

**DETERMINANTS OF VALUE ADDED TAX IN UGANDA  
(FINANCIAL YEARS 1999/00 TO 2010/11)**

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**ABSTRACT**

The study was undertaken to establish the determinants of VAT in Uganda with an overall objective of establishing which macroeconomic indicators that had an impact on the VAT trends. This was because of a need to expand the revenue take in light of the declining share of Aid in the government finances. This would require improvement of Uganda's VAT productivity by understanding the factors affecting its performance and thus inform policy measures.

The macroeconomic indicators considered were government consumption, private consumption, inflation, imports, population density, share of agriculture in GDP and monetary GDP. These variables were transformed in order to improve the normality. Structure stability tests and stationary tests taken revealed that there was no structure break and the variables became stationary after the second differencing except population density. The cointegration tests showed that a linear combination of the variables was stationary hence the existence of a long run relationship.

In the long run, population density, increase in VAT rate, and inflation had a positive effect on VAT, while private consumption, government consumption and imports had a negative impact. The Error Correction Model was then estimated and the over parametrised model reduced to parsimony.

The determinants of VAT in Uganda for the period under study were; private consumption, inflation and imports. Lagged VAT, private consumption and inflation were found to have a significant positive effect on current periods VAT in the short run. It was also established that imports had a significant and positive effect on current VAT after the second lag. Government consumption was found to be insignificant to VAT in Uganda for the period under study. This means that previous levels of tax bases (private consumption, imports and inflation) have a significant influence on the present levels of VAT.

The study recommends that in order to improve VAT revenue, government should enhance growth of economic activities to support increase of imports and promote increase in private consumption. Inflation rate should also be considered when projecting VAT collections.

**Keywords:** VAT,GDP, MOPPED, Inflation, Consumer price index, Income

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.0 Background to the study**

The major aim of most governments in developing countries is to stimulate and guide their economic and social development. Whatever the prevailing ideology or political situation of a particular country, it must steadily expand on non-revenue yielding services such as education, health, infrastructure and social security. This can be achieved through taxation.

In one taxation and economic development study by Toye, (1978) it was asserted that the connection between taxation and economic development is the connection between a universal desire and a form of government action that is believed to be a means to an end. While in the study by Wilford & Wilford (1978) it was observed that one of the most important policy upon which most economists agree is that emerging nations must increasingly mobilize their own internal resources to provide economic growth.

The most important instrument by which internal resources are mobilized is through the implementation of an effective tax policy, measured by the tax collection efficiency. Tax collection efficiency is affected by many different factors such as the economic situation of a country, which may determine consumption levels.

The relationship between consumption in an economy and indirect taxes is well known since indirect taxes are consumption taxes. The easiest way to understand the differences between the income and consumption tax bases is to define and understand the economic concept of income. In its broadest sense, income is a measure of the command over resources that an individual acquires during a given time period. Conceptually, individuals can exercise two options with regard to their income that is they can consume it or they can save it. This theoretical relationship between income, consumption, and saving allows a very useful accounting identity to be established: income by definition

must equal consumption plus saving. It follows that a tax that has a measure of comprehensive income applies to both consumption and savings.

A consumption tax, however, applies to income minus saving. An individual would add up all income in the same way as it is done now under the income tax but then would subtract out net savings (saving minus borrowing). The result of these calculations would be the consumption base on which tax is assessed. Equivalently, a consumption tax can also be collected at the retail level in the form of a sales tax or at each stage of the production process in the form of a Value Added Tax (VAT). Regardless of the form or point where a consumption tax is collected, it is ultimately paid by the individual doing the consuming. URA,(2011).

The VAT, first introduced approximately 50 years ago remained confined to a few countries until the late 1960s. VAT was originally a French idea, started in the 1950s. Britain introduced it as part of its condition of joining the European Economic Community (EEC). However, after another 30 years roughly 150 countries have implemented VAT which on average rises about 25% of their tax revenue according to Ebrill et al.(2001). In Europe the adoption of VAT was hastened, if not compelled by the creation of the common market. It came into force in 1973, introduced by Lord Barber, the chancellor under Sir Edward Heath, and started off as a simple 10 per cent tax on nearly all goods bought from a business. Since then it has swollen in size, complexity and popularity. One of the few holding out is America, but academics are talking about Obama introducing it over there.

Africa adopted it through the agreement of EEC where all countries joining the EEC had to replace their indirect taxes with the VAT. It replaced the Purchase Tax, which was a fairly complex system that had many different rates.

In the early days it was a relatively low level of no more than 10 per cent, with the exception of petrol and briefly electrical appliances, which were deemed in the days before Britain struck North Sea oil to be luxuries. They were subject to a 25 per cent rate.

According to Glenn & Kuo, (2001), there are growing concerns in the recent years about economic efficiency and tax simplicity in a competitive and integrated world economy. Many countries are lowering trade taxes and replacing distorted excise taxes with the consumption type VAT. Under the consumption based type VAT, all tax paid on purchases for use in the production process is immediately and fully recoverable. In other words business procurement is eliminated from the tax base or formulated differently, it can be expensed. As a result capital investment is not penalized through an additional tax

burden and the tax does not favor any method of production over another since substituting labor for capital or vice versa does not influence the total tax burden incurred by the firm.

However, according to Glenn et al (2000) potential revenue from VAT depends on a number of factors such as, how broad the tax base is (consumption) and the extent to which the businesses will comply with the tax (compliance).

Crossen(1991) broadly classifies the base of VAT into four categories; (i) all goods and services (total consumption) (ii) goods and selected services (iii) consumer goods and capital goods (iv) consumer goods and selected capital goods. However, two thirds of the countries use category (ii) of all goods and selected services.

In 2007, Mongolia's expansion of economic activity was responsible for a positive impact on VAT collections by 28 percent. In the determination of how much of the increase in the domestic VAT revenues was due to normal economic activity, and how much was due to tax reforms and taxpayer education campaigns between 2006 and 2007. The following were the results of Mongolia's expansion of economic activities.

1. 52 percent was due to VAT reform effects i.e. reduction of exemptions and zero rating.
2. 45 percent was due to economic activity effects.
3. 3 percent was due to economic effects induced by VAT reforms

Thus the economic activities in Mongolia have a significant impact on the VAT revenue growth. The VAT is related to the economy's growth rate, domestic demand changes, value of imports and value of exports among others.

The International Monetary Fund (IMF) provided input into the design of tax reforms in many transitional and developing countries according to Moore, (2005) and the recommendations were that there was a need for heavy reliance on broadly based sales tax such as VAT preferably with the single rate and minimal exemptions.

## **1.2 VAT System in Uganda**

The emergence of the consumption based VAT in Uganda was motivated by its unprecedented success in the developed world, motivated largely by its greater efficiency and buoyancy. This encouraged developing countries, like Uganda to adopt VAT during the eighties and nineties. However, with the exception of a few, many countries faced multiple difficulties in the adoption and implementation of VAT.

Uganda, undeterred by the concern generally expressed in the developing countries, decided to take the bold initiative and move forward with the introduction of VAT in 1996, with a goal of developing it into a major national tax. This move launched more than a decade ago, was initially confronted with resistance from some of the stakeholders but owing to efforts on public awareness about the progressive and futuristic dimensions of the tax and political recognition of its significance, the desired support eventually came in according to Kaweesa, (2004).

In Uganda VAT was introduced by an Act of parliament that provided for its imposition, collection and for other purposes connected to the tax. The tax at a rate of 17%, replaced the then sales tax and commercial transactions levy (CTL). In 2004/05, VAT rate was increased to 18%.

Various arguments were advanced to support the introduction of the VAT regime; some of which included the fact that VAT;

- Raises revenue productivity through its multi-stage coverage
- Provides fewer incentives for evasion because of its self-policing and cross-checking attributes
- Simplifies tax administration
- Increases efficiency in resource allocation
- Widens the tax base and ,
- Has a mechanism of tax credit that precludes cascading of the tax.

Uganda runs a multistage consumption tax based on the destination principle, similar to the European style VAT. The tax is applied to all goods and services at all stages of the production chain, at each stage the taxpayers are able to claim tax credits to recover the tax they paid on their business inputs. As a result, the tax system is in effect applying the tax only on the value added by each process. Since the only tax that doesn't get refunded is the tax imposed on final consumption, VAT has a relationship with consumption trends.

Uganda basically has three VAT regimes namely

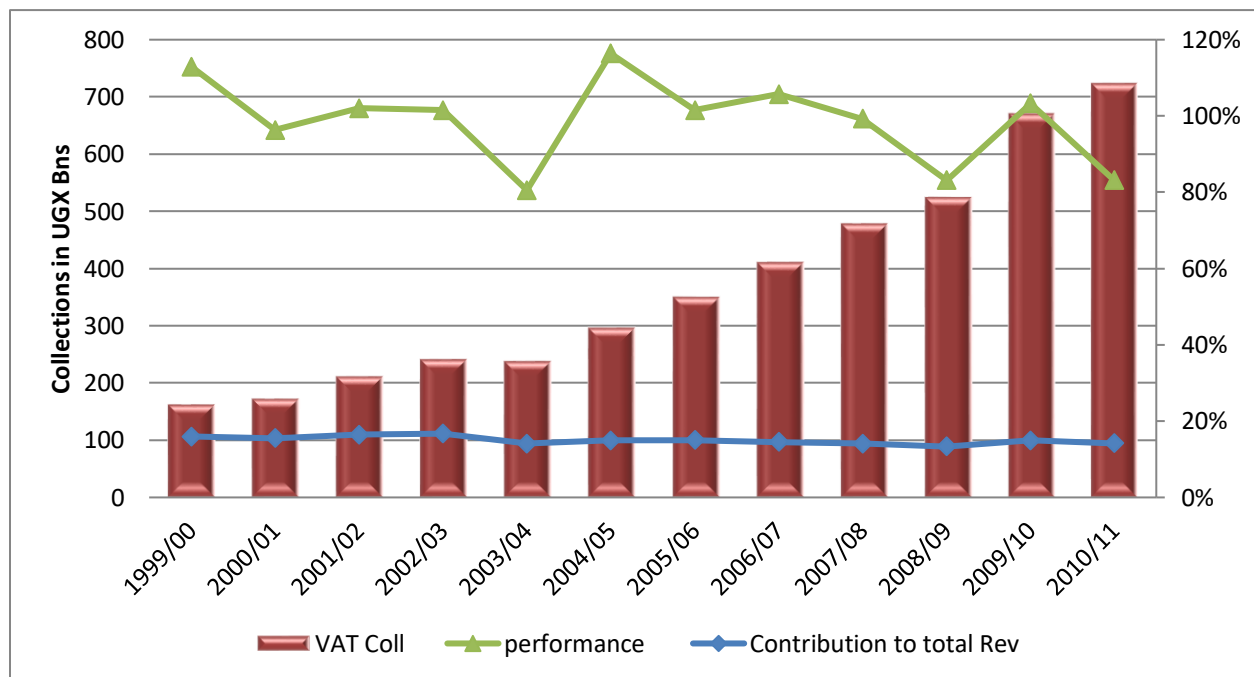
- a) The standard rate of 18% of all goods and services that are not zero rated or exempt.
- b) Zero rated commodities at 0%, the VAT not levied on the selling price of these items and the taxpayer receives full credit of the VAT paid on inputs used in production; examples are exports, drugs, medicine, feeds, fertilizers milk and many others
- c) VAT exempt commodities at no rate; because of conceptual and technical difficulties, VAT is not applied on sales of these commodities. However, tax payers are also not eligible to

receive any credit for taxes paid on inputs used to produce these goods thus an increase in their cost of production. Examples are; financial services, insurance, small businesses whose turnover is below UGX 50 million a year, unimproved land, education and computer software.

A number of performance measures have been used in several studies on this subject, ranging from simple ratios of revenue shares to GDP and individual tax head contributions to total revenues to more complex computations of tax capacity. While it is not the intention of this study to get into detailed discussion of these measures, a few are looked at to provide grounding for the study.

According to the URA annual revenue bulletin ( 2011), the percentage of the total local VAT collections and total revenue have stagnated below 20% for the period under study, despite the fact that introduction of VAT was to make it the major national tax, refer to figure 1.1.

**Figure 1.1: VAT Collection trends 1999/00 to 2010/11**



Source: URA databases where

- **VAT coll**, represents URA VAT annual collections in UGX Billions.
- **Performance** represents VAT annual collections against the set annual targets

- **Contribution to total Rev** representing the contribution of VAT to total annual revenue collections.

The total VAT collections against target trend show that there has been a decline in performance since 2005/06 (Figure 1.1). In a study carried out in the URA the average percentage contribution of total VAT collections (including import VAT) was 34 percent of total revenue collections for the period 1996/97 to 2005/06 Abibi et al, (2006). However, by 2010/11 there had been a decline to 32 percent which was far away from the international benchmark of about 35 percent for Africa and 45 percent for Central America as indicated by Gallagher, (2004) assessing tax systems using a benchmarking methodology.

According to Abibi et al.(2006), the VAT efficiency ratio<sup>1</sup> for Uganda stagnated at below 30 percent over the period 1996/97 to 2008/09, with 2008/09 recording the lowest of 24 percent in the 5 years. The study concluded that the increase in the VAT rate from 17% to 18% in 2004/05 led to a fall in the VAT efficiency ratio from 28 percent in 2003/04 to 27 percent in 2004/05. This showed that the increase in the VAT rate had not contributed positively to its performance. The URA databases show that average VAT efficiency ratio over the period under study stands at 25% which is quite low compared to the international benchmark of 69 percent.

The present tax structure in Uganda does not raise adequate revenue, for 2010/11 revenue mobilized from domestic sources could only fund 68% of the government expenditure budget. MOFPED, (2012). Hence encouraging domestic borrowing and seeking external finance which are only temporary measures of deficit financing. Moreover external funds can no longer be relied on due to donor conditions and the most recent financial crisis all over the world. Furthermore, potential sources of domestic borrowing are few and external grants reduce autonomy and increase political dependence. The alternatives are therefore to raise money through taxation, curtail desired government expenditure or continuously revising the tax structure.

With the above conditions in mind the introduction of the open market in the EAC region, international trade taxes in the region are anticipated to decline (import duty taxes). However, government expenditure is not expected to be reduced hence the need to bridge the gap. The Uganda government final consumption expenditure has grown from UGX 2,326 billion in 2004/05 to UGX 7,552 billion in 2010/11. MOFPED, (2012). VAT has been identified as the most acceptable tax and with its effect of being a “hidden tax” its increase would not be strongly felt yet effective in bridging the gap.

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<sup>1</sup> VAT Efficiency ratio is defined as the ratio of the share of VAT revenues in GDP to the standard VAT rate.

However recent studies have shown that:

- The Uganda VAT efficiency ratio has declined from 25 percent to 24 percent and is below the average of 31.4 percent in sub Saharan Africa . Abibi.et al.(2006).
- The VAT to GDP ratio has declined from 4.5 to 4.3 yet GDP is raising and a comparison with other African countries shows a ratio of 6.0 for Kenya and of 7.2 for Namibia; Abibi.et al.(2006).
- Local VAT collections are declining and the trends of VAT collection to the total revenue have shown no increase for a number of years. URA, (2009).

With VAT being a component of the consumption taxes imposed in Uganda, it may therefore not be too difficult to assume that, all things being equal, any attempt to vary the movement in macroeconomic indicators that directly affect consumption has the potential to impact on VAT revenues. Several researchers have looked at determinants of VAT using the income approach i.e. GDP and others have assessed the efficiency of the VAT system using the efficiency ratio. However, because of the importance of the trends in consumption in generating government revenues, the author has decided to adopt a slightly different slant to that of previous writers by finding out to what extent the trends of the selected macroeconomic indicators impact on the trend in VAT revenues. It is with these reasons in mind that this research is being carried out.

This study briefly traces the development of the VAT in Uganda and seeks to establish the determinants of VAT in Uganda. It investigates the macro economic variables that affect the VAT collections and models their impact.

### **1.3 Problem statement**

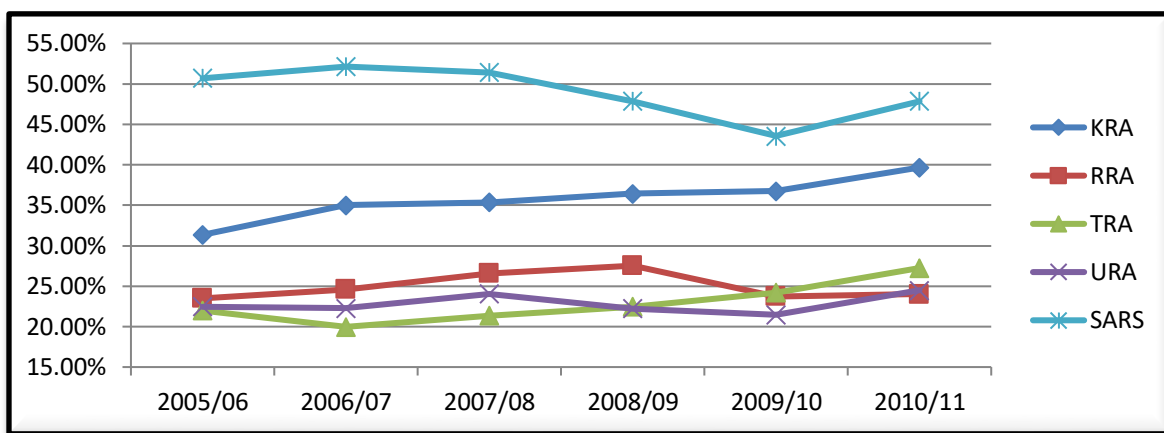
According to Gupta (2007), most developing countries are shifting away from trade taxes due to wide spread liberalization of trade. If trade liberalization occurs primarily through reduction in tariffs then loss in tariff revenue is expected implying the need to increase domestic revenue mobilization. Uganda is a member of the East African Community with a common market meaning a decline in the trade taxes from the region.

The Global financial crisis was a catalyst to the decline in external funding reducing the share of Aid in government finances to support government expenditure. Domestic revenue sources in Uganda could only fund 67.9% of government expenditure by 2010/11, while government expenditure grew from UGX 2 trillion in 2004/05 to above UGX 7 trillion in 2010/11. This implies that there is a need to expand the revenue take in light of the declining share of Aid in the government finances.



The VAT was introduced in Uganda in anticipation that it should be the major domestic resource thus the most likely tax to address the above issues. However contribution of VAT revenues to total revenue has stagnated below 20% according to figure 1.1. Uganda’s VAT productivity compared to other countries in the EAC region is low as is seen in figure 1.2. there is therefore need to improve the productivity of VAT in Uganda by understanding the factors that affect its performance.

**Figure 1.2: VAT productivity**



Source: EARATC regional comparative report 2010/11

- KRA - represents VAT productivity of Kenya
- RRA – represents VAT productivity of Rwanda
- TRA – represents VAT productivity of Tanzania
- URA – represents VAT productivity of Uganda
- SARS- represents VAT productivity of South Africa

Even with all the reforms in the current tax system, Uganda’s tax-to-GDP ratio remains one of the lowest in Africa and East Africa, with VAT bracket accounting for the biggest number of defaulters. Tax to-GDP ratio refers to the total government tax collections divided by the country’s GDP. When tax revenues grow at a slower rate than the GDP of a country, the tax-to-GDP ratio also drops. Unlike other East African states, Uganda’s tax revenue-to -GDP is said to have stagnated at 12%-13% for the last decade and currently financing 70% of the budget, which, experts say, is not sustainable. The low performance has been blamed on leakages and lack of proper revenue allocations. This led to URAs attempt to modernize its system to ease tax payments, but the tax-to-GDP ratio remains below the target levels. This is mainly because as the budget support declines, poor culture of tax compliance by the citizens, a big informal sector, which is outside the tax net, is resulting in widespread tax leakage and revenue loss.

Tax should be reflective of the growth of the economy. The system should have some level of predictability. There is need for Uganda to avoid depending on donors, increasing accountability, and get the informal sector into the tax bracket.

However policies have been drawn, Acts have been amended so as to improve and increase the performances of VAT in Uganda for example in the 2013/2014 national budget where a number of exemptions and taxes of VAT were introduced like the VAT exemptions on hotel accommodations was removed, VAT on water supply and wheat flour were introduced.

Furthermore studies that have been done on the VAT use annual total GDP while VAT revenue data is collected on a monthly basis and reported on a fiscal year basis in Uganda. It is therefore key to study the response of VAT to macroeconomic indicators that will inform the proposal of policy measures that would improve performance of VAT.

The above are the reasons why the researcher deemed it important to study the determinants of VAT revenue using macroeconomic variable which if adjusted would guide policy measures to improve VAT revenue performance and increase tax contribution to government expenditure.

#### **1.4 Objectives of the study**

The purpose of the study was to establish the determinants of VAT using macroeconomic indicators that measure consumption, such that when projections of the macroeconomic variables are made, VAT can easily be predicted, for proper planning. The model developed for this purpose is detailed enough to facilitate the estimation of the potential revenues for alternative tax options and can be used to assist decision makers in setting their tax policies. The main objective was to establish which macroeconomic indicators are determinants of VAT. The specific objectives were;

1. To establish the relationship between imports and VAT
2. To establish the relationship between inflation and VAT
3. To establish the relationship between private consumption and VAT
4. To establish the relationship between government consumption and VAT.
5. Whether there is a relationship between population and VAT.

#### **1.5 Hypotheses**

From the literature reviewed, the study will set out to test the following hypotheses.

1. There is no relationship between imports and VAT.
2. There is no relationship between Inflation and VAT.

3. There is no relationship between government consumption and VAT.
4. There is no relationship between private consumption and VAT.
5. There is no relationship between population density and VAT.

### **1.6 Significance of the study**

The study contributes to the existing literature on the VAT structure in Uganda. It is also important because of its due findings on the different determinants of VAT in a country, which include among others, imports, private consumption, government consumption and inflation. These results can be used by policy makers to design pro – growth tax policies and implement tax changes that are equity enhancing.

The study also highlighted the advantages of VAT like, self-policing, according to Alan, (1994) and VAT helps in curtailment of consumption of luxury and socially undesirable goods according to Obademi, (1994). According to Okele (1994), it provides incentives for export and thus promotes international trade and a positive balance of trade.

This theoretical discussion not only gave advantages, but also disadvantages of the VAT. However, it was also instructive to examine what happens when nations implement this tax. ie, Do they grow faster or slower? Does the aggregate tax burden increase? Are income taxes eliminated, or at least reduced?

Many countries already impose VATs, and the results of this real-world experiment have been dismal. Based on historical evidence and economic research, it is clear that adoption of a VAT will have several adverse consequences. Like VAT triggers more government spending and higher tax burdens.

International evidence clearly shows that a VAT is likely to increase the aggregate burden of government. The burden of government in Europe used to be only slightly larger than it was in the United States. Beginning in the late 1960s, however, European countries began to implement VATs. Since then, the overall tax burden in Europe has climbed rapidly.

VAT also slows the economy and destroys jobs. By taking resources out of the productive sector of the economy and transferring them to the government; a VAT would slow economic growth and undermine job creation.

VAT imposes heavy administrative costs on businesses and taxpayers. A VAT conscripts businesses to serve as tax collectors for the government. This is particularly true if lawmakers impose a credit-invoice VAT, as has been the case in almost every nation that adopts the tax.

This study sought seek to provide the necessary impetus towards resolving some of the problems identified, identify the factors contributing or mitigating the efficient administration of VAT and to suggest possible remedies to identified constraints in the VAT Act, its implementation and VAT administration in Uganda.

### **1.7 Scope of the study**

The study was limited to the period between 1999/00 to 2010/11, because this period captured the responsiveness of VAT revenues to the changes in the macroeconomic variables driving economic growth. VAT was introduced in 1996/97, thus the period 1999/00 to 2010/11 was relevant for the study within the VAT regime.

Within this period Uganda's economy grew rapidly. Therefore, it's possible in this period, to capture the effects on VAT revenues of such events like trade liberalization, privatization and tax modernization programs as some of the policies introduced.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0. Introduction**

This chapter gives an overview of earlier studies carried out on determinants of tax revenue inclusive of VAT and the theoretical relationship between macroeconomic variables and VAT. The variables detailed in here are imports, inflation, and private consumption, government consumption and population density. Models of VAT already in use have been cited in this chapter and the connection to the variables considered. The impact of change in VAT rate has also been addressed by detailing earlier studies on it.

#### **2.1 Theoretical determinants of VAT**

What affects revenue has been the subject of a long debate in relation to economic development and sophistication of the economic structure. Moreover according to Wagners law, the demand for government services is income – elastic, so the share of goods and services provided by the government is expected to rise with income.

According to Gupta (2007), the sectoral composition of output also matters because certain sectors of the economy are easier to tax than others. For example the agriculture sector may be difficult to tax especially if it is dominated by most developing countries that are shifting away

from trade taxes due to wide spread liberalization of trade . If trade liberalization occurs primarily through reduction in tariffs then loss in tariff revenue is expected.

Degree of international trade is measured by the share of exports and imports. However Keen and Simone (2004) argue that revenue may increase provided trade liberalization occurs through tariffication of quotas, eliminations of exemptions, reduction in tariff peaks and improvement in customs procedures.

Rodrick (1998) also points out that there is a strong positive correlation between trade openness and the size of the government as societies seem to demand (and receive )an expanded role of the government in providing social insurance in more open economies subject to external risks.

Foreign aid has also been identified as a factor that may affect revenue performance. The key distinction is whether the aid is used productively or simply to finance current consumption expenditures. Moreover, the consumption of aid has an important effect on revenue performance. For example Gupta et al (2004) found that concessional loans were associated with higher domestic revenue mobilization, while grants had the opposite effect.

The degree of external indebtedness of a country may affect revenue performance as well. To generate the necessary foreign exchange to service the debt, a country may choose to reduce imports. In such a scenario, import taxes will be lower. Alternatively, the country may choose to increase import tariffs or other taxes with a view to generate a primary budget surplus to service debt.

For consumption based VAT, the revenue raised depends on several broad factors, that is the tax base, the rate structure, the size of the economy and the degree of compliance. The broader the tax base the more activities are included and thus subject to tax and the higher the revenue. Exemptions will on the other hand reduce the amount of tax collected because the Value added of the exempt business or activity will remain untaxed but on the other hand the nondeductible input tax may be shifted forward depending on price elasticity's and lead to tax accumulation, increasing revenue. Reduced rates and zero rates (except when applied on imports) will naturally reduce the amount of revenue raised.

It is important to note that all these elements interact with each other. Tax base and revenue goals have a direct influence on the rate structure, in the sense that the latter will be determined in the light of the former. The complexity of the tax structure may not determine, but is evidently crucial for the degree of voluntary compliance. Exemptions and multiple rates may lead to misclassifications of goods and services. The rate structure may also affect the degree of tax evasion where high tax rates provide an incentive to shift activities and movement to the shadow economy.

Previous research in key determinants of VAT yield is hardly available or substantial. Apart from the above factors, other elements play an important role. Strong revenue performance is enhanced by a relatively high ratio of trade to GDP because of the ease of collecting VAT at importation. High literacy rates increase the potential of administrative compliance of taxpayers as well as the administrative capacity of the tax collectors. Collections are also impacted on by structural factors such as ease of tax evasion, urbanization level, share of agriculture and trade openness.

Under the consumption based type VAT, all tax paid on purchases for use in the production process is immediately and fully recoverable. In other words business procurement is eliminated from the tax base or formulated differently, it can be expensed. As a result capital investment is not penalized through an additional tax burden and the tax does not favor any method of production over another since substituting labor for capital or vice versa does not influence the total tax burden incurred by the firm.

If we ignore economic relations with foreign countries and exemptions, Gross national income (Y) is the sum of total consumption and total investments (I), or  $Y = C + I$ . When we deduct the value of investment, we find the value of consumption or  $Y - I = C$ . For this reason, the tax is referred to as a consumption type VAT because the tax base equals total private consumption expenditure.

Ideally VAT should include both private and government consumption. However in the government realm it proves difficult to realize an adequate identification of and to arrive at a precise distinction between investments and consumption.

## **2.2 Empirical Literature**

In a study of tax share determinants by Tanzi(1992), findings were that half of the variation in the tax ratio is explained by per capita GDP, import share, agriculture share and foreign debt share.

Leuthold (1991) uses panel data to find a positive impact on tax revenue from trade share, but a negative impact from share of agriculture. In a similar study, Stotsky and WoldeMariam (1997) find that both agriculture and mining share are negatively related to tax ratio, while export share and per capita income have a positive effect. Guhra (1998) concluded that tax ratio rises with income and degree of openness, and falls with share of agriculture in GDP.

Wawire(2000) used total GDP to estimate the tax buoyancy and income elasticity of Kenya's tax system. Tax revenues from various sources were regressed on their tax bases. Based on empirical evidence, the study concluded that the tax system had failed to raise necessary revenues.

Adari (1997) study focused on the introduction of VAT in Kenya that replaced sales tax in 1990. The study analyzed the structure, administration and performance of VAT. The estimated buoyancy and elasticity coefficients were less than unity implying a low response of revenue from VAT to changes in GDP.

Wawire (2011), carried out a study on determinants of VAT considering monetary GDP, imports, trade volumes and other economic shocks. The study found that growth elasticity's of VAT were all greater than one. It also found that VAT revenues responded with substantial lags to changes in its determinants, and concluded that Kenya's VAT revenue was very responsive to changes in its determinants especially international trade. However, it's considered that macroeconomic variables are in line with the study carried out by Wawire in Kenya to study the determinants of VAT in Uganda.

Empirical studies related to each of the identified VAT determinants are discussed below;

### **2. 2.1 Imports in relation to VAT**

An increase in imports should boost total VAT on account of growth in import VAT. Increase in the import value would imply that there is a lower demand of domestic goods. As imports are subject to tax in the country of consumption, a rise of its value results in a tax revenue growth. Low import of goods and services leads to a decline in VAT on imports hence a decline in the gross VAT. Wawire (2011) found that an increase in the volume of imports led to a more than one percent increase in VAT revenue.

Campbell (2001), in his study on consumer imports & their impact on Indirect tax, revenue in Barbados using regression analysis, showed that in the long run a per unit increase in the consumer imports boosted indirect taxes by 0.46 percent, while in the short run a per unit increase in the consumer imports increased indirect taxes by 0.78 percent. Where VAT is an indirect tax.

Baunsgaard & Keen (2005) showed that a general increase in imports led to an increase in total VAT revenue. In their study they found that in 2004 two thirds of the absolute increase in VAT collections was attributed to increase in imports.

However, in Ukraine, VAT revenue was forecast on the basis of macroeconomic indicators and the effective tax rates. This method was tested and approved by Ministry of Finance, the ministry of economics, the state tax administration and the state customs services in August 2004. In this methodology, the total VAT revenue was decomposed into VAT from imported goods and services, VAT from domestically produced goods and VAT refunds. Evolution of each component was forecast on the basis of historical data as well as macroeconomic indicators.

VAT on imports was forecast via dynamics of imports of goods & services and the exchange rate. The model revealed that, when there was a low import of goods and services, there was a decline in VAT from imports.

The model in Ukraine was contradicted by Bird (2005) where his study revealed that no such relationship is apparent in the Ukraine i.e. though imports increased by 14 percent in 2003 and 16 percent in 2004, VAT revenues as a share of GDP actually declined in these years. Ukraine VAT performance can't be explained by changes in economic structure as concluded by Bird, (2005).

### **2.2.2 Inflation and VAT**

Inflation is a rise in the general level of prices of goods and services in an economy over a period of time. The rate of inflation is measured by the change in consumer price index (CPI), which is expected to positively correlate with the VAT. Inflation reduces the real interest rate which in turn reduces savings and also reduces income and purchasing power; this increases expenditure hence increasing the VAT. Inflation also impacts directly on consumer behaviors by reducing purchasing power. High inflation may lead to shortage of goods if consumers begin hoarding out of concern that prices will increase in the future causing peaks in the current VAT.

Economic theory states that demand pull inflation is where increase in aggregate demand is due to increased private and government spending making it constructive and promotes growth in VAT. Whereas cost push inflation is where decrease in aggregate supply is due to natural disaster or increase in price of inputs causing reduction in VAT as manufacturers and traders may not be able to pass all the costs to the consumer implying that the input tax would be higher than the output tax thus a reduction in VAT. Tait.A. (1988).

A change in the inflation rate can be produced by an expansionary monetary policy under circumstances. If however, the term is interpreted as an increase in the price levels (or a one period increase in the inflation rate). Then whether VAT is inflationary and in this sense would depend on a number of factors. Presently inflation among nations is seen mainly through rising prices in international markets.

After VAT was first introduced a survey was conducted by the director of the IMF on the impact in several countries on the basis of international monetary fund data, which showed that VAT is never introduced in isolation.

There are a number of variables influencing price change, and therefore it is difficult to empirically assess the effect of VAT on prices. The impact of VAT on prices, therefore, cannot be strictly segregated from the general trend in inflation. First the taxes that have been replaced



are also relevant. They could be wholesale sales tax of the cascading type, a simpler VAT, a multistage ring system, a cascade production tax. Second, the design to yield equal or higher revenues also makes a difference. Thirdly, other concurrent changes such as rise in oil or steel prices in international and internal markets, increases in utility rates, changes in wages level, administrative changes such as tighter monetary policy, price control, monitoring of prices and these make a due impact on the price rise.

It is seen that the net price effect of VAT would be nil if the VAT is equal to yield tax. There would not be any effect on the overall price changes although there may be changes in relative prices.

The tax being revenue neutral, the aggregate demand is such unchanged and so there would be no impact on the aggregate price level. The economists all over the world have viewed that VAT is not inflationary.

Thus, this brings us to conclude that the potentially inflationary effect can be constrained by government policies to inform the public and traders about the expected effects of VAT on prices, the use of price controls, monitoring of prices, offsetting adjustment in other taxes and generous provisions to ensure full credit for previously paid taxes on inputs. More over a mechanized form of government can give it a better shape through administration.

Glenn et al (2000) noted that devaluation of the domestic currency will affect the quantities of imports and exports, which in turn affect the trade tax revenues from import duties ( includes Import VAT ) . Impact of inflation on VAT will ultimately depend on whether tax is imposed on unit tax or value added tax.

Slobodnitsky & Drucker in their VAT revenue forecasting in Israel, found a strong transmission mechanism of VAT rate changes to inflation which was more evident in times of VAT increases than in VAT reduction.

In 2008 the Bureau of internal revenue, in the republic of Philippines discovered that inflation had an impact on the tax collection at a much later stage considering that there was a lag in time between the production / purchases and sales, because goods passed through inventory stage first before they were sold. The Ukraine forecasting model also uses Consumer Price Index (CPI) with other macroeconomic variables to project VAT collections implying that inflation is a determinant of VAT.

### **2.2.3 Private Consumption and VAT**

In the case of this study, consumption was measured by the GDP which is made up of the two components, private consumption and government consumption. Private consumption includes total spending by the households on durable goods like cars, machines and heaters as well as non-durable goods like, food, gas, and clothes. And on services like education, health care. Spending on new houses is excluded as it is considered part of investments according to Jenkins, (2001).

Since VAT in Uganda is destination principle, imports are taxed in the same way as domestically produced goods and exports are not subject to tax. Therefore, tax essentially applies to goods and services consumed domestically, implying that private consumption and government consumption are based on which tax is imposed. Hence determining the magnitude of VAT revenues according to Jenkins & Kuo, (2000).

Consumption patterns determine part of the VAT pressure. VAT decreases in a country if for example it spends a lot on food, as food is subjected to lower or no VAT rate. Expenditure on food and other basic necessities decreases as a proportion of total expenditure with a rising standard of living or GDP.

According to Cnossen, (1995), VAT is proportional to expenditure and is explained by converging consumption patterns between income groups. The different income groups purchasing more and more of the same goods and services, the higher income groups buy more expensive varieties in comparison with lower income groups.

Chipeta (1998), evaluated effects of tax reforms on tax yields in Malawi for the period 1970 to 1994. The results indicated buoyancy of 0.95 and an elasticity of 0.6 concluding that the tax bases had grown less rapidly than GDP. While in Ghana a similar study concluded that reforms contributed significantly to tax revenue productivity from 1983 to 1993.

Adari(1997), focused on the introduction of VAT in Kenya. The study analyzed the structure, administration and performance of VAT. The estimated buoyancy and elasticity coefficients were less than unity implying low response of revenue from VAT to changes in GDP. This suggested the presence of laxity and deficiencies in VAT administration. However, the estimation was done in total disregard of the time series properties of the data therefore the results were not reliable for planning purposes.

Muriithi & Moyi (2003) study on responsiveness of tax yields on income showed that tax reforms had a positive impact on overall tax structure and on individual tax handles. The study

concluded that despite the positive impact, the reforms failed to make VAT responsive to changes in income.

Wawire (2011), considered monetized GDP in arriving at determinants of VAT in Kenya. His argument was that it was important to assess the response of VAT revenues to changes in monetary GDP to indicate the extent to which monetization of the economy and subsequent reduction in black market would affect these revenues. Wawire still found GDP to be significant to VAT revenues and the monetary GDP even explained the VAT trends better. However, the author used private and government consumption since having the three variables in the model would conflict. The author also had an interest in establishing the impact of the government consumption on VAT since in Uganda the government spends more on administration.

Tuan.M, (2012). Tax base and revenue forecasting, stated that Private consumption was used in the input output model typical for VAT forecasting. Further in the Israel VAT forecasting model Drucker – Slobonitsky found private consumption a significant variable in determination of VAT collections.

In Ukraine the forecast of domestic VAT was done with a simplified demand method using private consumption as a leading indicator. The model revealed that strong private consumption generated more revenue from Domestic sales.

#### **2. 2.4 Government Consumption and VAT**

According to Glenn et al (2000) Government consumption expenditure is the sum of government expenditure on final goods and services. It includes salaries of public servants, purchase of weapons for the military and any investment expenditure by a government. It does not include any transfer payments such as social security or unemployment benefits. Since goods and services attract VAT then government consumption expenditure is considered a VAT base. Ideally VAT should include both private and government consumption. However in the government realm it proves difficult to realize an adequate identification of and to arrive at a precise distinction between investments and consumption.

In the Israel forecasting model Drucker –Slobonitsky used government consumption as a VAT base and found it significantly impacted on revenue collections. Government consumption was also used in the Tuan M. (2012), input/ output modeling typical for a VAT model.

However in the Ukraine VAT revenue forecast model approved by the Ministry in 2004; it was found that though government consumption was one of the variables to determine the VAT base, it did not have a significant impact on VAT revenues unlike the private consumption.

In their study Tatiana & Lev, had a challenge of whether to use Gross VAT or Net VAT (excluding VAT refunds) and a comparison of the two using exogenous variables of government consumption, private consumption and tax rate revealed that the results were similar. Further they were worried about the endogeneity issues, mainly suspecting that government consumption was endogenously determined by VAT revenue. They carried out the Hausman test and results showed that there was no evident simultaneous correlation between government consumption and VAT.

The Bureau of internal revenue (2008), of the republic of Philippines revealed that government consumption and public spending for the first quarter affected VAT and income tax collections in the second and third quarters of the year.

### **2.2.5 Population Density and VAT**

Population density is the number of people per square kilometer in a given country. The use of population in this case was in recognition of the fact that population growth rate has great implications on demand for public goods and services and thus, on tax revenues that fund these goods and services. High population growth rate is also associated with high illiteracy rate and low education level that make it difficult to implement tax policies. Population enters the tax revenue equations as an independent variable, so as to determine its influence on tax yields from various sources. **In Wawire (2011), population when modeled with trade value was significant with 0.4 percent impact, however when modeled with imports it was significant at 0.07.**

Teera. M, (2001) in her study on determinants of tax revenue share in Uganda noted that, population density was expected to have an adverse effect on VAT revenue. This is because the higher the density of the population, the higher will be the use of taxable sources i.e. rising of the tax base and the tax authorities could intensify their efforts to collect taxes at a relatively minimal cost compared to a sparsely populated country. Conversely a thinly populated area, administrative costs are expected to be higher in terms of total yield and therefore less encouraging for collection of tax revenues. In such a situation, the degree of tax evasion and tax avoidance may also be relatively higher than the densely populated area (Ansari, 1982). Likewise the author adopted the use of population as use in the Teera(2001) study of the determinants of tax Revenue share in Uganda.

### **2.3 Identified gaps**

Most of the empirical studies cited employ cross sectional empirical methods and hence ignore on the variation over time. This study looks at the time variation using regression of time series data.

Wawire(2000) used total GDP to estimate the tax buoyancy and income elasticity of Kenya's tax system. Tax revenues from various sources were regressed on their tax bases. Based on empirical evidence, the study concluded that the tax system had failed to raise necessary revenues. However among the shortcomings of this study was the fact that it did not consider other important determinants of tax revenue. The study like others such as Wilford and Wilford (1978) and Ariyo (1997) used the proportional adjustment method which had shortcomings such as failure to get revenue receipts data and relying on budget estimates for discretionary effects of tax revenue. The current study used actual revenue receipts.

The studies cited such as Wawire (2011) use monetary GDP. However according to theory the Consumption VAT relates more to private consumption. Ideally VAT should include both private and government consumption. However in the government realm it proves difficult to realize an adequate identification of and to arrive at a precise distinction between investments and consumption. The current study separates government consumption from private consumption to get a closer relationship.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.0 Introduction**

This chapter gives a detailed account of the methodology used. It identifies the data sources and data analysis techniques used. The data was analyzed using E-Views to perform the ordinary least squares regression (OLS) in order to establish if the variables significantly affect VAT, as well as the normality, stationarity and cointegration test which precede regression analysis. Finally a brief on the problems encountered during the process is given.

#### **3.1 Data types and sources**

This study took on a quantitative research design; the research is non-experimental but descriptive because it's not going to tamper with the variables of the study. Its aim is simply to examine, describe and show what happens and then make observations on what happens.

Secondary data was collected from data bases of URA, Bank of Uganda and Bureau of Statistics. Various publications and reports were also used. Specifically data was collected from the URA revenue bulletins of 2004/05 to 2010/11; Bank of Uganda Financial indicators data base and UBOS statistical abstracts of 2006/07 to 2010/11. The empirical analysis covered data from 1999/00 to 2010/11. A total of six variables were used for the study, depending on the availability of degrees of freedom and completeness of the data.

These variables included; total value added tax collections (total of import and domestic VAT) represented as VAT, Private consumption represented by PCONS, Government consumption represented by GOVCONS, Inflation represented by INFLN, imports represented by IMP, and population density represented by PD. Table 3.1 specifies the unit of measure and source of variable.

**Table 3.1 Description of variables**

Variable	Description	Unit of measurement	Source
VAT	Value Added Tax	Billion UGX	Uganda Revenue Authority
PCONS	Private Consumption	Billion UGX	UBOS
GOVCONS	Government Consumption	Billion UGX	UBOS
INFLN	Inflation	Rate	Bank of Uganda
IMP	Imports	Billion UGX	Uganda Revenue Authority
PD	Population density	Ratio	UBOS and Authors calculations

A brief description of each variable is given below:

**VAT:** The dependent variable included in the model was the total VAT collections. These were the local and import VAT collections inclusive of refunds. Studies in Israel reveal that estimated equations of net VAT and gross VAT provide similar results with respect to macroeconomic variables. The source of the data was the URA data bases and the revenue has been presented in UGX billions.

**PCONS:** Private consumption was calculated on a quarterly basis using E-views. The source of the data was the UBOS statistical bulletin and data in UGX billions.

**GOVCONS:** Government consumption was calculated on a quarterly basis using E-views. The source of the data was the UBOS statistical bulletin and data in UGX billions.

**INFLN:** Is the rate of inflation measured by the change in consumer price index, which is expected to positively correlate with the VAT collections. The data was sourced from the Bank of Uganda website.

**IMP:** Imports were collected from the URA , Asycuda system that records total imports at CIF value in UGX billions. These were imports of dry cargo i.e. imports excluding fuel imports since these do not attract any VAT.

**PD:** Population density was calculated by dividing the population by the total area of the country in square kilo meters. The population statistics were collected from the UBOS statistical Bulletins, taking midyear population estimates to match the financial years used.

Annual data was obtained and in order to create more data points, it was converted to quarterly range using E- Views. The technique used was the quadratic match average which fits a local polynomial for each observation of the series in annual range. It then uses a polynomial to fill in all observations in quarterly range. The quadratic polynomial is formed by taking sets of three adjacent points from the source series and then fitting a quadratic so that the average quarterly observation matches annual data actually observed. The three points mentioned above are selected in a way that one point before and after the period currently being interpolated provides the three points.

The data was then subjected to descriptive statistics under E views to establish the Jarque – Bera statistic and kurtosis of each of the variables.

**3.2 Test for normality**

Normality assumes that the variables to be used in the model follow a standard normal distribution. Using the Jarque – Bera statistic, computed as

$$JB = \frac{n}{6} [(skewnessX_s)^2 + \frac{(kurtosisX_s - 3)^2}{4}] \dots\dots\dots(3.1)$$

The variables were tested under the following hypotheses;

H<sub>0</sub>: The series is normally distributed

H<sub>1</sub>: The series is not normally distributed.

Where the Jarque- Bera statistic was significant, the null hypothesis was accepted. The series were considered to be normally distributed at 5% level of significance if the probability of the

Jarque – Bera statistic was greater than 0.05 and at 10% level of significance if the Jarque – Bera statistic was greater than 0.1.

**3.3 Testing for Stationarity**

The series were also tested for stationarity using the Augmented Dickey Fuller test. The reason for this test was the fact that macroeconomic variables are desired when they are stationary and on the contrary, regression on the series yields spurious results. The ADF statistic was computed using the formula below;

$$\Delta Y_t = \alpha_0 + \lambda_t + \delta Y_{t-1} + \sum_{i=1}^l \phi_i \Delta Y_{t-i} + \varepsilon_t \dots\dots\dots(3.2)$$

Where l, is the lag length

The ADF statistic tested the null hypothesis that the series are non-stationary against the alternative that the series are stationary. Where the absolute value of the computed ADF statistic was greater than the tabulated one, the null hypothesis was rejected and an inference drawn that the series was stationary at a given level of significance. The series which were found to be non-stationary were differenced to make them stationary.

**3.4 Structural Stability test**

The chow break test was employed to test the stability in this study since there was a change of VAT rate from 17% to 18% within the period. In this test the F –statistic has an exact finite sample F- distribution if the errors are independent and identically distributed normal random variables. The hypotheses for this test were;

H<sub>0</sub>: There is no structural change

H<sub>a</sub>: There is a structural change.

The null hypothesis is rejected for F<sup>c</sup> > F<sup>o</sup> where F<sup>o</sup> is the tabulated F value.

**3.5 Test for cointegration**

The variables used in the study were tested for co integration in order to establish if there existed a long run relationship between the series. The fundamental equation for testing for co integration using Johansen’s procedure is as below;



$$\Delta Y_t = \sum_{i=1}^{p-1} \pi_i \Delta Y_{t-i} + \pi_p Y_{t-p} + \varepsilon_t \dots \dots \dots (3.3)$$

Where;

$$\pi_i = -[I - \sum_{j=1}^i A_j]$$
 is trace statistic,

$$\pi = -[I - \sum_{i=1}^p A_i]$$
 is Eigen value.

The key feature in Johansen's value is the rank ( $\pi$ ) which equals the number of independent cointegrating equations. The series were therefore tested for cointegration and after confirming its presence, when the absolute value of the likelihood ratio was greater than the tabulated value at a given level of significance for a given hypothesized number of cointegrating equations. The long run relationship was then modeled after confirming co integration.

**3.6 Theoretical Framework**

The model that the study used was constructed taking into account the demand side for government financing of public goods provision. It emphasizes the optimal allocation of resources between the public and private goods. The model was relevant to the study because it considered both the government revenue and its expenditure to provide the public goods. Moreover it is a model of resource allocation that can be modified to emphasize the interaction between desired levels of public goods provision and the economic cost of levying taxes according Barnett, (1993).

To model, assume that there is a pure private good ( $Q_p$ ) and a pure public good ( $Q_g$ ). Control of all resources initially lies with the private sector, and must be transferred to the public sector for producing  $Q_g$ . Increasing marginal opportunity cost characterizes this transference activity. This marginal cost includes resources used directly to levy taxes plus loss of  $Q_p$  through dampened incentives and reduced efficiency in the private sector resulting from the tax policies (Startz 2003).

Assume further that the government fully finances its activities through taxes. Also assume a set of individualistic preferences,  $\bar{U} (Q_g, Q_p)$  embodying continuously diminishing marginal rates of substitution between the public and private goods (Barnet, 1993). This preference function is assumed to be a characteristic of Scitovsky's social indifference curves (Mishan, 1981) or Bergson-Samuelson social welfare function (Varian; 1997).

The demand function for the public good is derived by considering a model of utility-maximizing behavior coupled with a description of underlying economic constraints. The basic assumption is that a rational individual will always choose a most preferred bundle ( $x$ ) that consists of both public and private goods from a set of affordable alternatives ( $X$ ) that satisfy the individual's budget constraint. If  $Y$  is a fixed amount of income available to the individual and  $p = (p_g, p_p)$  is the vector of prices for a public good ( $p_g$ ) and a private good ( $p_p$ ), the set of affordable bundles and the budget of the individual could be given by:

$$B = \{x \text{ in } X: PX \leq Y\}$$

The problem of utility maximization is then expressed as:

$$\text{Max } U(x)$$

Such that  $PX \leq Y$  and  $x$  is in  $X$

However, under the local non satiation assumption, a utility-maximizing bundle  $x^*$  must meet the budget constraint with equality (Varian, 1992). This allows the restating of the utility problem in indirect form as:  $V(P, Y) = \text{Max } U(x)$

Such that  $PX = Y$

The value of  $x$  that solves this problem is the individual's demand bundle which expresses how much of each good the individual would buy at given levels of prices and income. The function that relates  $P$  and  $Y$  to the demanded bundle, conditional on other covariates is the individual's demand function.

The individual's bundle that maximizes utility is at a point where the budget line is tangent to the indifference curve (Stiglitz, 1988). Therefore, a rational individual would choose to allocate the income between public and private goods in such a way that the marginal rate of substitution of the public good for private good ( $MRS_{g,p}$ ) equals the ratio of their prices. However, according to Agénor and Montiel, 1996, free foreign trade may prevent efficient allocation of income over time. This implies that for optimum allocation, the marginal benefit of any good must be equal to its marginal cost which should be equal to its world price in a competitive foreign market. For each level of income, there will be some optimal choice for each of the goods. For the public good ( $Q_g$ ), the optimal choice at each set of prices and income will be the demand function.

The demand equation of the following general form is often estimated:  $Q_g = f(p_g, y, z)$ ; where  $Q_g$  represents the demand for the public good for an individual,  $p_g$  is the price an individual pays for a unit of the publicly provided good,  $y$  is the income of the individual, and  $z$  is a vector of variables reflecting such things as the economic and political composition of the economy

(Barnett, 1993).  $Y$  is exogenously determined, while  $p_g$  is dependent on the tax share which in turn depends on the form of the tax base. The demand curve is actually the marginal willingness to pay curve (Stiglitz, 1988). At each level of output of the public good, the demand curve shows how much the individual would be willing to pay for an extra unit of the public good. The tax price for the public good at the optimal level is equal to the marginal rate of substitution which is the amount of the private good that an individual must give up for one more unit of the public good.

When income changes, the vertical intercept of the budget line is altered but its slope does not change if prices are fixed. With an increase in income, the budget line shifts outwards parallel to the original one. The individual can now purchase more of both goods and attain a higher utility-maximizing consumption choice for both public and private goods. The resulting locus of utility-maximizing bundles is known as the income expansion path (Varian, 1992).

From the income expansion path, an Engel curve is derived which relates income to the quantity demanded of the public good. A straight income expansion path leads to a linear Engel curve through the origin. In this case the individual's demand curve has unit income elasticity. This implies that the individual will demand the same proportion of each commodity at each level of income (Varian, 1992). However, in the case of utility-maximizing consumption choice, the income expansion path is expected to bend towards the private good implying that as the consumer gets more income, more of both goods are demanded but proportionately more of the private good than the public one.

Suppose the government wishes to tax a utility-maximizing individual in order to obtain a certain amount of revenue that is used to provide the public good the individual consumes, the revenue obtainable would be determined by the tax bases especially the individual's income. In this study therefore, total tax revenue is taken as a function of per capita income. This relationship paves the way for the estimation of Engel curves that relate the amount of tax revenues from various taxes to income (GDP).

### **3.7. Economic Model**

At the empirical level, tax revenue functions are proxies for Engel curves. Since taxes are used to finance public goods, a relationship of tax revenue to income is but a proxy for the relationship between consumption of a public good and income, which is a public good's Engel curve. The factors that shift the Engel curves were identified to include private consumption, government consumption, inflation, imports, population density, the change in tax rate, monetary GDP and percentage share of Agriculture in GDP. Implying that VAT is a function of the independent variables;

$$\text{VAT} = f(\text{PCONS}, \text{GOVCONS}, \text{INFLN}, \text{IMP}, \text{PD}, \text{MGDP}, \text{AGDP})\text{-----}( 3.4)$$

The multiplicative functional form of tax revenue model is specified as:

$$T = e^{\alpha} Y^{\beta} e^{\varepsilon} \dots$$

Where:

T = tax revenue

$\beta$  = estimated parameter

Y = income

$\alpha$  = constant term

e = natural number

$\varepsilon$  = error term

As noted in the literature review, this specification follows standard practice in this area (see Muriithi and Moyi , 2003 and Wawire ,2003).

To estimate the parameters using OLS method, the multiplicative equation is linearized by taking the logarithms of the variables in the model and introducing an error term  $\varepsilon$  and the subscript i, for a particular source of tax revenue. Therefore, the general estimating equation is:

$$\ln T_i = \alpha_i + \beta_i \ln Y + \varepsilon_i$$

Where,  $T_i$  = revenue from the ith source. For this study i is equal to 1 since it is only VAT

$\beta_i$  = elasticity coefficient

The foregoing approach does not pay attention to the special characteristics of the nature of the tax system and institutional and demographic factors that shape the trends in the economy. Considering the fact that tax revenues might change over time due to changes in the exogenous variables, the equations presented above are re-specified and some re-parameterized and dummies defined for discretionary changes, unusual circumstances and events.

An analysis on the variables revealed that Government consumption (GOVCONS) and Private consumption (PCONS) are components of GDP and are related to monetary GDP, hence the monetary GDP variable was dropped. A similar observation caused the drop of percentage of Agriculture in GDP. A dummy was introduced for the period when the VAT rate was increased.

Thus the long run model employed in this study took the form with the formula below.

$$LVAT_t = \alpha_0 + \alpha_1 LPCONS_t + \alpha_2 LGOVCONS_t + \alpha_3 LINFLN_t + \alpha_4 LIMP_t + \alpha_5 LPD_t + E_t \text{-----}$$

(3.5)

Where:

LVAT is the log of VAT revenue

LPCONS is the log of private consumption

LGOVCONS is the log of government consumption.

LINFLN is the log of inflation

LIMP is the log of imports

LPD is the log of population density

The above model was analyzed to explain how VAT changes as the independent variables change.

### **3.8 Error Correction Model (ECM)**

An error correction model was constructed and later a parsimonious model of the series also developed.

The ECM model for VAT was specified:

$$\Delta LVAT_t = \delta_0 + \sum_{i=0} \delta_i \Delta LZ_{t-1} + \sum_{i=1} \delta_i \Delta LVAT_{t-1} + \lambda_1 ECT\_1 + \varepsilon_t$$

.....(3.6)

Where  $Z_t$  is a vector of cointegrated variables as is defined before and  $ECT\_1$  is the error correction term lagged one period with  $\lambda_i$  as a measure of the adjustment mechanism and  $i=1$ . Equation 3.6 represents the initial over-parametized error correction model. Using Hendry's general-to-specific approach, the precedence involved a simplification process to make the model more interpretable and certainly a more parsimonious characterization of the data. The simplification process, guided by statistical rather than economic reasons, proceeded principally by setting certain parameters starting with those with "t" values between less than one and zero in absolute terms to zero.

### **3.9 Diagnostic Tests**

The variables were subjected to the Whiteness test. This is a test which examines the series for constant variance and serial correlation. The test for serial correlation examines the null hypothesis, that the series are not serially correlated against the alternative that the series are serially correlated. Whereas the test for constant variance examines the hypothesis that the series have a constant variance against the alternative or that the series have a varying variance.

Residual tests; the Breush- Godfrey test was used to test the residues for serial correlation; ARCH test was used to test for stability of residuals and Jarque-Bera to test for the normality of the residuals.

The model was also assessed in terms of the diagnostic tests for residual autocorrelation, and heteroskedasticity, in addition to information criterion. Using the general-to-specific modeling procedure, the analysis began with two lags for each variable, and the error correction term lagged one period, ECT\_1.

## **CHAPTER FOUR**

### **RESULTS AND INTERPRETATIONS**

#### **4.0 Introduction**

This chapter considers the transformation done on the study variables, as well as the empirical results of the model in the long and short run. The diagnostic tests are also presented in this chapter.

#### **4.1 Descriptive Statistics**

Descriptive analysis of all variables considered for the study were conducted to establish either their normality. Normality of all the variables in levels was conducted and the results are presented in the figure below.

**Table 4.1: Descriptive Statistics of Variables used in model**

<b>Statistic</b>	<b>VAT</b>	<b>PD</b>	<b>PCONS</b>	<b>INFN</b>	<b>IMP</b>	<b>GOVCONS</b>
<b>Mean</b>	803.238	137.146	15,905.580	6.533	4244.711	2,408.083
<b>Median</b>	719.158	136.030	12,931.620	6.569	3107.817	2,467.469
<b>Maximum</b>	1,454.926	167.061	40,593.690	14.591	10238.140	4,395.969
<b>Minimum</b>	357.519	111.633	6,588.938	-2.519	2203.019	1,092.250
<b>Std. Dev.</b>	370.272	16.448	8,877.576	3.633	2261.143	855.993
<b>Skewness</b>	0.370	0.166	1.128	-0.311	1.104	0.456
<b>Kurtosis</b>	1.710	1.852	3.360	4.471	3.013	2.424
<b>Jarque-Bera</b>	4.420	2.856	10.439	5.099	9.750	2.326
<b>Probability</b>	0.110	0.240	0.005	0.078	0.008	0.313
<b>Observations</b>	48	48	48	48	48	48

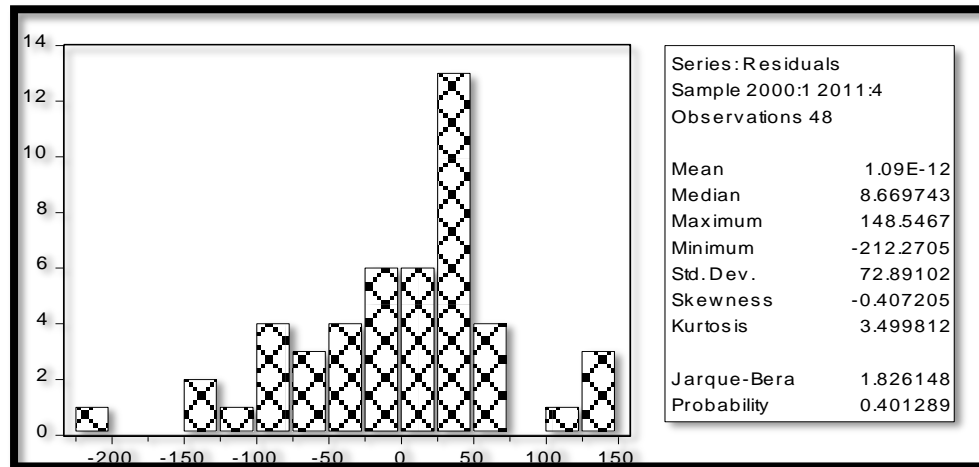
Source: Authors Calculations using E - Views

The skewness statistic of all the variables except inflation was higher than zero implying that the variables were not normal. The kurtosis values of the VAT and population density did not tend to three in absolute terms which is a condition for normality of any series.

Normality results in Table 4.1 show that VAT, population density, inflation and government consumption, are not normal at 5% level of significance. At 5% level of significance the critical value for 2 degrees of freedom is 5.99 for the Jarque- Bera statistic and all those below are not significant. We reject the null hypothesis that they are normal. The variables were then lagged prior to their use in subsequent tests.

However, a linear combination of the variables is normal as illustrated in Figure 4.1. The histogram is bell shaped. The skewness is – 0.4 tending to zero while the kurtosis is 3.4 tending to 3 which are both conditions for normality.

Figure 4.1: Linear combination of variables



Source: Eviews

The transformation of variables was done in order to stabilize their variances a condition for attaining normality. The variables were lagged in E-views.

#### 4.2 Structural Break

The Chow breakpoint test was used to test for a structural break in 2004/05 when the VAT rate was increased from 16% to 18% as is illustrated in the figure 4.2 below.

Table 4.2: Chow break Test

Chow Breakpoint Test: 2004:5			
F-statistic	14.886	Probability	0.000
Log likelihood ratio	65.919	Probability	0.000

There was a structural break in 2004/05 when VAT rate was increased to 18 percent and threshold increased to 50 million. This was shown by probability of the chow breakpoint test. It was found to be less than 0.05 the level of significance implying that we reject the null hypothesis that there was no structural break favoring the alternative and conclude there was one. The existence of a structural break led to the introduction of a Dummy variable (D45) as one of the independent variables to account for the change. The dummy variable was assigned 1 for the period when VAT rate was 17% and 10 when the rate was 18%. This is because the dummy entered the model in its natural form Domadar, (2003).



**4.3. Test for Stationarity**

The unit root test was performed in order to detect whether there existed stationary or non-stationary series closely following Dickey and Fuller (1979), Mackinnon (1991) and Thomas (1997). The tests showed that the time series for all the variables were non-stationary at levels using 1 percent critical value. The first difference for all the variables except population density exhibited unit roots, which means that population density, was stationary at first difference. The second difference of the rest of the variables did not exhibit unit roots, which means that they were stationary at second difference. This is illustrated in Table 4.3.

**Table 4.3: Stationarity test for variables in levels**

Variable	ADF statistic	1 percent	5 percent	10 percent	Integration
LVAT	-4.210	-4.178	-3.514	-3.187	2
LPD	-3.393	-4.173	-3.511	-3.185	1
LPCONS	-3.630	-4.178	-3.514	-3.187	2
LINFN	-4.785	-4.232	-3.539	-3.201	2
LIMP	-5.432	-4.178	-3.514	-3.187	2
LGOVCONS	-4.991	-4.178	-3.514	-3.187	2

Source: Computed by Author using E- views

All variables used in the model became stationary after second differencing except population density. All the variables at their respective order of integration, the absolute values of the ADF statistics were greater than the tabulated values at 5 percent level of significance.

**4.4 Cointegration Tests**

Johansen’s approach to cointegration test was used after establishing that the variables are integrated of the same order 2 except population density. This was necessary because as pointed out by Engel & Granger, (1987), even though individual time series may be non-stationary, a linear combination of them can be stationary because equilibrium forces tend to keep such series together in the long run. When this happens, the variables are said to be integrated and error correction terms exist to account for the short term deviations from the long term equilibrium relationship implied by integration. The results are presented in Table 4.4.

**Table 4.4: Cointegration Test**

Eigen value	Likelihood ratio	5 percent value	1 percent value	Hypothesized CE
0.545	119.475	104.940	114.360	None **
0.529	83.294	77.740	85.780	At most 1 *
0.358	48.658	54.640	61.240	At most 2
0.281	28.245	34.550	40.490	At most 3
0.219	13.039	18.170	23.460	At most 4
0.035	1.6428	3.740	6.400	At most 5

Source: Computed by author using E -Views

- (i) \*(\*\*) denotes rejection of the hypothesis at 5%(1%) significance level
- (ii) L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Table 4.4 reveals there were 2 cointegrating equations. This is so because at hypothesized 2 integrating equations, the likelihood ratio was less than the critical values at all levels of significance so we accept null hypothesis that there are 2 cointegrating equations. This meant that despite some of the variables being non stationary their linear combination was stationary hence the existence of a long run relationship of the variables. This confirmed the need for a long run model of the variables and an Error Correction Model (ECM) for their short run relationship as presented in the subsequent tests.

#### 4.5 Long run Relationship Model for VAT

The long run relationship was developed using the ordinary least squares in E- View after confirmation of integration. This is demonstrated in the figure below.

**Table 4.5: Long run Relationship model for VAT**

Dependent Variable: LVAT			
Variable	Coefficient	Std. Error	t-Statistic
C	-22.542	2.446	-9.215
D45	0.167	0.033	5.062
LGOVCONS	-1.048	0.304	-3.444
LPCONS	-0.387	0.227	-1.706
LIMP	-0.208	0.178	-1.169
LINFLN	0.167	0.036	4.601
LPD	8.557	0.955	8.963

Source: Computed by Author using E-Views

The regression results in Table 4.5 above suggest that the independent variables explain about 99% of the variations in the dependent variable. The probability of the F statistic was 0.00 showing that the model was perfectly specified. The increase in the VAT rate represented by dummy variable D45 had a positive impact contradicting the conclusion by Abibi et al (2006) that increase in VAT rate led to a decline in the VAT efficiency ratio. However, the coefficients of some of the variables particularly private consumption and imports are different from the anticipated ones based on theory.

Estimated Equation

$$LVAT = -22.542 + 0.167 D45 - 1.048L GOVCONS - 0.387 PCONS - 0.208 LIMP + 0.167 INFLN + 9.535*LPD$$

Observations made from Table 4.5 indicate that in the long run, population density (PD), increase in VAT rate (D45) and inflation (INFLN), positively affect VAT, while private consumption, government consumption, and imports have a negative impact.

#### 4.6 Estimation of the Error Correction Models and Results for VAT

Following Engle-Granger representation theorem, this step involved an estimation of the error correction of the relationship and testing the adequacy of the estimated equation.

The ECM was constructed by including in the model, the lagged terms of the variables and the error correction term that was generated.

The error correction model shows that there exists short run relationship between variables and its results are presented in the table 4.6.

**Table 4.6: Short run relationship Model for VAT**

Dependent Variable: DLVAT  
Included observations: 38 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.120	0.080	1.496	0.152
DLVAT_1	0.662	0.245	2.707	0.014
DLVAT_2	0.381	0.250	1.525	0.145
DLGOVCONS_1	-0.097	0.354	-0.275	0.787
DLGOVCONS_2	0.182	0.282	0.647	0.526
DLGOVCONS	0.008	0.313	0.027	0.979
DLPCONS	0.508	0.205	2.472	0.024
DLPCONS_1	0.093	0.295	0.315	0.756

DLPCONS_2	-0.038	0.296	-0.130	0.898
DLIMP	-0.131	0.119	-1.106	0.283
DLIMP_1	0.098	0.119	0.818	0.424
DLIMP_2	0.089	0.109	0.812	0.427
DLINFLN	-0.025	0.035	-0.713	0.485
DLINFLN_1	0.058	0.049	1.183	0.252
DLINFLN_2	0.044	0.052	0.839	0.412
DLPD	10.039	8.222	1.221	0.238
DLPD_1	-12.495	9.085	-1.375	0.186
DLPD_2	-11.159	9.086	-1.228	0.235
LD45	0.007	0.019	0.349	0.731
ECT_1	-0.030	0.076	-0.398	0.696
R-squared	0.969	Akaike info criterion		-5.904
Adjusted R-squared	0.937	F-statistic		29.781
Durbin-Watson stat	2.266	Prob(F-statistic)		0.000

Source; Computed by the Author using E -Views

Approximately 97 percent of the variation in VAT is explained by the independent variables (population density, inflation, imports, private consumption and government consumption). The probability of the F-statistic is 0.00 which is significant implying that the model is well specified.

It should also be noted that a percentage increase in the VAT rate represented by LD45 increased VAT revenues by 0.007% , however not statistically significant.

The over-parametized model was reduced until a parsimonious one was obtained. The estimation results of the parsimonious model are presented in the next section.

#### **4.7 The procession to Parsimonious Model**

After the formulation of the ECM, there was need to reduce the short run model components. This was done by removing variables whose absolute values of the t-statistic were less than one of the insignificant ones from the ECM. These variables would not have a strong correlation with VAT, since the t statistic measures the likelihood that the value of the parameter is not zero and the larger the value of t the less likely that the parameter could be zero. Results of the reduced model (parsimonious) are presented in Table 4.7.

**Table 4.7: Parsimonious model for VAT**  
 Determinants of VAT revenue ( *t*-statistics are in parenthesis)

Independent variables	Dependent variable
	Log VAT
Constant	0.168* (4.565)
First lag of log VAT	0.480* (3.025)
Second lag of log VAT	0.480* (2.713)
First lag of log population density	-5.489* (-1.361)
Second lag of log population density	-12.705* (-2.301)
First lag of log private consumption	0.588* (6.256)
First lag of log inflation	0.047* (2.201)
Second lag of log inflation	0.062* (2.559)
Second lag of log imports	0.134* (2.061)
R – Squared	0.963
Adjusted R – Squared	0.952
Number of observations	36
Durbin Watson Statistic	2.055
Akaike Info Criterion	-6.275
F – Statistic	83.981
P-value of F statistic	0.000

Source: Computed by Author using E- Views

The asterix \* denotes the parameter estimate statistically significant at 5% level.

Results in Table 4.7 show that the value of R-squared reduces from approximately 98% to 96%. The reduction in R squared value is due to the elimination of variables and their components which are not statistically significant in the ECM yet there is a portion they contribute to variation in VAT.

The predictors in this model are statistically significant unlike in the ECM model where both significant and insignificant variables were included. In this model the variables are significant at

5% level significance implying that the smaller the value of p, the less likely that the actual parameter value is zero.

The F-statistics of 83.9, with probability value of 0.00 indicate that, overall the model is significant. These results imply the rejection of the null hypotheses that all the right hand side variables except the constant terms have zero parameter coefficients. The Durbin-Watson (DW) statistics of 2.06 does not point to any serious autocorrelation problems.

A percentage increase in private consumption increased VAT revenue, by 0.59 percent and is statistically significant. This means that an increase of in the private consumption of the current period will lead to an increase in VAT of the next period. This is due to the fact that VAT is collected after consumption and is a monthly tax so the VAT on amounts consumed in the previous period are most likely to be collected in the current period. This finding was consistent with Druker – Slobonitsky in the Israel VAT forecasting model, Wawire ( 2011) who found GDP significant in determining VAT in Kenya and the Ukraine VAT model where the stronger the private consumption, the more the VAT.

The elasticity of VAT with respect to log imports is positive and significant. This means that a percentage increase in previous period imports led to a 0.13 percentage increase in VAT revenues of the current period. The imports of the previous period have a positive impact implying that an increase in volume of imports of a previous period increases the VAT revenue in the current period. The finding was consistent with Wawire (2011), Campbell(2001), Baunsgaard & Keen (2005) and the Ukraine revenue forecasting model, who all showed that general increase in imports increased VAT revenues.

A positive and significant coefficient was registered on VAT revenue of the previous period. This is due to the fact that the determinant factors of VAT in a given period sometimes spill over to another period affecting its performance as well. This finding was consistent with Wawire (2011) who found that the first lag of VAT had a statistically significant impact on the current VAT. In Wawire (2011), a percentage increase in lagged VAT led to a 0.59 percentage increase in current VAT, while in this study it leads to a 0.48 percentage increase.

Population density change in the previous period had a negative but not statistically very significant impact on VAT revenues. This is contradictory to theory where increase in population should lead to an increase in VAT because VAT is a consumption tax. It contradicts Teera (2001) where population density had an adverse effect on VAT revenue. This finding is also not consistent with Wawire(2011) who found population positively significant to VAT revenue in his model of VAT regressed on population, volume of trade and oil crisis.

The inflation rate of the previous period was found to have a positive and significant impact on VAT revenues. This is because of the VAT nature of being a consumption tax. As soon as there is inflation VAT increases immediately because of the inflationary tax component therein. The finding is consistent with the Bureau of Internal revenue in the republic of Philippines who discovered that inflation had an impact on the tax collection at a much later stage, because of the time lag between production/ purchases and sales.

Coefficient for Error Correction Term implies that disequilibrium in VAT revenue is corrected by 0.1 percent in the short run.

#### **4.8 Short Run Model Specification Tests.**

##### **4.8.1. The white heteroskedasticity test**

This test was used for constant variance, where

Ho: The variables are homoscedastic (constant variance)  $\gamma_1 = \gamma_2 = 0$

Ha: The variables are homoscedastic (constant variance)  $\gamma_1 \neq 0$  or  $\gamma_2 \neq 0$

Results of the test were presented in Table 4.8

**Table 4.8: Test for heteroskedasticity**

White Heteroskedasticity Test:			
F-statistic	5927.256	Probability	0.070292
Obs*R-squared	37.99982	Probability	0.378369

The probability is not significant so we accept null hypothesis, that the series are homoskedastic i.e. have a constant variance.

##### **4.8.2 Tests for serial correlation of residuals of DLVAT**

The Breusch- Godfrey and the ARCH tests were used for serial correlation and results presented in Table 4.9.

**Table 4.9: The correlogram for serial correlation of DLVAT**

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.891528	Probability	0.088888
Obs*R-squared	11.1083	Probability	0.003871
ARCH Test:			
F-statistic	1.099125	Probability	0.301854
Obs*R-squared	1.127335	Probability	0.288344

Observations made from Table 4.9 indicate no evidence of serial correlation. This is witnessed from the Insignificance of the Breusch Godfrey and the ARCH Test. It is further confirmed by the value of the Durbin Watson of 2.06 presented in table 4.7 which indicates no serial correlation in residuals.

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, CONCLUSIONS AND POLICYRECOMENDATIONS**

#### **5.1 Introduction**

This chapter presents the summary of findings, conclusions drawn from the study and recommendations on how VAT revenue performance can be improved using the VAT determinants.

#### **5.2 Summary of Findings**

The primary objective of the research was to establish the macroeconomic indicators that are determinants of the VAT revenue.

An analysis of the selected macroeconomic variables that theoretically related to VAT and had evidence of case studies was done. These variables included; Government consumption, private consumption, import volumes, inflation rate , population density and provided for the change in VAT rate. The long run relationship of these indicators with VAT was developed using ordinary least squares. This showed that only the change in VAT rate , inflation rate and population density had a positive impact on VAT.



The analysis was continued by estimating the error correction model and this revealed the existence of a short run relationship. However this was over-parametized so the model was reduced to establish the parsimonious model. From this analysis it was established that some macroeconomic indicators like private consumption, inflation rate and imports were statistically significant and had a strong determinants of VAT.

Lagged VAT and private consumption were found to have a significant positive effect on current periods VAT in the short run , implying that the previous period VAT and private consumption had an impact on the current period VAT .It was also established that the second lag of Import volumes and Inflation rate had a positive and significant effect on VAT revenue. Population density presented strange results of a large negative impact though significant. Government consumption was found to be insignificant to VAT in Uganda for the period under study.

### **5.3 Conclusion**

The determinants of VAT in Uganda for the period 1999/00 and 2010/11 were private consumption, lags of the VAT revenue, imports and inflation. VAT responds with lags to changes in its respective tax bases. This means that previous levels of tax bases (private consumption, imports and inflation) have a significant influence on the present levels of VAT. This implies that if these determinants are established, they can be used to predict VAT revenue of the next period. VAT revenue is very responsive to changes in its determinants. There is therefore need to address private consumption challenges, inflation rates, and imports so that VAT revenues can increase rapidly as the economy grows.

### **5.4 Recommendations**

Since the findings showed that VAT revenue is very responsive to private consumption, this has an implication on the allocation and policies put in place to facilitate private consumption. Government should target increase in household income to enhance private consumption. This could be done by promoting cottage industries that ensure sustainability of the household income.

Increase in inflation positively impacts VAT revenue, however the demand pull inflation is recommended because as aggregate demand increases, private and government expenditure increases thus promoting growth in VAT revenue.

Like Ukraine, Israel and the republic of the Philippines, the Ugandan government should build a VAT forecasting model using macroeconomic indicators to facilitate decision making on factors that influence VAT growth.

VAT is responsive to growth in imports; however this is VAT on imports which are likely to reduce as countries integrate into regions as the import taxes will tend to zero. Thus the increase in imports should not be pursued but instead grow the local production and private consumption levels.

### **5.5 Suggestions for further research**

In this study population density presented unusual results. Further research should be carried out to establish why.

The shadow economy in Uganda and other African countries is big and increasing according to Schneider (2006). This was however not considered in the study because its measurement could not be easily established, so further research should be carried out on the shadow economies of African countries.

Tax incentives and exemptions have also been identified as a cause for the erosion of the VAT tax base through distortions in the market. With this, further research can be made on the effects of tax incentives and exemptions on VAT.

Investigations on government expenditure to find out why it is significant in the determination of VAT in other countries like in (Ukraine and Israel), can also be conducted.

There is also need to investigate Revenue Administration impact on VAT in Uganda, with special emphasis to the Revenue Administration modernization.

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