International Journal of Applied Economics, Finance and Accounting
ISSN 2577-767X
Vol. 19, No. 1, pp. 82-96
2024
DOI: 10.33094/ijaefa.v19i1.1515

Determinants of tax revenue performance in South Africa for the period 1990-2018

Asiashu Given Mmbulaheni[1*]
Zvikomborero Nyamazunzu[2]
Mbulaheni Albert Dagume[3]

[1,2,3]*Department of Economics, University of Venda, South Africa.*
[1]*Email: asiashugiven@gmail.com*
[2]*Email: Zvikomborero.nyamazunzu@univen.ac.za*
[3]*Email: mbulaheni.dagume@univen.ac.za*

Keywords:
Tax compliance
Tax determinants
Tax revenue.

JEL Classification:
E60; F15.

Received: *12 October 2023*
Revised: *4 March 2024*
Accepted: *21 March 2024*
Published: *18 April 2024*
(Corresponding Author)*

Abstract

This study investigates the determinants of tax revenue performance in South Africa using time series data from 1990–2018. The study uses Augmented Dickey Fuller and the Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests to test stationarity in time series, while Johansen co-integration and error correction models identify long-run and short-run dynamics among variables. The results of the study revealed that Gross Domestic Product (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 also negatively correlated with tax revenue performance, while inflation was found to be negative but not statistically significant. The research's diagnostic tests confirmed the validity of the study model, revealing no serial correlation, heteroscedasticity, and a stable and correctly specified model. This study assists policy makers in having a thorough understanding of the determinants of tax revenue performance, and as a result, policymakers may create tax laws that complement the nation's economic environment. Knowing which variables, like GDP per capita, foreign direct investment, and trade openness, have a favourable impact on tax collection allows for more focused policy interventions. *Understanding the relationship between tax rates and revenue performance is helpful in determining the ideal tax rates.* Based on empirical data, policymakers can modify tax rates to maximise revenue without inhibiting economic growth. The study recommends that the South African government should enhance GDP, encourage foreign direct investment, decrease unemployment, and promote trade openness to enhance tax revenue performance.

Funding: This study received no specific financial support.
Institutional Review Board Statement: The Ethical Committee of the University of Venda, South Africa has granted approval for this study on 13 July 2023 (Ref. No. SMS/21/ECO/03/1207).
Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
Data Availability Statement: The corresponding author may provide study data upon reasonable request.
Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

1. Introduction

Low tax revenues have impeded the development of many low-income countries. Taxation is essential for the long-term viability of both developed and developing countries. Many governments use taxes as a source of revenue; it has therefore become an important and indispensable factor in government decisions. Following the global financial crisis of 2008, Aizenman and Jinjarak (2008) 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 (2007), can lead to unmanageable debts in the long run, so developing countries should concentrate on developing reliable domestic sources of finance. Gupta (2007) goes on to say that increasing tax revenue is one way for governments to mobilize domestic finances and resources.

Recently, domestic revenue mobilization has received 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 any doubt, a key aspect of a country's 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 their primary revenue source. Economic development is the primary goal for many developing countries, as reported by the 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, along with Morocco, Kenya, Egypt, and Ghana, which are all expected to grow at a rate of 4%. According to Stats (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% when compared to the previous year. Stats (2020) reported 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; however, South Africa's economic activities declined by only 1.5 % in 2009 (Stats, 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; therefore, the country must also possess the necessary capacity and resources. Many developing countries, including South Africa, have vast mineral resources, but despite this, they continue to have budget deficits. South Africa has had only a minor budget surplus from 2005/6 to 2008/9, which, according to Stats (2018), occurred when the government spent less than it earned. However, because of many factors, including the global financial crisis of 2008-2009, these budget surpluses did not last long. In 2008/09, the South African economy encountered difficulties, falling into a deep 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, and for the same period, South Africa's gross loan debt was R2.2 trillion, or 53% of GDP (Stats, 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).

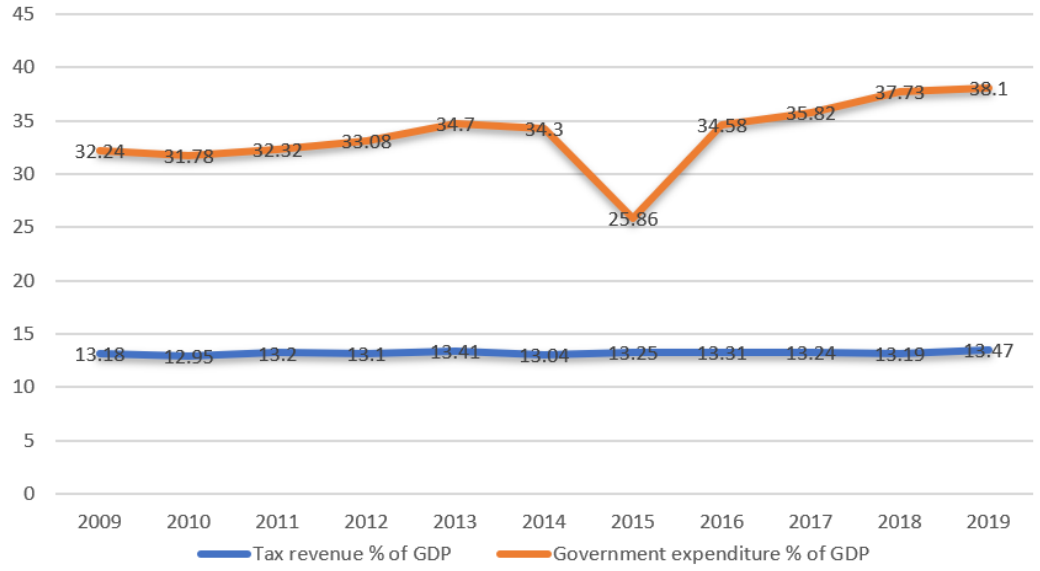

Figure 1. SA revenue % of GDP vs expenditure % of GDP time series 2009 to 2019.

Source: Stats (2020).

Figure 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 (Stats, 2020). Greater efforts, therefore, should be made to increase tax revenue, as the above figure indicates a deficit, which has several negative consequences for the economy.

According to the IMF (2018), South Africa's economy is strategically positioned, diversified, and sophisticated, but productivity disparities are primarily due to mismatches 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 the poverty rate rising to a record figure of around 42.5 % and unemployment increasing to 32.5% in 2021 using

the narrow definition of these terms (Stats, 2020). The IMF (2018) reveals that South Africa's consolidated fiscal deficit increased to 4.8% of GDP between 2017-2018, up from 4% between the 2016-2017 fiscal periods.

Despite the importance of tax revenue in financing development and expenditure, South Africa's development cannot primarily be financed through 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). Chigome and Robinson (2021) explain that a low tax-to-GDP ratio implies that a country will not be able to meet the required social and economic development needs due to budgetary constraints. Following the South African tax-GDP ratio, which declined from 28.5% in 2016, 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, basically, the fiscal situation in general.

Table 1. South Africa's fiscal position (as a % of GDP).

Year	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

Source: IMF (2019).

Table 1 above shows the performance of the South African economy between the 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 that ranged between -4% of GDP and -4.8% of GDP between these years. It is clear from Table 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 collection of enough revenue, as it will reduce various negative effects, such as increasing government debt.

Socioeconomic, demographic, and political factors have an impact on the government's tax revenue efficiency and effectiveness (Workineh, 2016). Several factors have been identified as reasons for the low contribution of tax revenue to developing countries' development and progress. The literature is divided on the factors that influence tax revenue performance. Muibi and Sinbo (2013), for example, identified agriculture as well as the industry's share in GDP, urbanization, external debt, and monetization rate as crucial factors in tax revenue. In the case of Turkey, Karagöz (2013) found income levels, the inflation rate, and the country's exchange rate to be the major exploratory variables of its tax revenue. Similarly, Velaj and Prendi (2014) empirically tested the same issue and found that inflation, unemployment, and gross domestic product are the country's main determinants of taxation revenue. Furthermore, debt and foreign aid have a positive impact on tax revenue, according to Eltony (2012), whereas both have a negative impact, according to Gupta (2007). Inflation's impact on tax revenue has yielded conflicting results. According to Mahdavi (2008), inflation and Foreign Direct Investment (FDI) negatively impact tax revenue; however, he maintains that FDI positively affects tax revenue. From the above, previous research findings on this issue are inconclusive. Furthermore, as per the literature reviewed and several studies conducted on this topic, most of them have focused on sub-Saharan African countries; 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 Stats (2020). Hence, the researcher decided that a study of the factors that influence tax revenue performance in South Africa was necessary.

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. 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 South African Revenue Services (SARS) in refining its tax collection performance. Furthermore, this current study could serve as a starting point for future researchers interested in similar points and topics. In other words, the study's findings, conclusions, and recommendations will serve as a foundation for criticism as well as the development of literature useful to tax academics.

The rest of the paper is organized as follows: Section 2 reviews the literature on tax revenue performance and empirical analysis. Section 3 shows the data and methodology. Section 4 draws on the empirical analysis and discusses the results. Section 5 presents the conclusion and potential recommendations, and the final section outlines the limitations and suggestions for further study.

2. Literature Review

This section reviews the theoretical framework as well as the empirical work on the determinants of tax revenue conducted within and outside South Africa.

2.1. Theoretical Framework

The researcher examined various tax theories, including the Optimal Tax Theory, Stochastic Tax Frontier, Deterrence Theory of Taxation, and Behavioural Approach Theory, to investigate the topic. The 1971 revision of Ramsey's Optimal Tax Theory by Diamond and Mirrlees focuses on economic redistribution. This theory suggests eight general lessons about taxes, which include: The ability distribution determines the optimal marginal tax rate. High incomes may see the optimal marginal tax rate schedule decline. A flat tax with a universal lump-sum transfer may be close to optimal. Wage inequality rises in proportion to the optimal extent of redistribution. Income and personal characteristics should determine taxes. Tax should only be levied on final goods and not intermediate ones, and it suggests countries should not tax capital income. 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 (Mankiw, Weinzierl, & Yagan, 2012). 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. Alfirman (2003) used the stochastic tax frontier, with the following inputs: income level, labor force participation, agricultural share of GDP, and trade openness, to evaluate Indonesia's tax capacity. Alfirman (2003) adds that this model has limitations when it comes to deciding which inputs to use to estimate the tax frontier. The consensus is that traditional labor and capital inputs determine the tax frontier; however, there is debate about which 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. The general regression model, which contends that a number of inputs determine production, serves as the foundation for this theory.

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

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

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

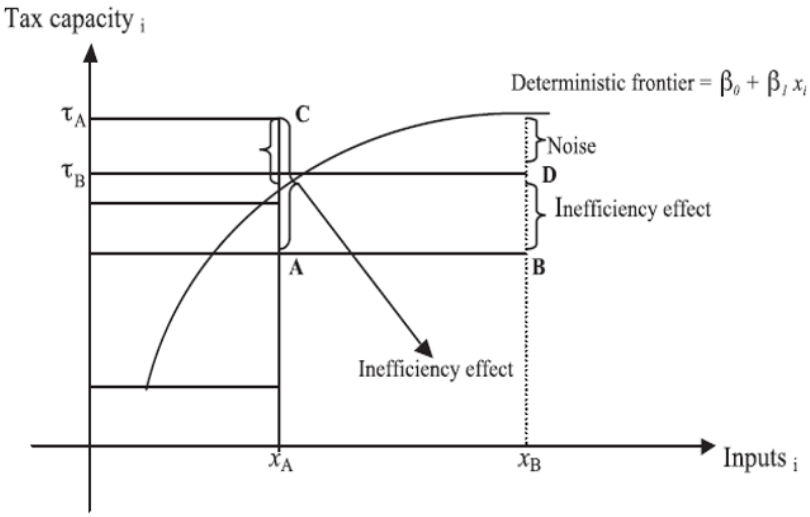

Figure 2. Stochastic tax frontier.

Source: Aigner et al. (1977).

On the x-axis of Figure 2 are the inputs, and the y-axis shows the tax revenue of two nations (A and B). The two tax revenues in points A and B above are those of countries A and B, respectively. When all revenue is collected efficiently, country A becomes country C, and country B becomes country D.

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. The deterrence theory suggests using persuasive and punitive methods to achieve its objectives. The punitive approach calls for austerity measures against those who break the tax code; tax evaders, therefore, must face harsh and high penalties because 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 and 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).

Allingham and Sandmo (1972) proposed the behavioural theory, which emphasized the importance of knowing and understanding the taxpayers' decision when they decide whether to comply. They say that a taxpayer is projected as a risk-taker who is most likely to evade tax to maximize anticipated gains. Taking such a stance carries a risk because tax authorities can conduct a tax audit at any time, exposing the evasion. In 1974, The Behavioural Theory was 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. Yitzhaki attempted to modify the work of Allingham and Sandmo (1972) by emphasizing fining and punishing evaders. In this study, the researcher expanded on the work of the 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 many additional explanatory variables into the study model.

2.2. Empirical Studies on the Determinants of Tax Revenue

Numerous studies in both developed and developing countries have looked at the factors that affect tax revenue, including (Bayu, 2015) who used data from 1980 to 2005 using the "fixed-effects regression framework" to examine this issue using 40 developed countries as the study's sample. The researcher found that structural issues, such as urbanisation and GDP/capita, are statistically significant and positively correlated with tax revenue. Velaj and Prendi (2014) used Pearson Correlation and regression analysis to investigate this same issue in Albania. They selected a set of variables that included - unemployment, inflation, GDP, exports, and imports. They found - GDP per-capita, exports, and foreign aid to be statistically significant to tax revenue performance. In the same vein, Zee (2006) 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's GDP and inflation rate have a negative effect on tax revenue performance, while GDP/capita and the percentage of manufacturing and service sectors in GDP were found to have a positive relationship and statistical significance with tax revenue performances.

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 and 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) conducted a study on 12 economically developed countries between 1994 and 2004, focusing on institutional, CPI, and per-capita incomes as independent variables of the tax ratio. They regressed, and their findings were that institutional factors, inflation, and per capita income were statistically significant. Chigome and Robinson (2021) found that corruption, economic development, financial deepening, trade openness, and inflation significantly impact a country's tax effort and capacity.

Desta, Reta, and Girma (2022) investigated the factors affecting tax revenue in Ethiopia from 1996 to 2020 using time series data. The impact of agricultural GDP, service-to-GDP, inflation, corruption, political stability, and tax reformation on the ratio of tax revenue to GDP was investigated in this study. The short-run and long-run associations between the variables were determined using the autoregressive distributed lag (ARDL). The outcomes of the study reveal that inflation has a positive relationship with tax; however, agriculture GDP had a negative impact on tax revenue in the short run over the study period. Political stability, service-to-GDP, and inflation, on the other hand, have a positive long-run impact on tax collection, whereas corruption has a negative impact. We recommend that politicians and governments take action to address corruption, foster political stability, expand tax bases to encompass a greater number of service-oriented firms, and decrease dependence on agricultural industries.

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 (1968) and "Dummy Variables Fixed Effects" (DVFE) developed by Park (1967). Their findings revealed that taxation, particularly tax rates and 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 relationship with tax revenue collected in the SADC region, as well as evidence of bi-

directional causality between tax revenue and FDI. In their policy recommendations, they urged the region to develop policies that encourage FDI to successfully collect more revenue (Ade et al., 2018).

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 from 1990 to 2010. He discovered that structural variables, which are exports and imports, have a significant impact on tax revenue. In the short run, economic growth has a positive impact on tax revenue, according to Hlongwane, Olebogeng, and Sithole (2022). Prowd and Kollie (2021) used monthly time series data and the VECM estimate technique to study the elements that are likely to drive tax revenue performance. They also applied the Johansen cointegration approach. The empirical findings show that real estate, income and profit, property income, administrative fees, import duties, excise tax, grants, loans, inflation, and GDP growth all have a positive long-term impact on tax collection. On the other hand, the contribution of mining and agriculture to social development, the real exchange rate, and population increase have a negative effect on tax income.

Tilahun and Yidersal (2014) analyzed the factors that affect tax effort and tax capacity using a sample of 46 countries in Sub-Saharan Africa, employed an "unbalanced panel set" for the period 1990-2006, and tested for the robustness of the outcomes by using an estimation regression. In their study, Tilahun and Yidersal (2014) used various independent variables that included - GDP/capita, inflation, the country's tax compliance, trade openness, and institutional quality. The findings indicated that all explanatory variables were statistically significant except for inflation, which was statistically insignificant. 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.

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 co-integration technique for 1992-2015 in East Africa. They checked for stationarity of the data using Augmented Dickey Fuller (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 the Gaussian Mixture Model (GMM) model, dynamic panel-data, and the FGLS. The researchers found that trade openness, agriculture's %age in the economy, foreign aid, and the %age of industry in the economy had a positive effect on tax revenue, while general price level (inflation), the country's exchange rate, and urbanization, all had a negative impact on tax revenue.

Tarawalie and Hemore (2021) studied Sierra Leone's tax revenue determinants from 1990 to 2020 using the ARDL estimation procedure. They found that real GDP, openness, and official development assistance are the main determinants, with positive coefficients. Inflation negatively impacts tax revenues. The study confirmed that short-term imbalances can be corrected with a quarterly adjustment rate of 11% and that the government should focus on growth-promoting sectors like agriculture, health, education, energy, and infrastructure development.

There is a paucity of empirical research on the factors that influence tax revenue performance in South Africa. We 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 the country's tax base, the 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 was noted. After a thorough literature review, the researcher noticed that some studies agreed on some parameters and differed on others. This disagreement motivated this researcher to continue with the current study to determine the determinants of tax revenue performance in South Africa. Because there isn't much written about South Africa, this study will contribute to the body of knowledge, filling the knowledge gap while also providing a larger basis for future scholars.

3. Methodology

3.1. Sample Period and Variables Description

This study will employ a causal research design to investigate determinants of tax revenue performance in South Africa within the study period, which ranges from 1990 to 2018. The availability of data influenced the choice of time. The study used Secondary data, and the technique of data acquisition includes desktop research utilizing South African Reserve Bank (SARB) quarterly bulletins and other publications that were principally sourced from SARB, the World Bank, Statistics South Africa (Stats SA), and the Department of Trade and Industry. The variables in the study involve tax revenue, which is the dependent variable, while GDP per capita, inflation, unemployment, trade openness, and FDI are independent variables. The study's data was analysed using the EViews package 12.

3.2. Model Specification and Definition of Variables

The researcher's review 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 and 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:

$$(T/_Y)it = f(x_{it}) = \beta_0 + \beta_{it}x_{it} + \mu_i + \epsilon_{it} \quad (1)$$

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; u_i stands for the individual effect and ϵ_{it} stands for the error term. From the above equation, the researcher 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. The study incorporated trade openness, FDI, and unemployment as explanatory variables, which most researchers had ignored.

$$\frac{T_t}{Y_t} = f(GDPpc, FDI, \pi, op, Unempl) \quad (2)$$

Where:

$\frac{T_t}{Y_t}$ = Tax Revenue

$GDPpc$ = Gross domestic product per capita

FDI = Foreign direct investment

$\pi,$ = 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:

$$Ln\left(\frac{Y}{T}\right) = \beta_0 + \beta_1 ln(GDPpct) + \beta_2 ln(FDI_t) + \beta_3 ln(\pi_t) + \beta_4 ln(OP_t) + \beta_5 ln(unempl) + u_t \quad (3)$$

Where:

β_0 = intercept of relationship in the model/constant.

$\beta_1 - \beta_5$ = coefficients of each independent or explanatory variable.

μ_t = Error term.

All the above variables are in natural logarithms, and hence the log-linear form of the model is used for the tax revenue model as opposed to the linear model. This is because the log-linear model is preferred to the linear model in that it helps to control the size of data and results in consistent and reliable estimates (Macek, 2014, as cited in Masiya, Chafuwa, and Donda (2015)).

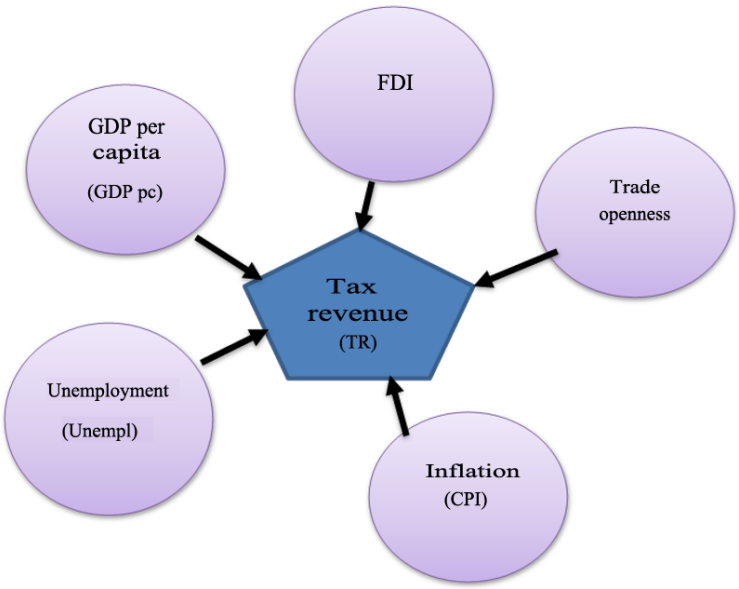

Figure 3. Illustration of variables (Own framework).

3.3. Explanation of Variables

Figure 3 provides an explanation of model variables, considering Equation 3, with tax revenue performance as the dependent variable, measured in terms of % GDP. The independent variables include GDP per capita, which 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 (Mohr, 2014). The performance of tax revenue is positively related to GDP per capita, so it is expected to be positive ($\beta_1 > 0$). Trade openness is 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, 2008). According to Beh, Cheah, Chek, and Lim (2021), the sum of imports and exports of a country indicates its trade openness and reflects how the trade relations between the host country and external countries are.

We, therefore, expect the relationship between tax revenue and Trade openness to be positive ($\beta_4 > 0$). Regarding inflation, the gross domestic implicit deflator's annual growth rate measures the rate of price change in the country. The government's revenue responds to changes in prices over time. Inflation is believed to impact tax revenue negatively because it erodes the real value of tax collected; thus, a negative causality is expected between inflation and tax revenue (Anware, 2014) ($\beta_3 < 0$). Foreign Direct Investment 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, 2007). More FDI shows the coming in of new foreign companies, which in turn increases revenue. A positive relationship is expected between tax revenue performance and FDI ($\beta_2 > 0$). Unemployment is defined as a situation in which an individual is actively looking for work but is not able to land one (Mohr, 2014). Thus, this is the part of the labour force that is failing to secure a job. The more people who are unemployed, the lower the tax revenue collected. We therefore predict that tax revenue and unemployment will have a negative relationship ($(\beta_5 < 0)$).

4. Results and Discussion

4.1. Unit Root Test Results

The ADF tests were carried out to test for stationarity, and the confirmatory test was the KPSS method. The results of the ADF are given below. The 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 variable of the study to see if the data is stationary in level form or after differencing them. Table 2 presents the level form results of ADF tests for each variable in the study.

Table 2. ADF tests in levels.

Variable	ADF t-statistic	Critical value ADF (5%)	Critical value ADF (10%)	P-value	Order
FDI	-4.703*	-2.971	-2.625	0.000	I(0)
GDP per capita	-1.103**	-2.976	-2.627	0.699	I(1)
Inflation	-3.440*	-2.976	-2.627	0.008	I(0)
Unemployment	-2.064**	-2.971	-2.625	0.259	1(1)
Trade openness	-1.661**	-2.971	-2.625	0.438	I(1)
Tax revenue	-1.267**	-2.971	-2.625	0.630	1(1)

Note: *stationary at level %, **stationary after first difference.

The unit root's null hypothesis is that the model's residuals are not stationary and that the study's variables have a unit root. As previously stated, the ADF output is represented in Table 2. With the null hypothesis in mind, the variables have a unit root. We failed to reject the null hypothesis for all study variables except FDI and inflation, which are stationary in level form, and we concluded that GDP/capita, unemployment, trade openness, and tax revenue are non-stationary in level form, implying that they have a 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 3. ADF after differencing.

Variable	ADF t-statistic	Critical value ADF (5%)	Critical value ADF (10%)	p-value	Order
FDI	-6.414*	-2.986	-2.632	0.000	I(0)
GDP per capita	-2.986**	-2.976	-2.627	0.001	I(1)
Inflation	-4.925*	-2.991	-2.635	0.000	I(0)
Unemployment	-4.484**	-2.976	-2.627	0.001	I(1)
Trade openness	-5.958**	-2.976	-2.627	0.000	I(1)
Tax revenue	-4.636**	-2.976	-2.627	0.001	I(1)

Note: *stationary at level %, **stationary after first difference. I[1] means cointegration of order 1.

After differencing the variables, they all became stationary in integration order one I[1], implying that the null hypothesis that variables have a unit root is rejected and the alternative hypothesis is accepted. Table 3 shows ADF tests after the 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 the unit root results of the 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 the ADF test. Tables 4 and 5 show the KPSS results at level and after the first difference.

Table 4. KPSS in levels*.

Variable	KPSS t-statistic	Critical value ADF (5%)	Critical value ADF (10%)	p-value	Order
FDI	0.262**	0.463	0.347	0.000	I(1)
GDP per capita	0.614**	0.463	0.347	0.000	I(1)
Inflation	0.498**	0.463	0.347	0.000	I(1)
Unemployment	0.266**	0.463	0.347	0.000	I(1)
Trade openness	0.607**	0.463	0.347	0.000	I(1)
Tax revenue	0.595**	0.463	0.347	0.000	I(1)

Note: *stationary at level %, **stationary after first difference.

When using KPSS, stationery is achieved when the KPSS p-value is > 5%. The KPSS results are shown in Table 4. All the variables are not stationary at the 5% and 10% levels of significance in their level form because their KPSS p-value is less than 0.05. This means we reject the null hypothesis that the variables are stationary, even though the KPSS null hypothesis assumes that the 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. KPSS after first differencing.

Variable	KPSS t-statistic	Critical value ADF (5%)	Critical value ADF (10%)	p-value	Order
FDI	0.221**	0.463	0.347	0.866	I(1)
GDP per capita	0.200**	0.463	0.347	0.073	I(1)
Inflation	0.231**	0.463	0.347	0.450	I(1)
Unemployment	0.111**	0.463	0.347	0.517	I(1)
Trade openness	0.243**	0.463	0.347	0.503	I(1)
Tax revenue	0.152**	0.463	0.347	0.453	I(1)

Note: **stationary after first difference.

Table 5 shows that variables stopped moving after the first difference. This means that the null hypothesis is true because the p-values are greater than 0.05, and the null hypothesis of stationarity around a trend is not thrown out.

4.2. Results of the Cointegration Test

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 was < 0.05% when checking the unrestricted cointegration rank test (Trace) from the Johansen E-Views output.

Table 6. Johansen cointegration test (Trace test).

Hypothesised no. of CE(s)	Eigenvalue	Trace-statistic	Critical-value 0.05	Prob**
(None)	0.788	123.689	95.753	0.000
(At most 1*)	0.672	81.706	69.818	0.004
(At most 2*)	0.597	51.538	47.856	0.021
(At most 3)	0.428	26.960	29.797	0.102
(At most 4)	0.263	11.867	15.494	0.163
(At most 5)	0.124	3.581	3.841	0.058

Note: * Rejection of the null hypothesis.
**stationary after first difference.

The testing for the cointegration was done using the Johansen Trace Test, as shown in Table 6. The trace test indicates 4 co-integrated 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 the *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.

Table 7. Error correction model (ECM).

Variable	Coefficient	Std. error	T-statistic	Prob.
C	-0.080	0.156	-0.518	0.009
D(TRADE-% OF-GDP)	0.082	0.044	1.854	0.016
D(UNEMPLOYMENT)	0.013	0.044	0.298	0.768
D(INFLATION)	-0.073	0.055	-1.321	0.099
D(GDP PER CAPITA)	0.001	0.000	2.320	0.029
D(FDI-%-OF-GDP)	0.077	0.086	0.892	0.032
RESID(-1)	-0.464	0.206	-2.247	0.035

Note: Adjusted R2=0.585557 DW-statistic=1.683176.

Table 7 shows the tests of the error correction model. The results of the error correction model show that GDP per capita, FDI, and trade openness are statistically significant as their respective probabilities are less than 5%, and these empirical results support the findings of Gupta (2007), who also found a positive association or relationship between FDI, GDP/capita and tax revenue performance in a study he conducted in sub-Saharan Africa over the period 1970-2010. Furthermore, Velaj and Prendi (2014) found that the country's FDI, GDP/capita, and exports positively and statistically significantly impact tax revenue performance in an Albanian study. Found a positive long-term relationship between tax revenue, trade openness, and per capita GDP in South Africa from 1980 to 2005. The findings of Beh et al. (2021), which found that both the level of openness and the FDI inflow had a positive impact on tax revenue but that GDP per capita had a negative impact, are consistent with the findings of the current studies. Furthermore, Tsaurai (2021) discovered that economic development and foreign direct investment had a favorable impact on tax revenue, but trade openness had a negative impact. Anware (2014) assessed the same issue, and the study confirmed the findings of this current study that trade openness, GDP per capita, and FDI significantly affect tax revenue performance. Hlongwane et al. (2022) found that tax revenue is positively affected by economic growth in the short run, while in the long run there is no effect. The current study, though it agrees with Hlongwane et al. (2022) that tax revenue performance is positively affected by economic growth in the short run, disagrees on the long-run period. The current study found that economic growth positively affects tax revenue performance both in the short-term and long-term. The study also revealed that unemployment and inflation have a negative impact on the country's tax revenue. Unemployment and inflation are not statistically significant because their probabilities are greater than 5%. Even if long-run equilibrium exists between variables, random shocks will push the variables out of their equilibrium (Gujarati, 2003). The obtained residual is negative and significant; therefore, we can accept the developed research model and conclude that it is suitable because long-term adjustment is possible. The coefficient -0. 463138 on the residual represents the rate of adjustment to equilibrium; the speed is 46. 41% per unit time. This is consistent with the studies done by Kubatova and Rihova (2014), who found that inflation and unemployment negatively impacted tax revenue in 12 developed nations from 1990–2010. Zee (2006) and Terefe and Teera (2018) conducted studies in Italy and East Africa, revealing that inflation negatively impacts tax revenue performance.

4.3. Results of Granger- Causality Test

This test was carried out to check the direction of the causal relationship between tax revenue performance and independent variables, which are inflation, GDP/capita, unemployment, FDI, and 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, as also used by Gujarati (2003).

Table 8. FDI and tax revenue causality.

Equation	Null hypothesis	F-statistic	Probability
Equation 1	Tax revenue is not caused by FDI	0.780	0.035
Equation 2	FDI is not caused by tax revenue	1.753	0.197

Table 8 shows that 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. 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 greater than *0.05*, we then fail to reject the null hypothesis. There is, therefore, unidirectional causality between FDI and tax revenue.

Table 9. GDP and tax revenue causality.

Equation	Null hypothesis	F-statistic	Probability
Equation 1	Tax revenue is not caused by GDP	1.844	0.001
Equation 2	GDP is not caused by tax revenue	0.923	0.345

Table 9 shows the granger causality between GDP and tax revenue. The 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 the p-value > 0.05; the causality is, therefore, unidirectional.

Table 10. Inflation and tax revenue causality.

Equation	Null hypothesis	F-statistic	Probability
Equation 1	Tax revenue is not caused by inflation	1.844	0.001
Equation 2	Inflation is not caused by tax revenue	0.923	0.345

As demonstrated in Table 10, the null hypothesis is not rejected, and we conclude that inflation does granger cause tax revenue since the corresponding p-value is < 0.05, while we cannot reject the null hypothesis that tax revenue does not granger cause inflation since the p-value > 0.05, therefore, there is unidirectional causality.

Table 11. Trade openness and tax revenue causality.

Equation	Null hypothesis	F-statistic	Probability
Equation 1	Tax Revenue is not caused by trade openness	0.086	0.770
Equation 2	Trade openness is not caused by tax revenue	1.361	0.254

We reject the null hypothesis in Table 11 for 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 12. Unemployment and tax revenue causality.

Equation	Null hypothesis	F-statistic	Probability
Equation 1	Tax revenue is not caused by unemployment	0.086	0.020
Equation 2	Unemployment is not caused by tax revenue	1.361	0.254

We reject the null hypothesis in Table 12 on unemployment since the corresponding *p-value is* < 0.05; however, we fail to reject that tax revenue does not cause unemployment since the corresponding *p-value is* $>$ 0.05. This suggests a unidirectional causality between these two variables.

4.4. Diagnostic Tests

Ocran (2013) emphasizes the importance of diagnostic testing in model evaluation to confirm parameter evaluation, as inefficient residuals can lead to biased parameters.

In this study, to test for serial correlation, the LaGrange multiplier (LM) test was used; the White test was used to test for heterogeneity; to check for specification errors (misspecification), a Ramsey reset was used; and for normality, Jarque-Bera was used. Tables 13 to 17 present the results of the diagnostic tests, and they all show good model fit; therefore, the results of this study may be reliable.

Table 13. Serial correlation (LM-test).

Breusch-Godfrey serial correlation			
F-statistic	1.007	Prob. F(2,24)	0.744
Obs.*R^2	2.685	Prob. $X^2(2)$	0.261

Note: * represents no presence of serial correlation: Durbin-Watson (DW) 1.978243.

For the autocorrelation tests, the researcher employed the LM test, as shown in Table 13. The probability value obtained, which is 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 were also used to test for autocorrelation.

Table 14. Q-statistic probabilities test e-views output.

AC	PAC	Q-stat.	Prob.*
0.106	0.106	0.349	0.555
0.057	0.046	0.453	0.797
-0.315	-0.330	3.777	0.287
-0.316	-0.284	7.282	0.122
-0.224	-0.170	9.115	0.105
-0.140	-0.234	9.867	0.130

AC	PAC	Q-stat.	Prob.*
0.025	-0.197	9.892	0.195
0.308	0.122	13.868	0.085
0.223	0.017	16.059	0.066
0.213	0.053	18.185	0.052
-0.092	-0.050	18.607	0.069
-0.169	-0.044	20.107	0.065

Note: * represents no presence of serial correlation.

The results of the Q-statistic probabilities, as demonstrated in Table 15, indicate no presence of serial correlation because all probability values were greater than 0.05. This confirms the results of the L-M test, and we therefore accept the null hypothesis that says there is no serial correlation.

Table 15. Heteroscedasticity.

Breusch-Godfrey serial correlation			
F-statistic	1.434	Prob. F (2,23)	0.249
Obs.*R^2	6.893	Prob. $X^2(5)$	0.228

Note: * represents that there no hetescedasticity.

The data's heteroscedasticity was tested using the White General Test, and the results, as demonstrated in Table 15, 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 it is concluded that it is homoscedastic. The data set has homoscedasticity, which leads to a good regression. Table 8 shows a *p-value >0.05*, which implies the model does not suffer from heteroskedasticity; hence, the conclusion is that it is a good model.

Table 16. Misspecification.

Test	Value	DF	Probability
F-statistic	0.531	(1, 25)	0.493
Likelihood ratio	0.673	1	0.493

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 that the p-value should exceed 5%, and as can be seen from the results in Table 16, which showed that the p-value obtained is > 0.05, this study failed to reject the null hypothesis.

Table 17. Normality test.

Test	Probability
Jarqu-Bera	0.721
P-Value	0.697

Table 17 shows the normality test results. To assess how model residuals are distributed, the J-B test was employed. The p-value (0.697007) obtained, which is > 5%, implies that a normal distribution is present in the residuals; hence, the null hypothesis cannot be rejected. The conclusion is that the developed model is normally distributed; hence, it is a good model.

Table 18. Chow breakpoint.

Probability	p-value	Test	p-value
Prob. F(6,17)	0.611	F-statistic	0.759
Prob. $X^2(6)$	0.331	Log likelihood ratio	6.884
Prob. $X^2(6)$	0.602	Wald-statistic	4.554

The results obtained from the Chow break-point test, as shown in Table 18 and Figure 4, show the study model is stable since the p-value obtained is > 0.05, and the following E-Views output graph below confirms that.

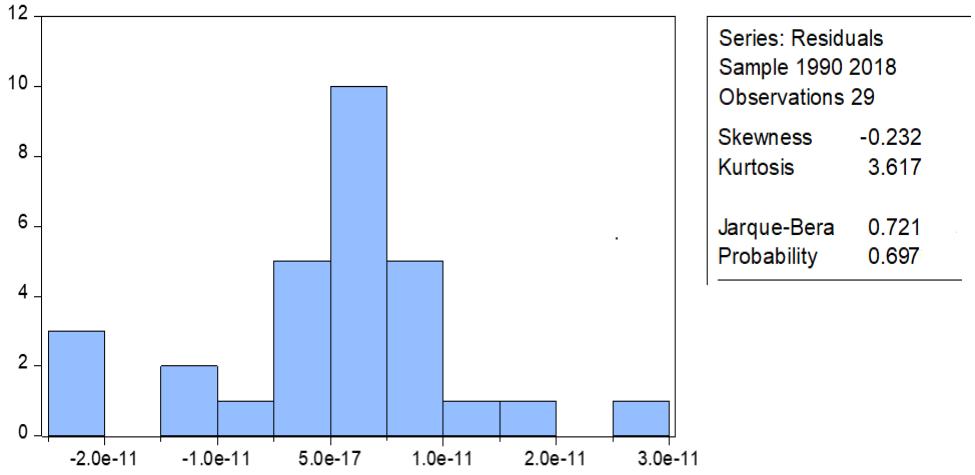

Figure 4. Chow break point test.

5. Conclusion and policy Recommendations

This paper investigates the determinants of tax revenue performance in South Africa using annual time series data from 1990–2018. The study confirms that variables are stationary, ensuring a non-spurious model. Diagnostic tests validate the model's stability and avoid autocorrelation, heteroskedasticity, or multicollinearity. The study identifies variables that positively and negatively influence tax revenue performance, with GDP per capita, foreign direct investment, and trade openness being statistically significant and positively related. Unemployment is statistically significant but negatively related, while inflation is negative but not statistically significant.

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, hence, 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 foreign investment opportunities but also protects existing investments; a favourable political and economic climate, therefore, 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 labour-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 will promote the accumulation of vital human capital, which in turn will be able to promote economic growth; and secondly, these two factors will create numerous job opportunities in the Republic. This will ultimately help South Africa's tax revenue performance in the future.

GDP per capita was noted to have a positive connection or relationship with the country's tax revenue performance; it is suggested that the South African government develop policies to boost GDP, which would improve tax revenue performance. To do so, South Africa should continue to invest in education and training, as improved 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 essential for GDP, and it is recommended that South Africa build good infrastructure as the economy will not grow significantly without investing in 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. The cruciality of tax revenue, however, is directly influenced by some of South Africa's characteristics in relation to corruption, administration, and allocative issues. Corruption and inappropriate governmental allocations must be urgently addressed for the country and its people to fully enjoy the benefits of the tax revenue collected.

6. Limitations and Suggestions for Further Study

The current research has limitations, including not incorporating recent data from 2019 and 2020, not considering explanatory variables like tax compliance, tax capacity, corruption, and urbanization, and using time series data. Future research should investigate corruption's impact on South Africa's tax revenue performance, incorporate other variables, use the Vector Autoregressive (VAR) Granger Causality Test for cointegration, and use panel data instead of time series data.

References

Ade, M., Rossouw, J., & Gwatidzo, T. (2018). *The effect of tax harmonisation in the Southern African development community on foreign direct investment.* ERSA Working Paper No. 694.

Aigner, D., Lovell, C. K., & Schmidt, P. (1977). Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics, 6*(1), 21-37. https://doi.org/10.1016/0304-4076(77)90052-5

Aizenman, J., & Jinjarak, Y. (2008). The collection efficiency of the value added tax: Theory and international evidence. *Journal of International Trade and Economic Development, 17*(3), 391-410. https://doi.org/10.1080/09638190802137059

Alfirman, A. C. (2003). The incidence of corporation income tax. *Journal of Political Economy, 70*(3), 215-240.

Allingham, M. G., & Sandmo, A. (1972). Income tax evasion: A theoretical analysis. *Journal of Public Economics, 1*(3-4), 323-338.

Anware, D. (2014). *Government revenue in Sub-Saharan Africa: Effects of economic policy and corruption*. IMF Working Paper No. 98/135.

Bayu, T. (2015). Analysis of tax buoyancy and its determinants in Ethiopia (Cointegration approach). *Journal of Economics and Sustainable Development, 6*(3), 182-201. https://doi.org/10.7176/JESD

Beh, K. K., Cheah, H. C., Chek, W. H., & Lim, Y. F. (2021). *The determinants of tax revenue in Malaysia*. Doctoral Dissertation, UTAR.

Chigome, J., & Robinson, Z. (2021). Determinants of tax capacity and tax effort in Southern Africa: An empirical analysis. *Applied Economics, 53*(60), 6927-6943. https://doi.org/10.1080/00036846.2021.1954593

Creswell, J., & Creswell, J. D. (2018). *Research design qualitative, quantitative, and mixed methods approaches* (5th ed.). Thousand Oaks, CA: Sage Publications.

De Clerk, B. (2020). *South African outlook during Covid-19 pandemic*. Retrieved from https://www.oecd.org/economy/south-africa-economic-snapshot/#:~:text=The%20economy%20is%20projected%20to,has%20held%20back%20economic%20activity

Desta, T., Reta, M., & Girma, B. (2022). Factors affecting tax revenue in Ethiopia: Autoregressive distributed lag approach. *Research Square*. https://doi.org/10.21203/rs.3.rs-1484380/v1

Eltony, M. (2012). *The determinants of tax effort in Arab countries*. Kuwait: Arab Planning Institute.

Frey, B. S., & Feld, L. P. (2002). *Deterrence and morale in taxation: An empirical analysis*. Public Finance CESIFO Working Paper No: 760.

GlobalData. (2020). *Real GDP growth (%) forecast for major African economies, 2021F*. Retrieved from https://www.globaldata.com/morocco-kenya-ghana-fastest-growing-major-economies-africa-2021-says-globaldata/

Gujarati, D. N. (2003). *Basic econometrics*. New York: McGraw–Hill, International Edition.

Gupta, A. (2007). Determinants of tax revenue efforts in developing countries. *International Monetary Fund, Working Paper, 7*(184), 1-39. https://doi.org/10.5089/9781451867480.001

Hamid, P., & David, O. (2011). *Impact of taxation on foreign direct investment in Nigeria*. Retrieved from http://www.doublegist.com/impact-taxationforeign-direct-investment-Nigeria

Hlongwane, N. W., Olebogeng, D., & Sithole, M. S. (2022). Determinants of taxation in South Africa: An econometric approach. *Journal of Economics and Management, 2*(16), 123-140.

IMF. (2018). *Current challenges in revenue mobilization improving tax compliance*. Washington DC: International Monetary Fund.

IMF. (2019). *International monetary fund, annual report*. Retrieved from https://www.imf.org/external/pubs/ft/ar/2019/eng/

Karagöz, K. (2013). Determinants of tax revenue: Does sectorial composition matter? *Journal of Finance, Accounting & Management, 4*(2), 50-63.

Kelly, N., & Baas, R. (2010). Why do more open economies have bigger governments? *Journal of Political Economy, 106*, 997-1032. https://doi.org/10.1086/250038

Kmenta, J. (1968). *Elements of econometrics* (2nd ed.). New York: Macmillan Publishing Co.

Kubatova, B., & Rihova, U. (2014). *Taxation compliance burden for small business in South Africa*. Master's Dissertation, University of Pretoria, Pretoria.

Longoni, A. F. (2011). Tax and spend, or spend and tax? An inquiry into the Turkish budgetary process. *Southern Economic Journal, 64*(4), 940-956.

Mahdavi, S. (2008). The level and composition of tax revenue in developing countries: Evidence from unbalanced panel data. *International Review of Economics & Finance, 17*(4), 607-617. https://doi.org/10.1016/j.iref.2008.01.001

Mankiw, J. D., Weinzierl, M., & Yagan, D. (2012). Federal government expenditure and revenue in the early years of the republic: Evidence from 1972-1860. *Journal of Macroeconomics, 13*(1), 133-155.

Masiya, M., Chafuwa, C., & Donda, M. (2015). Determinants of tax revenue in Malawi. *Institutions & Transition Economics: Macroeconomic Issues eJournal, 14*(2), 144-167. http://dx.doi.org/10.2139/ssrn.2887852

Mohr, P. (2014). *Economics for South African students* (5th Edition: ed.). Pretoria: Van Schaik.

Muibi, O., & Sinbo, O. (2013). Macroeconomic determinants of tax revenue in Nigeria (1970-2011). *World Applied Sciences Journal, 28*(1), 27-35.

Ocran, Z. (2013). *A cross country analysis of tax performance with special focus on Pakistan's tax effort*. Master's Degree Project, Swedish Business School at Orebro University.

OECD. (2019). *General statistics for developing countries*. Retrieved from https://doi.org/10.1787/f8d7880d-en

Park, R. E. (1967). Estimation with heteroscedastic error terms. *Econometrica, 34*(4), 888. https://doi.org/10.2307/1910108

Prowd, R. S., & Kollie, G. B. (2021). Determinants of tax revenue in Liberia: An empirical investigation. *African Journal of Economic Review, 9*(2), 62-85.

Stats, S. (2018). *Quarterly bulletin*. Retrieved from http://www.statssa.gov.za/?gclid=EAIaIQobChMI6qXCi6f68gIV0OvtCh0O3g9WEAAYASAAEgIRVPD_BwE

Stats, S. (2020). *World meters*. Retrieved from https://www.worldometers.info/world-population/south-africa-population/#:~:text=South%20Africa%202020%20population%20is,of%20the%20total%20world%20population

Tarawalie, A. B., & Hemore, S. (2021). Determinants of tax revenue in Sierra Leone: Application of the ARDL framework. *Journal of Economics and Management Sciences*, *4*(4), p25-p25. https://doi.org/10.30560/jems.v4n4p25

Terefe, K. D., & Teera, J. (2018). Determinants of tax revenue in East African countries: An application of multivariate panel data cointegration analysis. *Journal of Economics and International Finance*, *10*(11), 134-155. https://doi.org/10.5897/jeif2018.0924

Tilahun, A., & Yidersal, D. (2014). Determinants of tax compliance behavior in Ethiopia: The case of Bahir Dar City taxpayers. *Journal of Economics and Sustainable Development*, *5*(15), 226-273.

Tsaurai, K. (2021). Determinants of trade openness in transitional economies: Does the complementarity between foreign direct investment and human capital development matter? *International Journal of Economics and Business Administration*, *10*(1), 318-330. https://doi.org/10.35808/ijeba/675

Velaj, E., & Prendi, L. (2014). Tax revenue-The determinant factors-The case of Albania. *European Scientific Journal*, *10*(15), 167-180.

Workineh, J. (2016). Determinants of tax revenue in Ethiopia Johansen co-integration approach. *International Journal of Business, Economics and Management*, *3*(6), 69-84.

Zee, H. H. (2006). A note on global taxes and aid for development. *Journal of Economic Studies*, *33*, 5-11.