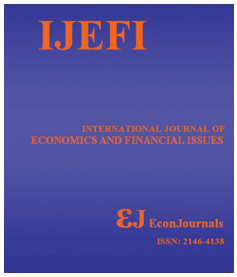

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Economic Growth Effects of Fiscal Policy in South Africa: Empirical Evidence from Personal Income Tax

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ABSTRACT

This study determined economic growth effects of fiscal policy in South Africa. Particular attention was paid to effects of personal income tax on economic growth for the period 1993Q3 -2022Q4. The influence of personal income tax on economic growth was analysed using non-linear autoregressive distributed lag (NARDL) bounds test for cointegration. Estimated results indicated rise in personal income tax is growth-friendly in the short-run. While, in the long-run growth is affected by both positive and negative shocks in personal income tax. Positive personal income tax changes are detrimental to economic growth in the long run. Increasing personal income tax will compromise the country's economic growth strategy. Furthermore, positive changes in personal income tax affect economic growth more than negative shocks as confirmed by dynamic multiplier graph. Dynamic multiplier graph further reveal existence of asymmetry. Additionally, Wald test value of −6.2775 validated asymmetric effect of personal income tax on economic growth. It is therefore, recommended that policy makers should focus on considering other sources of tax revenue. The current structure of the tax system is skewed towards personal income tax. Policy makers should keep the current ratio of personal income tax and widen tax base to realise inclusive economic growth.

Keywords: Economic Growth, Fiscal Policy, Personal Income Tax, South Africa
JEL Classifications: C5, E1, E62, H2

1. INTRODUCTION

In developing and emerging economies, the government has to play an active role in achieving sustainable economic growth. In the framework of endogenous growth by Solow (1956) government plays a pivotal role in promoting the accumulation of knowledge, research and development, productive public investment, human capital development and law and order. Fiscal policy as one of macroeconomic policies that governments implement to address socio economic challenges facing their respective citizens. Fiscal policy relates to raising tax revenues and geared towards the level and pattern of expenditures (Ogar et al., 2019). Availability and mobilisation of fiscal resources is the key factor that an economy can control and operate. As noted by Boly et al. (2020), that mobilising government revenues via taxation and other non-debt financing sources plays an important role in allowing countries to own and design policies that address their specific development challenges. The ability to increase domestic revenue is also beneficial through its potential to mitigating the risks of debt distress.

However, Kose et al. (2021) highlighted that many developing and emerging market economies have registered rising budget deficits in recent years, with growing concerns over implications for future fiscal sustainability, debt and macroeconomic stability. Within the context of South Africa, it is important to examine the effects of tax revenue on economic growth, in light of economic structural changes, high unemployment rate, poverty and inequality. Successful fiscal policy has an important role in stimulating economic sectors that are strategic in driving economic growth and job creation. South Africa as a developing country faces daunting socioeconomic challenges. For example, overall

economic development indicators registered a clear decline due to negative consequences electricity shortages, global economic downturn resulting from Russia's invasion of Ukraine coupled with flooding in KwaZulu Natal (African Development Bank [AfDB], 2023a). The South African economy contracted by 2.0% during 2022 from a growth rate of 4.9% in real GDP in 2021 (AfDB, 2023).

On the other hand, government debt jumped to approximately 71.4% of GDP in 2022 compared with the ratio of 56.22% in 2019 (AfDB, 2023). The Department of Statistics South Africa (2023) estimated unemployment rate to be 31.9% on the Quarterly Labour Force Survey. Clearly the South African economy is characterised by macroeconomic instability in general, particularly fiscal instability. It is for this reason that Hlongwane, (2023), point out that fiscal policy instruments are beneficial provided they used to counter slowdown in the economy and ensure fiscal stability. Fiscal policy intention is to stimulate economic and social development by pursuing policy stance that ensures balance between taxation, expenditure and borrowing that is consistent with sustainable development (Ojong et al. 2016).

The aim of this paper is to contribute to the literature by examining the effects of fiscal policy on economic growth in South Africa. The paper hope to shed some useful light by considering the effects of personal income tax on economic growth. Tax revenue can influence firm operations as well as research and development (Tendengu et al., 2022) while Maganya (2020) asserted that taxes have a potential to raise the cost of capital and decrease private agent's incentives to invest. A high tax regime deter foreign direct investment, because they will not be able to maximise their profits thereby negatively affect long-term growth of the economy (Al-tarawneh et al., 2020; Mdanat et al., 2018; Mazina et al., 2022). In order to take advantage of the low tax rates and strong investment opportunities, local investors will begin to invest abroad. Because of its impact on disposable income, taxes impact household decision to spend less, supply less labour and prefer more leisure to work. In some instances high tax burden induce households to engage in less productive economic activities, substitute high taxed activities for activities that are taxed at relatively lower rates by the government (Shafiq et al., 2022).

Some researchers have strong views about the pivotal role of tax revenues in driving sustainable and inclusive economic growth. Saidin et al. (2016) stated that tax revenue is a function of tax collection and tax revenues is source of finance for economic development activities. Maganya (2020) is of the view that tax revenue is the key to promoting sustainable growth and eliminating poverty in developing countries. Al-Afeef et al. (2022) and Maganya (2020) put emphasis on the fact that tax revenue provide developing countries with predictable and much-needed finance for social and physical infrastructure. Therefore, higher taxes support higher levels of public expenditure some of which may foster economic growth. In this regard, Hlongwane (2023) added that availability of resources that can be spent by the government is determined by the size and structure of the tax base. Al-Afeef et al. (2022) and Maganya (2020) further argue that a wide tax base combined with high economic growth have a potential to reduce the long-term dependency of developing and emerging countries on aid and ensure achievement of macroeconomic stability. Babatunde et al. (2017) and Stoilova (2017) confirmed that taxation is one of the significant factors that determines the productive capacity of the country. Clearly, there is no government that can function without tax receipts through the income tax from companies, individuals as well as goods and services (Saidin et al., 2016).

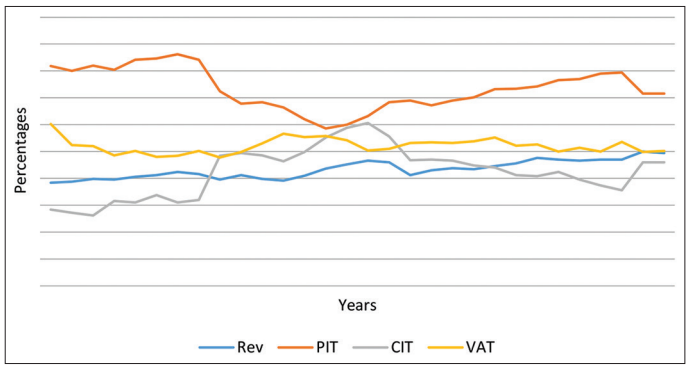
It is against this background that this study aims to provide an intensive examination of the effects of personal income tax on economic growth in South Africa. Yet, with few exceptions, the empirical literature has investigated the effects of total tax revenue on economic growth. How personal income tax affects economic growth individually remains an unexplored area, especially in the context of an emerging economy like South Africa, where personal income tax emerge as backbone of tax revenue. Therefore, this study contributes to the debated tax revenue-growth nexus, by looking at the asymmetric effects of personal income tax on economic growth. Devising requisite response requires a clear understanding of the effect of personal income tax on economic growth. This is particularly important in the context of South Africa, where the tax base is narrow and tax revenue structure is skewed towards personal income tax.

The remainder of this paper is organised as follows: following the introductory section is section two providing an overview of economic growth and tax revenue in South Africa. Sections three presents literature review, section four discusses data and methodology while section five presents empirical results. Section offers conclusion and policy recommendations.

2. OVERVIEW OF TAX REVENUE AND ECONOMIC GROWTH IN SOUTH AFRICA

Figure 1, displays trends on revenue as percentage of gross domestic product (Rev) in South Africa from 1993 to 2022. For purposes of this study tax revenue structure comprises of personal income tax (PIT), company income tax (CIT) and Value added tax (VAT). Hence, the figure also depicts the comparative contribution of PIT, CIT and VAT as percentage of total revenues. As indicated in Figure 1, since 1993, tax to GDP ratio increased by 5.5 percentage points from 19.2% in 1992 to 24.7% in 2022. During the 1993-2022 period, South Africa recorded a maximum 25% of GDP in 2021 and a minimum of 19.2% in 1993. In 2021

Figure 1: Tax revenue in South Africa, 1993-2022



Source: South African Reserve Bank (SARB), 2023

tax revenue ratio was 25.0% of GDP, the highest recorded ratio during the 1993-2022 period. In comparison, the South Africa's tax to GDP ratio in 2021(25.0%) was higher than the average of the 33 African countries in 2021 (15.6) by 9.4 percentage points (African Development Bank (AfDB), 2023b).

The figure also reveals that business sector contribution to tax revenue as percentage of total revenue has been fluctuating throughout the study period. The corporate sector's underperformance caused a fall in tax to GDP ratio. This sector contribution declined from 14.20% to 13.10% in 1993 and 1995 respectively. This decline is followed by a sharp increase of 15.80% recorded in 1996. Figure 1, further reveals a steady increase of 24.90%-30.30% registered from 2005 to 2008.

Apart from a contribution of corporate sector to total revenue of South Africa, value added tax collections also played an important role. Figure 1, indicates that the value added tax as share of total revenue exhibit mixed rates, with the highest of 30.10% registered in 1993. From 1994 to 2022, a moderate downward trend is observed, the decreasing trend is characterised by fluctuations, in 1994, 26.20% of total revenue was recorded, followed by a peak of 28.30% in 2004 and sharp drop of 24.90% in 2021.

Considering personal income tax, Figure 1 portrays that taxes collected from individual income are the backbone of tax revenue in South African economy. Revenue contribution by the personal income tax have been positive since 1993. The share of individual income tax expressed as percentage of total revenue was 40.90% in 1993 and became 34.80% in 2022. In 2006, personal income tax was 29.30%, which is the lowest during the study period.

Personal income tax's contribution to total revenue has been greater than contribution of the corporate sector. This may be attributed to the fact that, a maximum tax rate on individuals imposes a tax burden to households in comparison with the flat rate imposed on companies. Hence, the personal income tax remained the biggest contributor followed by value added tax (AfDB, 2023). Therefore, it is clear that PIT and VAT are two potential financing sources given the strained public finances in South Africa and the scale of financial resources needed to achieve the Sustainable Development Goals (SDGs), implementing the Addis Ababa Action Agenda and the African Union's Agenda 2063.

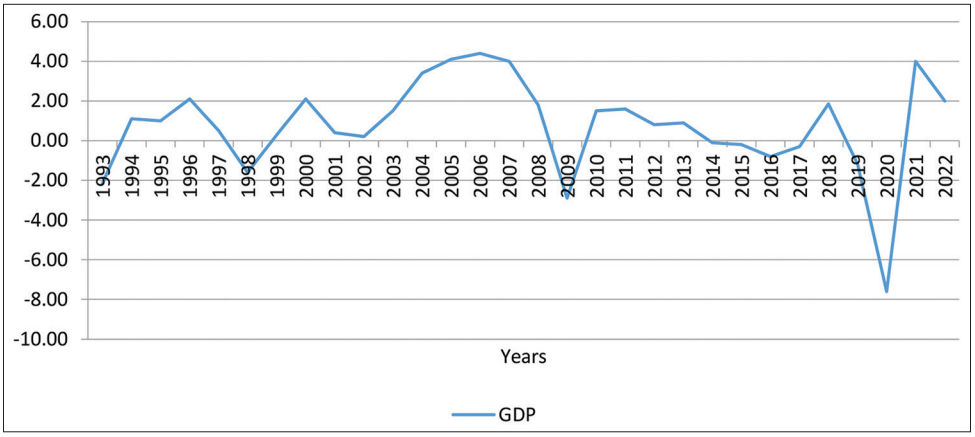
Government of South Africa's initiatives to increase economic growth are deep-rooted in the national development plans. Since 1994, the government of South Africa has launched a sequence of national development plans, with rapid inclusive and sustainable economic growth being one of the key guiding objectives. For instance, in September 2012, the government of South Africa introduced a long-term development plan, the National Development Plan (NDP) 2030. The focus of the (NDP) 2030 was on inclusive growth, eliminating poverty and reducing inequality. The NDP sets a growth target of 5.4% per year emphasising industrial development assumed to be led by the private sector (National Planning Commission, 2012).

Unfortunately, government was unable to achieve and sustain the envisaged target of economic growth partly due to infrastructure deficits. Medium Term Strategy Framework (MTSF) for the period of 2014-2019, planned to increase economic growth rate from 2.5 in 2012 to 5% in 2019 (Republic of South Africa, 2013). Figure 2, reveals that real GDP growth rate was 0.80% in 2012 and a negative growth rate of 1.20% was registered in 2019. South Africa's economy recovered strongly after the 2020 COVID1-19 pandemic from a negative 7.60% to 4.0% in 2021, however, as can be seen from the Figure, the growth momentum was not sustained. In 2022, South Africa experienced a growth rate of 2.0%, though within the proposed MTSF 2019-2024 growth rate of 2-3% (Republic of South Africa, 2018) is still below the NDP target of 5.4% per annum.

3. LITERATURE REVIEW

In the examination of tax revenue on economic growth, Romer and Romer, (2010) contends that tax revenue collection is a very important for government to meet planned expenditures and helps in the achievement of set growth targets over the years. The nature of direct or indirect taxes in an economy can help forecasting a growth pattern for future planning and policy implementation. The overall tax burden is of importance in explaining variations in economic growth. It is in this regard that theories provided justification for collection of tax revenues. Pigou (1920) proposed

Figure 2: Trends in real gross domestic product, 1993-2022



Source: South African Reserve Bank (SARB), 2023

that citizens should be taxed by the government according to their capacity to pay. In relation to ability to pay principle, the capacity to pay tax is based on income, property ownership as well as expenditure. The ability to pay postulation suggest that people with higher earnings should pay more taxes than citizens with lower earnings.

Another theory that have been applied to explain the revenue-growth nexus is the one advocated by Lindahl (1919) and Cooper (1994) premised on benefit principle. The theory attests that the state should impose personal taxes on the benefit accrued to the individuals. The more benefits an individual receives from the activities of the state, the more tax the government will receive. While, Solow (1956) is of the view that taxes affect growth of the economy in the transition to a new steady state through savings and investment channels.

In addition, the optimum tax theory proposed by Mirrlees (1971) advances for a given rate of the tax at which a given amount of government revenue can be raised, with minimum distortion in an economy. Borrowing from Mankiw et al. (2009) this theory entails designing and undertaking a tax that lowers distortion and inefficiency in the market equilibrium under certain economic conditions. This is a requisite to achieving social efficiency through a desired adequate income distribution or an improvement of welfare. Hence, Mankiw et al. (2009) substantiated the optimum theory by adding that if the first best outcome is not feasible and you have to seek for the second best then the design and implementation of the optimal tax requires knowing how to increase the number of outcome from a heterogeneous population using socially optimal way. Barro (1990) provided his views on the matter by strongly arguing that tax revenue has a short-run effect on economic growth, due to the fact, that tax cause inefficiency and distortion in the product and labour markets.

Hence, a tremendous amount of research have since been conducted focusing on unravelling the relationship between tax revenue and economic growth. Most of these studies focused on providing evidence on total revenue impact on economic growth. At the same time, there is a number of studies only focus on the influence of one type of tax at a time, whilst others consider the effect of more tax instruments on economic growth. Contributing to the tax revenue-growth nexus, Babatunde et al. (2017) conducted a study aiming to determine the effect of total tax revenue on economic growth focusing on African countries. Empirical results from the fixed effect, random effect and generalized least squares estimators reveal that tax revenue is instrumental in boosting economic growth for the 2004-2013 period. Specifically, on the average, 100% increase in the revenue for taxation will stimulate economic growth by approximately 75%.

Focusing on Pakistan Shafiq et al. (2022) employed ARDL bound test estimator to examine the impact of tax revenue on economic growth. In the growth model the study included government spending, inflation, fixed capital formation and current account balance. The results indicated that receipts from tax collection negatively affect economic growth during 1985-2021. Shafiq et al. (2022) recommended that policy makers should ensure that tax rate are set at the level that will ensure that there is sufficient finances to back government spending to grow the economy. On the same issue, Nguyen and Darsono (2022) contributed on the tax revenue-growth nexus. The study focused on nine ASEAN countries, utilising panel data estimation techniques. Results from fixed effect showed that tax revenue is detrimental to economic growth. Furthermore, threshold regression analysis to determine the optimal tax revenue revealed the threshold tax revenue of around 14.65% beyond which the effect is strongly negative to economic growth in 2000-2020.

With the aid of unrestricted VAR Nkhalamo and Sheefeni (2017) examined the interaction between tax revenue and economic growth in Namibia using quarterly data from 2001 to 2015. The impulse response results indicated that shocks from tax have negative effect on economic growth. While moderated fluctuations in economic growth due to tax shocks were revealed by the forecast error variance decomposition. Hence, Nkhalamo and Sheefeni (2017) recommended amongst other things that enhancing tax administration is necessary to increase efficiency and reduce corporate income tax to attract investment.

Aliyu and Mustapha (2020) applied OLS and ARDL estimators to determine the impact of companies income tax, value added tax, petroleum profit tax, custom excise duty and government domestic debt on Nigerian economy for the period 1981-2017. Estimated results indicated that value added tax and petroleum profit tax positively influence economic growth, while companies income tax and custom excise appeared harmful to economic growth. Granger causality test results confirmed presence of one way causal link, flowing from gross domestic product to companies income tax. Based on these outcomes, the study recommended strengthening of tax laws with a view to intensify tax revenue collections from value added tax and petroleum profit tax. The results concur with the study conducted by Maganya (2020) that found a significant positive relationship between value added tax and economic growth in Tanzania. On the same study, Maganya (2020) established that income tax has a negative association with economic growth during 1996-2019. Regarding causality, results provided evidence of bidirectional causal relationship between value added tax and economic growth.

McNabb (2018) employed Pooled Mean Group (PMG) estimator in an attempt to challenge the existing findings on the linkage between total tax revenue, tax structures and economic growth. The study focused on a panel of 100 countries categorised as low-income, lower-middle income, upper-middle income and high-income countries from 1980 to 2012. McNabb (2018) considered total tax revenue and extended the analysis by employing disaggregating approach looking at tax subcategories such as personal income tax, companies income tax, trade tax as well as value added tax. The results suggest that total tax revenue has a positive influence on economic growth. Considering personal income tax, results indicate a negative association between personal income tax and economic growth suggesting that higher personal income tax lead to lower economic growth. While value added tax and companies income appeared to be positively linked with the rate of economic growth. Mugableh (2019) explored the dynamics of fiscal policy

tools and economic growth in Jordan. Time series data covering 1978-2017 was analysed using ARDL cointegration procedure. The results indicated that reduction in total tax revenue is effective in stimulating economic growth.

On the other hand, Asel et al. (2022) presented evidence that total tax revenue has a positive long run impact on economic growth in the economy of Sri Lanka. The study also accounted for economic liberalization (from 1960 to 2018) and the post-liberalized period (from 1980 to 2018), hence relied on time series data collected over the period 1960-2018. A boosting effect of tax revenue on economic growth was identified in studies conducted by McNabb (2018) for a group of 100 countries, Babatunde et al. (2017) for African countries and Moyo et al. (2021) in their study focusing on South Africa. Asel et al. (2022) further identified that corporate and personal income taxes have a significant positive impact on economic growth both in the short and long-run. Additionally, ARDL estimation results also revealed that consumption tax was non-distortionary in the long-run. However, Neog and Gaur (2020) did not endorse non-distortionary effect of value added tax based on their study of 14 Indian states.

Neog and Gaur (2020) recommended that the Indian policy makers to focus on property taxes. This is based on their study for 14 Indian states for the period 1991-2016. The study applied panel PMG linear model, estimation results indicated a positive impact of property and capital tax on economic growth and the impact of income tax was not significant. This non-significant impact of corporate income tax was supported by Ojong et al. (2016) in their study on Nigerian economy. Neog and Gaur (2020), extended the analysis by incorporating panel threshold regression, revealing "U" association between property taxes and economic growth for the selected Indian states.

Balasoiu et al. (2023) discovered that direct taxations have distortionary impact on economic growth. The study aimed to determine efficiency of fiscal policy focusing on all 27 EU countries. The paned data set was employed covering the period 2008-2020.Fixed effect and dynamic GMM were selected as appropriate estimators to analyse the effect of personal and income taxes on economic growth. Empirical results from both estimators compelled authors to suggest that lowering direct taxes is beneficial for the EU countries. They support this view by pointing out that lower personal income tax is influential in economic growth through its positive impact on consumption. While lowering corporate tax will serve as an incentive to attract investment and lead to job creation. This chain effect will results into high economic growth, reduction of tax avoidance, stimulating competitiveness a well as reduction of tax evasion.

Stoilova and Patonov (2020) conducted a study attempting to investigate the impact of fiscal policy on Bulgarian economy. The study paid particular attention to the effect of personal and corporate taxes and value added tax during1995-2018. The receipts from value-added tax seem to be growth-enhancing since OLS regression results revealed strong evidence of positive impact value added tax has on economic growth, while corporate and personal income taxes emerged as distortionary in Bulgaria. Dibia and Onwuchekwa (2019), in their study of Nigerian economy further identified the positive influence of companies tax on economic growth. Odum et al. (2018) and Etale and Bingilar (2016) supported these outcomes based on their studies for Nigeria. As a result Dibia and Onwuchekwa (2019) concluded that Nigerian government should focus on creating enabling environment for entrepreneurship and innovation so as to widen the tax base. While Etale and Bingilar (2016) pointed out that effectiveness of corporate income tax depend on the strength of the tax system and tax compliance.

Jordan is a developing economy characterised by high rate of unemployment and poverty, low levels of investments and economic growth, within this context Al-Afeef et al. (2022) explored the impact of total tax revenue on economic development indicators. The study identified inflation rate, unemployment and economic growth as major development indicator for the Jordanian economy. To achieve the study objective, quarterly data covering the period 2005-2020 was utilised. Estimation results from a multiple regression model, showed that tax revenue has a statistical significant negative impact on economic growth. On the other hand, a positive link between tax revenue and unemployment was identified. While tax revenue and inflation revealed a negative association. In this regard, Al-Afeef et al. (2022) propose a rise in government expenditure combined with efficient allocation of resources as tools to sustain the required stable macroeconomic environment.

Even though the reviewed theoretical literature emphasise the importance of tax revenue collection in any economy to finance government expenditure, the results of empirical studies are not conclusive about the nature of the relationship between tax revenue and economic growth. From the reviewed literature one can conclude as follows: Firstly, total tax revenue is positively related to economic growth, this view is supported by McNabb (2018) and Babatunde et al. (2017) on their studies for 100 countries and African countries respectively. Secondly, some studies identified distortionary effect of tax revenue on economic growth this is evident in the study conducted by Al-Afeef et al. (2022) for Jordan. Thirdly, personal income appeared to be growth-friendly, this view is endorsed by Moyo et al. (2021) and Maganya (2020) for South Africa and Tanzania respectively. While some studies discovered that personal income tax is harmful to economic growth as confirmed by Stoilova and Patonov (2020) in the case of Bulgaria, McNabb (2018) study focusing on 100 countries and Balasoiu et al., (2023) exploring 27 EU countries. It is against these disparities in the empirical findings that this study seeks to elicit the effect of personal income tax on economic growth within the South African context.

4. DATA AND METHODOLOGY

This paper used quarterly data covering the period 1993Q3-2022Q4 obtained from the South African Reserve Bank online database. The study considered the following macroeconomic variables: Gross domestic product (GDP), Gross fixed capital formation (GFCF) and Personal Income tax (PIT). Gross domestic product (GDP) and Gross fixed capital formation (GFCF) were

transformed into logarithms to consider variables into percentage change.

4.1. Specification of Estimated Model

This study is motivated by studies conducted by Moyo et al. (2021), Maganya (2020) and Stoilova and Patonov (2020). Based on reviewed literature the study estimated the following model:

$$LGDP=f(PIT,LGFCF) \quad (1)$$

Applying regression procedure, the model is expressed in the form:

$$LGDP_t = \alpha_0 + \beta_1 PIT_t + \beta_2 LGFCF + \varepsilon_t \quad (2)$$

Where *LGDP,* is log of GDP, *PIT* is personal income tax as percentage of total revenue *LGFCF* is log of GFCF and ε_t is the error term. Additionally, α is the constant term while β_1 and β_2 are estimated parameters.

4.2. Estimation Techniques

In pursuance of the study objective, the model specified above was subjected to a number of econometric tests. The study utilised time series data, it was therefore important to test if the series is stationary or not.

4.2.1. Stationarity tests

Most economic variables are non-stationary and this can yield estimation results that are unreliable and invalid. In this regard, variables included in the specified estimated model were tested for stationarity. The study applied the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests. The underlying null hypothesis for both tests is that the variables have a unit root, against the alternative hypothesis that the data series is stationary. The result of stationarity test provide evidence of whether estimated parameters are in line with classic regression assumptions. Furthermore, performed stationarity tests validated that no variable of interest is integrated of order two or higher. The data series meet the requirement for conducting cointegration applying the NARDL without yielding invalid results.

4.2.2. The NARLD estimation technique

This paper employed nonlinear autoregressive distributed lag (NARDL) econometrics technique. The NARDL estimator was developed by Shin et al. (2014) an extension of ARDL estimation techniques introduced by Pesaran et al. (2001). An important characteristic of the NARDL is its ability to provide simple inferential methods that give a straightforward and valid means of differentiating between different types and combinations of nonlinearities. The purpose is to establishing whether the positive shocks of the explanatory variables have the same effect as the negative shocks on the explained variables (Pal and Mitra, 2016). Shin et al. (2014) emphasise that the positive change may have a larger impact in the short –run whereas a negative shock may dominate in the long-run or vice versa.

The reason behind applying NARDL is to reveal that, effects of positive and negative changes of PIT result to different changes on real GDP. In fact, NARDL challenges the assumption of symmetric estimates, by which the effect of increasing an independent variable is equal to the impact decreasing of the same variable on dependent variable as noted by (Nandelenga and Oduor, 2019).

The NARDL is applicable irrespective of whether the time series data are integrated of I(0), I(1) or mix of I(0) and I(1). However, the restriction of this econometric estimator is that it is not applicable if any of the variables are I(2) (Nandelenga and Oduor, 2019). As stated by (Haffejee and Masih, 2018) and (Hu et al., 2018) that the uniqueness of NARDL framework is its capability of coherently and simultaneously determine long and short run asymmetries jointly. Haffejee and Masih, (2018); Hu et al. (2018) and Nandelenga and Oduor (2019) pointed out that NARDL accounts for three general forms of asymmetries, namely: reaction asymmetry, impact asymmetry and adjustment asymmetry. Therefore, in order to determine reaction and impact asymmetries between personal income tax and economic growth the study adopted a bivariate NARDL model. The realisation of this necessitate the modification of equation (2) as follows:

$$\Delta LGDP_t = \delta_0 + \sum_{i=1}^{n}\delta_{1i}\Delta LGDP_{t-1} + \sum_{i=0}^{n}\delta_{2i}^{+}\Delta PIT_{t-1}^{+} + \acute{O}_{i=0}^{n}\delta_{3i}^{-}\Delta PIT_{t-1}^{-} \; \delta_4 LGDP_{t-1} + \delta_5^{+} PIT_{t-1}^{+} + \delta_6^{-} PIT_{t-1}^{-} + \mu_i \quad (3)$$

Where personal income tax is decomposed into sum process of positive given by $PIT^{+}$and negative changes denoted by PIT^{-}. In equation (3), δ_0 denotes a constant, δ_1-δ_3 represent short run coefficients; δ_4-δ_6 are the long run coefficients; while stands for difference operator; n is lag length and μ_i is an error term that is an iid process with zero mean and constant variance, σ_ε^2. Additionally, δ_{2i}^{+} and δ_{3i}^{-} denote short-run asymmetric coefficients whereas, δ_5^{+} and δ_6^{-} stand for long-run asymmetric coefficients. NARDL is based on the null hypothesis that the relationship between the variables is symmetric in the long and short run, whereas the alternative hypothesis indicate that there is an asymmetry (Haffejee and Masih, 2018).

The error correction model, derived from equation (3) explaining the short-run in the asymmetric relationship is outlined as follows:

$$\Delta LGDP_t = \delta_0 + \sum_{i=1}^{n}\delta_{1i}\Delta LGDP_{t-1} + \sum_{i=0}^{n}\delta_{2i}^{+}\Delta PIT_{t-1}^{+} + \sum_{i=0}^{n}\delta_{3i}^{-}\Delta PIT_{t-1}^{-} + \gamma_1 ECT_{t-1} + \mu_t \quad (4)$$

Where ECT_{t-1} is the one lagged error correction term. The coefficient of the error correction term given by γ_1 is expected to be statistically significant and have a negative sign.

For comprehensive and robust analysis, the study considered adjustment asymmetry by using a graph of asymmetric accumulative multipliers. The aim was to trace the pattern of adjustments of economic growth to its new long-run equilibrium following a positive or negative unitary shock in personal income tax. The cumulative dynamic multiplier effects of PIT^{+} and PIT^{-} on economic growth are assessed as:

$$V_h^{+} = £_{j=0}^{h}\frac{\varnothing LGDP_{t+j}}{\varnothing PIT_t^{+}} \text{ and } V_h^{-} = \sum_{j=0}^{h}\frac{\varnothing LGDP_{t+j}}{\varnothing PIT_t^{-}}, \; h=0,1,2 \quad (5)$$

It is expected that, as $h\to\infty$, $V_h^{+}\to\dot{\gamma}$, and $V_h^{-}\to\bar{\gamma}$, where γ^{+} and $\gamma-$ are the asymmetric long-term coefficients (Shin *et al.*2014).

5. EMPIRICAL RESULTS AND DISCUSSION

In this section, the study provides discussion of empirical results based on time series estimation techniques and the empirical model specified in the previous section.

5.1. Unit Root Tests Results

The stationarity tests were conducted as a foundation to cointegration analysis so as to establish the order of integration of the variables. For this reason, two types of stationarity tests were applied in the current study, namely: Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests. In order to reject the null hypothesis, the computed t-statistic has to be significant at 1%, 5% or 10% level.

The results of the ADF and PP, unit root tests in levels and first differences are depicted in Table 1. The unit root tests are conducted in the general form of intercept, trend and intercept and none.

Table 1, indicates that the variables are not stationary for ADF at levels, while the series is stationary at 5% under intercept, trend and intercept when applying PP test. As can be seen from the table that, using both tests, the variables became stationary after first difference under the same test equations. For example, LGDP was stationary at 10% and 5% significance level under trend and intercept for both unit root tests. In first differences, the results reveal that all the series are stationary, validating presence of co-integration. The unit root test results also provide validation that the series are not integrated of order (2) or higher.

5.2. NARDL Cointegration

The NARDL test for nonlinear cointegration is based on the assumption that there is no presence of long run asymmetric relationship while the alternative hypothesis is that long run asymmetric relationship exists. In order to conclude existence of asymmetric long run relationship, the F-statistic needs to be greater than the lower and upper bounds.

The findings in Table 2, reveal that F-statistic value is above the lower and upper bounds at 5% significance level, which implies that the long run relationship between the study variables is asymmetric. Specifically, for estimated LGDP model, F_{LGDP} (PIT^{-}, PIT^{+}) = 11.5217. With these results, the study proceed to estimate the effects of negative and positive changes of PIT on LGDP both in the long and short run.

5.3. NARDL Long-run and Short-run Results

Table 3, presents the long-run and short run dynamics of personal income tax and economic growth in the context of South Africa. The empirical results in Table 3, section A, shows that positive change on personal income tax has a strong negative impact on economic growth. Specifically, the estimated coefficient of PIT_POS, is (−3.00) and is statistically significant at 5% level. This implies that a 1% increase in personal income tax pulls down growth rate of the economy by approximately 3%. Another revelation, is that lagged positive change on PIT has a negative influence on economic growth in the long-term. Overall, these results imply that an increase personal income tax has a dampening effect on economic growth in South Africa for the duration of the study. This outcome support previous empirical studies that established a detrimental effect of personal income tax on economic growth (Stoilova and Patonov, 2020; McNabb, 2018; Balasoiu et al., 2023).

Table 3, further reveal that a negative change in personal income tax (PIT_NEG) is associated with positive change in economic growth. This outcome support the idea that lowering personal income tax is instrumental in stimulating economic growth. Precisely, the results indicate that a 1% decrease in personal income tax will increase growth rate by approximately 4.00% in the long-run. Clearly, a change in explanatory variable (PIT) does not have the same effect on the dependent variable over time, in other words there is no linear relationship between PIT and GDP. Some of the empirical studies reviewed so far, assumed a linear relationship, for instance McNabb, (2018) established that a 1% rise in personal income tax worsens gross domestic product by 0.067%, similarly, a 1% decrease in personal income tax translate into 0.067% of GDP growth rate.

It is for this reason that Nguyen and Darsono (2022) support the views of (Al-tarawneh et al., 2020; Mdanat et al., 2018) by strongly argue that the relationship between tax and economic growth in nonlinear and signalling presence of deadweight loss associated with tax. In other words, when the government tries to raise tax revenue to finance their activities; economic growth benefits are short-term. Mdanat et al. (2018) asserts that higher taxes would discourage the accumulated investment; meanwhile, Shafiq et al. (2022) observed that high taxes can reduce the growth of labour supply because of its effect on disposable income thus discouraging household participation in the productive sector and working hours. Furthermore, higher taxes have a potential of limiting productivity-enhancing activities, such as research and

Table 1: ADF and PP unit root test results

	ADF			PP		
Variables	**Intercept**	**Trend and Intercept**	**None**	**Intercept**	**Trend& Intercept**	**None**
LGDP	−2.5202	−0.0028	5.5392	−1.6086	−2.5711**	3.7185
PIT	−1.2346	−1.1376	−0.6463	−6.3223	−10.4571**	−0.5948
LGFCF	−1.7377	−0.9611	1.3230	−2.0462**	−0.9893	1.8482
Unit root tests at first difference						
LGDP	−12.9424	−13.5333*	−1.4545	−19.0470	−21.0678**	−14.6519
PIT	−14.2165**	−14.1601	−14.2775	−36.9270**	−36.7856	−37.0908
LGFCF	−4.0528	−4.3050**	−3.7996	−11.81107	−12.3609**	−11.4793

***, ** and * denote stationarity at the 1%, 5% and 10% significance level respectively

development (R&D). As a result, the high tax rate slows down economic growth by creating a deadweight loss (Nguyen and Darsono (2022).

Regarding short-run estimation results, section B show that positive changes in PIT have statistical significant effect on economic growth. For example, a percent increase in PIT will pull down economic growth rate by 1.8%. The estimated results show that PIT and GDP have a linear relationship in the short-run. This outcome is similar to Maganya (2020) empirical findings which established a negative linkage between income tax (personal and companies) and economic growth in the short. The results seems to be consistent seems with neoclassical theories of growth proposition that, taxes can impact growth during the transition to the new steady-state through savings-investment channel (Barro, 1990).

The results of both long and short run estimated models indicate statistical significance of the effect of personal income tax on economic growth. Therefore, there is a confirmed pull-down effect of personal income tax on economic growth. Specifically, positive change in personal income tax has negative effect on economic growth both in the long-run and short run, while negative change has a positive impact in the long-run. This results suggests dominance of asymmetric relationship between personal income tax and economic growth in the long-run.

Another revelation from Table 3, is the estimated lagged error correction term (ECT_{t-1}). For this study, the estimated ECT_{t-1} captures the speed at which GDP returns to long-run equilibrium after a shock in personal income tax. The obtained coefficient is –572, and significant at the 5% level. The outcome implies that any divergence in the short run towards long run equilibrium is corrected at a speed of 57.2%. Furthermore, any variations in real GDP are explained by the changes in personal income tax in the model as confirmed by (R^2) with the value of 99%.

Shin et al. (2014), strongly recommended the use of a Wald test to ascertain the presence of asymmetric effects of positive and negative changes of independent variable on the dependent variable. The test is based on null hypothesis of symmetry against the alternative hypothesis of asymmetry. As can be seen from Table 4, the null hypothesis rejected.

The results provide evidence long-run asymmetric relationship between personal income tax and economic growth in South Africa during 1993Q3-2022Q4. This outcome support the long run results obtained from the NARDL model indicating that the effect of personal income tax on economic growth is nonlinear in the long-run.

For intensive purposes, a dynamic multiplier graph for economic growth was conducted. The aim is to display cumulative dynamic multiplier effects of positive shock and negative shock in personal income tax. Figure 3, confirms existence of asymmetry as shown by the symmetry line falling outside the zero line but still lies within the upper and lower bound of the 95% interval.

As can be seen, the positive change curve denoted by multiplier for PIT (+) conveys information on the adjustment of economic growth to positive shocks in personal income tax at any given time, while the negative change curves displays information on adjustment of economic growth to negative shocks in personal income tax at a given period. The above figure indicates that economic growth reacts more to positive shocks than negative shocks from personal income tax in the long run. The outcome suggest that high personal income tax is harmful to economic growth. As depicted in Figure 3, in the long-run the positive change curve is above the negative change curve, signalling that the magnitude of decrease in economic growth due to a positive shock is larger than the magnitude increase due to negative shock in personal income. This difference reinforce the observed long-run asymmetry that is determined through the Wald test.

Table 2: Bounds test for nonlinear cointegration

Test statistic	Value	k
F-statistic	11.5217	3
Critical value bounds		
Significance	I (0) Bound	I (1) Bound
10%	2.37	3.2
5%	2.79	3.67
2.5%	3.15	4.08
1%	3.65	4.66

Source: Author's computation

Table 3: NARDL long and short-run results

Regressors	Nonlinear ARDL: (ARDL selected by SC 2, 1,0,1)		
	Coefficients	t- statistics	P-value
Section A: Long run results			
LGDP(-1)	0.5284	6.8300	0.0000
LGDP(-2)	0.1999	2.9398	0.0040
PIT_POS	−3.0054**	−5.6165	0.0000
PIT_POS(−1)	−2.0063**	5.9535	0.0000
PIT_NEG	−4.0003**	−5.2747	0.0000
Section B: Short run results			
C	2.6452	3.2206	0.0017
ΔLGDP(−1)	−0.2717	−3.0828	0.0026
ΔLGDP(−2)	0.0431	0.5403	0.5901
ΔPIT_POS	−1.8044**	−6.8071	0.0000
ECT(−1)	−0.5717**	−7.7306	0.0002

R-squared: 0.9936; Adjusted R-squared: 0.9931 ; F-statistic: 2361.371***; Prob (F-statistic): 0.0000; Durbin-Watson stat: 2.9427
*** and ** indicate significance at 1% and 5% respectively

5.4. Diagnostic Test Results

The estimated NARLD model was subjected to diagnostic checks to ensure that the parameters meet the requirements classical regression. Table 5, depict results for normality, serial correlation and heteroscedasticity. The Jarque-Bera test for normality indicate that residuals are normally distributed as the probability value of 0.158845 is insignificant.

Table 4: NARDL Wald test results

Test statistics	Value	Probability
t-statistics	-6.2775	0.0000
F-statistics	39.4065	0.0000
Chi-square	39.4065	0.0000
Decision	Long-run asymmetry	

Source: Author's computation using E-views 12

Table 5: Diagnostic tests results

Test	Null hypothesis	Test statistics	Probability	Decision
Normality test	Residuals are normally distributed	JB statistic=3.679652	0.158845	Residuals are normally distributed
Breusch- Godfrey Serial Correlation LM test	There is no correlation in residuals	Obs*Rsquared=1.217594	0.5440	There is no autocorrelation
Breusch-Pagan-Godfrey Heteroskedasticity	Residuals are homoskedastic	Obs*Rsquared=1.122867	0.5810	There is no heteroscedasticity

Source: Author's computation based on E-views 12

Figure 3: NARDL dynamic multiplier graph

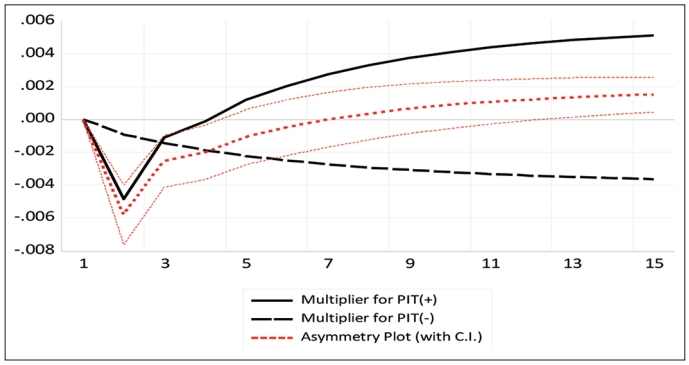


Figure 4: CUSUM test results

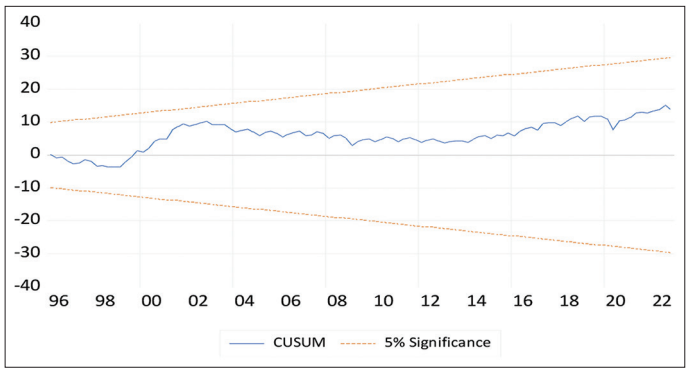
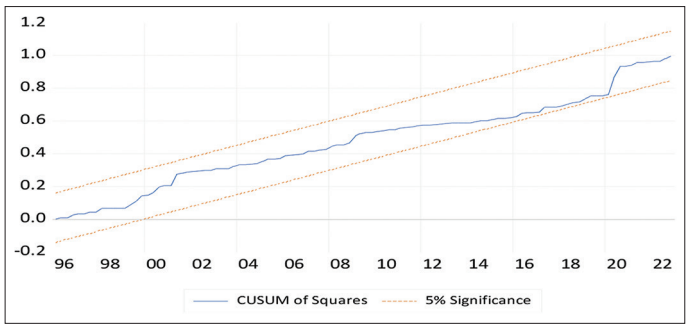


Figure 5: CUSUM of squares test results



The models does not suffer from serial correlation confirmed by a test statistic of 1. 217594 accompanied by a P-value of 0.5440. Regarding heteroscedasticity, the Breusch-Pagan-Godfrey test results reveal that the model does not have heteroscedasticity supported by test statistics of 1. 122867 with a P-value of 0.5810.

Furthermore, stability of the estimated model was determined by using the cumulative sum of the recursive residual (CUSUM) together with the cumulative sum of squares of the recursive residual (CUSMSQ) tests.

Results on Figures 4 and 5 indicate that the plot of the CUSUM and CUSUMSQ statistics lies inside the critical band of 5% level of significance confirming parameter stability. This validates presence of stability of the estimated coefficients. Consequently, conclusion can be made that asymmetric effects of inflation on financial development are of long-term nature in South Africa.

6. CONCLUSION AND POLICY RECOMMENDATIONS

This study determined economic growth effects of fiscal policy in South Africa. Particular attention is paid to the effect of personal income tax on economic growth for the period 1993Q3-2022Q4. The data showed personal income tax remained the backbone to tax revenue in South Africa. Number of research have been carried out focusing on unravelling the impact of fiscal policy on economic growth in South Africa. However, these studied have largely been concentrating on government consumption, government expenditure, fiscal deficits and public debt. In the context of South Africa few studies focused on providing evidence on total tax revenue impact on economic growth. In the majority of reviewed studies it has discovered that the effect of personal income tax on economic growth is linear. Studies that were focused on the nonlinear effect of tax revenue on economic growth in South Africa using disaggregated approach are scarce. In order to close this gap, the study focused on personal income tax decomposed into cumulative sum of positive changes and cumulative sum of negative changes. The decomposition of personal income tax allowed for the formulation of nonlinear ARDL. Estimated results indicated that personal income tax exert linear impact on economic growth. In the short –run economic growth in South Africa is only affected by positive changes in personal income tax.

Looking at long-run results, both positive and negative shocks in personal income tax. This indicates that even though personal income tax may be the major source of tax revenue in South Africa its economic growth in the long-run is vulnerable to shocks. This point to the direction that policy makers in South Africa still have a window to increase personal income tax in the short-run. Clearly, increasing personal income tax in the long-run will compromise the country's economic growth strategy. This is based on the empirical results that positive changes in personal income tax affect economic growth more that negative shocks. In the essence, the results revealed that economic growth responds more to positive

shocks. The study, suggest that policy makers should focus on consider other sources of tax revenue. The current structure of the tax system is skewed towards personal income tax. However, rise in personal income tax as indicated by positive shocks seem to be detrimental to economic growth, while a negative shocks are found to have a positive growth-supporting effect in the long-run. Policy makers should keep the current ratio of personal income tax to realise inclusive economic growth.

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