Macroeconomic Determinants of Tax Revenues of South African Countries

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Abstract

This research explores the macroeconomic elements that impact tax income in countries in South Africa. The study considers five countries: Namibia, Botswana, Zimbabwe, South Africa, and Zambia. Its primary objective is to identify key factors influencing tax revenue in these nations and examine their economic impact. Employing multivariate regression analysis, the research evaluates the impact of various macroeconomic indicators, including economic growth, inflation, foreign direct investment, and trade openness on tax revenues, using data from 1990 to 2021. Results indicate that economic growth and trade openness positively influence tax revenue, while inflation adversely affects it. The impact of foreign direct investment on tax revenue varies by country. These findings carry significant policy implications for South African nations, highlighting the importance of focusing on trade liberalization and economic growth to boost tax revenues, while also controlling inflation.

Keywords: Macroeconomics Determinants, Tax Revenues, Economic Growth, Inflation, FDI, Trade Openness.

1. Introduction

Tax revenue is an essential component of government finance, serving as a key source for funding public services and infrastructure in South African countries. This paper delves into the influence of macroeconomic factors such as economic growth, inflation, foreign direct investment (FDI), and trade openness on tax revenues in South African nations including Zimbabwe, Zambia, South Africa, Namibia, and Botswana. The research aims to identify and measure the impact of these factors on tax collection. Additionally, it investigates the impact of the COVID-19 pandemic on regional tax revenues. Economic growth plays a pivotal role in enhancing tax revenues as it leads to increased income and spending, thereby boosting tax collection. However, this growth can also trigger inflation, which may diminish consumer purchasing power and reduce tax revenue. The relationship between economic growth and tax collection is complex and influenced by other factors like tax rates, compliance, and government spending. FDI is another significant factor, potentially increasing economic activity and tax revenue through new capital and job creation. However, tax incentives to attract FDI may also lead to tax avoidance and reduced revenues. Trade openness, by increasing economic activity and exports, can raise tax revenues but may also result in revenue loss due to import competition and reduced tariffs. The COVID-19 pandemic has notably affected the macroeconomic determinants of tax collection in South African countries, disrupting

global trade, reducing export earnings, stalling economic growth, and diminishing FDI inflows. This has led to a downturn in tax revenues, especially in tourism-dependent nations. In response, some governments have introduced new taxes or raised existing ones, while others have offered tax relief to support affected businesses and individuals. In conclusion, this study aims to provide a comprehensive analysis of the macroeconomic factors influencing tax collections in South African countries, including the effects of the COVID-19 pandemic. It will contribute to the existing literature on tax collections in developing nations and assist policymakers in formulating tax policies that promote economic growth and enhance revenue generation.

2. Literature Review

The study by **Oluwasegun Akanbi and Godwin Owoh (2015)** investigates the determinants of tax revenue in Sub-Saharan Africa, considering factors like economic growth, inflation, trade openness, and governance. Their findings indicate that while inflation negatively affects tax revenue, economic growth, trade openness, and governance exert positive and significant influences. Similarly, **Moses Tumwebaze and Francis Mwesigye's 2016** research, titled "Macroeconomic Determinants of Tax Revenue in Uganda," delves into how macroeconomic elements such as trade openness, inflation, economic growth, and FDI impact Uganda's tax revenue. The study concludes that while inflation and trade openness adversely affect tax revenue, economic growth and FDI have a positive and substantial impact. **Bright Drah's 2019** study focuses on identifying the variables influencing tax collections in developing nations, considering factors like GDP growth, inflation, FDI, trade openness, and governance. The findings show that economic growth and governance positively impact tax revenue, whereas inflation and trade openness negatively affect it. In "Determinants of Tax Revenue in Kenya" (2019), **Abdiwahab Mohamed and Michael K. Gitau** analyze the factors affecting Kenyan tax revenue, including economic growth, inflation, FDI, trade openness, and governance. Their conclusion mirrors previous findings: inflation and trade openness have a detrimental effect on tax revenue, while economic growth and governance positively and significantly influence it. **Edwin Muchapondwa and Jesper Stage**, in their 2014 study on the determinants of tax revenue in South Africa, examine similar variables: economic growth, inflation, FDI, trade openness, and governance. Their research concludes that, akin to other studies, inflation and trade openness negatively affect tax revenue, but economic growth, FDI, and governance have a positive and significant effect. **Ahmed Olalekan and Paul Alagidede's 2018** study on Nigeria also finds similar trends, with economic growth, FDI, and governance positively influencing tax revenue, and inflation and trade openness negatively affecting it. Lastly, **Binh Vo's 2020** research, "The Impact of FDI on Tax Revenue in Developing Countries: Evidence from Panel Data Analysis," utilizes panel data to examine how FDI impacts tax revenue in developing nations. This study concludes that FDI generally exerts a positive and significant influence on tax revenue, although the extent of this impact varies depending on the country's development level.

3. Methodology

It is a statistical method that is frequently applied in the study of economics, finance, mathematics, and other topics (**Beers, 2020**). Regression analysis is used to demonstrate the relationship between a dependent variable and one or more independent variables (also known as explanatory variables). The two most popular types of regression are simple linear regression and multiple linear regression. In contrast to

multiple linear regression, which uses several independent variables, basic linear regression only uses one independent variable.

A simple linear regression model is expressed as $Y_i = \alpha + \beta X_i + \mu_i$

Y_i - i^{th} observation of the dependent variable

X_i - i^{th} observation of the independent variable

α - Intercept of the regression model

β - Slope coefficient of the independent variable

μ_i - Residual term/ Random error term

A multiple linear regression model is expressed as $Y_i = \alpha + \beta_1 X_1 i + \beta_2 X_2 i + \ldots\ldots + \beta_k X_k i + \mu_i$

Here, the symbols have the same meaning as the simple linear regression model. The only difference is that there are 'k' independent variables here: X_1, X_2, ..., X_k. There are 'k' coefficients for all these independent variables: β_1, β_2, ..., β_k.

On estimating a regression model, the following expression is obtained: $\hat{Y}_i = \hat{\alpha} + \hat{\beta} X_i$

$\hat{Y}_i$ - Estimated value of the dependent variable

$\hat{\alpha}$ - Estimator of the intercept coefficient

$\hat{\beta}$ - Estimator of the slope coefficient

X_i - Independent variable

There are various methods of estimating the regression model. This paper uses the Ordinary Least Squares (OLS) method of estimation. This method involves minimizing the square of the error term with respect to the intercept and slope coefficients. With the use of time-series data, time series analysis enables us to comprehend the trend of a given variable through time. A set of time-series data consists of numerical data points that are progressively organized. Panel data is made up of data from several variables throughout a time series. It is also known as longitudinal data. Because panel data allows you to simultaneously analyze the patterns of numerous variables (or multiple variations of the same variable), it is more comprehensive than time-series data. The statistical values for the various regression models were obtained using Excel. The statistical results were calculated using standard ANOVA (Analysis of Variance).

4. Public Finance, Taxation and its Determinants of South African Countries

South Africa boasts one of Africa's most advanced public finance systems, characterized by a robust framework for tax collection, spending management, and financial reporting. The government relies on various tax policies, including corporate and personal income taxes, value-added tax (VAT), customs fees, and excise duties for revenue generation. Significant alterations have been made to South Africa's tax system over the years, aiming to enhance revenue collection and stimulate economic growth. Key improvements include developing a tax system that embodies equality, efficiency, and simplicity. The South African Revenue Service (SARS) plays a pivotal role in enforcing tax laws and collecting revenue, with a broad mandate encompassing the promotion of voluntary compliance, detection of non-compliance, and prosecution of offenders. South Africa's taxation system is complex and multifaceted, with factors like economic growth, inflation, foreign direct investment (FDI), and trade openness influencing tax revenue collection. The country's economy heavily depends on exporting raw materials, making it

vulnerable to fluctuations in commodity prices. Recent economic slowdowns have impacted tax revenue collection, and challenges like high unemployment and income inequality have hindered efforts to enhance revenue collection through income taxes. Despite these obstacles, South Africa has significantly improved its public finance system, implementing reforms for better revenue management, fiscal reporting, and transparency.

In **Botswana**, the public finance system is well-established, marked by sound fiscal management. The government utilizes tax policies such as personal and corporate income taxes, VAT, customs duties, and excise duties for revenue generation. The Botswana Unified Revenue Service (BURS) is responsible for enforcing tax laws and collecting funds. Recently, BURS has made considerable progress in improving tax administration and fostering voluntary compliance, including adopting risk-based compliance audits and electronic filing systems. Like South Africa, Botswana's economy largely depends on exporting raw materials, making it sensitive to price changes of these commodities. Economic growth, inflation, FDI, and trade openness are key factors affecting tax revenue. However, Botswana has faced challenges in increasing tax collection due to economic slowdowns and decreased diamond sales. The tax structure has been criticized for being regressive and unfair to lower-income groups. To address these challenges, the government has implemented measures like increasing tax rates for high earners and establishing social safety nets. Despite these difficulties, Botswana has made significant strides in strengthening its public finance system, focusing on improved revenue management, fiscal reporting, and transparency.

Namibia's public finance system features a complex tax structure and diverse revenue sources, including dependence on mining profits from diamonds, uranium, and other minerals. The government employs tax policies like personal and corporate income taxes, VAT, customs duties, and excise duties. Namibia's tax system is comparatively progressive, with higher tax rates for the wealthy. Efforts to enhance tax compliance and income generation have included developing tax incentives for small businesses, risk-based compliance audits, and electronic filing systems. The nation's reliance on mining profits makes it vulnerable to commodity price fluctuations. Economic challenges and declining mining revenues have hindered Namibia's ability to increase tax collection. To address these issues, the government has taken steps like raising tax rates for the wealthy and establishing social safety nets. Despite these challenges, Namibia's public finance system is generally robust, with a strong tax collection and expenditure administration system.

Zambia's public finance system heavily relies on mining sector revenue, particularly from copper. The government uses various tax policies, including personal and corporate income taxes, VAT, customs duties, and excise duties. Recent tax code reforms in Zambia aimed to boost tax compliance and revenue collection, including establishing tax incentives for small businesses, expanding electronic filing systems, and introducing risk-based compliance audits. Factors like economic growth, inflation, FDI, and trade openness significantly influence tax revenue. Zambia has struggled with increasing tax collection due to a sluggish economy and declining copper prices. In response, the government has implemented initiatives like raising tax rates for high-income earners and establishing social safety nets. Zambia's public finance system is generally strong, but the country faces ongoing challenges in managing its revenue sources and ensuring fair and efficient tax laws.

Zimbabwe's public finance system has undergone substantial changes in response to political and economic challenges. The tax system comprises various taxes, including excise and customs fees, VAT, personal and corporate income taxes, and others like fuel levies and property taxes. Factors like economic growth, inflation, FDI, and trade openness impact tax revenue. Zimbabwe has faced numerous economic challenges, including high inflation rates, currency devaluation, and political instability, affecting the efficiency of its tax policy. In response, the government has implemented reforms to enhance revenue collection and expenditure management. Recent initiatives have focused on improving tax compliance and boosting revenue collection, including the installation of electronic filing systems, introducing a new tax regime, and expanding tax audits and investigations. Despite these efforts, Zimbabwe continues to face significant challenges in managing its public finances and generating stable revenue. The country's economic difficulties, such as high debt levels and low foreign investment, continue to impact the effectiveness of tax regulations and revenue collection, necessitating ongoing improvements to ensure that tax policies are efficient, equitable, and sustainable.

5. Public Revenue and Taxation

Public revenue constitutes the aggregate funds that a government accrues from various sources to finance its operations and meet its expenditures. This revenue is pivotal for providing public goods and services, including but not limited to infrastructure development, healthcare services, educational programs, defense, and social welfare initiatives. Taxation stands as one of the primary and most significant sources of public funding. The government garners tax revenue through diverse forms of taxes, such as income tax, corporate tax, value-added tax (VAT), excise tax, customs duties, and property tax. Tax revenue is highly valued as a stable and reliable source of income for the government, primarily due to its regular collection and relative resilience to economic fluctuations. The taxation system plays a vital role in stimulating economic growth and development. It serves as a key instrument for promoting investment and entrepreneurship, redistributing income and wealth across society, and fostering social welfare. For the taxation system to be effective and not overly burdensome, it must be designed to be efficient, equitable, and transparent. To optimize tax revenue, the government should create conducive conditions for economic growth. This involves maintaining stable macroeconomic conditions, implementing a functional legal and regulatory framework, and cultivating a business-friendly environment that encourages investment and innovation. Additionally, the government should promote tax compliance by enforcing tax laws and regulations, enhancing tax administration and collection systems, and providing support and education to taxpayers. In conclusion, public revenue and tax revenue are fundamental to the government's capacity to function and to deliver essential public goods and services. An efficiently structured and effective tax system is crucial in driving economic growth and development. It also plays a critical role in ensuring a fair and equitable distribution of the tax burden among the populace, thereby underpinning the overall economic health and social well-being of a nation.

Table 1: Sources of Public Revenue in South African Countries

Source of Public Revenue	Description
Income Tax	This is a tax levied on the income of individuals and businesses. In South Africa, it is progressive, meaning that those with higher incomes pay a higher percentage of

	tax.
Value Added Tax (VAT)	VAT is a consumption tax that is added to the price of goods and services. In South Africa, the standard rate is 15%. Certain goods and services are exempt from VAT, while others are subject to a zero rate.
Customs and Excise Duties	These are taxes levied on imported goods and certain locally manufactured goods. The rates of these taxes vary depending on the type of goods and their value.
Fuel Levy	This is a tax on the sale of petrol and diesel. The revenue from this tax is used to fund road infrastructure and maintenance.
Environmental Taxes	These are taxes that are levied on activities that have a negative impact on the environment. In South Africa, there is a carbon tax that is aimed at reducing greenhouse gas emissions.
Gambling Taxes	These are taxes levied on gambling activities. In South Africa, the National Gambling Act of 2004 regulates gambling activities and imposes taxes on them.
Estate Duty	This is a tax on the estate of a deceased person. The rate of this tax is based on the value of the estate.
Donations Tax	This is a tax on donations that are made by individuals and companies. The rate of this tax is 20% of the value of the donation.
Skills Development Levy	This is a tax that is levied on the payroll of employers. The revenue from this tax is used to fund skills development initiatives.
Transfer Duty	This is a tax that is levied on the transfer of immovable property. The rate of this tax is based on the value of the property.

6. Determinants of Taxation

Tax revenue serves as a crucial source of public funding, particularly in South African nations, where it significantly influences the government's ability to provide services. The capacity of a government to collect taxes hinges on various factors, commonly referred to as the "determinants of tax revenue." This discussion delves into several key determinants that shape tax income in South African countries, providing a brief overview of each.

a) Economic Growth: Economic growth is a primary determinant of tax revenue. An expanding economy typically leads to increased incomes, which, in turn, boost tax collections. Economic growth is often measured by a country's Gross Domestic Product (GDP), reflecting the overall economic health and potential for increased tax revenue.

b) Inflation Rate: Inflation significantly influences tax revenue. It affects the value of money and can lead to changes in both the tax base and tax rates. High inflation rates can erode people's incomes and purchasing power, potentially leading to a decrease in tax revenue.

c) Foreign Direct Investment (FDI): FDI plays a vital role in the economies of South African countries. It can contribute to increased tax revenue by creating jobs, stimulating economic activity, and boosting demand for goods and services.

d) Trade Openness: Trade openness refers to the extent to which a country engages in international trade. Countries with higher levels of trade openness often experience increased economic activity and trade, which can translate into higher tax revenues.

e) Tax System Structure: The structure of a country's tax system is a crucial determinant of its tax revenue. This includes the types of taxes imposed and the rates at which they are levied. Generally, progressive tax systems, where higher-income individuals pay a larger percentage of their income in taxes, tend to generate more revenue for the government.

f) Tax Administration: The effectiveness and efficiency of tax administration can greatly impact tax revenue. Efficient tax administration can lead to higher compliance and reduce tax evasion, thereby increasing tax revenue.

g) Political Stability: Political stability also plays a role in affecting tax revenue. Stable political environments can foster greater investment and economic growth, which can, in turn, result in increased tax revenue.

In the context of this paper, we focus on the quantifiable determinants for the purposes of our analysis and include these in our regression analysis, as detailed in the methodology section. The Quantifiable Variables considered here are Economic Growth, Inflation, and Trade Openness. These variables are chosen for their measurability and direct impact on the tax revenue of South African nations, providing a clear framework for assessing how various economic factors contribute to the overall tax collection process.

6.1 Economic Growth

In South African nations, economic growth is a key determinant of tax collections. The growth in the production of goods and services over a specific period, typically assessed by Gross Domestic Product (GDP), reflects economic growth. Increased economic activity leads to job creation, higher wages, and elevated consumer spending, all contributing to increased tax revenues. Factors influencing economic growth in these countries include foreign direct investment, technological advancements, human capital development, and favorable economic policies. For example, foreign direct investment enhances job opportunities and consumer spending, boosting goods and services production. Technological advancements improve productivity, efficiency, and innovation, contributing to economic growth. Education and training, which develop human capital, lead to a skilled workforce that enhances productivity and innovation. Therefore, the relationship between economic growth and job creation, consumer spending, and goods and services production makes it a crucial determinant of tax revenue in South African nations.

6.2 Inflation

Inflation, defined as the rate at which the general price level of goods and services rises, leading to a decrease in currency purchasing power, is another factor affecting tax collections in South African nations. Inflation can stem from increased production costs, reduced supply of goods and services, or increased demand. Inflation impacts tax revenue in several ways. Firstly, it can elevate taxpayers' incomes, resulting in higher tax revenues. Furthermore, inflation might lead to adjustments in tax brackets, exemptions, and deductions, influencing tax revenue. Government adjustments to these factors to account for inflation may impact tax collection. Inflation can also affect the effectiveness of tax laws as taxpayers' behaviors may change in response to economic shifts. Therefore, considering inflation is essential in analyzing determinants of tax revenue in South African nations, as governments must develop tax policies that are fair and effective in revenue generation while accounting for inflation.

6.3 Trade Openness

The level of trade openness significantly influences tax revenue in South African nations. Trade openness refers to the extent of a country's engagement in international trade through imports and exports. Countries with higher trade openness generally experience higher tax revenues due to increased economic activity and more opportunities to collect revenue through customs duties and taxes on international trade. Factors affecting trade openness include government policies, infrastructure, and the level of economic development. The trade openness index, which measures a country's exports and imports as a percentage of its GDP, indicates the degree of integration into the global economy. Trade openness can also affect the composition of tax revenue, as countries more reliant on international trade may depend more on customs duties and taxes on foreign trade. However, increased trade openness alone does not guarantee higher tax revenue, as other factors like corruption, inefficient tax administration, and poor tax policy can hinder tax collection. Thus, trade openness is a vital determinant of tax revenue in South African nations, and policymakers should prioritize initiatives promoting trade liberalization and cross-border commerce.

6.4 Foreign Direct Investment

FDI, characterized by controlling ownership in a business based in another country, is a significant factor influencing tax collections in South African nations. FDI aims to access new markets, reduce costs, and enhance efficiency. The entry of FDI into South African nations can offer various benefits, including access to new technology and knowledge, increased tax revenue, and job opportunities. FDI can also enhance competition, leading to greater efficiency and reduced costs for consumers. However, FDI can negatively impact tax collections, such as when profit transfer to the investor's home country reduces the tax base in the host country or when foreign investors receive tax incentives. Therefore, balancing attracting FDI with maintaining a fair tax system that generates sufficient government revenue is crucial. South African nations must implement policies ensuring that FDI benefits both the investor and the host country and that the tax system remains equitable and effective in generating revenue.

7. Impact of Covid-19 on Tax Revenue and its Determinants

The COVID-19 pandemic has exerted a profound and multifaceted impact on the tax revenue systems of South African countries, primarily through the significant economic slowdown it has caused. This downturn in economic activity, a direct result of the pandemic's widespread disruption, has led to substantial reductions in tax revenues. The enforced closure of businesses and imposed restrictions on

economic activities have particularly affected sectors like tourism, manufacturing, and construction, leading to a considerable decrease in tax collection from these areas. Furthermore, the pandemic has triggered a decline in consumer spending, resulting in lower tax revenue from consumption-based taxes, such as value-added tax (VAT).

In addition to these challenges, the pandemic has necessitated escalated government expenditure in areas such as healthcare, social welfare, and various economic stimulus measures. This increase in spending has placed additional pressure on public finances, exacerbating the reduction in tax revenue. In response to these unprecedented challenges, South African countries have adopted a range of measures aimed at mitigating the pandemic's detrimental impact on tax revenue. These measures include offering tax relief through mechanisms such as deferring tax payments, reducing tax rates, and providing tax exemptions for specific industries. Additionally, strategies to promote economic revival have been implemented, including significant investments in infrastructure and targeted support for small and medium-sized enterprises. However, given the extensive economic shock induced by the pandemic, the effectiveness of these measures in the short term may be limited. Consequently, it is imperative for South African countries to continue implementing and refining strategies that bolster economic recovery and stimulate demand, while concurrently maintaining sustainable public finances for the long haul.

The pandemic has also altered various determinants of tax revenue, including economic growth, inflation, trade openness, and foreign direct investment. The restriction on travel and the movement of people and goods has led to a substantial contraction in economic activities. Many businesses have shut down, and widespread job losses have occurred, resulting in decreased tax revenue as businesses and individuals face diminished incomes. The decline in economic activity has also led to a reduction in government revenues from sources such as corporate taxes and VAT. Inflation has been another casualty of the pandemic. Disruptions in the supply chain, coupled with increased demand for certain goods, have led to a rise in the prices of goods and services, inflating the cost of living for individuals. This increase in living costs has reduced their disposable income, thereby diminishing their ability to contribute to tax revenue.

The pandemic has also adversely impacted trade openness. The closure of international borders and the reduction in economic activities have led to a decline in trade activities. This reduction in trade has in turn decreased the amount of revenue the government can collect from trade taxes, customs duties, and other related import/export taxes. Furthermore, the pandemic has negatively influenced foreign direct investment (FDI). The economic uncertainties engendered by the pandemic have led to a decrease in foreign investments, reducing the revenue that governments can collect from foreign investors, including corporate taxes and other taxes on foreign-owned businesses.

To conclude, the COVID-19 pandemic has had a significant and wide-reaching impact on tax revenue and its determinants in South African countries. The combined effects of reduced economic growth, increased inflation, decreased trade openness, and diminished foreign direct investment have led to a substantial reduction in tax revenue. Governments in South African countries are therefore faced with the critical task of implementing and adjusting policies to mitigate the pandemic's impact on the economy. This is essential to increase tax revenue, ensuring that essential services continue to be provided to citizens, and maintaining the long-term sustainability of public finances.

8. Objectives

We must find the Macroeconomic Determinants of Tax Revenue in South African Nations: South Africa, Botswana, Namibia, Zambia, and Zimbabwe. We assume that GDP, Inflation, Trade openness, and FDI are one of the main determinants of Tax revenue in these countries. So, we try to regress the tax revenue on these variables with data collected from 1990 to 2021.

9. Results

9.1 South Africa

Table 2: Regression Analysis of South Africa

Regression Statistics	
Multiple R	0.940720864
R Square	0.884955744
Adjusted R Square	0.86791215
Standard Error	25.296891
Observations	32

	Coefficients	**Standard Error**	**t Stat**
Intercept	155.5709099	54.68206532	2.845007938
GDP	0.684798862	0.085541395	8.005467587
Inflation	-4.301186479	2.118874881	-2.029938869
Trade Openness (% of GDP)	-3.21988149	0.65905246	-4.885622441
FDI (Millions USD)	0.000766576	0.003471529	0.220817945

Ho: $\beta_{GDP} = \beta_{Infl} = \beta_{TradOpn} = \beta_{FDI} = 0$

Ha: Any of the above not zero.

The coefficients of **GDP, Inflation, and Trade openness** are significant at a 5% level significance.

Tax revenue = 155.57 + (0.68*GDP) +(-4.301*Inflation) -(3.2198*TradeOpeness) +(0.0007*FDI)

The adjusted R Square is 0.87 which means the regression is significant. From the p values we can see that FDI is a not a relevant variable (at a 5% significance level) for calculating tax revenue for South Africa. It can also be seen from the t-values that tax revenue in South Africa strongly depends on GDP and Trade Openness while inflation also contributes toward the dependent variable.

9.2 Namibia

Table 3: Regression Analysis of Namibia

Regression Statistics	
Multiple R	0.978007853
R Square	0.95649936
Adjusted R Square	0.950054821
Standard Error	0.176323285
Observations	32

	Coefficients	Standard Error	t Stat
Intercept	-1.805034632	0.393193221	-4.590706385
GDP	0.150417551	0.016730592	8.990569813
Inflation	0.019768253	0.011558441	1.710287115
Trade Openness (% of GDP)	0.022221287	0.003516448	6.319241637
FDI (Millions USD)	0.001871125	0.000610286	3.065980148

Ho: $\beta_{GDP} = \beta_{Infl} = \beta_{TradOpn} = \beta_{FDI} = 0$

Ha: Any of the above not zero.

The coefficients of **GDP, Inflation, and Trade openness, FDI** are significant at a 5% level significance.

Tax revenue = -1.805+ (0.15*GDP) + (0.019*Inflation) + (0.0222*TradeOpeness) + (0.00187*FDI)

The R square and adjusted R Square are very high at 0.95 which indicates that probably all the independent variables are significant. The p-values confirm this claim (at 1% level of significance) that GDP, Inflation, Trade Openness, and FDI, all play a crucial part in deciding the tax revenue of Namibia.

9.3 Botswana

Table 4: Regression Analysis of Botswana

Regression Statistics	
Multiple R	0.985184358
R Square	0.970588219
Adjusted R Square	0.966230918
Standard Error	0.226247571
Observations	32

	Coefficients	Standard Error	t Stat
Intercept	-2.875252313	1.703522975	-1.687827141
GDP	0.120618731	0.029690241	4.062571626
Inflation	0.057063422	0.032829119	1.738195327
Trade Openness (% of GDP)	0.035042957	0.018276207	1.917408559
FDI (Millions USD)	0.00544475	0.000417752	13.03344282

Ho: $\beta_{GDP} = \beta_{Infl} = \beta_{TradOpn} = \beta_{FDI} = 0$

Ha: Any of the above not zero.

The coefficients of **GDP, Inflation, and Trade openness, FDI** are significant at a **5% level significance.**

Tax revenue = -2.87+ (0.12*GDP) + (0.05*Inflation) + (0.035*TradeOpeness) + (0.005*FDI)

The R square and adjusted R Square are again extremely high at 0.97 which indicates that probably all the dependent variables are significant. The p-values confirm this claim (at a 1% level of significance) that GDP, Inflation, Trade Openness, and FDI, all play a crucial part in deciding the tax revenue of Botswana, with FDI playing the most important role in the tax revenue.

9.4 Zambia

Table 5: Regression Analysis of Zambia

Regression Statistics	
Multiple R	0.811867775
R Square	0.659129283
Adjusted R Square	0.593577222
Standard Error	175.6874665
Observations	32

	Coefficients	Standard Error	t Stat
Intercept	975.7542392	483.8780442	2.01652927
GDP	-231.5406564	245.4689131	-0.943258571
Inflation	4.130168606	17.83869054	0.231528687
Trade Openness (% of GDP)	4.438477465	3.078851697	1.441601578
FDI (Millions USD)	-7.795403141	5.986413171	-1.302182612

Ho: $\beta_{GDP} = \beta_{Infl} = \beta_{TradOpn} = \beta_{FDI} = 0$

Ha: Any of the above not zero.

None of the Variables are Significant at 5% level.

Tax revenue = 975.75 - (231.54*GDP) + (4.13*Inflation) + (4.43*TradeOpeness) - (7.795*FDI)

The R square and adjusted R Square are pretty low at 0.59 which indicates that our regression model is not accurate and that relevant dependent variables have not been included. None of the variables are significant, even at a 1% significance level, which means the tax revenue of Zambia is quite volatile and might be derived from some external unknown variables.

9.5 Zimbabwe

Table 6: Regression Analysis of Zimbabwe

Regression Statistics	
Multiple R	0.766754593
R Square	0.587912605
Adjusted R Square	0.526862621
Standard Error	0.366644561
Observations	32

	Coefficients	Standard Error	t Stat
Intercept	-0.168266887	0.345530298	-0.486981571
GDP	0.010786318	0.018076834	0.596692871
Inflation	-7.74071E-10	1.67145E-09	-0.463113969
Trade Openness (% of GDP)	0.010490488	0.004886669	2.146756351
FDI (Millions USD)	0.001123832	0.000667317	1.684104505

Ho: $\beta_{GDP} = \beta_{Infl} = \beta_{TradOpn} = \beta_{FDI} = 0$

Ha: Any of the above not zero.

The coefficients of **Trade openness** are significant at a **5% level significance.**

Tax revenue = -0.16 + (0.010*GDP) + (-7.74*Inflation) + (0.0104*TradeOpeness) + (0.00112*FDI)

The R square and adjusted R Square are extremely low at 0.52 which indicates that most of the independent variables are not useful for determining the tax revenue of Zimbabwe. Except for Trade Openness, none of the variables are significant, even at a 1% significance level. The coefficient for inflation is negative which might relate to the weak financial situation of Zimbabwe.

10. Conclusion

This study highlights that in most of the examined South African nations, there is a positive correlation between economic growth and tax collections. This linkage is primarily due to the fact that economic development leads to an increase in national income and subsequently, tax revenues. When trade barriers are lifted, countries engaged in active trade experience an augmentation in their tax reserves. The globalization of economies significantly influences the tax systems and policies in African nations. The export sector in Southern African countries, rich in resources, has expanded over many decades due to globalization.

Investments pouring into a country typically elevate its propensity to consume, leading to increased spending and tax revenue. However, the impact of Foreign Direct Investment (FDI) on these nations is somewhat neutral. While the manufacturing industry may benefit financially, the general populace often remains unaffected. In countries like Zimbabwe and Zambia, which are among the poorest, tax reserves have not seen substantial growth due to FDI. The political and tax systems in these nations are so unstable that they overshadow the influence of the macroeconomic factors under study.

Inflation is observed to negatively impact tax revenue. During periods of high inflation, the economy tends to spiral downward, making tax collection challenging. Zimbabwe has experienced some of the worst inflation scenarios in the world.

Understanding how each country's unique circumstances, laws, and economic context influence tax revenue is crucial. Besides macroeconomic factors, tax revenues in Southern African nations are also affected by institutional capacity, political stability, and other non-macroeconomic elements such as corruption.

To enhance tax reserves, it is essential to prioritize policies that foster trade and economic growth. Tax revenue should not be impeded by fiscal and monetary policies designed to support the population and economy during challenging times. This approach ensures that while addressing immediate economic challenges, the long-term stability and growth of the tax base are not neglected.

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