



University of Venda

**DETERMINANTS OF TAX REVENUE PERFORMANCE IN SOUTH AFRICA FOR
THE PERIOD 1990-2018**

BY

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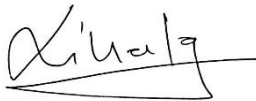
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DECLARATION

I, Asiashu Given Mmbulaheni, Student Number 11632007 hereby declare that this dissertation - **DETERMINANTS OF TAX REVENUE PERFORMANCE IN SOUTH AFRICA FOR THE PERIOD 1990-2018** - for the Master of Commerce in Economics, in the School of Management Sciences, submitted to the Department of Economics at the University of Venda, has not been submitted previously for any degree at this or another University. It is my original work in design and in execution, and all reference material contained therein have been duly acknowledged.



05 / 09 / 2022

Signature

Date

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ABSTRACT

Quantitative research on tax revenue performance is required to identify the variables that influence it and, as a result, develop strategies for increasing tax revenue or changing its composition. Previous scholars have mainly concentrated on developed countries, while others have avoided using newly-available variables. With data from 1990 to 2018, the study investigated the factors that have influenced South Africa's tax revenue performance. The study's three main objectives were - to examine tax revenue trends and performance in South Africa, identify the determinants of tax revenue performance in South Africa, and determine the relationship between tax revenue and explanatory variables. The goal of this study was to investigate how the South African government could increase revenue as it is so crucial for any country's economic growth. This thesis has contributed to the topic by expanding the literature pertaining to the determinants of tax revenue performance by incorporating current relevant sample which is inclusive of other deterministic variables. The determinants of tax revenue performance in South Africa were investigated using time series data over a 28-year period, from 1990 to 2018. The study's data was analyzed using the EViews package 12. Endogeneity, serial correlation, cross-sectional dependence of the error term, group-wise heteroscedasticity, stability, and contemporaneous correlation were all checked in the time series data before the process was estimated. The research diagnostic tests revealed that the study model was valid, as there was no serial correlation, no heteroscedasticity, and the model was stable and correctly specified. According to the study, GDP per capita, foreign direct investment, and trade openness are statistically significant and positively related to tax revenue performance. Unemployment was found to be statistically significant, but it was also discovered to be negatively related to tax revenue performance, while inflation was found to be negative however, not-statistically significant. The South Africa's government is, therefore, being urged to boost GDP, allow more FDI, reduce unemployment, and be more open to trade to improve tax revenue performance.

Key words: Tax determinants, Tax revenue, GDP, Tax compliance, Unemployment.

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LIST OF ACRONYMS

ADF	Augmented Dickey Fuller
OECD	Organisation for Economic Co-operation and Development

CPI	Consumer Price Index
GDP	Gross domestic product
ECM	Error Correction Model
FDI	Foreign Direct Investment
FGLS	Feasible Generalized Least Squares
DVFE	Dummy Variables Fixed Effects
IMF	International Monetary Fund
LM	Lagrange Multiplier
SFA	Stochastic Frontier Approach
SADC	Southern African Development Community
SARB	South African Reserve Bank
SSA	Sub-Saharan Africa

CHAPTER 1

INTRODUCTION

1.1. Background of the study

Recently, domestic revenue mobilization has gotten a lot of attention. To meet the Sustainable Development Goals, South Africa's government will have to put in a lot of effort in connection with revenue. Taxation, which is an essential component of financing public expenditure, is without a doubt a key aspect of the fiscal policy. Every government is responsible for achieving socioeconomic, institutional, and, to a degree, political objectives; these objectives necessitate funding, hence, taxation becomes critical, as governments use it as primary revenue source.

Economic development is the primary goal for many developing countries as reported by the International Monetary Fund (IMF, 2019). In the face of Covid-19, which has slowed the growth of many African countries, GlobalData (2020) noted that South Africa is expected to be one of Africa's fastest-growing economies with Morocco, Kenya, Egypt, and Ghana all expected to grow at a rate of 4%. According to StatsSA (2020), despite positive growth in the third and fourth quarters of 2020, this growth was insufficient to counter or offset the devastating impact of Covid-19 on the economy, during the peak of the lockdown restrictions. As a result, economic activity in 2020 decreased by 7% compared to the previous year. StatsSA (2020), report that this is a record drop, followed by the second-highest drop-in economic activity occurring in 1992, when the economy contracted by only 2.1 %. The economic slump experienced in 2020 is higher than that experienced in 2009, which was triggered by the global financial crisis; South Africa's economic activities declined by only 1.5 % in 2009 (StatsSA, 2020).

South Africa's low growth rates were exacerbated by the country's ongoing electricity crisis, political instability, and fiscal imbalance prior to the Covid-19 pandemic (IMF, 2019), however, simply hoping for economic development is insufficient; the country must also possess the necessary capacity and resources. Many developing countries, including South Africa, have vast mineral resources, despite this, they continue to have budget deficits. South Africa only had a minor budget surplus from 2005/6 to 2008/9, according to StatsSA (2018), when the government spent less than it earned, however, as a result of many factors that include the global financial crisis of 2008-2009, these budget surpluses did not last long. In 2008/09,

the South African economy struggled, falling into a deeper recession for the third year in a row. The drop in government revenue in 2009/10 was primarily due to a decrease in the amount of business tax collected. In the 2016/17 fiscal year, the budget deficit was R156 billion, or 6.1 % of GDP. For the same period, South Africa's gross loan debt was R2.2 trillion, or 53% of GDP (Stats SA, 2018). The budget deficit was expected to worsen to 14.6 % of GDP in the 2020 fiscal year. This is mainly because of the government's announcement of a 500-billion-rand corona virus relief package, which is equal to 10% of the country's GDP (De Clerk, 2020).

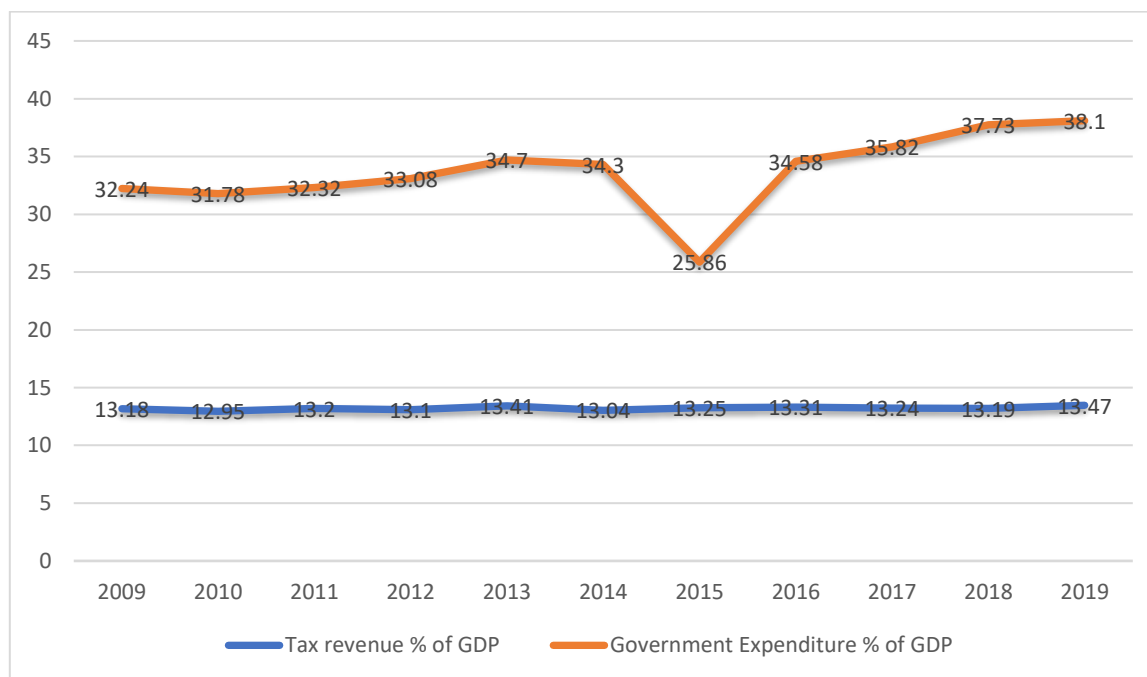


Figure 1.1. SA Revenue % of GDP vs Expenditure % of GDP Time Series 2009 to 2019

Source (StatsSA, 2019)

Figure 1.1 shows that between 2009 and 2019, South Africa's government expenditure % of GDP was much higher than tax revenue as a %age of GDP (StatsSA, 2019). Greater efforts, therefore, should be made to increase tax revenue, as the above figure indicates a deficit, which has a number of negative consequences for the economy.

According to the IMF report of 2018, South Africa's economy is strategically positioned, diversified and sophisticated, but productivity disparities are primarily due to mismatch, arising from the country's physical infrastructure, fiscal space, electricity, and educational problems. Business and consumer confidence were on the decline in 2018. It should be noted, and this point is relevant to this study's discussion - that South Africa's debt is rapidly increasing, limiting policy options. As a result, South Africa's growth rate has been negative, with poverty

rate rising to a record figure of around 42.5 %, and unemployment has increased to 32.5% in 2021 using the narrow definition of these terms (StatsSA, 2020).

The IMF Report (2018) reveals that South Africa's consolidated fiscal deficit increased to 4.8% of GDP between 2017-2018, up from 4% between 2016-2017 fiscal periods.

Table 1.1. South Africa's Fiscal Position (as a % of GDP)

Source: IMF Report (2020)

	2014	2015	2016	2017	2018	2019
Revenue	27.6	28.1	28.6	28.3	29.0	29.5
Expenditure	31.9	32.9	32.7	32.9	33.3	33.6
Overall balance (Deficit)	-4.3	-4.8	-4.1	-4.6	-4.3	-4.0
Overall primary balance	(1.2)	(1.5)	(0.6)	(1.0)	(0.5)	0.0
Fiscal balance (% of potential GDP)	(4.1)	(4.1)	(3.8)	(3.9)	(3.7)	(3.5)
Gross debt % of GDP	47.0	49.3	51.6	53.0	55.0	56.0

Table 1.1. above shows the performance of the South African economy between the period 2014-2019 fiscal years. The trend shows that revenue was collected steadily however, it did not increase significantly. The same was also experienced with government expenditure, which gave a steady balance deficit which ranged between -4% of GDP and -4.8% of GDP between these years. It is clear from Table 1.1. above, that the South African government debt has been increasing over the years, and it is possible that this is due to the fiscal balances that the economy of South Africa has experienced over the years. This then justifies the collecting of enough revenue as this will reduce various negative effects, such as increasing government debt.

In support of the above point, Figure 1.2. shows the change in debt ratio numerator caused by changes in macro-economic variables.

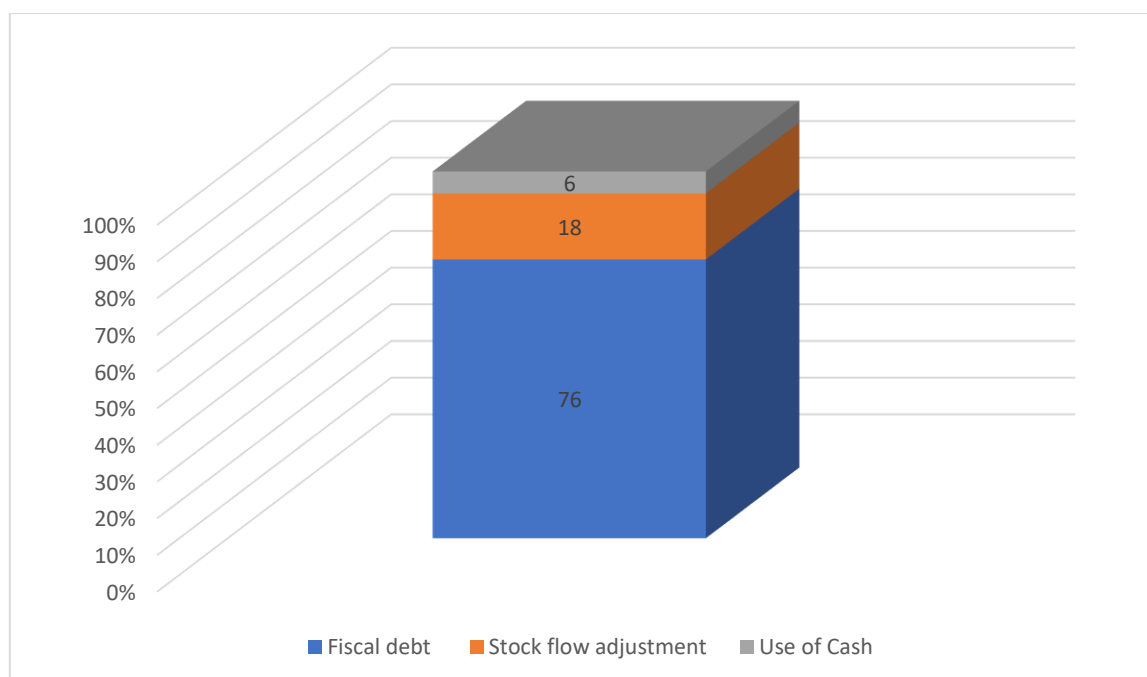


Figure 1.2. Breakdown of Debt Numerator Change, 2007-19

Source: StatsSA (2019)

Changes in the numerator (i.e., fiscal deficit, accumulation of cash balances, and a stock-flow adjustment term) or in the denominator cause changes in the actual debt stock as a share of GDP (i.e., nominal GDP). CPI adjustments of inflation-indexed debt, valuation changes of foreign currency denominated debt, and other stock flow adjustment movements, such as debt management operations, are all included in the stock flow adjustment term. The fiscal deficit accounted for 76% of the change in the debt ratio's numerator, the stock flow adjustment for 18%, and the accumulation of cash balances for the remaining 6%, according to the findings of StatsSA, (2019).

Following these consecutive years of fiscal deficit, South Africa had to rely on borrowing and external assistance to finance its development. Table 1.1. above gives a summary of the overall budget debt for the periods 2015/18; this picture is mainly due to the mismatch in the tax revenue versus expenditure. Karagos (2013) explains that better mobilization of internal resources will help a country close its fiscal deficit, adding that, further stresses that many developing countries face in relation to fiscal deficit, are mainly attributable to growing expenditure, coupled with low revenue collection practices.

Tax Revenue remains an essential source of South Africa income as this contributed about 87% of the country's income for the 2014/15 fiscal year. Individual tax, value added tax, and

business tax are the main source of government tax according as depicted in Figure 1.3. This %age in tax revenue contribution shows how much the government is dependent on tax, for development.

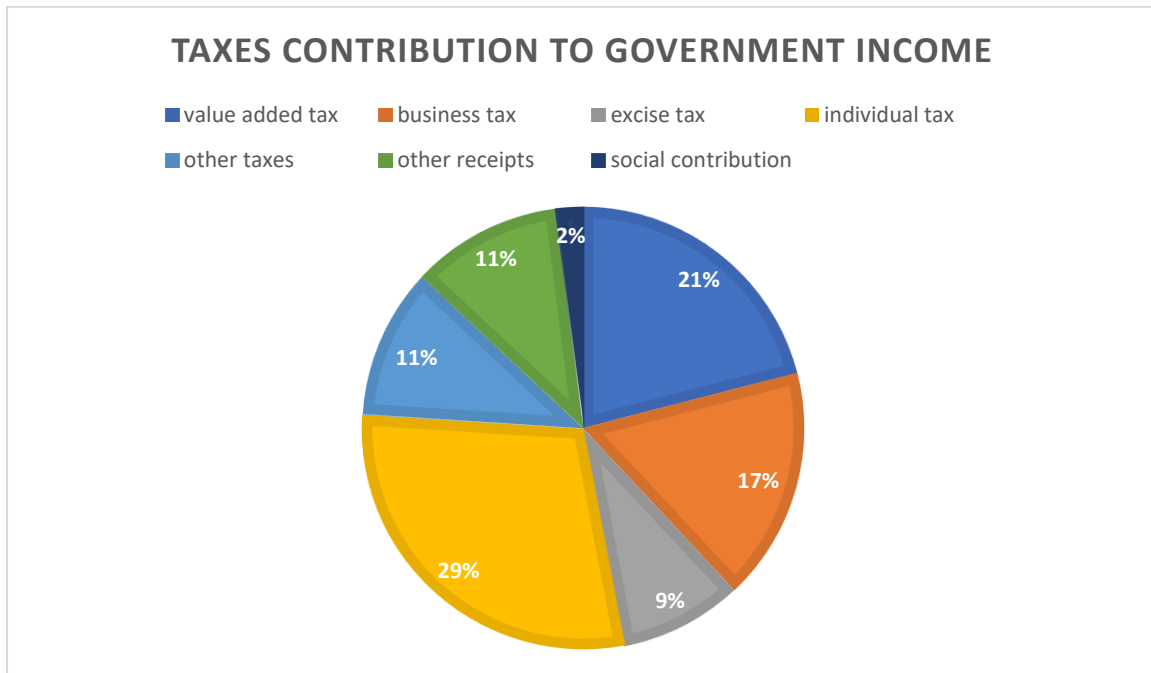


Figure 1.3. Source: Financial Statistics of Consolidated general government 2014/15
Source: StatsSA (2019)

Despite collecting such an amount in taxes (R1.22 trillion), South Africa for the same fiscal period, spent R1.4 trillion, which implies a fiscal deficit of R180 billion (Stats SA, 2018). According to Pius and Raymond (2014), the main responsibility of a tax system is to raise substantial revenue to meet the different categories of expenditures that include education, defense, social grants, and government projects. Chaudry and Munir (2010) note that resources of a country are normally not able to meet these government expenditures, thus, most governments resort to borrowing and printing of more money to finance deficits. The African Investment Initiative Report (2018) indicate that taxes provide, usually, substantial, and stable revenue to finance expenditure. In support of this view, Michael (2015) points out that much attention, therefore, should be given to knowing the determinants of tax revenue.

Sadly, even though tax revenue is crucial in financing development and expenditure, South Africa's development cannot be financed mainly from tax revenue. In comparison to Brazil, Russia, China and India, the BRICS countries, South Africa's tax revenue to gross domestic product ratio in 2018 was 24.8 %, according to IMF (2019) and OECD (2019) reports. South

Africa's tax-to-GDP ratio outpaced only India and China, which had tax-to-GDP ratios of 16.8% and 24.8 %, respectively. Russia had a tax-to-GDP ratio of 28.2 %, while Brazil topped the group with a 33.4 % tax-to-GDP ratio (IMF 2019; OECD, 2019). Yadav (2019) explains that a low tax-GDP ratio implies that a country will not be able to meet required social and economic development needs, due to budgetary constraints. Following the South African tax-GDP ratio which declined to 28.5% in 2016 and to 24.8% in 2017 and declined even further to 23.9% in 2019, concerns were raised as to the government's sustainability in managing its debt, exchange rate controls, inflation controls and the fiscal situation, in general.

Several factors have been identified as reasons for the low contribution of tax revenue to developing country development and progress. Muibi and Sinbo (2013), for example, identified agriculture as well as the industry's share in GDP, urbanization, external debt, monetization rate as the crucial factors of tax revenue. In the case of Turkey, Karagos (2013) found income levels, inflation rate, and country's exchange rate as the major exploratory variables of its tax revenue. Similarly, in Albania, Velaj and Prendi (2014) empirically tested for this same issue, and found that inflation, unemployment, and gross domestic product are the country's main determinants of taxation revenue.

1.2. Problem statement

Many low-income countries' progresses has been hampered by a low tax revenue collection. Taxation is critical to the long-term viability of both developing and developed countries, as stated in the introduction. Various governments make use of taxation as revenue source; thus, it has become a crucial and indispensable element in governments' decisions.

Following the global financial crisis of 2008, Bhushan and Samy (2016) argue that governments should turn to more stable and sustainable ways of financing development, as aid flows are no longer stable and predictable. Over-reliance on foreign financing, according to Gupta (2013), can lead to unmanageable debts in the long run, so developing countries should concentrate on developing reliable domestic sources of finance. Gupta (2013) goes on to say that increasing tax revenue is one way for governments to mobilize domestic finances and resources. As a result, Longford (2015), assert that increasing tax revenue is critical for reducing and mitigating unnecessary reliance on external borrowing, as well as assisting a

country in managing its economic problems. Policymakers in low-income economies, therefore, have made increasing tax contributions to GDP ratios, a clear goal.

The efficiency as well as the effectiveness with which tax revenue is obtained by the government is controlled by a variety of socioeconomic, demographic, and political factors (Workineh, 2016). The literature is divided on the factors that influence tax revenue performance; for instance, debt and foreign aid have a positive impact on tax revenue, according to Eltony (2012), whereas both have a negative impact, according to Gupta (2013). Inflation's impact on tax revenue has yielded conflicting results. According to Mahdavi (2010), inflation and FDI negatively impact tax revenue, however, Lotz (2016), maintains that FDI positively affects tax revenue. From the above, it is clear previous research findings on this issue are inconclusive, hence, the researcher decided that a study of the factors that influence tax revenue performance in South Africa was necessary.

1.3. Research objectives

The study's main goal is to figure out what factors influence tax revenue performance in South Africa. The study's specific goals are as follows:

- To examine the trends and performance of tax revenue in South Africa.
- To establish the determinants of tax revenue performance in South Africa.
- To determine the association between tax revenue and the explanatory variables.

1.4. Study hypotheses

- Tax revenue performance in South Africa has improved over time.
- Tax revenue performance is influenced by the general level of economic development in South Africa.
- Tax revenue performance is positively related to explanatory variables.

1.5. Significance of the study

The IMF (2019) report records that South Africa's economic and revenue prospects have deteriorated since the global financial crisis of 2008/9. The government spends more than it earns; unemployment was at 34.4% in second quarter of 2021, and inflation occasionally exceeds the target range of 3% to 6% (MTBS, 2019). South Africa, like many other countries,

has a variety of obligations, including servicing internal and external debts and other public financial obligations; for these to be met without borrowing, require a significant amount of tax revenue. To achieve long-term economic development, real capital formation must be generated domestically, according to Michael (2015). Taxation is a crucial revenue source for countries' economies, however, there is a mismatch between the scope of tax revenue raised to meet government goals and the ever-increasing demand for government spending in South Africa (Joyce, 2014; Merwe, 2018).

Several studies have been conducted on this topic, but majority of them have focused on Sub-Saharan African countries or the SADC as a whole, therefore, it is critical for the researcher to determine the causes of tax revenue performance, specifically, in South Africa, as tax revenue is the primary source of government funds, according to StatsSA (2016). The necessity of a well-functioning tax system has been prompted by increases in government spending, in areas, such as education, social grants, and other public expenditures.

This study would contribute to our understanding of the factors that influence tax revenue in South Africa as the research clearly identified those variables that positively impact South Africa's tax revenue performance. Trade openness and foreign direct investment were used as explanatory variables in the study, which most researchers overlook. This research will also aid policymakers by suggesting tax policies that would eliminate budget deficits; this would result in lower government debt and an improvement in the social welfare of South African citizens. The findings and conclusions, it is hoped, will assist SARS in refining its tax collection performance. Furthermore, this current study could serve as the starting point for future researchers interested in similar points and topics. In other words, the study's findings, conclusions, and recommendations will served as a foundation for criticism as well as the development of literature useful to tax academics.

1.6. Delimitations of the study

The researcher used secondary data to examine South African tax revenue performance determinants between 1990 and 2018, so the study was limited to the South African economy. The study took a quantitative approach within the positivism research paradigm. The time series variables were derived from data provided by SARB, the World Bank, and StatsSA. The researcher checked for the stationarity of the study's variables by testing for the unit root because the time series has a tendency to be non-stationary in their level forms. The

cointegration test was also carried out to check out for the long-run and short run association of the study's variables.

1.7.Operational definitions

Tax Compliance

Taxation, as defined by OECD is "a compulsory unrequited payment to the government" (OECD, 2019). OECD (2019) adds that tax evasion occurs when taxpayers engage in illegal activities in order to avoid paying taxes, such as failing to report certain incomes on their annual tax return (OECD, 2019). In this study, "tax compliance" means "true reporting of the tax base; correct computation of the liability; timely filing of the return; and timely payment of the amounts due" (Gupta, 2013). As a result, we expect a positive association between tax compliance and tax revenue performance, with the expected priori sign positive, implying that as compliance rises, so will tax revenue.

Trade Openness

"The total of imports and exports normalized by the country's GDP is known as trade openness" (Mohr, 2014). The open market index (OMI) measures a country's degree of trade openness across a range of economic issues. This is also referred to as the ratio of total goods and services exported to total goods and services imported. The tax base expands as the number of traded goods increases, and a positive association between these two variables is expected (Mahdavi, 2010).

Unemployment

According to Mohr (2014), unemployment is a situation in which an individual is actively looking for work but is not in a position to acquire one. This indicator is frequently used by governments and policymakers to assess the health of the economy, with rising unemployment rates indicating a deteriorating economy. We predicted that tax revenue and unemployment would have a negative relationship.

Inflation

Inflation is the gradual loss of a currency's purchasing power over time (Mohr, 2014). An increase in the average price level of a basket of selected goods and services in an economy, over time, can serve as a quantitative estimate of the rate at which purchasing power declines. A rise in the general level of prices, often expressed as a %age, indicates that a unit of currency now buys less than in previous periods (Passion, 2010). A negative relationship between inflation and tax revenue performance is expected.

Foreign Direct Investment (FDI)

“FDI is a type of cross-border investment in which an investor from one country develops a long-term interest in and significant control over a company in another country” (Gupta, 2013). A relationship exists when an investor in one economy owns 10% or more of the voting power in a company, in another economy. This type creates stable and long-lasting links between economies, therefore, FDI is an important component of international economic integration (Gupta, 2013). A positive relationship is expected between tax revenue performance and FDI.

1.8. Organization of the study

The division of this study is as follows: **Chapter one** of the study presents the background, including information on the topic under study, objectives, hypotheses, contribution, and study rationale. **Chapter two** presents an overview of tax revenue performance in South Africa by providing information regarding the definition and classification of tax, the types of taxes, contribution of different types of taxes, trends in tax revenue, and general determinants of tax revenue performance. **Chapter three** reviews available literature - both theoretical and empirical. On the theoretical part the review will dwell on the Stochastic Tax frontier, the Deterrence Theory, the Ability to Pay Principle and, lastly, the Behavioral Approach to taxation. The study will quote several researchers who have done similar studies, on different countries. **Chapter four** details the methodology; the econometric model is presented, and several diagnostic tests are proposed to validate the model. **Chapter five** of the study interacts with the results using e-views; the findings are presented from several econometric tools. **Chapter six** presents the summary, conclusion, and recommendations to various stakeholders.

1.9. Conclusion

By providing background information on the factors that affect tax revenue performance, this chapter has laid the groundwork for the overall thesis. The researcher presented the problem statement, which identified the research gap, the anticipated contribution to the body of literature, study hypothesis, and rationale. There are differing viewpoints on the factors that positively and negatively affect tax revenue performance in literature, hence, the researcher felt compelled to undertake this, with particular reference to the South African context.

CHAPTER 2

OVERVIEW OF SOUTH AFRICAN TAX REVENUE PERFORMANCE

2. Introduction

The preceding chapter provided an overview of the factors that influence tax revenue performance in the South African context and in the world in general. The problem statement, the study's rationale, the study's overarching and sub-objectives, the study hypothesis, and the study's organization were also presented in the preceding chapter. This current chapter will provide an overall overview of tax revenue in South Africa, including the crucial nature of tax revenue, its determinants, trends, types of tax revenue and their classification.

2.1. Definition and classification of taxation

According to the OECD (2019), "tax is a compulsory, unrequited payment to general government", while Workineh (2016), explains the word as "a mandatory levy imposed by public authorities for which no direct benefit is received", therefore, money that must be paid to the government in order for it to provide public services can be defined as a tax. Individuals pay taxes on their earnings, while businesses pay taxes on their profits (Cutt, 2017). Based on the nominal source of taxation, the OECD (2019) divides taxes into two categories: direct and indirect taxes. It is worth remembering that the meanings of "direct and indirect taxes" change depending on the context; this can lead to confusion (Karagos, 2013). "Direct taxes are defined as taxes that appear to be imposed on organizations or individuals and are primarily collected from them" (Patrick & Davina, 2016). This means that direct taxes, such as income tax, are collected directly from individuals. Indirect taxes are the type of taxes imposed on the consumption of goods and services and not on people's income or company profits (Mohr, 2014).

2.2. Objectives of taxation

Tax revenue in the South African context is gathered by SARS to meet various macro-economic and social objectives. The objectives of taxation in South Africa are stated below:

2.2.1. Raising of Revenue

In South Africa, one of the primary and important goals of taxation is to raise funds in the form of revenue for the government (Mohr, 2014). The South African government demands tax revenue to cover a variety of government expenses. Government spending can take the form

of providing public goods and services that the private sector does not provide; these include national defense and various public goods.

2.2.2. Wealth Redistribution

In South Africa, another essential goal of taxation is to redistribute wealth among the various socio-economic classes. Taxation serves two distinct rationale; the first is the concept of levying taxes based on one's ability to pay and the other assumes that the current distribution of wealth is not equitable, therefore, should be redressed and reversed (Ajala, 2013).

2.2.3. Economic Price Stability

Summerfield (2018) claims that “another fundamental objective for government in collecting taxes from its citizens is to provide a reasonable degree of price stability.” It is important to remember that many of the private and public sectors’ spending takes place without the imposition of taxes, resulting in uncontrollable demand and inflation (Summerfield, 2018). If all other factors remain constant, taxation will serve as a deflationary measure.

2.2.4. Economic Growth and Development

In South Africa, taxation is critical in directing the economy's path to development prospects. "The central government has an absolute control of the republic and taxation plays an important role in this direction." By managing inflation through taxation, South Africa's government will be able to create and promote "near-full employment" of the economy's resources, which will then translate into economic growth.

2.3. Tax revenue performance determinants

This section of the study will go over the general factors that influence tax revenue performance.

2.3.1. GDP per capita

Mohr (2014) explicates that "per capita GDP is a metric that breaks down a country's economic output per person and is calculated by dividing a country's GDP by its population". GDP per capita are regarded as the crucial measure for overall economic development and is assumed to have a positive relationship with tax revenue performance (Gupta, 2007). To back this up, Workineh (2016) claims that significant high GDP per capita, is a good indication that people have the ability to pay taxes.

2.3.2. Agriculture % of GDP

The “share of the agricultural sector in GDP” is another variable that researchers have noted to influence tax revenue performance (Gupta, 2007). Majority of developing countries are said to have a large agricultural sector that is primarily subsistence in nature (Workineh, 2016). Various economic sectors reflect the difficulty or ease with which they can be taxed, thus, the total of tax revenue collected relies heavily on the type of sector; the agricultural sector, for example, is thought to have a negative association with tax revenue. Various agricultural activities are tax exempt which then lowers the amount of tax revenue that the government can collect in a fiscal year. “The share of agriculture in GDP is expected to be negatively correlated with tax performance” (Gupta, 2007).

2.3.3. Trade Openness

The total of imports and exports normalized by the country’s GDP is known as “trade openness” (Mohr, 2014). The open market index (OMI) measures a country's degree of trade openness across a range of economic issues. This is also the ratio of total goods and services exported to total goods and services imported. The tax base expands as the number of traded goods increases, and a positive association between these two variables is expected (Mahdavi, 2010).

2.3.4. Inflation

Inflation is another variable that affects a country's tax revenue performance as noted in the literature. Inflation is defined as a steady and persistent rise in the economy's overall price level, therefore, is the gradual loss of a currency's purchasing power over time (Mohr, 2014). The increase in the average price level of a basket of selected goods and services in an economy, over time can serve as a quantitative estimate of the rate at which purchasing power declines (Passion, 2010). A negative relationship between inflation and tax revenue performance is expected.

2.3.5. Exchange rate

The exchange rate is the price of a country’s currency in comparison to another currency (Mohr, 2014). When a currency has a flexible exchange rate, it is important to remember that it can appreciate or depreciate. The currency will appreciate in value, whereas depreciation will cause the currency to lose value. As the exchange rate depreciates, prices of imports are expected to rise; import duties are a type of tax, so, an increase in imports will cause an increase in tax revenue. As a result, depreciation of a country's currency is expected to increase tax revenue, whereas appreciation decreases the value of tax revenue (Gupta, 2013).

2.4. Categories of South African Taxes Sources

The main sources of tax revenue for the South African government are personal income tax, corporate taxes, and value-added taxes.

2.4.1. Personal Income Tax (PIT)

PIT accounts for the largest revenue source for South Africa and for the 2019/20 fiscal year it added to the total revenue about 39%, which was an increase of 0.7 % from 38.3 % the previous year (StatsSA, 2020). Personal income tax is paid by individuals and trusts on their taxable income (gross income minus exemptions and deductions). Capital gains are included in taxable income brackets if they are subject to taxation (SARS, 2017). Personal income tax collections can be divided into three categories:

- ✚ Employers collect PAYE (Pay as You Earn) on behalf of their employees.
- ✚ Taxation on a temporary basis (payable by any person who derives income other than remuneration, an allowance or advance) also known as provisional tax.
- ✚ Tax that has been assessed and must be paid at the time of the final assessment.

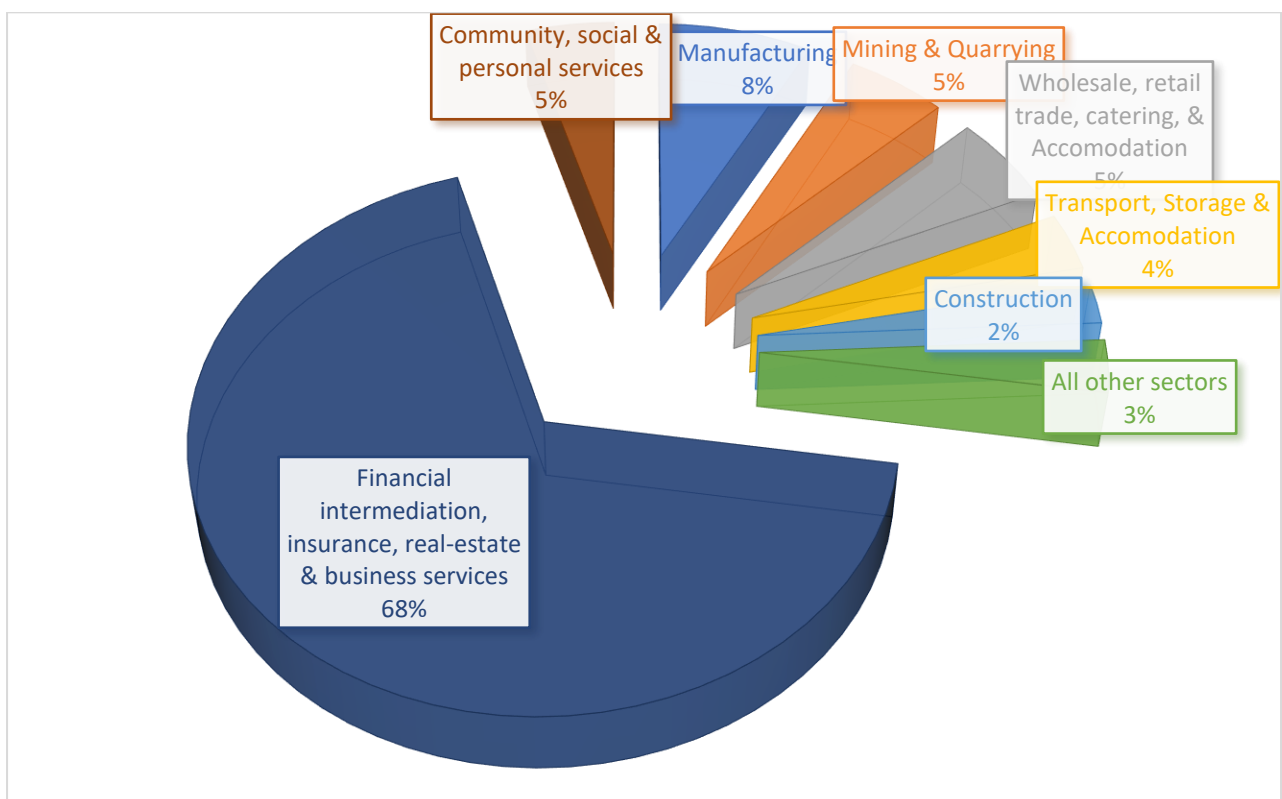


Figure 2.1. PAYE payments received by economic activity, 2019/20

Source: StatsSA (2020)

Activities like - financial intermediation, insurance, real-estate, and business services - added the greatest %age to the PAYE during 2019/20 fiscal periods amounting to 68%. The second contributing sector to PAYE payments was manufacturing, accounting for 8% with the least contributing sector based on 2020 statistics was construction which only accounted for 2% (StatsSA, 2020).

2.4.2. Company Income Tax

Any company which is managed and incorporated in the Republic is liable for tax, thus, it is expected to pay taxes to SARS (Mohr, 2014). The Company Income Tax (CIT) is a tax levied on the taxable income of companies and close corporations (gross income less exemptions and allowable deductions) (SARS, 2017). The CIT in South Africa is at present moment levied at 28 %, and an exception is given to small businesses which are given tax breaks, however, they must meet stipulated criteria for SMEs.

Worth noting is that CIT in 2019/20 fiscal year contributed about 15.9% of the overall tax revenue SARS collected, slightly less than the 16.6% recorded the previous fiscal year (StatsSA, 2020). It was also lower than the previous high of 26.7 %, which occurred before the serious 2008/09 worldwide financial crisis. In 2008/09, the country's strong performance was primarily due to increased global commodity demand in previous years and high commodity prices in 2008/09. Consequently, reduced company profits began to filter through in 2009/10, and the recession's impact on CIT collections became apparent; the tax product appears to be struggling in recent years to reach historic contribution levels. As of March 31, 2019, over 2.0 million businesses had registered for CIT. Only 83.0 % of these businesses were assessed in 2018, despite the fact that around 1 million (939 781) companies were anticipated in 2018 fiscal year to file their income tax returns; SARS, unfortunately, only assessed 83.0% of these companies (StatsSA, 2020).

The financial intermediation and its sub-branches that include, insurance and real estate, accounted for about 200343 companies (25.7 %) and 41.6 % of the CIT, indicating that they continue to contribute the most in comparison to all the other sectors. Small Business Corporations (SBCs) accounted for 170207 of the overall 780480 companies that SARS assessed in the 2018 fiscal year.

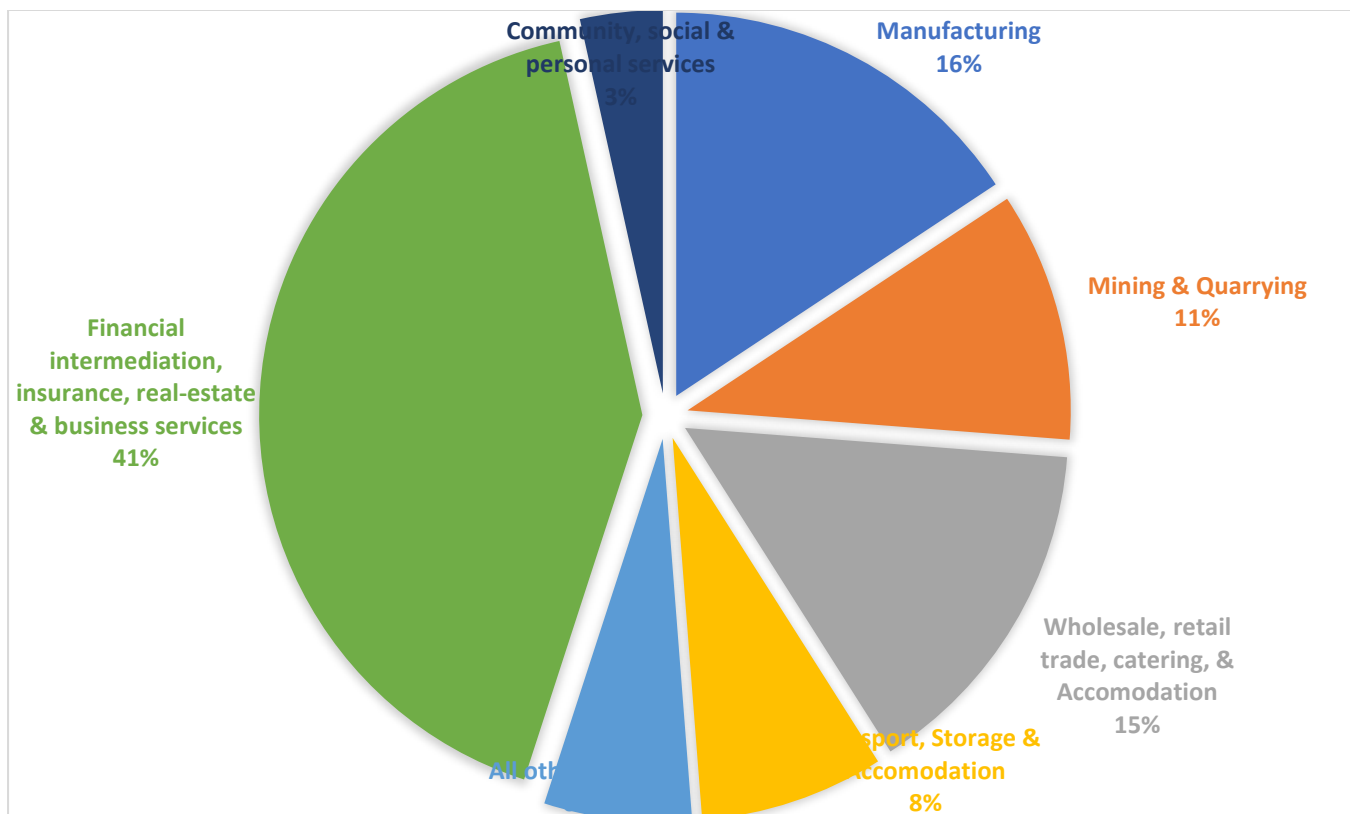


Figure 2.2. Company taxes by economic activities

StatsSA (2020)

Just like personal taxes, finance intermediation, real estate insurance, as well as business services sectors accounted for 41% of total company taxes, followed by manufacturing (16%) and community, social, and personal services (3%) (StatsSA, 2020). “As of 31 July 2020, the financial intermediation, insurance, real-estate, and business services’ sectors had the highest number of taxpayers (25.7 % assessed) in relation to the 2018 tax year. This sector accounted for 41% of the total tax assessed in the same fiscal year. In the 2018 tax year, the Mining and Quarrying sector had the fewest taxpayers (0.4 % assessed), but it accounted for 11% of the tax assessed” (StatsSA, 2020).

2.4.3. Value-Added Tax (VAT)

The destination-based system is the type of VAT South Africa employs; this means that the country only taxes domestic consumption of goods and services; as a result, VAT, is levied on both local goods and services and imports coming into the Republic. It is a broad-based consumption tax, and not a product-specific tax (SARS, 2017). South Africa's standard VAT rate was raised to 15% on April 1, 2018, after being constant at 14 % since the 1993 fiscal year.

VAT is imposed as value is added at every stage in the value chain - from production to distribution. VAT is meant to be levied on all goods and services except on those goods that are zero-rated. There are many reasons why some goods are exempt from VAT; this includes assisting low-income-earning families as VAT is a regressive type of tax which places much burden on the poor (Gupta, 2013). In South Africa, this type of tax is a very significant revenue source, added about 26 % to revenue collected in 2019 (StatsSA, 2020).

2.5. Conclusion

This chapter looked at the definition and classification of taxation and provided an overview of tax revenue performance issues in South Africa. The researcher went on to detail the advantages of tax revenue and the factors that influences it. PIT, CIT, and VAT are noted as the three main significant tax revenue sources for the republic, which together account for roughly 70% of South African tax revenue. The following chapter will provide a thorough review of the theoretical and empirical literature in this field.

CHAPTER 3

3. Literature review

This chapter focuses on theories of tax revenue, determinants of tax revenue and past empirical studies that were carried out on this particular topic, conducted within and outside South Africa. The discussions will provide a critical look at studies done by previous researchers which has relevance in achieving the objectives of this current study. The popular belief is that the determinants of tax revenue are the main key issues that affect tax revenue collection in South Africa and this point is examined with reference to other studies.

3.1. Theoretical literature review

The main objective of reviewing the literature was to examine the body of theory or theories that have accumulated around the tax revenue phenomenon (Terefe & Teera, 2018). The theoretical literature review helped the researcher in understanding the theories that are available and also to determine the degree to which these theories have been investigated and are relevant to the current study. The theories also assisted in testing and developing new hypotheses. The process assisted the researcher in identifying the dearth of appropriate theories and that the already available theories are insufficient to explain emerging problems in the present world. The Optimal Tax Theory, the Stochastic Tax Frontier, the Deterrence Theory of Taxation, and the Behavioural Approach Theory were all examined by the researcher.

Explored here are some of the tax revenue models that have been propounded.

3.1.1. Optimal Tax Theory

The revision of Ramsey's Optimal Tax Theory by Diamond and Mirrlees done in 1971 focuses on economic redistribution. This theory suggests eight general lessons about tax, according to Mankiw, Weinzier, and Yagan (2012).

- The ability distribution determines the optimal marginal tax rate.
- High incomes may see the optimal marginal tax rate schedule declining.
- A flat tax with a universal lump-sum transfer may be close to optimal.
- Wage inequality rises in proportion to the optimal extent redistribution.
- Income and personal characteristics should determine taxes.
- Tax should only be levied on final goods and not intermediate ones.
- It suggests countries should not tax capital income.

- Highest level of sophistication and dynamics should be exercised on optimal tax policy.

The goal of this theory is to figure out how the government can use taxes and transfers to maximize citizens' social welfare, while minimizing taxpayer sacrifice. It is necessary to point out that, every tax system that a nation employs should aim to maximize the nation's social welfare functions subject to various constraints, according to the standard theory of optimal taxation. The purpose of this review was to discuss how tax policy can be applied to the theory.

3.1.2. Stochastic Tax Frontier

Aigner, Lovell, and Schmidt (1977) created the Stochastic Tax Frontier theory. In this model, the total amount of tax revenue that can be collected is estimated to be constrained by available inputs. To assess Indonesia's tax capacity, Alfirman (2003) used the stochastic tax frontier, constrained by the following inputs: income level, labor force participation, agricultural share of GDP, and trade openness. Alfirman (2003) adds that this model has limitations when it comes to deciding which inputs to use to estimate the tax frontier. The general consensus is that traditional labor and capital inputs determine the tax frontier, however, there is debate about which demographic, institutional, and economic factors are best for estimating a country's capacity.

The difference between actual revenue and tax capacity, according to this model, indicates the presence of technical inefficiencies and the application of ineffective policies. This theory is rooted in the general regression model, which states that production is determined by a set of inputs.

An econometric analysis propounded by Aigner *et al.*, (1977) is as follows

$$\ln t_{it} = \alpha + \beta x_{it} + v_{it} - u_{it}$$

Where u_{it} stands for inefficiency that falls short of the maximum level of tax that can be collected.

t_{it} , stands for tax capacity in relation to GDP for country

x_{it} – stands for factors affecting tax revenue

β stands for a vector of unknown parameters

v_{it} , is error term

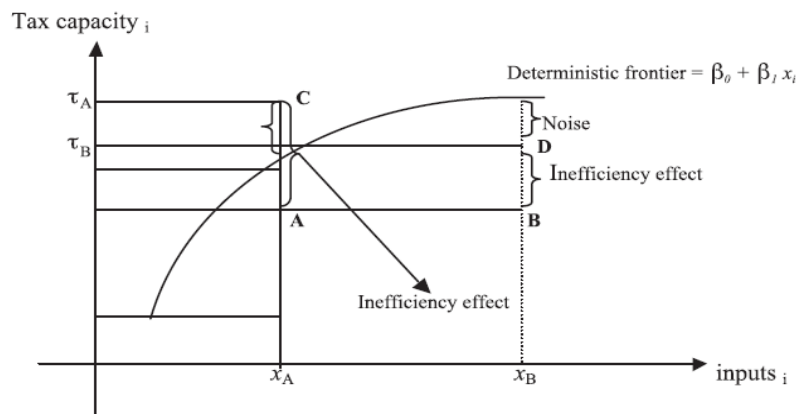


Figure 3.1.: Stochastic Tax Frontier

Source: Aifirman (2017)

On the x-axis of the figure above are the inputs and the y-axis shows the tax revenue of two nations (A and B). Points A and B above are two tax revenues collected by countries A and B, respectively. When all revenue is collected efficiently, country A becomes C, and country B becomes D.

3.1.3. Deterrence Theory of Taxation

The Deterrence Theory as posited by Frey and Feld (2002), means people will deliberately break the law after weighing the costs and benefits of their actions. This theory is most useful in cases of tax evasion, although, it is also considered the best in terms of tax compliance. Persuasive and punitive approaches are suggested by the deterrence theory for achieving its goals. The punitive approach calls for austerity measures against those who break the tax code; tax evaders, therefore, must face harsh and high penalties as a result of this. According to Frey and Feld (2002), if the government takes this path, it must increase and improve the taxation system to detect any type of wrongdoing in order to punish the defaulters.

The loose route advocates the government and taxpayers sitting down at the negotiating table, where the latter is advised on the benefits of meeting their tax obligations without necessarily imposing a penalty. This is also accomplished by providing free tax-compliance education, as well as placing advertisements in newspapers and state broadcasters to keep taxpayers informed. Furthermore, the government and the responsible tax authority can reward those who comply by providing tax incentives, thereby, attempting to entice them to repeat their good work.

People, according to the deterrence theory, have a natural tendency to gamble with their taxes. When evading tax payments, taxpayers consider the chances of being caught, as well as the cost of being caught and determine whether they can withstand the punishment. If they believe the penalty costs are reasonable, they will continue to avoid paying taxes (Frey & Feld, 2002).

3.1.4. The Behavioural Theory of Taxation

It is illegal to avoid paying taxes, and the costs to the economy are enormous, however, calculating the costs of tax evasion is difficult because those who evade taxes have a good reason to do so. Allingham and Sandmo (1972) proposed the behavioral theory, which emphasized the importance of knowing and understanding the taxpayers' decision when they decide whether or not to comply. The study of taxpayers' compliance tendencies can be traced back to the work done by (Allingham & Sandmo, 1972). A taxpayer is projected as a risk-taker who is most likely to evade tax to maximize anticipated gains, according to Allingham and Sandmo (1972). Taking such a stance carries a risk, because tax authorities can conduct a tax audit at any time, exposing the evasion. In 1974, Yitzhaki attempted to modify the work of Allingham and Sandmo (1972), by emphasizing fining and punishing evaders. The Behavioural Theory is based on two assumptions: first, that the risk taxpayers take is proportional to the expected benefit, and second, that each taxpayer makes an individual decision and does not plan in response to what others are doing. The Behavioural Theory is essentially a choice model.

The researcher expanded on the work of Stochastic Tax Frontier by adding additional variables to investigate the determinants of tax revenue performance in South Africa from 1990 to 2018. The Stochastic Frontier has some limitations, particularly in terms of the inputs used to calculate the tax frontier. The researcher overcame this limitation by incorporating a large number of additional explanatory variables into the study model.

3.2. Empirical Literature Review

Under this section of the review, the researcher explored previous work undertaken on this topic. The review explored past related literature focusing on developed countries, Sub-Saharan African countries, developing countries, and South Africa. This allowed the researcher to see where this study fits in, nationally and internationally.

3.2.1. Empirical Literature on Developed Countries

Khatri and Mohan (2012) looked into this issue by making use of the “fixed-effects regression framework”. The researchers used 40 developed countries as a study sample, using data from 1980-2005. They found that structural issues, such as urbanisation and GDP/capita are statistically significant and positively correlated with tax revenue. Velaji and Prendi (2014) used the Pearson Correlation and regression analysis to look into this same issue in Albania. They selected a set of variables that included unemployment, inflation, GDP, exports, and imports. They find GDP per capita, exports and foreign aid to be statistically significant to tax revenue performance.

In the same vein, Ahsan and Wu (2012) examined the same problem for Italy and ten (10) other developed countries. They used statistical regression models for the years 1988-2011. The findings of these researchers showed that agriculture’s share in a country GDP and inflation rate have a negative effect on tax revenue performance while, GDP/capita and %age of manufacturing and service sectors in GDP were found to have a positive relationship and statistical significance with tax revenue performances. In his study, Kemal (2013) examined the same problem for 46 developed countries for a period of 20 years. The conclusion of his study agrees to some extent with that of Ahsan and Wu (2012) on some variables. Kemal (2013) notes a positive impact of GDP per capita, foreign aid, foreign direct investment on tax revenue, while share of agriculture and inflation were found to be statistically insignificant.

Ajaz and Ahmed (2014) examined the effects of institutional, structural, and macro-economic factors on tax revenue performances. They used a panel data set for 30 developed countries using the Generalized Method of Moments Regression. The study concluded that institutional variables impact tax revenue positively, while corruption had an adverse outcome on tax revenue performance. Similarly, Kubatova and Rihova (2014), carried out a regression study for 12 developed nations, for a 20-year period, from 1990-2010. They noted that inflation, GDP per capita and foreign aid were statistically significant while unemployment and share of agriculture were found to impact revenue negatively. Eltony (2012) did a study on 17 developed countries; his analysis was done to find out whether tax revenue depended on mining share as %age of GDP. Eltony (2012) regressed and found negative correlation between tax ratio and mining share but found that per capita income and tax ratio are positively related.

Longoni (2011) performed a cross-sectional analysis using a population of 83 developed nations during a ten-year period - 1978 to 1988. He noted that GDP/capita and tax revenue are positively related. In his findings, he concluded that agriculture positively affects tax revenue; this opposed the work of Kelly and Baas (2010) who noted that agriculture had an adverse effect on tax revenue. Hamid and David (2011) undertook a study on 12 economically developed countries between 1994 and 2004. They included institutional, CPI and per capita income as independent variables of tax ratio. They regressed and their findings were that institutional factors, inflation, and per capita income were statistically significant.

3.2.2. Empirical Literature on Sub-Saharan Africa

Ade, Rossouw, and Gwatidzo (2018) used panel data to investigate the same problem for SADC countries in a study that spanned a 20-year period, from 1990 to 2010. To test for country specificity, they used two estimation techniques which are - “Feasible Generalized Least Squares” (FGLS) developed by Kmenta in 1968, and also the “Dummy Variables Fixed Effects” (DVFE) developed by Parky in 1967. Their findings revealed that taxation, particularly, tax rates, tax policy harmonization, as well as other important determinants, have a crucial role in the amount of tax revenue collected in the region (Ade *et al.*, 2018). It is worth noting that they found FDI inflows to have a positive relation with tax revenue collected in the SADC region, as well as the evidence of a bi-directional causality between tax revenue and FDI. In their policy recommendations, they urged the region to develop policies that encourage FDI, in order to successfully collect more revenue (Ade *et al.*, 2018).

Bolthole (2010) analyzed the factors that affect tax effort and tax capacity using a sample of 46 countries in Sub-Saharan Africa and employed an “unbalanced panel set” for the period 1990-2006 and tested for the robustness of the outcomes by using an estimation regression. In his study, Bolthole (2010) used various independent variables that included - GDP/capita, inflation, country’s tax compliance, trade openness, and the institutional quality; the findings indicated that all explanatory variables were statistically significant except for inflation which was statistically insignificant.

Ghura and Greeve (2014) did a study also on Sub-Saharan countries, with the goal of investigating the same topic for the period, 1985-1996. They chose per capita income, share of agriculture, structural reforms, and inflation as independent variables. In their findings,

GDP/capita and various structural reforms were noted as a positive factors of tax revenue, while inflation and share of agriculture were noted as negative factors of tax revenues.

Over a 25-year period, Gupta (2013) empirically examined the same problem as the current study for Sub-Saharan countries. He employed a variety of statistical techniques that included Random and Fixed Effects, Prais-Winsten technique, and various GMM systems. He points out that GDP/capita has a positive relationship with on tax revenue, while inflation and the share of the elderly population have a negative effect on tax revenue.

3.2.3. Empirical Literature on Developing Nations

Anware (2014) assessed the factors that influence the Ethiopian Revenues and Customs Authority's tax revenue performance. Agriculture, inflation, industry share of GDP, per capita income, exports, and imports were among the six variables he looked at in his study, which spanned the years, 1990 to 2010. He discovered that structural variables, which are exports and imports have a significant impact on tax revenue. Gobachew (2018) investigated the same problem for Ethiopia OLS technique. The study was quantitative in nature, and it analyzed the data using a time-series-dataset spanning the period of 15 years from 1990-2015, as well as econometrics and descriptive statistics. The contribution of the industrial sector to GDP, GDP per capita and the extent of trade openness, according to Gobachew (2018), were statistically significant. They had a positive relationship with tax revenue, however, agriculture and inflation had a negative effect on tax revenue (Gobachew, 2018).

Terefe and Teera (2018) theorized that tax revenue is critical for the economic upliftment of countries' economies; their study employed a novel dataset and panel-data cointegration technique, for 1992-2015, in East Africa. They checked for stationarity of the data using ADF tests and discovered that many of their variables were cointegrated of order I(1), while others were stationary at level. Their econometric model was estimated using GMM model, dynamic panel-data as well as the FGLS. The researchers found that, trade openness, agriculture's %age in the economy, foreign aid, and the %age of industry in the economy to have a positive effect on tax revenue, while general price level (inflation), the country's exchange rate, and urbanization, all had negative impact on tax revenue. This study agrees with Gobachew (2018)'s findings on some variables, but not on the issue of inflation, where Gobachew found that inflation reduces tax revenue, whereas Terefe and Teera (2018) found the opposite.

Ayenew (2016) investigated the same issue for Kenya, employing Johansen co-integration technique from 1975 to 2013. According to his findings, GDP/capita, the %age of industry in the economy, foreign investment were found to have positive relationship with tax revenue, while inflation was not significant and had a negative relationship with the revenue collected. Chaudhry and Munir (2010) investigated the same issue for Pakistan from 1973 to 2009. They wanted to see if economic policies and external factors influenced Pakistan's tax revenue performance. From their findings, broad money, the degree of openness, external debt, foreign aid, and political stability, are all statistically significant to tax revenue. Furthermore, Chaudhry and Munir (2010) claim that Pakistan's low tax revenue is due to the agriculture sector's low share of GDP and low literacy.

Amoh (2017) conducted a study in Ghana from 2010 to 2015 to look into the factors that influence tax revenue. In his findings, foreign direct investment (FDI), %age of manufacturing to country's GDP, external debt stocks, and government consumption all had a positive relationship with tax revenue. Bassey and Efiang (2018) used per capita income, net exports, and inflation as explanatory variables to investigate this problem in Nigeria. All the explanatory variables were statistically significant, implying that they all had an impact on tax revenue. Similarly, Mahdavi (2010) employed a model that made use of numerous explanatory variables for 43 developing countries spanning the period, from 1973 to 2002. The study noted that the total tax revenue has a positive relationship with urbanization, international trade, and literacy rate, while foreign aid, the elderly population share, inflation, and population had a negative effect to the countries' tax revenue (Mahdavi, 2010).

Oyetunji (2012) empirically determined the factors that affect tax revenue performance in Nigeria from 1986 to 2010 as understanding tax revenue determinants is critical because the information will aid in improving a country's economic performance. Using Vector Auto Regression Models, Oyetunji (2012) looked at the effects of GDP/capita, %age share of agriculture, the service sectors' %age in GDP, political instability (which was treated as a dummy variable), inflation, external debt, foreign aid, imports and exports', the country's broad money supply, and finally the manufacturing sector's share of GDP. Agriculture, external debt, and foreign aid were statistically insignificant, while GDP per capita, service sector share, and manufacturing sector share were statistically significant (Oyetunji, 2012).

There is a paucity of empirical research on the factors that influence tax revenue performance in South Africa. Addison and Levin (2012) are among the few researchers in South Africa who have investigated the factors that influence tax revenue performance. Their study spanned the years 1980 to 2005 and discovered that a variety of factors influence tax revenue performance; among them are the country's tax base, country's structural factors and the amount of foreign aid. In their research, a positive long-run relationship between tax revenue, trade openness, and per capita GDP were noted.

Majority of studies on this topic in the South African context focused on determining the relationship between tax and economic growth, as mentioned in the previous chapter; for example, Riba (2016) conducted research to examine the causality that exists between economic growth and tax for South Africa. The study looked at the long-run relationship between these variables making use of quarterly data spanning between 2003-2016 and also an autoregressive distributed lag (ARDL) cointegration framework to assist in determining the long-term association between these variables. Taxes and economic growth, according to the research, have a positive relationship. Gupta (2013) investigated the factors that influence internal tax compliance in the South African sphere. The researchers were able to compare the various tax types by identifying significant determinants for each one. Gupta (2013) claims that turnover is the most significant variable affecting internal compliance costs. A study by Evans and Joseph (2015) on tax compliance in South Africa concluded that South Africa has the capacity to improve and boost tax compliance and to combat corruption, which would help the country's existing tax base to be protected in the long run.

After noticing the scarcity of literature on this particular issue in South Africa, the researcher decided to conduct a study on the subject in order to fill the gap.

3.3. Synthesis of Variables

Table 3.1. Synthesis of Variables

Source: Anware (2014)

Author & Date	Topic/focus or purpose	Conceptual	Paradigm	Findings	Research Gap(s)
Bolthole (2010)	Determinants of tax effort and tax	Empirical	Positivism	Tax compliance, GDP, and FDI	The researcher used only three

	capacity in Sub-Saharan African, between 1990-2006			positively affect tax revenue performances	variables while there are many variables that could have been included in his model.
Anware (2014)	Determinants of tax revenue performance in Ethiopia	Empirical	Positivism	%age of agriculture and the country's inflationary levels were noted to have a negative influence on tax revenue, while GDP per capita positively influenced GDP.	The researcher failed to look into the long-run association between variables.
Ade <i>et al.</i> , (2018)	Determinants of tax revenue performance in SADC region (1990-2010)	Empirical	Positivism	FDI positively influences tax revenue with inflation negatively influencing the amount of revenue SADC collected.	The researcher used too small a sample for a 20-year period. Results could be different if a larger sample had been used.
Longoni (2011)	Investigating the determinants of tax revenue in developed nations using a cross sectional analysis (1978-1988)	Empirical	Positivism	Interestingly, he found agriculture to positively influence tax revenue while other researchers found it to have a negative impact (Kelly & Baas, 2010)	Even though the study was carried out on 83 countries, the time gap was too small, covering only 10 years.

3.4. Conclusion

This chapter presented literature review in which the researcher first discussed theories related to tax revenue performance. the researcher reviewed the Optimal Tax Theory, the Stochastic Tax Frontier, The Deterrence Theory of Taxation and the Behavioural Approach Theory. From the reviewed theoretical literature, the researcher followed the Stochastic Tax Frontier by adding other variables to investigate the factors that affect tax revenue performance in South Africa from 1990-2018. The Stochastic Frontier has a limitation, especially, on the inputs used to estimate the tax frontier. The researcher addressed this limitation by including many other explanatory variables to the study model. After a thorough literature review, the researcher notes that some studies agreed on some parameters and differ on others. This disagreement motivated this researcher to continue with the current study to determine the determinants of tax revenue performance in South Africa. There is limited literature on South Africa, hence, this study will add to the literature, so that, future researchers can work with a broader base.

CHAPTER 4

RESEARCH METHODOLOGY

4. Introduction

The previous chapter presented a thorough review of the literature and dissected various empirical findings on the factors that influence tax revenue performance around the world. This chapter presents an econometric model and its results, in line with the study's objectives of (a) determining the determinants of tax revenue performance in South Africa, (b) examining the trends and performance of tax revenue in South Africa, (c) determining the association and connection between tax revenue and explanatory variables. As a result, the researcher was able to provide an association between this study's variables. The data sources and estimation methods will be discussed in this chapter.

4.1. Research Paradigm

A research paradigm is explained as a set of shared beliefs and agreements among scientists regarding how problems should be understood and addressed (Creswell & Creswell, 2018). There are basically two types of research paradigms that researchers make use of, namely, positivism and interpretivism. This study utilised the positivism paradigm which focuses on prediction. Gray (2014) argues that all causality studies should follow the positivism worldview; since the current study examined the determinants of tax revenue performance in South Africa from 1990-2018, it adhered to the positivism paradigm.

4.2. Research Design

In carrying out a study, a design is crucial and is noted as a framework for both the methods and techniques that the researcher will employ to answer the research problem (Guiditta, 2018). This study will employ the causal research design, which aims to comprehend a phenomenon through conditional statements of causality. According to Creswell (2014), this type of research is used to investigate causal explanations that reflect hypotheses testing and show the impact of one variable or variables on another. The researcher wanted to establish the causality between a set of variables, thus, the appropriateness of this design.

4.3. Research Approach

A research approach is important in a study as it shows the procedures, the plans, and the assumptions that the researcher makes in data collection. The approach also covers issues of data analysis and interpretation (Creswell, 2014). Researchers can choose from either qualitative, quantitative, or mixed methods as their study approaches, according to Gray (2014). Quantitative research depends much on the gathering of numerical data, whereas qualitative research much depends on the researcher gathering non-numerical data, such as pictures and words (Babbie & Mouton, 2012). In support of Babbie and Mouton (2012), Patton (2010) points out that research methods are divided into two categories: qualitative and quantitative research. This research will take a quantitative approach, with the researcher concentrating on hypothesis and theory testing as “quantitative research employs deductive logic, according to in which the researcher begins with a hypothesis and collects data, which is then used to determine whether empirical evidence exists to support that hypothesis” (Creswell (2014). In other words, a researcher uses this method to develop a hypothesis and then tests it with empirical data to see if it is supported. A research approach is determined by the study’s research problem, therefore, the problem for the current study was appropriate for a quantitative research design.

4.4. Model Specification

The researcher’s reviewing of the literature prompted the development of this study’s model. Terefe and Teera (2018) in their study on East African countries inspired the model specification for this study; in their model, they used multivariate panel data cointegration analysis. The model used an explicit production function, in which a set of independent variables, the tax revenue determinants, were considered as potential factors to explain the dependent variable, tax revenue (Terefe & Teera, 2018).

Terefe and Teera (2018) then specified the econometric model as follows

$$(T/Y)_{it} = f(X_{it}) = \beta_0 + \beta_{it} X_{it} + \mu_i + \epsilon_{it} \dots \dots \dots [1]$$

They assumed $(T/Y)_{it}$ is the fraction of tax revenue/GDP for country (i) at a time (t) and was revealed and explained by a number of variables X; μ_i stands for the individual effect and ϵ_{it} stands for the error term.

From the above equation, the researcher has developed a model for this study; in the model, tax revenue performance is considered an endogenous/dependent variable, while the vector of tax handles is considered as exogenous variables.

$$T_t/Y_t = f(GDP_{pc}, FDI, \pi, op, Unempl) \dots \dots \dots [2]$$

Where

T_t/Y_t Tax Revenue

GDP_{pc} Gross domestic product per capita

π , Consumer price index (inflation)

Op Trade openness

$Unempl$ Unemployment

Assuming equation (2) will follow a log-linear form, we then take the logarithms of both sides, and the new model will be as the one below:

$$\begin{aligned} \ln(Y/T) = & \beta_0 + \beta_1 \ln(GDP_{pct}) + \beta_2 \ln(FDI_t) + \beta_3 \ln(\pi_t) + B_4 \ln(opt) \\ & + \beta_5 \ln(unempl) + \mu t \dots \dots \dots [3] \end{aligned}$$

All the above variables are in natural logarithms.

4.5. Explanation of Variables

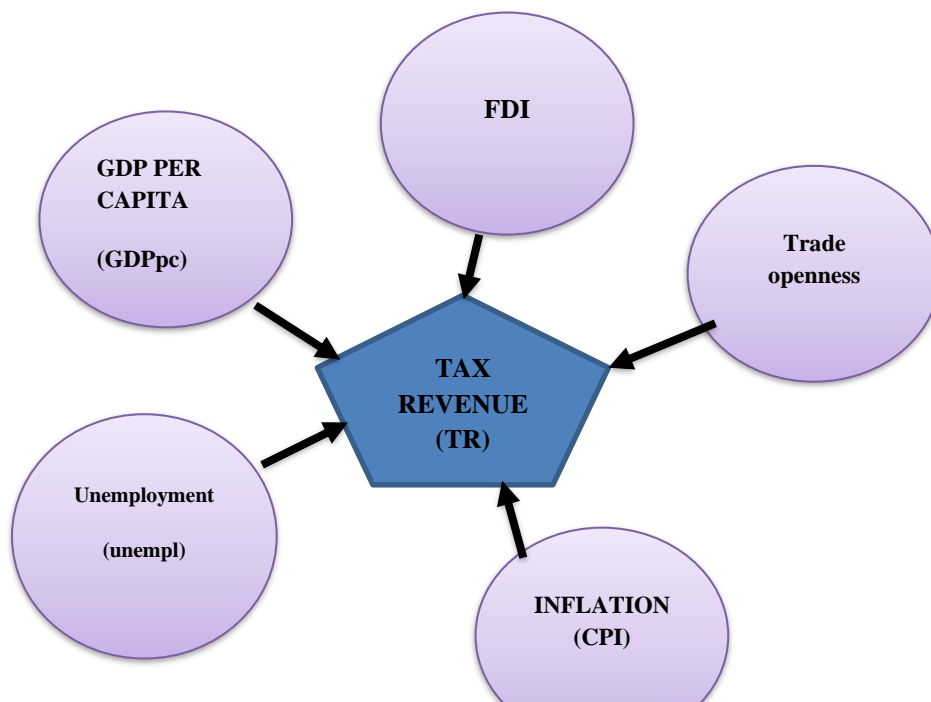


Figure 2:1. Illustration of Variables

Source: Author's own formulation

4.5.1. GDP per Capita

According to Mohr (2014), per capita GDP is a metric that breaks down a country's economic output per person and is calculated by dividing a country's GDP by its population. GDP per capita is regarded as a crucial measure for overall economic development and is assumed to have a positive relationship with tax revenue performance (Gupta, 2007). To back this up, Workineh (2016) claims that significant high GDP per capita, is a good indication that people have the ability to pay taxes.

4.5.2. Tax Compliance

Taxation, as defined by OECD is "a compulsory unrequited payment to the government" while tax evasion occurs when taxpayers engage in illegal activities in order to avoid paying taxes, such as failing to report certain incomes on their annual tax return (OECD, 2019). In this study, "tax compliance" means "true reporting of the tax base; correct computation of the liability; timely filing of the return; and timely payment of the amounts due" (Gupta, 2013). As a result, we expected a positive association between tax compliance and tax revenue performance, with the expected priori sign positive, implying that as compliance rises, so will tax revenue.

4.5.3. Trade Openness

"The total of imports and exports normalized by the country's GDP is known as trade openness" (Mohr, 2014). The open market index (OMI) measures a country's degree of trade openness across a range of economic issues. This is also referred to as the ratio of total goods and services exported, to total goods and services imported. The tax base expands as the number of traded goods increases, and a positive association between these two variables can be expected (Mahdavi, 2010).

4.5.4. Unemployment

Unemployment is defined as a situation in which an individual is actively looking for work but is not in a position to land one, according to Mohr (2014). This indicator is frequently used by governments and policymakers to assess the health of the economy, with rising unemployment rates indicating a deteriorating economy. We predicted that tax revenue and unemployment would have a negative negative relationship.

4.5.5. Inflation

Gross domestic implicit deflator's annual growth rate measures the rate of price change in the country. The government's revenue responds to change in prices, overtime. Inflation is believed to impact tax revenue negatively. This is because inflation erodes the real value of tax collected,

thus, a negative causality relationship is expected between inflation and tax revenue (Passion, 2010).

4.5.6. Foreign Direct Investment

“FDI is a type of cross-border investment in which an investor from one country develops a long-term interest in and significant control over a company from another country” (Gupta, 2013). A relationship exists when an investor in one economy owns 10% or more of the voting power in a company in another economy. FDI is an important component of international economic integration because it creates stable and long-lasting links between economies (Gupta, 2013). A positive relationship is expected between tax revenue performance and FDI.

Table 4.1. Summary of variables, explanation, and their hypothesized signs

Source : Author’s own formulation

Variable	Definition of Variable	Source	Expected Sign
Tax revenue performance	Tax revenue (%age of GDP)	SARB	Dependent variable
GDP/capita	National income in proportion to the number of population. The performance of tax revenue is positively related to GDP per capita.	SARB	+ (positive)
Inflation	Gross domestic implicit deflator’s annual growth rate measures the rate of price change in the country. The government's revenue responds to change in prices, overtime. Inflation is believed to impact tax revenue, negatively (Passion, 2010).	SARB	- (negative)
FDI	More FDI shows the coming in of new foreign companies which in turn increases revenue. This is	SARB	+ (positive)

	theoretically positively related to tax revenue performance		
Trade openness	Openness to trade will allow for the trade of goods and services between countries. We expect the relationship between these two to be positive.	SARB	+ (positive)
Unemployment	The part of the labour force that is failing to secure a job. The more people are unemployed, the lower the tax revenue collected	SARB	+ (negative)

4.6. Data Sources

Secondary data was used, and the method of data collection included desktop research using Reserve Bank quarterly bulletins and other publications. The data for this study came primarily from SARB, World Bank, Statistics South Africa (Stats SA), and the Department of Trade and Industry, and covered the years 1990 to 2018.

4.7. Data Analysis

"The process of systematically applying statistical and logical techniques to describe, illustrate, condense, recap, and evaluate collected data is known as data analysis" according to McGregor, (2018). The E-views package software was employed by the researcher to analyse secondary data. The output of E-views was analysed to determine the model's normality and validity; this helped the researcher to make decisions on whether to accept or reject the hypothesis.

4.7.1. Estimation Techniques

The first step in this process was to look at the data's time series properties. This research looked into the data trends and then tested for stationery and integration order as most of the variables are non-stationary at the level, and time series can lead to spurious regressions. For estimation and diagnostic tests, the study used E-views package 12.

4.7.1.1. Unit Root Test

This is one of the best unit root testing methods, according to Dickey and Fuller. Non-stationarity is prevalent in many time series data sets at the level form. The Dickey-Fuller test is employed to check if a data model's unit root $\phi = 0$ in the model of the data.

$$Y_t = \alpha + \beta t + \phi Y_{t-1} + \epsilon_t$$

Which is written as

$$\Delta Y_t = Y_t - Y_{t-1} = \alpha + \beta t + \phi Y_{t-1} + \epsilon_t$$

where Y_t is my model data. The equation was written this way to allow the researcher to carry out a linear regression of ΔY_t against t and Y_{t-1} and for the researcher to test if Y was significantly different from 0. It is worth noting that if $Y=0$, the study model would have a random walk process. In the situation that $\Delta -1 < 1 + \phi < 1$ then we can safely say we have a stationary process.

The ADF-test caters for higher-order autoregressive processes by incorporating $\Delta Y_t - p$ in the model, however, the study test is stable if $\gamma = 0$.

$$\Delta Y_t = Y_t - Y_{t-1} = \alpha + \beta t + \phi Y_{t-1} + \epsilon_t$$

An important point is that the null hypothesis for both tests, Dickey-Fuller and the Augmented Dickey-Fuller (ADF) is that the data are non-stationary. For this test, we wanted a p -value that was below 0.05 so as to reject the null hypothesis.

With the `adf.test()` from the `tseries` package, the researcher did an ADF-test and set lags = 0 with both an intercept and a trend.

When non-stationary data were present, the researcher converted them to a stationary format; when time series data continued to trend, the researcher used the trend removal method. Non-stationary data was converted to stationary data by differencing it in order to obtain a consistent and reliable model. The results from the ADF-test for unit root, shows an ADFt-statistic value, less than the critical value, this means the variables are not stationary and have a unit value.

4.7.1.2. Cointegration

To see if several time series have a long-term correlation, a cointegration test is used (Gujarati, 2003). Cointegration tests are imperative in the assessment and identification of scenarios where time-series data are integrated so much that they never swerve from equilibrium over time (Gujarati, 2003). The variables are said to be co-integrated if they are stationary at the level or even after differencing and despite the fact that many variables may be trending

individually, they can make stationary by combining them linearly (Gujarati, 2003). For analyzing both long and short run parameter movements, cointegration tests are critical.

Before performing the cointegration test, the researcher checked for stationarity on all levels for all variables. It was critical to conduct a cointegration test because the variables were mixed, with some being stationary in levels and others after differencing them. The cointegration was carried out using the Johansen Cointegration Method as this is the recommended test when performing cointegration tests (Gujarati, 2003). After confirming the cointegration, the researcher used the ECM. An important point is that once variables are cointegrated, it implies a long run association between them exists, and any short-run variance or disequilibrium will be corrected using an Error Correction Model (ECM) (Leamer, 1985).

4.7.1.3. Granger Causality Test

This is a statistical tool for establishing the causal relationship between a set of parameters and tax revenue performance (Granger, 1969). Granger-Causality is a statistical causality concept based on prediction (Leamer, 1985) and is a method for determining whether two variables in a time series data are causally related, according to Gujarati (2003). When testing for Granger-Causality, it is imperative that the null hypothesis is the independent variables that do not cause variation in the dependent variable or there is no causality.

Granger-Causality was tested in this study using the steps proposed by Granger (1969):

- (a) State the null and alternative hypotheses
- (b) Choosing of lags
- (c) Finding of the f-value
- (d) F-statistic calculation.
- (e) Rejection of the null hypotheses in the event that $t\text{-statistic} > f\text{-value}$

Under this framework, a time series $\{X_i, t\}$ is Granger causal of another time series $\{X_j, t\}$ if inclusion of the history of X_i improves prediction of X_j over knowledge of the history of X_j alone.

Thus, $\{X_i, t\}$ Granger causes $\{X_j, t\}$ if

$$\text{var}(X_j, t - \hat{X}_j, t \mid X_j, 0:t-1) > \text{var}(X_j, t - \hat{X}_j, t \mid X_j, 0:t-1, X_i, 0:t-1).$$

To investigate for causality of X_i, t to $\{X_j, t\}$ in this study we let

$$\begin{bmatrix} X_j, t \\ X_i, t \end{bmatrix} = \sum_{p=1}^p \begin{bmatrix} A_{j,j}^f(p) & A_{j,j}^f(p) \\ A_{i,j}^f(p) & A_{i,j}^f(p) \end{bmatrix} \begin{bmatrix} X_j, t-p \\ X_i, t-p \end{bmatrix} \begin{bmatrix} w_{j,j}^f \\ w_{i,j}^f \end{bmatrix}$$

4.7.2. Diagnostic Tests

It is worth noting that if a model is not correctly specified, it will cause serious problems to the overall sampling properties that include both the tests and estimators. The fitted model's forecasts and other inferences have similar implications (Bhattacharya, 2005). Diagnostic tests are a collection of procedures used to validate a model in a variety of ways (Gujarati, 2003). This can be accomplished by looking into a model's underlying statistical assumptions or by looking at the structure of the model. Graphs, informal quantitative results, or formal statistical hypotheses tests could all be used to verify the results. The researcher used autocorrelation, heteroscedasticity, normality, misspecification, and stability as diagnostic tests in this study (Gujarati, 2003).

4.7.2.1. Autocorrelation

The random error components or disturbances are identically and autonomously distributed, which are crucial and basic assumptions expected to be present in the “linear regression model” (Gujarati, 2003). When two-time intervals are correlated to each other, autocorrelation becomes a problem, thus, the lagged version of a particular variable in a time series is assessed against the original version (Schreiber, 2014). To detect non-randomness in data, Box and Jenkins (1976) proposed for-autocorrelation tests. This is because when dealing with time series data, there is a tendency for the error terms of the parameters being serially correlated. For a simple model such as $y = X\beta + \mu$ we then assumed the following:

$$E(\mu_t; \mu_{t-s}) = \begin{cases} \sigma_u^2 & \text{if } s=0 \\ \sigma & \text{if } s \neq 0 \end{cases}$$

When $E(\mu_t; \mu_{t-s}) = 0, s \neq 0$ is infringed, i.e., the variance of a disturbance error term remains constant even, autocorrelation is a problem.

For this study, autocorrelation was tested using the Langrange Multiplier (LM) test. The p -value $> 0.05\%$ implies serial correlation does not exist. The Breusch–Godfrey test or LM-test was employed in this study for testing autocorrelation in the errors in a regression model. In this study, the LM test used the residuals from the model developed and a test statistic was derived from the residuals. The null hypothesis was up to order p , there is no serial correlation.

Considering our regression for this model

$$\begin{aligned} \ln(Y/T) = & \beta_0 + \beta_1 \ln(GDPpct) + \beta_2 \ln(FDIt) + \beta_3 \ln(\pi t) + \beta_4 \ln(opt) \\ & + \beta_5 \ln(unempl) + \mu t \end{aligned}$$

The errors followed an AR (p) autoregressive scheme as follows:

$$\mu_t = p_1 \mu_{t-1} + p_2 \mu_{t-2} + \dots + p_p \mu_{t-p} + \epsilon_t$$

The regression model was then fitted by OLS in order to draw a set of sample residuals $\hat{\mu}_t$. The following LM in the regression below confirmed that the model is fitted.

$$\mu_t = \alpha_0 + \alpha_1 X_{t,1} + \alpha_2 X_{t,2} + p_1 \hat{\mu}_{t-1} + p_2 \hat{\mu}_{t-2} + \dots + p_p \hat{\mu}_{t-p} + \epsilon_t$$

The null hypothesis for this model holds, as we shall see in the next chapter in which

$$H_0 : \{p_i = 0 \text{ for all } i\}$$

4.7.2.2. Heteroscedasticity

In OLS regression, one of the key assumptions made about errors is that they have the same (equal) but unknown variance (Schreiber, 2014). Homoscedasticity, or constant variance, is the term for this. When this assumption is breached, heteroscedasticity is a problem. There are many consequences of heteroscedasticity that include but not limited to:

- The OLS estimators of the model as well as the predictions made on the regression always become unbiased and consistent due to heteroscedasticity.
- OLS estimators again cease to be BLUE, an abbreviation for *Best Linear Unbiased Estimators* (Gujarati, 2003).
- Both *t-test* and *F-test* become useless when heteroscedasticity is present since there will be inconsistency in estimated regression coefficients (Gujarati, 2003).

The error term would be homoscedastic in the event that variance ϵ_t is a constant σ^2 and is heteroskedastic in the event that $\sigma_i^2 = x_i \sigma^2$, that is, the variance is proportional to the value of x .

Brooks (2002) did several heteroscedasticity tests; for the purpose of this study, the White General Tests (1980) will be used for heteroscedasticity test. The White General Test was based on the estimation of the following:

$$\hat{\epsilon}_i = \alpha_0 + \alpha_i X_{t,1} + \dots + \alpha_p X_{ip} + \alpha_{p+1} X_{ip}^2 + \dots + \alpha_{2p} X_{ip}^2 + \alpha_{2p+1} (X_{i1} X_{i2}) + \dots + u_i$$

The White General Test has an advantage over the Park Test in that it considers several assumptions, such as the linearity of the estimated regression model (Gujarati, 2003). Regression gives out residuals, which the researcher then regressed to determine the joint significance of the regression. The error terms are homoscedastic if the null hypothesis is not rejected; for example, the p -value should be > 0.05 after the test, indicating that the model is homoscedastic.

4.7.2.3. Normality

"In statistics and econometrics, normality tests are used to determine whether a data set is well-modeled by a normal distribution and to compute the likelihood that a random variable underlying the data set is normally distributed" (Schreiber, 2014). It is crucial to point out that in descriptive statistics, the researchers must measure and assess the "goodness of fit" of a particular model. It follows that if the model is not normally distributed, the fit is poor (Gujarati, 2003). A normality test was carried out in this study to assess if the study sample is drawn from a normally distributed population within an accepted given tolerance (Schreiber, 2014). The assumption of normality is required for both the single and joint testing of the hypothesis of the model's parameters. The Jarque Bera (JB) test was used to see if the variables were normally distributed in the study.

The formula for JB used is $JB = n [(\sqrt{b1})^2 / 6 + (b2 - 3)^2 / 24]$.

Where:

n is the sample size,

$\sqrt{b1}$ is the sample skewness coefficient,

b2 is the kurtosis coefficient.

The JB test's null hypothesis that should be remembered by researchers is that "data is normally distributed", while the opposing or alternative hypothesis subscribes to the notion that the study data is not normally distributed. The p -value for the model in this study is > 0.05 %, indicating that the data for the study model was normally distributed, as will be seen in the next chapter..

4.7.2.4. Misspecification

When a regression analysis model is incorrect, it is known as "model misspecification". Simply put, the model will fall short of taking into account everything that needs to be taken into account. Mis-specified models are most likely to have biased coefficients as well as biased

parameter estimations, are very likely (Schwartz, 1978). The Ramsey Reset test model was used by the researchers to check for misspecification which validated the study model because it was correctly specified. A model with incorrect specifications is rendered useless, however, this study's model was correctly specified because the p -value obtained was $>$ the critical value from the tests.

4.7.2.5.Stability

The Chow test is used to see and check the variance in the split data set of the regression coefficients. It principally determines whether a unit regression line or more autonomous regression lines are better at fitting a split set of data. It is very difficult to interpret the findings if the model is not stable, therefore, it is critical for policy analyses to check if the models are invariant to possible policy interferences. If, for example, changes in the coefficients are expected, the Chow Break of 1960 is suggested. This test is useful for determining whether or not the time series reveal the presence of a structural breakpoint (Chow, 1960).

Running of the Chow Test

The null hypothesis of the Chow test posits that there is no break point.

Steps Taken in running the Chow

- (i) The researcher gathered the "error sum of squares data" by running the overall data set.
- (ii) The researcher also ran autonomous regressions for two regressions by splitting the data into half.
- (iii) The following formula was employed to get the Chow F -statistic:

$$CHOW = \frac{(RSS_p - (RSS_1 + RSS_2))/k}{(RSS_1 + RSS_2) / (N_1 + N_2 - 2K)}$$

where,

RSS_p = pooled (combined) regression line.

RSS_1 = regression line before break.

RSS_2 = regression line after break.

(iv) From the F -table, find the F -critical value.

(v) Acceptance of the model's null hypothesis in the event that F -value $<$ F -critical value and vice versa.

4.8. Ethical Considerations

This research was carried out in accordance with the University of Venda's ethical guidelines. The researcher relied on secondary data collection sources, so there was no direct contact with people, however, the information gathered was kept confidential and the researcher ensured that the data gathered were treated only for the purposes they were meant for.

4.9. Conclusion

The above chapter presented the derivation of the model and the estimation techniques to be used in the estimation of data using E-views 12 package. The unit root was conducted using Augmented Dickey-Fuller, and KPSS as a confirmatory test. Johanesen Cointegration test was used to check for the presence of a long-run association between variables. The diagnostic tests were identified as they validated the model. For heteroscedasticity, the White General Test was employed, Chow Break test was used for stability, Ramsey Reset was employed for misspecification test, LM test was used to detect for serial correlation, and Granger Causality was employed for causality test between the variables. The next chapter presents the findings and discussion of those findings.

CHAPTER 5

DATA PRESENTATION AND ANALYSIS

5.1. Introduction

The methodology that this study employed was explained in the previous chapter, while the results are analyzed and presented in this chapter. Unit root tests, Engle Granger two-stage cointegration tests, Granger Causality tests, and Diagnostic tests are among the tests conducted. The findings of this study were also discussed in relation to the reviewed literature.

5.2 Unit root tests

The ADF tests were carried to test for stationarity and the confirmatory test was the KPSS method. The results of the ADF are given below. First differencing was done, in the situation where variables failed to be stationary in level as non-stationary series result in spurious regressions. This justifies the reason for conducting a unit root for each and every variable of the study to see if the data is stationary in level form or after differencing them. The following Table 5.1. shows results of ADF tests for each and every variable of the study in level form.

Table 5.1.: ADF Tests in Levels

Source: Own formulation

<i>Variable</i>	<i>ADF t-Statistic</i>	<i>Critical value ADF (5%)</i>	<i>Critical value ADF (10%)</i>	<i>p-value</i>	<i>Order</i>
<i>FDI</i>	-4.703151*	-2.971853	-2.625121	0.0008	<i>I(0)</i>
<i>GDP per Capita</i>	-1.103398**	-2.976263	-2.627420	0.6995	<i>I(1)</i>
<i>Inflation</i>	-3.440972*	-2.976263	-2.627420	0.0082	<i>I(0)</i>
<i>Unemployment</i>	-2.064943**	-2.971853	-2.625121	0.2594	<i>I(1)</i>
<i>Trade openness</i>	-1.661929**	-2.971853	-2.625121	0.4389	<i>I(1)</i>
<i>Tax revenue</i>	-1.267317**	-2.971853	-2.625121	0.6302	<i>I(1)</i>

*Stationary at 5%, **stationary at 10%

The unit root's null hypothesis is that the model's residuals are not stationary and that the study's variables have unit root. As previously stated, the ADF output are represented in Table 5.1. With the null hypothesis in mind, the variables have a unit root. The null hypothesis in this was not rejected for all study variables except FDI and inflation, which are stationary in level form, and the researcher concluded that GDP/capita, unemployment, trade openness, and tax

revenue are non-stationary in level form, implying that they have unit root at the stated level of significance because the ADF t -statistic is $>$ critical values. At both the 5% and 10% levels, the ADF t -statistic for FDI and inflation is less than critical, indicating that they are stationary, however, the ADF- t -statistics for unemployment, trade openness, tax revenue, and GDP per capita are all higher than critical values, implying that they have a unit root. We can also use the p -value, which should be less than 0.05 for stationary and greater than 5% or 0.05 for non-stationary.

Table 5.2. ADF after first difference*

Source: Own formulation

Variable	ADF Statistic	t - Critical ADF (5%)	Critical value ADF (10%)	p -value	Order
FDI	-6.414922*	-2.986225	-2.632604	0.0000	I(0)
GDP per Capita	-2.986110**	-2.976263	-2.627420	0.0017	I(1)
Inflation	-4.925013*	-2.991878	-2.635542	0.0006	I(0)
Unemployment	-4.484553**	-2.976263	-2.627420	0.0015	I(1)
Trade openness	-5.958653**	-2.976263	-2.627420	0.0000	I(1)
Tax revenue	-4.636716**	-2.976263	-2.627420	0.0010	I(1)

*Stationary at 5%, **stationary at 10%

Normally variables have a tendency of exhibiting unit root in their level form, and for that reason we difference them to make them stationary; after differencing the variables, they all became stationary of integration order one I[1], implying that the null hypothesis that variables have unit root is rejected and the alternative hypothesis is accepted. Table 5.2 shows ADF tests after first difference, and the test statistic values for all variables are now less than the critical value, indicating that they are stationary, which is desirable. The p -values have now dropped below 0.05 %, indicating that the variables are now stationary.

Creswell and Creswell (2018) argue that it is necessary to undertake a confirmatory test to verify the results of a particular test. To confirm unit root results of ADF-test, the KPSS was used in this study as a complement and confirmatory test. The KPSS was run both in levels and at first difference as was done on ADF-test. Figures 6 and 7 show the KPSS results in level and after first difference.

Table 5.3. KPSS in levels*

Source: Own formulation

Variable	KPSS t-Statistic	Critical value ADF (5%)	Critical value ADF (10%)	p-value	Order
<i>FDI</i>	0.262557**	0.463000	0.347000	0.0000	<i>I(1)</i>
<i>GDP per Capita</i>	0.614111**	0.463000	0.347000	0.0000	<i>I(1)</i>
<i>Inflation</i>	0.498220**	0.463000	0.347000	0.0000	<i>I(1)</i>
<i>Unemployment</i>	0.266759**	0.463000	0.347000	0.0000	<i>I(1)</i>
<i>Trade openness</i>	0.607877**	0.463000	0.347000	0.0000	<i>I(1)</i>
<i>Tax revenue</i>	0.595740**	0.463000	0.347000	0.0000	<i>I(1)</i>

*stationary at 5%, **stationary at 10%

When using KPSS, stationary is achieved when KPSS p -value $> 5\%$. Table 5.3. above shows the KPSS confirmatory results and all the variables are non-stationary at both 5% and 10% levels of significance in their level form since their KPSS p -value < 0.05 , therefore, we reject the null hypothesis that says variables are stationary, bearing in mind that null hypothesis for KPSS assumes variables are stationary. The p -values are < 0.05 for all study variables, therefore, the null hypothesis of stationarity around a trend is rejected.

Table 5.4. KPSS after first difference*

Source: Own formulation

Variable	KPSS t-Statistic	Critical value ADF (5%)	Critical value ADF (10%)	p-value	Order
<i>FDI</i>	0.221920**	0.463000	0.347000	0.8660	<i>I(1)</i>
<i>GDP per Capita</i>	0.200588**	0.463000	0.347000	0.0737	<i>I(1)</i>
<i>Inflation</i>	0.231635**	0.463000	0.347000	0.4500	<i>I(1)</i>
<i>Unemployment</i>	0.111283**	0.463000	0.347000	0.5175	<i>I(1)</i>
<i>Trade openness</i>	0.243998**	0.463000	0.347000	0.5034	<i>I(1)</i>
<i>Tax revenue</i>	0.152929**	0.463000	0.347000	0.4530	<i>I(1)</i>

*stationary at 5%, **stationary at 10%

After differencing all variables once, they became stationary, allowing us to reject the null hypothesis or, to put it another way, to accept the null hypothesis that variables are stationary after the first difference because the p -values is > 0.05 . Finally, because the p -values for all variables are > 0.05 , the null hypothesis of stationarity around a trend is not rejected.

5.2. Test for Cointegration

The cointegration tests were carried out to check if the long-run connection between the study variables existed. The researcher used the Johansen Cointegration test, and the results are presented and explained as follows. The null hypothesis was that there is no cointegration among the variables of the model, and we rejected this null hypothesis because the p -value $< 0.05\%$ when checking the unrestricted cointegration rank test (Trace) from the Johansen E-Views output.

Table 5.5: Johansen Cointegration test (Trace test)

Source: own formulation

<i>Hypothesised No. of CE(s)</i>	<i>Eigen-Value</i>	<i>Trace-Statistic</i>	<i>Critical-Value 0.05</i>	<i>Prob**</i>
<i>(None)</i>	<i>0.788800</i>	<i>123.6897</i>	<i>95.75366</i>	<i>0.0002</i>
<i>(At most 1*)</i>	<i>0.672845</i>	<i>81.70603</i>	<i>69.81889</i>	<i>0.0042</i>
<i>(At most 2*)</i>	<i>0.597592</i>	<i>51.53834</i>	<i>47.85613</i>	<i>0.0217</i>
<i>(At most 3)</i>	<i>0.428224</i>	<i>26.96056</i>	<i>29.79707</i>	<i>0.1026</i>
<i>(At most 4)</i>	<i>0.263250</i>	<i>11.86734</i>	<i>15.49471</i>	<i>0.1634</i>
<i>(At most 5)</i>	<i>0.124242</i>	<i>3.581978</i>	<i>3.841466</i>	<i>0.0584</i>

Trace test indicates 3 cointegrated eqn(s) at the 0.05 level; *denotes rejection of the hypothesis at the 0.05 level. Following the results from the Johansen Cointegration test carried out for this study, we can safely reject the null hypothesis because p -value (0.0002) is less than 0.05 which is the rule of thumb. This implies that all or some of the study model variables are cointegrated and because of that we can run the ECM.

The error correction can be estimated as follows:

$$\Delta \text{Taxrev} = \alpha + \beta_1 \Delta \pi + \beta_2 \Delta \text{GDP} + \beta_3 \Delta \text{FDI} - \beta_4 \Delta \text{Op} + \beta_4 \Delta \text{Unem} + \text{res}(-1) + u_t$$

Table 5.6. Error-Correction-Model (ECM)

Source: Own formulation

<i>Variable</i>	<i>Coefficient</i>	<i>Std Error</i>	<i>T-Statistic</i>	<i>Prob</i>
<i>C</i>	-0.080985	0.156100	-0.518805	0.0093
<i>D(TRADE-% OF-GDP)</i>	0.082435	0.044446	1.854714	0.0165
<i>D(UNEMPLOYMENT)</i>	0.013372	0.044852	0.298148	0.7683
<i>D(INFLATION)</i>	-0.073023	0.055253	-1.321605	0.0993
<i>D(GDP PER CAPITA)</i>	0.001163	0.000501	2.320510	0.0295
<i>D(FDI-%-OF-GDP)</i>	0.077377	0.086667	0.892805	0.0321
<i>RESID(-1)</i>	-0.464138	0.206507	-2.247568	0.0355

Adjusted R²=0.585557 DW-statistic=1.683176

The error correction model results shows that GDP per capita, FDI and trade openness are statistically significant because their corresponding probabilities are less than 5%. Unemployment, and inflation are statistically insignificant as their probabilities are more than 5%. “Even though long-run equilibrium exists amongst the variables, random shocks knock the variables away from its equilibrium” (Gujarati, 2003). The obtained residual is negative and significant, we can, therefore, accept the developed study model and conclude that the model is perfect, since long run adjustments are possible. The coefficient of -0.463138 on residuals, shows the speed of adjustment towards equilibrium; the speed is 46.41% per unit time. This is also known as the “error correction term”.

5.3.Granger Causality Test

This test was carried out to check the direction of the causal relation between tax revenue performance and independent variables which are inflation, GDP/capita, unemployment, FDI, as well as trade openness. This is to see if the relationship is unilateral, bilateral (bidirectional) or no causal relationship at all. The causality was done using the Pairwise Granger causality test based on the understanding that in causality all variables are both independent and dependent (Gujarati, 2003).

Table 5.7. FDI and Tax revenue causality

Source: Own formulation

Equation	Null hypothesis	F-statistic	Probability
Equation 1	<i>Tax revenue is not caused by FDI</i>	0.78044	0.0354
Equation 2	<i>FDI is not caused by Tax Revenue</i>	1.75311	0.1975

The two equations were estimated with FDI as an explanatory factor in *equation 1* and with tax revenue as a dependent variable in *equation 1*. While in *equation 2*, FDI is the dependent variable while tax revenue is an independent variable. The Granger causality test results lead us to conclude that FDI granger causes tax revenue because of the corresponding p -value $< 5\%$ and because of that we reject the null hypothesis. On the other hand, if the tax revenue does not cause FDI, because its probability is more than 0.05 ; we then fail to reject the null hypothesis. There is, therefore, unidirectional causality between FDI and tax revenue.

Table 5.8. GDP and Tax Revenue causality

Source: Own Formulation

Equation	Null hypothesis	F-statistic	Probability
<i>Equation 1</i>	<i>Tax revenue is not caused by GDP</i>	1.84491	0.0012
<i>Equation 2</i>	<i>GDP is not caused by Tax Revenue</i>	0.92315	0.3459

GDP/capita in this study does cause tax revenue since the corresponding p -value is < 0.05 , hence, it follows that we reject the null hypothesis. We are not, however, in a position to reject the null hypothesis on the assertion that tax revenue does not granger cause GDP because p -value > 0.05 ; the causality is, therefore, unidirectional.

Table 5.9. Inflation and Tax Revenue causality

Source: Own Formulation

Equation	Null hypothesis	F-statistic	Probability
<i>Equation 1</i>	<i>Tax revenue is not caused by Inflation</i>	1.84491	0.0012
<i>Equation 2</i>	<i>Inflation is not caused by Tax Revenue</i>	0.92315	0.3459

The null hypothesis is not rejected, and we conclude that inflation does granger cause tax revenue since the corresponding p -value < 0.05 , while we cannot reject the null hypothesis that tax revenue does not granger cause inflation since p -value > 0.05 , therefore, there is unidirectional causality.

Table 5.10. Trade openness and tax revenue causality

Source: Own Formulation

<i>Equation</i>	<i>Null hypothesis</i>	<i>F-statistic</i>	<i>Probability</i>
<i>Equation 1</i>	<i>Tax Revenue is not caused by trade openness.</i>	<i>0.08688</i>	<i>0.7706</i>
<i>Equation 2</i>	<i>Trade openness is not caused by Tax Revenue.</i>	<i>1.36187</i>	<i>0.2542</i>

We reject the null-hypothesis on the above Table on *both equations* since *p-values* are > 0.05 and we conclude no causal relationship exists between the two variables based on the corresponding *p-values*.

Table 5.11. Unemployment and tax revenue causality

Source: Own Formulation

<i>Equation</i>	<i>Null hypothesis</i>	<i>F-statistic</i>	<i>Probability</i>
<i>Equation 1</i>	<i>Tax revenue is not caused by unemployment</i>	<i>0.08688</i>	<i>0.0206</i>
<i>Equation 2</i>	<i>Unemployment is not caused by Tax Revenue.</i>	<i>1.36187</i>	<i>0.2542</i>

We reject the null-hypothesis on the above Table on unemployment since the corresponding *p-value* < 0.05 , however, the study fails to reject that tax revenue does not granger cause unemployment since the corresponding *p-value* > 0.05 . This suggests a unidirectional causality between these two variables.

5.4. Diagnostic Tests

Ocran (2013) states that performing a diagnostic test on a model is critical because it validates the parameter evaluation of the model's outcomes. "If the estimated model's residuals have a problem, the model will be inefficient, and the parameters will be biased" (Ocran, 2013).

Table 5.12. Serial Correlation (LM-Test)

Source: Own Formulation

<i>Breusch-Godfrey Serial Correlation</i>			
F-statistic	1.007916	Prob. F(2,24)	0.7443
Obs*R ²	2.685750	Prob. X ² (2)	0.2611
Durbin-Watson (DW)	1.978243		

For the autocorrelation tests, the researcher employed the LM test; the probability of a greater than 0.05 indicates that the study model developed is free from serial correlation, thus, we will not reject the null hypothesis that there is no serial correlation. The DW statistic of 1.978243 falls within the 1.5 to 2 rule of thumb for the confirmation of no serial correlation. Following the serial correlation tests performed, the null hypothesis that there is no serial correlation is not rejected.

A confirmatory test for serial correlation Correlogram Q-statistic probabilities was also used to test for autocorrelation.

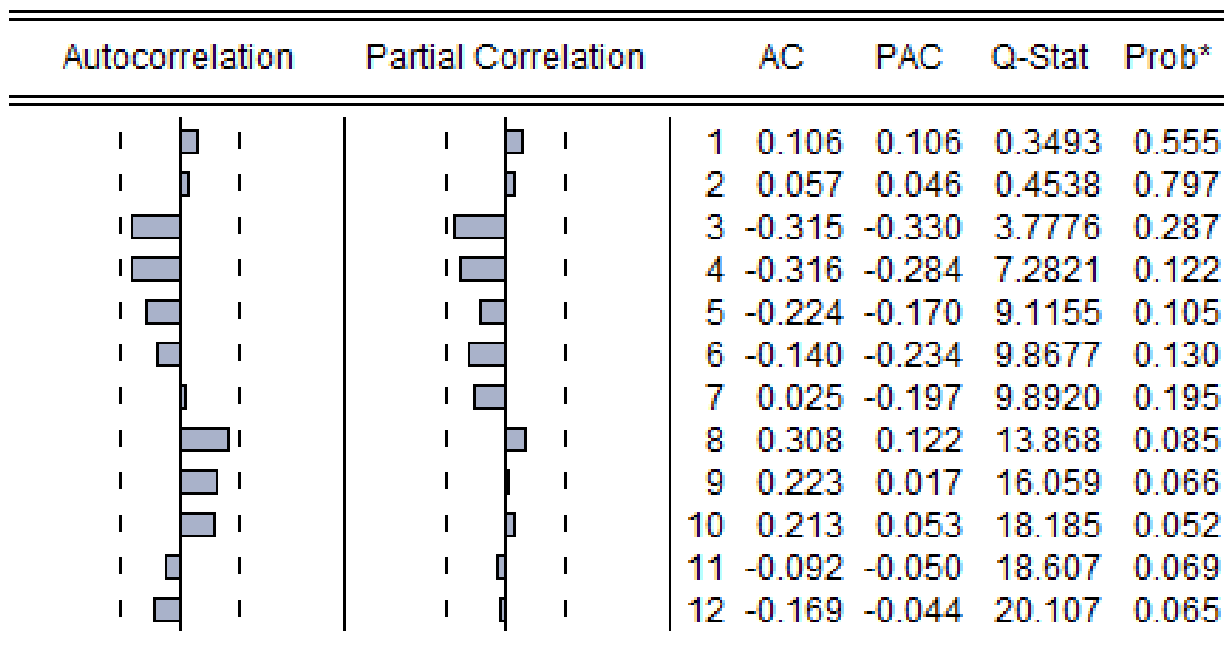


Figure 5.1. Q-Statistic Probabilities Test

Source: Own formulation from Eviews Output.

The results of the Q-statistic probabilities indicate no presence of serial correlation because all probabilities values were greater than 0.05. This confirms the results of L-M test, and we therefore accept the null hypothesis that says there is no serial correlation,

Table 5.13. Heteroscedasticity

Source: own formulation

<i>White General Test</i>			
F-statistic	1.434531	Prob. F(2,23)	0.2495
Obs*R ²	6.893890	Prob. X ² (5)	0.2287

The heteroscedasticity was tested using the White General Test and results show that the model is homoscedastic since the *p*-value obtained is > 0.05 , therefore in this study the null hypothesis is not rejected and conclude that there is homoscedastic. The data set has homoscedastic which lead to a good regression.

Table 5.14. Misspecification

Source: own formulation

	Value	DF	Probability
F-statistic	0.531917	(1, 25)	0.4937
Likelihood ratio	0.673712	1	0.4937

To check for misspecification, the Ramsey Reset test was used, and the results prove the developed study model is correctly specified. The rule of thumb is *p*-value should exceed 5%, and as can be seen from the results in Table 5.14. the *p*-value obtained is > 0.05 and therefore this study fails to reject the null hypothesis.

Table 5.15. Normality test

Source: own formulation

Jarqu-Bera	0.721920
P-Value	0.697007

To assess how model residuals are distributed the J-B test was employed. The *p*-value (0.697007) obtained which is $> 5\%$ implies that normal distribution is present in the residuals, hence, the null hypothesis cannot be rejected in this study. The conclusion is that the developed model is normally distributed, hence, it is a good model.

Table 5.16. Chow Breakpoint

Source: own formulation

Prob. F(6,17)	0.6114	F-statistic	0.759159
Prob. X ² (6)	0.3317	Log likelihood ratio	6.884378
Prob. X ² (6)	0.6020	Wald-statistic	4.554954

The results obtained from the Chow break-point test show the study model is stable since p -value obtained is > 0.05 and the following E-Views output graph below confirms that.

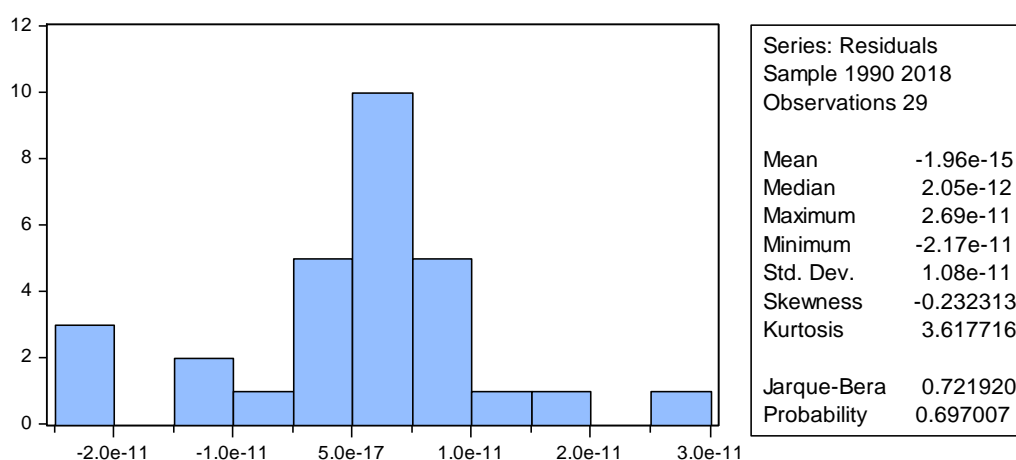


Figure 5.2 . Chow Break point test

Source: own formulation

5.5. Discussion of the Findings

Having analysed the data, the researcher found the findings that are complementary to the findings of the previous researchers. Firstly, in this chapter, the researcher tested for the unit root using the augmented dickey fuller test and the KPSS as a confirmatory test. The findings confirm that the variables are stationary at levels and after first difference. According to Workineh (2016), the study variables should be stationary so that the model will not be spurious. Both ADF and KPSS confirm that the model is non-spurious since the variables are stationary. Tables 5.1 and 5.2 which are unit root at levels and after first difference confirmed this aspect. Diagnostic tests were also carried out to validate the model. The model should not suffer from autocorrelation, heteroskedastic, multicollinearity, and it should be stable. Various tests were conducted for diagnostic analysis, for heteroskedasticity, White General Test was used, and the results conclude that the model is homoscedastic since the p -value obtained is $>$

0.05. With the analysis above, the study managed to unpack variables that influence tax revenue performance positively.

This chapter through use of econometrics techniques managed to present the results. The white test results are heteroscedastic under OLS assumptions. The study's F- test and the X^2 ('LM') forms of the *test-statistic*, according to the findings, reach similar conclusion which confirmed the absence of heteroskedasticity because the *p-values* at the 95 % confidence interval are significant at > 0.05 . The autocorrelation test, which was performed using the DW and LM tests, was another important diagnostic test used in this study. The auxiliary regression estimates are shown in the second option, and the DW-test indicates a value of 1.978 which is close to 2.0 with a zero lagged value. The study data had no serial correlation issues, according to all autocorrelation tests performed for this study. The obtained histogram from this study has a “*bell-shape*” and the identified JB-statistic was not significant, according to the findings. As a result, the researcher came to the conclusion that residuals are normally distributed and that the current kurtosis value of 3.62 can be approached to 4 in the future.

Overall, the empirical findings evidenced in this study confirm that tax revenue is invaluable for the growth of the economy, as the Granger causality test confirmed. The study was able to determine the factors of tax revenue performance in South Africa, which helped to meet the study objectives outlined in Chapter 1. The researcher was able to make recommendations after establishing the determinants of tax revenue in South Africa, which the researcher presents in the following chapter of the study.

5.6. Conclusion

The results and analysis have been presented in this chapter. At the beginning of this chapter, the researcher tested for stationarity/unit root using the ADF-test which is considered one of the best methods of testing for unit root. Some variables were non-stationary at level and the researcher had to difference them to make them stationary. KPSS confirmatory test for stationarity was also conducted. The chapter also showed the Granger Causality test in which GDP per capita, trade openness, FDI were found to granger cause tax revenue. Several diagnostic tests which were also conducted with the model were found to be homoscedastic, perfectly specified, stable, and with no presence of serial correlation. ECM was carried out to reveal and confirm the short run impact of the variables. The chapter ended by discussing the

findings, from which the researcher was in a position to accomplish the objectives of the study established in the first chapter.

CHAPTER 6

Summary, Conclusion and Recommendations

6. Introduction

In the previous chapter, the researcher offered an analysis and interpretation of data which helped to make conclusions and recommendations. In this chapter, the researcher will offer a study summary, make policy recommendations backed by the results presented in the previous chapter, and will conclude the chapter by offering limitations and areas for further studies.

6.1. Overview of the study

The study's main objective was to "assess the determinants of tax revenue performance in South Africa between 1990-2018", and sub-objectives of determining the direction of causality between tax revenue performance and independent variables; in this case, these were trade openness, FDI, GDP per capita, inflation, and unemployment.

The background, significance of the study, hypotheses, and problem statement were all presented in the first chapter. The second chapter provided an overview of tax revenue performance in South Africa as well as the factors that influence it. The study began by providing an overview of tax revenue in South Africa, examining the general factors that influence tax revenue together with the major sources of tax revenue. Urbanization, unemployment, GDP, inflation, trade openness, agriculture's share of GDP, and foreign direct

investment (FDI) were some of the major factors that influence tax revenue. The literature review was presented in Chapter 3 and included both theoretical and empirical literature. Stochastic Tax Frontier, Deterrence Theory of Taxation, and Optimal Tax Theories were investigated as tax revenue theories. The researcher was able to better understand the connection and association between tax revenue performance and independent variables based on the reviewed empirical literature. The methodology was covered in Chapter 4, and a model was developed with tax revenue performance as the dependent variable and FDI, inflation, unemployment, trade openness, and GDP per capita as explanatory variables. The unit root test, ECM, cointegration, Granger-causality, and diagnostic tests were all identified as estimation techniques; the analysis of the results was presented in Chapter 5. The Augmented Dickey-Fuller was used to estimate unit root, and KPSS was used as a confirmatory test, and the results proved that all the variables are stationary. The model's diagnostic tests in Chapter 5 show that it is an appropriate model that can be used to make policy.

6.2. Key Findings

The determinants of tax revenue performance in South Africa from 1990 to 2018 were investigated using time series data estimation techniques. The goal was to figure out the association between tax revenue performance and the identified independent variables. The main question that was posed was: *Which variables have a positive significant effect on the country's tax revenue?* According to the findings of this study, GDP per capita, FDI, and trade openness all have a positive significant relationship/association with tax revenue performance in South Africa. The empirical findings corroborate Gupta's (2007) findings, who also found a positive association/connection between FDI, GDP/capita and the tax revenue performance in a study he carried out in Sub-Saharan Africa for the period, 1970 to 2010. Furthermore, the study served as a follow-up to the findings of Ade *et al.*, (2018), who investigated the determinants of tax revenue performance in SADC for the period, 1990 and 2015. FDI is a significant variable that affects tax revenue performance, according to Ade *et al.*, (2018). Tax revenue is essential for economic growth, according to the empirical findings of this study, and the Granger causality test confirms this. This study was successful in identifying the factors that influence tax revenue performance in South Africa, which led to the policy recommendations presented in the following section.

The study also found that unemployment and inflation have negative impact to the country's tax revenue performance. As a result, the higher unemployment and inflation are, the lower

will be the amount of tax revenue that can be collected by SARS. The South African government, therefore, should work to address issues such as unemployment and inflation, in order to successfully influence the tax revenue process in the Republic. Velaji and Prendi (2014) found that FDI, GDP/capita, and country exports were positive and statistically significant to tax revenue performance in an Albanian study, but that inflation was not.

Tax revenue determinants in Italy and ten other developed countries were studied by Ahsan and Wu (2012). They empirically examined this same problem making use of the statistical regression models spanning from 1988 -2011. Their findings confirmed that the agriculture sector as well the country's inflation have a negative effect on the tax revenue performance. They also found GDP/capita and the %age share of the service and manufacturing sectors to the country's GDP to be statistically significant and to have a positive influence on the tax revenue performance. Ahsan and Wu (2012) used a model that included the share of agriculture in GDP, which this study did not, despite this, the findings are similar.

The current study's empirical findings confirmed the Granger causality test's conclusion that tax revenue is critical for growth and development of nations. The study was successful in identifying the determinants of tax revenue performance in South Africa, which contributed to the achievement of the study objectives outlined in Chapter 1. The study was successful in achieving its objectives, hence, the researcher was able to make recommendations, as outlined in the following section.

The study findings can be summarised as:

- GDP per capita is statistically significant with tax revenue performance in South Africa.
- FDI is important as it was found to be statistically significant with tax revenue performance.
- Trade Openness is statistically significant with tax revenue performance in South Africa.
- GDP per capita granger causes tax revenue performance.
- Inflation has a negative connection/relationship with the country's tax revenue performance.
- Unemployment is negatively related and statistically significant with tax revenue performance.
- FDI granger causes tax revenue performance.

6.3. Main Contributions of the study

Following the IMF (2019) report, it was noted that the economic and revenue outlook for South Africa has deteriorated since the global financial recession of 2008/9. Now the government of South Africa is spending more than it earns; unemployment rates are standing at a record high at 32.4% in 2021; this study, thus, adds greatly to the tax revenue body of knowledge and should assist policymakers of South Africa. To the policy makers this study provides recommendations that will be very useful in drafting policies pertaining to tax revenue in South Africa.

The researcher acknowledges that several studies have been carried out on this topic, however, most of them have focused on sub-Saharan countries or SADC as a whole; for instance, Gupta (2007), Gupta (2013) and Oyetunji (2012) all looked at SADC or East African countries with very few studies carried out for the South African context. Riba (2016) who conducted a similar study from the South African perspective did not include many explanatory variables. It remained imperative, therefore, to ascertain, comprehensively, the determinants of tax revenue performance for South Africa.

This study has contributed to the already available body of literature on this particular issue and can be used for the South African context and also for other developing countries. The study clearly determined the factors that affect, positively, tax revenue performance in South Africa as well as those that affect it negatively. The study incorporated in its methodology, trade openness and FDI as its explanatory variables, which most researchers had ignored. This research also contributes in the way of suggesting policies on tax, to policymakers so that budget deficits will be a thing of the past; this would cause a decrease in government costs, hence, an improvement in the social welfare of South African citizens. The overall study findings obtained in this current study would help the South African Revenue and Customs Authority improve its tax collection performance and assist the making of policy recommendations in the future. In addition, the study can be used as a point of departure by future researchers who want to look into similar topics.

6.4 Policy Recommendations

The findings of this study revealed that GDP per capita, trade openness, unemployment, and FDI are significant variables for tax revenue performance in South Africa, and policymakers are advised to encourage more foreign direct investment, raise GDP, and reduce unemployment to boost tax revenue in the country. It is recommended that South Africa develop policies that aid and increase FDI, and they should be proactive. To attract enough FDI, South Africa needs

to develop a business climate that not only offers foreigners investment opportunities but also protects existing investments; a favorable political and economic climate can encourage FDI. South Africa will be able to generate more revenue if it is able to attract significant FDIs because those companies will be taxed.

The study discovered that unemployment has a negative impact on South Africa's tax revenue performance, thus, the country is advised to adopt policies to reduce unemployment. One of the policies that must be implemented is the adoption of labor-intensive industrial growth, as well as investments in citizen training and education. Promoting education and healthcare in the Republic will serve two important functions in relation to tax revenue performance: firstly, it promotes the accumulation of vital human capital who will be able to promote economic growth, and secondly these two factors will create numerous job opportunities in the Republic; this will help South Africa's tax revenue performance in the future.

GDP per capita was noted to have a positive connection/relationship with the country's tax revenue performance, thus, it is suggested that the South African government develop policies to boost GDP, which would improve tax revenue performance. To do so, South Africa can invest in education and training, as better education and job skills enable people to produce more goods and services while also putting them in a better position to start their own businesses. Infrastructure is also important for GDP, and it is recommended that South Africa build good infrastructure as the economy will not grow significantly without a functioning power system and good roads.

South Africa, like many other developing countries, is struggling to achieve long-term growth, so increasing tax revenue will result in long-term growth; despite the importance of tax revenue, its usefulness is directly influenced by South Africa's characteristics in terms of corruption, administrative, and allocative issues. Corruption and allocation issues must be addressed in order for the country and the people to fully enjoy the benefits of tax revenue collected. This point brings us to the study's limitations.

6.4.Limitations and Suggestions for further study

In undertaking a research there are various limitations that one may encounter and for the current research the following can be cited as the research limitations. The researcher to begin with did not incorporate recent data for the 2019 and 2020 period which could have brought

different results. The study has also a limitation of not incorporating other explanatory variables that could have been very useful in the study model, such as tax compliance, tax capacity, corruption, and urbanisation. The research also used time series data; different results could have brought had it employed panel data. The study limitations have assisted the researcher in developing suggestions for further studies as follows:

Future research could look into the impact of corruption on the country's tax revenue performance in South Africa and those who want to investigate the same topic can incorporate other explanatory variables, such as urbanization, exports, institutional dummies, and imports. The study used Granger Causality Pairwise test for cointegration, however, future researchers could use the VAR Granger Causality Test. Future researchers can also make use of panel data instead of time series data used in this study and incorporating current data, for instance, 2020 data, when available.

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