this or any other university.

Student Signature: 

Date: March 20, 2024

Supervisor:

I recommend~~/ do not recommend~~ this dissertation for submission for examination

Mwata L Chisha, PhD:

Signed: 

Date: March 20, 2024

Dedication

This work is dedicated to my wife and children. I would want to express my heartfelt gratitude to my wife, Joyce Mutunda, for her steadfast support and boundless affection throughout my spiritual, social, professional, and academic pursuits. A heartfelt tribute to my two sons, Izu and Nkuli, my little children. I hope you have the opportunity to view this work once you reach an age where you can fully comprehend the academic endeavours your father was engaged in your early years as you were preoccupied with cartoons and toys.

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List of Acronyms and Abbreviations

7NDP	Seventh National Development Plan
8NDP	Eighth National Development Plan
AIC	Alkaike Information Criterion
ARDL	Autoregressive Distributed Lag
ADF	Augmented Dickey-Fuller Test
CSO	Central Statistics Office
ECM	Error Correction Model
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
MOE	Ministry of Education
MOF	Ministry of Finance
MoFNP	Ministry of Finance and National Planning
MNDP	Ministry of National Development Planning
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least of Squares
UN	United Nations
Zamstats	Zambia Statistics Agency

Abstract

The population of Zambia has experienced a significant increase, with the country's population going from 4.1 million in 1969 to a remarkable 19.6 million people in 2022. This represents a significant increase in the country's demographic landscape. During this time period, the economy of Zambia has experienced extraordinary growth, with the real gross domestic product (GDP) skyrocketing from roughly 1.8 billion USD in 1970 to approximately 22.2 billion USD in 2021. These notable developments point to the possibility of a connection between the changes in Zambia's population and the country's economic growth. Against this backdrop, the research endeavoured to investigate the correlation between population growth and economic development in Zambia, employing annual time series data spanning from 1970 to 2021 and employing a comprehensive analytical toolkit that encompasses the autoregressive distributed lag model, the Dickey-Fuller Generalised least squares unit root test, the Phillips Perron test, and the error correction model.

A number of fascinating insights into the dynamics at play are revealed by the outcomes of the investigation. There are some variables that exhibit stationarity at their initial levels, whereas there are others that only demonstrate stationarity when evaluating changes between consecutive observations. Over the course of both the short and the long run, the Autoregressive Distributed Lag bound test highlights the existence of a discernible relationship among the variables. It is important to note that the long-term research indicates that inflation and foreign direct investment have a favourable influence on the pace of growth of the domestic product. On the other hand, the age dependency ratio and the average growth rate of the population are both related with a negative impact on the growth rate of the gross domestic product. In spite of these tendencies that have been detected, the findings do not reach the level of statistical significance required for a confidence level of 5%. Thus, the analysis does not produce any strong statistical evidence to support the hypothesis that there is a causal connection between the growth of Zambia's economy and the country's growing population. This sophisticated view highlights the necessity of having a full understanding of the complex dynamics that are influencing the economic landscape of Zambia.

Keywords: Economic Growth; Population Growth; ARDL; Cointegration; and Correlation.

CHAPTER ONE

1.0 Introduction

The correlation between population and economic growth is multifaceted. Population growth can exert strain on natural resources and the environment, hence impeding economic growth. However, it is important to note that population growth can also result in several positive outcomes, such as enhanced specialisation, heightened human capital, and breakthroughs in technology. These factors collectively have the potential to significantly contribute to overall economic growth. Hence, the discourse around the correlation between population expansion and economic growth can be categorised into three primary perspectives: pessimists, optimists, and neutralists (Mamingi & Perch, 2013).

The proponents of the pessimistic viewpoint contend that the expansion of population exerts a deleterious influence on the trajectory of economic progress. The pessimists argue that the growth of the population places significant strain on natural resources and the environment, which can lead to unequal distribution of wealth and a decrease in total welfare (Bongaarts, 1996; Cropper & Griffith, 1994). Conversely, proponents of the optimist perspective assert that economic growth is a result of population growth. The optimists contend that a growing population may result in greater specialisation, enhanced human capital, and technological innovation, all of which could support economic growth and expansion (Barro, 2001; Kuznets, 1973). Finally, advocates of the neutralist viewpoint argue that the relationship between population expansion and economic growth is complex, with few empirical evidences suggesting a direct causal link between these two factors (Bloom & Freeman, 1988; Bloom et al., 2003; Gallup et al., 1998; Thornton, 2001).

The relationship between population growth and economic development therefore continues to be a complex and controversial topic in the field of development economics. The absence of a clear agreement regarding the connection between population increase and economic development requires a more thorough investigation to understand the intricacies inherent in this relationship. This study examined the complex relationship between population growth and economic development, with a specific focus on Zambia.

Within the realm of economic development, the intricate connection between population dynamics and economic growth presents numerous complex obstacles and potential advantages. The discussion on this subject is characterised by a variety of perspectives, with certain ideologies promoting the beneficial influence of an increasing population on economic well-being, while others highlight potential drawbacks linked to uncontrolled demographic growth as highlighted above. Due to the complex and ever-changing nature of these relationships, there is a significant lack of understanding in the current body of knowledge that requires further examination. The inadequacy of empirical evidence and divergent opinions in existent studies requires a systematic and concentrated investigation into the possible connections between population expansion and economic progress.

This study therefore aimed at enhancing the current body of knowledge by conducting a thorough investigation with special focus on Zambia. The selection of Zambia as a case study was deliberate, given the country's significant population growth rate and the potential consequences for its economic path. This study analysed demographic and economic data to uncover the intricate connections and reveal the fundamental patterns and trends that shape the interaction between population increase and economic development in Zambia.

The study utilised quantitative research methodologies, employed statistical analyses, and economic modelling to obtain reliable and nuanced insights. The study's results are anticipated to offer policymakers, academics, and practitioners a more elaborate comprehension of the interrelationships between population dynamics and economic growth in Zambia. In essence, the research aimed to add to the current discussion on economic development by promoting decision-making based on solid information and providing insights for methods that encourage sustainable and equitable growth in the context of population growth.

1.1 Background to the study

1.1.1 Overview of Demographic Trends in Zambia

The demographic transition and economic development exhibit strong interdependence in the trajectory of a nation's advancement. The phenomenon of economic growth exerts a significant impact on individuals' decision-making processes and the range of possibilities available to them. Consequently, this influence extends to the rates of both births and deaths, ultimately shaping the demographic composition and overall population size of a given country. On the other hand, demographic shifts have implications for economic growth through multiple avenues, including but not limited to education, labour force engagement, job prospects, and income inequalities. The alterations being made possess the capacity to impact the structure of the labour market in an economy (Becker et al., 1990).

Zambia continues to grapple with the task of expediting its demographic transition, as it has encountered a sluggish decline in fertility rates, particularly in rural regions. In 2018, the total fertility rate in rural areas stood at 5.8, a decrease from 7.4 in 1992 (Zambia Statistics Agency [Zamstats] et al., 2019). In contrast, Zamstats reports that urban areas experienced a decline from 5.8 to 3.4 during the same period. Zamstats further reports that the limited educational attainment among women emerges as a significant determinant contributing to the sluggish fall in fertility rates in Zambia over the reference period. Despite the country's notable accomplishment of attaining near universal primary school enrolment rates for both genders, the net enrolment rate for secondary education remains remarkably low, at 38% in 2020 (Ministry of Education [MOE], 2021). MOE further reports that 32% of those who are enrolled in secondary school successfully finish the final grade.

In addition, the substantial occurrence of adolescent pregnancies and child marriages, which were both documented at a rate of 29% in 2018, has also played a role in impeding the gradual decrease in fertility rates in Zambia (Zamstats et al., 2019). Evidence indicates that postponing marriage and childbearing by a period of five years can exert a significant influence on decelerating population growth by about 15% to 20% (Bongaarts, 2010; Bruce & Chong, 2006). Furthermore, extending the duration of females' education by one year has been found to correlate with a notable rise in salaries, ranging from 10% to 20% (Levine, 2008).

In Zambia, mortality trends show a declining pattern, where adult mortality dropped from 573 deaths per 1000 adult population in 1992 to 271 deaths per 1000 persons in 2018 (Zamstats et al., 2019). Zamstats further reports that age-disaggregated mortality has also declined. As a result of declining mortality, in 2021, life expectancy at birth was estimated at 58.2 years for females and 53.3 years for males (Zamstats, 2021).

1.1.2 Zambia's Demographic Transition and Demographic Dividend Potential

The possible dynamic relationship that exists between a country's demographic shift and its economic development is an essential component of that nation's progress. The growth of the economy has an effect on the choices and opportunities available to individuals, which in turn has an effect on the birth and death rates, which in turn determine the demographic structure and population size of a nation. On the other hand, demographic shifts have an impact on economic growth through various social and economic factors (Becker et al., 1990).

The term "demographic dividend" refers to the increase in economic production that occurs as a consequence of a low dependence ratio and a larger productive population within a particular age period, which is commonly between the ages of 15 and 64 (African Union, 2017). At the beginning of the year 2015, Zambia carried out her first ever demographic dividend study with the purpose of assessing the potential for economic and human growth in the country over the short, medium, and long term. Through the use of this study, Zambia was able to align herself with the Vision 2030 target of being a prosperous middle-income nation (Ministry of Finance [MOF], 2015). This study provided essential information that was indispensable for the development of effective policies and programmes.

Nevertheless, Zambia is still confronted with the problem of accelerating its demographic transition, particularly in light of the gradual drop in fertility patterns that has been observed, particularly in rural areas. Increasing the speed at which this transition occurs could hasten the demographic dividend and increase the benefits it provides. It is vital that actions such as reducing infant mortality and hunger, pushing for female education and gender justice, challenging social and cultural norms connected to fertility, preventing child marriage, and

extending comprehensive family planning programmes be taken in order to accomplish this goal (African Union, 2017).

It is possible for the changing age structure of the population to have a substantial impact on economic growth and development. This can have an effect on the equilibrium of benefits and costs associated with population change, as well as the realisation of the demographic dividend. Countries with younger populations, such as Zambia, are mandated to place a higher priority on investments in the health and education of children, whereas countries with an ageing population are confronted with issues relating to the growing responsibilities of pensions. Zambia's ability to maximise its economic potential by optimising its legal and market systems and investing in human capital is a critical factor in determining whether or not the country would be able to achieve the demographic dividend (MOF, 2015).

1.1.3 Population and Development in Zambia

Zambia experienced a notable annual population growth rate of 3.4% between the years 2010 and 2022 (Zamstats, 2022). This placed Zambia among the countries with one of the highest population growth rates worldwide. Zamstats further reports that Zambia has experienced exponential growth, increasing from 4.1 million individuals in 1969 to 19.6 million individuals in 2022. The continuous high annual population growth rates of the country have been ascribed to the interplay of demographic variables, specifically fertility, mortality, and migration (Ministry of National Development Planning [MNDP], 2019).

In order to achieve sustainable development, one must take a sophisticated strategy that strikes a careful balance between the dynamics of population growth and the imperative of socioeconomic advancement. It is therefore essential to have a complete grasp of population dynamics in order to properly implement policies that support socioeconomic advancement. This is because of the numerous correlations that exist between population characteristics and development results.

A position that is largely acknowledged among policymakers and scholars emphasises the significance of ensuring that the rate of economic growth in a nation is greater than the rate of population growth in order to achieve sustainable and long-term socio-economic development

(MNDP, 2019). According to this point of view, the equilibrium that exists between economic and demographic elements is one of the most important factors in determining the path that a country's development will take.

In essence, the cornerstone for a comprehensive approach to sustainable development is the delicate balance that exists between the dynamics of the population and the progress that has been made in socioeconomic conditions. This allows policymakers to build informed plans that contribute to the main objective of attaining socioeconomic development that is both long-lasting and inclusive. This is accomplished by recognising and navigating the delicate interplay that exists between the growth of the economy and the expansion of the population.

Zambia's Vision 2030, which serves as the country's first comprehensive long-term plan, includes an objective to achieve an annual population growth rate of less than 1% by the year 2030 (Ministry of Finance and National Planning [MoFNP], 2006). The objective of decreasing the pace of population growth is to ensure that population patterns are in line with sustainable socio-economic development by the year 2030. In order to accomplish this goal, a number of steps must be implemented. One such action involves the promotion of reproductive health services to encourage the adoption of smaller, more sustainable family sizes, particularly in rural regions, as outlined in the country's 8th National Development Plan (8NDP) for the period of 2022–2026 (MoFNP, 2022).

In addition, Zambia is currently implementing her third National Population Policy, 2019–2030. The objective of this policy is to incorporate population dynamics into all developmental planning processes throughout the nation (MNDP, 2019). Despite the implementation of national population policies since the establishment of the initial policy in 1989, Zambia has persistently faced a multitude of challenges in the realms of population and development.

The challenges encompass elevated poverty rates, a widening income disparity, and an increased need for social services such as education and healthcare (MoFNP, 2022). This research therefore sought to investigate the relationship between population and economic growth in Zambia.

1.2 Problem Statement

Diverse viewpoints exist regarding the intricate and complex relationship between economic development and population growth (Bongaarts, 1996; Guest & Swift, 2007; Serban, 2012). Zambia's real GDP growth rate averaged 3.7% between 2011 and 2021 while population growth rate averaged 3.4% during the same period (Zamstats, 2022). The real GDP and population growth rates deviated from the desired outcome of the Vision 2030, which aimed to achieve and maintain annual real economic growth rates ranging from 6-10% while decelerating the annual population growth rate to 1% during the stated period (MoFNP, 2006). The discrepancy between Zambia's real GDP growth rate and population growth rate, compared to the Vision 2030 targets has become a cause of concern among key stakeholders including policymakers and scholars, posing sustainability questions and challenges in effective population and development programmes in Zambia. The discrepancy observed also goes against the aspirations of the 2019 National Population Policy which seeks to achieve sustainable development, by ensuring that population growth is commensurate with socio-economic growth (MNDP, 2019).

Further, the rapid population expansion in Zambia has resulted in an increase in age dependency ratios, where there are over 90 dependents for every 100 economically active adults (Zamstats, 2019). Consequently, this phenomenon has imposed a considerable burden on both households and the public sector, as the majority of available resources are allocated towards aiding those who are not engaged in active employment and thus do not contribute to economic output. Moreover, the elevated dependency ratio has resulted in several economic consequences, such as reduced tax revenues, increased government spending, elevated tax rates, and disparities (MNDP, 2019). This is imperative and it underscores the urgency for investigations into the relationship between population growth and economic growth in Zambia. It is particularly important because scholarly research examining the precise effects of population expansion on the economic progress of Zambia is still scarce. With the absence of local research evidence and the observed trends of population and economic growth, it is unclear whether Zambia should continue pursuing policies aimed at decelerating population growth rates.

1.3 Research Objectives

1.3.1 General Objective

The overall objective of this study is to investigate the relationship between population growth and economic growth in Zambia for the period 1970 to 2021.

1.3.2 Specific Objectives

The specific objectives are to:

i. To determine the effect of the annual population growth rate on economic growth in Zambia
ii. To assess the impact of age dependence ratio on economic growth in Zambia
iii. To establish the effect of foreign direct investment on economic growth in Zambia
iv. To analyze the relationship between the inflation rate and economic growth in Zambia

1.4 Research Hypothesis

i. H_0: There is no statistically significant relationship population growth and economic growth in Zambia

   H_1: There is a statistically significant relationship between population growth and economic growth in Zambia

ii. H_0: There is no statistically significant relationship between the age dependence ratio in Zambia and economic growth in Zambia

   H_1:There is a statistically significant relationship between the age dependence ratio in Zambia and economic growth in Zambia

iii. H_0: There is no statistically significant relationship between Foreign Direct Investment Inflows and economic growth in Zambia

   H_1: There is a statistically significant relationship between Foreign Direct Investment Inflows and economic growth in Zambia

iv. H_0: There is no statistically significant relationship between the inflation rate and economic growth in Zambia

   H_1: There is a statistically significant relationship between the Inflation rate economic growth in Zambia

1.4 Justification of the Study

In alignment with the recommendations proposed by Essien (2016) and Adenola (2017), this study among other things emphasised the significance of investing in human capital to facilitate economic advancement. Despite the presence of previous studies conducted in other nations, it is crucial to conduct this investigation in Zambia due to the unique historical development, patterns of urbanisation, rates of population growth, distribution patterns, and the age and gender composition. The study also recognises the fluid nature of the potential relationship between population and economic variables and suggests that conducting this research in Zambia could provide tailored recommendations for efficiently addressing the unique demographic challenges and opportunities that Zambia may face. Zambia's distinct social, economic, and demographic characteristics makes this research particularly relevant to the nation as the findings will be more applicable to the local policy environment.

1.5 Significance of the Study

The correlation between population expansion and economic growth is a subject of considerable scholarly debate, marked by a notable absence of conclusive agreement among scholars. This study offers significant insights that can be exploited by policymakers, academia, and programme implementers. The findings of this study consequently offer practical suggestions for governmental bodies, civil organisations, and other pertinent institutions involved in the design and implementation of population and development efforts. This will ultimately contribute to the improvement of policies and programmes.

Moreover, this study undertaking, being a first endeavour to thoroughly investigate the correlation between population increase and economic development in Zambia, addresses a notable deficiency in the existing scholarly literature. Furthermore, it will function as a valuable repository for future scholarly investigations. Additionally, the outcomes of this research bears significance for other developing nations that share comparable demographic attributes to Zambia. The findings thus provide valuable perspectives on effectively addressing population increase and fostering economic development. Most importantly, the insights generated will help in the midterm review of the 2019 National Population Policy.

1.6 Scope of the Study

The primary objective of this research was to investigate the complex link that exists between the expansion of the population and the expansion of the economy, with a particular emphasis on the specific circumstances that are present in Zambia. The research utilised quantitative research approaches in order to carry out an exhaustive investigation so that it could be conducted. A foundation for the time series analysis was established through the utilisation of secondary data, which was obtained from renowned local and international agencies such as the Ministry of Finance and National Planning, the United Nations Statistics Division, the World Bank, and the Zambia Statistics Agency.

The research utilised data from 1970 – 2021. This allowed for an in-depth investigation into a variety of elements that were taken into consideration. A number of important parameters were taken into consideration, including rates of population growth, the age dependency ratio, rates of inflation, rates of foreign direct investments, and rates of GDP growth. The purpose of this research was to attempt to decipher the intricacies of the relationship between demographic shifts and economic development in the context of Zambia by diving into these essential components.

1.7 Definitions of Key Terms and Concepts

For this research, the fundamental terms and concepts will mean as follows:

1.7.1 Age structure

The relative size of specific age groups in comparison to one another, or to the population as a whole (Central Statistics Office [CSO], 2018; Crenshaw, 1997; Veron et al., 2002).

1.7.2 Economic Growth

The sustained, long-term increase in a country's capacity to produce goods and services, which is typically measured by the rise in Gross Domestic Product (Barro, 1996; Romer, 1990).

1.7.3 Gross Domestic Product

The total value of all goods and services produced within a country's borders during a specific period (Blanchard, 2012; Kuhe, 2019).

1.7.4 Population

The total number of persons in a given geographic area at a specified point in time (CSO, 2018; McFalls, 2007; Organisation for Economic Co-operation and Development [OECD], 2023).

1.7.5 Population Growth

The increase in the number of individuals in a particular population over a specified period (CSO, 2018; OECD, 2023; Preston, 2001; Obere et al., 2013).

1.7.6 Real Gross Domestic Product

An inflation-adjusted measure of the value of all goods and services produced by an economy in a given year (Befikadu, 2022).

1.7.7 Total Fertility Rate

The average number of children that would be born to a woman over her productive life (Klasen, 2007; Obere et al., 2013).

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

The purpose of this chapter is to provide a complete investigation into the intricate and controversy-filled link that exists between demographic and economic variables. The objective of doing a meticulous study is to achieve a comprehensive understanding. The analysis is carried out with the intention of identifying and addressing the gaps and shortcomings that are present in the existing body of literature discussing the association between population dynamics and economic growth. Not only does this comprehensive evaluation shed light on the limits of the existing research, but it also establishes a clear link to the overarching research problem.

Throughout the course of this investigation, the Unified Growth Theory serves as the fundamental theoretical framework that is being utilised. This overarching framework is supplemented by subordinate theoretical viewpoints, such as the Malthusian Theories, the Solow expansion Model, and the Endogenous Growth Theory. These theories contribute nuanced insights to the understanding of the relationship between population expansion and economic growth. In addition to this, a conceptual framework is offered, which is the result of an exhaustive review and synthesis of relevant theories and literature. This conceptual framework offers a systematic foundation for the subsequent empirical study, which makes it possible to conduct an in-depth investigation of the complex dynamics that are present at the confluence of demographic shifts and economic growth.

2.1 Theoretical Framework

2.1.1 The Malthusian Theory

The Malthusian theory of population, first presented by Tomas Robert Malthus in his 1798 essay "Essay on the Principle of Population," is among the earliest explanations for why population expansion negatively impacts human well-being (Malthus, 1798, 1995). Malthus contended that because the population increased more quickly than the amount of food available, it was necessary to reduce the population through various forms of suffering in order to maintain a level of population that was compatible with the total amount of food produced. This implied that the average income level, which is dependent on the rate of population growth, would only be sufficient to ensure the people's survival.

Boserup (1966) dismissed the Malthusian trap. Rather, she contended that the population will never exceed the availability of food. Boserup argued that the increase in population is either an exogenous or autonomous force that propels agricultural technological advancement. According to her, population pressure to maintain output per capita would cause the aggregate agricultural production function to eventually shift higher.

2.1.2 The Solow Growth Model

After Malthus (1798), Solow (1956), and Swan (1956) led the second phase of theoretical work on the link between population and economic output. Solow and Swan stated that population growth is a major factor in determining economic growth and that economic growth may be impeded if saving does not outpace population growth and the depreciation of human and material capital. They went on to say that technological advancements can only lead to an increase in the productivity of a certain stock of capital, which will boost economic growth.

This theory's main drawback is that technology, the engine driving growth, is exogenous, making it impossible for models to account for the most important variables influencing growth rate. Therefore, policy has no effect on the rate of economic growth. One of the theory's flaws was that Solow (1956) assumed that technical advancements were exogenous. According to Solow and Swan's thesis, population expansion and technological advancement are the two main variables that affect economic growth. The hypothesis, however, is unable to explain how technological advancement happens in this situation or how policies may encourage it.

2.1.3 Endogenous Growth Theory

The endogenous growth model, which eased the assumptions of exogenous population expansion and technical advancement, was developed in response to the limitations of the classical growth model. The endogenous growth concept holds that economic conditions and the decisions made by economic agents affect population growth and technological advancement (Romer, 1986).

The endogenous growth model's ability to distinguish between human and physical capital is one of its main advantages. Because of this duality, population increase can be directly incorporated as an endogenous component in the growth process and as a determinant of human

capital (Barro, Mankiw, and Sala-I-Martin, 1992). Therefore, the endogenous growth model expands upon the classical growth model by supposing that economic policy can affect population growth and technological advancement rather than predetermining them. This makes it possible to comprehend economic growth drivers and how to modify them to get desired results in a more complex way.

2.1.4 Unified Growth Theory

Galor introduced the unified growth theory in 2000 as a solution to the problems with endogenous and exogenous neoclassical growth models (Galor, 2012). The unified growth theory offers a unified framework for analysis of the historical shift from stagnation to growth, which takes place through a sequence of steps that nations must take on their route towards development. These stages include the majority of human history's Malthusian stagnation epoch; escaping Malthusian traps; the emergence of human capital formation during the development process; the start of the demographic transition; the beginnings of the current era of sustained economic growth; and the differences in per capita income across nations. Therefore, the theory assumes that the link between population growth and economic growth varies during economic development in an effort to reconcile the Malthusian and endogenous growth views.

The unified growth theory has its detractors, just like other growth theories in economics. It has received just as much criticism as the Malthusian theory on which it is predicated. According to Nielson (2015), statistics on global and Western European economic development run counter to the unified growth hypothesis. He continues by claiming that data on GDP per capita in the former Union of Soviet Socialist Republics (USSR) disprove the theory, implying that there was never a Malthusian trap to avoid. Instead, growth was unrestricted during the purportedly false period of stagnation. Thus, the unified growth theory's proponents' claims about theoretical stagnation and escape are false.

Nevertheless, the unified growth theory remains true despite the critiques. The issues associated with population growth in Africa lend credence to the hypothesis. Africa seems to lend more credibility to the unified growth theory than just criticisms when considered within its framework (Peter & Bakari, 2018). This is one of the key justifications for the study's adoption of the unified

growth theory as the primary theory for examining the connection between Zambia's population growth and economic expansion.

The endogenous growth theory is central to this study due to its recognition that economic growth is driven by factors internal to the economy, such as technological innovation and human capital accumulation (Peter & Bakari, 2018). Therefore, population growth can affect economic growth through several channels, including labour force growth, which can provide more workers to produce goods and services, which can boost economic growth; human capital accumulation, which can lead to increased investment in education and training, thereby improving the quality of the labour force and boosting economic growth; and technological innovation, which can accelerate technological progress and boost economic growth.

By acknowledging that internal economic variables like technological innovation and the accumulation of human capital drive economic progress, the endogenous growth theory is crucial to this research (Peter & Bakari, 2018). As a result, there are a number of ways in which population growth can influence economic growth. These include the expansion of the labour force, which can provide more people to produce goods and services and so accelerate economic growth; the accumulation of human capital, which can result in higher investments in education and training, which can improve the quality of the labour force and accelerate economic growth; and technological innovation, which can accelerate technological advancement and accelerate economic growth.

However, it is important to acknowledge that endogenous growth theory does acknowledge that insufficient investment in technical innovation and human capital could result in negative consequences of population expansion on economic growth (Peter & Bakari, 2018). Take Zambia as an example, where the population is experiencing rapid growth at an annual rate of 3.4%. This situation has the potential to put pressure on natural resources and cause environmental damage. Both of these outcomes have the potential to present difficulties and impede the overall advancement of the economy (Zamstats, 2022). Therefore, achieving a harmonious equilibrium between population expansion and the essential allocation of resources towards innovation and human capital becomes a crucial determinant of the overall influence on economic progress.

2.2 Empirical Literature

In the context of the delicate relationship that exists between population expansion and economic progress, the discourse that surrounds this relationship is characterised by complexity and disagreement. Various research efforts have produced a variety of perspectives, with some academics arguing that population expansion has a negative impact on economic growth, while others argue that there is a positive association between the two. The lack of a conclusive consensus highlights the subtle and multifaceted nature of this topic, recognising that different outcomes may emerge depending on the precise contextual factors that are present. This range of viewpoints contributes to the ongoing conversation about the interaction between demographic shifts and economic development, highlighting the necessity of conducting assessments that are both comprehensive and context-specific in order to decipher the intricacies that are inherent in this relationship.

In the midst of this intricate situation, a prevailing viewpoint from the academic literature tends to adopt an optimistic stance. The optimistic view hypothesises that population growth has a positive impact on economic development. A substantial body of research underscores the presence of a positive correlation between population and economic growth.

Savaş (2008) conducted a study aimed to examine the causal link between population increase and per capita economic growth in the central Asian economies (CAEs). The study employed the Autoregressive Distributed Lag (ARDL) approach to cointegration and discovered compelling evidence of a sustained connection between population growth and real per capita income. This finding strongly supports the premise that population increase plays a crucial role in driving economic growth.

Further, Mamingi (2013) conducted a study in Barbados that employed the ARDL approach to underscore a statistically significant and positive correlation between economic expansion and population development. The findings of this research also reveal a substantial association with population density. Similarly, the results found by Befikadu (2022) in Ethopia found the long run relationship between real gross domestic product and population size. The study findings also

showed a positive relationship between real gross domestic product and foreign direct investment exchange rate.

In spite of this, scholarly discourse continues, as contradictory findings in the literature attest. A study conducted by Afzal (2009) in Pakistan utilised ordinary least squares regression to substantiate the assertion that population growth has a detrimental effect on economic development. As a result of conducting multivariate analyses on data covering the years 1981 to 2005, it was discovered that there is a significant and negative link between the expansion of the population and indices of economic advancement. The findings of this study highlight the significant issue that is posed by the rapid population expansion in Pakistan. This growth is related with a decrease in the rate of savings and a reduction in the growth of investments.

Nevertheless, Ali's (2013) subsequent research contradicts Afzal's (2009) claim, arguing empirically that population expansion does, in fact, exert a beneficial influence on economic growth. In particular with regard to Pakistan, this presents a challenge to Afzal's position, which asserts that population growth has a detrimental effect on economic growth. Instead, it is consistent with the alternative viewpoint that suggests that population increase might not be a serious problem and might instead be able to aid economic progress. This is because there is a large labour force available, and there are advantages to labour division.

Contributing to this dialogue, research conducted by Furuoka (2009, 2012) in Thailand and the Philippines found long-term cointegrating connections and unidirectional causal links. These findings add validity to the hypothesis that population growth is driven by economic expansion. In the long run, Furuoka discovered that there is a cointegrating relationship that exists between the increase of the population and the gross domestic output in Thailand. Furthermore, it demonstrated that there is a unidirectional causation between population and GDP, which suggests that the increase in the population in Thailand functioned as a Granger-causal factor for the economic development of the country.

In addition, Furuoka discovered that there is a long-term co-integrating link between the growth of the Philippines' economy and the expansion of the country's population. Furthermore, a

unidirectional causality was established between GDP and population, which indicates that economic growth Granger-caused the population dynamics in the Philippines.

Pegou et al. (2016) extend these perspectives by establishing a reciprocal causal association and sustained equilibrium connection in a panel analysis that encompassed thirty populous nations. This conclusion is in accordance with the findings that Furuoka obtained. The results of the study suggested that there is a relationship that can be described as a maintained equilibrium between the expansion of the population and the expansion of the economy throughout the course of time. In addition, the Granger causality test indicated that there is a reciprocal causal relationship between economic growth and population expansion over the full panel of the thirty nations with the highest population.

Kidane's (2020) analysis in Ethiopia provides evidence for the population-driven economic growth theory. The study establishes the presence of co-integration among population, export, import, trade openness, government expenditure, and economic growth, with real GDP as the dependent variable. The empirical model demonstrated that population growth, export growth, and import growth have a significant positive influence on the economic growth of Ethiopia, both in the short-run and long-run. However, trade openness has a significant negative effect on economic growth, and government expenditure growth has an insignificant impact.

In his analysis of Nigeria, Essien (2016) emphasised a crucial factor, stating that while population expansion might contribute to economic advancement, the quality of the working population is more essential than the size. By utilising the Augmented Cobb-Douglas Production Function, incorporating the Solow expansion Model, and employing an error correction modelling framework, the econometric results confirmed that population expansion in Nigeria has the ability to foster economic growth. Nevertheless, it stressed that the attainment of these advantages depends not only on the sheer magnitude of the total population, but also greatly on the calibre of the population, namely the percentage that is economically productive.

Adenola (2017) supports this perspective, highlighting the significance of a knowledgeable, educated, and competent population in attaining economic success. Adenola discovered that both the exchange rate and inflation have negative impacts on GDP, but gross fixed capital formation

has a positive contribution to GDP. Furthermore, it was determined that the labour force participation rate has a beneficial effect on GDP, although its relevance remains ambiguous.

Alimi et al. (2021) introduce an additional level of intricacy by suggesting that population expansion in Nigeria can have both immediate negative repercussions and long-lasting positive outcomes, which are determined by the quality of the workforce. The results indicate a persistent correlation between population increase and economic growth in Nigeria in the long run. Furthermore, the study emphasised that the influence of population increase is more noticeable and statistically significant on the growth of long-term income than on the rise of long-term income per person. Nevertheless, in the immediate timeframe, an unfavourable consequence was noted, suggesting that population expansion has a harmful impact on economic growth within this specific era.

The investigations conducted by Kuhe (2019) and Ogunleye (2018) provide significant contributions to the literature on the positive impact of population growth on economic growth in Nigeria. Nevertheless, Ogunleye and Kuhe overlook the significance of human capital in favour of population growth alone; this oversight is remedied in earlier works by Essien (2016) and Adenola (2017), who emphasise the criticality of education and skills in the context of economic development.

The importance of human capital is emphasised by the beneficial influence of enrolling in primary school on economic development, as evidenced by Temitope (2013). Temitope conducted a study that examined how changes in population, particularly death and birth rates, affected the economic development of 35 nations in sub-Saharan Africa from 1970 to 2005. The study employed a five-year average to analyse the data. The study's results revealed a direct relationship between life expectancy and economic growth, while fertility was found to have an inverse relationship with economic growth in the sub-Saharan African (SSA) environment.

Similarly, a study conducted in Kenya found evidence of a two-way relationship between population expansion and economic growth in the Kenyan environment (Obere et al., 2013). Moreover, the analysis confirmed that the correlation between population expansion and economic growth endured as a lasting connection. The utilisation of the Vector Auto Regression

Approach (VAR) revealed a direct association between population growth and economic growth. The findings demonstrated that an increase in population not only has a favourable effect on economic growth in the short run but also has a lasting favourable effect on the country's economic progress in the long run.

Befikadu's (2022) study conducted in Ethiopia further substantiates the idea that economic progress and population expansion are intricately linked in a reciprocal manner. The econometric analysis findings from this research demonstrated a consistent correlation between population increase, economic growth, and the independent variables. Aligned with the theoretical foundation, the study found that the inflation rate has a negative long-term effect on economic growth. The population growth rate, on the other hand, was not statistically significant. However, all other variables consistently showed positive coefficients in both the short and long run.

Nyoni's (2017) research in Zimbabwe provides additional evidence supporting the notion of a positive association between population growth and economic expansion. The results of this analysis suggest a positive impact of population on Zimbabwe's economic growth. The population coefficient demonstrates a positive correlation with economic development in Zimbabwe, as seen by its statistical significance at the 1% level. This suggests that an increase in population growth within the country is associated with beneficial economic outcomes.

However, there are research that challenge this favourable correlation. Klasen's (2007) study conducted in Uganda demonstrates that population increase acts as an impediment to economic progress. The analysis suggests that Uganda can achieve significant advantages by reducing its fertility rates. Theoretical perspectives and strong empirical data suggest that the current rapid population growth significantly impedes the potential for per capita growth in Uganda. Moreover, it has a substantial impact on hindering advancements in poverty alleviation and is associated with households enduring long-term poverty and shifting into destitute circumstances.

Obere et al. (2013) sought to establish the relationship between economic growth and population growth in Kenya. Employing a Vector Auto Regression estimation technique and using annual time series data for the period 1963 to 2009. The model results indicated that population growth

and economic growths are both positively correlated and that an increase in population will impact positively on economic growth in the country. The study concludes that in Kenya population growth promotes economic growth and subsequently economic development.

The research carried out by Ali (2015) in Bangladesh and Aidi (2016) in Nigeria highlights the challenges that come from the rapid growth in population, which impedes the ability to save and invest. According to Ali (2015), the rapid increase in population in Bangladesh presents a real problem, as it results in a decrease in investment growth and a loss in the savings rate. Moreover, the influence of overseas investment and the development of exports on the economic growth of Bangladesh is negligible. In addition, Aidi (2016) revealed an inverse correlation between the fundamental variables (namely fertility, mortality, and net migration) analysed in the study and economic growth during the time under investigation.

Garza-Rodriguez et al. (2016) establish a temporal bidirectional causal link between economic progress and population in Mexico. The results suggest that, in the short term, economic expansion has a detrimental effect on population increase. However, in the long run, population has a beneficial effect on per capita GDP, and conversely, per capita GDP has a positive influence on population, indicating a mutually influential relationship between these factors. Furthermore, the Granger causality test demonstrated that there is a causal relationship between per capita GDP and population. Specifically, per capita GDP is influenced by population, and population is influenced by per capita GDP. This suggests that these two variables have a mutually reinforcing relationship.

Additionally, the research carried out by Tsen (2005) emphasises the absence of a conclusive connection between economic growth and population increase in Asian economies. The research findings suggest that the relationship between population and economic growth is complex and not easily predictable. The relationship between population expansion and economic growth can have both beneficial and detrimental effects, as economic growth can also impact population growth.

Mulok's (2011) investigation of Malaysia reveals a heightened level of complexity by highlighting the lack of a consistent relationship between economic growth and population increase. The

research unequivocally establishes the absence of a causal relationship between economic growth and population expansion. Hence, the findings of the study do not support the existence of a lasting correlation between economic growth and population expansion over an extended period of time.

Dao (2012) demonstrates a negative correlation between population growth and per capita GDP growth, highlighting the complex relationship between demographic shifts and economic development in emerging countries. Dao disclosed that the relationship between population increase and per capita GDP growth is constantly negative and linear. This negative influence becomes more noticeable when interaction terms are included in the statistical model. He contended that changes in fertility rates do not have a statistically significant impact on economic growth in emerging nations, as they just affect the age distribution of the population without addressing the dependency ratios of both the young and old. On the other hand, we may identify positive factors that contribute to economic growth by examining the relationships between the young dependence ratio, population growth, and if the average annual population growth rate is below 1.2%.

Grübler et al., (2007) establish that the ADR rate had a negative significant effect on overall production in India. Further, Adefemi (2018) assessed the main mechanisms through which demographic change may affect economic outcomes, and estimates the association between changes in the share of working-age population with per capita growth and poverty rate. An increase in the working-age population share and a reduction in the child dependency ratio are found to be associated with an increase in gross domestic product per capita growth, with similarly positive effects on poverty reduction (Marcio Cruz, 2018).

Using a panel data methodology, Fantahun (2019) investigates the effect of demographic expansion on the economy of 43 Sub-Saharan African countries from 1990 to 2019. The analysis employed annual secondary data from the database of development indicators of the World Bank and from the database of world economic outlook of IMF. The results of both models of fixed and random effects analysis revealed a one-to-one correlation between GDP per capita growth and population surge, suggesting that demographic expansion benefits the economy. The study

recommends that Sub-Saharan African countries design and execute realistic population policy initiatives to increase the productivity level of their population to reap larger demographic dividend gains (Fantahun, 2019).

Ndaba (2015) conducted a study on the effect of Foreign Direct Investments (FDI) on economic growth in Zambia adopting a resource dependent context. Employing an exploratory data analysis method to find the impact of FDI on economic growth in Zambia, concludes that FDI had a greater impact on economic growth in the years prior to 2000 but a negligible to no effect after 2000. The researcher found that in the case of Zambia, FDI is concentrated in the Mining sector and recommended that the government should consider putting in place measures that attract foreign direct investment (Ndaba S. , 2015). Similarly, the findings of the study are consistent with those of Libanda (2017) who in a study investigating the effect of foreign direct investment on economic growth in emerging countries with particular interest to Zambia found that foreign direct investment has a positive effect on economic growth in Zambia.

Badji and Amukule (2019) used the growth accounting approach as the basis for an econometric model. The study used is a time series from 1970 to 2019. An ordinary least squares method is employed to investigate whether foreign direct investment is significantly associated with economic growth. The findings show that the relationship between foreign direct investment and economic growth in Kenya is negatively insignificant (Gibba Badji, 2013).

Phiri (2013) examined threshold effects of inflation on economic growth for the Zambian economy using quarterly data collected between 1998 and 2011. The objective was tackled through the use of a threshold autoregressive (TAR) model and the conditional least squares (CLS) estimation technique. As a by-product of utilizing this estimation technique, the study identified whether there could be an optimal inflation level at which the adverse effects of inflation on economic growth are subdued, or similarly, a level of inflation at which the positive effects of inflation on economic growth are maximized. As such, the paper estimates an inflation threshold level of 22.5% for the observed data. This indicates that economic growth in Zambia can be stimulated even in a moderately high inflation environment.

2.2.1 Summary of the Empirical Review

Through a thorough examination of the highlighted works, we gain insight into the intricate nature of the relationship between population expansion and economic development. This analysis uncovers a dynamic interaction of several elements that consistently influence academic discussions. Despite the abundance of studies, there are still ongoing disagreements over the causality and directionality of the relationship between population growth and economic development. The complexities of this interaction defy basic assumptions and emphasise the necessity of a sophisticated comprehension of the many elements involved.

An important factor that contributes to the intricacy is the lack of thorough investigation into the impacts of different types of population expansion. Although several studies have examined the relationship between general population increase and economic development, there is a significant knowledge vacuum on specific factors, such as growth driven by migration and rapid population expansion. Further investigation is warranted to examine the impact of these different types of population expansion on economic indicators, as they introduce distinctive factors that might have a substantial influence on the course of economic development.

Furthermore, the research highlights a significant lack of information resulting from the neglect of human capital quality in favour of solely focusing on population size. Although population size offers a numerical assessment, it fails to consider the qualitative aspect of the labour force. The workforce's skills, education, and training are essential factors that enhance economic production and foster innovation. Failure to consider the subtle elements of human capital quality leads to an inadequate comprehension of the actual impact of the workforce on economic growth.

The prioritisation of population size over the quality of human capital perpetuates a constraint on our capacity to implement comprehensive policies and strategies that promote sustainable economic growth. Understanding the importance of a competent and knowledgeable workforce as a key factor in promoting innovation and productivity is crucial for developing successful policies that tackle the complex aspects of economic growth.

The careful examination of current research therefore provides insight into the complex and ever-changing connection between population expansion and economic progress. The area is difficult

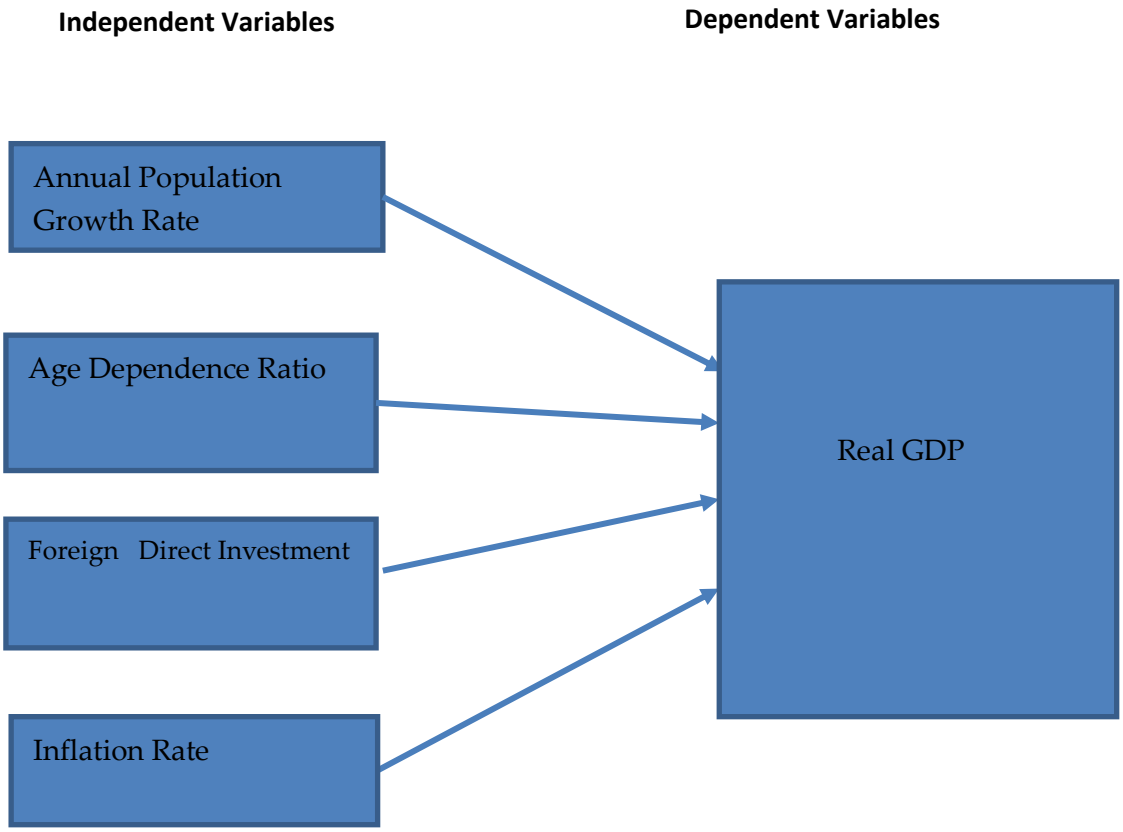
due to unresolved arguments, inadequate research of specific kinds of population expansion, and disregard of human capital quality. To advance our comprehension of the elements that impact economic growth and to establish well-informed policies that encourage sustainable development in a constantly evolving global environment, it is crucial to address these knowledge gaps.

Moreover, it is apparent that the relationship is contingent upon the context, as there is substantial variation observed among regions, countries, and phases of demographic transition. Persisting research voids in the investigation of dynamics specific to particular contexts present distinct prospects and obstacles in various domains. For example, evidence has shown that in order to attain long-term economic prosperity and improve living conditions, several East Asian nations have successfully controlled population growth. Their success can be ascribed to their use of cutting-edge technologies and increased efficiency. Their youthful, well-educated, and physically fit populace have played a crucial role in promoting growth, capitalising on the expedited shift in demographic trends in their nations. In addition, the enhancement of human resources and the availability of suitable employment possibilities with favourable remuneration have stimulated saving and investment, so reinforcing the economic expansion (Pritchett, 1996).

In summary, the integration of diverse sources underscores the intricate and multifaceted character of the correlation between economic development and population expansion. Although certain studies propose positive correlations, others yield negative or equivocal results, underscoring the necessity for additional research to clarify these complex associations. Furthermore, the evaluation emphasises the significance of considering the calibre of human capital, the dynamics of the environment, and the diverse consequences of various types of population expansion when attempting to develop more holistic comprehensions of this correlation.

2.3 Conceptual Framework

Figure 1: The Population and Development Conceptual Framework



Source: Author's construction

The theoretical foundation of the Solow Growth Model, which highlights that elements of production act through the production function at constant returns to scale to produce economic output, is the basis of this conceptual framework (Solow, 1956). This conceptual framework illustrates the significant role that population growth may play in the production process using the Solow model. Population factors such as fertility, mortality and migration impact on the population growth rate which may have an effect on an economy's capacity to generate products and services effectively and sustainably, as has been noted in the empirical literature section.

The labour force participation rate and labour supply are both impacted by the population growth in different ways. Higher birth rates have the potential to boost the working-age population over the medium to long term (Barro, 1995). Barro argued that, this can increase labour inputs into the economy and growth. Extremely high fertility rates, however, may put pressure on infrastructure and resources, including housing, healthcare facilities, and schools, in the near run and consequently impede economic expansion.

Furthermore, because high population growth rates linked to high fertility rates are associated with lower levels of female school attendance and lower engagement in formal economic endeavours, they can impede economic production (MOF, 2015). A population that is more likely to be available for productive employment is generally indicated by a reduced age dependency ratio, which can increase economic output (MNDP, 2019). On the other hand, a high age dependency ratio could point to a heavier weight of dependents, which might lower the work force that is available.

Although it is recognised that population growth stimulates consumer demand and fosters economic expansion, an uncontrolled and unsustainable high population growth rate that surpasses productivity growth becomes problematic. Therefore, it has been contended that in order to effectively support the projected population growth rate of Zambia, which is predicted to be 3.4% year, there is a need for a higher level of economic growth (MoFNP, 2021). Investments in human capital and value addition are crucial for attaining socio-economic development. Under the Fifth National Development Plan 2006-2010, Zambia experienced an average yearly real GDP growth of 8.7%, with a peak of 10.3% in 2010. As a result, per capita income increased and Zambia was categorised as a lower-middle-income country in 2011.

During the period of 2011 to 2016, there was a decrease in economic growth, with an average of 4.9%. This figure falls significantly short of the targeted 8% growth outlined in the Vision 2030 plan. During the period 2017-2021, there was a further decline in economic growth. Zambia experienced its weakest economic growth in a decade in 2019, with a growth rate of 1.4%. The

COVID-19 pandemic caused a further decline in the economy in 2020, with a reduction of 2.8% in GDP. However, there was a recovery in 2022, with GDP recovering to 4.6% (MoFNP, 2022). As Zambia's economic growth has been declining and fluctuating over the stated periods, the annual population rate has been increasing and is among the highest in the world at 3.4% (Zamstats, 2022).

In order to promote inclusive growth, purposeful economic changes are essential, even though some level of economic growth can occur organically through a decrease in fertility and a reduction in the child dependence ratio. These factors have the potential to raise labour income and household savings. The simulated findings from the DemDiv model, as presented in the Demographic Dividend Study Report of 2015, reveal that the job gap in the absence of economic changes is substantial, amounting to 14.5 million (MOF, 2015). MOF further indicate that the job gap under a combined scenario that stresses economic, fertility, and education changes is twice as large as the 7 million gap. Given the current socio-economic conditions, it is crucial to implement economic reforms in order to generate enough productive jobs to accommodate the growing number of young people in the workforce, increase salaries, and achieve the goal of being a wealthy middle-income country by 2030.

CHAPTER 3: METHODOLOGY

3.0 Introduction

This section basically gives an account of how the research will be conducted stating the research approach, research design, study population, the econometric model and the data analysis methods used in this study.

3.1 Research Approach

This study investigates the relationship between population growth and economic growth using quantitative research methods in Zambia. Time series secondary data were sourced from reputable official statistics providers, such as the United Nations Statistics Division, the World Bank, the Zambia Statistics Agency, and the Ministry of Finance and National Planning. Real GDP growth rate, population growth rate, age dependency ratio, foreign direct investment, and inflation rates for the years 1970 to 2021 are among the essential variables for this study that were covered by the data.

3.2 Research Design

The research design utilised in this study is correlational, as its objective is to find patterns of connection or correlation between the variables of interest without proving a direct causal relationship between them. The study used a correlational research approach to precisely investigate the relationship between population increase and economic growth. This methodology enables a thorough examination of the interaction between various factors, providing insights into possible correlations without making assumptions about causality. The study aims to provide detailed insights into the relationship between population increase and economic development by employing a correlational research design.

3.3 Data Collection and Data Sources

An annual time series data from 1970 to 2021 was used for this study. Published time series secondary data was gathered from the following key institutions; the Zambia Statistics Agency, Ministry of Finance and National Planning, World Bank and United Nations. The following actions will be taken as part of the data collection process:

3.3.1 Desk reviews

This entailed examining relevant published books, academic journals, reports, and other publications to gather information on gaps in the literature, key variables used, objectives and methodologies used, as well as theories applied. Further, key findings and recommendations were also be areas of interest in the publications. Key concepts and themes on the relationship between population and economic growth were used to search for relevant literature in academic databases, such as Google Scholar. Further, the literature was organised in chronological order by date of publication. This helped trace the developments in research on the relationship between population growth and economic growth over time.

3.3.2 Accessing official datasets

The utilization of established datasets from reliable sources contributes to the credibility and robustness of the research findings. This entailed obtaining authorization to utilise pre-existing datasets and gaining access to portals managed by reputable local and international organisations, academic institutions, or governmental agencies. The objective of this method was to gather data on crucial research variables, such as real GDP growth rates, population growth rates, age dependence ratios, foreign direct investment, and inflation, among others. Using solid datasets from reputable sources enhances the legitimacy and strength of the research findings.

3.4 Data Analysis

In order to conduct a comprehensive study of the data, a systematic three-step methodology was implemented, which included univariate analysis, bivariate analysis, and multivariate analysis. The data analysis procedure was conducted using the STATA 14 programme, which was selected for its expertise in managing large datasets and producing accurate outcomes. The software allowed for the creation of graphs and tables, as well as the implementation of regression analysis using the ARDL model. The researcher utilised this methodological approach to extract significant insights from the information and draw reliable conclusions about the correlation between population expansion and economic growth.

3.5 Model Specification and Estimation Technique

The study utilised ARDL model as the econometric model due to its ability to estimate both long-term and short-term relationships between population growth and economic growth. The use of

the ARDL model was benchmarked with the research conducted by Afzal (2009) and Ali (2013). The ARDL model, created by Pesaran et al. (2001), possesses three distinct advantages in comparison to alternative models. One advantage of ARDL is that it does not necessitate the integration of all variables utilised in the study to be of the same order. This indicates that the model is appropriate when variables are integrated with orders of zero, one, or fractional integration. Furthermore, the ARDL model demonstrates notable efficiency when applied to datasets with limited and finite sample sizes. Furthermore, the utilisation of the ARDL model yields unbiased long-term estimations (Harris & Sollis, 2003).

3.5.1 Stationarity Test

Given that the data utilised in this study are time series, it was necessary to assess the stationarity of the data. The data's stationarity properties were assessed by doing the Augmented Dickey Fuller (ADF) test (Dickey & Fuller 1979, 1981) and the Phillips Perron (PP) test. The general format of this test is estimated in the following manner.

$$\Delta Y_t = b_0 + \beta Y_{t-1} + \mu_1 \Delta Y_{t-2} + \cdots \ldots\ldots\ldots\ldots\ldots + \mu_p \Delta Y_{t-p} + e_t \ldots\ldots\ldots\ldots (1)$$

The equation is a unit root test for a time series Y_t. The intercept term is denoted as b_0, the coefficient of interest is denoted as e, and p represents the parameter of the augmented lagged first difference of Y_t, which represents the pth order autoregressive process. The error term is denoted as e_t and is assumed to be white noise.

3.5.2 Autoregressive Distribution Lag (ARDL) Model

Pesaran (1996) developed a technique to confirm cointegration in cases when variables have different levels of integration. Pesaran argues that, if variables possess distinct integration orders, the ordinary least squares (OLS) regression will not yield precise estimates. Hence, it is imperative to employ either the autoregressive distributed lag (ARDL) model or the limits test approach. However, when working with variables in the model that have a second difference I(2), the computed F-statistic may produce erroneous results (Pesaran et al., 2001). Consequently, it is imperative to do a unit root test in order to eliminate any ambiguities. The ARDL model is represented by the following equation:

$$GDPGR = f(POPGR, ADR, FDI, INF) \ldots\ldots\ldots\ldots\ldots\ldots Eq_1$$

$$GDPGR = \alpha_0 + \alpha_1 POPGR + \alpha_2 ADR + \ a_3 FDI + a_5 INF + e_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots Eq_2$$

GDPGR refers to the rate of growth of the gross domestic product, POPGR represents the annual population growth rate, ADR denotes the age dependency ratio, FDI stands for foreign direct investment, and INF signifies the inflation rate. Additionally, e_t represents the stochastic error term. It is important to clarify that, for the purpose of this research, all of these variables are considered in logarithmic form. In order to conduct a long-run limits test, we must express the equation in logarithmic form as follows:

$$e_t = a_0 + a_1 GDPGR + \alpha_2 POPGR + \alpha_3 ADR + a_4 FDI + a_5 INF \dots\dots\dots\dots\dots\dots\dots\dots\dots Eq_3$$

After confirming the existence of cointegration, we proceed to calculate an error correction model (ECM) that incorporates both the long-term and short-term dynamics. The lack of equilibrium in equation (iv) leads to discrepancies, which form a time series that is stationary and has a mean of zero. Therefore, the tests should demonstrate stationarity either at the first level or by employing first differences. The occurrence of long-term equilibrium is rare, although there is a trend for convergence towards equilibrium.

The Error Correction Model (ECM) is used to demonstrate the long-term (static) and short-term (dynamic) correlations between the growth rate of the Domestic Gross Product and the independent variables. Hence, ECM is apt for assessing the impact of additional variables on the pace of GDP growth. Furthermore, the ECM model is employed to quantify the rate at which the system shifts from the short-term equilibrium to the long-term equilibrium state. The speed at which the model shifts from the short run to the long run accelerates as the coefficient of the parameter increases. The ECM model is defined according to equation (iii). The equation (iv) denotes the error correction model.

$$\Delta GDPGR = \alpha_0 + \alpha_1 \sum_{t-1}^{n} \Delta POPGR_{t-1} + \alpha_2 \sum_{t-1}^{n} \Delta ADR_{t-1} + \alpha_3 \sum_{t-1}^{n} \Delta FDI_{t-1} + \alpha_4 \sum_{t-1}^{n} \Delta INF_{t-1} + \delta ECM(-1) + e_t \dots\dots Eq_4$$

The error term is represented by e_t, the error correction term is denoted as ECM (-1), and G represents the long run impact. The immediate impacts are represented by the individual coefficients of the differenced terms (D), whereas the coefficient of the ECM variable indicates

whether historical values of variables influence present values. The magnitude and statistical significance of the coefficient of the Error Correction Model (ECM) indicate the propensity of each variable to revert back to the equilibrium state. A substantial coefficient indicates that previous deviations from equilibrium have an impact on deciding the present results. The ARDL model will undergo post-estimation testing prior to the interpretation of the results. Medical examinations: The study will employ the following post-estimation tests:

i. Heteroscedasticity Test: The Breusch-Pagan-Godfrey test is employed to check if the variance of the errors is constant;
ii. Autocorrelation Test: The Breusch-Godfrey Serial Correlation Test is employed to check if the errors are related;
iii. Multicollinearity Test: The Tolerance and variance inflation factor is employed to check if the independent variables are correlated;
iv. Omitted Variables: The Ramsey RESET test is utilized to check the stability of the model; and
v. Normality Test: The Jarque-Bera test is used to check if the errors are normally distributed.

3.6 Ethical Considerations

The study strictly followed ethical guidelines governing the utilisation and ownership of data, duly recognising the ownership of the original material when relevant. The study mostly utilised data from openly accessible data from sources such as periodicals, the Internet, or other public platforms. Further, permission was sought prior to utilisation of datasets that are not publicly available. The study also ensured the preservation of secrecy and privacy for persons encompassed inside the data sets.

CHAPTER 4: PRESENTATION AND ANALYSIS OF RESULTS

4.0 Introduction

The effect of population growth on economic growth in Zambia was investigated in this section. Using Secondary time series data on the Annual Population Growth Rate (APGR), Age Dependency Ratio (ADR), Foreign Direct Investment (FDI) and the Inflation Rate (INFR) obtained from the Ministry of Finance, Zamstats, World Bank Development Indicators and the Bank of Zambia over a sample of 50 years covering the period 1970 to 2020. The resulting variables were then regressed to show how population growth affected Zambia's economic growth. After a brief overview of the data, data analysis tests including the unit root test, cointegration testing, lag length and the Error Correction Model (ECM) were presented. The results of the post-diagnostic tests such as heteroscedasticity, autocorrelation, stability and normality testing were also conducted.

4.1 Descriptive Statistics

Table 1 presents descriptive statistics of the variables used in the analysis. The characteristics include the median, minimum, maximum, mean, and standard deviation. The average Annual Population Growth Rate over the period 1970 to 2020 was 3.01% with the highest growth rate of 3.64% recorded in 2008 and the lowest 2.43% recorded in 1993. Further, the average Real GDP Growth rate over the period was 3.13%, with the lowest value being -8.63% recorded in 1994 and the highest being 10.30% recorded in 2010. Other variables included are, Age Dependency Ratio, Foreign Direct Investment, and Annual Inflation Rate. With an average value of 101.33 recorded during the study period, Age Dependency Ratio (ADR) was highest in 1979 at 111.86 and lowest in 2021 at 81.82. Foreign Direct Investment averaged 0.38 billion between 1970 to 2021 with the highest inflows recorded in 2013 at 2.09 billion and the lowest recorded at -0.35 billion in 2021 which represent outflows. At its lowest and highest points, inflation had values of 0% and 185.89% respectively.

Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Annual Population Growth Rate	3.014038	0.3232995	2.43	3.64
Age Dependency Ratio	101.3329	8.543765	81.82	111.86
Foreign Direct Investment	0.381599	0.5511816	-0.3516466	2.0998
Real GDP Growth Rate	3.128296	4.079304	-8.6254	10.2982
Annual Inflation Rate	30.68726	38.88692	0	185.8917

Source: Author's computations from Stata outputs

4.2 Distribution of variables

Figure 2 and 3 depict the logarithmic representation of the distribution of the growth rate of gross domestic product and the average growth rate of population. During the research reference period, both the Gross Domestic Product (GDP) and the rate of population expansion demonstrated a consistent upward trajectory. However, in recent years, there has been a decline. This is apparent from the significant decrease in the growth rate of the gross domestic product in 2020, followed by a moderate rebound in 2021, as depicted in the graph. During the 1990-2000 intercensal period, there was a decrease in the annual population growth rate, which later rose again from 2010 to 2020.

Figure 2: Distribution of real GDP growth rate, 1970-2021

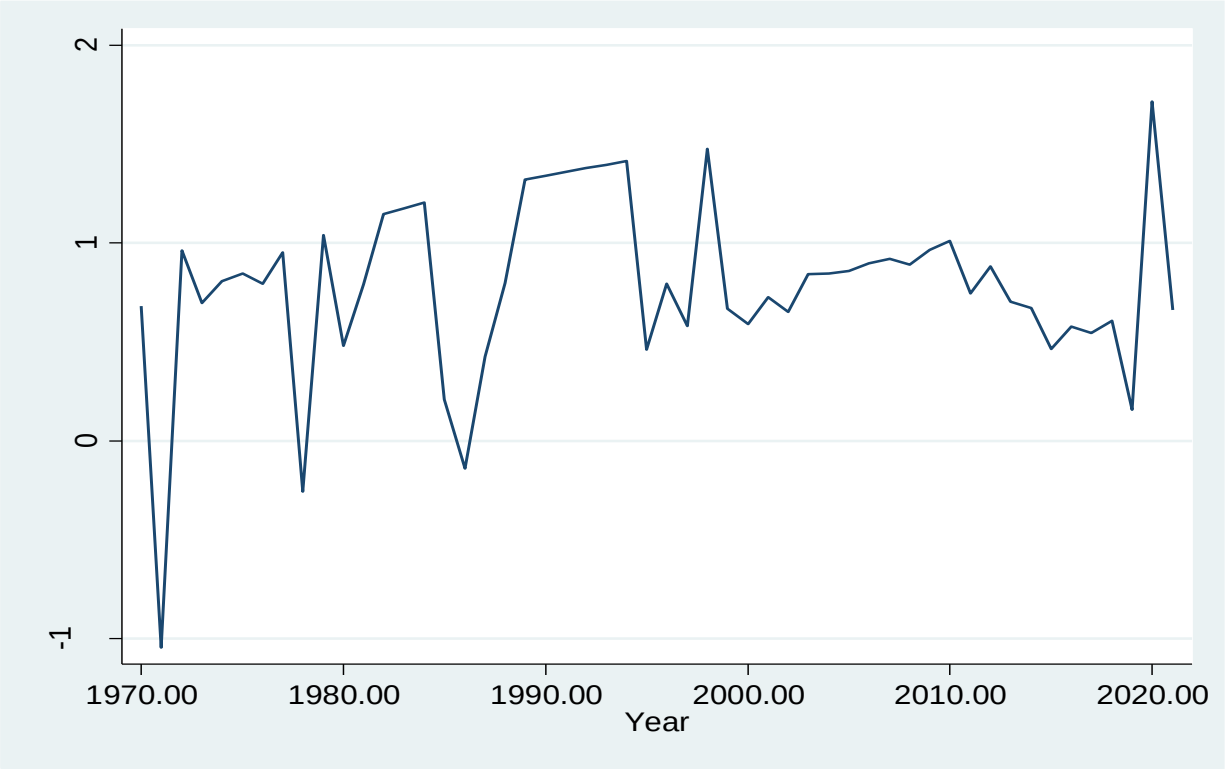
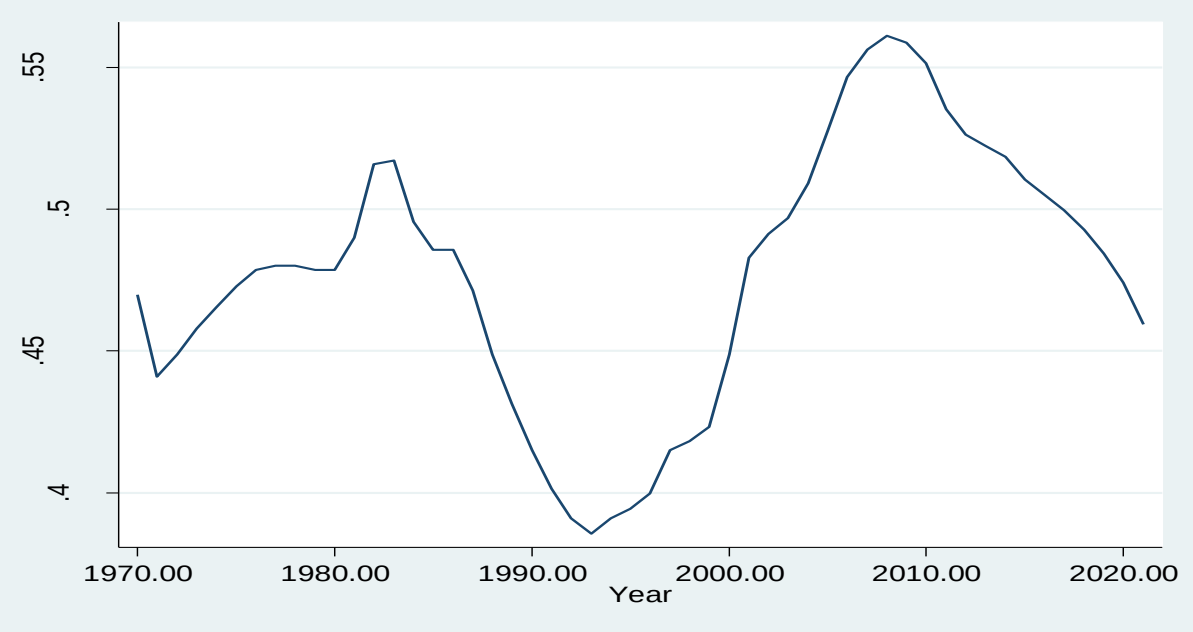


Figure 3: Distribution of the Annual Population Growth Rate, 1970-2021

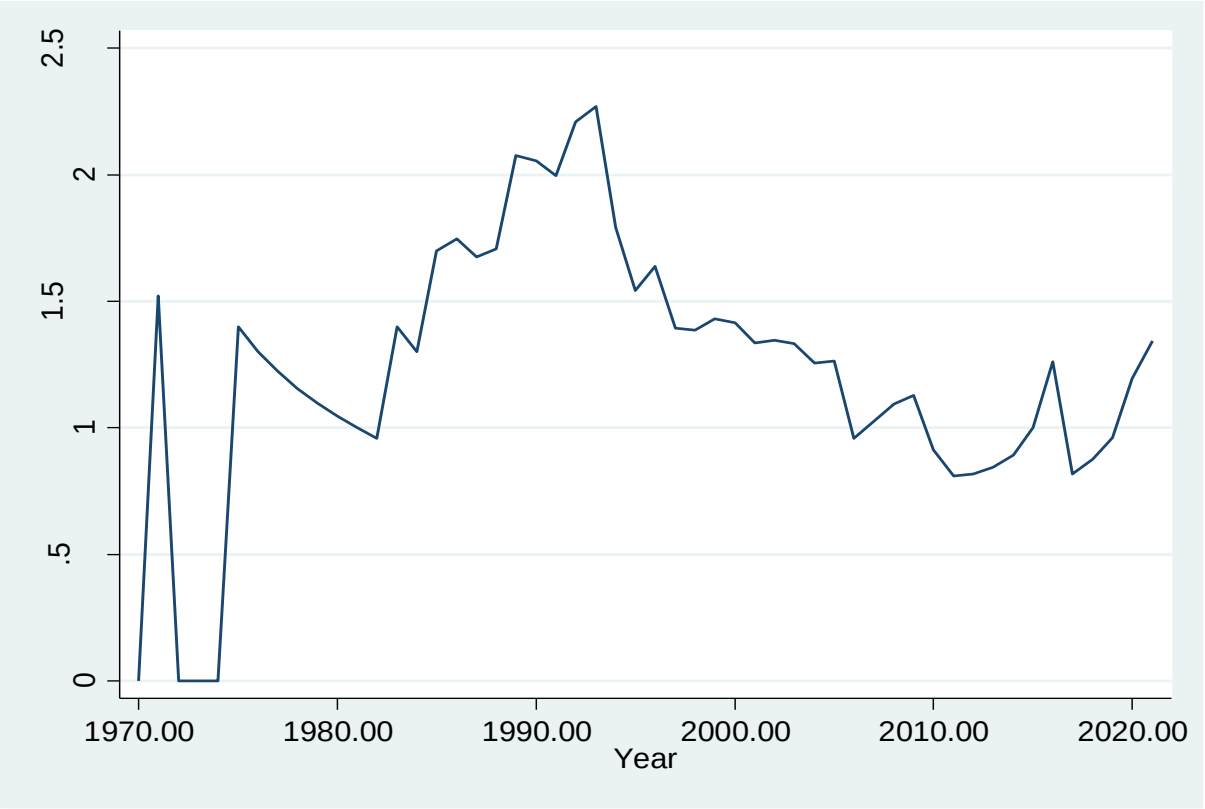


Further, Figure 4 shows a decrease in the dependency ratio and a rise in foreign direct investment over the duration of the charts.

Figure 4: Distribution of Age Dependency Ratio and Foreign Direct Investment, 1970-2021

Finally, the graphic below depicts the distribution of inflation throughout the duration of the investigation. The findings suggest a steady rise in inflation over the specified period.

Figure 5: Distribution of Annual Inflation Rate, 1970-2021



4.3 Pre-diagnostic tests

4.3.1 Unit Root test

The Augmented Dickey Fuller (ADF) test was utilized to determine if the variables were stationary. The lag time of the variables prior to the stationarity test was also evaluated using the Alkaike Information Criteria (AIC). This is shown in the Appendix. If, employing the Augmented Dickey Fuller (ADF) test, the absolute test statistic value exceeds the critical value at a significance level of 5%, the null hypothesis is to be rejected.

Table 2: Stationarity test results at levels

Variable	Test Statistic	5% Critical Value	Order of Integration
GDPG	1.950	1.012	I(0)
APGR	1.950	0.023	I(0)
ADR	1.950	4.456	I(0)

INFR	1.950	1.004	I(0)
FDI	1.950	0.553	I(0)

Hypothesis

H_o : Unit root

H_1 : No unit root

The level results for the Augmented Dickey Fuller Test are displayed in the table 2. The alternative hypothesis asserts that the variable is stationary or does not have a unit root, in contrast to the null hypothesis, which states that the variable is either non-stationary or has a unit root. The null hypothesis is disregarded in line with the criteria for rejection if the test statistic's absolute value is higher than the critical value. All of the absolute values of the test statistics for the model variables (GDPG, APGR, FDI and INFR), with the exception of ADR, are below the 5% absolute critical value of 1.950. GDPG, APGR, FDI and INFR were the only variables in the model that were somewhat non-stationary as a result, after differentiation, the cointegration of these variables was evaluated.

Table 3: Stationarity test results at first difference

Variable	**Test Statistic**	**5% Critical Value**	**Order of Integration**
GDPG	0.023	6.482	I(1)
APGR	1.004	3.206	I(1)
INFR	1.950	4.352	I(1)
FDI	1.950	5.841	I(1)

Hypothesis

H_o : Unit root

H_1 : No unit root

Table 3 above provides an overview of the Augmented Dickey Fuller Test results. The model's unit root was assumed to exist as the null hypothesis, and its absence as the alternative. Since the absolute value of the test statistic (6.482) is larger than the absolute value of the 5% critical value at 5% level of significance, the null assumption of non-stationarity for the variable Gross Domestic

Product (GDP) is rejected. The variables Population Growth, Inflation and FDI all have absolute test statistical values that are larger than the corresponding critical values (1.950), which is similar to the previous example. As a result, at the first difference, all the variables were stationary.

Using the available data, we performed a cointegration limits test to determine if there is a sustained connection between the dependent variable, specifically the real gross domestic growth rate, and the independent variables. The Autoregressive Distributed Lag Model (ARDL) was selected because to the different orders of integration found in the ADF results, as explained in the previous chapter.

4.3.2 The Bounds test for cointegration

To run the ARDL test, the null of no cointegration and alternative hypothesis were tested as stated below as;

H_0: $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6$

H_1: $\alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6$

The ECM is employed to evaluate the existence of cointegration between the independent variables and the rate of GDP growth. Here, we utilise the F-test process following the ARDL approach. However, the asymptotic distribution of the F-statistic differs from the typical distribution. Therefore, we utilise the critical values of the upper and lower bands tests, which were developed by Pesaran et al. (1996, 2001). Pesaran has generated two sets of critical values that correlate to a particular level of significance. The first band is calculated assuming that all variables in the ARDL model have a unit root of order zero (I(0)), whereas the second band is calculated assuming that the variables have a unit root of order one (I(1)). If the calculated F-statistic is greater than the upper limit of the range, it indicates that the null hypothesis of no cointegration is rejected, providing evidence for the presence of cointegration.

However, if the calculated F-statistic is below the lower threshold of the range, it is not possible to reject the null hypothesis of no cointegration. This indicates that there is supportive evidence for the absence of cointegration. If it is inside the designated range, the result is indeterminate. The optimal amount of delays in the short-term specification of the ARDL model is obtained by

employing the Akaike Information Criteria (AIC), which effectively deals with the problem of autocorrelation in time series data. Using the F statistic, we find that the F statistic (29.992) exceeds the upper bounds of all critical values at significance levels of 1%, 0.5%, 0.25%, and 0.01% as shown in table 4. In this analysis, we reject the null hypothesis that there is no co-integration and instead establish the presence of a long-term link. There is a consistent relationship between the dependent variable and the independent variables when they are viewed collectively. Here, we are assessing the long-term association.

Table 4: ARDL Bounds Test

Coefficients	**Test Statistic**	**Lower Bound**	**Upper Bound**
F-Statistic	29.992	2.45	5.06
t-Statistic	-12.058	-2.57	-4.6

4.4 Long Run and Short Run Estimates

After establishing the existence of a relationship, both in the short and long term, between variables by the ARDL bound test, the study next proceeds to ascertain the precise parameters linked to these variables. The short-term and long-term results of the error correction model are displayed in Table 5. According to the statistics, there were a collective of 49 observations recorded for each of the variables. The coefficient of determination, R squared, signifies that 80% of the variations in the dependent variable can be ascribed to the independent factors. The coefficient of the lagged error correction term measures the speed at which the system adjusts to reach equilibrium following shocks.

The speed of adjustment, also known as the adjustment coefficient (-1.526), to exhibit any short-run out-of-equilibrium behaviour. At the 5% level of significance, the coefficient is significant with a probability value of (0.000), which is less than 0.05. Any GDP outliers will be collected by

1.526% in the following period due to the model's approaching equilibrium, as shown by the model's negative and substantial coefficient of adjustment.

The findings indicate that fluctuations in the rate of economic growth are influenced by imbalances in the co-integrating relationship. The lagged error correction term has a negative value of (-1.526) indicating statistical significance. This suggests that the series is not prone to explosive behaviour and that a long-term equilibrium can be achieved, which is expected to take around 1.5 years.

Controlling for all other variables, the findings indicate that the long run gross domestic growth rate was influenced by the average population growth rate, inflation, foreign direct investment, and the age dependency ratio. Nevertheless, the model does not find any variable to be statistically significant at 5% significant level. The results show that in the long run inflation and foreign direct investment have a positive influence on growth domestic product growth rate whereas age dependency ratio and average population growth rate have a negative influence on gross domestic product growth rate.

When examining the short-term perspective, the findings indicate that the logarithm of foreign direct investment and the average rate of population increase exert a detrimental impact on the dependent variable. Nevertheless, the outcomes do not exhibit statistical significance at a 5% confidence level.

Table 5: Long Run and Short Run Estimation

ARDL(1,0,1,2,0)					regression
Sample: 1973.00 - 2021.00				Number of obs	= 49
				R-squared	= 0.8012
				Adj R-squared	= 0.7614
Log likelihood = -24.786128				Root MSE	= 0.4441
D.dlogGDPGR	Coef.	Std.Err.	T	P>t	[95%Conf. Interval]

ADJ						
dlogGDPGR						
L1.	-1.526	0.127	-12.060	0.000	-1.782	-1.270
LR						
dlogINF	0.134	0.179	0.750	0.460	-0.229	0.496
dlogFDI	1.486	0.723	2.060	0.046	0.025	2.946
dlogAPGR	-4.268	4.277	-1.000	0.324	-12.912	4.377
LogADR	-0.037	1.116	-0.030	0.973	-2.293	2.218
SR						
dlogFDI						
D1.	-1.381	0.876	-1.580	0.123	-3.152	0.389
dlogAPGR						
D1.	-7.003	7.646	-0.920	0.365	-22.457	8.451
LD.	10.748	6.986	1.540	0.132	-3.371	24.866
_cons	0.078	3.412	0.020	0.982	-6.818	6.973

4.5 Post Diagnostic tests

In order to ensure the validity and suitability of the aforementioned findings for policy decisions, the econometric model underwent various diagnostic tests to assess its robustness. The tests conducted consist of the serial correlation test, heteroscedasticity test, Ramsey RESET specification test, and Jarque-Bera normalcy test.

4.5.1 Test for Serial Correlation

Serial correlation between time series residuals and their own lagged values can occur in Ordinary Least Squares (OLS) regression. When there is serial correlation, many issues arise: (i) Ordinary Least Squares (OLS) estimates become biased and inconsistent if a lagged dependent variable is included as an explanatory variable, (ii) standard errors are inaccurate and tend to be overestimated, and (iii) OLS is no longer an effective linear estimator. The Breusch-Godfrey test is employed to assess serial correlation. The results indicate a chi-square probability value of 0.197, which above the significance level of 0.05. Consequently, we do not have sufficient evidence to reject the null hypothesis that there is no serial correlation. This indicates the absence of any serial correlation in the model.

4.5.2 Heteroscedasticity Test

Gujarati (2003) states that the existence of heteroscedasticity causes the OLS estimators to lose their efficiency as estimators, since they no longer have the smallest variance. In other words, they no longer qualify as the Best Linear Unbiased Estimators (BLUE). Nevertheless, they remain linear and impartial. The null hypothesis of the White (1980) test posits that the disturbance term's variance is homoscedastic, whereas the alternative hypothesis suggests that the disturbance term's variance is heteroskedastic. The results indicate that the model does not exhibit heteroscedasticity issues. Therefore, we do not reject the null hypothesis of homoscedasticity, as the chi-square probability value above 0.05.

Table 6: Post Diagnostic Tests

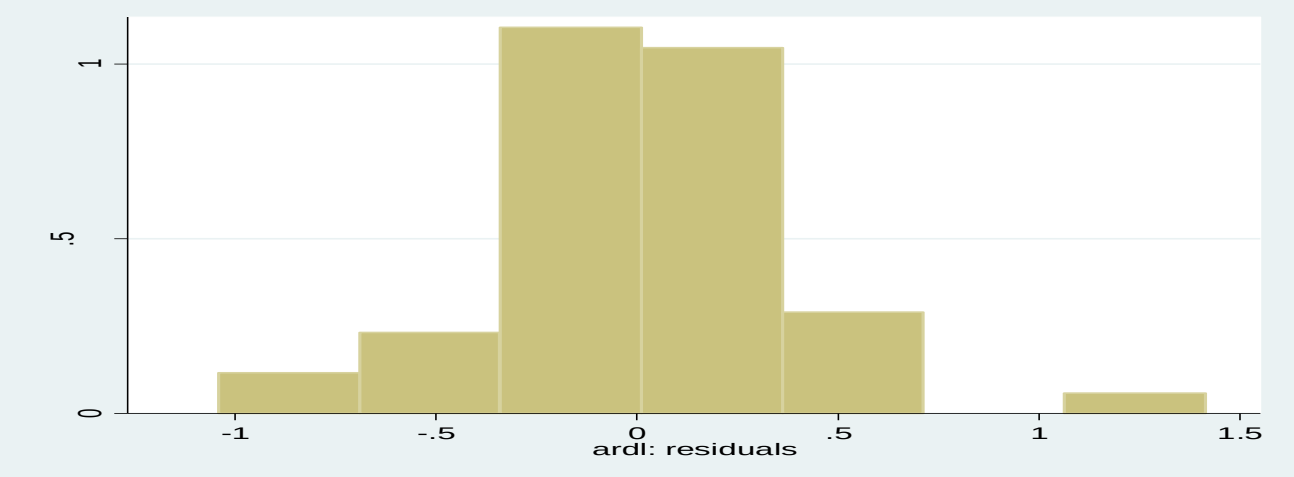
	Chi-Square (chi2)	**Degree of Freedom (Df)**	**Probability**
Breusch-Godfrey LM	3.248	2	0.197
Heteroscedasticity	42	44	0.557
Skewness	14.68	8	0.066
Kurtosis	2.490	1	0.115
Normality	7.57	-	0.0227

4.5.3 Normality Test

The residuals of the ARDL model were examined using a test to assess their adherence to normality. While not a critical issue, it is crucial to verify the normal distribution of residuals in the model. In this study, we employed the normality test to ascertain the normal distribution of the residuals. The skewness/kurtosis test for normalcy in this study. In this situation, the probability chi2 value is 0.02, which is below the significance level of 0.05. Therefore, we cannot reject the null hypothesis that the residuals are normally distributed. Thus, we can deduce that the residuals exhibit normality.

The graph of the residuals below shows that the residuals are normally distributed.

Figure 6: Distribution of Residues



4.5.4 Ramsey test for Omitted Variables

The study also performed the Rumsey reset test in Stata to check if they are omitted variables in the model. The results show that the probability F statistic (0.7514) is greater than 0.05 which means that we cannot reject the null hypothesis. We can therefore conclude that there is no significant problem of omitted values in the dependent variable.

Table 7: Ramsey RESET test

	F-statistic	**Degree of Freedom (Df)**	**Probability**
Omitted Variables	0.40	37	0.7514

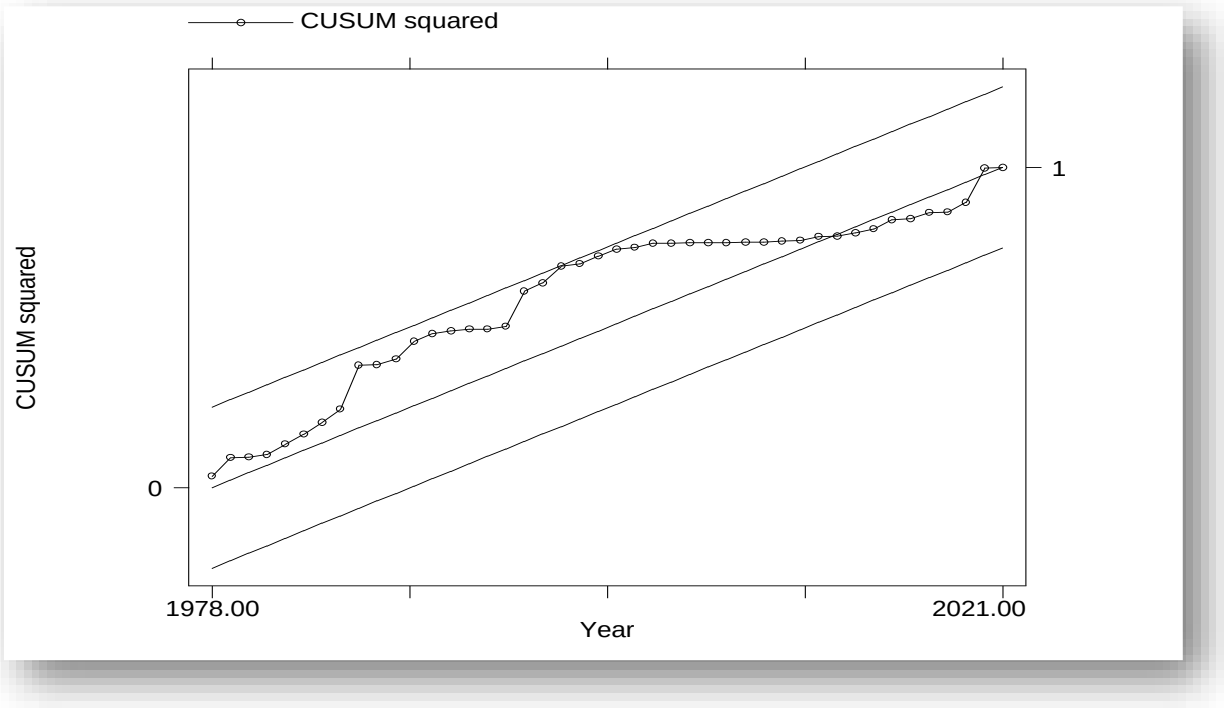
4.5.5 Stability Test

We assess the stability of the model by employing the Recursive test on the recursive residuals. This test presents a graph illustrating the residuals plotted against the zero line. Residuals falling within the conventional error bars demonstrate parameter stability. Residuals that fall outside the specified error ranges suggest the existence of parameter instability in the equation. The CUSUM test, credited to Brown, Durbin, and Evans (1975), is obtained by cumulatively summing the recursive residuals. The residuals are subsequently graphed alongside the lines representing the critical values at the 5% significance level. When parameter instability occurs, the cumulative recursive total exceeds the error bands, which are represented by the two critical values. The CUSUM test's test statistic is defined as follows:

$$W_t = \sum_{r=k+1}^{t} w_r/s$$

Where t=k+1 is the recursive residual s is the standard deviation of the recursive residual. Parameter instability therefore results from the movement of the W_t outside the two critical values. The results of the cusum graph shows that the graph lies between the two boundaries which means that the model is stable at 5% significant level.

Figure 7: Cumulative Sum Squared



4.5.6 Multicollinearity Test

The investigation also aimed to determine the presence of multicollinearity as a potential issue in the study. The average VIF value in the multicollinearity test is 1.43, which is less than 10. If the mean value of VIF is below 10, multicollinearity is absent. In this investigation, we adhered to the guideline that the variance inflation factors (VIFs) should not exceed a value of 4. All the squared VIF values of the variable are less than 4, indicating the absence of multicollinearity in the model.

Table 8: Multicollinearity Test

Variable	**VIF**	**1/VIF**
GDPG	4.42	3.89
FDI	1.730	0.578
APGR	1.640	0.608
INFR	1.320	0.758
ADR	1.060	0.941
Mean VIF	1.430	

CHAPTER 5: DISCUSSION OF FINDINGS

5.1 Discussion of Findings

The overall objective of this study was to investigate the relationship between the rate of growth in gross domestic product and the rate of growth in population. The study incorporated the growth rate of the gross domestic product as the dependent variable. The independent factors in the model consisted of the average population growth rate, inflation, age dependency ratio, and foreign direct investment. The variables were examined using the ARDL model, with their values transformed into logarithmic form. The results of the cointegration test indicate the presence of a long-term relationship between the dependent variable and the independent variables collectively. However, the results did not reveal any statistical significance at a 5% level between the dependent variable and independent variables, both in the short term and in the long term.

Based on the overarching goal, we observe no substantial correlation between the gross domestic product growth rate and population growth rate at significance levels of 1%, 5%, and 10%. The findings exhibit certain similarities, but diverge from the conclusions of study by Savaş (2008), which sought to examine the causal connection between per capita economic growth and population expansion in Central Asia. Applying the ARDL approach to cointegration, the findings indicated the presence of a long-term connection between the variables.

In contrast to Savaş' methodology in the stated study, this research takes a more thorough approach by including additional factors, such as inflation, foreign direct investment, and age dependency ratio, into the analytical model. The deliberate incorporation of additional elements was deemed essential, as these variables had the ability to exert significant influence on the overall results derived from the model. This study intended to provide a comprehensive and detailed knowledge of the complex relationship between population dynamics and economic growth in Zambia by considering relevant aspects and increasing the area of investigation.

Moreover, Savaş' research findings indicate that countries in Central Asia are presently experiencing the second phase of the Malthusian hypothesis. During this phase, where there is a direct relationship between population increase and economic development, the increasing population is believed to have a beneficial effect on the overall economic path. This discovery

introduces a new level of complexity to the ongoing discussion about the connection between population dynamics and economic results.

In line with the findings of this study, Tsen (2005) highlights a similar viewpoint by emphasising the lack of a noticeable correlation between economic growth and population increase in Asian economies, a conclusion supported by the study's results. Tsen's research is therefore consistent with the current study in emphasising the complex and detailed nature of the connection between economic growth and demographic issues in the Asian environment. Tsen's emphasis on the absence of a straightforward correlation adds to the increasing evidence indicating that the relationship between population growth and economic expansion is complex and influenced by various factors. This highlights the need for a more comprehensive understanding of these relationships in different regions, considering the specific context. This collective understanding emphasises the intricate nature of examining the interaction between demographic patterns and economic progress in various Asian economies.

In addition, Mulok's (2011) study on Malaysia found that there is no statistically significant correlation between economic growth and population growth, indicating a higher degree of complexity. This statement is consistent with the findings of the study and questions traditional beliefs, emphasising the complex relationship between population changes and economic progress. The findings indicate that factors other than only population increase may influence the economic trajectory in Malaysia. This highlights the need for a more detailed knowledge of the various complicated elements involved in the situation.

This study adds to the current discussion by emphasising the importance of considering several factors that can influence the connection between population dynamics and economic growth. These variables may include governmental frameworks, institutional structures, and socio-economic settings that are specific to Malaysia. The results of this study, which align with Mulok's research, highlight the need for scholars and policymakers to consider the specific regional and contextual factors when examining the complex relationship between population growth and economic development. This finding cautions against making broad generalisations about the connection between these two factors.

Befikadu (2022) identified a persistent relationship between real gross domestic product, population size, foreign direct investment, and exchange rate in Ethiopia by the utilisation of the ARDL model. The study also included these covariates, but they did not show statistical significance at the 5% level of significance. According to the Malthusian theory, this study's results suggest that Zambia is currently experiencing the early stages of demographic transition, which is marked by elevated birth and mortality rates. Consequently, the current population expansion in Zambia has an insignificant effect on economic growth (Malthus, 2001).

The study's findings suggest that the country is currently in the early stages of demographic transition, based on the principles of the Malthusian hypothesis. This is characterised by high birth and mortality rates, which indicate a demographic picture that corresponds to Malthusian predictions. Therefore, the research suggests that currently, Zambia's population expansion has a little effect on economic growth, in accordance with the principles of Malthusian theory (Malthus, 2001). This perspective emphasises the significance of historical demographic patterns in influencing the current economic dynamics of a nation, providing useful information for policymakers and researchers.

This study provides significant insights into the intricate interaction between population dynamics and economic growth, emphasising the necessity of incorporating supplementary variables to comprehend these linkages. The varied results observed in different regions and countries emphasise the necessity for detailed and context-specific examinations when investigating the complex connection between population shifts and economic results.

5.1.1 Population growth and Economic Growth

The first specific objective of this study was to determine the effect of the annual population growth rate on economic growth in Zambia. The findings show that population growth does not have a short or long run effect on economic growth in Zambia. This therefore led to the failure to reject the null hypothesis of no significant statistical relationship population growth rate and economic growth in Zambia.

The findings are similar to those of Tsen (2005) who emphasises the lack of a noticeable correlation between economic growth and population increase in Asian economies. The results

are also in agreement with, Mulok (2011) who found that there is no statistically significant correlation between economic growth and population growth in Malaysia, indicating a higher degree of complexity.

However, the findings do not align with the model findings by Obere et al., (2013) who found that population change has a positive effect on economic growth in Kenya and that an increase in population will impact positively to the economic growth in the country. Similarly, the findings are also not aligned with Fantahun (2019) who in a study titled "the effect of economic growth of 43 Sub-saharan African countries: Panel data analysis" established that population growth has a positive effect on economic growth in the Sub-Saharan African Nations.

5.1.2 The Age Dependence Ratio (ADR) and Economic Growth

The second specific objective of this study sought to assess the impact of age dependence ratio on economic growth in Zambia. The model findings reveal that there exists a non-significant relationship between economic growth and the ADR and thus led to the failure to reject the null assumption of no relationship between the two variables.

The findings of this study are consistent with Dao (2012) who reports that a decline in fertility affects the age structure of the population of a developing country, but is found to have no significant statistical impact on economic growth when both the young and old dependency ratios are included in the model. The findings, however, are not consistent with those in a study by MOF (2015), who found that Zambia's demographic indicators and emerging economic opportunities can be turned into a sizable demographic dividend by 2053, which can propel the country to surpass the socio-economic transformation targets envisaged in its Vision 2030. Further, the long-term model results demonstrate a non-significant relationship between the Age Dependency Ratio and GDP growth.

5.1.3 Foreign Direct Investment (FDI) and Gross Domestic Product (GDP)

The third specific objective of this study was to establish the effect of foreign direct investment on economic growth in Zambia. The findings of the study show that there exists a short-run significant but long run non-significant effect of foreign direct investment on economic growth

in Zambia. This therefore led to the rejection of the null hypothesis of no relationship between FDI and economic growth.

The findings of this study reveal that foreign direct investment (FDI) has a positive significant effect on economic growth in Zambia with a 1% rise in foreign direct investment leading to a 1.486% rise in economic growth. The findings of the study are consistent with those of Libanda (2016) who in a study investigating the effect of foreign direct investment on economic growth in emerging countries with particular interest to Zambia found that foreign direct investment has a positive effect on economic growth in Zambia.

The findings of the study are however are not consistent with those of Ndaba (2015) who examined the effect of foreign direct investment in Zambia. Ndaba established that foreign direct investment has not contributed to dynamic economic growth because it is mainly concentrated in the mining sector. In the long run, the findings of the long run model show that foreign direct investment has a non-significant effect on economic growth.

5.1.4 Inflation and Economic growth

The fourth objective of this study was to analyse the influence of inflation on economic growth in Zambia during the period 1970 and 2021.The study results which show that there exists a non-significant long run relationship between inflation and economic growth led to the failure to reject the null assumption of no significant relationship between the two variables.

The short run model findings of the study show that Inflation has non-significant effect on economic growth in Zambia. The findings of the study are not consistent with those of Phiri (2013) who used quarterly data gathered between 1998 and 2011, to examine the threshold effects of inflation on economic development for the Zambian economy. The findings of the model show that inflation has a positive effect on economic growth in Zambia.Similarly, the long run model results reveal that inflation has a non-significant effect on economic growth in Zambia. These findings are not in line with those of Chibwe (2015) who established that Inflation has a negative effect on economic growth in Zambia using secondary time series data covering the period 1980 and 2011.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.0 Conclusion

This study examined the effect of population growth on economic growth and output in Zambia during the period 1970 to 2021. With Economic growth measured using Gross Domestic Product growth, this study sought to assess the impact of population growth, foreign direct investment, the age dependence ration and inflation on economic growth in Zambia. In the short run, the model results show that population growth and foreign direct investment, had negative non-significant effects on economic growth in Zambia. On the other hand, the Variables Inflation and the age dependence ratio all had positive non-significant effects on economic growth in Zambia.

Furthermore, in the long run the findings of the study show that only foreign direct investment (FDI) exerted a positive significant effect on GDP growth while the variables while the variables the age dependence ratio, population growth and inflation had non-significant long run effects on economic in Zambia during the study period.

6.1 Recommendations

The study's ramifications go beyond its immediate conclusions, necessitating a more comprehensive investigation of issues that have a substantial impact on economic growth. Future studies should explore alternative factors, acknowledging that economic advancement is influenced by a multitude of aspects. Technical progress is a significant determinant, and a thorough comprehension of how technology innovation drives economic expansion is vital. Education policies also have a crucial impact on shaping the labour force and, as a result, economic results. It is necessary to conduct a comprehensive examination of how different institutional frameworks affect economic growth, considering the influence of governance and regulatory settings in promoting or hindering development.

Furthermore, the study emphasises the significance of considering geographical and contextual differences that may modify the relationship between population increase and economic advancement. Distinct regions may have distinct dynamics affected by cultural, historical, and geographical variables. Hence, it is crucial to adopt a nuanced methodology that takes into

consideration these variables in order to achieve a thorough comprehension of the correlation between population and economic growth.

Moreover, the study emphasises the importance of workforce participation and educational attainment across different sectors of the economy. Gaining insight into the ways in which these factors either facilitate or impede economic growth is crucial for devising efficacious strategies. Policymakers should implement a holistic approach that extends beyond just tackling population trends. This entails formulating policies that bolster educational systems, guarantee skill acquisition, and generate abundant employment prospects. Acknowledging the fact that an increasing population can be advantageous rather than disadvantageous, economic policies should be specifically designed to utilise the potential of a rapidly expanding labour force.

The report advises against placing exclusive reliance on measures that target population control, such as the 2019 National Population Policy. Although these methods may contribute to influencing demographic patterns, they may not be adequate for attaining long-term economic sustainability. Instead, the focus should be on implementing policies that aggressively use the abilities of an expanding population. This entails making calculated investments in education, vocational training, and fostering a conducive environment for the production of employment opportunities.

The study emphasises the importance of adaptability in policymaking, as it suggests adjusting policies depending on empirical facts. Policymakers should demonstrate a willingness to modify plans in light of evolving conditions and novel insights derived from continuous study. This iterative and evidence-based approach guarantees that policies stay up-to-date and efficient in dealing with the changing dynamics of population and economic expansion.

Ultimately, the study advocates for a comprehensive and adaptable approach to policymaking, encouraging both academics and policymakers to examine a wide array of issues, consider regional variations, and be willing to modify tactics based on empirical data. A comprehensive viewpoint is crucial in promoting sustainable economic advancement that is in line with the intricacies of a swiftly evolving global landscape.

6.2 Limitations of the Study

This research successfully looked at how population growth and economic growth are related in Zambia. However, there have been limitations on how this has been done. The study's data may be modelled in a number of different ways, to start. By changing the proxies for some variables say inflation and economic growth, for instance, one might predict somewhat different results.

Another problem is that the study only used a tiny amount of data, which is problematic given the approaches used. The study's scope was constrained due to an inadequate number of data points, which hindered the author's ability to incorporate additional aspects that could have been of interest, such as the average years of schooling, labour force participation rate, and other significant indices of human development. The study period was constrained by the absence of data from government ministries and agencies before 1990, leading to the omission of significant variables from the model that were only available for years after 1990.

The statistical software, however, is flexible enough to allow for the presentation of findings from tiny samples. In order to replicate the estimation method and verify the correctness of the results, future study should consider using non-linear models and presumably include more nations in the region. It would have been ideal for the study to incorporate variables associated with education and employment.

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