An analysis of the impact of taxation and government expenditure components on income distribution in Namibia

by

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DECLARATION

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I declare that "**An analysis of the impact of taxation and government expenditure components on income distribution in Namibia**" is my own work and all information sources that I have used or quoted have been indicated and acknowledged by means of complete references.

_____ 15 November 2018__

Signature Date

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ABSTRACT

This research analyses the statistical relationship between income distribution and seven taxation and government expenditure components in Namibia using data from 1996-2016. The research is aimed at creating new knowledge on the research topic because no literature exists for Namibia. The Autoregressive Distributed Lag (ARDL) cointegration technique was employed to assess the long-run relationship between the dependent and independent variables in Eviews. The research findings indicated that there is no long-run relationship between the dependent variable and independent variables. In the short-run, the research findings indicate that government expenditure on social pensions and government expenditure on education have a balancing effect on income distribution, while tax on products, corporate income tax and customs and excise duties have an unbalancing and/or worsening effect on income distribution. Based on these findings, tertiary education loans are recommended as opposed to grants to ensure sustainability of Namibia Students Financial Assistance Fund (NASFAF). In adjusting corporate and value added taxes, the government is cautioned to avoid overburdening consumers and employees through tax shifting in the form of high prices of goods and services and low wages and benefits. A tax mix, tax discrimination and a hybrid of taxation and government expenditure components are strongly recommended to achieve a balance.

KEY TERMS

Income inequality; Government expenditure; Customs and excise duties; Taxation; Gini coefficient; Income distribution; Error correction model; Multiple linear regression; Social pensions; Education

DEDICATION

I wish to express my sincere appreciation and gratitude to the following individuals, units and institutions for their immense contribution towards the completion of this dissertation:

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The abovementioned individuals and institutions have contributed immensely to the completion of this dissertation. Any possible errors, omissions or shortcomings in this dissertation cannot however be attributed to them, but rather to the researcher himself.

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ACRONYMS

ADF - Augmented Dickey Fuller

AIDS - Acquired Immune Deficiency Syndrome

ARCH - Autoregressive Conditional Heteroscedasticity

ARDL – Auto-Regressive Distributed Lag

BEE - Black Economic Empowerment

BoN - Bank of Namibia

CE - Customs and Excise duty

CIT - Corporate Income Tax

CLRM - Classical Linear Regression Models

CMA - Common Monetary Area

CGP - Codes of Good Practice

CRP - Common Revenue Pool

CUSUM - Cumulative Sum

DRC - Democratic Republic of Congo

DF-GLS - Dickey-Fuller Generalized Least Squares

ECM - Error Correction Model

G - Gini coefficient

GEE - Government Expenditure on Education

GEH - Government Expenditure on Health

GDP - Gross Domestic Product

GLS - Generalised Least Square

GMM - Generalised method of moments

GNI - Gross National Income

HDI - Human Development Index

HIV - Human Immune Virus

MoF - Ministry of Finance

NDPs - National Development Plans

NEEEF - National Equitable Economic Empowerment Framework

NSA - Namibia Statistics Agency

NSFAF - Namibia Students Financial Assistance Fund

NHIES -National Housing Income and Expenditure Survey

NPC - National Planning Commission

OECD - Organization for Economic Co-operation and Development

OLS - Ordinary Least Squares

OMAs – Offices, Ministries and Agencies

PAYE - Pay As You Earn

SACU - Southern African Customs Union

SADC - Southern African Development Community

SDGs - Sustainable Development Goals

SNA - Standards of National Accounts

TB - Tuberculosis

TIW - Tax on Income and Wealth

TP - Tax on Products

SSC - Social Security Contribution

UN - United Nations

UNISA - University of South Africa

UNDP - United Nations Development Programme

UNAIDS - United Nations Acquired Immune Deficiency Syndrome

USA - United States of America

VAT - Value Added Tax

VECM - Vector Error Correction Model

WB - World Bank

DEFINITION OF KEY CONCEPTS

Customs duties – These are charges that are payable when goods first enter the economic territory of any Southern African Customs (SACU) Union Member State from outside the SACU.

Excise duties – Refers to the charges that are collected on specified goods that are produced and consumed in a specific country or economic bloc, e.g. SACU.

Gini coefficient: This is an internationally accepted measure of income distribution, which expresses the income distribution of a country into a single number ranging between 0 and 1. A higher number represents high levels of income inequality and vice versa.

Government expenditure – Refers to the purchasing of goods and services by the government. This is inclusive of all government operations such as the provision of public goods and transfer payments.

Income distribution – This refers to the way in which the national income of a country is distributed among its citizens.

Income inequality – The extent to which the national income of a country is unequally distributed among its citizens.

Social pensions – In the Namibian context, Social Pensions refers to the universal and unrestricted transfer of money to persons who are 60 years and older with the objective of improving the social welfare of the recipients. Social pensions in Namibia are extended to other vulnerable members of the society, e.g. people with mental and/or physical disabilities.

Taxation – The method in which governments raise funds by charging their citizens and corporate bodies to finance government expenditure.

CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1 Introduction

Income inequality is a global issue that has been at the centre of discussion over the past decades. Inequality has been receiving attention at both national and international level. Goal 10 of the United Nations Sustainable Development Goals (SDGs) is aimed at reducing income inequality within and among countries. At country level, national objectives such as Namibia's Vision 2030 and National Development Plans (NDPs) all prioritise the reduction of income inequality. Namibia's Vision 2030 has eight themes, the first of which is Inequality and Social Welfare (Office of the President, 2004). Increasing income equality was one of the three objectives of the fourth National Development Plan (National Planning Commission, 2012). Governments use taxation and expenditure for redistribution and revenue collection purposes, among others. Taxation is a way in which governments raise funds by imposing charges on citizens and corporate entities to finance their expenditures. Governments need funds from taxation to finance expenditures such as national defence, transport infrastructures, healthcare, education, ports and telecommunication services, among others. In economics, these goods are referred to as public goods. Apart from the provision of public goods, governments need funds to correct market failures such as negative externalities (e.g. pollution), information asymmetry and income inequality, among others.

This research analysed the impact of taxation and government expenditure components on income distribution in Namibia for a period of 21 years. Leu, Frey & Buhmann (2009) carried out a research to analyse the impact of government policies on income distribution in Switzeland using the Budget incidence approach. In conducting their investigation, Leu, *et al.,* (2009) used data from the first nationwide representative Income and Wealth Survey. The findings of their research indicate that government expenditures are more effective in redistributing national income as opposed to direct taxes. Social welfare expenditures were found to be more effective in redistributing national income as opposed to other government expenditures. Their research further indicate that indirect taxes have an unbalancing effect on the distribution of income. It is very important to conduct a similar research for Namibia

with some modifications to statistically analyse the relationship between income inequality and a selected number of taxation and government expenditure components in the country. Namibia is at the centre of discussion for this research because it is one of the countries with the highest income inequality levels in Southern Africa as per the World Bank categorisation of income inequality. The Gini coefficient is used as a measure of income inequality in this research because it is an internationally accepted measure of income inequality which is comparable across countries, and data for this variable is readily available. The findings of this research seek to create or expand knowledge pertaining to the effects of taxation and government expenditure components on income distribution in Namibia. Income in Namibia is unequally distributed with a Gini coefficient measure of 56 (Bank of Namibia Annual Report, 2015). The National Housing Income and Expenditure Survey (NHIES) of 2004 revealed that the richest fifth of the population accounted for 78.7 percent of the total national income, while the poorest fifth of the population survived on a meagre 1.4 percent of the total income (National Planning Commission, 2004). This is a clear indication that the resources of the country are in the hands of very few individuals, while the majority of the Namibian population dwell in abject poverty. Income inequality is a common phenomenon in most African countries, especially in Sub-Saharan Africa. It is worth noting that Africa has the highest level of income inequality among all continents with an average Gini coefficient of 43. The average Gini coefficient of other developing countries is 39 (African Development Bank Group, 2017). Namibia is a member of the SADC, which is an economic bloc consisting of 15 member states, including Zambia, Angola, Zimbabwe, Botswana, the Democratic Republic of Congo (DRC), United Republic of Tanzania, Lesotho, Madagascar, Malawi, Mozambique, Mauritius, South Africa (SA), Seychelles and Swaziland. Key objectives of the SADC are to fast-track economic growth and development, reduce poverty and improve the living standard of its inhabitants. The economic bloc also aspires to strengthen political and institutional co-operation and safeguard peace and security in the region. It is worth noting that member countries deal with taxation and expenditure policies individually. Namibia is also a member of the Southern African Customs Union (SACU) as well as the Common Monetary Area (CMA). Key objectives of the SACU are to smoothen cross-border trading between the member states. The bloc aims to promote an equitable and fair distribution of the

revenue arising from customs and excise duties levied by SACU member states using the SACU revenue sharing formula. Customs and Excise (CE) duty from the SACU is one of the explanatory variables for this research. The Gini coefficient for Namibia is considered very high as per the inequality categorisation of the World Bank below:

Table 1.1: Categories of income inequality

INCOME INEQUALITY CATEGORY	GINI COEFFICIENT VALUE/RANGE
Low income inequality	20-29.9
Medium income inequality	30-39.9
High income inequality	40-49.9
Very high income inequality	≥ 50

Source: World Bank (2018)

Several studies show that world income is unevenly distributed and this inequality in income distribution is evident within countries, between countries and between continents. Kuznets (1980) indicates that the three underdeveloped regions of the world (Latin America, Africa and Asia) account for 66.5 percent of the world's population but account for only 23.8 percent of the world's income. Table 2 below shows a comparison of income inequality and human development status of Namibia to its neighbouring countries:

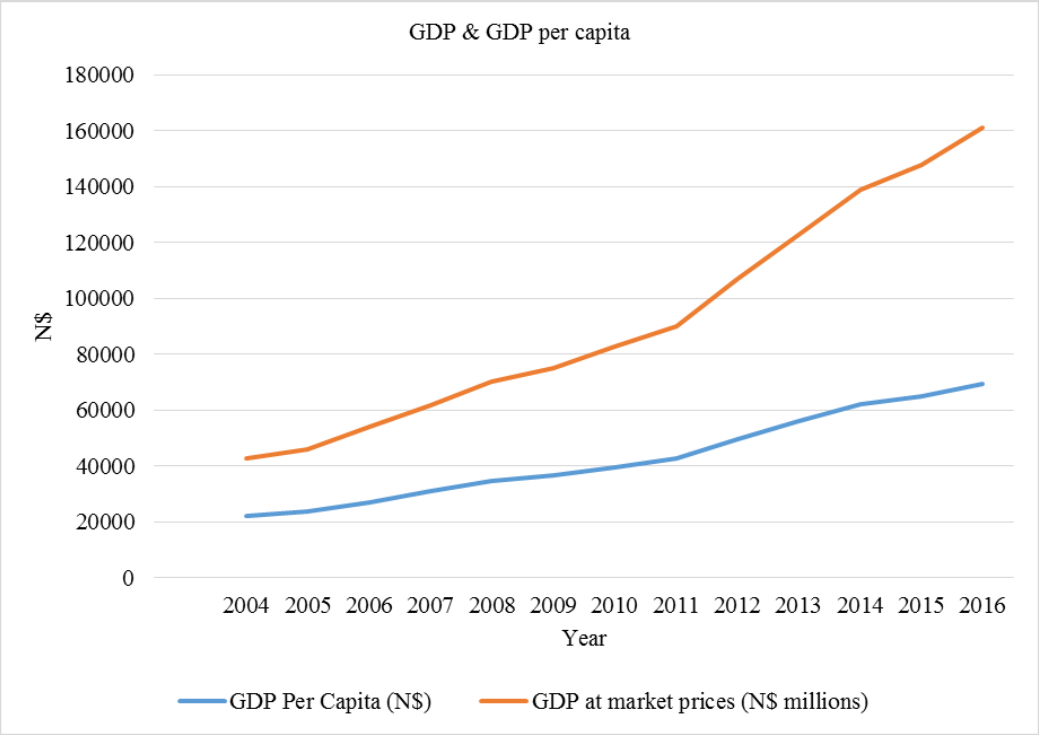
Table 1.2: Income inequality and Human Development Index (HDI)

Country	Income inequality category	Average Gini coefficient (2005-2015)	HDI Category	HDI (2015)
Namibia	Very high income inequality	61.3	Medium Human Development	0.628
South Africa	Very high income inequality	65.0	Medium Human Development	0.666
Botswana	Very high income inequality	60.5	Medium Human development	0.698
Angola	High income inequality	42.7	Low Human Development	0.532
Lesotho	Very high income inequality	54.2	Low Human Development	0.497

Source: United Nations Human Development Report (2016)

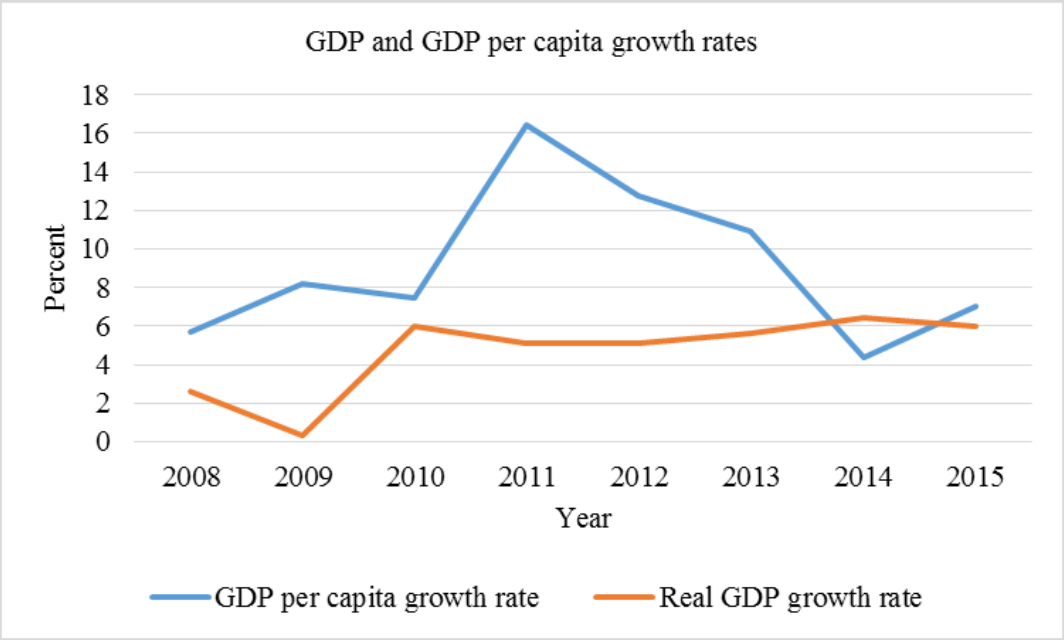
The Namibian economy has grown steadily during the past years with an average real GDP growth rate of 4.6 percent and an average GDP per capita growth rate of 9 percent over the past eight years (2008 - 2015). Despite this steady growth realized over the past eight years, the gap between the poor and the rich as measured by the Gini coefficient remained very high as shown in Figure 1.3 below. Figure 1.1 below depicts the growth trajectory of the real GDP and GDP per capita in actual values while Figure 1.2 presents the growth rate of real GDP and GDP per capita in percentage points.

Figure 1.1: Growth trajectory of the real GDP and GDP per capita in actual values



Source: Author's compilation using data from National Accounts

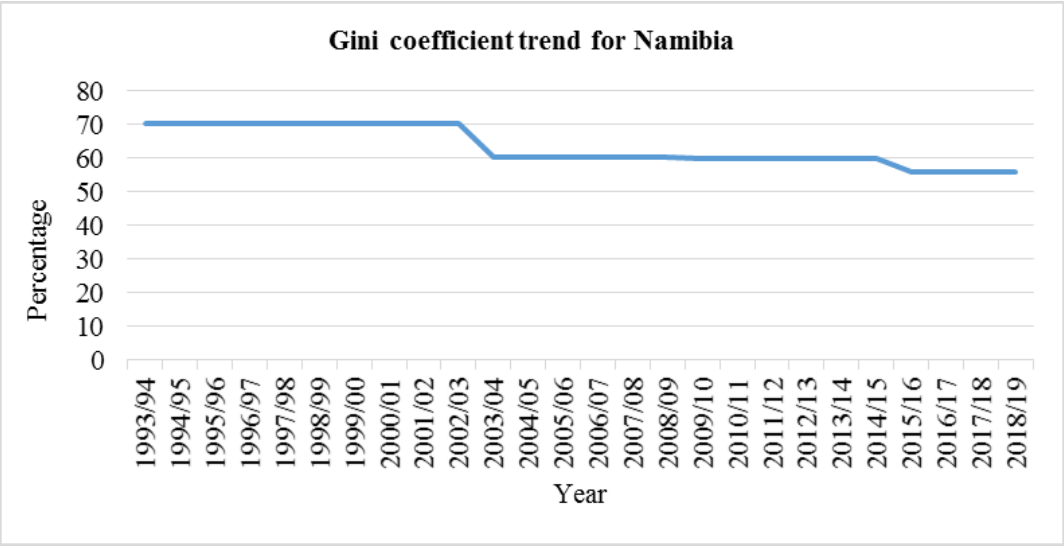
Figure 1.2: Real GDP and GDP per capita percentage growth rates



Source: Author's compilation using data from National Accounts

Based on the figures above, Namibia was ranked in the upper-middle income category, a situation that has lowered donor funding, which has shrunk since the announcement of the ranking. Income inequality in Namibia has been decreasing since 1990 but at a snail's pace. The graph below depicts the Gini coefficient trend for Namibia from 1993 to 2018.

Figure 1.3: Gini coefficient trend for Namibia



Source: Author's depiction using data from Namibia Statistics Agency

It is worth noting that the Gini coefficient figure for Namibia decreased between 1993 and 2017. However, the rate at which it is decreasing is a point of concern which requires prudent interventions. It can be clearly observed from Figures 1.1, 1.2 and 1.3 above that GDP and GDP per capita have been increasing gradually over the past few years, but that the Gini coefficient remains at an unacceptable level.

Taxation policies and regulations in Namibia are guided by the Income Tax Act and the Sales Tax Act, while social security matters fall under the Social Security Act of 1994. In terms of taxation policies, there are different forms of taxes, which can be categorised into five groups namely direct, indirect, regressive, progressive and proportional in nature. The variables considered for this dissertation are government expenditure on social pensions, government expenditure on education, government expenditure on health, customs and excise duty from SACU, tax on income and wealth, tax on products and tax on corporations. The naming of the variables in this dissertation is adjusted based on how they appear in the national accounts, which is the main source of data for this dissertation. To be specific, VAT is referred to as tax on products, corporate tax is referred to as tax on corporations while personal income tax is included in the category of tax on income and wealth in the national accounts.

1.2 Statement of the problem

This dissertation analyses the impact of taxation and government expenditure components on income distribution in Namibia in order to fill the gap in the literature because no literature exists for Namibia on this specific topic. Namibia has one of the highest income inequalities in the world with a Gini coefficient measure of 56 as of 2015. According to the World Bank categorisation of income inequality, Namibia is in the category of "very high income inequality" (see table 1.1 and 1.2 above). Given the gap in the literature and evidence of high income inequality, a need for an empirical study was identified in order to come up with research-based solutions and policy recommendations to address unequal distribution of income and the gap in the literature.

1.3 Research objective

The general objective of this dissertation is to analyse and interpret the impact of taxation and government expenditure components on income distribution in Namibia. Specific objectives of the study are:

a) To identify the gap in the literature by reviewing theoretical and empirical literature.
b) To apply statistical tools to test the joint significance of the selected variables
c) To identify which independent variables have a balancing/positive effect and which variables have a negative effect on the Gini coefficient.

1.4 Research questions

This dissertation seeks to get answers to the following research questions:

a) Are corporate income tax, customs and excise duty from SACU (SACU receipts), tax on income and wealth, tax on products, government expenditure on social pensions, government expenditure on health and government expenditure on education jointly significant determinants of the Gini coefficient?
b) Does corporate income tax, customs and excise duty (SACU receipts) and tax on products have an unbalancing effect on the Gini coefficient?
c) Does government expenditure on social pensions, government expenditure on education, government expenditure on health and tax on income and wealth have a positive or balancing effect on the Gini coefficient?

From the research questions above, we can derive the corresponding null and alternative hypotheses of the dissertation for each question. The hypotheses of the dissertation are:

a) Corporate income tax, customs and excise duty from SACU (SACU receipts), tax on income and wealth, tax on products, government expenditure on social pensions, government expenditure on health, and government expenditure on education are jointly significant determinants of the Gini coefficient.
b) Corporate income tax, customs and excise duty (SACU receipts) and tax on products have an unbalancing or worsening effect on the Gini coefficient.
c) Government expenditure on social pensions, government expenditure on education, government expenditure on health, and tax on income and wealth have a positive or balancing effect on the Gini coefficient.

1.5 Significance of the research

This topic is of interest to the researcher because it can contribute extensively towards finding a lasting solution to the skewed distribution of income in Namibia, which has one of the highest income inequalities in Southern Africa, as measured by the Gini coefficient. The researcher wishes to encourage other researchers and scholars to conduct further studies by building on this research. Protest movements such as the Affirmative Repositioning and the Landless People's Movement in Namibia all came about because of unequal distribution of income and wealth in the country. In summary, this research is significant in that:

a) It can be used as a guiding tool for policy making both in the private and public sector;
b) It can create new knowledge and understanding about the research topic;
c) It can be used as an instrument for further research;
d) It can provide additional research material for students who are studying research-related topics/subjects.

1.6 Expected contribution of the research

This research is a first attempt to analyse the impact of taxation and government expenditure components on income distribution in Namibia. It can thus contribute significantly to the field of economics and to the economy in various ways as summarised below: There is a gap in the literature because to the best of my knowledge, no literature exists on the impact of taxation and government expenditure components on income distribution in Namibia. Therefore, this study attempts to fill this gap and create new knowledge in this area. This research is also inclusive because it covers many taxation and expenditure variables compared most previous papers, thus creating new knowledge in diverse aspects. Considering the similarity in the economic structures of SADC member states, other SADC countries can use this research as a benchmark for further enquiry into the impact of taxation and government expenditure components on income distribution. Research material on the SADC region is scanty and additions are of immense value.

1.7 Outline of the research

The rest of this research is structured as follows: Chapter 2 provides an outline of taxation and income inequality on a global perspective, taxation and government expenditure in Namibia as well as the status of income distribution in the country. Chapter 3 presents the review of theoretical and empirical literature pertaining to the research topic. It highlights the findings of various researchers on the topic, and covers the methodologies used in empirical literatures. The chapter also looks at conflicting and contradicting literature as well as conformity to general theories. Chapter 5 presents econometric data analysis and empirical findings of the research using the estimation model and techniques. The chapter provides an interpretation of the empirical relationship between the dependent variable and independent variables. Chapter 6 presents a summary of the findings of this research. It consists of the summary of the empirical research findings, policy recommendations and limitations of the research.

CHAPTER 2: INCOME DISTRIBUTION AND POLICIES FOR REDRESS IN NAMIBIA

2.1 Introduction

This chapter presents an outline of taxation and government expenditure in Namibia as well as the current state of income distribution in Namibia. It covers four main discussions, namely, the pillars of national development planning, taxation in Namibia, an overview of government expenditure in Namibia, and the state of the distribution of income in Namibia, followed by a brief conclusion of the chapter. Before proceeding, the global perspective is painted.

2.2 Income inequality and taxation on a global perspective

2.2.1 Income inequality in the world

Income inequality is a global challenge that affects all countries in the world. However, the degree of inequality differs from country to country and continent to continent. Various researchers and scholars indicate that the world income is unequally distributed and that this inequality occurs within countries, between countries and between continents. Kuznets (1980) indicates that the three underdeveloped continents of the world, namely Latin America, Africa and Asia, account for more than 60 percent of the world's population but account for less than 30 percent of the world's income. Table 2.1 below depicts the distribution of income according to different household quantiles.

Table 2.1: Income distribution of selected countries

Households (quantile)	**Percentage of total income**		
	Brazil and South Africa	**United States**	**Finland and Sweden**
Lowest	2	5	8
Second	5	11	14
Third	10	16	20
Fourth	18	24	23
Highest	65	44	35

Source: Parkin (2016)

According to the African Development Bank Group (2017), Africa has the highest income inequality in the world with an average Gini index value of 43, while Europe has the lowest income inequality. At country level, South Africa, Colombia, Namibia, Botswana, Brazil, Honduras and Chile are among countries with the highest income inequalities in the world, with an average Gini index value above 50. Countries with the Gini index value of 30 and above but less than 50 are considered as medium Gini coefficient countries. These countries include Russia, Vietnam, Argentina, Mexico, Uruguay, Poland and the United States. Countries with a Gini coefficient below 30 are considered as low Gini index countries, and these countries include Norway, Denmark, Austria, Slovenia, Germany, Sweden and Ukraine, among others. The causes of income inequalities differ from continent to continent and country to country. The next section highlights the causes of income inequality and the strategies that can be implemented to mitigate the effect of income inequality.

2.2.2 Causes of income inequality

Income inequality can be attributed to a number of factors, which differ from country to country and continent to continent. Below are seven factors that are attributed to income inequality in the United States of America (USA). These are ability, education and training, discrimination, preferences and risks, unequal distribution of wealth, market power and luck, and connections and misfortunes (McConnell and Brue, 2002). These factors are based on the explanations below:

a) **Ability** - People have different mental, physical and aesthetic talents and abilities that can enable them to earn high salaries over time. Some people have very weak mental and physical abilities that consequently deprive them of highly paid professions. This condition is hereditary and as a result, people of a specific bloodline are likely to remain poor because they can only secure low paying jobs based on their mental and physical abilities.
b) **Education and Training** - Education and training can generate continuous income for people over time. The more educated the individual is, the more future income the individual can receive, thereby reducing income inequality. Firms should be encouraged to offer bursaries and scholarships to their workers as well as to deserving students from low-income households to acquire those rare skills.

There is also a need to prioritise some fields of study which are deemed very critical in terms of skills shortage to increase the country's productivity in the future and consequently reduce poverty and income inequality. This should be done with caution to ensure the inclusion of low income earners and poor members of society.

In the modern world, most industries are very sophisticated and require highly skilled labour because of the nature of their operations. These industries include the health sector (surgeons to be specific) and the aircraft industry. To ensure that there are enough rare skilled workers such as doctors and engineers, nations must ensure that high school graduates from poor families/poor townships are well equipped with the necessary skills to pursue specialised professions with a view to reducing income inequality. Firms should also be encouraged to offer bursaries and scholarships to poor citizens as part of their corporate social responsibility to enable deserving students from low-income households to acquire specialised skills.

c) **Discrimination** - McConnell and Brue (2002) identify discrimination as a source of income inequality in the USA. This occurs because of biased selection in education, hiring, training and promotion that as a result contributes to high income inequality. Discrimination in the USA is based on race and gender, and as a result, racial and ethnic minorities are restricted to low-paying jobs because the labour supply is artificially modified to favour men and the majority race in the USA, thereby increasing income inequality along racial and gender lines.

d) **Preferences and Risks** - It is believed that consumer preferences and risks are among the major causes of income inequality in the USA. Individuals who prefer to stay home or work fewer hours to take care of their families often find themselves in the low-income group and, at times, they find it difficult to meet basic needs, thereby increasing income inequality.

e) **Unequal distribution of wealth** - Unequal distribution of wealth is associated with income inequality everywhere in the world. People with wealth in the form of machinery, real estate, farmland, stocks and bonds and savings accounts tend to receive more income from their wealth compared to those with no wealth at all.

New graduates may have a good salary but it takes several years to accumulate assets.

f) **Market power** - Manipulation of the market system for own benefit can increase income inequality because it restricts the participation of other market participants. This is done in some professions whereby new entrants are required to obtain operational licences, but the entry criteria are in the hands of competitors, who can easily control the number of new entrants or competitors into the market.

g) **Luck, Connections and Misfortunes** - Income inequality can be a result of luck, connections and misfortune. Discovering gold/oil/diamonds on a farm or owning land along a proposed freeway has resulted in substantially high income for individuals. Good industry connections and political connections are other personal and professional connections can lead to extremely high incomes. On the other hand, misfortunes such as fatal illnesses, fatal accidents and the death of a breadwinner in the family and loss of income/employment may result in extreme inequalities.

Even though the abovementioned causes of income inequality were identified specifically for the United States, most of them are applicable to other countries' situations. The next section provides mitigation measures to deal with the challenges of income inequalities.

2.2.3 Policies and strategies to reduce income inequality

According to Nafziger (2006), the following policies should be put in place to deal with the problem of unequal distribution of income.

a) Population Programmes

Individuals in the low income group tend to have fewer children in order to reduce the financial burden on the parents, such as medical, educational and food costs. Low-income earners should be encouraged to reduce the sizes of their families through family planning.

b) Health and Nutrition

Least Developed Countries increase equity by shifting funds from advanced curative medicines in urban areas to hospitals and health services in rural areas. The demand for health care of low-income earners is highly price-elastic and when the fees are

higher than nominal, the poor are the first to drop out. This problem can be solved by charging the rich high fees to subsidise health care for the poor. Poor health and insufficient food reduce employment opportunities and the earning power of low-income earners. Therefore, food subsidies or free rations increase the income of the poor, thereby improving their health and consequently permitting them to work many days per year. An unhealthy employee represents a double loss to the employer because of lost production due to sick leave, and the employer still has to pay the employee who is on sick leave.

c) Education and Training

Education and training are the major factors that can reduce the problem of income inequality in any country. Gaining skills through education as well as through other forms of human capital yields a stream of income over time. Therefore, low-income earners should be given the privilege to attain free primary, secondary and tertiary education. This can help the country to achieve equality in income distribution. Given the fast changing nature of technology, industries and employers prefer educated as opposed to uneducated workers. It is worth noting that uneducated and educated workers are considered as imperfectly substitutable inputs to the production process. This is true in most industries, especially in the medical, financial and IT industries. In a heart operation, 10 nurses with a midwife and nursing certificate cannot replace one cardiologist. From this viewpoint, it is evident that different production processes are demanding more of educated labour as compared to uneducated labour, and educated labour cannot be substituted by uneducated labour regardless of the quantity of uneducated labour. In the modern world, most industries are very sophisticated and require highly skilled labour because of the nature of their operations. These industries are such as the health sector (surgeons to be specific) and the aircraft industry (Meier and Rauch, 2005). It is therefore advisable that low income earners be encouraged to obtain some sort of education and/or ensure that their children obtain the best education they can afford to ensure a steady future income and avoid generational poverty.

d) Research and Technology

The benefit of research and modern technology in reducing income inequality is most apparent in agriculture. The introduction of high-yielding wheat and rice, “the green revolution”, has expanded food supply and reduced food prices for the poor. It is

worth noting that the strategies identified by Nafziger (2006) above are in line with the existing economic theories.

The implementation of remedial measures highlighted by Nafziger (2006) above would require government expenditure, and the main source of government funds is taxation. This shows the crucial role of taxation and government expenditure components in the redistribution of income.

2.2.4 Measures of income inequality

Hayami (1998) identifies three ways of measuring income inequality. The first method is the simplest one and is measured by taking the percentage of total income accruing to households belonging to the high-income or low-income class (such as the bottom 20 percent of households). The higher the share of the high-income class and the lower the share of the low-income class, the greater the inequality, and vice versa. The second measure is by taking the ratio of the income share of the top group to that of the bottom group, which equals the ratio of the average income in the highest income group to that of the low-income group. The third measure is the Gini coefficient, which is derived from the Lorenz curve. The Gini coefficient was developed by an Italian statistician and sociologist, Carrado Gini, and published in his 1912 paper titled "Variability and Mutability". The Gini index value lies between zero and one ($1 \leq$ Gini coefficient≤ 0). A large Gini coefficient figure indicates a high level of inequality and a low Gini coefficient figure is associated with low income inequality. The first two measures of income inequality are simple to calculate and easy to understand, but they are subject to constraints such as biased use of information pertaining only to the top and the bottom group and randomness in the differentiation of the income classes. The Gini coefficient is used instead, to avoid the above-mentioned shortcomings. Income inequality could also be measured from the expenditure side and not only from the income side. When income inequality is measured from the expenditure side excluding tax payments, the Gini coefficient tends to be lower than when tax payments are included (Fourie and Burger, 2013).

2.2.5 The rationale for paying tax

2.2.5.1 Why should we pay tax?

While many people regard paying tax as a form of legalised theft, Munday (1996) provides three main reasons why taxation should remain an integral part of the national economic system. The first function of taxation is to redistribute income from those who have more to those who have less. The second function of taxation is to correct market failures. These market failures include lack or limited provision of public goods, lack of perfect information/asymmetric information, monopolies that exist within the free market economy and negative externalities. Public goods and services include all goods and services that cannot be provided efficiently and profitably by the private sector, such as national defence, police services, public road infrastructures and telecommunication services. Negative externalities include pollution by firms as well as the need to regulate the fishing, mining and forestry sectors to avoid over-exploitation of these natural resources. This can be corrected by creating an ownership structure and legally establishing charges for the use of these natural resources. The third function of taxation is to raise revenue for the government. We can add the fourth function of taxation within the macroeconomic policy, which is to regulate the level of aggregate demand in the economy by cutting or raising tax, depending on the state of the economy. Based on the critical points above, we confidently conclude that taxation should remain an integral part of the economic system because of its crucial role in the national economy.

2.2.5.2 What makes a 'good' tax

The tax system should be extremely significant and avoid wastage. Munday (1996) identifies three criteria for a good tax. Firstly, the tax must be fair. Secondly, the tax must minimise the administrative cost involved in collecting tax, and lastly, it must minimise the disincentive effects of taxes. Munday's criteria are in line with the four 'canons' of a good tax stipulated by Smith (1776), which include:

Economy - All taxes should be inexpensive to collect and should not discourage desirable business;

Convenience - All taxes must be collected in a way that is convenient to the taxpayer;

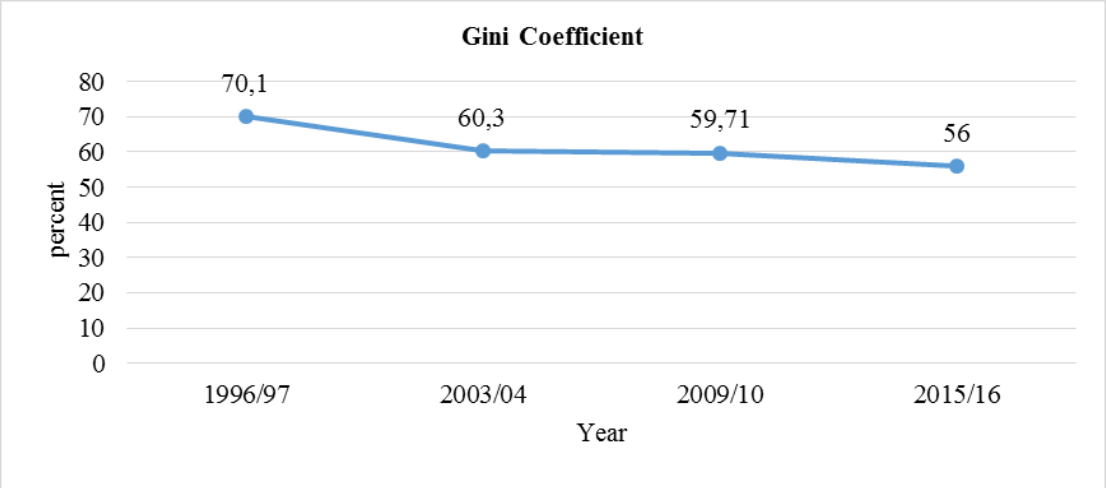
Certainty - All taxes must be clear and easy to understand; and

Equity - All taxes must be fair in all essence.

2.3 Income distribution in Namibia since 1990

When the first democratically elected government took over on 21 March 1990, Namibia was faced with a number of challenges such as a much-skewed distribution of income (with the Gini coefficient greater than 70), low level of education and a large element of unskilled labour. As highlighted in 2.2.1 above, education and training is one of the determinants of income inequality. It is worth noting that income inequality has reduced since independence, though at a snail's pace. This is evident from Figure 2.1 below.

Figure 2.1 Gini coefficient trend



Source: Author's depiction using data from Namibia Statistics Agency

The government embarked on a number of redistribution policies and strategies with a view to equalising the much skewed distribution of income and correcting the errors of the Apartheid system. Employment and education opportunities had been offered on the basis of race and ethnicity, and this created a wide gap between the white and previously disadvantaged communities (Black people, Coloureds and Basters) of Namibia. It is worth noting that at independence in 1990, the white Namibians' social pension was three times higher than that of the previously disadvantaged people. Discriminatory practices of this nature contribute extensively to income inequality as indicated by McConnell and Brue (2002) in section 2.2.1 above. The social pension of white citizens was frozen while upwardly adjusting the social pension of previously disadvantaged citizens until 1994, when the social pension was equalised at N$ 120. During the equalisation process, white Namibian pensioners were left worse-off

because their social pension was reduced by more than 30 percent (Bank of Namibia, 2013).

2.3.1 Redistribution policies and strategies

Policies and initiatives that were put in place to address unequal distribution of income include:

- Black Economic Empowerment
- Affirmative Action Act, Act 29 of 1998
- National poverty reduction strategy of 1998
- Zero Hunger challenge
- The New Equitable Economic Empowerment Framework

a) Black Economic Empowerment (BEE)

The BEE initiative was initiated with a view to bringing previously disadvantaged Namibians into the mainstream economy and to close the gap that existed between previously disadvantaged and previously advantaged individuals. BEE in Namibia is considered as an important poverty alleviation measure among indigenous Namibians who are considered "previously disadvantaged" due to the past colonial apartheid policies. The Namibian Black Economic Empowerment is applied without a National Black Economic Empowerment Policy. Despite that shortcoming, the Black Economic Empowerment Guidelines were developed by the government and government Offices, Ministries and Agencies (OMA's), and private institutions are encouraged to formulate their own empowerment initiatives in alignment with the draft Black Economic Empowerment strategies. A BEE scorecard was formulated to measure the implementation of the Broad Based Black Economic Empowerment objectives by the various sectors of the economy. The BEE scorecard is part of the Code of Good Practice (CGP) which measures compliance of all sectors of the economy. According to the Office of the Prime Minister (2005), the four components of the Codes of Good Practice are direct empowerment, human resources development, indirect empowerment and the residual sector specific indicator. The four codes of good practice, their subcomponents and weights are summarized in Table 2.2 below:

Table 2.2: Components and weights of the CGP

Component	Weight	Subcomponent	Weight
Direct Empowerment	30 %	Ownership	20 %
		Management and Control	10 %
Human resources development	30 %	Employment equity	10 %
		Training and skills development	20 %
Indirect empowerment	30 %	Preferential procurement	20 %
		Enterprise development	10 %
Residual sector specific indicator of their choice	10%		

Source: Office of the Prime Minister

b) Affirmative Action Act, Act 29 of 1998

The second intervention is the Affirmative Action Act, Act 29 of 1998, which was developed to ensure that previously disadvantaged Namibians have equal employment opportunities and a fair representation in the workforce of relevant employers. The formulation of the Affirmative Action Act was necessitated by the need to redress the wrongdoings of the past colonial apartheid system which provided employment opportunities to citizens on the basis of race and ethnicity. Previously disadvantaged Namibians were prohibited from occupying certain some positions and the Affirmative Action Act was established to fill the gap created by this practice. The Affirmative Action Act promotes skills development and training to ensure that previously disadvantaged persons are competent for the positions they occupy, thereby ensuring that performance standards are not compromised. To ensure proper implementation of the Affirmative Action Act, the Employment Equity Commission was established to enforce and keep track of the implementation of the affirmative action plan. In the implementation of the Affirmative Action Plan, the Namibian government (including SOEs and Parastatals) has been spearheading the process by appointing previously disadvantaged Namibians to management positions.

c) National Poverty Reduction Strategy of 1998 and the Zero Hunger Challenge

The third intervention is the National Poverty Reduction Strategy of 1998, which is aimed at reducing poverty drastically in the country. Following the approval of the poverty eradication strategy, the 'Namibia Poverty Reduction Action Plan 2001-2005'

was developed to fast-track the implementation of the Poverty Reduction Strategy. Namibia has also adopted the Zero Hunger Challenge, which is one of the 17 sustainable development goals. The fourth programme worth mentioning is the Food Bank, which was initiated by His Excellency Dr. Hage Geingob, the current President of Namibia. The Food Bank provides food supplies to vulnerable members of society in urban areas. To show his seriousness in reducing poverty in the country, Dr. Geingob formed a Ministry designated to specifically fight and end poverty in Namibia, which is referred to as the "Ministry of Poverty Eradication and Social Welfare". During the formulation of the First National Development Plan (NDP1), Namibia adopted the reduction of poverty as one of its national objectives. It is important to note that during NDP1, Namibia adopted the reduction of poverty over its alleviation or eradication. However, this time around, the government has committed its time and resources to eradicate poverty at all levels.

d) The New Equitable Economic Empowerment Framework

The NEEEF is an initiative of the Namibian government, which is aimed at achieving equity using the procurement system of the government as the main instrument, considering the fact that government has one of the largest procurement systems in the country. As of this year (2018), the framework is at the final stage where inputs from stakeholders are being incorporated. The NEEEF consists of policies and guidelines that are crafted to deliberately motivate and encourage the private sector to involve previously disadvantaged Namibians in their operations and business activities in order to achieve the desired level of equity and national economic empowerment. In its quest to realise the required level of economic empowerment and equity, the Namibian government will use all legal instruments such as procurement and licensing in order to achieve its objective (Government of the Republic of Namibia, 2016).

According to the Government of the Republic of Namibia (2016), the objectives of the NEEEF include but are not limited to the following:

- Ensuring that the country's resources are shared equitably and sustainably by all Namibians;
- Create a socially just society in which all citizens have equal opportunities regardless of their race, ethnicity, religion and political affiliation;

- Implement redistributive policies and strategies to address the challenge of unequal distribution of income and resources;
- Create instruments and platforms for economic empowerment;
- Ensure that previously disadvantaged Namibians are brought into the mainstream economy.

2.4 Pillars of national development planning

In 2004 the Namibian government through the Office of the President developed Vision 2030, which is a high-level document aimed at fast-tracking Namibia's national development. Vision 2030 is aimed at achieving prosperity, industrialization, peace and political stability in Namibia (Office of the President, 2004). Vision 2030 is a long-term vision of the government, which is implemented in five-year national plans, starting from NDP 2 to NDP 5. Each government Office, Ministry and Agency is required to develop a five-year strategic plan, which should incorporate NDP objectives. The five-year strategic plan for each government Office, Ministry and Agency is then cascaded to annual plans for implementation. In 2015 the Namibian government, through the Office of the President, spearheaded the development and finalisation of the Harambee Prosperity Plan (HPP). The HPP is a four-year plan aimed at accelerating economic growth in strategically selected sectors of the economy which are deemed critical for the growth and development of the Namibian economy. The Plan is designed to complement NDPs and Vision 2030. Namibia is currently implementing NDP 5, which aims to achieve greater efficiency in tax collection and broaden the revenue base of the government through tax reforms (National Planning Commission, 2017).

2.5 Taxation in Namibia

2.5.1 Income tax

Income tax policies and regulations in Namibia are guided by the Income Tax Act. It is worth noting that Namibia adopted a progressive income tax system, and the tax bracket was adjusted in 2015 to ensure that employees in the low-income category do not pay tax, thereby contributing towards the realisation of a fair distribution of income. Tax on income in Namibia ranges between 18 and 37 percent. The table below shows different tax rates for different income categories:

Table 2.3. Taxable personal income

Income rage (N$)	Tax rate
0 - 50 000	Not taxable
50 001 - 100 000	18 percent for each N$ above 50 000
100 001 - 300 000	N$ 9 000 + 25 percent for each N$ above 100 000
300 001 - 500 000	N$ 59 000 + 28 percent for each N$ above 300 000
500 001 - 800 000	N$ 115 000 + 30 percent for each N$ above 500 000
800 001 - 1 500 000	N$ 205 000 + 32 percent for each N$ above 800 000
Above 1 500 000	N$ 429 000 + 37 percent for each N$ above 1 500 000

Source: Ministry of Finance Website

In Namibia it is the responsibility of an individual to submit a tax return form to the Receiver of Revenue Office once a year. The tax year runs from 1 March to 28 February and employers are empowered to withhold the tax income of their employees and pay it directly to the Receiver of Revenue. The employer is tasked with a number of duties such as:

a) To register as an employer with the Receiver of Revenue and inform the Receiver of Revenue in writing of any changes to the registration particulars.
b) To keep track of the remuneration paid to every employee and the tax deducted.
c) Deduct the correct amount of tax from the employees' remuneration and be responsible for any errors that they may make along the way.
d) Issue the PAYE5 certificate to all employees within one month after the end of the tax year (Ministry of Finance, 2018).

Currently, the Receiver of Revenue office in Namibia is under the supervision of the Ministry of Finance. However, the Namibia Revenue Agency Act, Act 12 of 2017 made provision for the establishment of Namibia Revenue Agency. The Revenue Agency will be responsible for all tax revenue collection related matters when it is operationalised. The powers and functions of the Revenue Agency include the following activities: collection and assessment of tax as mandated by the Act, and imposition of charges on overdue accounts and taxation related activities that are currently undertaken by the MoF. Once operationalised, the Revenue Agency will be the agent of the government that will be responsible for tax assessment and the collection and recording of government revenue under the direct supervision and

guidance of the Minister of Finance. The Revenue Agency was established with a view to ensuring effective and efficient revenue collection for the government.

2.5.2 Tax exempted income

The Income Tax Act provides for tax exemption for various income categories. Below is a summary of some of the tax exempted income types as per the Income tax Act, 1981:

a) Local and foreign dividends received by or accrued to any company.
b) Salaries of any person who holds office in Namibia as an official of a government other than the government of Namibia, or of any agency of the United Nations as stipulated in section 16(c) of the Namibia Income Tax Act.
c) Interest earned from deposits in the Namibia Post Office Savings Bank.
d) Interest earned from stock or securities issued by the government of Namibia or any local authority.
e) A bursary granted to a person to assist such a person to study at a recognised educational or research institution.
f) A single grant given to a person upon obtaining a higher or additional academic qualification at a recognised institution of open learning. This refers to a grant that most private companies, Government and State Owned Enterprises give to individuals upon completion of an academic qualification. This grant is a form of motivation and a token of appreciation for the academic accomplishment.
g) A uniform allowance given to an employee, which is clearly distinguishable from ordinary clothing.
h) Compensation lump sum paid by the employer to the beneficiaries/family members in case of the death of an employee.
i) N$ 300 000 of the lump sum gratuity payments received due to the relinquishment of any office by a person older than 55 years or due to ill health, superannuation, early retirement or termination of services due to redundancy.

It is worth noting that income earned by a trust is taxed as a person; therefore, Table 2.3 above is applicable for the taxation of trusts. Farmers are taxed in the same manner as individuals or companies with the exception of certain provisions pertaining to capital expenditure. Married persons in Namibia (husband and wife) are taxed separately.

2.5.3 Corporate income tax

Corporate income tax in Namibia is guided by the Income Tax Act, the same statutory instrument which regulates personal income tax. The general corporate tax rate stands at 32 percent. Mining companies (excluding diamond mining companies) pay the corporate tax rate of 37.5 percent, while the diamond mining companies' corporate tax rate stands at 55 percent. Corporate tax rates for petroleum companies (including exploration, development and production operation) stands at 35 percent. The table below presents a summary of corporate tax rates for various categories:

Table 2.4 Corporate tax rates in Namibia (2017/18)

Company Tax	Tax rate
Corporate tax	32 percent
Branch income tax	32 percent
Diamond mining companies	55 percent
Mining companies (apart from diamond mining companies)	37.5 percent
Long term insurance companies (40 percent of gross investment income taxed at 32 percent)	12.8 percent
Petroleum companies (exploration, development or production operations)	35 percent

Source: Ministry of Finance website

Manufacturing companies in Namibia are treated differently in terms of corporate tax. Tax incentives are offered to manufacturing companies with a view to promoting manufacturing and industrialisation for the purpose of economic growth and employment creation. For the first ten years of operation of a manufacturing company, a special corporate tax rate of 18 percent is charged. After the end of the 10 year incubation period, the normal corporate tax rate of 32 percent will become applicable.

2.5.4 Value Added Tax and social security

Value Added Tax (VAT) is a form of tax that is payable on the taxable value of all goods and services sold or imported in accordance with the Value Added Tax Act, Act 10 of 2000. The standard VAT rate in Namibia stands at 15 percent of the value of goods and services; however, basic goods are exempted from VAT to ensure affordability. These include white and brown sugar, maize and mahangu meal, sun flower cooking oil, fresh milk, animal fat used for the preparation of food, and bread,

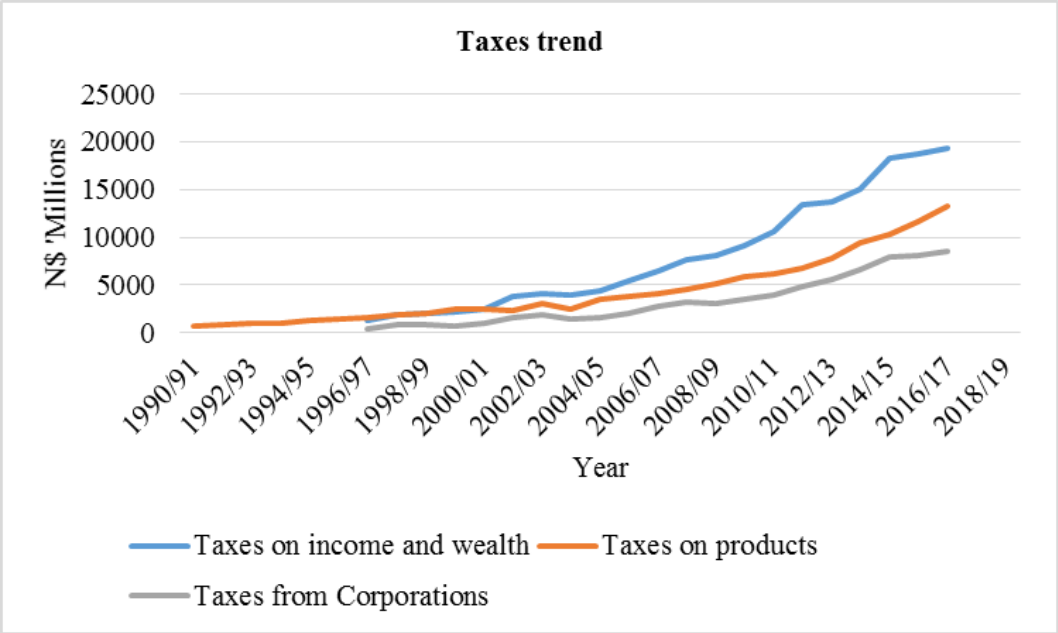
among others. This is done with the purpose of making basic goods and services affordable to consumers in the low income category. Other goods and services that are exempted from VAT are exports of goods and services, financial services, medical services and services provided by hospitals, education services, local authorities, fringe benefits, supplies to foreign heads of state, public transport services and international transport services, among others. The exemption from VAT is however subject to specified terms and conditions. Any company, individual, trust or partnership carrying on a taxable activity with a turnover for the past or future 12-month period in excess of N$ 500 000 is obliged to register for VAT.

Social security operations and activities in Namibia are guided by the Social Security Act, Act 34 of 1994. The employer and employee are obliged to make a combined social security contribution of 1.8 percent of the employee's basic salary on a 50-50 basis. Both the employee and the employer are obliged to contribute 0.9 percent each to make up 1.8 percent. The maximum monthly social security contribution for both the employer and the employee is N$ 81, while the minimum amount payable by the employee and the employer is N$ 2.7. All employees under the age of 65 years are obliged to make monthly social security contributions and the employer is obliged to pay the social security contribution over to the Social Security Commission within 30 days after the end of the month.

2.5.5 Taxation and government revenue

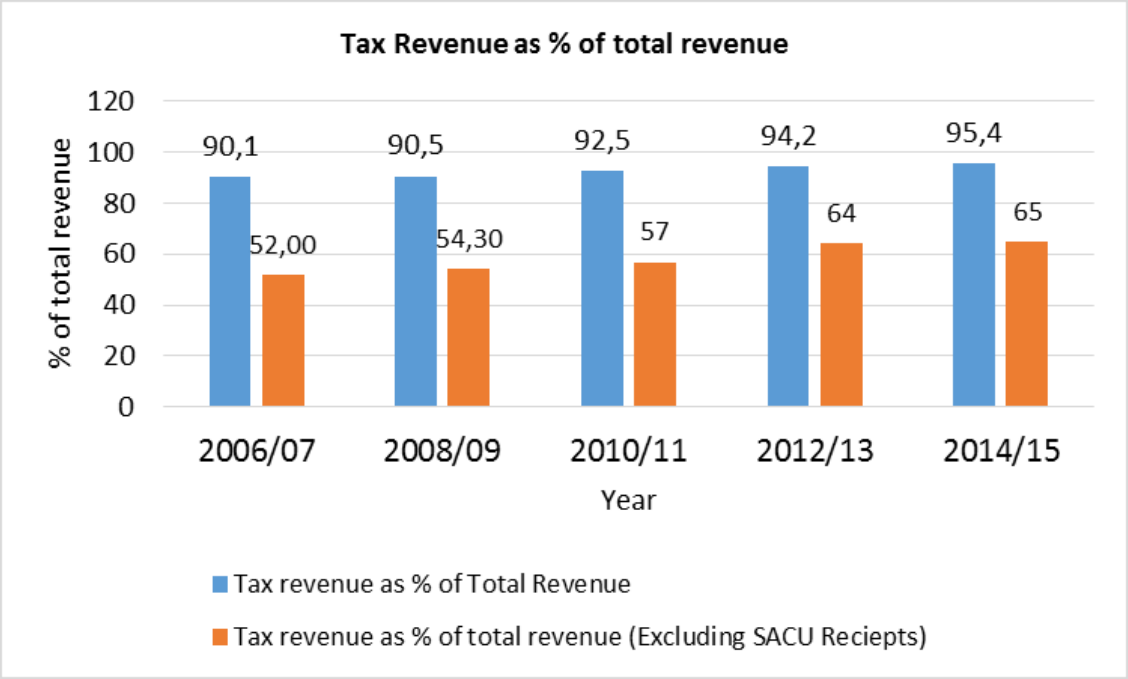
Taxation plays a major role as a vital source of revenue for the Namibian government and also as a fiscal policy instrument. In general, taxation is the main source of revenue for the Namibian government, contributing about 90 percent of total government revenue, and this is evident from the revenue figures below:

Figure 2.2: Government revenue from various taxes



Source: Author's depiction using data from national accounts

Figure 2.3: Tax revenue as a percentage of total revenue



Source: Author's depiction using data from national accounts

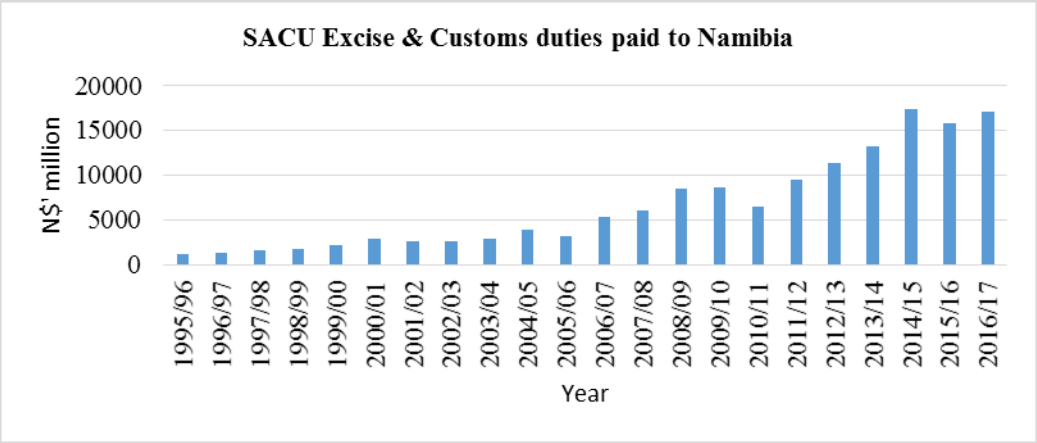
Figures 2.2 and 2.3 above demonstrate that tax revenue, including customs and excise duties from SACU (SACU receipts) constitute more than 90 percent of total government revenue. With the exception of SACU receipts, tax revenue constitutes more than 50 percent of total government revenue. It is worth noting that three taxes

discussed above are among the explanatory variables considered for data analysis in this research.

2.5.6 Customs and excise duties

The Directorate of Customs and Excise in the Department of Revenue Management of the Ministry of Finance is responsible for the regulation and implementation of Customs and Excise laws in Namibia (Ministry of Finance, 2018). The Customs and Excise Act (Act no. 20 of 1998) regulates the functions and operations of the directorate of customs and excise. As mentioned in Chapter 1 above, Namibia is a member of the SACU, and therefore, customs duties are payable according to the CRP. Special duty rates apply to imports from SADC member states, while goods may be imported customs duty-free from Zimbabwe as per the Namibia-Zimbabwe Free Trade Agreement. Customs duties are payable when goods first enter the economic territory of any SACU Member State from outside SACU. No customs duties are payable when goods enter the economic territory of one Member State from another. For goods in transit, duties are collected at destinations, and therefore, no Member State collects duties on behalf of another. The excise duties are collected on specified goods that are produced and consumed within the SACU, and no excise duties are levied on the specified goods that are exported to non-SACU countries. The excise duties are payable at factory gate, and are not payable when the goods enter the economic territory of one Member State from another. Duties collected by Member States are transferred into the Common Revenue Pool (CRP) (SACU, 2013). SACU receipts have been a vital source of revenue for the Namibian government, constituting more than 30 percent of the total revenue of the government. This is evident from Figure 2.4 below, which depicts customs and excise duties received from the SACU Common Revenue Pool over a period of 21 years (1995-2016):

Figure 2.4 Customs and excise duties paid to Namibia from SACU CRP



Source: Author's depiction using data from the Bank of Namibia Annual Reports

2.5.7 Transfer and stamp duties

The acquisition of an immovable property by a natural person in Namibia is subject to transfer duty. Land acquired by a natural person for agricultural purposes and funded by the Agricultural Bank of Namibia is charged a special rate. Table 2.5 below presents the rates of duty payable by a natural person for the acquisition of any immovable property, including mineral rights.

Table 2.5 Transfer duties for properties acquired by natural persons (including mineral rights and excluding the acquisition of agricultural land)

Value	Rates of duty
N$ 0 - N$ 400 000	0 percent
N$400 001 - N$ 800 000	1 percent
N$800 001 - N$ 1 500 000	N$ 4000 + 5 percent
> N$1 500 000	N$39 000 + 3 percent

Source: Author's depiction using data from the Ministry of Finance website

Any other property, including mineral rights, acquired by persons other than natural persons, including trusts, is charged a transfer duty of 12 percent of the value of the property.

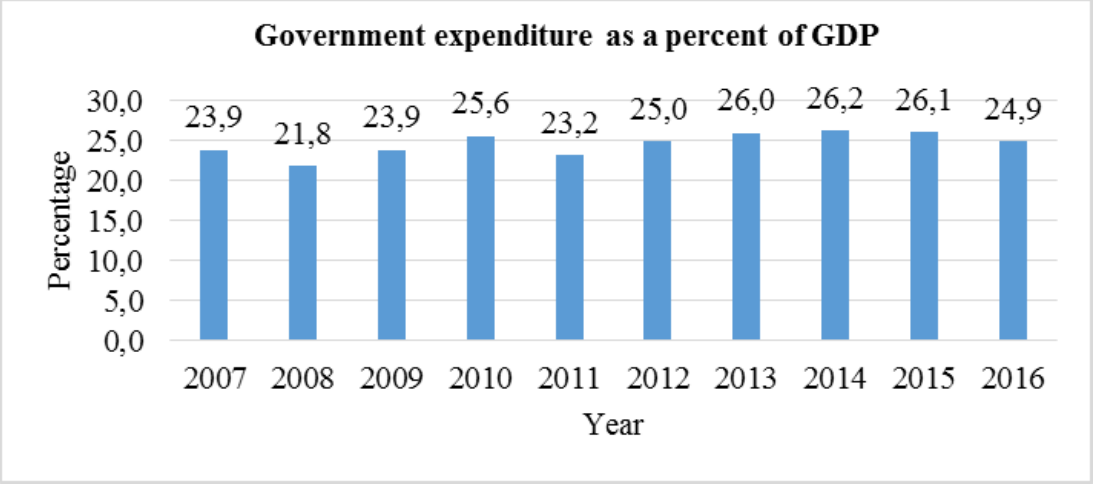
Stamp duty guidelines and activities are stipulated in the Stamp Duties Act of 1993. Stamp duties are charged at different rates on instruments executed in Namibia as stipulated in the Stamp Duties Act. Instruments that are subject to stamp duties are

life insurance policies, bonds and deeds of sale relating to immovable property, among others. In the next section, government expenditure and its linkage with taxation will be discussed.

2.6 Overview of the Namibian government expenditure

Government expenditure is composed of all government investment, consumption and transfer payments, which consist of income transfers (pensions, social benefits, etc.) and capital transfer. The Namibian government has been prioritising various sectors such as education, health, national defence and agriculture because of their significance to the national economy. Government expenditure is properly captured in the national accounts published by the Namibia Statistics Agency (NSA). According to the Ministry of Finance (2018), the Namibian National Accounts estimations are published in line with international standards, the 1993 System of National Accounts (SNA). The National Accounts in Namibia are produced bi-annually and are revised for the latest three years. The Preliminary National Accounts are published during April of each year, while the Annual National Accounts are released in September of each year. Figure 2.5 below presents government expenditure as a percentage of GDP over a period of 10 years (2007 - 2016).

Figure 2.5: Government expenditure as a percentage of GDP

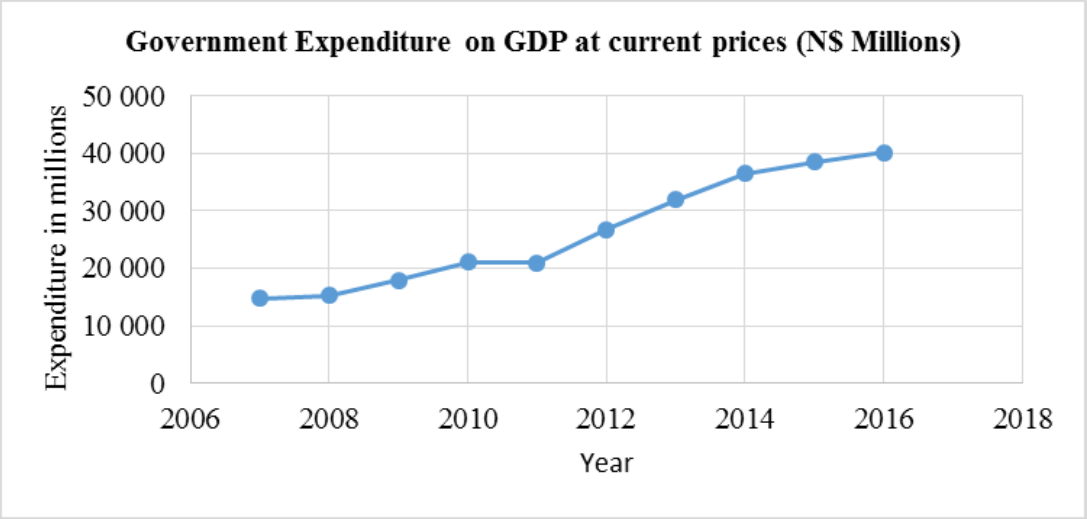


Source: Author's depiction using data from the national accounts

Based on the graph above, average government expenditure as a percentage of GDP over the period of ten years (2007 - 2016) is 24.644 percent. This is an indication that government has a significant and dominant role to play in the national economy. The

Namibian government expenditure has been increasing steadily over the past few years and this can be observed from Figure 2.6 below:

Figure 2.6: Namibian government expenditure



Source: Author's depiction using data from the national accounts

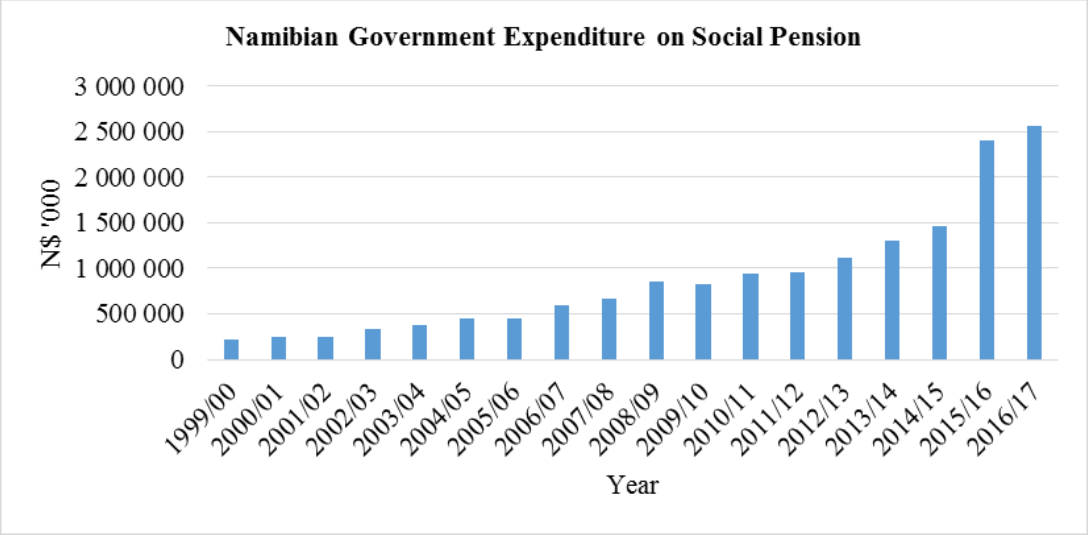
Based on Figure 2.6 above, government expenditure on GDP at current prices has more than doubled within the 10-year period. This gradual increment is replicated in essential areas of the economy such as government expenditure on social safety net, education, health, etc. These expenditures are discussed in detail in the next subsections.

2.6.1 Namibia's social safety net

Namibia is among the few African countries that provide non-contributory pensions to vulnerable citizens in the country. The findings of this research indicate that government expenditure on social pensions has a balancing/improvement impact on income inequality. The government of the Republic of Namibia provides social pensions to vulnerable members of the society in the following categories: the Ministry of Poverty Eradication and Social Welfare provides Old Age Pension (60 and above), Disability Pension and funeral benefits to its members. The disability pension is provided to Namibian citizens with mental or physical disabilities to enable them to afford basic needs. The Office of the Prime Minister through the Department of Veteran Affairs provides a War Veterans Allowance to qualifying war veterans of the liberation struggle, while the Ministry of Gender Equality and Social welfare

provides the Place of Safety allowance, Special Maintenance Allowance (for orphan children) and Maintenance Grant (Bank of Namibia, 2013). The graph below shows government expenditure on social pensions in Namibia:

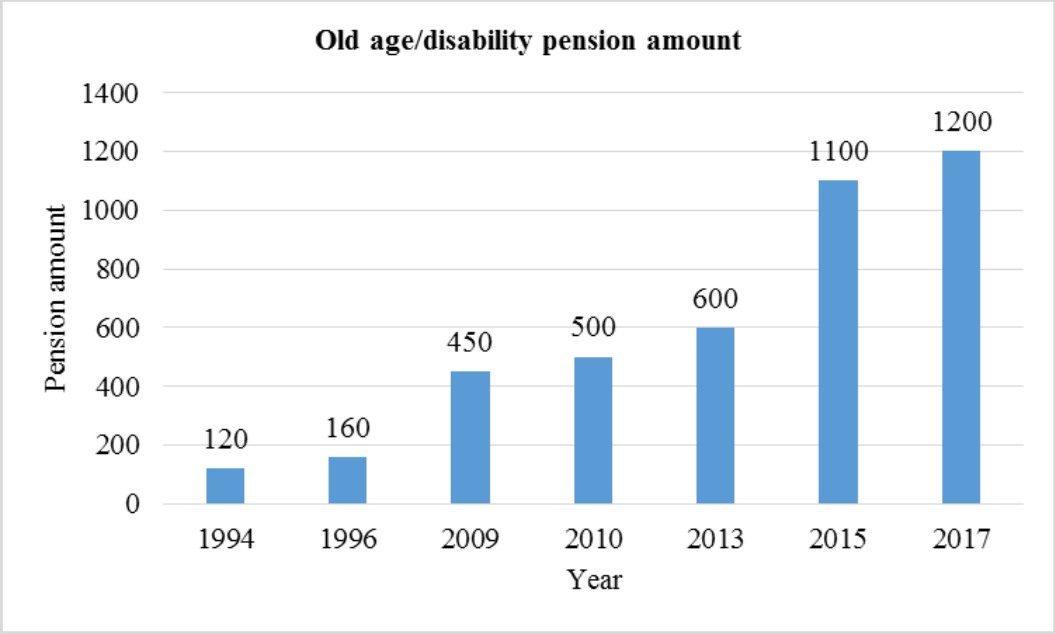
Figure 2.7: Government expenditure on social pensions



Source: Author's depiction using data from the Bank of Namibia 15th Annual Symposium, 2013 and the Ministry of Poverty Eradication and Social Welfare

Figure 2.7 above depicts a steady increase in government expenditure on social pensions from 1999 to 2014 and a sharp increment in the 2015/16 financial year. This can be attributed to the adjustment in social pension from N$ 600 to N$ 1100 in 2015/2016, which represents an increment of more than 80 percent. The bar graph below presents social pension adjustments from 1994 to 2017. For the purpose of this research, government expenditure on social pensions is considered as an explanatory variable.

Figure 2.8: Social pension adjustments from 1994 - 2017



Source: Author's depiction using data from the Bank of Namibia 15th Annual Symposium and the Ministry of poverty Eradication and Social Welfare

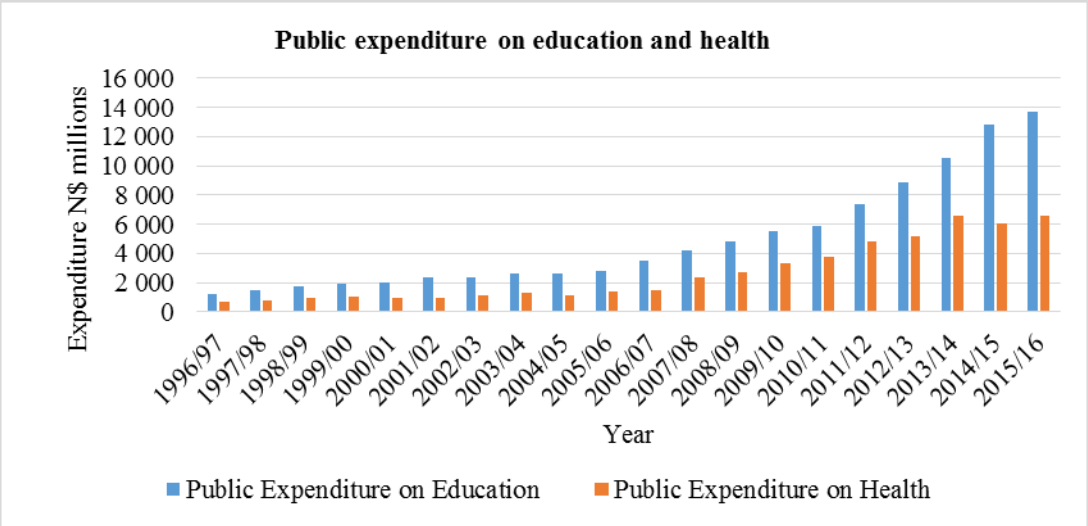
2.6.2 Government expenditure on health and education

The health and education sectors have been on the priority list of the Namibian government over the years due to their significant role in the growth and development of the national economy. In Namibia. Public health services are almost free, considering the fact that the rates charged to access health services at government health institutions in Namibia are close zero. The Ministry of Health provides antiretroviral drugs to HIV/AIDS patients free of charge to an estimated number of 168 000 people who are on treatment (UNAIDS, 2017). In addition to that, the Ministry of Health also provides free drugs to patients with various illnesses such as TB, cancer, high blood pressure and mental disorders, among others. The Ministry of Health operates approximately 340 hospitals, clinics and health care centres nationwide. The government through the Ministry of Health and Social Services incurs the cost of paying all health professionals, drugs and medical equipment in all government health centres countrywide.

In terms of education, the Namibian government introduced Universal Primary Education in 2013, whereby all primary education costs are catered for by the

government. During the same period, the government also took over the responsibility of providing free pre-primary education in the country. Initially, pre-primary education was the responsibility of the parents, and all related costs were catered for by the parents before the new reform. The government also heavily subsidises secondary and tertiary education. The government also provides loans, scholarships and grants to tertiary institution students through Namibia Students Financial Assistance fund (NSFAF). During the period under research (1996 - 2016), government expenditure on education increased from N$ 1,199 million to N$ 15,821 million while government expenditure on health increased from N$ 713 million to N$ 7,230 million in the same period. Figure 2.9 below presents government expenditure on education and health (1996 - 2016).

Figure 2.9: Government expenditure on education and health



Source: Author's depiction using data from Ministry of education, Bank of Namibia and Ministry of Education

2.7 Conclusion

This chapter provided an overview of the status of income distribution as well as taxation and government expenditure components in Namibia. From independence in 1990, a number of income redistribution initiatives and policies were put in place to redress the wrongdoings of the former colonial apartheid government. These policies and initiatives include the BEE, Affirmative Action Act, National poverty reduction strategy, the Zero Hunger challenge, and the NEEEF. These policies and initiatives are incorporated in the national development planning agenda of the government. The

government objectives and plans are strategically implemented and cascade from Vision 2030 to the NDP's and OMA's strategic, annual and quarterly plans to individual quarterly and monthly plans.

It can be observed that government expenditure on education and health has more than tripled over the past 14 years and this can be attributed to the growing population, which leads to an increased demand for government education and health services. Statistics clearly indicate that taxes, customs and excise duties are the main source of the Namibian government revenue, contributing more than 95 percent of government revenue. Government expenditure on social pensions has more than doubled over the past six years due to a number of factors, of which the main one are highlighted below. Firstly, the sharp increase in government expenditure on social pensions is due to an increase in the proportion of the population that is receiving social pensions. Secondly, the sharp increment can be attributed to an 83.33 percent increment in the old age pension in 2015. In general, it is evident that the government has made some strides in reducing income inequality as indicated by the declining Gini coefficient over the period of 1996-2016. However, more needs to be done to bring the Gini coefficient to an acceptable level.

CHAPTER 3: LITERATURE REVIEW

3.1 Introduction

This chapter provides a review of theoretical and empirical research and information from various sources that are related to the research topic. The chapter is designed to provide theoretical and empirical foundation of this research project. It highlights the findings of various researchers on the topic and it covers the methodologies used in the empirical literatures. The chapter also looks at conflicting and contradicting literature as well as conformity to general theories.

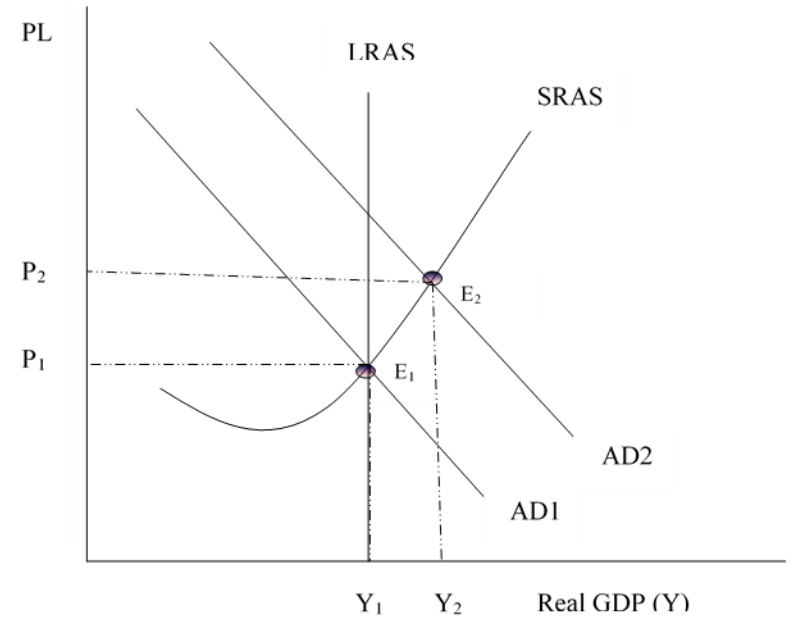
3.2 Theoretical literature review

3.2.1 Keynesian theory on taxation and government expenditure

In his most influential publication, "The General Theory of Employment, Interest and Money," Keynes (1936) highlighted the need for government to intervene in the national economy in order to correct market failures. He indicated that the capitalist system has disastrous weaknesses because it has failed to reduce income inequality and unemployment in the national economy. On that basis, Keynes argues that the government should employ fiscal and monetary policies to realise an equitable distribution of income, and full employment. Keynes believes that fiscal policy (the use of taxation and government expenditure) is more efficient in stimulating the national economy as opposed to monetary policy (the use of interest rates and money supply). Keynes (1936) emphasised that the capitalist system is capable of remaining in a state of unequal distribution of income, high unemployment rate and low economic growth for a long period of time with no sign of recovery or collapsing. This concept became evident during the period preceding the Second World War, in which some countries experienced persistent unemployment and stagnant economic growth. Various economists have interpreted this phenomenon as Keynes's postulate that involuntary unemployment can persist as an equilibrium phenomenon (Snowdon and Vane, 2005). Keynes strongly rejected Adam Smith's theory of uncontrolled "laissez-faire" in which the capitalist economy is assumed to be self-adjusting towards the equilibrium level. Keynes's argument is that a laissez-faire capitalist economy could possess equilibria characterised by massive involuntary unemployment, and that therefore, intervention in the capitalist economy is required

to correct market failures. Keynes (1936) argues that if government is to be effective in correcting market failures, it should not execute activities which can be effectively and efficiently executed by the private sector, but rather attend to those functions which the private sector cannot provide. The Keynesian approach to correcting market failure is by means of fiscal and monetary policies. When the economy is going through a recession, Keynes suggests the use of fiscal policy to stabilise the economy by lowering taxes and increasing government expenditure. The reduction in taxes increases the marginal propensity to consume, which will consequently lead to an increase in the consumption of consumers. An increase in consumption subsequently leads to an increase in total demand which results in the growth of the economy in totality. The additional money in the economy creates a positive multiplier effect, thereby creating more jobs and reducing poverty and income inequality. This shifts the Aggregate Demand curve to the right, thereby increasing real GDP as shown in Figure 3.1 below.

Figure 3.1: Impact of expansionary fiscal policy



Source: own computation

PL represents the price level, SRAS is the short-run aggregate supply, LRAS is the Long-Run Aggregate Supply curve, E_1 and E_2 represent the equilibrium level at different levels of output and AD represents Aggregate Demand. According to Brown-Collier and Collier (1995), Keynes believes that planned government expenditure/investment is more likely to be successful than the interest rate policy.

However, Barro (1990) warns that excessive involvement of government in economic activities can have detrimental effects on economic growth. He highlighted that unnecessary involvement of government in economic activities can lead to a large government budget which consequently leads to an increase in taxes to finance the increased government expenditure. High taxes leads to a reduction in the marginal propensity to save, to consume and to invest, which subsequently retards economic growth. Barro (1990) further indicates that government expenditure will have both short-term and long-term effects on economic growth.

3.2.2 Theory of public goods

The provision of public goods and taxation has been researched extensively by economists and researchers such as Samuelson and Pigou, who nurtured the theory of public goods to its current state. Economists define public goods as goods that have two key characteristics of public goods, namely non-excludability and non-rivalry. Any good that possess one of the two characteristics can be categorised as a public good. Goods with both characteristics are called pure public goods, e.g. national defence and police services. The provision of public goods requires funding from the government, and the two common sources of government funds are taxes or/and borrowing. In developing countries, donor funding also forms a large portion of the national budget. Samuelson (1958) indicates that some goods can be either in the category of public goods or in the category of private goods such as railroads, provision of water, electricity supply and postal services among others. Samuelson (1954) indicates that there are no good incentives or appealing motivation for the provision of public goods in the private sector, and therefore, if they are produced, they will not be produced efficiently. In some cases, the private sector cannot produce these goods at all. The provision of these goods by the government is therefore required for efficiency. Samuelson (1954) indicates that public goods are under-produced in the private sector, or may not be produced at all, since there is no motivation to produce these goods except by charges to the citizens through taxation and user fees, and to channel these earning towards the production of these goods. He emphasised that the development and usage of public goods provides justification for government expenditure/production. In his publication on public goods, Kaplow (1996) concluded that under standard simplifying assumptions, there is a way of

modifying the income tax to finance a public good such that the marginal cost for the provision of the public good is equivalent to the marginal utility derived from the consumption of that particular good. Samuelson (1955) indicates that all redistributions take place through tax policies and transfer expenditure. Transfer expenditure includes the provision of public goods such as education and health services. The method of finance involves adjusting the income tax so that at each income level, tax increases achieve the desired benefit from the consumption of a public good. Samuelson (1958) pointed out that government expenditure on public goods is aimed at maximising the social welfare benefits of the citizens while consumers of public goods aim to maximise their utility. Pigou (1932) indicated that expenditure should be spent at the point at which the utility obtained from the consumption of a public good is at the maximum, and this is referred to as the maximum social advantage theory. The maximum social advantage theory stipulates that resources should be allocated optimally in order to obtain the maximum social advantage. According to Pigou (1932) the optimum level of resource allocation is reached at a point where the marginal return is equal to the marginal cost, and in the case of public goods, this is the point where marginal social cost is equal to the marginal social benefits. The marginal social cost is derived from taxation while the marginal social benefits are derived from government expenditure. It is however worth noting that it is practically impossible to determine the optimal level for the provision of public goods due to the complexities associated with the determination of marginal social costs and marginal social benefits.

3.2.3 Peacock-Wiseman hypothesis

The Peacock-Wiseman Hypothesis represents the supply side of government expenditure which is based on the political theory of government expenditure determination. This hypothesis states that governments are willing to increase government expenditure, but taxpayers are not willing to pay high taxes. Peacock and Wiseman (1967) conducted an analysis on the growth of government expenditure in the United Kingdom from 1890 to 1955. The results indicate that as the economy grows, tax revenue will also grow at constant tax rates, thus leading to an increase in government expenditure. The Peacock-Wiseman Hypothesis postulates that, under normal circumstances, government expenditure would show a steady upward trend,

but that this trend would be distracted during periods of economic turbulences such as wars, social and natural disasters, etc. In such situations, the Peacock-Wiseman Hypothesis suggests an increment in taxation to cater for the unexpected increase in government expenditure. This phenomenon is referred to as the 'displacement effect'. Government expenditure is displaced upwards during the crisis period, thereby displacing private expenditure for government expenditures. The process represents an upward shift in the government expenditure curve. After the crisis, government expenditure does not fall to its original level and citizens accept the upwardly adjusted tax level. Auld and Miller (1977) analysed data for the United Kingdom from 1890 - 1955 and their analysis indicates the presence of the 'displacement effect'. The Peacock-Wiseman hypothesis is based on the following assumptions regarding the nature of the state:

a) Decisions regarding government expenditure are taken politically, therefore, they can be influenced through the ballot box or by whatever medium that citizens can use to pressurise the government,
b) Political choices regarding the utilization of the resources differ from choices in the market system, and
c) Citizens can have ideas about desirable government expenditure which are quite different and at times incompatible with their ideas about the tolerable burden of taxation. On that basis, the government closely observes the reaction of citizens to the tax rates imposed.

In testing the Peacock-Wiseman hypothesis, Reddy (1972) conducted an empirical research on the growth of government expenditure in India, using data from 1872 to 1968. The research findings indicate the presence of the 'displacement effect'.

3.2.4 Wagner's Law

Wagner's Law was developed by Adolf Wagner in 1893, and this law of increasing government expenditure is based on historical facts, mostly German historical facts at that time. Wagner's law highlighted that government expenditure tends to grow relative to economic growth, which means that as a country grows economically, government will also be required to increase its essential services, hence an increase in government expenditure. Wagner's law attempted to establish a direct link between economic development and growth and the relative size of government sector and

subsequently government expenditure. Wagner's law states that an increase in government expenditure represents a change in the economic activities in the country and that government expenditure grows faster than output. According to Wagner's law, government expenditure tends to increase in two different ways, namely, extensively and intensively. In his hypothesis, extensive growth refers to the execution of new activities and functions that are required as the economy grows and as time passes. In this case, an expansion of government work will consequently lead to an expansion in government expenditure. Intensive growth refers to the government's quest to execute both old and new functions more efficiently and effectively. Wagner's law highlighted three main reasons why government expenditure in a progressive economy tends to increase. These are:

a) As the economy grows, government expenditure increases due to an increase in the structure of the economy which would require increased expenditure to cater for new laws and the expansion of the legal structure to meet the sophisticated needs of the growing economy. The growing economy is in most cases accompanied by a growing population and hence the need to spend more on education, social pensions, health and other public goods and services to cater for the growing needs of the expanding population.
b) Increased urbanisation leads to a much larger per capita expenditure on civil amenities required to deal with the increased urban population. Urbanization exerts pressure on municipalities and town councils to increase their services to cater for the increased number of people who are moving from small towns and rural areas to big cities. These services include the provision of public transport and servicing of urban land, among others. On that basis, a progressive economy will always experience growth in government expenditure.
c) Public goods such as education, healthcare and recreation facilities have a high income elasticity of demand which implies that an increase in the income of the citizens will lead to an exponential increase in the demand for public goods. This would require the government to increase its expenditure to meet the growing needs of the society. We can therefore summarise that, as the economy grows, the demand for public goods and services will increase exponentially, which consequently leads to an increase in government expenditure.

Various economists argue that a continuous increase in government investment is required to correct market failures such as monopolies, wealth/ income inequalities and externalities. Bird (1971) criticised Wagner's law because it applies only to countries with specific features. Bird (1971) pointed out that Wagner's law can only apply to nations with the following features:

a) Countries that have an increasing per capita income;
b) Countries that are experiencing technological and institutional changes of a certain form and at least implicitly, democratisation in the form of wider political participation of the polity.

On that basis, Wagner's law appears to exclude countries with stagnant economies or populations and countries with limited institutional and technological changes.

3.2.5 A rational theory of the size of government

Meltzer and Richard (1981) analysed the impact of taxation and government expenditure on the distribution of income in their publication titled "A Rational Theory of the Size of Government". The underlying principle of this theory is that government uses taxation and government spending for redistribution purposes. This notion is in line with the findings of the research conducted by Alesina and Rodrik (1994), whose findings indicate that there is a very high demand for redistributive initiatives in communities where a large proportion of the population has limited or no access to the factors of production of the economy, to avoid conflict and destabilisation of the national economy. Alesina and Rodrik (1994) argue that conflict over unequal distribution of income and wealth has a negative impact on the growth of the economy. In their analysis, Meltzer and Richard (1981) indicate that a government that wishes to be re-elected would use a positive tax on income to channel funds to median voters if the median voters' earnings are below average income. Meltzer and Richard (1981) concluded that government expenditure and taxes have grown proportionally to economic growth in most countries with elected governments for a period of 30 years or longer. This implies that as the economy grows, government expenditure will also increase to cater for the growing needs of society. The increment in the relative size of government appeared to be independent of the budget and tax system, federal or national government and other institutional arrangements. However, the relative rates of change in different countries may change

depending on these arrangements. The Meltzer-Richard model is based on the following assumptions:

- There are a number of individuals;
- Each individual takes prices, wages, and tax rates as given, derived from the market for commodities and labour and by the polity;
- Differences in the choice of labour, leisure, and consumption and differences in wages arise solely because of differences in endowments which reflect differences in productivity.

This model suggests that the size of the government is determined by the ratio of average income relative to the income of the decisive voter. According to Meltzer and Richard (1983), changes in the age composition of the population that increase the proportion of the population receiving social pensions also increase government expenditure for redistributive purposes and consequently lead to high taxes on labour income. The tests of Meltzer and Richard (1983) also indicate that changes in productivity or in the labour force participation, which lead to reduction in the average income relative to the income of the decisive voter, lead to a reduction in the size of the government. The findings indicate that the ratio of government expenditure for redistribution to total income, and the share of aggregate income redistributed in cash, rise and fall with the ratio of mean to median income and the level of income. Other government expenditures such as education, health, etc., were also found to rise and fall with the ratio of mean to median income, but appear to be independent of the levels of income. The next subsection presents the tax incidence theory.

3.2.6 The tax incidence theory

Mieszkowski (1969) conducted a review of the impact of taxes on income distribution and concluded that the burden of a relative income tax that is applied on the entire income is relative to the household's share in the national income. Mieszkowski's theory implies that taxes that are not imposed on all kinds of income, or on all commodities, change commodity prices, influence factor use in specific industries and change the production structure of the economy. The modern general equilibrium incidence theory is based on the marginal productivity theory of distribution that assumes that businesses choose to produce at a point where costs are at a minimum

and profits are at a maximum. Mieszkowski (1969) employed the neoclassical assumptions in his analysis of the effects of taxes on the distribution of income. These assumptions are that:

- There is perfect competition in the market for commodities and factors of production;
- The economy is closed (there is no cross-border trade);
- There are perfect factors of production mobility;
- Finally, the total supplies of all factors of production are in perfectly inelastic supply to the economy as a whole.

In his earlier work, Mieszkowski (1967) conducted an analysis on the general equilibrium propositions of the incidence theory. The main focus of the analysis was on the calculation of the differential incidence of various general taxes, partial commodity taxes, and partial factor taxes, and on analysis of the factors which determine whether the substitution of one form of tax finance for another form of tax increases or decreases the real income of a particular group. The results of his research indicate that an income tax on gross income is equivalent to a general sales tax that is applied on gross value and applies to capital goods as well as consumption goods. The results also indicate that a VAT that is applied at the same rate on the production of consumption and capital goods and under which the depreciation of capital is subtracted from the tax base is equal to a relative income tax on net income.

3.3 Empirical literature review

This section presents the empirical literature review of the work by various researchers and scholars whose empirical research has relevance to the analysis of the impact of taxation and government expenditure components on income inequality in Namibia. The empirical literature is demarcated according to the method of study. This section is designed to provide an in-depth understanding of the research topic from the empirical analysis point of view and to provide the empirical foundation/footing of this research.

Various scholars and researchers have analysed the impact of taxation and government expenditure components on income distribution, with most of the

empirical findings indicating that taxation and government expenditure components are statistically significant in influencing income inequality in general. Leu, *et al.*, (2009) carried out a research to analyse the impact of government policies on income distribution in Switzerland using the Budget incidence approach. In conducting their investigation, Leu, *et al.*, (2009) used data from the first nationwide representative Income and Wealth Survey. The findings of their research indicate that government expenditures are more effective in redistributing national income as opposed to direct taxes. Social welfare expenditures were found to be more effective in redistributing national income as opposed to other government expenditures. Their research further indicate that indirect taxes have an unbalancing effect on the distribution of income.

Regarding government expenditure on education, Tsanos and Manos (1999) conducted empirical research on the distributional impact of government education expenditure in Greece using micro-data of the 1987/88 Greek Household Budget Survey which was conducted by the National Statistical Service of Greece. Tsanos and Manos (1999) segmented the education component into three segments, namely, primary, secondary and tertiary education. Secondary education was further segmented into lower-secondary education and upper-secondary education while tertiary education was further segmented into higher education institutions and technological education institutions. Tsanos and Manos (1999) employed hedonic regression techniques to estimate their model. The research findings indicate that government expenditure on primary and secondary education is undoubtedly significant in reducing inequality on aggregate. Education expenditure on tertiary education was found to have an unbalancing/regressive effect on inequality.

The effects of education expenditure on income inequality have been researched widely by various researchers, and the most of the findings undoubtedly indicate a balancing effect on income inequality. Sylwester (2002) conducted research on the effects of government expenditure on education on income inequality using cross-sectional data of a selected number of countries. In analysing the effects of government expenditure, Sylwester (2002) used the Gini coefficient as a proxy for income inequality and the empirical research findings indicate that countries whose governments devote more financial resources to education as a percentage of GDP

experienced lower income inequality in subsequent years. In conducting the research, Sylwester (2002) employed the least square regression method and White's correction for heteroscedasticity. The findings of the research undoubtedly indicate that government expenditure on education has a balancing effect on income inequality in both developed and developing countries. Sylwester (2002) concluded that allocating more government resources to the education sector will lead to a reduction in income inequality.

Another research conducted by Vaalavuo (2013) indicated that social expenditure by government has a balancing effect on income inequality. Vaalavuo (2013) conducted empirical research on the re-distributional impact of traditional and modern/new social expenditure by the governments of six selected European countries, namely, France, the Netherlands, Slovenia, United Kingdom, Spain and Denmark. The research employed the imputation method as an estimation tool. The findings of the empirical research by Vaalavuo (2013) indicate that traditional social expenditure by government, e.g. old age cash benefits or social pensions, is effective in reducing income inequality because it is directed towards the bottom income quintiles as opposed to the new social expenditure methods. The research findings further indicate that the inclusion of government services in the model further reduces income inequality.

The existing theories of taxation suggest that taxation is very effective in reducing income inequality and that labour taxes are effective in reducing income inequality, as opposed to consumption taxes. This theory is supported by the empirical research findings of Mylonidis and Losifidi (2017), in which they analysed the redistributive effects of taxation using a panel of 17 Organisation for Economic Co-operation and Development (OECD) countries over a period of 31 years. In conducting their research, they employed the two stage least squares estimation method. The findings of the research by Mylonidis and Losifidi (2017) indicate that direct taxes such as progressive income taxes/labour taxes are effective in reducing income inequality, as opposed to consumption taxes such as value added tax or general sales tax. In conducting their empirical research, Mylonidis and Losifidi (2017) identified and analysed tax rates that are comparative among across the selected OECD countries

with the view to levelling the playing field. The primary focus of their research was to analyse how a change in the combination of different tax rates, namely, labour, consumption and capital taxes affect inequality in OECD countries. With regard to the change in the tax mix, the research findings indicate that an increase in the tax burden on labour relative to capital leads to an increase in income inequality. Increasing the tax burden on consumption relative to capital was also found to have an unbalancing effect on income inequality. The research findings further indicate that income equality improves with an increase in the tax burden on labour relative to consumption. The research findings indicate that the distributive power of labour taxes is very significant in reducing income inequality. The research findings of Mylonidis and Losifidi (2017) indicate that a tax mix is more effective in reducing inequality and poverty as opposed to one specific tax in general. On that basis, Mylonidis and Losifidi (2017) recommend a tax mix as an effective income redistribution measure as opposed to one specific tax. The research findings also reveal that the gap between the poor and the rich has widened over the past three decades in OECD countries.

Researchers and scholars have generally accepted that the gap between the poor and the rich has increased over the past decades. A research by Wittenberg (2017) on the wages and wage inequality in South Africa substantiated this claim. Wittenberg (2017) used 1994-2011 data from October Household Surveys and Quarterly Labour Force Surveys. To deal with measurement issues such as outliers, bracket data and missing values, Wittenberg (2017) used three procedures, namely, the BACON algorithm for outlier detection, extreme stundentised regression residuals and robust regression. These procedures ensure data quality and reliability of the results. Wittenberg (2017) pointed out that it is not possible/sufficient to read wage trends from raw data without applying various data adjustment methods. Data quality adjustment approaches considered by Wittenberg (2017) include the mid-point imputation, reweighting, multiple imputation, hot deck, point and mean imputation approach. The empirical research findings of Wittenberg (2017) indicate that inequality in earnings among employees in South Africa has increased during the period of 1994-2011. Considering that the labour markets of South Africa and

Namibia are closely intertwined, the same assumption can be made for Namibia. However, empirical research will be required to substantiate this statement.

Most economists and researchers generally accept the effectiveness of taxation and government expenditure policies in reducing income inequality. Martinez-Vasquez, Moreno-Dodson and Vulovic (2012) cement this notion with the research findings on 'the impact of Taxation and Expenditure policies on income distribution'. Martinez-Vasquez., *et al.* (2012) indicate that taxation policy is statistically significant in reducing income inequality. In conducting their analysis, Martinez-Vasquez., *et al.* (2012) employed the generalised method of moments approach (GMM) which is considered appropriate for a research of that nature. The research conducted by Martinez-Vasquez., *et al.* (2012) indicates that taxes and government expenditure have a significant effect on income distribution. The research is based on data from a sample of 150 countries over a period of 36 years from 1970-2006. Martinez-Vasquez., *et al.* (2012) indicate that when progressive income taxes are considered separately, they tend to have a balancing/improvement effect on income inequality, leading to a decrease inequality. The research further indicates that general consumption taxes (e.g. tax on products), excise and custom duties have an unbalancing effect on the distribution of income. On the expenditure side, the research findings indicate that large proportions of GDP on social welfare activities, education services, health services have a balancing/improvement effect on the distribution of income, both individually and collectively. It should however be noted that different countries may have different empirical results for similar variables because each country has different economic and environmental factors which may influence the relevance of each variable.

3.4 Conclusion

This chapter presented the review of empirical and theoretical literature on the impact of taxation and expenditure policies on income distribution. Theoretical literature review includes the Keynesian theory, the theory of public goods, the Peacock-Wiseman hypothesis, Wagner's Law, the rational theory of the size of government and the tax incidence theory. The Keynesian theory states that there is a need for the government to intervene in the national economy in order to correct market failures

such as unequal distribution of income and unemployment, among others. This government intervention is done through fiscal and monetary policy instruments to realise equitable distribution of income and full employment. The theory of public goods states that there is no good incentive for the production of public goods in the private sector, and that therefore, they should be produced by the government. The government has to charge people for the production of these goods through taxation. The Wiseman-Peacock hypothesis represents the supply side of government expenditure, which postulates that decisions on government expenditure are taken politically and can be influenced by voting. This hypothesis states that as the economy grows, tax revenue will also grow at constant tax rates, thus leading to an increase in government expenditure.

Wagner's Law states that as the economy grows, government expenditure will also grow at a higher rate than that the economy. Wagner's law specified three factors which lead to an increase in government expenditure and these are: the need to fund new structures and laws for the expanding economy, the need to finance new urbanization related developments and the need to expand the provision of public goods because they have a high income elasticity of demand. The rational theory of the size of government states that governments use taxation and government expenditure for redistribution purposes and that there is an increased demand for the redistributive initiatives in societies with unequal distribution of income and wealth.

Empirical literature reviews include the research by Leu, *et al.,* (2009), Mylonidis and Losifidi (2017), Martinez-Vasquez., *at al* (2012), Sylwester (2002), Tsanos and Manos (2009), Vaalavuo (2013) and Wittenberg (2017). The empirical literature indicates that social transfers such as government expenditure on social pension, education and health have a balancing/improvement effect on the distribution of income. Empirical literature further indicates that direct taxes have a balancing/improving effect on the distribution of income while indirect taxes such as tax on products have an unbalancing/worsening effect on the distribution of income. It is worth noting that there is no literature for Namibia on the research topic, therefore, the results of this research will play a major role in filling the literature gap.

CHAPTER 4: METHODOLOGY

4.1 Introduction

This chapter outlines the methodology used in undertaking this research. It includes the data sources and research method, empirical model specification, qualities of a good model, definition and measurement of variables, estimation methods/techniques, diagnostic tests, and lastly, a brief conclusion of the chapter.

4.2 Empirical model specification

The ARDL bounds test approach to cointegration was employed for this study. The dependent variable for this research is the Gini coefficient (G), which is the proxy/measure of income inequality. On the taxation side, the independent variables for this thesis are tax on income and wealth (TIW), tax on products (TP), corporate income tax (CIT) and customs and excise duty from SACU (CE). On the expenditure side, the independent variables are government expenditure on social pensions (GESP), government expenditure on education (GEE) and government expenditure on health (GEH). The research employed the linear log regression model as used by Manning and Mullahy (2001). This research is a modified version of an empirical research conducted by Leu, *et al.,* (2009), titled "Taxes, expenditures and income distribution in Switzerland". In their research, Leu, *et al.,* (2009), analysed the impact of government policies on income distribution and poverty in Switzerland. In conducting their investigation, Leu, *et al.,* (2009), used mainly data from the first countrywide representative Income and Wealth Survey. The findings of their research indicate that government expenditures are more effective in redistributing national income as opposed to direct taxes. Social welfare expenditures were found to be more effective in redistributing national income as opposed to other government expenditures. Their research further indicate that indirect taxes have an unbalancing effect on the distribution of income. This research is modified to focus specifically on the impact of taxation and expenditure components on income distribution in Namibia. The empirical model that was used in undertaking this research is specified in a functional form as follows:

$$G = f\,(GESP, GEE, GEH, TP, TIW, CE, CIT) \qquad (4.1)$$

Equation (4.1) above is expressed in an econometrics equation as specified below:

$$G_t = \beta_0 + \beta_1 GESP_t + \beta_2 GEE_t + \beta_3 GEH_t + \beta_4 TP_t + \beta_5 TIW_t + \beta_6 CE_t + \beta_7 CIT_t + \varepsilon_t \quad (4.2)$$

Where:

G = Gini coefficient

GESP = Government Expenditure on Social Pensions

GEE = Government Expenditure on Education

GEH = Government Expenditure on Health

TP = Tax on Products/VAT

TIW = Tax on Income and Wealth

CE = Customs and Excise duties from SACU

CIT = Corporate Income Tax

ε = Stochastic error term

β_s = Coefficients

t = Time/period

β_1 to β_7 represents the coefficients of the independent variables and they determine how much the independent variables affect the dependent variable in this research. Time series data is considered to be affected by heteroscedasticity if the variance of the error term of an OLS is not constant. In the presence of heteroscedasticity in the time series, the standard error becomes biased, thereby affecting the confidence interval and the test statistics. Berry and Feldman (1985) indicate that minor heteroscedasticity may have little effect on significance tests. However, enormous heteroscedasticity can lead to serious misrepresentation of the research findings, thereby compromising the analysis and increasing the possibility of a Type I error. Manning and Mullahy (2001) indicate that transforming an equation into a natural log can reduce heteroscedasticity, and therefore equation three (4.3) is converted into a natural log as formulated below with the prime purpose of reducing heteroscedasticity. This method helps to estimate the variables in the same form and makes the interpretation of the results easy and simple. The natural log equation is specified as follows:

$$lnG_t = \beta_0 + \beta_1 lnGESP_t + \beta_2 lnGEE_t + \beta_3 lnGEH_t + \beta_4 lnTP_t + \beta_5 lnTIW_t + \beta_6 lnCE_t + \beta_7 lnCIT_t + \varepsilon_t \quad (4.3)$$

The Ordinary Least Squares method alone would not yield the desired results; therefore, the research employed appropriate techniques to test the stationarity

property of the variables in the model. The DF-GLS and the Phillips-Perron (1988) unit root tests are employed to test the stationarity property of the variables in equation 4.3 above. The research used the ARDL approach to estimate the parameters in equation 4.3 above. The research also employed the bound test to test for cointegration and the Wald test to test for the significance of the variables. The research employed the Breusch-Godfrey serial correlation LM test, the Jarque-Bera normality test, the Autoregressive Conditional Heteroscedasticity test (ARCH test and the normality test to assess the robustness of the model. The Granger causality test was also conducted to establish the causal relationship between the Gini coefficient and its explanatory variables.

The variable to the left-hand side of the equation (G) is the dependent variable while the variables on the right-hand side of the equation (GESP, GEE, GEH, CE, TP, TIW and CIT) are the independent variables. The stochastic error term (ε_t) on the equation above represents the effects of the variables that were omitted from the equation, which are assumed to have a mean value of zero, and to be uncorrelated to the independent variables.

4.3 Data sources and research method

This research used a quantitative research method using the dataset which comprises of 21 data points at a yearly frequency for all the variables. Data extrapolation was conducted by transforming annual frequencies to quarterly frequencies in E-views. Descriptive statistics are provided in appendix 2 of this paper. The transformation was conducted in E-views by selecting ‘Data Structure’ and select ‘quarterly’ to transform the frequencies from annual to quarterly data. The transformation of the frequencies was done in order to have the necessary number of frequencies required to conduct various ARDL tests and procedures. Secondary data was obtained and analysed to create new knowledge on the research topic. Data for tax on income and wealth, tax on products and tax on corporations was collected from NSA, National Accounts. Data on government expenditure on social pensions was obtained from various publications of the Bank of Namibia (Research Department), Ministry of Finance (MoF), Ministry of Poverty Eradication and Social Welfare and Ministry of Labour and Industrial Relations. To have a complete set of data for the desired time series,

some data were collected from the United Nations (United Nations Development Programme). Data for the Gini coefficient was obtained from NSA (Namibia Household Income and Expenditure Surveys) while data for customs and excise duty was obtained from SACU annual reports. Data for government expenditure on education and health was obtained from the Bank of Namibia, Ministry of Education and Ministry of Health.

4.4 Qualities of a good model

The quality of any empirical research depends heavily on the quality of the regression model adopted for the research. According to Osborne and Waters (2002), a regression model should meet certain requirements for the results of the research to be considered reliable and acceptable. Below is a brief summary of qualities/specifications for a good regression model.

Firstly, the value of R-squared should be greater than or equal to 50 percent and the value of R-squared should be close to the value of adjusted R-squared. Secondly, most of the independent variables should be statistically significant in explaining the dependent variable. In simple terms, the P-value for most of the independent variables should be less than 5 percent. Thirdly, all the independent variables should be jointly significant to explain/estimate the dependent variable. In other words, the F-statistics should be less than 5 percent. Fourthly, the signs of the coefficients should be in line with economic theories. Lastly, there should not be serial correlation or autocorrelation in the residuals, which means that the residuals should be normally distributed. Given the nature and complexity of regression analysis, it is possible for a model to violate some of the requirements and still be a good model.

4.5 Measurement and expected signs/effects of variables

4.5.1 Gini coefficient (G)

The Gini coefficient is described as a measure of income inequality that expresses the entire income distribution of a country into a single digit ranging between zero and one. The higher the number, the greater the degree of income inequality, and vice versa. The Gini coefficient is the internationally accepted measure of income distribution, and therefore, for the purposes of this research, the Gini coefficient is

used as a proxy for income distribution. As of 2018, the Gini coefficient for Namibia stands at 56 and this figure is relatively high as compared to the acceptable value. It is worth noting that the Gini coefficient estimate records at Namibia Statistics Agency (the custodian of official data in Namibia) is lower than the Gini coefficient estimates of international institutions such as UNDP.

4.5.2 Government expenditure on social pensions (GESP)

According to the Bank of Namibia (2013), Social Pensions is a universal and unrestricted transfer of money to persons who are 60 years and older which is aimed at improving the social welfare of the recipients. The main qualifying criteria in Namibia are age (recipients must be 60 years or older) and citizenship (recipients should be Namibian citizens; or must have permanent residence; and should be living in Namibia). It is worth noting that social pensions in Namibia are extended to people with mental and/or physical disabilities. As of this year (2018), social pensions in Namibia stand at N$ 1200 per month. Government expenditure on social pensions is expected to have a balancing/positive effect on the Gini coefficient.

4.5.3 Government expenditure on education

Government expenditure on education represents state funding of education-related expenses. Government expenditure on education is expected to have a balancing/positive effect on the Gini coefficient. In the Namibian context, government expenditure represents state funding of universal free primary education, secondary education and subsidies to tertiary education including vocational institutions. Recently, the government also incorporated pre-primary education into its system. The government expenditure on the education component also includes the subsidy to private schools. During the period under review (1996 - 2016), government expenditure on education increased from N$ 1,199 million to N$ 15,821 million.

4.5.4 Government expenditure on health

Government expenditure on health refers to state funding for the provision of healthcare and healthcare-related activities. Government expenditure on health is executed through the Ministry of Health and Social Services which runs all state hospitals, clinics and health centres in the country. This expenditure includes the

personnel cost of health professionals, acquisition of drugs and medical equipment and the day-to-day running of all health facilities nationwide. Government expenditure on health is expected to have negative sign which imply that this variable is anticipated to have a balancing/positive effect on the Gini coefficient.

4.5.5 Customs and excise duty

Customs duties are charges that are payable when goods first enter the economic territory of any SACU Member State from outside the SACU. Excise duties are charges that are collected on specified goods that are produced and consumed in the SACU. It is worth noting that no excise duties are levied on specified goods that are exported to non-SACU countries. The excise duties are payable at factory gate and are not payable when the goods enter the economic territory of one member state from another. Duties collected by Member States are transferred into the Common Revenue Pool. Data for this component is obtained from SACU annual reports. Customs and excise duty is expected to have a worsening effect on the Gini coefficient.

4.5.6 Tax on income and wealth (TIW)

Tax on income in Namibia is referred to as personal income tax and it is applicable to the total taxable income of an individual whereby the employer withholds the tax. Personal income tax in Namibia is taxed at progressive rates over a series of income brackets. Individuals who earn an annual income of N$ 60 000 or less (N$ 5000 per month or less) do not pay tax in Namibia. Wealth tax is defined as a levy on the total value of personal assets which include real estate, assets in insurance, pension plans, bank deposits, personal trusts and financial securities. Data for this component is readily available from the national accounts stationed on the website of Namibia Statistics Agency. Unlike customs and excise duty, tax on income and worth is expected to have negative sign which imply that this variable is anticipated to have a balancing/positive effect on the Gini coefficient.

4.5.7 Corporate income Tax (CIT)

Corporate tax is defined as a tax that is imposed by a jurisdiction on the income or capital of corporations. In Namibia, corporate income tax differs depending on the

type of corporation. Corporate income tax is expected to have a positive sign which imply that this variable is anticipated to have an unbalancing or worsening effect on the Gini coefficient.

4.5.8 Tax on products (TP)

Tax on products is the consumption tax placed on a product whenever value is added at each stage of the supply chain, from production to the point of sale. In economic theory, tax on products is proved to have an aggravating effect on income distribution because it charges a large percentage of poor people's income as opposed to the rich people's percentage of income. Tax on products is expected to have a worsening effect on the Gini coefficient.

4.6 Estimation methods/techniques

Various tests were conducted in this research to estimate the relationship between income inequality (measured by the Gini coefficient) and the selected explanatory variables. The tests that were conducted include the stationarity test, diagnostic tests and the cointegration tests. The ARDL model was employed to estimate and assess the long-run and short-run relationship between the Gini coefficient and its explanatory variables in Namibia.

4.6.1 Stationarity tests

In time series data analysis, data is assumed to be stationary, meaning that the variance, the mean and autocorrelation remain constant over time. Time series data is said to be stationary when it has a flat looking series, with a constant autocorrelation structure over time, no trend, constant variance over time, and no periodic fluctuations. To determine the stationarity property of the data series, a sequence plot can be used. According to the National Institute of Standards and Technology (2018), if the time series dataset is not stationary, stationarity can be attained using the following methods:

(i) The time series data can be differenced. The data can be differenced several times, however, first differencing is usually sufficient.

(ii) When the time series data has a trend, a curve can be fitted to the data and then model the residuals from the fitted curve. A straight line I is normally used with the view to removing the long-term trend.

(iii) We can take the logarithm or square root of the time series dataset with the view to stabilising the variance. An appropriate constant can be added in case of negative data with the purpose of converting the entire dataset to positive before transforming the dataset.

For the purposes of this research, the stationarity property of the variables is tested using the DF-GLS and the Phillip-Perron unit root tests, and differencing is employed to attain stationarity.

4.6.1.1 Dickey-Fuller Generalised Least Square (DF-GLS)

The DF-GLS unit root test is a modified version of the Dickey-Fuller *t* test (D-F) proposed by Elliott, Rothenberg, and Stock (1996). It is similar to the Stata's Dickey-Fuller test; however, the time series is transformed through the Generalised Least Squares (GLS) regression before conducting the unit root test. Given a time series Y, the DF-GLS test can be expressed mathematically as follows:

$$\Delta Y = \alpha + \beta Y_{t-1} + \varepsilon_t \quad (4.4)$$

Where Δ represents the difference operator, α represents the constant, ε represents the error term. The coefficient β is designed to account for the serial correlation in ε_t. This test provides an option on whether to include a constant and/or time trend. This test has proven to be superior to the previous versions of the Augmented Dickey-Fuller test (Elliott *et al*. 1996).

The null and alternative hypotheses are formulated as follows:

H_0: The series has a unit root

H_1: The series does not have a unit root

4.6.1.2 Phillips-Perron Test

Phillips and Perron (1988) came up with a non-parametric test for the null hypothesis of a unit root that explicitly allows for weak dependence and heterogeneity of the error term. The Phillips and Perron test is a modified version of the DF or ADF test; however, the t-ratio is modified so that the serial correlation does not affect the

asymptotic distribution of the test statistic. Given the time series X, the DF-GLS can be expressed mathematically as follows:

$$\Delta X_{t-1} = \beta_0 + \alpha X_{t-1} + \varepsilon_t \quad (4.5)$$

Where Δ represents the difference operator, β_0 represents the constant, ε_t represents the error term. The coefficient δ is designed to account for the serial correlation in ε_t. This test provides an option on whether to include a constant and/or time trend. The null hypothesis of no unit root is tested against the alternative hypothesis which states that the series has a unit root.

4.6.2 ARDL approach to Cointegration

In econometric data analysis, cointegration tests are employed to identify the stability and the long-run relationship between variables. However, Rao (2007) indicates that if the cointegration test fails to find that relationship, this is not proof that such a relationship does not exist. There are various tests that are used for testing cointegration. The most popular tests are; Engle-Granger, Phillips-Ouliaris, F-bound and the Johansen-Juselius cointegration tests. The Engle-Granger method first constructs residuals based on the static regression. The ADF test is used to assess the residuals for the presence of unit roots. The Philips-Ouliaris is a residual-based unit root test of cointegration (Phillips and Ouliaris, 1990). This test is believed to be better than the Engle-Ganger test. This test takes supplementary variability into account. The Johansen-Juselius procedure is a cointegration test that allows for multiple cointegrating relationships. For the purpose of this study, the F-bound cointegration test was employed to test the presence of cointegration. The ARDL bounds testing approach is a cointegration method which was developed by Pesaran, Shin & Smith (2001) to test the presence of the long run relationship between the variables. This statistical method is relatively new, however, it has many advantages over the classical cointegration tests. The first superiority of the ARDL bound test is that it can be used irrespective of whether the series are I(0) or I(1). Secondly, unrestricted error correction model (ECM) can be derived from the ARDL bounds testing through a simple linear transformation. This model has both short and long run dynamics. Thirdly, the empirical results show that the approach is superior and provides consistent results for small sample. The cointegration relationship/long-run

relationship for the Gini coefficient equation is estimated using the ARDL bounds test, which is based on the standard ARDL model below:

$$\Delta lnG_t = \beta_0 + \sum_{i=1}^{m} \beta_{1i}\Delta lnG_{t-i} + \sum_{i=1}^{n} \beta_{2i}\Delta lnGESP_{t-i} + \sum_{i=1}^{n} \beta_{3i}\Delta lnGEE_{t-i} + \sum_{i=1}^{n} \beta_{4i}\Delta lnGEH_{t-i} + \sum_{i=i}^{n} \beta_{5i}\Delta lnTP_{t-i} + \sum_{i=i}^{n} \beta_{6i}\Delta lnTIW_{t-i} + \sum_{i=i}^{n} \beta_{7i}\Delta lnCE_{t-i} + \sum_{i=i}^{n} \beta_{8i}\Delta lnCIT_{t-i} + \beta_{9i} lnG_{t-i} + \beta_{10i} lnGESP_{t-i} + \beta_{11i} lnGEE_{t-i} + \beta_{12i} lnGEH_{t-i} + \beta_{13i} lnTP_{t-i} + \beta_{14i} lnTIW_{t-i} + \beta_{15i} lnCE_{t-i} + \beta_{16i} lnCIT_{t-i} + \varepsilon_t \quad (4.6)$$

Where Δ represents the first differences of the natural logarithms of the respective variables and ε represent the error term. The null hypothesis is tested by considering the unrestricted ECM for the Gini coefficient equation in (6) excluding the lagged variables lnGESP, lnGEE, lnGEH, lnTP, lnTIW, lnCE and lnCIT. The joint null and alternative hypotheses are:

H_0: $\beta_9 = \beta_{10} = \beta_{11} = \beta_{12} = \beta_{13} = \beta_{14} = \beta_{15} = \beta_{16} = 0$

H_1: $\beta_9 \neq \beta_{10} \neq \beta_{11} \neq \beta_{12} \neq \beta_{13} \neq \beta_{14} \neq \beta_{15} \neq \beta_{16} \neq 0$

The first part (with differenced variables) of equation 6 above represent the short-run dynamics while the second part of the equation represent the long-run dynamics. Pesaran and Shin (1999) recommends the Autoregressive Distributed Lag (ARDL) approach to cointegration or bound testing procedure for a long-run relationship, regardless of whether the underlying variables are I(0), I(1) or a combination of both. In such situation, the application of ARDL approach to cointegration provides realistic and efficient estimates. Unlike the Johansen-Juseliu cointegration procedure, Autoregressive Distributed Lag (ARDL) approach to cointegration helps in identifying the cointegrating vector(s). The ARDL model operate in such a way that each of the underlying variables stands as a single long run relationship equation. The distributed lag model imply that there is an inclusion of unrestricted lag of the regressors in a regression function. This cointegration testing approach assists us to know whether the underlying variables in the model are cointegrated or not, given the endogenous variable.

4.6.3 Long-run and short-run ARDL model expression

The unrestricted Error Correction model is used to estimate the short-run dynamics between the variables. If the cointegration test indicates that the time series data is cointegrated, the cointegrating term which is also known as the error correction term (ECT) has to be estimated. If a long run relationship between Gini coefficient and

the explanatory variables exists, the ARDL representation of the equation is formulated as follows:

$$lnG_t = \beta_0 + \sum_{i=1}^{m} \beta_{1i} lnG_{t-i} + \sum_{i=1}^{n} + \beta_{2i}\, lnGESP_{t-i} + \sum_{i=1}^{n} \beta_{3i} lnGEE_{t-i} + \sum_{i=1}^{n} \beta_{4i}\, lnGEH_{t-i} + \sum_{i=i}^{n} \beta_{5i}\, lnTP_{t-i} + \sum_{i=i}^{n} \beta_{6i}\, lnTIW_{t-i} + \sum_{i=i}^{n} \beta_{7i}\, lnCE_{t-i} + \sum_{i=i}^{n} \beta_{8i}\, lnCIT_{t-I} + \varepsilon_t \quad (4.7)$$

The ARDL specification of short-run dynamic parameters are obtained by estimating the ECM version of the ARDL model in the following form:

$$\Delta lnG_t = \beta_0 + \sum_{i=1}^{m} \beta_{1i} lnG_{t-i} + \sum_{i=1}^{n} \beta_{2i}\, \Delta lnGESP_{t-i} + \sum_{i=1}^{n} \beta_{3i} \Delta lnGEE_{t-i} + \sum_{i=1}^{n} \beta_{4i}\, \Delta lnGEH_{t-i} + \sum_{i=i}^{n} \beta_{5i}\, \Delta lnTP_{t-i} + \sum_{i=i}^{n} \beta_{6i}\, \Delta lnTIW_{t-i} + \sum_{i=i}^{n} \beta_{7i}\, \Delta lnCE_{t-i} + \sum_{i=i}^{n} \beta_{8i}\, \Delta lnCIT_{t-i} + \Upsilon ECM_{t-1} + \varepsilon_t \quad (4.8)$$

Δ represents the first differencing operator, G is the Gini coefficient, GESP represents Government Expenditure on Social Pensions, GEE represents Government Expenditure on Education, GEH represents Government Expenditure on Health, TP represents Tax on Products, TIW represents Tax on Income and Wealth, CE represents Customs and Excise duties from the SACU, CIT represents Corporate Income Tax, Υ represents the speed of adjustment which must be negative and significant, ECM_{t-1} is the lagged error term, t is the time period and ε_t is the Stochastic error term. The constant is represented by β_0 while β_1 to β_8 represents the coefficients of the explanatory variables, and they determine how much the explanatory variables influence the dependent variable.

4.6.4 Diagnostic tests

The primary purpose of regression modelling and data analysis is to formulate a good predictive relationship between the dependent and independent variables. A regression model is estimated/formulated under the assumptions that the observations are statistically independently distributed, all the observations have the same variance, and the residuals are normally distributed. The residuals of these observations are also assumed to have the above-mentioned attributes. To summarise the above statements, the assumptions made about the estimation model are those of independence, stability and homoscedasticity. The model can be tested for goodness of fit by examining autocorrelation, Regression Equation Specification Error Test (RESET), heteroscedasticity and parameter stability associated with the estimated model. It

should be noted that a model can violate one of the assumptions and still be a good model. These examining tools are discussed in detail below.

4.6.4.1 Autocorrelation

Autocorrelation can be defined as a mathematical representation of the similarity between a specified time series and a lagged version of itself over successive time intervals (John Hopkins Bloomberg School of Public Health, 2018). One of the assumptions of Classical Linear Regression Models (CLRM) is that the covariances and correlations between all disturbances are zero. Which means that the disturbances of a specified time series and the disturbances of its lagged version should be independently distributed. If this assumption is not met, then the time series is considered to be serially related. Autocorrelation is caused by various factors, some of which are explained here. One of the factors that can cause autocorrelation is the omission of statistically significant variables. A significant variable can be omitted either by mistake or on purpose. Secondly, autocorrelation can be caused by misspecification of the model, e.g. using a linear model instead of an exponential model. Lastly, autocorrelation can be caused by systematic errors in measurement. This normally happens when the institution responsible for providing data has over-reported or under-reported. Autocorrelation can be in different stages, e.g. first-order, second-order, third order etc. The most common form of autocorrelation is the first order autocorrelation which occurs when the current observation of the error term is a function of the previous/lagged observation of the error term. Given a multiple regression model below:

$$Y_t = \beta_1 + \beta_2 X_2 + \beta_3 X3 + \beta_4 X_4 + ... + \beta_r X_{rt} + \mu_t \quad (4.9)$$

In this case, first-order autocorrelation occurs when:

$$\mu_t = \rho \mu_{t-1} + e_t \quad (4.10)$$

Where ρ is the first order autocorrelation coefficient and it takes a value between -1 and +1. When ρ = 1, there is no autocorrelation.

Second-order autocorrelation occurs when:

$$\mu_t = \rho_1 \mu_{t-1} + \rho_2 \mu_{t-2} + e_t \quad (4.11)$$

The third autocorrelation occurs when:

$$\mu_t = \rho_1 \mu_{t-1} + \rho_2 \mu_{t-2} + \rho_3 \mu_{t-3} + e_t \quad (4.12)$$

The n-th autocorrelation occurs when:

$$\mu_t = \rho_1 \mu_{t-1} + \rho_2 \mu_{t-2} + \rho_3 \mu_{t-3} + ... + \rho_n \mu_{t-n} + e_t \quad (4.13)$$

Autocorrelation can be detected using a number of tests and procedures. The simplest method is the residual scatter plot where one can visually assess the presence of autocorrelation. Other tests for detecting autocorrelation include the Durbin-Watson test, the Breusch-Godfrey test, the Durbin's h test and the Engle's ARCH Test, among others. For the purposes of this research, the Breusch-Godfrey serial correlation LM test will be conducted to detect autocorrelation.

4.6.4.2 The Wald test

The Wald test is one of the methods of testing the significance of exogenous variables in an econometric model. For each explanatory variable in the model there will be an associated parameter. According to Polit (1996) and Agresti (1990) the Wald test is used to test whether the parameters associated with an explanatory variable or a group of variables are zero. If the Wald test is significant for a specific explanatory variable, or for a group of explanatory variables, then we can conclude that the parameters associated with these variables are not zero, so that the variables should be included in the model. If the Wald test is insignificant, then we can conclude that those independent variables can be omitted from the model. The mathematical expression of the Wald test is given below:

$$W_T = \frac{[\hat{\theta} - \theta_0]^2}{1/I_n(\hat{\theta})} = I_n(\theta)\left[\hat{\theta} - \theta_0\right]^2 \quad (4.14)$$

Where: $\hat{\theta} =$ Maximum Likelihood Estimator (MLE) and

$I_n\hat{\theta} =$ Expected Fisher information (evaluate at the MLE)

4.6.4.3 Heteroscedasticity, structural stability and normality tests

The presence of heteroscedasticity indicates that the error term does not have a constant variance. According to Austerio and Hall (2011), heteroscedasticity can be detected by conducting a number of tests such as the Glesjer LM test, the park LM test, the Breusch-Pagan LM Test, the ARCH test and the White test, among others. For the purposes of this research, the ARCH test is adopted because it is suitable for financial time series. Given an equation 4.14 below:

$$Y_t = \beta_0 + \beta_1 X_t + u_t$$
$$u_t \sim N(0, \alpha_0 + \alpha_1 u_{t-1}^2) \quad (4.15)$$

The ARCH test can be expressed as follows:

$$u_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2 + \alpha_2 u_{t-2}^2 ..... + \alpha_3 u_{t-p}^2 + v_t \quad (4.16)$$

Where *u* represents the residual from the initial regression, σ_t^2 represents the conditional variance of the error term, while *p* is the number of lags. The appropriate number of lags is determined by inbuilt Eviews lag selection feature. The study employed the Jarque-Bera (JB) test to assess whether the series is normally distributed or not. Normality of the residuals is an indication that there are no outliers and it is one of the assurances that the model is fit. The study also employed the Regression Equation Specification Error Test (RESET) to test whether the model is correctly specified.

4.6.5 Granger causality test

The Granger causality test is a statistical approach which is employed to determine whether one time series is statistically significant in determining another. The Granger causality test was proposed by Granger (1969) in order to determine causality among variables. Granger indicated that in a two variable model, *x* and *y*, *x* is a *c*ause of *y* if it is useful in predicting the value of *y*. For the purpose of this study, the Granger causality test was employed to assess the short-term causality between the Gini coefficient and the selected explanatory variables.

4.7. Conclusion

This chapter provided a brief overview of the research methodology which was adopted, the sources of data for the research and a brief definition of the variables for this research. The chapter also provided the theoretical and empirical model specifications and specified the estimation methods used for this research. The DF-GSL and the Phillips-Perron tests are employed to test the stationarity property of the variables. The ARDL bounds test approach to cointegration is employed to assess the long-run relationship between the Gini coefficient and the selected explanatory variables. If the cointegration test reveals the presence of cointegration, the ECM will be estimated. The Wald test will be employed to test for the significance of the

explanatory variables. The Granger causality test will also be employed to assess the causality between the Gini coefficient and the selected explanatory variables. Robustness checks that will be conducted include the Regression Equation Specification Error Test, the normality test, the Breusch-Godfrey serial correlation LM test, and the ARCH test.

CHAPTER 5:ECONOMETRIC DATA ANALYSIS AND EMPIRICAL FINDINGS

5.1 INTRODUCTION

This chapter presents econometric data analysis and empirical findings of the research using the estimation model and techniques specified in Chapter 4. The chapter provides an interpretation of the empirical relationship between the dependent variable, namely, income inequality as measured by the Gini coefficient and explanatory/independent variables, namely, government expenditure on social pensions, government expenditure on education, government expenditure on health, tax on income and wealth, tax on products, customs and excise receipts from the SACU and corporate income tax. The chapter comprises of three subsections. Subsection 1 presents the stationarity test results of the Dickey-Fuller Generalised Least Square (DF-GLS) and the Phillips-Perron tests, while subsection 2 presents the estimated Model. Subsection 3 presents the robustness test results and finally a brief conclusion of the chapter.

5.2 Stationarity test results

The Dickey-Fuller Generalised Least Squares (DF-GLS) and the Phillips-Perron Tests were employed to test the stationarity property of the variables, firstly, at level and secondly, at first difference. The null and alternative hypotheses for the stationarity tests are specified as follows:

$H_{0:}$ The series has a unit root (non-stationary)

$H_{1:}$ The series has no unit root (stationary)

The null hypothesis is rejected if the absolute value of the test statistic is greater than the critical value in absolute terms. The Dickey-Fuller Generalised Least Squares (DF-GLS) and the Phillips-Perron Test results are summarised in Table 5.1 below:

Table 5.1: Dickey-Fuller Generalised Least Squares and the Phillips-Perron stationarity tests results

Variable	Model	DF-GLS		Phillips-Perron Test (PP)		Decision
		Levels	First Difference	Levels	First Difference	
LNG	Intercept	-0.737	-4.684***	-0.860	-4.622***	I(1)
	Trend & Intercept	-2.286	-4.727***	-2.165	-4.472**	
LNGESP	Intercept	0.684	-6.347***	-0.161	-6.238***	I(1)
	Trend & Intercept	-3.022*	-6.372***	-2.912	-6.164***	
LNGEE	Intercept	0.224	-3.833***	0.621	-4.287***	I(1)
	Trend & Intercept	-1.288	-4.562***	-1.164	-4.750***	
LNGEH	Intercept	-0.154	-4.813***	0.050	-4.672***	I(1)
	Trend & Intercept	-1.759	-4.882***	-1.783	-4.624***	
LNTIW	Intercept	-0.461	-4.082***	-4.894***	-6.591***	I(1)
	Trend & Intercept	-3.190*	-4.943***	-2.970	-9.817***	
LNTP	Intercept	0.547	-8.222***	1.232	-9.209***	I(1)
	Trend & Intercept	-3.538**	-8.596***	-3.341*	-24.062***	
LNCE	Intercept	-0.232	-6.153***	-0.664	-9.473***	I(1)
	Trend & Intercept	-3.898*	-6.168***	-3.649*	-8.091***	
LNCIT	Intercept	0.261	-0.449*	-2.520	-11.189***	I(1)
	Trend & Intercept	-5.489***	-6.032***	-9.309**	-10.343***	

Source: Author's compilation from Eviews output

Notes: (***), (**), (*) indicate 1 percent, 5 percent and 10 percent level of significance, respectively. I(1) indicate stationarity after first differencing.

The stationarity test results based on the Dickey-Fuller Generalised Least Squares (DF-GLS) method indicates that one variable is stationary at level at 1 percent, one other variable is stationary at 5 percent while three variables are stationary at 10 percent. The DF-GLS test results further indicate that all the variables are stationary at 1 percent after first differencing with intercept and trend. The Phillips-Perron stationarity test results indicates that two variables are stationary at level at 1 percent while two others are stationary at levels at 10 percent. The Phillips-Perron stationarity test results shows that all the variables are stationary after first differencing and they are integrated of the first order I(1). Based on the two test results (the Dickey-Fuller Generalised Least Squares (DF-GLS) and the Phillips-Perron stationarity test results)

collectively, we fail to reject the null hypothesis, and conclude that the data sets are non-stationary at level. The DF-GLS and the Phillips-Perron stationarity test results jointly indicate that the variables are stationary after first differencing. In the next section, the cointegration test is conducted to determine if there is a long-run relationship between the dependent and independent variables.

5.3 ARDL model estimation and cointegration test results

The next step is to estimate the standard ARDL model from which we can derive the long-run equation to establish the long run relationship between the Gini coefficient and the selected explanatory variables. For the purposes of this research, we employed the ARDL Bounds test approach to establish the long-run relationship between the variables. If the cointegration test results indicate that the variables are cointegrated, the ECM will be estimated to establish the short-term dynamics. The ARDL in-built/automatic lag selection criteria was employed to select the optimal number of lags for each variable. The optimal lags for the ARDL model are (1, 1, 1, 0, 0, 1, 1, 1). Table 5.2 below shows the results of the ARDL model.

Table 5.2: ARDL Model

Dependent Variable: LN_G					
Method: ARDL					
Date: 05/14/19 Time: 17:13					
Sample (adjusted): 1996Q2 2016Q4					
Included observations: 83 after adjustments					
Maximum dependent lags: 4 (Automatic selection)					
Model selection method: Akaike info criterion (AIC)					
Dynamic regressors (4 lags, automatic): LN_GESP LN_GEE LN_GEH LN_TIW LN_TP LN_CE LN_CIT					
Fixed regressors: C					
Number of models evalulated: 312500					
Selected Model: ARDL(1, 1, 1, 0, 0, 1, 1, 1)					
Variable		Coefficient	Std. Error	t-Statistic	Prob.*
C1	LN_G(-1)	0.889481	0.048878	18.19792	0.0000
C2	LN_GESP	-0.131894	0.021309	-6.189532	0.0000
C3	LN_GESP(-1)	0.105944	0.022771	4.652634	0.0000
C4	LN_GEE	-0.166086	0.039079	-4.250015	0.0001
C5	LN_GEE(-1)	0.145905	0.035550	4.104216	0.0001
C6	LN_GEH	0.014511	0.012155	1.193769	0.2367
C7	LN_TIW	-0.049179	0.023922	-2.055767	0.0436
C8	LN_TP	0.146049	0.027267	5.356175	0.0000
C9	LN_TP(-1)	-0.121935	0.026709	-4.565376	0.0000
C10	LN_CE	0.044029	0.016201	2.717755	0.0083
C11	LN_CE(-1)	-0.030385	0.016456	-1.846393	0.0691
C12	LN_CIT	0.115921	0.021942	5.282986	0.0000
C13	LN_CIT(-1)	-0.076091	0.016348	-4.654494	0.0000
C14	C	0.477109	0.231581	2.060221	0.0432
R-squared		0.983482	Mean dependent var		4.138346
Adjusted R-squared		0.980370	S.D. dependent var		0.080552
S.E. of regression		0.011286	Akaike info criterion		-5.977882
Sum squared resid		0.008789	Schwarz criterion		-5.569885
Log likelihood		262.0821	Hannan-Quinn criter.		-5.813972
F-statistic		316.0146	Durbin-Watson stat		2.076120
Prob(F-statistic)		0.000000			

Source: Author's compilation from Eviews output

The Wald test for coefficient significance is employed to test for the significance of the coefficients in the ARDL model above. The null and alternative hypotheses for the Wald test for coefficient significance are given below:

H_0: Coefficients = 0

H_1: Coefficients ≠ 0

We reject the null hypothesis if the p-value of the F-statistic is less than or equal to 0.05. The test is conducted in two categories, the first category consists of coefficients with the value less than 0.05 while the second category consists of coefficients with the p-value greater than 0.05 level of significance. The Wald test results are given in table 5.3 and 5.4 below:

Table 5.3: Wald test results for significant coefficients

Wald Test:			
Test Statistic	Value	df	Probability
F-statistic	101.3089	(11, 69)	0.0000
Chi-square	1114.398	11	0.0000
Null Hypothesis: C(1)=0, C(2)=0, C(3)=0, C(4)=0, C(5)=0, C(7)=0, C(8)=0, C(9)=0, C(10)=0, C(12)=0, C(13)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(1)		0.889481	0.048878
C(2)		-0.131894	0.021309
C(3)		0.105944	0.022771
C(4)		-0.166086	0.039079
C(5)		0.145905	0.035550
C(7)		-0.049179	0.023922
C(8)		0.146049	0.027267
C(9)		-0.121935	0.026709
C(10)		0.044029	0.016201
C(12)		0.115921	0.021942
C(13)		-0.076091	0.016348

Source: Author's compilation from Eviews output

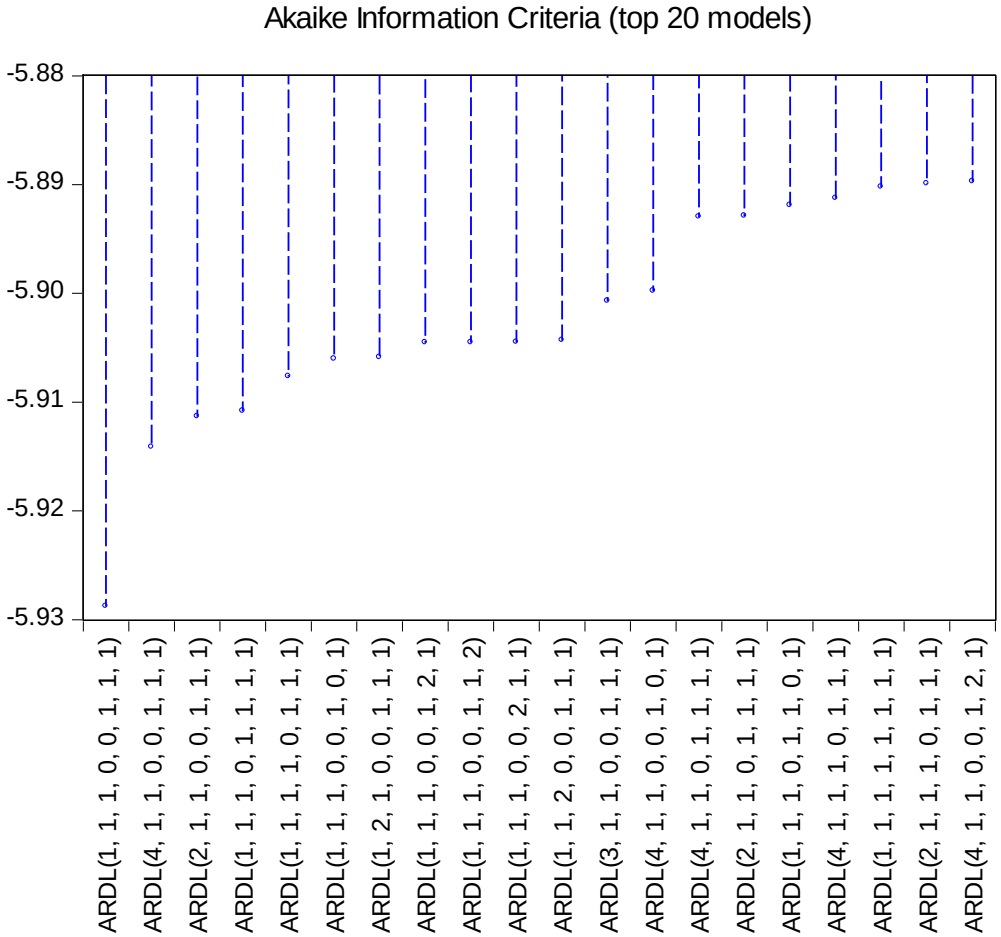
Table 5.4: Wald test results for redundant variables

Wald Test:			
Test Statistic	Value	df	Probability
F-statistic	2.171887	(2, 69)	0.1217
Chi-square	4.343774	2	0.1140
Null Hypothesis: C(6)=0, C(11)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(6)		0.014511	0.012155
C(11)		-0.030385	0.016456

Source: Author's compilation from Eviews output

The Wald test results above confirms that C1, C2, C3, C4, C5, C7, C8, C9, C10, C12 and C13 are jointly statistically significant at 5 percent level of significance while C6 and C11 are statistically insignificant or redundant variables. To confirm the strength of the ARDL model estimated, we can view the criteria graph which presents the best 20 models evaluated using the Akaike information criteria. The criteria graph is presented figure 5.1 below:

Figure 5.1: Akaike Information Criteria graph



Source: Author's compilation from Eviews output

Based on the Akaike Information Criteria graph of the top 20 models above, we can observe that the selected model is superior compared to other models on the top 20 list. Using the results of the ARDL model in table 5.2 above, we can derive the long run equation from the ARDL bounds testing through a simple linear transformation. The long run equation is presented in table 5.5 below:

Table 5.5: Long run levels equation

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN_GESP	-0.234804	0.119593	-1.963363	0.0536
LN_GEE	-0.182609	0.208150	-0.877295	0.3834
LN_GEH	0.131297	0.124376	1.055645	0.2948
LN_TIW	-0.444983	0.241550	-1.842200	0.0697
LN_TP	0.218184	0.195401	1.116600	0.2680
LN_CE	0.123456	0.105027	1.175465	0.2438
LN_CIT	0.360395	0.188926	1.907603	0.0606
C	4.316989	0.716023	6.029125	0.0000

Long Run Coefficients				
Cointeq/ECT = LN_G - (-0.2348*LN_GESP -0.1826*LN_GEE + 0.1313*LN_GEH - 0.4450*LN_TIW + 0.2182*LN_TP + 0.1235*LN_CE + 0.3604*LN_CIT + 4.3170)				
CointEq(-1)	-0.101450	0.032098	-3.160652	0.0023

Source: Author's compilation from Eviews output

The P-values associated with the long-run coefficients are all insignificant at 5 percent level of significance, therefore, we can conclude that there is no cointegration. To confirm the p-values of the long-run results above, we can conduct the ARDL bounds test. The bounds test results are presented in table 5.6 below:

Table 5.6: F-Bounds test results

ARDL Bounds Test		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	k
F-statistic	1.046439	7
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	1.92	2.89
5%	2.17	3.21
2.5%	2.43	3.51
1%	2.73	3.9

Source: Author's compilation from Eviews output

The cointegration test results above confirms that all the variables do not have long-run relationships at 5 percent level of significance, therefore, we cannot specify an error correction model.

5.4 ARDL short-run model and causality test

The next step is to estimate the parsimonious ARDL model with differenced variables and conduct the short-run granger causality based on the t-statistics and the Wald F-test. Five control variables, namely, GDP growth, population growth, inflation, corruption perception index and unemployment rate were included in the model, however, desired results could not be obtained. The automatic/build-in lag selection criteria was employed to select the optimal number of lags for each variable in the model. The results of the ARDL model with differenced variables are presented in table 5.7 below:

Table 5.7: ARDL model with differenced variables

Dependent Variable: D(LN_G)				
Method: ARDL				
Maximum dependent lags: 4 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (4 lags, automatic): D(LN_GESP) D(LN_GEE) D(LN_GEH) D(LN_TIW) D(LN_TP) D(LN_CE) D(LN_CIT)				
Fixed regressors: C				
Number of models evalulated: 312500				
Selected Model: ARDL(4, 0, 0, 0, 0, 0, 0, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
D(LN_G(-1))	-0.005016	0.063385	-0.079139	0.9372
D(LN_G(-2))	-0.005016	0.063385	-0.079139	0.9372
D(LN_G(-3))	-0.005016	0.063385	-0.079139	0.9372
D(LN_G(-4))	0.427349***	0.089109	4.795818	0.0000
D(LN_GESP)	-0.139709***	0.018818	-7.424107	0.0000
D(LN_GEE)	-0.146113***	0.044489	-3.284236	0.0016
D(LN_GEH)	-0.022352	0.024483	-0.912957	0.3645
D(LN_TIW)	-0.061108	0.046679	-1.309111	0.1950
D(LN_TP)	0.232441***	0.031974	7.269658	0.0000
D(LN_CE)	0.044395***	0.015637	2.839141	0.0060
D(LN_CIT)	0.119209***	0.028737	4.148300	0.0001
C	-0.000601	0.001373	-0.437300	0.6633
R-squared	0.733304	Mean dependent var		-0.002843
Adjusted R-squared	0.689518	S.D. dependent var		0.018345
S.E. of regression	0.010222	Akaike info criterion		-6.189477
Sum squared resid	0.007001	Schwarz criterion		-5.829560
Log likelihood	256.4843	Hannan-Quinn criter.		-6.045283
F-statistic	16.74746	Durbin-Watson stat		1.997336
Prob(F-statistic)	0.000000			

Source: Author's compilation from Eviews output
Notes: (***), (**), (*) indicate 1 percent, 5 percent and 10 percent level of significance, respectively.

The short-run estimates in the table above reveals that Government expenditure on social pensions (GESP), government expenditure on education (GEE), tax on products (TP), corporate income tax (CIT) and customs and excise duties from SACU are statistically significant at 1 percent level of significance in the short-run. Government expenditure on health (GEH) and tax on income and wealth were found to be statistically insignificant. The research findings reveals that government expenditure on social pensions has a reducing effect on the Gini coefficient, and it is statistically significant at 1 percent with the P-Value of 0.0000. The coefficient of government expenditure on social pensions is -0.1397, which implies that a 1 percent increase in government expenditure on social pensions will lead to an improvement in income

distribution of 0.13 percent, ceteris paribus. This is in line with economic theory which stipulates that social transfers promote a fair distribution of income since it targets vulnerable members of society and boosts the purchasing power of people in the low income category such as elderly people, physically and mentally challenged individuals, as well as orphans in the case of Namibia. Samuelson (1955) indicates that all redistributions take place through transfer expenditure. A number of research findings have also indicated that social transfers have a positive impact on income distribution, e.g. the findings of an empirical research conducted by Vaalavuo (2013) indicate that government expenditure on social welfare such as cash benefit/social pensions have a balancing effect on income distribution. Keynes (1936) also insists on the need for the government to intervene to correct market failures such as income inequality, through various interventions which include the provision of social pensions.

The coefficient of government expenditure on education is negative and significant. The P-value of government expenditure on education is 0.0016 and its coefficient is -0.14611, which implies that a 1 percent increase in government expenditure on education will lead to a reduction in the Gini coefficient by 0.15 percent, ceteris paribus. These results conform to economic theory, which suggests that government expenditure on education has a positive impact on income distribution as measured by the Gini coefficient. Samuelson (1955) highlighted the benefits and distributional effects of government expenditure on education. These results confirm the findings of the research conducted by Sylwester (2002) and Tsanos and Manos (1999), whose empirical research findings indicate that government expenditure on education has a balancing effect on income inequality. Another research by Martinez-Vasquez., *et al.* (2012) indicates that government expenditure on social welfare activities such as education services reduces income inequality.

Tax on products has a worsening effect on the Gini coefficient. The worsening effect is indicated by the coefficient of tax on products, which is positive and significant at 1 percent level of significance. Its P-value is 0.0000 while its coefficient is 0.2324 which implies that an increase in tax on products by 1 percent will lead to an increase in Gini coefficient by 0.23 percent, ceteris paribus/holding all other variables

constant. The findings of an empirical research by Leu, *et al.,* (2009) indicate that taxes have an unbalancing/regressive effect on income distribution. These findings are in line with economic theories and with empirical research findings of various researchers such as Mylonidis and Losifidi (2017), whose findings indicate that consumption taxes such as VAT or tax on products have a negative impact on income distribution. The negative impact of consumption taxes can be attributed to a number of factors, of which the key factors are summarised below:

Firstly, taxes on products have a negative impact on income distribution because they charge low-income earners a large fraction of their income and high-income earners a small fraction of their income. This is because consumption taxes such as tax on products are regressive in nature; as a result, they negatively affect low-income earners severely as opposed to high income earners. Secondly, when there is an increase in consumption taxes, retailers and businesses would pass on the tax burden to consumers by increasing the prices of goods and services on which the tax is levied. Considering the fact that consumption taxes are regressive in nature, people in the low-income category will be worse off as opposed to those in the high-income category. These results are confirmed by the research conducted by Martinez-Vazquez, *et al.,* (2012), whose findings indicate that consumption taxes have an unbalancing effect on income inequality.

The research findings indicate that customs and excise duty has a worsening effect on the Gini coefficient, which is a similar trend in consumption taxes discussed earlier in this subsection. The coefficient of customs and excise duty is positive and statistically significant at 1 percent significance level. The P-value of customs and excise duty is 0.0060 while its coefficient is 0.04439, which implies that an increase in customs and excise duty by 1 percent will lead to an increase in income inequality (Gini coefficient) by 0.04 percent, ceteris paribus. These results conform to economic theories and empirical findings, which suggest that consumption taxes are not effective in reducing income inequality. The findings of the research conducted by Mylonidis and Losifidi (2017) reveal that indirect taxes are not effective in reducing income inequality. Martinez-Vazquez, *et al.,* (2012) also arrived at the same

conclusion that consumption taxes such as excise taxes and custom duties have an unbalancing effect on income inequality.

The empirical findings of this research indicate that corporate income tax/tax on corporations is statistically significant at 1 percent and has a negative impact on income distribution with the P-value of 0.0001. These findings are in line with the findings of Leu, *et al.,* (2009), whose research findings indicate that indirect taxes are regressive in nature, contributing to an increase in inequality and poverty. The coefficient of corporate income tax is 0.1192, which implies that a 1 percent increase in corporate income tax will lead to a 0.12 percent increase in the Gini coefficient. This is in line with general economic theories and with the empirical research findings of various researchers such as Mylonidis and Losifidi (2017), whose research findings indicate that indirect taxes are not effective in reducing income inequality. Increasing corporate income tax has a worsening effect on income distribution because corporations and businesses pass on the increment in corporate tax to employees and consumers through low salaries, poor service benefits and high prices of goods and services. This has a severe effect on employees in the low-income group and ordinary citizens at low-income category, thereby aggravating income inequality and poverty.

The R-squared value is 0.733304, which implies that 73.33 percent of the variation in the Gini coefficient is explained by the explanatory variables under investigation, namely, government expenditure on education, government expenditure on health, customs and excise duty from the SACU, tax on products, tax on income and wealth, government expenditure on social pensions, and corporate income tax. The remaining 26.67 percent is explained by the error term. The Durbin-Watson statistic is 1.9973, which is very close to 2, and this is an indication that there is no autocorrelation. The F-statistic is significant at 5 percent, which shows that the estimated short run ARDL model is robust.

5.4.1 Granger causality and Diagnostic test results

The study employed the Granger causality tests to assess the short-term causality between the Gini coefficient and the selected explanatory variables. The granger causality test rests are given in table 5.9 below:

Table 5.8: Granger causality test results

Dependent variable	SHORT RUN GRANGER CAUSALITY		Tests Conclusion
	t-Statistics	Wald F-Test	
D(LN_G)	D(LN_GESP) Significant	C(5)=0 55.11736(0.0000)	D(LN_GESP) Causes D(LN_G)
	D(LN_GEE) Significant	C(6)=0 10.78621(0.0016)	D(LN_GEE) Causes D(LN_G)
	D(LN_GEH) Insignificant	C(7)=0 0.833491(0.3645)	D(LN_GEH) does not cause D(LN_G
	D(LN_TIW) Insignificant	C(8)=0 1.713772 (0.1950)	D(LN_TIW) does not cause D(LN_G)
	D(LN_TP) Significant	C(9)=0 52.84793(0.0000)	D(LN_TP) Causes D(LN_G)
	D(LN_CE) Significant	C(10)=0 8.060723(0.0060)	D(LN_CE) Causes D(LN_G)
	D(LN_CIT) Significant	C(11)=0 17.20839(0.0001)	D(LN_CIT) Causes D(LN_G)

Source: Author's compilation from Eviews output

The short run Granger causality tests indicate that there is a statistically significant causal relationship between the Gini coefficient and five of the seven explanatory variables, namely, government expenditure on social pensions, government expenditure on education, tax on products, customs and excise duties from SACU and tax on income and wealth. The short run Granger causality test results further indicate that government expenditure on health and tax on income and wealth do not have a significant causal relationship with the Gini coefficient. The Granger causality results using the two tests above are supporting each other which implies that the results obtained are valid and robust.

Four diagnostic tests were conducted to assess the robustness of the estimated model. The robustness tests that were conducted are the Breusch-Godfrey serial correlation LM test, the ARCH test for heteroscedasticity, the Ramsey Regression Equation Specification Error Test (RESET) and the test Jarque-Bera normality test. Three of the four diagnostic tests reveal that the estimated model is robust. Table 5.9 below demonstrate the outcome of the diagnostic tests:

Table 5.9: Diagnostic test results

Breusch-Godfrey serial correlation LM test	
F-statistic: 0.000130	Prob. F: 0.9999
Obs*R-squared: 0.000315	Prob. Chi-Square: 0.9998
ARCH test results for heteroscedasticity	
F-statistic: 0.893661	Prob. F: 0.3475
Obs*R-squared: 0.906519	Prob. Chi-Square: 0.3410
Ramsey RESET test	
t-statistics	Prob. 0.5436
F-statistic	Prob. 0.5567
Jarque-Bera Normality Test results	
Jarque-Bera: 729.3972	Prob. 0.0000

Source: Author's compilation from Eviews output

The Breusch-Godfrey serial correlation LM test result indicate that there is no serial correlation and the ARCH test results for heteroscedasticity indicate that the residuals are homoscedastic. The Ramsey RESET test reveals that the model is correctly specified. The residuals are not normally distributed and this can be attributed to data extrapolation. Based on the test results of the majority of the tests, we can confidently conclude that the model is robust and statistically acceptable.

5.5 Conclusion

This chapter presented the econometric data analysis and empirical findings of the research, employing various tests and estimation techniques. The DF-GSL and the Phillips-Perron tests were employed to test the stationarity property of the variables. Both tests indicate that the variables are non-stationary at levels; however, all the tests indicate that all the variables are stationary after first differencing. The ARDL bounds test was employed to assess the long-run relationship between Gini coefficient and the selected explanatory variables. Since the cointegration test reveals that there is no cointegration, we could not specify the ECM. The short run ARDL estimates revealed that 5 explanatory variables are statistically significant while two variable were found to be statistically insignificant. The Granger causality tests indicates that there is a causal relationship between the Gini coefficient and 5 explanatory variables. Robustness checks were also conducted, such as the Breusch-Godfrey serial correlation LM test, the ARCH test, the Jarque-Bera Normality test and Ramsey

RESET test. Three out of four robustness tests indicates that the model is robust. Considering that 3 out of four tests indicates that the model is robust, we can confidently conclude that the model is robust and statistically acceptable.

CHAPTER 6: CONCLUSIONS AND POLICY RECOMMENDATIONS

6.1 Introduction

This chapter presents a summary of the research and it consists of three subsections, namely, the summary of the research, summary of the empirical findings, conclusion and recommendation. The chapter concludes with discussion on the limitations of the research.

6.2 Summary of the research

This research was initiated with the main objective to statistically analyse and interpret the impact of taxation and government expenditure components on income distribution in Namibia. The research is designed specifically for Namibia, because Namibia has one of the highest income inequality levels in Southern Africa, based on the World Bank categorization of income inequality. Other objectives of the research are to identify the gap in the literature by reviewing theoretical and empirical literature, to apply statistical tools to test the joint significance of the selected variables and to identify which independent variables have a balancing/positive effect and which variables have a negative effect on the Gini coefficient. The study aims to create new knowledge about the correlation between the dependent and independent variables and to have an in-depth understanding of the impact of taxation and government expenditure components on income distribution in Namibia. The research also aims to come up with research-based policy recommendations on how to improve the distribution of income in Namibia. The research tested three hypotheses. The first hypothesis is that corporate income tax, customs and excise duty from SACU (SACU receipts), tax on income and wealth, tax on products, government expenditure on social pensions, government expenditure on health, and government expenditure on education are jointly significant determinants of the Gini coefficient. The second hypothesis is that corporate income tax, customs and excise duty (SACU receipts) and tax on products have an unbalancing or worsening effect on the Gini coefficient. The third and final hypothesis is that government expenditure on social pensions,

government expenditure on education, government expenditure on health, and tax on income and wealth have a positive or balancing effect on the Gini coefficient.

Income inequality and taxation on a global perspective includes the work of authors such as McConnell and Brue (2002), who highlighted the causes of income inequality in the United States, and Nafziger (2006), who suggested strategies to reduce income inequality. Theoretical literature reviews include the Keynesian theory and the theory of public goods. Keynes believes that the capitalist system has some fatal weaknesses because it gives rise to unequal distribution of income and has undoubtedly failed to provide for full employment. On that basis, Keynes argues that the government should employ fiscal policy (taxation and government expenditure policies) to realise equitable distribution of income and full employment. Keynes strongly supports government involvement in the capitalist economy to correct market failures such as income inequality and unemployment. On the theory of public goods, Samuelson (1954) indicates that public goods are under-produced in the private sector, or may not be produced at all, following the conventional wisdom, so economic efficiency requires that the government force people to make a contribution (through taxation) towards the production of public goods and services and then allow all citizens to consume them. Efficient provision of public goods such as education consequently leads to reduction in income inequality because even citizens who cannot afford to pay for education and other public goods and services are afforded the opportunity to consume them. The theoretical literature reviews also included fundamental theories such as the Peacock-Wiseman hypothesis and the tax incidence theory, among others.

Various empirical studies were reviewed, such as Leu, *et al.*, (2009), Wittenberg (2017), Mylonidis and Losifidi (2017), Vaalavuo (2013) and Sylwester (2002), among others. The findings of a research by Leu, *et al.*, (2009) indicate that government expenditures are more effectives in reducing income inequality as opposed to direct taxes. Social welfare expenditures were found to be more effective in redistributing national income as opposed to other government expenditures. Their research further indicate that indirect taxes have an unbalancing effect on the distribution of income. Sylwester (2002) indicates that government expenditure on education is statistically significant in influencing income inequality. This research has eight variables,

namely, the Gini coefficient (dependent variable), tax on products, tax on income and wealth, tax on corporations, customs and excise duty from the SACU, government expenditure on social pensions, government expenditure on education, and government expenditure on health. This research is a modified version of an empirical research conducted by Leu, *et al.*, (2009) titled 'Taxes, expenditures and income distribution in Switzerland'.

Various econometric estimation techniques were used to establish the relationship between the Gini coefficient and the above-mentioned explanatory variables. The data was converted into a natural log and thereafter, the stationarity tests were conducted using the DF-GLS and the Fillips-Perron stationarity tests. The ARDL bounds test was employed to assess the long-run relationship between the Gini coefficient and the explanatory variables. Since the cointegration test revealed that there is no cointegration, we could not specify the ECM. Five control variables (GDP growth, population growth, inflation, corruption perception index and unemployment rate) were included in the model, however, desired results could not be obtained. Robustness tests that were conducted include the Breusch-Godfrey serial correlation LM test, the ARCH test for heteroscedasticity, the Ramsey Regression Equation Specification Error Test (RESET) and the test Jarque-Bera normality test. Three out of four robustness tests indicated that the model is robust, therefore, we can accept the model based on the performance of the majority diagnostic test results.

6.3 Summary of empirical findings, conclusions and recommendations

Below is a summary of the empirical findings of the research:

a) The Dickey – Fuller Generalised Least Square and the Phillips-Perron stationarity test results jointly indicate that the variables are non-stationary at levels; however, all the variables became stationary after first differencing.
b) The ARDL Bounds test results for cointegration reveal that there is no cointegration, therefore, there is no need to specify the ECM.
c) The short run ARDL model was estimated and the results indicated that 5 explanatory variables are statistically significant. The Wald test confirmed that 5 explanatory variables are statistically significant while 2 explanatory variables are statistically insignificant.

d) The Granger causality test reveals that there is a causal relationship between Gini coefficient and the five of the explanatory variables.
e) The Breusch-Godfrey serial correlation LM test results reveal that there is no serial correlation, which is an indication that the model is robust and acceptable.
f) The ARCH test results indicate that there is no heteroscedasticity, which implies that the model is defensible and acceptable.
g) The Ramsey Regression Equation Specification Error Test (RESET) indicates that the model is correctly specified and this is an indication that the estimated model is robust.
h) The research reveals that government expenditure on social pensions has a reducing effect on the Gini coefficient and that it is statistically significant at 1 percent, which suggests that an increase in government expenditure on social pensions will lead to a reduction in the Gini coefficient, representing an improvement in income distribution. Given this relationship, government should maintain/improve the current social pension scheme because of its contribution towards a fair distribution of income.
i) The findings of this research indicate that government expenditure on education has an improvement or balancing effect on the Gini coefficient and it is statistically significant. This implies that an increase in government expenditure on education will lead to a reduction in income inequality as measured by the Gini coefficient. On that basis, the Namibian government should increase its expenditure on education; however, expenditure in the form of loans should be prioritised as opposed to grants and scholarships. Prioritising loans over grants and scholarships will ensure sustainability of the NSFAF in the long run because the funds will be revolving.
j) The findings of this research reveal that tax on products, customs and excise duty from the SACU, and corporate income tax have an unbalancing effect on the Gini coefficient and that they are significant determinants of the Gini coefficient. An increase in any of the three taxes mentioned above will lead to an increase in income inequality as measured by the Gini coefficient. The research recommends a tax mix and tax discrimination where certain products are highly taxed, e.g. luxury products. With the tax mix, some taxes can be slightly reduced, e.g. corporate tax to attract investors, while other taxes should be increased, e.g. sin

tax (tax on alcohol and tobacco) to increase government revenue and discourage destructive habits. A tax mix and a hybrid of taxation and government expenditure components are strongly recommended to achieve a balance. Corporate companies should also be charged differently depending on the industries they operate and the nature of their operations. This should however be done with caution to ensure that the country remain competitive to foreign and local investors.

6.4 Limitations of the research

Considerable care was taken to ensure that this research is as acceptable and defensible as possible. However, a few challenges and limitations were experienced. The first limitation is the unavailability of national data for the years before independence. Data from 1990 and older is very limited or unavailable because there was no proper record due to the war in the country during that time. We should also take note that most of the institutions, e.g. Bank of Namibia and Namibia Statistics Agency, were established only after independence in 1990, which means that the records were unreliable or non-existent. As a result, the research used data from 1996 – 2016. Due to limited data, data extrapolation was conducted by converting annual observations to quarterly observations in Eviews in order to be able to conduct a complete assessment. The second limitation is that some explanatory variables were excluded because the data records available are very limited. Future studies can include some of the excluded variables such as transfer and stamp duties. Further analysis might include a Generalised Method of Moments (GMM) approach that could also be used with a panel of data in terms of SACU or SADC for future studies.

Despite these limitations and challenges that might have an effect on the empirical findings of this research, it is assumed that these effects did not significantly affect the findings of the research. This assumption is backed by the fact that the results conform to theoretical and empirical literature and most diagnostic tests reveal that the estimated model is robust. On that basis, there is a very strong conviction that the results are credible and acceptable.

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APPENDIX 1: ETHICAL CLEARANCE CERTIFICATE

UNISA university of south africa

UNISA ECONOMICS ETHICS REVIEW COMMITTEE

Date 13 August 2018

Dear Mr A A Indongo

Decision: Ethics Approval from 2018 to 2021

NHREC Registration # : (if applicable)

ERC Reference # : 2018_DE_004(SD)_MR_INDONGO

Name : Mr A A Indongo

Student #: 53157338

Staff #:

Researcher(s): Name Mr A A Indongo

E-mail address 53157338@mylife.unusa.ac.za, telephone +264812877575

Supervisor (s): Name Prof Zurika Robinson

E-mail address robinz@unisa.ac.za, telephone # 012 433 4608

Working title of research:

An analysis of the impact of taxation and expenditure policies on income distribution in Namibia

Qualification: Mcom Economics

Thank you for the application for research ethics clearance by the Unisa Economics Ethics Review Committee for the above mentioned research. Ethics approval is granted for 3 years.

*The **low risk application** was **reviewed** by the Economics Ethics Review Committee on 13 August 2018 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment. The decision was approved on 13 August 2018.*

The proposed research may now commence with the provisions that:

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the Economics Committee.
3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.
5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data require additional ethics clearance.
7. No field work activities may continue after the expiry date. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

The reference number 2018_DE_004(SD)_MR_INDONGO *should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

Yours sincerely,

Dr I Maloma

Signature

Chair of Economics Department ERC

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Signature

Executive Dean :

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APPENDIX 2 DESCRIPTIVE STATISTICS

	LN_G	LN_GEE	LN_GEH	LN_GESP	LN_TIW	LN_TP	LN_CE	LN_CIT
Mean	4.139674	8.305938	7.662604	6.307995	8.709617	8.375947	8.529634	7.778043
Median	4.099332	8.152486	7.293018	6.378426	8.762333	8.326758	8.593019	7.898411
Maximum	4.249923	9.669093	8.885994	7.850493	9.867808	9.491375	9.758751	9.045702
Minimum	4.025352	7.089493	6.569481	4.804021	7.160846	7.395721	7.206378	6.059123
Std. Dev.	0.080986	0.767254	0.789905	0.867770	0.823593	0.627285	0.807287	0.864370
Skewness	0.478313	0.304179	0.266807	0.013587	-0.202515	0.194115	0.040193	-0.184847
Kurtosis	1.621074	1.873813	1.496793	2.033460	1.862110	1.849031	1.708753	1.998522
Jarque-Bera	9.857993	5.734388	8.905318	3.272280	5.105954	5.164084	5.858237	3.988711
Probability	0.007234	0.056858	0.011648	0.194730	0.077850	0.075619	0.053444	0.136101
Sum	347.7326	697.6988	643.6587	529.8716	731.6079	703.5795	716.4893	653.3556
Sum Sq. Dev.	0.544371	48.86031	51.78787	62.50100	56.29937	32.65934	54.09208	62.01226
Observations	84	84	84	84	84	84	84	84