REVENUE PRODUCTIVITY OF THE TAX SYSTEM IN NAMIBIA

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ABSTRACT

Namibia depends mainly on tax revenue to finance the budget. This study evaluate the revenue productivity of Namibia's overall tax system on the basis of estimates of tax buoyancy and tax elasticity, using the quarterly time series data for the period 2001 to 2014. Secondary data from ministry of finance was used in this study. Time series properties were tested using Dickey fuller (ADF) to test the existence of unit roots among the variables. The variables were found to be non-stationary but became stationary at their first differences. The residual based test to cointegration revealed there is cointegration among the variables. The study employed Ordinal Least Square to regress the equations. The tax buoyancy was computed using Singer's (1968) Dummy variable technique to abstract from discretionary changes in the tax system. Tax elasticity had been estimated using two methods, historical time-series tax data (HTSTD) adjusted to discretional tax measure (DTMs) and unadjusted HTSTD with dummy variables as proxies for DTMs. In spite of the positive impact that the reforms had on tax buoyancy and elasticity findings revealed that this was not sufficient to generate adequate revenue to eliminate the recurring budget deficit. The estimation results revealed that the tax system as whole is income inelastic and not buoyant.

DECLARATIONS

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LIST OF ABBREVIATIONS AND ACRONYMS

ADF   Augmented Dickey Fuller

DTM   Discretional Tax Measures

GDP   Gross Domestic Product

GGGD Gross General Government Debt

ECM   Error Correction Model

HTSTD Historical Time Series Tax Data

ITAS   Integrated Tax Administration System

MTEF Medium Term Expenditure Framework

OLS   Ordinal Least square Method

PAM   Proportional Adjustment Method

PAYE Pay As You Earn

PPT   Petroleum Products Tax

SACU   Southern Africa Customs Union

VAT   Value added Tax

VECM Vector Error Correction model

ACKNOWLEDGEMENT

DEDICATION

I dedicate this study to my family for their unconditional love and support.

CHAPTER ONE: INTRODUCTION

1.1 Orientation to the proposed study

Taxation is an absolute and sustainable source of revenue for government and a tool for fiscal policy and macro-economic management. In principle according to Adam Smith, for a tax system to be productive it should be able to yield sufficient revenue for the treasury and the government. There should be no need to resort to deficit financing which possess negative impact on the growth of the economy (Yousuf&Huq, 2013). Taxation is used as mechanism of providing the much needed revenues for socio-economic development. Moreover, taxation is tool for macro-economic policy and revenue mobilization to finance government deficit.

Most developing countries like Namibia are going through the hardship of mobilizing sufficient revenues to meet their growing demand for public services. Insufficient public revenue is attributed to lower levels of tax revenues and slow economic growth (Musa, Bulus, Nwokolo and Yuni, 2016). Of recent fiscal deficit had greatly hampered the operation and performance by the government in the provision of public goods and services, funding of expenditures including drought and pandemics outbreak.

A productive tax system is the one that yield adequate revenue to cover government spending, thus tax productivity is defined as a rational means of raising sufficient or adequate revenue for government spending on goods and services without excessive

borrowing to discourage economic activities (Bonga,2009). Tax productivity is estimated by employing the concepts of elasticity and buoyancy.

This study uses time series data to estimate tax elasticity and tax buoyancy in Namibia for the period 2001 – 2014. The measurements of tax productivity is very essential in cases where there are amendments, change in tax rate and other reforms in different tax heads or in the tax system as whole. The main objective of these reforms and changes is to deepen and broaden the existing tax base. Econometric techniques generate coefficients of interest and these are interpreted to indicate the level of productivity of different taxes in the economy. This could assist revenue officials to understand the productivity of the tax system as a whole, or of individual tax heads, and hence use it for future forecasting and planning.

1.2 Statement of the Problem

Taxation is the main source of government revenue in Namibia with the contribution of 65% to total revenue (Bank of Namibia, 2015). According to this report Namibia is experiencing persistent increase in government expenditures and a drop in government revenue. The report further indicates a public debt to GDP of 34%. Government Debt to GDP in Namibia averaged 20.8% between 1993 until 2015, reaching the highest ever 34% in the last quarter of 2015 and the lowest recorded is 14.2% in the second quarter of 2010.

Generally, developing countries are confronted by challenges such as such as corruption, rent seeking individuals and bureaucrats that limit the optimal mobilization of revenue. Besides the above chronic challenges to all developing countries, Namibia is particularly heavily reliant on mineral exports, with a very small manufacturing sector (Kalumbu and Sheefeni, 2014). Hence, any economic or natural disturbance easily wreak havoc with its economy and hence government's ability to raise adequate revenue. For example, Namibia is faced with worsening budget deficit which is partly attributed to recurring drought, freezing and or reduced capital projects e.g. the rehabilitation railways and mass housing projects. One of the main contributing factors for the declining revenue is the substantial reduction in SACU receipts resulting from the prevailing global and regional economic conditions (Namibia Economist, Mar 16,2012).

Namibia fiscal problems are compounded by the fact that recently the international credit rating agency Fitch downgraded Namibia economic outlook from stable to negative, exacerbating fears of sovereign downgrade. This came to pass when Moody's very recently, in August 2017 down-graded Namibian sovereign credit rating to junk status, with a negative economic outlook. One of the main reasons for the downgrade in Namibia's economic outlook was the soaring public debt. This means that government debt has increased beyond the accepted threshold. Government has initiated as a response to the imminent downgrade fiscal consolidation (austerity) measures which have sent ripples throughout the economy. This is a deliberate attempt to reduce Public debt.

In order to finance this difference between expenditure and total revenues, government uses alternatives to taxation such as money creation that may lead to inflationary pressure and borrowing that may cause a debt crisis (Tofu, 2008). This raises the need to strengthen domestic revenue base and collection, rather than resorting to printing more money. It is hence important to estimate the productivity of the Namibian tax system. Thus the current study is an attempt to estimate the productivity of the Namibian tax system in order to assist policy makers to take appropriate measures to deepen and diversify the revenue base. Due to the lack of recent studies on the tax productivity there is a greater need to analyse the adequacy of the tax revenue given a number of changes in the tax brackets, amendments and introduction of new taxes.

1.3 Objectives of the study

The overall objective of this study is to assess the productivity of the tax system in Namibia. The specific objectives of the study are:

- To estimate the elasticity and buoyancy of the tax system in Namibia.

- To enrich the literature on the productivity of the tax system in Namibia.

- To draw policy recommendations from the findings of the study on how in future Namibia's tax revenue collection and administration could be improved.

1.4 Significance of the study

There is a greater concern from various stakeholders including the civil society, foreign, local investors, and the general public and government sectors that Namibia does not have a stable revenue base to finance its ever increasing expenditure.There is hence an urgent need to curb the ever recurring fiscal deficits affecting Namibia. This concern increased following the recent downgrade of Namibia's economic outlook by Fitch Rating Agency from stable to negative, and the very recent downgrade by Moody's of Namibia's sovereign credit rating to junk status. Budget deficit and gross general government debt (GGGD) were cited as the main drivers to negative rating. Due to these concerns, potential investors could consider Namibia not safe for investment. In order to address possible further downgrading, a number of government capital projects were put on hold including the recruitment in the public service, citing the lack of funds. Given the above concerns, this study will analyse the productivity of the tax system and provide possible advice and policy direction to policy makers and presents options on how to deepen and diversify the revenue base to increase revenue mobilisation. This study is vital as it will help to determine if the government is keeping track on tax mobilization with GDP growth. In addition, estimation of buoyancy and elasticity of individual tax will help the fiscal authority to ascertain taxes that are productive. This study will further enrich economic literature on the Namibian tax system.

1.5 Limitation of the Study

There are some limitations to this study. The first one is that Namibia got independence in 1990 hence most data in the early years of independence are not available. Value added tax (VAT) was introduced in 2000, this replaced the general sales tax which was inherited from the colonial era hence data on general sales tax is not available. For this reason this study makes use of the data over the period 2001/2 to 2014/5 which is obtained with the written approval from the permanent secretary in the Ministry of Finance.

1.6 Organisation of the Study

This study consists of six chapters. Chapter one is the Introduction and it consists of the orientation of the proposed study, the research problem, objectives of the study, and the significance of the study and lastly the limitation of the study.Chapter two contains a brief overview of the Namibian tax system. Reviews of relevant theoretical and empirical literature is discussed in Chapter three. Chapter four presents the methodology of the study. This consists of the model specification, estimation techniques and data descriptions. In Chapter five the regression analysis and discussion of empirical results is presented. Finally Chapter six provides the conclusions and policy recommendations.

CHAPTER TWO: OVERVIEW OF THE NAMIBIA TAX SYSTEM

2.1 Introduction

Like other developing countries Namibian government is facing challenges of mobilising enough resources to finance capital projects, poverty alleviation and to attain the targets stated by government in the national development plans. With current reduction in donor funding, the global economic crises and reduction in SACU revenue, Namibia is left with no option but to focus on domestic revenue mobilisation as the best alternative to avail the much needed funds for developmental projects and to address socio economic challenges facing the country.

Namibia gained independence on 21 March 1990. Prior to independence Namibia has been using the tax system of the colonial masters of the time and post-independence Namibia continued to operate under the tax system that was inherited from colonial government until amendments and changes were made some years later. Bonga (2009) defined tax as a fiscal burden laid upon individuals or property owners to support the government. The Namibian tax structure consists of two major direct taxes: individual income tax and corporate income tax and two main indirect taxes: Value Added Tax (VAT) and Value Added Tax on Imports. The Namibian tax system is regulated by the Income Tax Act and Value Added Tax Act 10 of 2000. Employee tax is another tax head collected by the employer from the employee and remitted to the Receiver of Revenue. These taxes are collected and enforced by the Department of Inland Revenue and Customs in the Ministry of Finance. Namibia has a source based tax system which implies that Namibian residents and foreign

nationals are liable to pay tax on the income generated in the country. Thus tax is imposed on taxable income of individual and corporate sourced within Namibia.

In Namibia, the Ministry of Finance of which its mission is "to develop and administer fiscal policy that ensures macro-economic stability, sustainable and equitable socioeconomic development'' is mandated by the constitution to manage public finance and state revenue, to control the government assets and liabilities and overseeing financial regulations, public finances and state revenues.

The Namibian government had been pursuing anumber of amendments over the years with the primary objective of designing a system that is sustainable and productive to fund and sustain the operations of the government without resorting to deficit financing. Post-independence, the main sources of tax revenue have been a share from Southern African Customs Union (SACU), Income tax on individuals and the mining sector and general sales tax which was only operational from independence to 2000. According to the report by the Bank of Namibia (2015),SACU revenue had been contributing a greater portion to total tax revenue up to some few years back when the SACU pool was negatively influenced by global economic crises which resulted in the share dropping from 8 billion Rand to 3 billion Rand. Tax from sales had been the second main contributor to total tax revenue followed by income tax in the first decade after the independence.

Analysis of the medium term expenditure frame work (MTEF) or rolling budget, shows that between 2011 and 2014 total revenue increased progressively from N$ 20.7 billion in 2007 to N$ 24.2 billion in 2010. This was attributed to greater revenue

from SACU common revenue pool and revenue enhancing policy, driven by enhanced revenue collection and improved tax administration. Namibia has achieved a commendable tax to gross domestic product revenue collection ratio, which average 34.3 percent in recent years, as seen against the global average of about 16.2 percent. In exclusion of SACU revenue, the national (Namibia) tax to GDP ratio stood at an average of 23.2 percent, which can be compared to the rest of the world (Bank of Namibia, 2015).

Namibian government debt to GDP which measures the country's ability to pay its debt has a direct effect on the cost borrowing and the bond yields. The figure below presents an overview of Namibia's debt to GDP ratios.
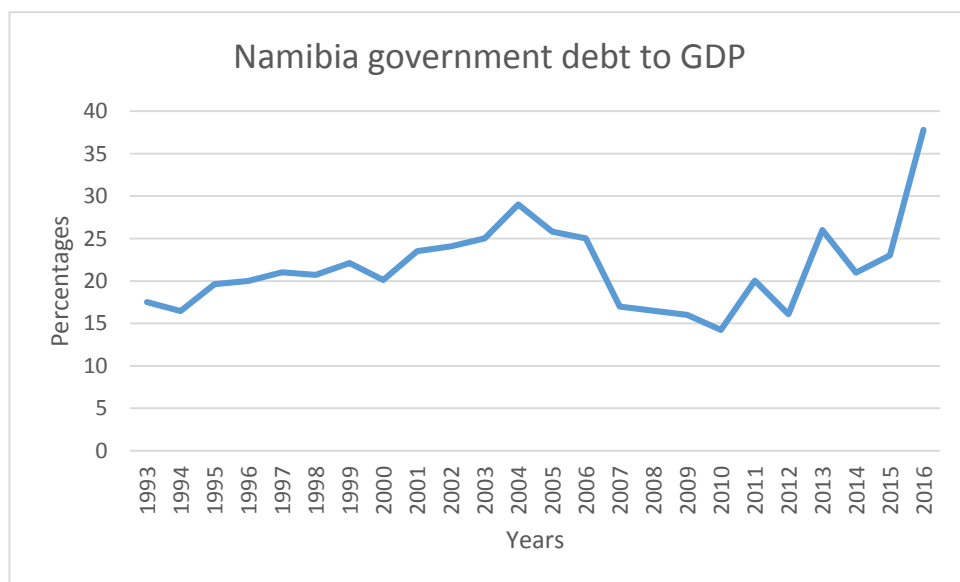
Figure 2.1 Namibia Government Debt to GDP ratio

Source: Data from Bank of Namibia

On average government debt to GDP had been 20.88 percent between 1993 and 2015 with the ever high recorded debt to GDP of 34 percent in the last quarter of 2015. This literary means that the government had not been mobilising sufficient resources to fund the ever increasing government expenditure.

2.2 Structure of the tax system in Namibia

Namibian tax system has different types of taxes. Major taxes are: Income tax, Value added tax, Stamp and Transfer duty, Withholding tax and Employees tax.

2.2.1 Income tax

Income tax in Namibia is levied according to income Act No. 24 of 1981. Income tax refers to taxing of income this includes mainly taxation of individuals that earn a salary and taxation of business income including farming activity. The taxation system in Namibia is based on a source principle and deemed principle. This principle implies that all income earned or deemed to have been earned within the border of Namibia is subject to taxation. In Namibia anyone who earns a salary of N$ 50 000.00 and more per annum is required by law to register as tax payer and submit the registration to the employer. Namibia has adopted progressive tax rates on individual salaries ranging from 18% to the maximum 37%.Table 2.1 below show the tax rates at which salaried individuals are taxed (Price Waterhouse Cooper, 2017).

Table 2.1 Individual income tax rates 2017

Taxable amount	Rates of tax
Where the taxable amount does not exceed N$ 50 000	0%
between N$ 50 001 and N$ 100 000	18% of the amount by which the taxable amount exceeds N$ 50 000
between N$ 100 001 and N$ 300 000	N$ 9 000 + 25% of the amount by which the taxable amount exceeds N$ 100 000
between N$ 300 001 and N$ 500 000	N$ 59 000 + 28% of the amount by which the taxable amount exceeds N$ 300 000
between N$ 500 001 and N$ 800 000	N$ 115 000 + 30% of the amount by which the taxable amount exceeds N$ 500 000
between N$ 800 001 and N$ 1 500 000	N$ 205 000 + 32% of the amount by which the taxable amount exceeds N$ 800 000
over N$ 1 500 000	N$ 429 000 + 37% of the amount by which the taxable amount exceeds N$ 1 500 000

Source: Price Waterhouse Cooper

2.2.2 Value added tax

Namibia's largest share of tax revenue is attributed to value added tax (VAT). VAT replaced sales tax and it was implemented in 2000 guided by Value Added Tax Act No. 10 of 2000. Businesses with annual taxable turnover above N$ 500 000.00 are required by law to register for value added tax. However businesses with taxable turnover of N$ 200 000 to N$ 500 000 can voluntarily register pending the approval of the commissioner.VAT is levied at the following rates: a zero rate and a standard late of 15% on the supply of goods and services. This is remitted every two months to the receiver of revenue with the return and payment due on the 25th of every second month. The receiver of revenue has the power to verify the information submitted by the tax payer.

2.2.3 Stamp and Transfer Duty

Stamp duty is the tax on a lease agreement whereby an immovable property is let, whether with or without other assets, on the provision that no transfer duty is chargeable in respect of such lease agreement. Transfer duty on the other hand is the tax levied on any property acquired by any person and its payable within six months of the acquisition date. A transfer duty rates in Namibia varies from 1% to 12% both for natural and non-natural persons.

2.2.4 Withholding tax

Certain payments are liable to withholding tax. Section 35A of the Namibian Income Tax Act obliges Namibian tax payers to withhold tax on invoices issued to foreign supplies rendering services in Namibia and pay the withheld amount to the receiver of revenue. Withholding tax on services, foreign interest, Royalties and non-resident shareholders tax is levied at a rate of 10%.

2.2.5 Employer's tax

An employer is any person who pays an amount by way of remuneration to an employee. By law an employer is required to apply for registration as an employer within 14 days of becoming an employer. An employer is required to deduct tax from qualifying employees in accordance to tax rates and remit that amount to the receiver of revenue. The payment and return of employees tax is due on the 20th of every month of which failure to submit results in penalties and interests.

2.2.6 Summary

Taxation is the main sustainable source of developmental funds in Namibia. Like other developing countries taxation in Namibia is levied at a progressive rate and is source based. Namibia has two main taxes, the direct and indirect taxes. Unlike in other SADC countries where revenue collection is carried by an autonomous entity, in Namibia the Departments of Inland Revenue and Customs in the Ministry of Finance is mandated to collect taxes.

CHAPTER THREE: LITERATUREREVIEW

3.1 Introduction

This chapter deals with the reviews of theoretical and empirical literature related to the revenue productivity of the tax systems. The chapter also introduces some fundamental notions relating to tax productivity and its literature.

3.2 Theoretical Literature Review

Economists have developed a number of theories of taxation over time to guide governments on how the tax system can be harnessed to mitigate the persistence of fiscal imbalances. Singer (1968) measured or estimated tax elasticity and tax buoyancy by regressing aggregate tax based revenue on Gross Domestic Product (GDP), which is proxy for the tax base and incorporating a dummy variable. Prest (1962) developed proportional adjustment method to estimate tax elasticity.

3.2.1 Methods of Estimating Elasticity of the tax revenue

Mansfield (1972) defines tax elasticity as discretionary changes, less the automatic growth in tax revenue. High tax elasticity means that the elasticity coefficient is one or more, which is said to be desirable as it allows the growth in expenditure to be financed by tax revenue without external financing or a change in tax rate.

Scholars have developed a number of techniques that has been used to measure the productivity of the tax system. Elasticity of the tax can be measured using the

following techniques: Divisia Index Method (DIM), the Dummy Variable Technique (DVT), Constant rate structure (CRS) and Proportional Adjustment Method (PAM).

3.2.1.1 Divisia Index Method

This method introduces a proxy for discretionary tax measures. This index measures the technical change, which is taken as the effects of discretionary changes in tax yields. The method is more appropriate to use in the case where information about the impact of discretionary measures on tax revenue is not available. According to Choudry (1979) the index is derived from the estimated functions analogous to the production function. He further defended this method arguing that it is most useful where the revenue effects of discretionary measure are not available. The method uses time trends as proxies for discretionary changes. However, Milwood (2011) argues that this method causes bias in estimation.

3.2.1.2 Dummy Variable Technique

The second technique is the Dummy Variable Technique which according to Bonga, Dhoro and Strien (2014) was first used by Singer (1968) to capture the effect of the exogenous change in tax policy. This involves introducing the dummy variable when the tax policy change is exogenous. The dummy variable takes a value of one for each year when there is discretionary tax change and a zero for otherwise.

3.2.1.3 Constant Rate Structure Technique

Constant rate structure method is based on the simulation of series of tax revenues based on the tax rate that is effective for a particular base year and the tax base estimates for the successive years. According to Jenkins, Kao and Shukla (2000) constant rate structure method apply the current year's rate to the previous year's tax base and the construction of tax revenue series that would have been obtained, possess similar tax structure in existence over time. The Constant Rate Structure Technique involves gathering of statistical information on receipts of actual tax and data on both monetary value and corresponding value of different taxes Muraya (2013). The limitation of this method is that it can only be applied when there are few items to be included.

3.2.1.4 Proportional Adjustment Method

Lastly, the Proportional Adjustment Method was developed by Prest (1962) and used by Mansfield (1972) and Osoro (1993). According to Muraya (2013), the Proportional Adjustment Method isolates data on changes in discretionary revenue based on government data so as to get a reflection of the revenue that would have been collected if the structure of the base year had been applicable in the entire sample period. This method involves simply the basic information about the mobilisation of revenue for the purpose of making the adjusted tax base series. The adjusted tax revenue only respond to change in GDP or expenditure on the assumption that tax system remain the same during the study period.

3.2.2 Methods of Estimating Buoyancy of the Tax Revenue

Osoro (1993) defined tax buoyancy as the ratio of growth in tax revenue to a growth in the tax base. Tax buoyancy of the tax measures the change of tax revenue due to the changes in income without controlling for discretionary change in tax policy.

Mukarram (2001) defined buoyancy as the responsiveness of tax revenue to GDP without correcting for discretionary changes in the tax system. It attempt to measure the total response of the tax system due to both changes in the national income and the deliberate decision of the government to raise tax rate, reviewed tax code and tax machinery etc. Tax Buoyancy = %ΔT/%ΔGDP. Where, ΔT is the change in tax revenue and ΔGDP, change in GDP.

GDP is taken as base, although it is possible to have other bases. Several studies have used GDP as one of the determinants of tax revenue. Tax buoyancy was estimated using the model below;

$$\text{TR} = e^{\propto} Y^{\beta} e^{z} \qquad\qquad (1)$$

The model above is linearized by introducing the logarithm on both sides of the above equation. The Ordinal Least Square method (OLS) is then used to evaluate the equation below.

$$\text{Log TR} = \alpha + \beta Log Y + z \qquad\qquad (2)$$

From the above equation TR - total revenue, Y – GDP; β is buoyancy coefficient; α is a constant term while e is a natural number.

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3.3 Empirical Literature Review

Different authors have carried out practical estimation of buoyancy and elasticity of the tax system in different countries. An analysis of the tax system and implications of the index computed was made. Among the authors who carried out empirical studies, some of their findings are presented below.

Kusi (1998) evaluated the productivity of Ghana overall tax system and that of individual tax heads of the bases of tax buoyancy and tax elasticity estimates over the period 1983 to 1993. The study employed the proportional adjustment (PA) method and a constant rate structure to estimate the tax buoyancy and tax elasticity of the Ghanaian tax system. The study found a post reform buoyancy of (1.29) and elasticity (1.22), this was much larger than the pre-reform period of (0.72) and (0.71) buoyancy and elasticity respectively. The study revealed that tax reform had significant impact on the productivity of both individual tax head and the entire tax system. The study attributed low buoyancy and elasticity during the pre- reform period to smuggling, unrecorded trade, tax evasion and laxity in tax collection. Twelefou et al,. (2010) estimated the elasticity of Ghanaian tax system using the dummy variable technique. They used historical time series data for the period 1970 – 2007. The overall tax system was found buoyant and elastic in the long run. In the short-run the scenario turned to be the opposite. Authors used the Engle-Granger two steps co-integration procedure to establish the long-run relationship between variables and to generate the error correction term.

Another study on Ghana by Appiah (2013) assessed the impact of fiscal regimes in the mining sector on revenue productivity utilising tax elasticity and buoyancy ratio. The study employed Singer's method of dummy variables with the purpose of making adjustment for the discretional effect of tax measure in order to compute the elasticity and buoyancy. Results indicated that the buoyancy estimates were in fact higher than those of elasticity; there was a difference between the short run and the long run elasticity. Results further indicated that discretionary tax measure were very effective in increasing tax revenues hence the tax system was inelastic during the study period.

In a recent studyBokoe, Danquah and Sanahey (2016) investigated Ghana's tax reform programme and determine its effect in facilitating revenue mobilisation capacity of the overall tax system and that of individual tax heads on the bases of tax buoyancy and elasticity. The study used the proportional adjustment approach to estimate tax buoyancy and elasticity of the entire and individual taxes for the period before and after the tax reform over the 1970 to 2013 period. Their results indicated that in general tax reform has a positive impact on the overall tax structure and on individual taxes, this is shown by a more than unit buoyancy and elasticity. Individual tax in exception of excise duties recorded buoyancies and elasticities of more than a unity.

In Asia Mukarram (2001) examined the elasticity of buoyancy of the major taxes in Pakistan over the period 1981-2001 by using the chain indexing technique to remove

the discretionary changes. The results reveal that estimates of the elasticity and buoyancy were higher for direct taxes, followed by those of sales taxes. Results further indicated that customs and excise duties are rigid as a result of tax elasticity which was low. The study concluded that higher coefficients of buoyancy compared to corresponding coefficients of elasticity for all the taxes confirms that growth in revenue was achieved due better tax rates and widened tax base as an alternative to automatic growth. In a separate study Bilquees (2004) examined the elasticity and buoyancy of the tax system in Pakistan over the period 1974/5 to 2003/4. The study employed the Divisia Index approach. Results indicated that elasticity of the tax revenue both with respect to total GDP and non-agricultural GDP is less than a unit. The buoyancy estimates suggested that tax restructuring did not lead to significant revenue augmentation in Pakistan.

Muzenda (2016) investigated the impact of informal sector growth in Zimbabwe on tax performance, the reason why informal economies is contributing very little to the state revenue and why tax collection remain very low considering the overgrowing of the sector. The study is based on the time series analysis of data for the period 1985 to 2013. The study adopted the Ordinary least squares (OLS) econometric model to estimate tax ratios. Findings of the study from the regression estimation pointed out that despite the growth of the informal sector, the sector contribution to tax revenue is not significant. This is attributed to the fact that a number of businesses in this sector are not registered with the revenue authority.

Another study on Zimbabwe which was carried out by Ndedzu, Macheka, Ithiel and Zivengwa (2013) evaluated the revenue productivity of Zimbabwe's overall tax system for the period 1975 to 2008. They employed Dummy Variable Technique to compute buoyancy. Their results indicated that the overall tax systems with exception of customs duty are all not buoyant. The study concluded that buoyant and elastic tax structure is the most appropriate in a developing country. This means that tax collections will grow automatically with the growing economy without resorting to sensitive discretionary changes. Similarly Tofu (2008) evaluated the productivity of the tax system in Ethiopia for the period 1961 to 2005. Using similar approach, however, the results showed that tax revenue tend to be inelastic with respect to change in tax base.

A study similar to the Zimbabwean and Ethiopian studies by Timsina (2007) examined tax elasticity of Nepal. Results of the study showed that the tax system in Nepal was inelastic during the period under study, with more than unitary buoyancy coefficients, hence reflecting that the bulk revenue collections emanates from discretionary changes in the tax policy, rather than automatic response.

Urama, Nwosu and Aneke (2012) examined the buoyancy and elasticity of tax system in Nigeria using the time series data of 20 years period. The study adopted Singer's (1968) dummy variable approach to estimate the coefficient of tax buoyancy and tax elasticity of the tax system. The study found the total tax buoyancy coefficient of 1.1 which is more than a unit and the coefficient of tax elasticity of 0.82. The study concluded that the overall tax system was found to be relatively

buoyant but not elastic.Josef and Samuel (2014) assessed the effect of value added tax (VAT) on revenue generation for the sustainable development in Nigeria. The study adopted the log linear regression approach to estimate tax buoyancy and tax elasticity. The results of the study showed positive coefficients for both tax buoyancy and tax elasticity. The study concluded that value added tax had a greater potential to increase tax revenue.

Oriakhi and Osemwengie (2013) analysed the tax incentives and the revenue productivity of the Nigerian tax system from 1981 to 2009 period with aim of identifying the short-run performance of different taxes. The study employed two measure tax buoyancy and elasticity to access the productivity of Nigerian tax system. Results indicated that there was an unsatisfactory level of total tax revenue productivity in Nigeria. This study further identified the lagging sources of revenue and non-buoyant of total tax revenue. Institutional failure, corruption and mismanagement of state revenue were some of the factors attributed to lower level of revenue. Meshak (2014) evaluated the productivity of the Nigerian tax system as source of revenue needed to boast economic growth. The study used time series data of GDP and aggregate tax revenue for the period 1993 to 2012. The study adopted tax buoyancy as against elasticity in the decomposition process of tax to base and base to income. The findings of the analysis indicated that two out of four tax bases has a buoyancy above a unit with VAT as the most buoyant of all with the coefficient of 1.82 while the total tax revenue have the buoyancy of 0.95.

David-Wayas, Ugbor, Ilkepe and Musa (2015) investigated the elasticity and buoyancy of tax in an attempt to establish its flexibility and the possible increase in tax base in Nigeria. The study employed the standard OLS estimation procedure modified into Dynamic OLS (DOLS) and fitted into a Vector Error Correction Model (VECM). Results indicated that aggregate revenue is relatively elastic and significant buoyant according to 2004 reforms. Results of major tax heads examined showed that only petroleum profit tax (PPT) was found to be relatively elastic were others (Value Added Tax, Custom and Excise Duty and company income tax) were relatively inelastic. Edeme, Nkalu, Azu and Nwachucku (2016) examined the relationship between tax revenue and Gross Domestic Product in Nigeria. The study used a time series data of the period 1970 to 2013. The study adopted the ordinal least squares method in the form of log linear to estimate the degree of tax buoyancy. The findings of the study indicated that tax revenue is highly buoyancy with respect to national income. The study found a very low buoyant coefficient with respect to income from social sector.

Using the proportional adjustment method (PAM) and a double log regression fanction to estimate tax buoyancy and tax elasticity, Wanjiku (1993) examined revenue productivity implications of the tax system and that of individual taxes in Kenya over the period from 1972/73 to 1990/90. Findings of this study revealed that tax system had not been elastic with respect to income. The entire tax system during the study period had an elasticity of 0.67064 which is less than a unit. The performance of the income taxes was not significant and showed a slight

improvement with an elasticity of 1.07130. These results were confirmed by Gituku (2011) who employed the proportional adjustment method (PAM) and also by Samel and Isaacs (2012) examined the elasticity and buoyancy of tax components in Kenya using time series data for 24 years, employing the proportional adjustment method (PAM) of eliminating the discretionary effects from revenue series.

On the other hand, Mawia and Nzomoi (2013) examined the buoyancies of tax revenue to change in economic growth GDP and proxy bases using quarterly data instead of annual data of GDP and tax revenue and their bases. The study utilizes the time series approach to estimate tax buoyancy for Kenya during the period under study of 1999/2000 - 2010/2011. It shows that the entire tax was buoyant with a buoyancy value of 2.58 while their individual tax heads were not buoyant with exception of excise duties which was found buoyant with respect to the base. The study further found tax bases to respond well to economic changes with buoyancy values greater than unit. In the same year Muriithi and Moyi (2013) assessed whether the tax reforms undertaken by Kenya revenue authority had achieved the desired outcome. In their study they employed the double log regression analysis to estimate the responsiveness of tax yield to income. Their finding indicated that tax reform had a positive impact on the entire tax system. Their results further indicated that tax reforms had a greater impact on direct taxes than on indirect taxes. This is conforming to the findings of other authors.

Madela and Olukuru (2015) assessed the extent of tax buoyancy in Kenya between the year 1980 to 2014 and also of South Africa between the years 1972 to 2014. The study adopted the error correction method to estimate tax buoyancy coefficients. The results revealed that tax system for both countries are buoyant, both in the short run and long run with an average speed of adjustment between the long run and the short run estimates. The study found a significant long run buoyancy coefficient for the tax system of 1.77 in South Africa and 1.18 for Kenya. Results of short run buoyancy coefficients showed a significant 1.82 and 2.69 for South Africa and Kenya respectively. Bolthole and Aglobenebo (2006) utilizing the vector error correction model (VECM), found that the Botswana tax system to be income inelastic, but buoyant. In Uganda Lawrence (2011) analysed the adequacy of the tax revenue in Uganda employing the Ordinal Least Square method showed that during 1980 – 2008the tax revenue had a negative relationship with budget deficit. The study further found total revenue to be inelastic before tax reform and elastic after tax reform.

Indraratna (2009) did a study to measure tax elasticity in Sri Lanka. The study used time series data approach to empirically estimate tax elasticity of Sri Lanka for the period 1960 to 1994. The result of this analysis reveals that tax structure was very inelastic over the period under study. Findings further indicated that taxes were not greatly responsive to changes in income because of the elasticity coefficient that are below a unit. The period before reform and after reform did not show the significant difference in elasticity coefficient for most taxes. However, this study associated

elasticity as a results of strengthened tax administration during that period. The study concluded the most reforms that were implemented during the period under study had a small effect on the elasticity of the tax system.

Steenekamp (2007) compared South Africa performance with that of other developing economies over the period 2000 to 2004. The study utilized regression approach to tax performance. Results of the study revealed that South Africa revenue authority outperformed the comparable economies. Finding on individual tax heads indicated South Africa use personal and income tax very intensively, while value added tax (VAT) , effort index and the effect value added tax are relatively low. By comparing, the study total tax burden to be high.

The vast literature covered in this chapter shows different methods used to analyse the productivity of the tax system in different countries. Developing economies favoured Dummy Variable Approach over the Divisia Index method, Constant Rate Structure and Proportional Adjustment Method. The Dummy Variable Approach takes into account the likely multiple changes over the study period. Most studies on Sub-Saharan Africa used the Ordinary Least Square (OLS) approach in estimating the elasticity and buoyancy coefficients. According to Osoro (1993) the advantage of this technique is that it takes account of the multiple changes over time period, relatively easy to compute and does not require complicated and hard data.

CHAPTER FOUR: METHODOLOGY

4.1 Introduction

This chapter is made up of four sections. Section one presents sources of data used for the study. The second section consists of the model specification and the third section discusses the data analysis. The last section presents measurement of variables.

4.2 Data Sources

The study used quarterly time series data for the Namibian financial years 2001 to 2014 obtained from Ministry of Finance, Inland Revenue Department and Bank of Namibia. Collected data is GDP, total tax revenues and various relevant tax heads (Income tax, VAT, PAYE and Import duty).

4.3 Analytical Framework

Government undertakes changes, such as change in tax rates, tax reforms and budget rationalization programmes. In this case it is essential that the tax system is designed in a way that taxes have horizontal and vertical equity, be neutral with respect to economic incentives and administratively easy. To study the productivity of the tax system, the concepts of tax buoyancy and tax elasticity is utilised as in Singer (1965).

4.3.1 Tax Elasticity

According to Timsina (2007) tax elasticity is a measure of automatic changes in tax revenue for a given tax base in response to change in GDP. This excludes the effects of discretionary tax changes, improvements in compliances change in tax laws. Mathematically, elasticity of tax can be expressed as:

$$E_{TY} = \frac{\%\Delta T}{\%\Delta Y} = \frac{\Delta T}{T} \times \frac{Y}{\Delta Y} = \frac{\Delta T}{\Delta Y} \times \frac{Y}{T},$$

From the above expression T is tax revenue, Y is GDP and E_{TY} represents income elasticity of tax. The tax system is considered to be income elastic if the coefficient β_1 is greater than 1, this indicates that, if GDP changes by 1%, tax revenue will change by more than 1%. The primary objective to estimate elasticity is to assess taxes which are elastic by nature and to identify taxes that yield more as national income increase. Moreover, if β_1 is less than 1 the tax system is said to be income inelastic, which will mean that a proportionate change in GDP will cause the tax revenue to change with less than 1%. If β_1 is equal to one than the tax proportion is said to be unitary elastic. Taxes that are elastic are said to be desirable due to the fact that they minimise the need to make changes to the tax system every year.

Usually, elasticity of total tax to national income is expressed in an aggregate form as a single value, but in reality the entire elasticity of a tax system is the weighted average of the sum of individual tax elasticity that in various ways responds to changes in GDP. This means that evaluation of the elasticity of the entire tax system should start with the examination of the individual tax heads elasticities. Twerefou at al. (2010) expressed these elasticities as follows:

Elasticity of total tax revenue to national income: $ET_{ty} = \frac{\Delta T_t}{\Delta Y} \times \frac{Y}{T_t}$

Elasticity of the kth individual tax head to income: $ET_{ky} = \frac{\Delta T_k}{\Delta Y} \times \frac{Y}{T_k}$

(1)

Elasticity of the of the kth individual tax head to base:

$$ET_k B_k = \frac{\Delta T_k}{\Delta B_k} \times \frac{B_k}{T_k} \quad (2)$$

Elasticity of the kth individual base to income: $EB_{ky} = \frac{\Delta B_k}{\Delta Y} \times \frac{Y}{B_K}$ (3)

From the above equations T_t is the total tax revenue, Y is the income/GDP, B_k is the base of the kth tax and T_k is the revenue from k^{th} tax. Given the definitions of tax elasticity, the system of n taxes than becomes:

$$ET_{tY} = \frac{\Delta T_t}{\Delta Y} \times \frac{Y}{T_t} = \frac{T_1}{T_t}\left(\frac{\Delta T_1}{\Delta Y} \times \frac{Y}{T_1}\right) + \frac{T_2}{T_t}\left(\frac{\Delta T_2}{\Delta Y} \times \frac{Y}{T_2}\right) + \cdots + \frac{T_n}{T_t}\left(\frac{\Delta T_n}{\Delta Y} \times \frac{Y}{T_n}\right)(4)$$

From the above equation subscripts *1, 2* and *n* represent different individual tax heads which are stated as a ratio of total tax revenue shown by the subscript *t* to give the individual tax head weight. Elasticity of individual tax heads with respect to GDP/ national income may be decomposed into the product of the elasticity of the tax-to-base and the elasticity of the base-to-income.

Mathematically,

$$ET_{ky} = \frac{\Delta T_k}{\Delta Y} \times \frac{Y}{T_k} = \left(\frac{\Delta T_k}{\Delta B_k} \times \frac{B_K}{T_k}\right)\left(\frac{\Delta B_{k\Delta}}{\Delta Y} \times \frac{Y}{B_k}\right) \qquad (5)$$

When we combine equations (4) and (5) we get:

$$ET_{tY} = \sum_{i=1}^{n} \frac{T_i}{T_t}\left[\left(\frac{\Delta T_i}{\Delta B_i} \times \frac{B_i}{T_i}\right)\left(\frac{\Delta B_i}{\Delta Y} \times \frac{Y}{B_i}\right)\right] \qquad (6)$$

The above equation implies that, elasticity of total tax revenue in a system of n taxes will depend on the product of elasticity of tax base to income for each tax head, weighted by significant of each tax in the entire tax system (Twerefou at al.,2010).

Computing tax elasticity ignores the effect of discretionary policy changes. Tax elasticity is the best measure that can be used to identify tax heads that are elastic by nature. Elastic tax systems assist the public sector to appropriate a share of marginal increases in national income. However, in case of inelastic tax system, an increase in government spending can be financed through an increase in money supply which may lead to inflation and the balance of payment crises, or this can be financed thorough an annual adjustment of tax rates. The tax system that is elastic is viewed to be efficient and serves a stabilisation instrument.

4.3.2Tax Buoyancy

Tax Buoyancy is a measure of percentage change in tax revenue, including discretionary tax changes due to a percentage change in GDP which is the base. Tax

buoyancy outlines the connection between the change in state's tax revenue growth and the change in national income. Tax buoyancy can be evaluated by regressing tax revenue over the tax base which is real GDP in this case once applying the natural logarithm for each of them. This assesses the link between the proportional changes in revenue and those in GDP.

To measure the overall buoyancy of the tax system, the relative change in total revenue from tax with respect to the relative change in national income. This is stated as:

$$\mathrm{B}_{TY} = \frac{\Delta T}{\Delta Y} \times \frac{Y}{T}$$

From the above expression T is total tax revenue, Y represent GDP. The buoyancy of the tax system can be decomposed into buoyancy of individual taxes;

$$\mathrm{B}_{TY} = \frac{T_1}{T_t} B_{T_1 Y} + \frac{T_2}{T_t} B_{T_2 Y} + \ldots + = \frac{T_n}{T_t} B_{T_n Y}$$

$T_t = T_1 + T_2 + \ldots + T_n$ and n is the number of tax heads. Buoyancy of the tax system according to Bonga, Dhoro and Strien (2014) it is the weighted sum of individual tax head buoyancy and this is utilised to acquire elasticity of tax with respect to tax-to-base and base-to-income stated as:

$$Tax\text{ - }to-base-elasticity = \frac{\Delta T}{\Delta B} \times \frac{B}{T}$$

And

$$Base-to-income-elasticity = \frac{\Delta B}{\Delta B} \times \frac{Y}{B}$$

Buoyancy of the tax system than becomes;

$$B_{TY} = \frac{\Delta T}{\Delta Y} \times \frac{Y}{T} = \left(\frac{\Delta T}{\Delta B} \times \frac{B}{T}\right) \times \left(\frac{\Delta B}{\Delta Y} \times \frac{Y}{B}\right)$$

Tax buoyancy is measured in the way with tax elasticity. According to Appiah (2013) the only difference is when discretionary measures are not controlled which change the tax rate and/or base, then the sensitivity of tax revenue to changes in national income is the buoyancy and adjusting of this measure give the estimates of tax elasticity. This means that a tax is buoyant or elastic when the elasticity is greater than unit/one. In cases where the elasticity of main revenue bases are low irrespective of the amendments and incentives that the state undertake due to factors such as evasion, the state resort to rising additional resources through discretionary measures. Tax revenue increases when the buoyancy is high compared to elasticity.

4.4 Model Specification and Data Analysis

Tax buoyancy and Elasticity, just as revealed in the literature review are two components that are used in analysing the productivity of tax system of a country. To achieve the objective of this study, this section explains methods used for this study. Tax elasticity had been estimated using two methods, historical time-series tax data (HTSTD) adjusted to discretional tax measure (DTMs) and unadjusted HTSTD with dummy variables as proxies for DTMs. Over the years different techniques such as proportional adjustments, constant rate structure, Divisia index and Dummy variable had been used to estimate the elasticity of the tax.

This study will follow the unadjusted historical time series tax data with the dummy variables integrated as proxies for discretionary tax measures as developed by Singer (1965) to measure buoyancy and elasticity of the tax system, because of non-intensive data required and for the fact that it does not require disaggregated data.

By specifying Singer's (1968) multiplicative form of a tax revenue model stated as:

$$\text{TTR} = e^{\alpha} Y^{\beta} e^{z}$$

$$lnTTR = \alpha + \beta lnGDP + z \tag{7}$$

Ordinary Least Square (OLS) is applied to equation (7) to estimate the parameters α and β, the coefficient β represent the tax buoyancy estimates and z it the stochastic term. Y in the Singer's equation represents GDP. To obtain elasticity estimates, historical tax revenue series is replaced by the tax revenue series at a constant tax structure. Revenue at a constant tax structure is acquired from historical series of tax revenue by cleaning the tax series for effect of changes in tax rate and tax base during the specified period. Using the equation (7) above tax buoyancy is decomposed in two components:

Tax-to-Base component: $\ln TTR_k = \alpha_o + \alpha_k \ln B_k + v$ (8)

Base-to-income Component: $\ln B_k = \delta_o + \delta_k lnY + \mu$ (9)

From the above equations TTR_k is the unadjusted historical time series tax data of the kth tax, B_k is tax base for the kth tax, GDP/Y is the nominal Gross Domestic Product which is also the entire base, α_k is the elasticity of the kth tax to its base, δ_k is the elasticity of the kth tax base to income, a_o, δ_o are constants while v and μ are stochastic error terms.

Equations (8) and (9) will assist in obtaining the elasticity of the kth tax to income. Dummy variable D is introduced in the two equation above to capture the effects of tax reforms in the short run. Modified short run elasticity and buoyancy equations then become;

$$\ln TR_k = \propto_o + \alpha_k \ln\beta_k + \sum_{i=1}^{k} \alpha_{21} D_i + v_k \qquad (10)$$

$$\ln B_k^t = \delta_o + \delta_k \ln GDP + \sum_{i=1}^{k} \delta_{2i} D_i + \mu_k \qquad (11)$$

From the above equations α_{2i} and δ_{2i} are the dummy coefficients and the summation sign denotes the total discretionary tax measure under the reforms. The Dummy Variable Approach utilizes unadjusted HTSD with dummy variables integrated as proxies for discretionary tax measures to capture elasticity. The empirical model from equation (7) is then expressed as follow:

$$\ln TTR_t^k \alpha + \beta_1 \ln Y_t + \beta_2 \ln Y_{t-1} + \sum_{i=1}^{k} \beta_{\beta i} D_i + \varepsilon_t \qquad (12)$$

From the above equation TTR_t^k represent tax revenue for the kth tax, β denote the elasticity and D for dummy variables, dummy variables takes values one for discretionary tax measures and zero for otherwise. Summation sign will take into account of the discretionary tax changes over the period understudy. This study consider two dummies, D_{2011} which reflect fiscal reforms undertaken in 2011 and D_{slope} which is an interactive term/ slope of the tax revenue function as a result of a reform. Slope (D_{slope}) in this study is defined as a product of total revenue and D_{2011}, this is done to warrant the linearity in the model. In this model the lagged base

are incorporated to cater for the efficiency in administration or otherwise in the collection of tax.

The study uses Engle-Granger two steps co-integration the long-run relationship between variables involved. Therefore, this study uses time series data which are tested to warrant their stability and relationship between variables. Testing the features in data follow steps such as unit root test to test for stationarity and Co-integration analysis.

4.4.1 Unit Root Test

Stationarity of time series data is important as this avoid problems during the empirical analysis, hence to ensure true and reliable results it is necessary to test data for stationarity. If data that are not stationary are used results will be nonsensical. When variables are to be non-stationary at level, the test is repeated at first difference to check if they are not stationary and it continues. Stationarity in data is tested employing unit root test and this process starts with specifying an Augmented Dickey-Fuller (ADF) test equation bellow:

$$\Delta X_t = a_o + \beta_o X_{t-1} + \alpha_1(t) + \sum_{i=1}^{k} \beta_i \Delta X_{t-i} + \epsilon_t$$

From the above equation X_t can be any variable used in a model, a_o is constant, t is the linear trend and the lag of $\Delta X_{t\Delta}$ is combined in the model to form the augmentation and I is the optional lag.

4.4.2 Co-integration analysis

Variables can be non-stationary and not co-integrated, however, this does not necessarily imply that results are false. The essence of unit root is to ensure that appropriate method employed taking into consideration level of integration. Moreover, co-integration is not always guaranteed, hence the model can be estimated in level form of in first difference in case there in no co-integration but variables are non-stationary in levels (e.g. stationary in first or second difference). The presence of co-integrating relationship means that the regression of variables in their level gives true and meaningful results. Moreover, variables can be integrated of different orders and still have co-integration, under this condition Auto Regressive Distributive Lag (ARDL) model used and it only works for a combination of I(0) and I(1) but not I(2). On the other hand Vector Error Correction Model (VECM) takes a mixture of I(0), I(1) and I(2). To avoid spurious regressions this study uses Engel-Granger two-step procedure.

4.4.3 Error Correction Model

This is the model that estimate the speed at which a dependent variable (Y) return to equilibrium after a change in an independent variable (X). This is done to correct for short term disequilibrium while taking into account the long-run relationship. If dependent and independent are cointegrated, this implies the existence of long-term, or equilibrium relationship between the two. The coefficient on error correction model gives information about the speed at which a dependent variable adjusts toward its long run equilibrium.

4.5 Definition and measurement of variables

The variables of the model are real GDP, total tax revenue (TTR) and Dummy variable (D) this is referred as tax reform or change in tax policy variables. The table below shows the variables used in the model, their symbols and how measurement was done.

Table 4.1 Definition and measurement of variables

Variable	Definition and measurement
Total tax revenue (TTR)	This is the total revenue of all individual tax heads and its measured in Namibian dollars
Gross Domestic Product (GDP)	This is the value of goods and services produced in a country over the period of one year irrespective of whether they were produced by foreigners or domestic residents. This is measured in Namibian dollar as well.
Dummy variable (D1)	This is a slope dummy variable representing changes undertaken in 2011 and this takes 1 for the change and zero for otherwise.

CHAPTER FIVE: ANALYSIS AND DISCUSSION OF EMPIRICAL RESULTS

5.1 Introduction

This chapter discusses the empirical analysis of the study. Tests for properties of time series used and the co-integration test formed part of this chapter. It also contains diagnostics tests, analytical findings as well as the discussion of the study.

5.1.1 Test for the Time series properties of variables

Since this study used time series date, it was crucial to carry out a stationarity test to check for unit roots. If any variable is found to be non-stationary this means it has a unit root. Presence of a unit root means there will be a problem of spurious results when ordinal least square is used.Standard regression requires both the dependent and independent variables sequences to be stationary. The study applied the Augmented Dickey Fuller (ADF) to test unit roots. Test results in both levels and first difference of the relevant variables are reported in the Table 5.1 below and graphical representation of all variables.

Table 5.1: Unit root test: ADF in Levels and first Difference

Variable	Model specification	Levels	First Difference	Order of integration
LNTTR	Intercept	-1.735	-8.148	I(1)
	Trend and intercept	-3.276	-8.255	I(1)
LNGDP	Intercept	-0.384	-2.937	I(1)
	Trend and Intercept	-2.925	-2.897	I(1)
LNETX	Intercept	-1.232	-8.401	I(1)
	Trend and Intercept	-2.315	-8.493	I(1)
LNITX	Intercept	-1.132	-7.573	I(1)
	Trend and Intercept	-2.611	-7.502	I(1)

Table 5.1 above represent the ADF test results in levels at first differences. Results revealed that all the tested variables were found to be integrated of order one meaning they were non-stationary in levels. This means that the basic ordinal least square can be directly applied to these variables.

5.1.2 Co-integration results

The co-integration analysis was done by estimating Engle-Granger co-integration relationships. The ADF unit root tests were performed on the regression residuals for this purpose. This is presented in Table 5.2 in the appendix. Residuals were tested for unit root and they were found stationary in levels, this reflects the presence of the long run relationship between variables.

5.1.3 The diagnostics tests

Normality test: in these results, the null hypothesis states that the data/ model follow a normal distribution, while the alternative denotes that a model do not follow a normal distribution. Results for Jarque-Bera statistics is 0.4631 which is greater than the significant level of 0.05 with the probability value of 0.000 and this mean rejecting the null hypothesis and conclude that the model is not normally distributed.

Serial correlation LM test: the null hypothesis of this test indicate that the model does not suffer from autocorrelation, while the alternative indicates that the model suffers from autocorrelation. Results from Breusch-Godfrey Serial Correlation indicate that the model does not suffer from autocorrelation hence the p-value of Obs*R-squared is 0.3921, this more than 5 %.

Heteroscedasticity test: the null hypothesis of this test indicates that the model is homoscedasticity, while the alternative indicates that the model is heteroscedasticity. Using the ARCH test results indicate that the model does not suffer from heteroscedasticity because the p-value of Obs*R-squaredis 0.6942 which is more than 5 percent.

5.2 Buoyancy estimates

After performing unit root and co-integration tests, the estimation of buoyancy coefficients were performed by using equation (7).Findings of the analysis revealed

that there is long run relationship between total revenue and GDP in Namibia. The residuals were found to be stationary, hence total tax revenue and GDP were co-integrated. Table 5.3 in the appendix present the regression output of the error correction model. The coefficient of the error correction model which reflect the speed of adjustment of individual variable towards its long run equilibrium value, while the sign of the coefficient represent the direction of adjustment to the equilibrium. Hence the ECM coefficient is negative and implies that variables converge towards their long run equilibrium values and relationship. Results from the model used in this study shows the coefficient of -0.27 (from Table 5.3) which is significant at the 1% or higher but it rather reflect a low speed of adjustment; since only 27% of revenue is corrected. P-values less than 0.05 and significant, therefore the model is perfect to draw conclusion that independence variables in the model are jointly significant to explain the dependent variables. It takes about 26.9 percent for the two variables to converge to long run equilibrium where the disequilibrium is corrected.

The adjusted R^2 for the model adopted in this study is 0.74, meaning that about 74% of the variation in tax revenue is explained by the model. The F statistics which test the overall significant of the model strongly rejects the null hypothesis that the regression coefficients jointly equal to zero. This implies that all the explanatory variables in the model are important determinant of tax revenue productivity in Namibia. The Durban Watson (DW) statistic of 1.91 indicates that the regression model does not suffer from the problem of auto correlation. The results presented in

Table 5.4 in the appendix indicate that the buoyancy of the Namibian overall tax system is low at negative 0.036. Thus, the total tax system is not buoyant with national income and hence it not generating sufficient revenue both through discretionary tax measure and through the expansion in the economy activities. This results conform to studies done in other developing countries such as a study by Ndedzu et al. (2013). The negative/ low buoyancy is attributed to negligence in administration of taxes. Another possible cause of poor revenue is the existence of large number of informal sector which is outside the tax system.

5.3 Estimation for elasticity

Secondly the study aimed to determine the effect of discretionary tax measure on the elasticity of the Namibian tax system. To estimate elasticity, data was adjusted for discretionary tax changes and the regression analysis was then carried out. Results are shown in Table 5.5 in the appendix. Results presented in Table 5.5 indicate that the elasticity for Namibian overall tax system is 0.268. The coefficient has a positive sign and is statistically significant. The tax elasticity of less than a unit means that the increase in the gross domestic product (GDP) stimulates a less than proportionate increase in tax revenue, revenue from the total tax system would grow by about 0.268 percent if there is no change in tax rates over that period, reflecting a very inelastic tax structure. This shows that the government has been lax in the collection of taxes. The error correction term is negative sign, less than a unit and p value less than 0.05 as desired. This coefficients offer a speed of adjustment of variables respectively towards it long-run equilibrium value and the sign of the coefficient indicate the direction of adjustment to the equilibrium. From regression results, the

coefficient of the error correction term is -0.542 and is significant. It takes about 54.2% for the two variables to converge to long run equilibrium where disequilibrium is corrected.

CHAPTER SIX: CONCLUSION AND RECOMMEDATION

5.1 Conclusion

Since Namibia gained independence in 1990, there have been several attempts to mobilise sufficient revenue to finance the ever increasing government expenditures through reforms and amendments of tax policy. These have led to fiscal imbalances in the economy. In spite of these efforts from fiscal authorities, productivity of tax revenue has not been sufficient.

Given the fiscal problems facing the country and a number of remedies introduced with the primary objective to reduce government expenditure and increase revenue collections, there is a need to examine the productivity of the tax system. This will be very crucial if the tax system is to be ruled out from the blames of failing to mobilise sufficient revenues. Hence, this study assessed the revenue productivity of Namibia's overall tax system.

In chapter three, the study reviewed the theoretical and empirical literature on the productivity of the tax system and the enhancement of revenue mobilisation. Based on the literature review the study adopted Singer's (1968) dummy variable technique in estimating tax buoyancy and tax elasticity of the overall tax system. The specific objective of this study was to analyse both tax elasticity and tax buoyancy with the view of getting the insight of revenue productivity and also to draw policy recommendations on possible solutions that could improve revenue productivity.

Empirical findings from the study revealed that for the period understudy, the Namibian tax system was not productive regardless of several efforts and measures undertaken. This is reflected by the coefficients of buoyancy and elasticity being less than a unit. The regression results indicated a very low tax buoyancy coefficient of -0.036, while elasticity estimates showed 0.268, all less than a unit. The elasticity coefficient of less than a unit implies taxes are not progressive to changes in income (Timsina, 2007). Comparing the two estimates buoyancy and elasticity indicated that discretionary tax measure has improved the productivity of Namibia tax system.

6.2 Policy recommendations

Given the fact that tax productivity of Namibian system is still low, there is a greater need to register informal business such as hair salons, taxi and bus business, hawkers and kapana vendors. This will broaden the tax base and increase tax revenue from the informal sector. Strengthening the existing tax law will encourage the potential defaulters to comply and this will have a positive impact on revenue collections.

The recurring economic shocks to the economy, requires that the tax system be reviewed more frequently. Hence, there is a need to establish a tax review commission to offer timely advice and to ensure development of new tax measures. Ministry of finance need to accelerate the formation of a semi-autonomous tax agency which will operate outside the public service, this will increase revenue because it will attract experts from elsewhere.

There is a need to establish an independent tax intelligence and investigation unit to deal specifically with tax evasion, tax fraud and corrupt practices in Inland Revenue and Customs Department. There is also a need for public tax education; this will give the tax payers and general public the insight on the importance of paying tax. This can include, completion and filing of returns, tax audits and understanding the tax laws. Tax officials should also attend specialised trainings. The tax authority need to upgrade from the current manual ways of submitting returns by investing in technology as it will be more convenient for tax payers to file and do inquiries online. There is a need to speed up developing of the new Integrated Tax Administration System (ITAS), as this will improve tax payer's service and operational tax administration efficiency.

The importance of research in the area of tax efficiency should be emphasised, as there are dearth studies with respect to Namibia on productivity of the tax system. The tax authority need to encourage academics to do more in depth analysis on the tax system productivity so as to offer evidence-based policy advice.

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Appendix
Table 5.2: Residual based co-integration test

Null Hypothesis: EC01 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.517033	0.0111
Test critical values:	1% level	-3.555023	
	5% level	-2.915522	
	10% level	-2.595565	

*MacKinnon (1996) one-sided p-values.

Source : Authors compilation and obtained from EViews

Table 5.3:The Error Correction Model Results

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EC01)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EC01(-1)	-0.272675	0.077530	-3.517033	0.0009
C	0.005608	0.007913	0.708671	0.4816
R-squared	0.189225	Mean dependent var		0.005709
Adjusted R-squared	0.173927	S.D. dependent var		0.064565
S.E. of regression	0.058682	Akaike info criterion		-2.797689
Sum squared resid	0.182508	Schwarz criterion		-2.724695
Log likelihood	78.93645	Hannan-Quinn criter.		-2.769462
F-statistic	12.36952	Durbin-Watson stat		1.906725
Prob(F-statistic)	0.000904			

Source: Authors complation and obtained from Eview

Table 5.4 Regression results buoyancy estimates

Dependent Variable: D(LNTTR)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.006441	0.018363	0.350739	0.7273
D(LNGDP)	-0.036138	1.324278	-0.027289	0.9783
D(LNETX)	0.680178	0.113520	5.991723	0.0000
D(LNITX)	0.458055	0.064914	7.056311	0.0000
EC01(-1)	-0.269312	0.086688	-3.106675	0.0031

R-squared	0.762004	Mean dependent var		0.040267
Adjusted R-squared	0.742964	S.D. dependent var		0.117740
S.E. of regression	0.059693	Akaike info criterion		-2.712708
Sum squared resid	0.178160	Schwarz criterion		-2.530224
Log likelihood	79.59948	Hannan-Quinn criter.		-2.642140
F-statistic	40.02183	Durbin-Watson stat		1.911452
Prob(F-statistic)	0.000000			

Source: Authors compilation using Evies

Table 5.5:Regression results for elasticity estimates

Dependent Variable: D(LNTTR)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.075888	0.035327	2.148186	0.0396
D(LNGDP)	-3.955933	3.602136	-1.098219	0.2806
D(LNGDP(-1))	0.268429	3.540696	0.075812	0.9401
DU	0.021415	0.038297	0.559174	0.5801
EC1(-1)	-0.542880	0.141250	-3.843394	0.0006

R-squared	0.341016	Mean dependent var		0.037227
Adjusted R-squared	0.255986	S.D. dependent var		0.081090
S.E. of regression	0.069945	Akaike info criterion		-2.353975
Sum squared resid	0.151660	Schwarz criterion		-2.134042
Log likelihood	47.37155	Hannan-Quinn criter.		-2.277213
F-statistic	4.010526	Durbin-Watson stat		2.147531
Prob(F-statistic)	0.009793			