HOW FAR ARE WE FROM THE SLIPPERY SLOPE?: THE LAFFER CURVE ANALYSIS IN TANZANIA

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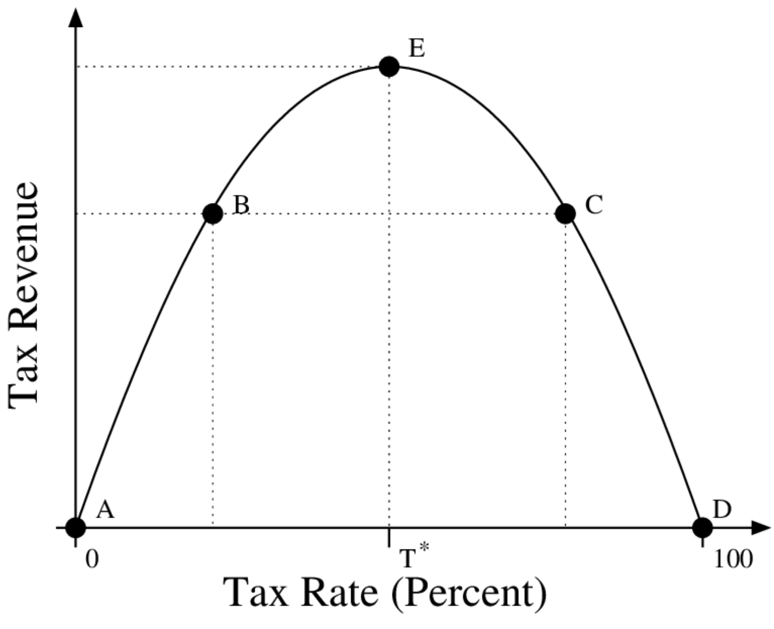
CHAPTER ONE
INTRODUCTION

1.1 Background to the Study.

Over the last ten years, there have been severe economic and financial crises in many countries, which later gave rise to a sovereign debt crisis. Governments therefore implemented austerity measures to combat the rising public budget deficits and public debts. Taxes have been sharply rising in an effort to raise revenue for the government and close budget gaps. The effectiveness of these austerity measures in reducing public budget deficits has drawn serious concerns from a wide range of people. Almost all of these skepticisms were based on the Laffer Curve theory. The Laffer Curve, which depicts the connection between marginal tax rates and revenues, was first introduced by Wanniski in 1978. The Laffer curve shows that the relationship between tax rates and tax revenues is an inverted U-shaped curve, in which the tax rate and the revenue both reach their maximum levels.

Figure 1: Laffer Curve



The curve suggests that initially as the tax rate "T" increases, the government's tax revenue also increases. This pattern persists until a tax rate (T=T*) where the government's tax revenue is at its highest. Any further increases in the tax rate would result in a decline in tax revenue. The curve also demonstrates that tax revenue is zero when (T=0) and (T=100%). The idea behind charging lower tax rates to producers and employees came from the notion that if tax rates were higher, producers and employees would be less motivated to work because the majority of their earnings would go to the government. Both will cut back on their output and labor, which will both slow economic growth and result in a decrease in tax revenue. As a result, this Curve illustrates how raising taxes actually reduces revenue rather than increasing it. It implies that taxes may be either too high or too low to generate the most revenue, with both a 0% and a 100% income tax rate producing nothing in revenue. Given that tax revenue does not always rise as the tax rate rises, the Laffer Curve makes sense. Of course, the government receives no revenue when the tax rate is 0%. There is considerable political debate surrounding the precise point at which total revenue is maximized. The tax system is also complicated, so increasing the rate of one tax may affect or cancel out the advantages or drawbacks of reducing another. In fact, by assigning a single tax rate that is overly simplistic, the Laffer curve oversimplifies the relationship between taxes.

Several policy reforms were introduced in Tanzania, including reform of the banking and financial sector; agricultural marketing; and trade and exchange rate reform. Challenges related to economic development, global trade, and international standards of governance, like those faced by other developing nations, are among the factors driving reforms. In 1986, the World Bank and the IMF supported the Economic Recovery Program. Even though certain taxes had been gradually changed since the 1960s, this reform had a broad impact on tax reform. As part of a larger economic reform program to promote growth and achieve long-term macroeconomic stability, Tanzania has implemented fairly extensive tax reforms since 1988 (Osoro et al.,2001).Tax reform primarily goes beyond tax measures that aim to fix flaws in a tax system that frustrate benefits as identified through the political, balancing bureaucracy with business liaison. Tanzania's tax system is attempting to address long-ignored issues and prioritize other factors over tax reform under the current administration.

This study will investigate the Laffer curve hypothesis in Tanzania. Two opposing outcomes would result from raising a tax rate. One is a direct increase in tax revenue. The other is to decrease tax revenue because investment and labor provision are less motivated by high tax rates (Nutahara, 2015). According to the Laffer curve hypothesis, taking more money in taxes from businesses than is reasonable reduces their ability to invest, so taxpayers seek out ways to shield their capital from taxation. At a certain point, known as the Revenue-Maximizing Tax Rate, tax revenue begins to decline as the tax rate is raised. If a larger portion of investors' profits is taken, they will be less willing to risk their own money. Similar to how employees would not want to see an increasing percentage of their pay reduced due to increased effort on their part, they are likely to lose their motivation to work.

1.2 Statement of the Problem.

Major tax reforms have been taking place in Tanzania since the early 1960s. The government would increase tax rates in order to raise revenue. Equity would be achieved through progressive income taxation, a high indirect tax on luxuries, and a high import duty rate on imported goods in order to support domestic industries. Studies show that, of all the previous attempts at tax reform over the years since Tanzania's independence, the simplification of the tax system was the most successful, with little regard given to the effectiveness of the tax system. The main focus of tax reform was improving the tax system's ability to generate revenue.

Tanzania continues to have a severe revenue shortage, which causes sizable fiscal deficits. The revenue productivity of the tax system has not yet been improved by tax reforms. This has been caused by several factors, including a failure to simplify the tax structure through tax reform, the granting of discretionary and statutory tax exemptions, high tax rates that encourage tax evasion and thus reduce compliance, and a lack of or misunderstanding of reform in tax administration.

Tax return data must be analyzed to identify the necessary trends in order to study how differently people react to changes in tax rates. Changes in tax rates have a problem as well as a positive effect on the environment that allows for behavioral reactions to taxation. The top marginal tax rates have generally decreased over time due to the less progressive nature of the tax code, but more people are now subject to these top brackets due to population growth. Because more people may fall into a particular tax bracket after a tax cut due to base broadening, revenue generated at the top marginal tax rate may rise. This could lead to biased elasticity estimates. If so, revenue growth following the cut could give the impression that there has been a change in behavior in response to the tax cut, even though it is really just a result of taxing more people at the same rate. The log-log functional form will also be employed after the Laffer curve has been examined using the quadratic functional form. This is one of the most commonly used functional forms for relating tax rate changes to tax revenue.

1.3 Significance of the Study.

This study will show the importance of tax administration system reform for the effectiveness of the tax system as well as the usefulness of the Laffer curve as a tool for illustrating the relationshipll between tax rates and tax revenues, where tax rates between 0% and 100% generate no revenue while all other rates produce some. The purpose of the Laffer curve analysis in Tanzania is to illustrate the point at which the government can raise taxes and the point at which doing so reduces government revenue. Tax reforms are frequently used to improve the tax system's revenue productivity. Low compliance, higher tax rates, and high levels of tax evasion in society have all been linked to the inefficiency of the tax system. According to Maliyamkono and Bagachwa (1990), high tax rates have encouraged tax evasion, which has caused a shift in production toward illegal activities that are challenging to tax. If the Laffer curve theory holds true then the quadratic functional form will show significant results supporting the notion that an upside down parabolic model is the best way to model this relationship. The study will illustrate the argument that cutting tax rates can result in increased total tax revenue and subsequently determine an ideal tax rate.

The debate over the Laffer curve and peoples' attitudes toward taxes has a significant impact on the potential tax policy measures that the government could take. For a given tax reform to achieve the desired goals after enactment, government officials must be able to predict the effects on tax revenue. The government needs to raise more money, and raising taxes is frequently considered a viable option to do so during a time of high deficits, so this estimation is crucial.

If tax payers behave in a way that results in less taxable income, the reasonable hypothesis that retributive tax rates might not raise much additional revenue can be simply explained using the Laffer curve.

1.4 Objectives of the Study.

The general objective of the study is to analyse the Laffer curve hypothesis in Tanzania.

1.4.1 Specific Objectives.

The specific objectives are as follows

(i) To identify various factors affecting tax revenue mobilization in Tanzania.

(ii) To determine the revenue-maximizing tax rate in Tanzania

(iii) To analyse the revenue trends in Tanzania from 1966 to 2020.

1.4.2 Research Questions.

The study will examine the following research questions;

(i) What are the key determinants of revenue mobilization in Tanzania

(ii) What is the revenue-maximizing tax rate in Tanzania?

(iii) What is the tax revenue trend in Tanzania

CHAPTER TWO

LITERATURE REVIEW

2.1. Theoretical Literature Review.

The expansion of capital formation heavily influences the way many nations' economies develop. Therefore, despite the fact that developing nations have a severe capital shortage, capital formation is the main driver of economic growth. Consequently, taxation is typically by far the most significant source of government revenue, even though governments frequently use various methods of resource raising (Chaudhry, 2010).

The majority of governmental initiatives and projects are financed by taxes. Taxation is primarily used as a means of raising revenue to cover significant public expenditures. Taxes and other government-collected funds make up the majority of the funding for development projects. Taxes serve as the main revenue stream for all governments (Bird et al., 2008). In the modern world, taxes and tax policy do have some non-revenue objectives, such as serving as a tool for economic policy. Various other public policies are influenced by the outcomes of tax policy. Every effective tax policy should support regional and national economic growth. The main strategies for achieving this are to increase savings and focus investments on high return activities (Jenkins and co., 2000). In addition to affecting a country's balance of payments, taxes also determine where, how much, for how long, and how income is distributed. Tax authorities must strike a balance between their desire to protect national revenues and their reluctance to jeopardize the international competitiveness of their domestic business interests (Razin and Slemrod, 1990).

There are always two tax rates that produce the same amount of revenue (Wanniski, 1978). (Wanniski, 1978) introduced the Laffer curve concept. The relationship between tax rates and tax revenues is graphically depicted by the Laffer curve, which shows that all tax rates except for those between 0% and 100% generate some revenue. This conclusion is supported by the fact that, if taxes were to be paid at a rate of 100%, taxpayers would be responsible for paying the full amount of profits realized; as a result, there would be no incentive for people to work and earn an income, and as a result, no revenue would be generated. It goes on to show that tax revenue would be at its highest at a particular tax rate, as the Laffer curve demonstrates. One possible outcome of this theory is that, past a certain point, raising tax rates will become counterproductive for raising additional tax revenue due to diminishing returns (Laffer 2004). With this assertion, we can infer that there is an inverted U-shaped relationship between tax rates and tax revenues, and that relationship can give us the highest tax rate and highest level of revenue. The Curve is named after the economist Arthur Laffer because he was the first to discuss this relationship/trade-off. A trade-off between the arithmetic effect and the economic effect on tax revenue is represented by the Laffer curve, which Arthur Laffer first explained to himself in a 2004 article. The economic effect "recognizes the beneficial impact that lower tax rates have on work, output, and employment. The arithmetic effect always works in the opposite direction from the economic effect. The author also explains another concept, namely that the Curve contains a region of prohibitive taxation, designated as the region of declining revenue, which is to the right of the optimal tax rate. The optimal tax rate is defined as the revenue maximising point. As a result of the economic effect being stronger than the arithmetic effect, which happens when the tax rate is higher than the maximum tax rate, as tax rates rise, tax revenues fall.

In the literature, the Laffer curve's upward-sloping side is referred to as the normal range and its downward-sloping side as the prohibitive range (see, for instance, Wanniski, 1978; Fullerton, 1982; Ballard et al. 1985; as well as Laffer, 1981, 2004, and 2008). This suggests that a certain amount of revenue can be raised using two different tax rates, one of which falls within the normal range and the other within the prohibitive range of the curve. The lower rate, which is within the normal range where the income/incentive effect predominates over the substitution/disincentive effect of taxation, would be the rational fiscal policy option in such a situation. Despite more than three decades having passed since Laffer's postulate, the Laffer curve is still a topic of debate. The main topic of debate is whether the Laffer curve is an exact representation of reality or just a rough approximation. As vehemently argued by Laffer (1981, 2004, 2008), the debate has focused on whether there is a relationship between tax rates and government tax revenue. If so, what is the tax rate that will yield the maximum revenue, i.e. optimal rate of taxation?.

According to Baurer's (2005) argument, it is a well-known fact that taxes on citizens and businesses provide the government with a significant source of income. However, among other important issues for economic development, Bofah (2003) focused on tax revenue collection. The amount of economic resources available to society is typically constrained, and because government spending is growing at an ever-increasing rate and private spending is declining as a result, taxes are imposed on both the public and private sectors. Similar problems have been faced by governments in every region of the world and throughout history when it comes to funding their goals (Persson, 2013). The entire tax system, consisting of tax policy, law, and administration, is typically covered by the study of taxation. In endogenous-growth models, such as those proposed by Barro and Sala-i-Martin (1992), well-designed tax systems can reduce the efficiency losses brought on by taxes and even increase the growth rate.

Tax revenue is a function of the tax rate times the tax base hence an understanding of Laffer curve theory is of importance because it discloses how tax revenue is created. Government revenue can decrease after a tax increase if the tax base falls by a large enough margins. Tax revenue is determined by the tax rate multiplied by the tax base. If the tax base is reduced by a significant enough margin following an increase in taxes, government revenue may decrease (Kazman, 2014). Whether tax increases or decrease tax revenue relates to how individuals and firms respond to tax changes since their reactions alter the size of the tax base. Laffer explains the model in terms of two effects of taxation: an “arithmetic effect” and an “economic effect” (Laffer 2004)

Laffer (2016) explains the model in terms of two interactive effects of taxation which are arithmetic effect and economic effect. The arithmetic effect assumes that tax revenue raised is the tax multiplied by the revenue available for taxation (or tax base). Thus revenue R is equal to t x B where t is the tax rate and B is the taxable base. (R = t x B). At a 0% tax rate, the model assumes that no tax revenue is raised.

According to the "economic effect," the tax rate will have an impact on the tax base itself. Because taxpayers adjust their behavior in response to the tax rate, the government theoretically earns zero revenue at the highest possible tax rate of 100 percent. Either they lose the desire to work or they figure out a way to pay less taxes. As a result, the "economic effect" of a tax rate of 100% establishes a rate that will maximize revenue.

The Laffer curve hypothesis further explains that, in contrast to popular belief, the curve does not indicate whether a tax cut will result in an increase or decrease in revenue. The hypothesis goes on to say that what happens to revenues as a result of a change in the tax rate depends on a number of variables, including the tax system in place, the time period being considered, the ease of moving into illegal activities, the current level of tax rate, as well as the prevalence of legal and accounting-driven tax loopholes. This gave rise to the claim that people who think the Laffer curve consistently holds that a tax cut results in an increase in tax revenues, whether for good or for bad, are misrepresenting what it hypothesizes.

Increasing tax rates past a certain point, has the unintended side effect of making it harder to collect additional taxes. This is a significant implication of the Laffer curve. There is no way to know exactly what a Laffer curve would look like for a specific economy; all we can do is estimate it. There is general agreement among eminent economists that lowering the federal income tax rate in the US would not increase total yearly tax revenue (Laffer, 2004).

Different economists have discussed the tax rate at which revenue is maximized. According to Fullerton (2008), a comparison of academic studies results in a range of revenue maximizing rates that are centered around 70%, according to the New Palgrave Dictionary of Economics. From a study carried out by Edgar L. in the early 1980s, Fullerton derived the series of academic studies. Mr. Feige and Mr. According to Edwards (2007), McGee developed a macroeconomic Laffer curve model that is dependent on the strength of supply side effects, the progressiveness of the tax code, and the size of the unobserved economy.

Those who oppose tax increases point to the Laffer curve's logic, arguing that a rise in tax rates reduces or only slightly increases tax revenue because people avoid paying taxes, which shrinks the tax base. Additionally, they claim that Kazman's (2014) research indicates that tax cuts have negligible revenue effects. The Laffer curve attracted a lot of attention, particularly in the early 1980s, when the leading supply curve-side economists argued that lower tax rates would mean higher revenues because existing rates were too high to maximize government tax revenue, that is, tax rates were so high that fewer goods were being produced and the overall effect was lower tax revenues (Becsi, 2000).

2.2. Empirical Literature Review

There are empirical works that estimate the Laffer curve for both individual nations and groups of nations. Regarding specific nations, Hsing (1996) estimated a Laffer curve for the USA for the years 1959 to 1991 using the personal income tax and four distinct functional forms: linear, log-log, linear-log, and log-linear. The tax rate that maximizes revenues ranges between 32 percent and 35 percent, and the author confirmed the inverted U-shape for the tax under study. Feige and McGee (1983) used a theoretical model that they simulated and calibrated with empirical data to estimate a Laffer curve for Sweden using the income tax rate. The optimal tax rate for Sweden was between 54 and 62 percent, according to the authors' estimation of a Laffer curve for the marginal tax rate, which took into account direct and indirect taxes as well as social security contributions. Over the years 1960–1985, Ravestein and Vijlbrief (1988) estimated the Laffer curve for the Netherlands using OLS data on tax rates on earnings and indirect taxes. They used an OLS to calculate the ideal tax rate, which they discovered to be 66.9% for the Netherlands in 1970.

Heijman and van Ophem (2005) estimate the Laffer curve for Austria, Belgium, Switzerland, Germany, Spain, France, Italy, Ireland, Japan, Netherlands, Sweden, and the United Kingdom using optimization techniques. According to the black economy that these authors include in their model and their underlying assumptions, the ideal marginal tax rate is always lower than 36 percent. Another key finding is that raising tax rates has a negative impact on revenues and decreases economic activity in the formal economy, both of which contribute to an expansion of the "black economy, or informal economy, or informal economy in other words. This judgment echoes Matthews' (2003) judgment, which is presented below. Using quarterly data and the Linear Probit Model, Ioan (2012) generated an aggregate Laffer curve for Romania for the years 1999 through 2009 from the data. The author draws the conclusion that tax evasion rates rise when tax rates are raised by the government, which is a stronger conclusion than the one that tax rates fall when they do.

Using information from the period between 1972 and 1992, Hansson and Stuart (2003) calculated the Laffer limits for OECD nations. They estimated the model and calibrated it using tax rates (in their model, the tax rates are the marginal tax rates of labor income, capital income, and interest income) as a dependent variable and tax revenues as an independent variable. The authors came to the conclusion that it is difficult to keep the full tax rate higher than 70% after calculating the Laffer limit as a percentage of Gross National Product.

Using a panel of OECD countries from 1981 to 2005, Brill and Hasset (2007) investigate whether a corporate Laffer curve exists (or does not). The authors calculate the corporate tax rate's Laffer curve and came to the conclusion that there is a trade-off between the corporate tax rate and corporate tax receipts. A 31 percent maximum corporate tax rate was predicted. Matthews (2003) for EU-14 used an unbalanced time-series of data for VAT for many countries [Austria (1974-97); Belgium (1971-97); Denmark (1970-95); France (1970-97); Germany (1970-97); Greece (1987-97); Italy (1973-98); Ireland (1972-96); Luxembourg (1971-96); Netherlands (1970-97); Portugal (1986-97); Spain (1986-97); Sweden (1980-1998); UK (1973- 98)], to estimate the Laffer Curve, computed using OLS and LAD. For EU-14, the range's maximum is 18–19 point 3 percent. The author emphasizes that when a government raises its VAT, people try to find other ways to avoid paying it, which lowers consumption. For the EU-14, the USA, and capital taxes, Trabandt and Uhlig (2011) calculated a Laffer curve. These two authors simulate a theoretical model using calibration to estimate the Curves. The empirical calibration period spans the years 1995 to 2007. For labor taxes, the authors determine an optimal tax rate of 30% and 40% for the USA and the EU-14, respectively, while for capital taxes, they determine an optimal tax rate of 40% and 35% for the USA and the EU-14, respectively. Only Sweden and Denmark, according to the authors, remain on the correct side of the optimal tax rate, and the EU-14 remains closer to the ideal tax rate than the USA. In their estimations, these authors do not discover a tax rate for consumption that is five times as effective. When these two authors perform the same estimation in 2012 for the same taxes covering the years 1995 through 2010, they discover that, in the case of the labor tax rate, countries have moved closer to the optimal tax rate, but in the case of the capital tax rate, the tax rate has moved further away from the optimal tax rate. Oliveira and Costa (2013) estimate the Laffer Curve using panel data robust (truncated) estimation and VAT for the EU-27 over the period 2000–2010. The 22.15 percent ideal VAT rate was discovered. The Laffer curve was estimated using all observations, just using observations from periods of low economic growth, and just using observations from periods of high economic growth. The authors used each of these three models.

The Laffer curve and behavioral reactions to taxation were examined by Kazman (2014). By examining the tax code and structure of the USA and closely examining the variables influencing the country's tax revenue, the author of the study attempted to shed light on the tax responsiveness, or how people react to taxation. He evaluated the effects of changing the tax rate by using regression analysis to determine the revenue impact. According to the results of his research, the Laffer curve theory does not exactly correspond to the growth in government revenue, as shown by the econometric analysis of high income earners. According to the study, quadratic regressions depicted by the Laffer curve are not statistically significant; therefore, the claim that taxation is reducing government revenue while tax rates are rising does not appear to be empirically supported.

Herbst (2008) looked at empirical evidence from the corporate income tax for Selected OECD Countries, where only a small number of those countries were examined using a time-series model. The analysis's results confirmed the traditional shape of the Laffer curve for corporate income taxation for those countries, and panel data estimates suggested that the revenue-maximizing tax rate was what the study's panel data estimates indicated.

Iranian Laffer curve estimation using a non-linear approach was the subject of a study by Kalmarzi and Mousavi in 2014. To determine whether a non-linear Laffer curve exists in Iran, this study used the threshold regression model developed by Hansen (1996, 2000). The findings showed that tax rate and real tax income have a significant positive relationship when the tax rate is less than 0.0848, but a significant negative relationship when the tax rate is greater than 0.0848. A tax rate of 8% maximizes the government of Iran's real tax revenue, according to the study.

A study on the relationship between trade liberalization and trade revenue was conducted by Ali (2018) in Pakistan. Using the Laffer curve approach, this study examined the effects of trade liberalization on Pakistan's trade revenue. The method seeks to identify the non-linear relationship between trade openness and trade tax receipts. The study's main goal was to determine the financial effects of trade linearization and trade revenue. The empirical findings showed that, over the long term, trade liberalization has a favorable effect on trade revenue. While average tariff rate is negatively correlated with trade revenue in a non-linear sense, trade revenue is positively correlated with tariff rate in a linear sense.

Karas (2012) identified the tax rate that maximizes revenue the Czech Republic. His research is based on sophisticated econometric calculation methodologies that were discussed in earlier works by Hsing (1996). Based on data collected between 1993 and 2010, the study created a modal on the correlation between the tax rate at which individual income is taxed and the revenue generated. The two models' final findings showed that a small change in tax rates might result in a modest increase in tax revenue.

2.3. Synthesis and Knowledge Gaps

The empirical studies have not successfully counter the inquiry on the validity of Laffer curve in Tanzania and how it could either reduce or increase the current Tanzania tax rate. The empirical findings have been diverse due to uniqueness of country's` tax rate, country's revenue policy and taxpayer's sensitivity to changes in tax rates and relative changes in taxpayers' response to changes in tax rate. Laffer curve effect is demonstrated by way of relationship between revenue and the tax rate. Most tax reforms in Tanzania and many developing countries have been focusing on increasing revenue. This basically means increasing tax rate and tax base hence placing a larger burden on taxpayers. This type of revenue collection is characterized by low compliance percentage, high tax evasion. This led a country opting to other source of income that mighty has an aggregate effect on future economy of a country. This this study have a role in showing that traditional tax reforms must look at relationship between tax revenue and tax rate that lead to optimal tax that will lead to maximum revenue.

CHAPTER THREE
METHODOLOGY

3.1. Model Specification

The relationship between the tax rate and tax revenue is assumed to be nonlinear as prohibitively high rates of the taxation may lead to declining tax revenue. A quadratic form is therefore applied to estimate the effects of average tax rate on total tax revenue. The overall marginal effect of tax rate on tax revenue is then $(\gamma_1 + 2\gamma_2 t)$ and hence depends on *t.*[1]The revenue-maximizing rate of trade taxation is obtained by solving for *t* in the following equation: $(\gamma_1 + 2\gamma_2 t) = 0$, that is $t = -\gamma_1 / 2\gamma_2$ [2]. Thus, the model is expressed as

$$\log TR_t = \gamma_0 + \gamma_1 t_t + \gamma_2 (t)^2 + \gamma_3 \log(GDP_t) + u_t$$

(3.1)

where	$\log TR_t$	=	Log of tax revenue at time *t*
	t_t	=	Tax rate defined as a ratio of tax revenue to GDP at time *t*, , i.e. $t_t = \frac{TR_t}{GDP_t}$
	t_t^2	=	Tax rate squared, $\left[\frac{TR_t}{GDP_t}\right]^2$
	$\log(GDP_t)$	=	Log of GDP at time *t*
	$\beta_i \quad i = 0, 1, 2, 3$	=	Parameters to be estimated
	u_t	=	Error term, $u_t \sim N(0, \sigma^2)$

Traditionally, empirical estimations of the Laffer curve only use the tax rate as explanatory variable and the tax revenues as the dependent variable. A negative and significant value for coefficient "t_t" and a positive value for coefficient "t_t^2" are both necessary for the existence of a Laffer Curve. When

[1]see. Ebrill et al., (1999)
[2]see Khatty and Rao,(2002).

we can guarantee that circumstance, we are in the presence of a Laffer Curve and can determine the best tax rate to collect the highest amount of tax revenue possible for a particular state. The optimal tax rate is obtained by maximizing equation (3.1)

As noted earlier, there are several theoretical/mathematical formulations of the Khaldun-Laffer curve, each of which is based on different assumptions. In the literature, empirical studies on the Laffer curve mainly employ single factor model. In other words, they are taking tax revenue as dependent variable and tax rate and its square as only independent variables such as Hsing (1996), Karas (2012). However, omitting a relevant variable causes specification error, called “omitted variable bias”. Underspecifying the model by excluding a relevant variable violates one of the Gauss-Markov assumptions: Zero conditional means of the error term (Woolridge, 2012). This violation harms the unbiasedness of estimated coefficients. Hence, if the expected values of estimated coefficients are not equal to population parameters, it will be meaningless to interpret them. In order to prevent this misspecification problem, some control variables are included in our analysis. In the present paper, we depict the Khaldun-Laffer curve by controlling other determinants of personal income tax revenue different from its tax rate. These variables are listed as follows: i) GDP per capita, ii) share of agriculture, iii) share of trade, iv) share of external debt, v) inflation rate. With the exception of GDP per capita and the inflation rate, all other variables are expressed as a fraction of GDP. Wagner and Weber (1977) argue that as economy progress, i.e. increase in per capita income, is observed, public sector tends to expand. This principle is called as Wagner's Law in the literature. In this paper GDP per capita is used as a proxy for the overall development of the economy. Combining with the Wagner's Law, a positive relationship is expected between personal income tax revenue and GDP per capita (Gupta, 2007). On the other hand, sectoral decomposition of output is significant for tax revenue because collecting tax from certain industries is easier (Leuthold, 1991; Stotsky and WoldeMariam, 1997; Gupta, 2007). Lack of bookkeeping and existent of subsistence farming make the agriculture sector for many developing countries difficult to tax. So, the share of agriculture is used as a proxy for an informal sector that cannot be taxed properly from personal income. Hence, personal tax revenue is negatively affected by the share of agriculture (see Stotsky and WoldeMariam, 1997; Agbeyegbe et al., 2004; Gupta, 2007; Mahdavi, 2008).

The best sample size for time series analysis has not been widely agreed upon in the literature. Large sample sizes increase the accuracy of population estimates. Thus, the adage "more is better" fits nicely. Some control variables are incorporated into our analysis to help prevent this misspecification issue. In the current study, we illustrate the Laffer curve by manipulating factors other than the tax rate that affect the revenue from personal income taxes. These factors are as follows: (i) GDP per capita, (ii) agricultural share, (iii) trade share, (iv) external debt share, and (v) inflation rate. All other variables are expressed as a percentage of GDP, with the exception of GDP per capita and inflation rate. According to Wagner and Weber (1977), as the economy develops, i.e. as per capita income rises, the public sector tends to grow. Wagner's Law is the name given to this rule in literature.

In this study, the GDP per capita is used as a stand-in for the economy's overall level of development. Personal income tax receipts and GDP per capita are predicted to have a positive correlation when combined with Wagner's Law (Gupta, 2007). However, because it is simpler to collect taxes from some industries than from others, sectoral decomposition of output is important for tax revenue (Leuthold, 1991; Stotsky and WoldeMariam, 1997; Gupta, 2007). It is challenging to tax the agriculture sector in many developing nations due to poor bookkeeping and the prevalence of subsistence farming. As a result, the percentage of agriculture is used as a stand-in for the informal economy, which is unable to be fairly taxed from personal income. Therefore, the proportion of agriculture has a negative impact on personal tax revenue (see Stotsky and WoldeMariam, 1997; Agbeyegbe et al. Gupta (2007), Mahdavi (2008), and 2004). Since high inflation rates also imply increases in nominal wages, the relationship between the two variables is simple. According to the progressivity of the personal income tax, as incomes rise, they are taxed at higher rates. This phenomenon is known as "bracket creep," which depends on the rate of inflation and the structure of the progressiveness. Thus, by increasing the real tax burden of individuals who pay personal income taxes, or what is known in the literature as "taxflation," bracket creep enables the government to generate artificially higher levels of personal income tax revenue. The so-called "Tanzi effect," also known as the "Olivera-Tanzi effect," is a phenomenon that appears when one or more of the following conditions exist: high inflation, slow tax collection, or an inelastic tax structure. On the other hand, it is also very likely that inflation will reduce the real value of tax revenue.

In summary, theoretically, it is very likely that inflation will have an impact on personal tax revenue, either favorably or unfavorably, depending on the scenario we discussed above. The World Bank database's calculation of the Consumer Price Index (CPI) annual percentage change is known as the inflation rate. External debt is a further indicator of the government's performance in terms of revenue. The government must raise tax revenue when it needs more money to pay for its obligations, such as paying off debt. Therefore, a positive outcome is anticipated for the external debt (Gupta, 2007). Various factors, including international trade, influence tax revenue. The sum of exports and imports as a percentage of GDP is frequently used in the literature as a proximate indicator of how open an economy is to foreign trade. First off, Adam Smith is credited with popularizing the notion that trade has a positive impact on economic growth. Therefore, personal income tax revenue rises as income does. Additionally, since foreign trade activities take place at specific locations, they are easier to tax than domestic activities.

3.2 Definitions and Expected Signs on Variable Parameters

Table 3.1 presents the definitions and expected signs of variables used in the tax revenue equation. For estimation, the ratio of tax revenue to GDP is considered as a proxy of tax rate. With this measure, an increase in the index is considered to indicate greater prohibitive range.

Table 3.1 Definitions and Expected Signs on Variable Parameters

Variable	Abb.	Definition	Expected Sign
Tax revenue	$\log TR_t$	Log of tax revenue	
Tax rate	t_t	Ratio of tax revenue to GDP, i.e. $t_t = \frac{TR_t}{GDP_t}$	$\gamma_1 > 0$
Tax rate squared	t_t^2	$\left[\frac{TR_t}{GDP_t}\right]^2$	$\gamma_2 < 0$
Tax base	$\log(GDP_t)$	Log of Gross Domestic Product	$\gamma_3 > 0$

3.3 Data and Data Sources

This study used annual secondary data, spanning from 1966 to 2020. The number of observations is 50 years. Tax revenue and data on GDP were obtained from Bank of Tanzania: A Review of the Role and Functions of the Bank of Tanzania (1961-2011), and Tanzania Revenue Authority: National Tax Statistics, 2020. Other variables namely tax rate and tax rate squared were computed as shown in Table 3.1

3.4. Time Series Characteristics of the Data.

3.4.1. Unit Root Test.

The use of time series variables in estimating econometric models requires that a stochastic process generating the data series be stationary. The distinction between whether the levels or differences of a series is stationary leads to substantially different conclusions and hence, in principle, it is important to test the order of integration of each variable in a model, to establish whether it is non-stationary and how many times the variable needs to be differenced to derive stationary series (Johansson *et a.l*, 2010). Engle & Granger (1987), define a non-stationary time series to be integrated of order *d* if it achieves stationarity after being differentiated *d* times. This notion is usually denoted by *Xt ~I(d).* The null hypothesis of the unit root implies non-stationarity, such that if the null hypothesis is rejected then the series is stationary. Therefore no differencing in the series is necessary to induce stationarity. There are several ways of testing for the presence of unit root. For the case of this study, all the series will be tested for the probable order of difference stationarity by using the augmented Dickey-Fuller (ADF). The idea behind the ADF unit root tests is that it makes a parametric correlation for higher-order correlation by assuming that the series follows autoregressive process and adjusting the test methodology. In addition, the ADF test controls for higher-order correlation by adding lagged difference terms of the dependent variable to the right-hand side of the regression.

3.4.2 Testing Cointegration

Co-integration test provides the basis for tracing the long-term relationship between the variables. Two or more variables are said to be co-integrated if their linear combination is integrated to any order less than‘d’. There are two procedures that are popularly used to identify and estimate the cointegrating vectors and the short run adjustment parameters. These are Granger and Engle two-step estimation procedure and the Johansen procedure. The former procedure involves normalizing the cointerating vector on one of the variables, which makes the assumption that the corresponding element of the cointegrating vector is non-zero. The Johansen procedure is a multivariate approach, the estimation of which would consume a lot of degree of freedom. In this study long run relationship among the variables will be tested using the Johansen and Juselius cointegration technique. The theory of co-integration put forward by Johansen & Juselius (1990) indicates that the maximum likelihood method is more appropriate in a multivariate system.

3.5 Validation and Reliability.

Prior to the actual study, the research will try to visits informally the area of study in order to familiarize with the respondents, thereafter the researcher will be carried out the exercise, where necessary making corrections to the instrument in order to make them effective during the actual research.

3.6 Data analysis Plan.

According to Rwegoshora (2006), “data analysis is the ordering of the data into constituent puts in order to obtain answers to research questions”. The researcher will collect raw data as described above, later evaluation will done to see whether their expatiation/theme grading data characteristics and quality have been met.

3.7 Ethical considerations

Researcher assured the research ethics have been adhered. That is confidentiality and freedom, plagiarism and feedback. The study generally used data provided by the Central Bank of Tanzania and the publications and journals that are published and widely available that are relevant to this study, nevertheless the information collected had been treated with integrity and without any manipulations to fit this study. Plagiarism has been highly avoided accordingly in this study to extent of enhancing the integrity. The researcher has also aided with all ethical principles in the whole process of the project. Computations have been done using prescribed software in real time to avoid misleading results and making the authentic to support the recommendations given.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.1. Empirical Results and Discussion

4.2. Unit Root Test.

Test for stationarity of tax revenue and real GDP before their linear combination was conducted using both Augmented Dickey-Fuller (ADF) and Phillips-Perron tests. Selection of the numbers of lags was made using t-statistics. All variables were tested for unit root using 1 lag by including only a constant and also by including a constant and trend. Constant and trend option was selected because it is a general case. The whole process was done in levels, first difference, and second difference. The results for unit root test are presented in Table 4.1.

Figure 4. 1: Correlogram of Tax Revenue

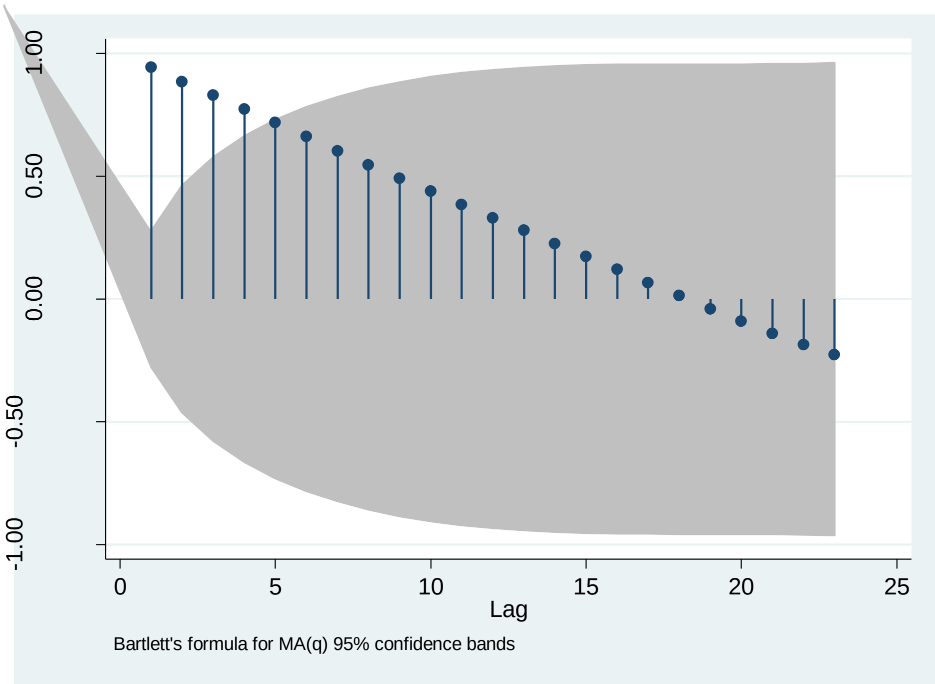


Figure 1: Partial Correlogram of Tax Revenue

H0: There is no serial correlation in the series;

H1: There is serial correlation in the series.

Source: Author's computations using data from Bank of Tanzania

Figure 2: Partial autocorrelation of the Log Tax Revenue:

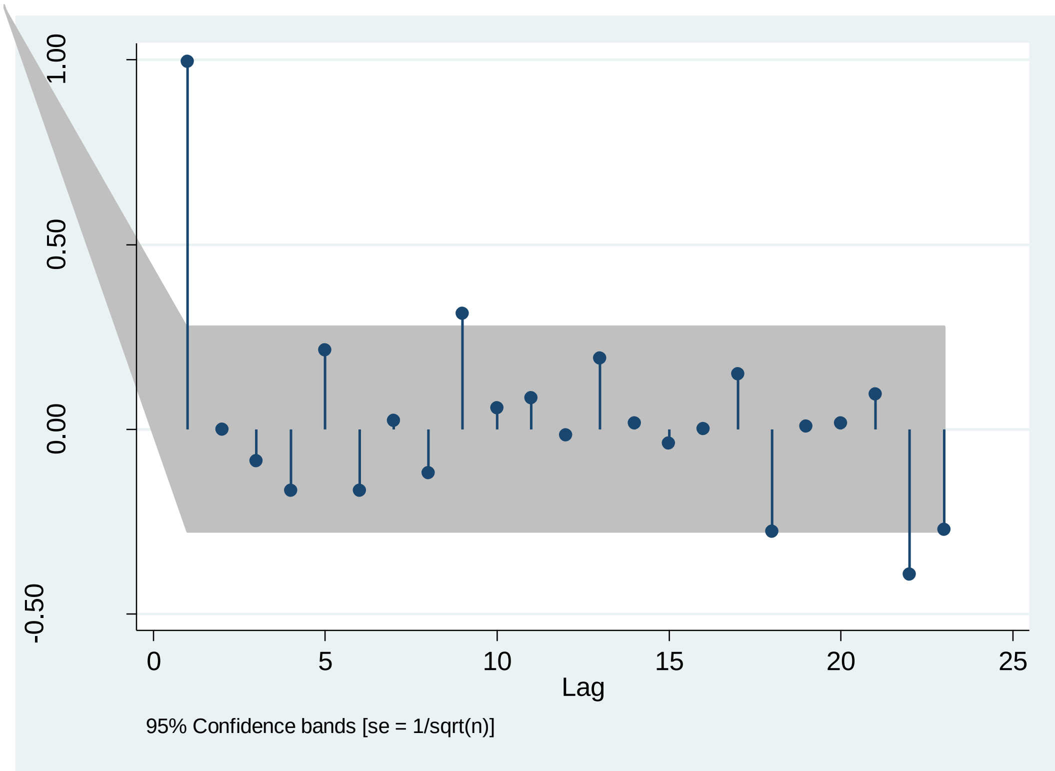


Figure 2.Partial autocorrelaton of tax revenue.

There is no serial correlation in the Tax Revenue.

There is serial correlaion in the Tax revenue .

Source: Author`s computations.

Figure 3:

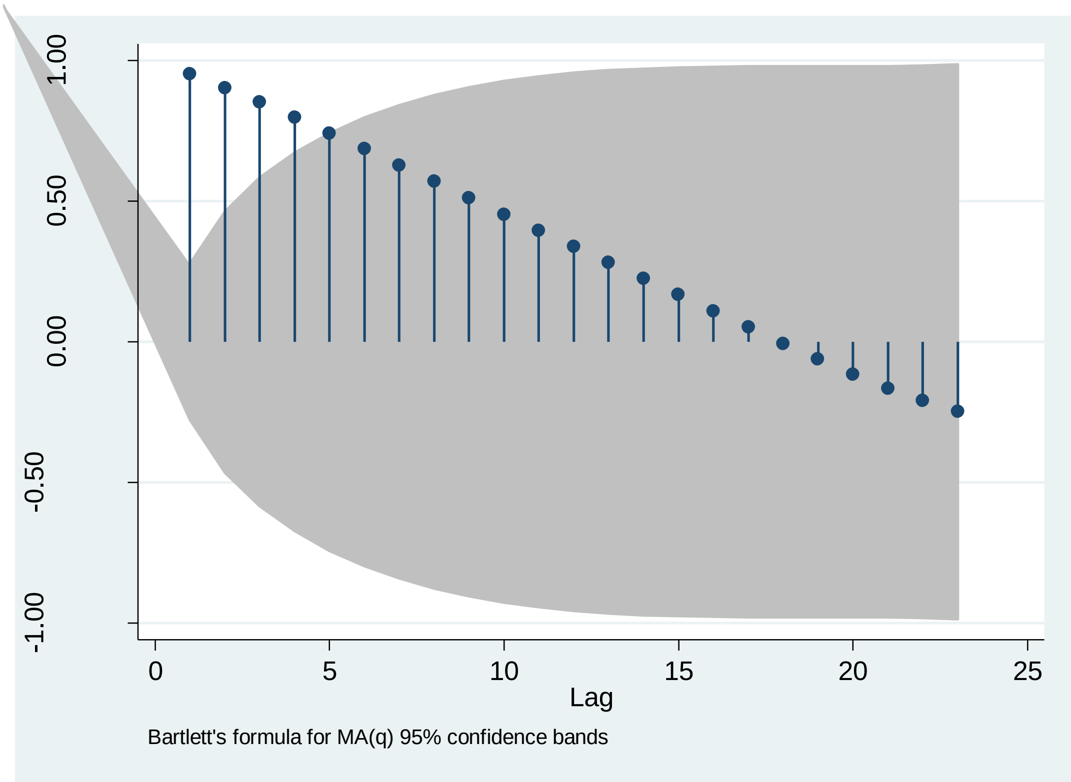


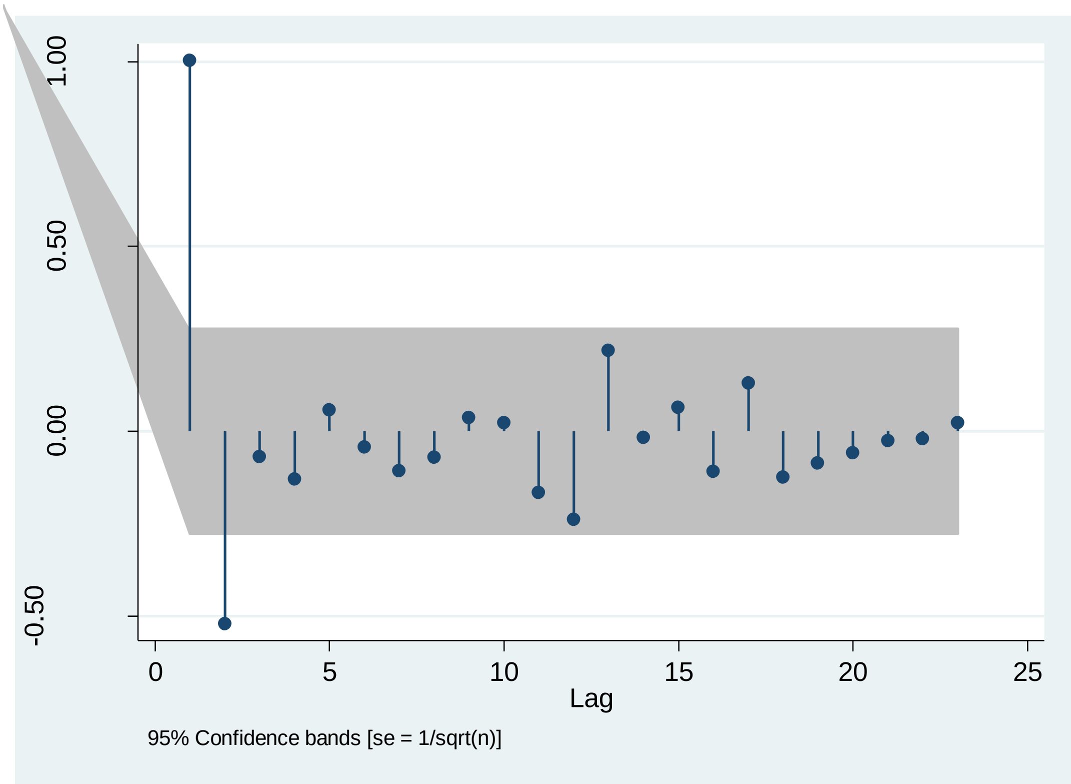
Figure 3

There is no serial correlation in series.

There is serial There is serial correlation in the series. Source:

Source: Author’s computations using data from Bank of Tanzania.

Figure 4: Partial autocorrelation of Log of GDP

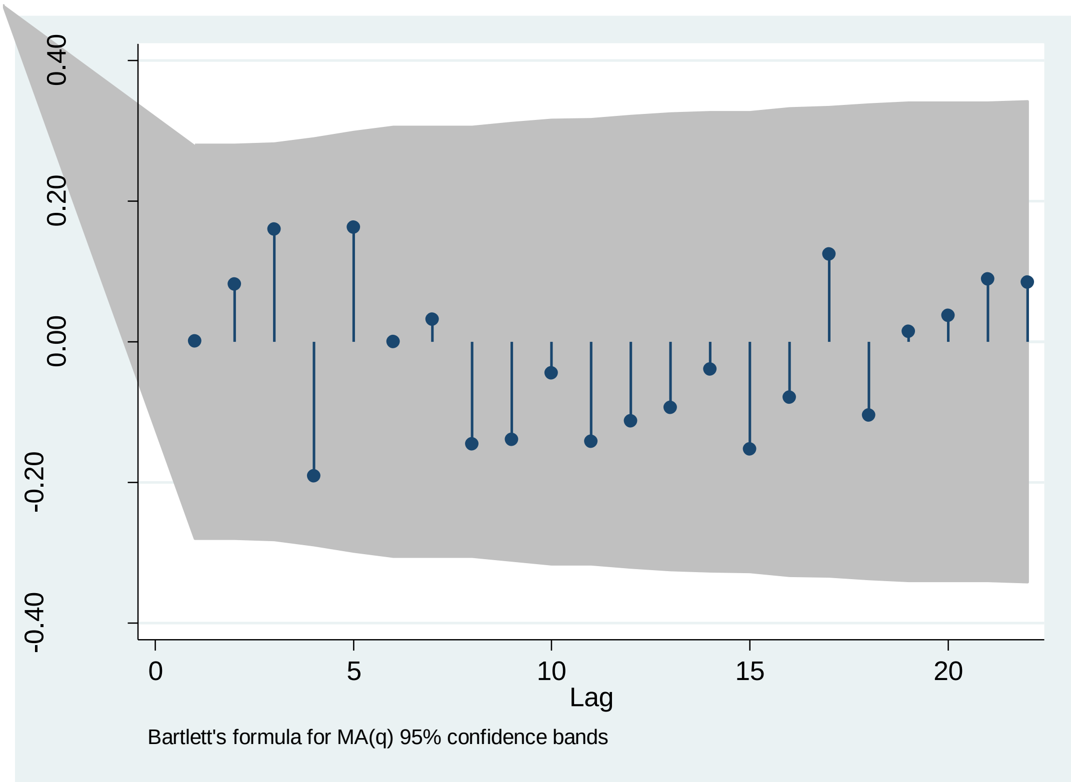


H0: There is no serial correlation in the Log of GDP

H1 There is serial correlation in the Log of GDP.

Source: Author`s Computations.

Figure 5: Autocorrelation of D. Log of Tax revenue.



H0 There is no serial correlation in the D. Log of tax revenue.

H1 There is serial correlation in the D. Log of Tax revenue.

Figure 5: Autocorrelation of the D. Log of Tax revenue.

Figure 6: Partial autocorrelation of D. Log Tax Revenue.

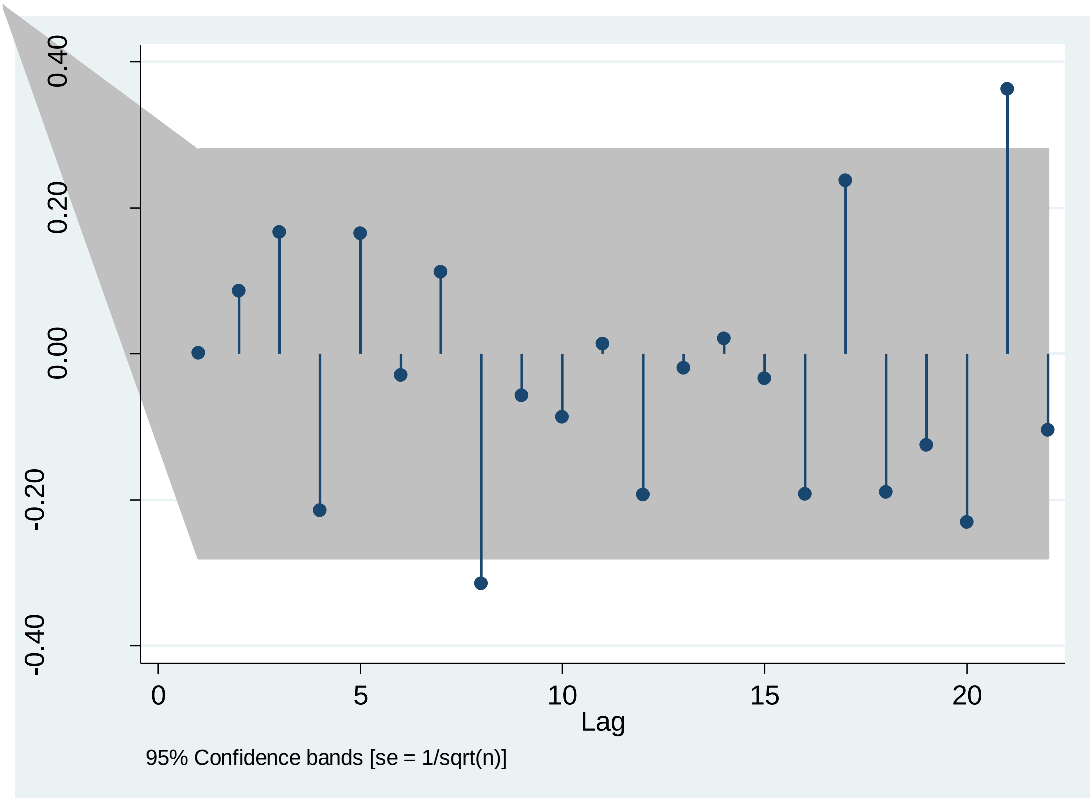


Figure 6: Partial autocorrelation of D. Log Tax Revenue.

There is no serial correlation in the D. Log tax revenue.

There is serial correlation in the D. Log tax revenue.

Source: Author`s computations.

4.4. Cointegration Test

The fact that all the variables are integrated of order (1), Johansen Cointegration test is used to test whether there is a long- run relationship among the variables. The reason behind this is if cointegration exists among the variables, VECM approach will be used to determine long term relationships.

However, as stated earlier, prior to the Johansen`s test of co-integration and the VECM estimation, the optimal lag selection criteria is employed to determine the lad length to be used in carrying out the estimation. To determine appropriate lag length, a VAR is estimated with an arbitrary lag length. The lag order selection criteria for standard VAR are presented in Table 6. Based on the final prediction error (FPE), Akake information criterion (AIC) and Hannan-Quinn information criterion, the appropriate lag length is 2. The results of the Johansen Cointegration Analysis with 2 lags order are presented in Table 7. As reported in the Table, the Cointegration test results for the trace test indicates three cointegrating equations at the 5 percent significance level. Accordingly, it can be said that a long-run relationship exists among the macroeconomic variables included in the model.

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.444949	69.59752	47.85613	0.0001
At most 1 *	0.359011	41.34016	29.79707	0.0015
At most 2 *	0.335151	19.99251	15.49471	0.0098
At most 3	0.008281	0.399148	3.841466	0.5275

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

4.4 Descriptive Statistics.

	TAX	GDP	RATE	RATESQ
Mean	1299255.	9065789.	12.47128	170.3129
Median	99864.00	958483.0	10.72542	115.0346
Maximum	9891680.	53467939	20.73536	429.9553
Minimum	556.0000	7217.000	7.704032	59.35211
Std. Dev.	2463654.	14569654	3.883509	106.3399
Skewness	2.244067	1.715254	0.599952	0.816954
Kurtosis	7.133547	4.816198	1.852912	2.288558
Jarque-Bera	77.56156	31.38950	5.740788	6.616256
Probability	0.000000	0.000000	0.056677	0.036585
Sum	64962741	4.53E+08	623.5641	8515.646
Sum Sq. Dev.	2.97E+14	1.04E+16	739.0006	554101.0
Observations	50	50	50	50

Table: Regression Results: Dependent Variable: DLTax Revenue

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.012585	0.003902	3.225519	0.0024
D(LGDP)	0.905999	0.043016	21.06199	0.0000
D(TAX RATE)	0.056699	0.004491	12.62474	0.0000
D(TAX RATE SQ)	-0.000911	0.000146	-6.222492	0.0000
RESID(-1)	-0.363914	0.143678	-2.532843	0.0150

R-squared	0.945782	Mean dependent var	0.086604
Adj. R-squared	0.940738	S.D. dependent var	0.049524
S.E. of regression	0.012056	Akaike info criterion	-5.900174
Sum squared resid	0.006250	Schwarz criterion	-5.705257
Log likelihood	146.6042	Hannan-Quinn criter.	-5.826514
F-statistic	187.5222	Durbin-Watson stat	1.976685
Prob(F-statistic)	0.000000		

Source: Author's Estimates

Results show that real GDP has a positive effect on tax revenue. The tax rate has a positive effect on tax revenue, however a prohibitive tax rate may lead to a declining tax revenue collection as it is shown by a negative relationship between tax rate squared and tax revenue.

4.5 Diagnostic Test

Presence of autocorrelation and heteroscedasticity disrupts the classical assumption of the OLS and hence invalidate statistical validity of the parameter estimates. Therefore the diagnostic analysis is crucial to ascertain if the modal is statistically adequate. These tests are focusing on the properties of residuals.

Included observations: 48

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. | . |	. | . |	1	0.008	0.008	0.0030	0.956
.*| . |	.*| . |	2	-0.099	-0.099	0.5116	0.774
. |** |	. |** |	3	0.224	0.227	3.1776	0.365
. | . |	.*| . |	4	-0.048	-0.071	3.3028	0.508
. | . |	. | . |	5	-0.056	-0.007	3.4759	0.627
. |*. |	. |*. |	6	0.152	0.097	4.7897	0.571
. | . |	. | . |	7	0.039	0.052	4.8799	0.675
. | . |	. |*. |	8	0.054	0.093	5.0543	0.752
. | . |	.*| . |	9	-0.012	-0.072	5.0632	0.829
. | . |	. |*. |	10	0.065	0.086	5.3330	0.868
. |*. |	. |*. |	11	0.119	0.096	6.2493	0.856
.*| . |	.*| . |	12	-0.190	-0.192	8.6558	0.732
.*| . |	.*| . |	13	-0.109	-0.124	9.4744	0.736
. |*. |	. | . |	14	0.111	0.030	10.349	0.736
.*| . |	. | . |	15	-0.119	-0.053	11.382	0.725
. | . |	. |*. |	16	0.046	0.089	11.544	0.775
. |*. |	. | . |	17	0.122	0.016	12.700	0.756
.*| . |	. | . |	18	-0.067	0.009	13.060	0.788
. | . |	. | . |	19	0.018	0.052	13.088	0.834
. | . |	. | . |	20	0.010	-0.019	13.097	0.873

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.109194	Prob. F(2,41)	0.3395

Obs*R-squared	2.463826	Prob. Chi-Square(2)	0.2917

Heteroskedasticity Test: Breusch-Pagan-Godfrey

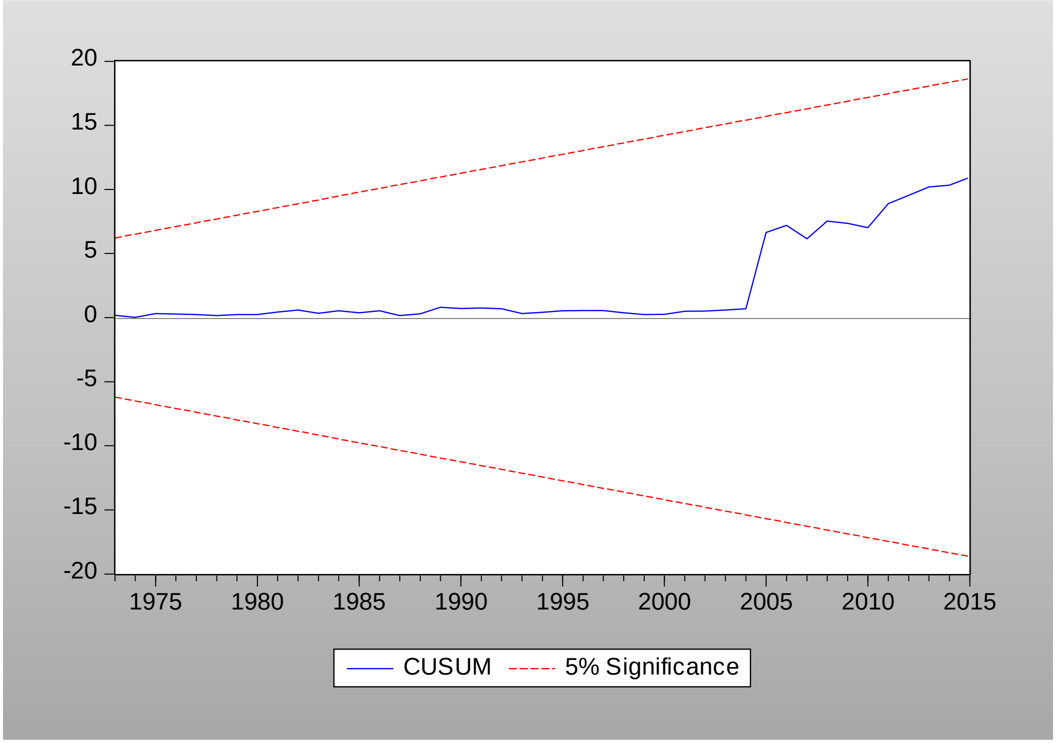
F-statistic	0.953247	Prob. F(4,43)	0.4428
Obs*R-squared	3.909671	Prob. Chi-Square(4)	0.4184
Scaled explained SS	29.60750	Prob. Chi-Square(4)	0.0000

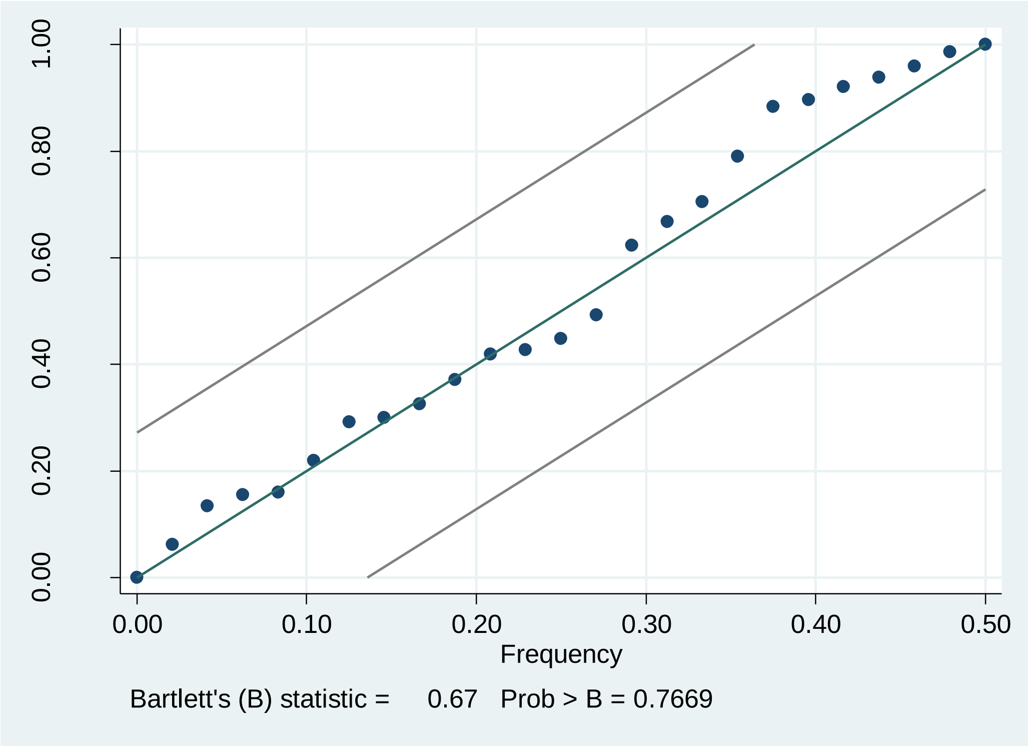
Heteroskedasticity Test: ARCH

F-statistic	0.070302	Prob. F(1,45)	0.7921
Obs*R-squared	0.073312	Prob. Chi-Square(1)	0.7866

Ramsey RESET Test
Equation: UNTITLED
Specification: D(LTAX) C D(LGDP) D(RATE) D(RATESQ) RESID03(-1)
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.823680	42	0.4148
F-statistic	0.678449	(1, 42)	0.4148
Likelihood ratio	0.769174	1	0.3805


20
15
10
5
0
-5
-10
-15
-20
1975
1980
1985
1990
1995
2000
2005
2010
2015
CUSUM
5% Significance



Source: Bank of Tanzania (Various) and Author's computations

CHAPTER FIVE

CONCLUSION, RECOMMENDATIONS, POLICY IMPLICATIONS AND CRITICAL EVALUATION OF THE STUDY

5.1 Introduction.

This chapter provides a summary of the findings, conclusion and recommendations. Policy implications as well as identification of areas that needs further research as the result of the study findings. This chapter will also show the limitations as well as critical evaluation of this study.

5.2 Summary of the Findings.

The primary objective of the study is to test the validity of Laffer curve hypothesis in Tanzania. The study explored the taxation system of Tanzania by looking at areas like tax is collection, the level of compliance and the different parameters that the government uses to measure tax efficiency. Then a discussion on validity of Laffer curve hypothesis in Tanzania. Detailed discussion of the about Laffer curve theory as well as how its applicability has been useful in different tax territories. The study specifically covered tax rates which are based on GDP covering 50 years analysis. The study also was supported by time series methods in unit root test, Cointegration Test, Descriptive Statistics and Diagnostic Test conducted to provide an evidence for to see the validity of the Laffer Curve hypothesis in Tanzania.

5.3 Conclusion.

This study empirically examined the optimum tax rate that will determine highest tax revenue. The study looked validity of Laffer curve hypothesis in Tanzania. The Laffer curve opposes higher tax rates that are source of lack of productive incentives; discourage work hence less tax revenue to the government. The study employed an analysis using time series where specifically Time series characteristics of data were analysed using both units root and Cointegration tests. The study focused on understanding what could be an optimum tax rate and by using Laffer curve theory then understanding the Validity of Laffer curve hypothesis in Tanzania. Cointergration test provided the basis for tracking the long term relationship between the variables and in study tax rate and Tax revenue in Tanzania. The Laffer curve indicates relationship between tax rate and tax revenue. The threshold that the tax curve indicates a point where and deviation from this value reduces the tax revenue. The non-linear theory of Laffer, the time series test the presence of relationship between tax rate and tax revenue in Tanzania. The Empirical results indicated a positive relationship between tax rate and tax revenue and when the tax rate is 28.5 the maximum revenue can be obtained.

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