Chapter 2
INTRODUCING VALUE-ADDED TAX

2.1.   Introduction

VAT was introduced in South Africa in 1991 to replace GST. VAT is an indirect tax and is levied on the value added in production during the different stages (Metcalf in Baker and Elliott,1997:413). In South Africa VAT is levied on the supply and importation of goods and services, while exported goods and services are exempted. The South African Value-Added Tax Act No.89 of 1991 makes allowances for exemptions, exceptions, deductions and adjustments that effectively lower the VAT liability. VAT was imposed in 1991 at a statutory rate of 10 percent; the rate was increased to 14 percent in 1993. To reduce the regressiveness of VAT, various basic food items where exempted from VAT when introduced.   Later, in 2001 paraffin, an energy source used by most poor households, was also exempted (RSA,2001:16).   The latest changes in VAT aim at improving the administration of VAT with the objective to reduce the administrative burden especially for small businesses (RSA,2002a:17).   When VAT was initially introduced there were some questions on whether or not VAT can replace GST as a revenue source for government, to what extent VAT would increase inflationary pressures, and how regressive VAT would be.

This chapter first gives a brief history of VAT; next it discusses issues within a VAT system with specific focus on South Africa. The last section analyzes VAT in South Africa since its inception in September 1991 till 2001, and addresses the questions: How important is VAT as a revenue source for government? How inflationary is VAT? What is the impact of VAT on the trade balance? How regressive is VAT taking current zero-ratings into consideration? What is the long- and short run variables that determine VAT collections?

Analyzing VAT from 1991 until 2001 will also provide clues in terms of issues to be considered for the future within the South African VAT system.

2.2.   VAT Overview

VAT is a tax instrument used by countries all over the world. Japan was the first country to introduce a VAT-like tax just after World War I. However, this tax was short-lived. Brazil, followed by Denmark, introduced VAT in 1967. Denmark was the first European Community (EC) (now the European Union (EU)) country to adopt VAT. Other countries in the EC like France, Germany, the Netherlands, Luxembourg, Belgium, Ireland, Italy, and the United Kingdom followed. The VAT structure differed from country to country and therefore VAT could not be imposed uniformly throughout the EC. In 1977 the sixth directive on VAT brought together the former directives of the EC, and established consistent rules for VAT in the European Community. Other countries in the EC like Greece, Portugal, and Spain also introduced VAT. (Metcalf in Baker and Elliott,1997:417-419).

VAT is also used by various developing countries. An example is Bolivia, who introduced VAT in 1986 as one of the country's centerpiece taxes. When introduced, the statutory VAT rate was 10 percent, but in 1992 it was raised to 13 percent. In 1993 VAT contributed about a third of the total tax revenue of the country. (McMahon and Schmidt-Hebbel in Fiscal Reform and Structural Change in Developing Countries. Vol. 2,2000:184). Another example is the Philippines, which introduced VAT in 1988 to replace all forms of sales taxes at that time. The statutory VAT rate at inception was 10 percent. VAT, in the Phillipines, is levied on final destination and exempts the primary sector, while exports are zero-rated. The tax credit method is used - credit for VAT paid on inputs are thus allowed. (Clarete and Diokno in Fiscal Reform and Structural Change in Developing Countries. Vol. 2,2000:102).

In 1989 Japan reintroduced a subtraction type VAT. Canada introduced VAT in 1991. VAT in Canada is levied on the purchaser, but vendors are responsible for collecting tax.

Other countries that also use a VAT system are New Zealand, Norway, Switzerland, and Turkey, (Metcalf in Baker and Elliott,1997:417-419) as well as Brazil, Colombia, India, South-Korea, and Taiwan. The list is not inclusive, and in April 2001 about 123 countries had a VAT-like tax (Ebrill et al,2001:8).

VAT is generally experienced by most countries as an effective tax. Apart from Japan only five other countries ever removed a VAT, which are Vietnam, Grenada, Ghana, Malta and Belize. Three of these countries, Ghana, Malta and Vietnam, as well as Japan have since reintroduced the VAT (Ebrill et al,2001:14). Australia and the United States are the only OECD countries not ever to have introduced a VAT (OECD,1997:7), however, one state in the USA employs a VAT tax; the state of Michigan introduced VAT in1975 (World Bank Symposium,1990:4).

2.3.   Broad Issues Within a VAT System

There are eight broad issues within a VAT system. These issues are usually dealt with at the design stage of a VAT system. The choices when designing a VAT system are:

- The broad type; whether VAT should be based on consumption, income, or gross product.
- The regime for international trade: whether VAT should be levied at the place of origin or alternatively at the place of destination.
- The method that will be used to compute tax liability. The methods available are the subtraction, tax credit or invoice methods.
- The products, firms or sectors to be free of tax.
- Whether to apply exemptions or zero-rating to products, firms or sectors free of tax.
- The special rules or regimes that will apply to certain products, firms or sectors.
- Whether or not to use a single-rate or multiple rates within the VAT system.
- Whether or not to apply a tax-inclusive rate or alternatively a tax-exclusive rate. With the former tax is levied on the total amount of money transferred, including the tax itself. (World Bank Symposium,1990:5).

The rest of this section looks at some of the issues listed above by firstly discussing them in general, but then also discussing them specifically in the South African context. The issues of taxes on services, and tax evasion, are also discussed.

2.3.1   VAT: a Tax on Consumption

When introducing VAT, the most basic choice is to decide whether or not VAT would be imposed as a consumption, gross-product or income type tax. The following table illustrates the difference between the three types:

Table 2.1:   The Three Types of VAT from (Sicat,1988:70)

Deductible from Sales	Gross-Product	Income	Consumption
Purchases of materials and services	Yes	Yes	Yes
Depreciation of capital goods	No	Yes	Yes
Investment purchases	No	No	Yes
Base	GDP	NNI	Private Consumption

The three types of VAT differ in terms of the items deductible from the VAT base. With a gross-product type of tax only purchases of materials and services are deductible. The gross-product type of tax often leads to double taxation, as capital goods are taxed when first purchased, but may be taxed again when sold. The income type tax, on the other hand, also allows for the exclusion of depreciation on capital goods, however, the calculation of depreciation is a problematic issue. A consumption type tax allows for the deduction of purchases of materials and services as well as investment purchases. Most countries adopted a consumption-based tax, since VAT was in most cases intended to replace another consumption type tax, such as the sales tax. Consumption-based VAT also does not create a disincentive for investment like the other two types. (Sicat,1988:71-72).

South Africa's VAT is also a consumption type tax. Even though VAT is levied on production, VAT is generally seen as a consumption tax, as the consumer pays it at the final stage of production.

2.3.2   VAT and International Trade

VAT may be based on the location of production (also known as the origin principle) or on the location of final consumption (also known as the destination principle).   A consumption tax is usually based on the destination principle.   Under the destination principle exports are usually excluded from VAT, while imports are taxed.   South Africa's VAT is also based on the destination principle, as exports are zero-rated. (Sicat,1988:73).

2.3.3   Methods Used for Computing VAT Liability

There are three methods that may be used to impose VAT, namely the subtraction, invoice (or also known as the credit method) and cash flow methods. The most common method used to impose VAT is the invoice (credit) method where VAT is calculated on total sales at each stage of the production process, and where a credit for any VAT paid on inputs in the production process is allowed. A firm is required to supply proof of the payment of input VAT before allowing the credit. With the subtraction method VAT is calculated by multiplying gross sales net of intermediate goods purchases at each stage of the production process with the statutory VAT rate. With the invoice method VAT is calculated by multiplying gross sales and allowing for credit on VAT payments by other firms at previous stages of the production process (Metcalf in Baker and Elliot, 1997:413-414). With the cash flow method VAT is calculated on the cash flow for a firm. The following cash flow equation may be used to denote the sources and uses of cash in a firm:

$$S + K^{+} = L + M + K^{-}$$

where

S is the proceeds from the sales of goods or services

K^+ is the capital inflows, including both new equity and borrowing

L is payments for labour

M is intermediate goods

K^- is capital outflows, including dividend payments, interest payments, debt repayments and equity

VAT as calculated using the subtraction method is equal to $S - M$. Rearranging the terms give VAT as:

$$V = S - M = L + K^- - K^+$$

Therefore, VAT may also be calculated as payments to labor plus capital outflows less capital inflows. Old capital in the firm is taxed as it is repaid, or interest on it is paid, or servicing payments like dividends are made. (Metcalf in Baker and Elliott,1997:413).

Table 2.2: *The Difference Between the Subtraction and Credit Methods to Impose VAT*

Transaction	Value	Subtraction method	Credit method
A farmer sells maize to mill	R200	R(200-0)x10%=R20	R200x10% = R20
The mill sells flour to baker	R300	R(300–200)x10%=R10	R300x10%=R30–R20=R10
Baker sell bread to consumer	R600	R(600-300)x10%=R30	R600x10%=R60-R30=R30
Total	**R1100**	**R60**	**R60**

* Assume the farmer has no input costs and maize, flour and bread not exempt as usual.
* VAT is levied at a rate of 10%.
Own Calculations

South Africa uses the invoice (credit) method to determine VAT liability. Under the invoice method each trader charges output tax on sales. In turn the trader is allowed a credit on his/her own purchases against the output tax. The trader will receive a refund if the credits exceed the output tax on sales. (Ebrill et al,2001:20). The trader must supply proof of the credits.

**2.3.4   Items, Firms or Sectors to Exclude from VAT**

Certain products, firms or sectors are often excluded from VAT. Economic, social and administrative reasons are often stated for their exclusion. Exclusions on economic and social reasons are mainly associated with welfare gains: Excluding certain commodities, for example food, may aid redistribution. Exclusions may also be on the ground of administrative impracticalities. Certain products, firms or sectors are difficult to tax, or too costly to tax. This usually applies to small firms. Retailing in most developing countries, as with South Africa, is characterized by a large number of small firms. Developing countries most often also have a large informal sector. Most agricultural activities are carried out by small-scale farmers. Usually operations are carried out as a household activity, the person often uneducated, with few or no records. This makes the collection and administration of VAT difficult and impractical. The cost of collecting taxes from small firms is very large in relation to the actual taxes collected, both in terms of compliance and administrative costs. There need to be some form of exemption of the small firm from the registration and returns requirement of VAT. (Due,1986:1-3).

To exclude small firms as a collection point a threshold is set. Small firms earning an annual turnover below the threshold are not required to register for VAT and are also not required to fill the VAT returns, or levy VAT on their products. Small firms, however, can then also not claim VAT credits. The main reason for the exclusion of small firms as a collection point, as stated above, is the fact that the compliance cost of small firms is proportionately larger than the compliance cost for larger firms.   (Agha and Haughton,1996:304). To reduce the compliance cost for small firms the threshold may be raised (Sanford and Godwin,1986:14). It is unlikely that the small firm will escape from paying VAT at all. Through the stages on intermediate inputs VAT will be paid, unless all trade (even in the intermediate stage) takes place between non-registered traders (Due,1986:4-5).

The threshold for small firms in South Africa is R300 000. Any person whose total value of taxable supplies exceeds the limit of R300 000 per year must register for VAT

(SARS,2003).   Small firms supplying less than R300 000 per year are therefore not required to register as a VAT payer. Figure 2.1 shows the ratio of small, medium and large firms in the Sectors of Production for South Africa. The data is obtained from the 1998 Supply and Use Tables as published by Statistics South Africa.

Figure 2.1:   The Ratio of Small, Medium, and Large Firms in the Sectors of Production in 1998 from (Conninghart,2001)
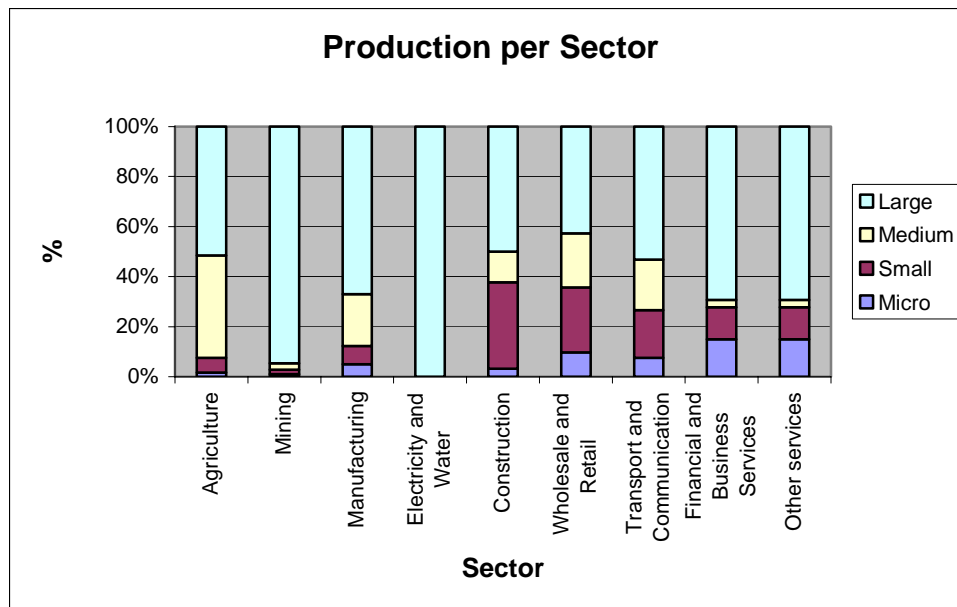
The micro, small and medium firms contribute between 40 and 55 percent of the producers in the agricultural, construction, wholesale and retail, as well as transport and communication sectors, respectively. Micro, small and medium firms contribute about 28 percent of the producers in the manufacturing sector. In the services sectors the micro, small and medium firms contribute about 25 percent respectively. In the mining sector less than 5 percent of the firms are micro, small and medium. Large firms do all the production in the electricity and water sector, mainly because large parastatals, government or local government municipalities supply these services. The figure is based on relative production and not on the number of small firms. It might be expected that there are more than 50 percent SMME farmers in South Africa producing less than 50 percent of total production.

Sectors that are usually excluded as a collection point are the agricultural, education, health, and financial sectors. The reason for excluding the first three sectors is mainly for redistribution, while excluding the financial sector is usually due to administrative difficulties. Financial services are not easily taxed, and not necessarily all financial services are taxed. (Gillis,1986:1). It is difficult to determine the value of some services rendered by banks. In South Africa the financial sector is not fully exempt. There are a number of different types of transactions subjected to VAT. Some include the sale of cheque book covers, charges for the provision of information to third parties, installation and rental of electronic payment devices, brokerage fees on derivative trading, cash value of rental agreements and vehicle maintenance agreements, rental of safety deposit boxes, bureau fees on payroll services. (International VAT Monitor,1995:376). The list is not inclusive.

The IMF's Fiscal Affairs Department (FAD) recommends the zero-rating of agricultural production. In a study done on 30 countries, 25 countries exempt agricultural production. (Ebrill et al,2001:65). The agricultural sector, in South Africa, is not excluded, although certain products produced within this sector is excluded.

State output is sometimes excluded from VAT because the output is sold below the true market value.

Either zero-rating or exemption may achieve the exclusion of products, firms or sectors from VAT. The implication of zero-rating and exemption is discussed in the next section.

2.3.5   Zero-rating Versus Exemptions

Zero-rating is a situation where the rate of tax applied to sales is zero, though credit is still given for taxes paid on inputs. An example is exports: exports leave the country free of VAT, but the producers are allowed a refund on their inputs. (Ebrill et al,2001:3, Davis and Kay,1985 :5, and SARS,2003). The reasons for zero-rating exports are two-

fold. Firstly by zero-rating exports (while still allowing a refund for producers) create an incentive for producers to export rather than sell domestically, and secondly, to zero-rate exports are consistent with the destination principle. The destination principle is the international norm and requires that the country of final destination must determine the tax paid on the goods. Food, a necessity is often zero-rated from VAT to aid redistribution. Certain items may be zero-rated when it is considered as politically desirable to encourage consumption. Some items, firms or sectors pose administrative and practical problems. (Davis and Kay,1985:5). Other commodities, apart from exports, zero-rated in South Africa include the sale of a going concern to a registered vendor, certain inputs in farming, as well as fuel which is subject to the fuel levy (SARS,2003).

Exemption on the other hand means that again no tax is paid on outputs, but the tax paid on inputs may not be reclaimed (SARS,2003). Taxes paid on intermediate goods may not be reclaimed and will therefore affect the production decision (Ebrill et al,2001:3 and Davis and Kay,1985 :5). The reasons for exemptions are both economic and social reasons. Items, firm or sector may be exempt due to redistribution goals or administrative impracticalities. Goods that are exempted in South Africa include certain financial services, donations, rental of accommodation, certain educational services, passenger transport by road or rail, as well as certain supplies by employee organizations (SARS,2003).

Consequences of Exemptions and Zero-Ratings

Zero-rating and exemptions have different impacts on government revenue. Also the stage at which exemption occurs may have alternative impacts. Exemption may occur at the final stage of sales, or during the intermediate stages of production. When exemption occurs at the intermediate stage of production the VAT chain is broken. If exemption occurs at the retail stage, only the value added at the final stage will not be subjected to VAT, while if exemption occurs at the intermediate stages of the production stages, sales of subsequent businesses acquiring the goods are overtaxed. Inputs prior to the exempt stage are not credible. The tax base is not reduced but augmented. (Jenkins and

Kuo,2000 :764). The following table illustrates the effect of zero-rating and exemption at different stages:

Table 2.3:   The Effect of Zero-Ratings and Exemptions on Government Revenue

Stage	Transaction Value	Without Zero-Rating or Exemptions	Zero-rating	Exemption	
			Zero rating occurs at final stage	At Retail Stage	At Intermediate Stage – Farmer
A farmer sells maize to mill	R220	R20-R0=R20	R220 : R20	R220 :R20	R200 :R0
The mill sells flour to baker	R330	R30-R20=R10	R330 :R10	R330 :R10	R330 :R30
Baker sell bread to consumer	R660	R60-R30=R30	R600 :R-10	R600 :R0	R660 :R30
Total Government Revenue	R60	R60	R20	R30	R60

*   The invoice method is used for calculating tax liability.
Own Calculations

Without any zero-ratings of exemptions the government collects an amount of R60. Suppose that bread is zero-rated. The zero-rating occurs at the final stage of production; the baker collects no VAT, and at the same time is allowed R10 credit on inputs. The total amount VAT collected through the production process is R20. Suppose now that bread is exempted; again the baker collects VAT and is also not allowed any credits on inputs. The total amount VAT collected is now R30. If, however, maize is exempted (not bread) it means that the farmer does not charge VAT on his maize, the miller is not allowed a credit, but in turn, collects VAT on flour sold to baker. The baker also collects VAT on his bread and is allowed a credit for VAT paid for flour. The total amount collected is R60.

Therefore, the stages where exemption may occur in the production process will have a different impact on government revenue. Revenue will fall if the exemption occurs at the stage of final sales. Revenue will increase when intermediate goods are exempt. When exemption occurs at the retail stage the VAT from the final stage is lost for government and the government only collects R30 VAT, instead of the possible R60 on value added. However, the VAT collected is more when the break occurs in the initial stage of production; the government receives R60.

The exemption of inputs will affect the production decision. The exemption of intermediate goods will create the incentive for producers to self-supply. For example: suppose security services are exempt. The purchaser of security services will not be allowed to claim a credit on security services. Therefore, instead of purchasing security services that are exempt, firms will rather supply security services themselves. This will generate a saving for the firm to the extent of the VAT paid on security services. As far as possible levying taxes on intermediate goods must be avoided. Levying taxes on inputs will distort the production decision and will lead to production inefficiency. (Davis and Kay,1985 :4).

Complications also arise when producers sell both exempt and taxable items. Producers will try to allocate the inputs to the exempt items, evading taxes thereby. Furthermore exemption creep may arise – exempting one commodity will increase the pressure for exemption of commodities used to produce the exempt commodity. Avoidance of tax payment may also occur when the taxpayer classifies goods as exempted goods to avoid tax payments. (Ebrill et al,2001:85-90). In South Africa vendors making only exempt supplies, may not be registered for VAT (SARS,2003).

A government should only apply zero-rating, exemption, or differential rates if there is a strong economic argument for the special treatment of a particular commodity group, because the tax structure will be under pressure of the different lobbying powers of various groups of producers and consumers. (Davis and Kay,1985:5).

It is important to note that exemptions and zero-rating may impose a revenue loss for government. (Sanford and Godwin,1986:6).

2.3.6   Single or Multiple Rates

When designing and applying a VAT system a country may either use a single VAT rate, meaning that all commodities and services are taxed at the same rate, or alternatively

employ multiple (or differential) rates. When employing differential rates, more than one rate is applied.

A single rate will ease compliance and is not likely to have a less distortionary impact on the production decision. (Sicat,1988:81). A single rate VAT system is the easiest to administer and is distributionally neutral (Alderman and Del Nino,1999:183). On the other hand, the argument for multiple rates is that it allows policy makers to discriminate between commodities, firms and sectors. A VAT system with multiple rates may be followed for economic and social reasons: A VAT is in nature regressive, and applying lower rates to certain commodities or sectors may reduce the regressiveness of the tax (Sicat,1988:81). Higher taxes, in turn, are often applied to goods with inelastic demand. VAT systems are often introduced with exemptions to reduce the impact on low-income households (Alderman and Del Nino,1999:183). Taxes on goods that individuals may consume regardless of price (such as tobacco) are often taxed at a higher rate. (Davis and Kay,1985 :3) Applying differential rates often reflects a government's distributional and fiscal objectives.

Table 2.4:   *VAT Introduced with a Single Rate from (Ebrill et al,2001:69)*

Date of Introduction	Number of Countries	Single Rate	Multiple Rates
Before 1990	48	12	36
1990-1994	46	31	15
1995-April 2001	31	25	5
TOTAL	**125**	**68**	**56**

Table 2.4 illustrate that there is a tendency among countries towards single rates. It is maybe proof that countries find single rates better.

When employing a single VAT rate, the IMF's Fiscal Advisory Department (FAD) recommends a rate between 11 and 19 percent (Ebrill et al,2001:65).

There are two basic reasons for rate differentiation. They are efficiency and equity. Efficiency may be promoted by levying lower rates on commodities for which the

demand is more elastic and higher rates on commodities for which demand is inelastic. This will minimize the impact of the tax on consumption patterns. An efficiency aspect that also needs to be considered is the ability of the tax to raise revenue. An efficient tax should also be levied according to the destination principle: the tax needs to be levied on the consumption of domestic residents. Equity objectives look at the distribution of income. Alternative commodity tax structures will alter the distribution of income. In terms of equity it will be more equitable to tax more heavily those goods that account for a greater share of the expenditure of the more wealthy. Having a progressive income tax structure is more likely to promote equity objectives than an indirect tax, but ultimately combining a progressive income tax structure with different VAT rates may improve equity. (Ebrill et al,2001:75).

Cost of Rate Differentiation

Applying differential VAT rates carries cost in terms of increased administration as well as compliance cost. It also makes politicians, or the government, vulnerable to lobbying and the political powers of producers and other interest groups. (Ebrill et al,2001:80)

The administration and compliance cost of VAT increases when applying differential rates because it complicates the taxpayers' books and invoices; it also complicates audits, creates scope for argument, and creates incentive for deliberate misclassification of items. With a multiple VAT rate system the compliance cost rises as the tax forms become more complex, and accounting records need to be more complete. (Agha and Haughton,1996 :304).

In terms of social reasons, another argument against applying differential rates is that other mechanisms like direct taxes, or social transfers may be used instead of differential VAT rate. These measures will not create distortion between supply and demand. (Sicat,1988:81). If commodities that consumers may readily substitute for each other are taxed at very different rates, then the tax system will artificially distort their choices between these commodities (Davis and Kay,1985 :3).

However, when applying differential rates, the invoice method is more suitable for dealing with differential rates (Ebrill et al,2001:21)

2.3.7   VAT on Services

Goods and services are often treated under a tax system as essentially the same. However, there are a number of differences between goods and services that should be taken into consideration under a VAT system. Firstly the income elasticity of demand for services is higher compared to that of commodities. Compared to commodities, services show a higher value added at the principle stage of production. Taxation on exports should also be treated differently for commodities and services. For services, taxation usually occurs at the place of production, except for consulting services delivered abroad, while with commodities the destination principle almost always applies. Also taxing services is more likely to lead to self-supply, which is not the case with commodities. (Kay and Davis,1986).

2.3.8   VAT Evasion

The VAT is harder to evade than its predecessor the sales tax, especially when the invoice method is used. The reasons for this are:
*   Invoices provide a good audit trial.
*   The tax is collected at all stages of production.
*   Import taxes are collected at the point of entry.
*   The onus of proof for tax credits is on the taxpayer.
*   Regular crosschecking, even on a sample basis, helps income tax enforcement.
*   Better record keeping is required.
*   The VAT base may be widened over time by including more services, or by covering more items.
*   The invoice method makes VAT self-enforcing, since the taxable buyer has an incentive to insist on an invoice. (Agha and Haughton,1996:303).

Some of the methods used, however, to evade VAT include:

- Understating sales.

- Inflating claims for VAT paid on inputs.

- Claiming credit for tax paid on inputs used in producing goods exempt from VAT. This usually happens when a producer sells both exempt and non-exempt items.

- A firm collects VAT, but it does not pay it to the receiver of revenue.

- Claiming VAT credit on purchases that are non-creditable. For example a car used for non-business purposes.

- Non-registration for VAT.

- Diversion of zero-rated exports to the domestic market.

- Claiming the transaction is not a taxable event, that it is a gift rather than a sale.

(Agha and Haughton,1996:304).

Agha and Haughton (1996) found that VAT compliance increases with lower VAT rates, fewer rates, a smaller population, more learning time and with greater spending on tax administration. The reasons for most of this is quite straightforward:

- The higher the VAT rate, the higher the incentive for the taxpayer to evade taxes and therefore the lower the compliance.

- The greater the number of VAT rates, the more opportunity for evasions, the harder to supervise and therefore the lower the compliance.

- The higher the expenditure on tax administration the more effective the system will be, and compliance will increase.

- The longer the experience with administering VAT the more effective the system will be, and compliance will increase.

- The smaller the population, the smaller number of VAT transactions to be observed, and compliance will increase.

(Agha and Haughton,1996:305).

### 2.4.   Analyzing VAT in South Africa from 1991 to 2001

The next section analyses the performance of VAT in its first decade of existence. The section first looks at the importance of VAT as a revenue source to government: How VAT compares to general sales tax (GST), how VAT compares to other tax revenue sources, and how each sector of the economy contributes to VAT revenue. The section also looks at the performance of VAT as a percentage of gross value added (GVA) and GDP respectively. Then this chapter focuses on the efficiency and C-efficiency ratios of VAT over the stated period. The efficiency and C-efficiency ratios are used to determine the broadness of the VAT base. Then the inflationary pressures of VAT in South Africa are investigated. A section dealing with the influence of VAT on the Balance of Payments follows next. The section also looks at the regressiveness of VAT on its own compared to the progressiveness of the complete tax system. Lastly, this section investigates the variables that determine VAT collections in the long- and short run.

2.4.1   VAT as a Revenue Source for Government

One of the initial questions when VAT was introduced was whether or not a 10 percent VAT can replace a 12 percent GST as a revenue source for government. Figure 2.2 compares GST with VAT over the period 1981 to 2001 as a percentage of total tax receipts.

Figure 2.2 below shows that VAT contributed slightly less than GST when the statutory rate was 10 percent – the GST rate at that time was 13 percent. Therefore the 10 percent VAT could not replace a 13 percent GST. A reason for this might be transitional problems experienced when moving from a GST to a VAT. After 1993, when the rate increased to 14 percent, VAT contributed to revenue to the same extent as GST for the first four years, and thereafter slightly less. At this stage however it is still not possible to deduce what the difference is in terms of the economic impact of VAT as apposed to GST.

Figure 2.2:   VAT compared to GST from SARB Time Series Data

**GST/VAT as a Percentage of Total Receipts**
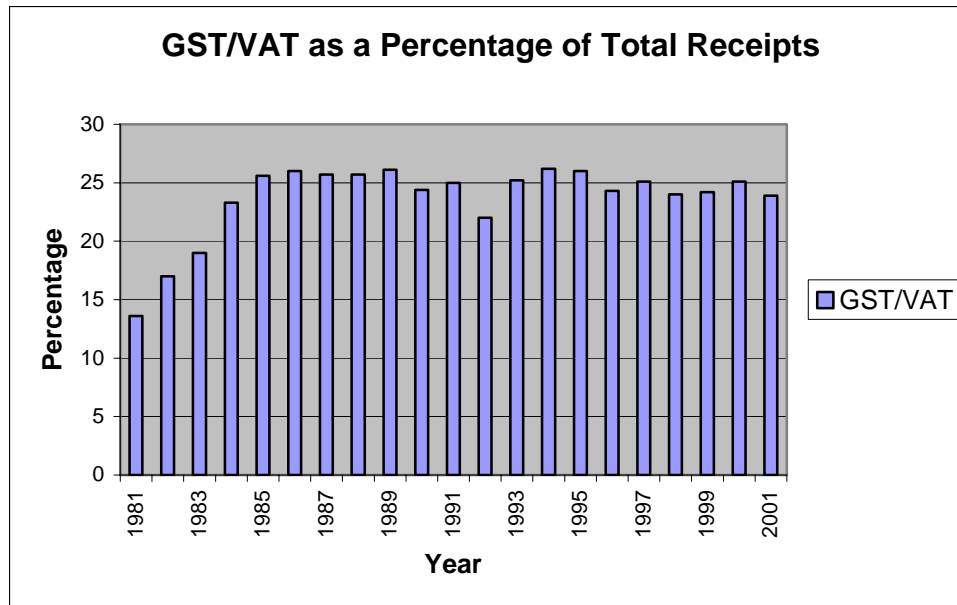
KBP4578M and KBP4595M

Another interesting observation is that GST increased from 1981 until it reached a plateau in 1986, whereas with VAT a plateau was reached almost immediately. One possible explanation is that VAT was implemented by using experience gained from implementing VAT.

It is also important to compare VAT with GST as a percentage of GDP. This is shown in Figure 2.3.

VAT as a percentage of GDP has steadily increased from 1993 onwards. At the end of 2001 VAT as a percentage of GDP was in the region of 10 percent.

The main reasons for the increase in VAT as a percentage of GDP can possibly be attributed to an increase in consumption, an increase in imports, rising inflation and a decline in investment. As VAT is a consumption tax, an increase in consumption will lead to an increase in VAT revenue, while inflation, in turn, increases the base on which VAT is levied. VAT payments on investment goods are excluded from VAT, and therefore a reduction in investment means less credits, and VAT receipts increase.

Figure 2.3:   VAT as a Percentage of GDP for 1991 to 2001 from SARB Time   Series

Data
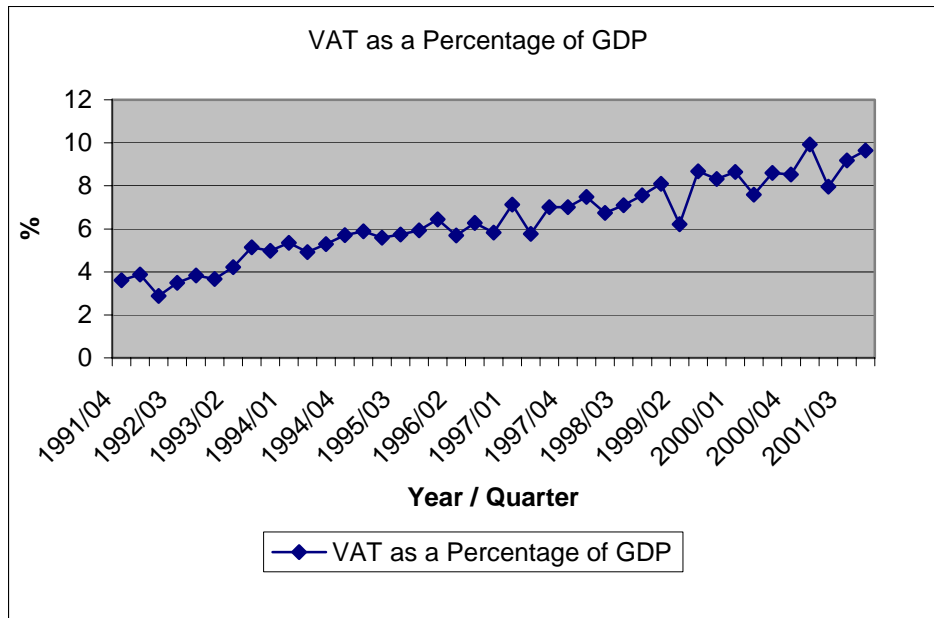
KBP6006C, KBP4578M and KBP4595M

The correlation tables in table 2.5 show VAT as a percentage of GDP compared to the variables listed above:

Table 2.5:   The Correlation Between VAT as a Percentage of GDP and Chosen

Explanatory Variables

Consumption

	C	VAT
C	1	
VAT	-0.04422	1

Imports

	M	VAT
M	1	
VAT	0.420953	1

Investment

	GFI	VAT
GFI	1	
VAT	0.117209	1

Inflation

	CPI	VAT
CPI	1	
VAT	0.381838	1

KBP6006K, KBP6007K, KBP6009K, KBP6014K, KBP6050K, and KBP7032Q

From the tables in Table 2.5 it seems that the increase in VAT as a percentage of GDP can be explained by rising imports and an increase in inflation, more than any of the other identified variables. A depreciation of the rand fueled the increase in imports, especially

over the last two years. It seems further that consumption as a percentage of GDP is declining, and therefore does not explain the increase in VAT as a percentage in GDP. However, there is not a strong correlation between any of the variables identified above and VAT as a percentage of GDP. The last section of this chapter further investigates the variables that determine VAT collections in the long- and short run.

The increase in VAT as a percentage of GDP can also be attributed to an increase in the efficiency of the administration of VAT collections. The VAT proposals to simplify VAT administration may also broaden the VAT collection base, this change, however, was only imposed in 2002, and can therefore not be the only reason for the increase in VAT as a percentage of GDP from its inception. The other VAT proposals, like the elimination of VAT on paraffin, would in contrast serve to contract the VAT base.

Figure 2.4, in turn, compares VAT to other taxes over the period 1990 to 2001:

Figure 2.4:   VAT Compared to Other Taxes from 1991 to 2001 SARB Time Series Data
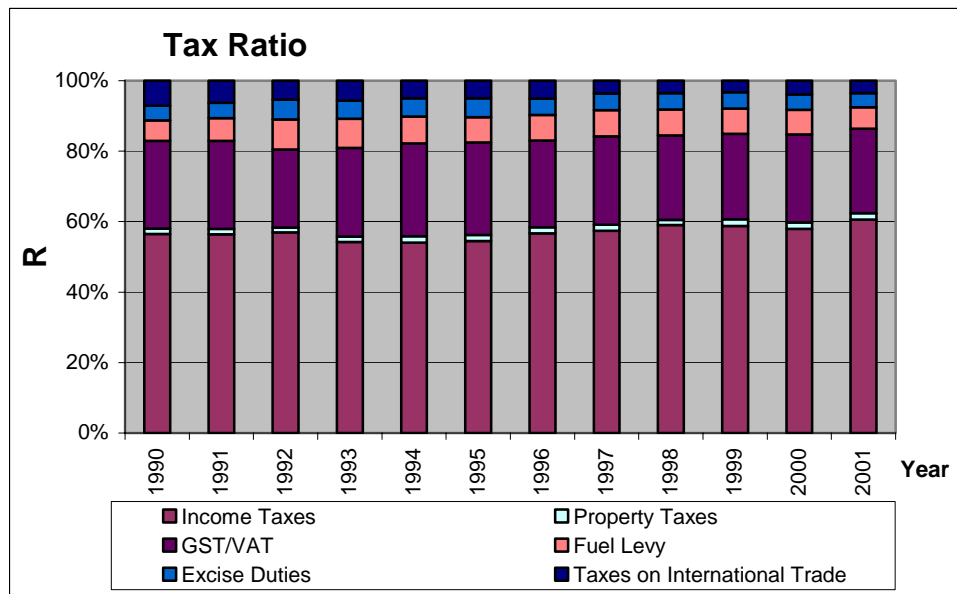
KBP4570M, KBP4577M, 4578M, 4579M, 4580M, and 4592M

If one compares VAT to all the major taxes levied in South Africa, one may see that VAT is the second most important revenue source for government after income taxes. VAT's

importance also remained relatively constant over the years. In 2002 VAT contributed 25 percent to total tax revenue (SARB,2002:S-54 and S-55).

It is also necessary to look at the contribution of each sector in the economy to VAT. This is shown in Figure 2.5:

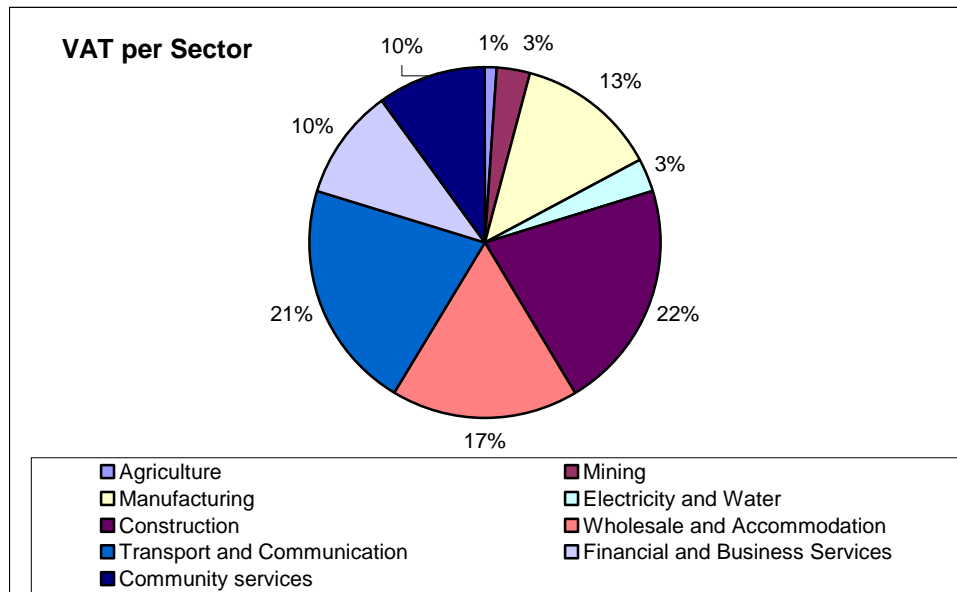*Figure 2.5:   VAT per Sector in 2001 from (SA SAM,2003)*

Figure 2.5 shows that the construction industry contributes 22 percent to total VAT receipts. The transport and communication sector contributes 21 percent to total VAT revenue. Wholesale, trade, accommodation and catering each contribute 17 percent followed by manufacturing with 13 percent. Both financial and community services contribute 10 percent each. Mining and electricity and water contribute three percent each, with agriculture only one percent.

Another way to look at the contribution of each sector in the economy to VAT, is by looking at the contribution to VAT by sector as a percentage of Gross Value Added in the same sector. Figure 2.6 shows the VAT contribution of the economic sectors as a percentage of Gross Value Added.

Figure 2.6:   *VAT as a Percentage of Gross Value Added in 2001 from (SA SAM,2003)*

VAT as a Percentage of GVA per Sector
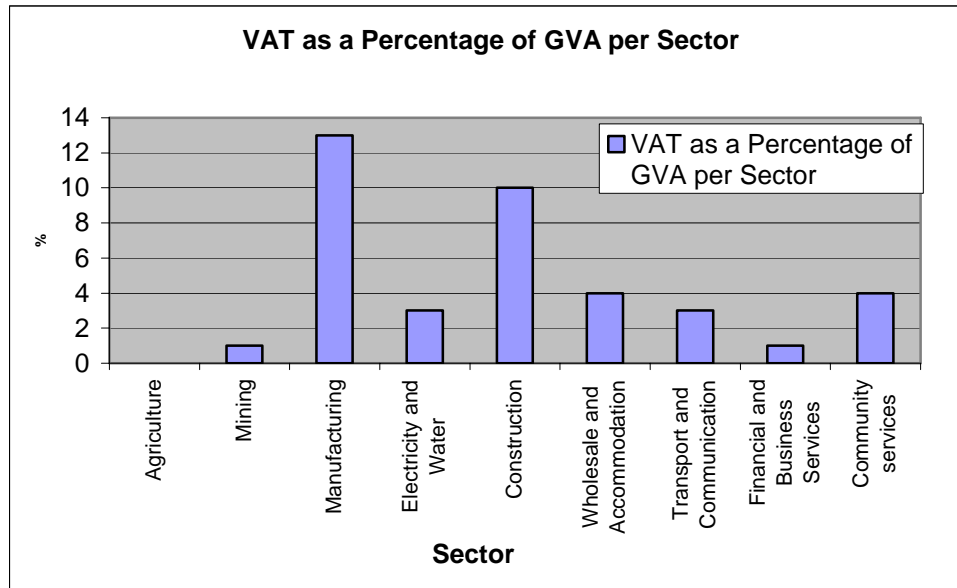
As shown in figure 2.6 the VAT collected in the agricultural sector is almost zero percent of gross value added in the same sector. This is mainly due to the large number of exemptions in that sector. Most basic food items are exempted from VAT. The VAT collected in the mining sector is about one percent of gross value added in the same sector. The same applies for financial and business services. The reason for this is that the mining industry is a major exporter and exports are zero-rated, while most financial services are exempted. Other sectors like electricity and water, wholesale and accommodation, transport and communication and community services only earn around three to four percent to gross value added of the respective sector. A possible reason for the low collection rate in water and electricity is the fact that a large portion of water and electricity production is used as an intermediate good (37,45 percent) meaning that firms can receive a credit for the use of water and electricity (SA SAM,2003). Construction pays 10 percent of gross value added. The VAT collected in the manufacturing sector is more than 13 percent of gross value added in the same sector and may be explained by the fact that exclusions in the manufacturing sector are limited. Leakage may be contributed more to non-compliance and poor administration.

Total VAT as a percentage of total gross value added, equals six percent (SARB,2002:S-106 and S-54). Even though gross value added is not the exact VAT base, it indicates that there are some leakages from the system. Leakages may be due to exemptions, zero-rating, non-compliance and insufficient administration.

The efficiency ratio is widely used as a summary indicator of the performance of VAT. The efficiency ratio is an indicator of the extent to which the VAT bears uniformly upon a broad base. A higher ratio indicates a broader base. The efficiency ratio is the ratio of VAT revenues to GDP divided by the standard rate (expressed as a percentage). A more applicable measure (where differential rates or zero-rating applies) is the C-efficiency ratio. The C-efficiency ratio is the ratio of VAT revenues to consumption divided by the standard rate. The normalized C-efficiency ratio is 100 percent. A higher or lower C-efficiency rate will indicate the use of differential rates. Zero-rating will result in a C-efficiency rate of less than 100, while increasing the base will result in a C-efficiency ratio above 100. (Ebrill et al,2001:40-42). Both ratios were calculated for the period 1991 to 2001 and are shown in figure 2.7:

Figure 2.7:   Efficiency and C-efficiency Ratio of VAT from 1991 to 2001
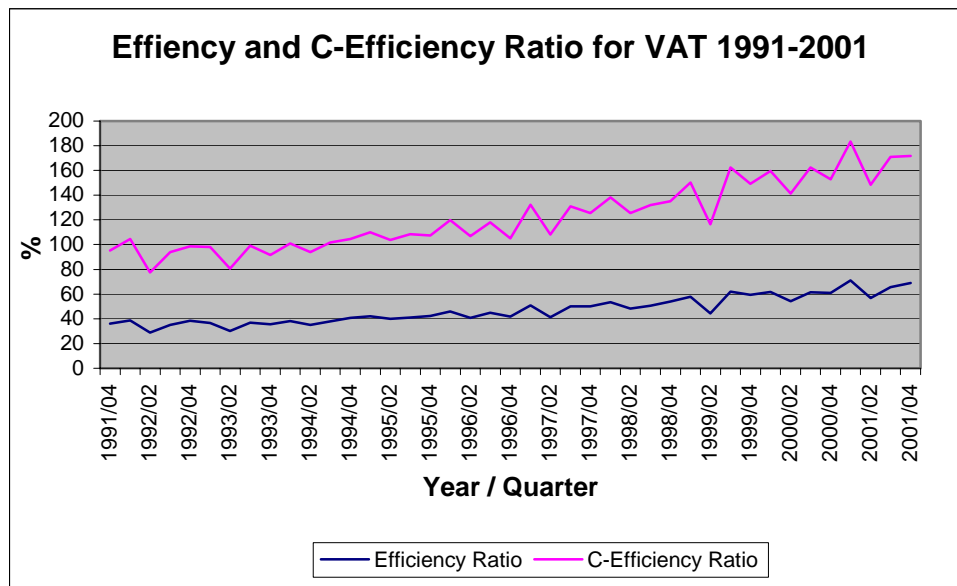
KBP6006C, KBP4578M, KBP6007C

*   Household consumption expenditure only is used for C-efficiency ratio.

Both the efficiency and C-efficiency ratios for VAT increased steadily from 1991 to 2001. Both the efficiency and C-efficiency ratio show the same trend. The C-efficiency ratio above 100 percent shows that the VAT base is relatively broad, and is steadily increasing. The increase in the base might be more attributable to more efficient collection techniques, since little was done since the inception of VAT to legally expand the base. Products and sectors, which were excluded since inception, are in most cases still excluded. On the other hand the government introduced more exclusions, for example paraffin.

2.4.2   VAT and Inflation

When VAT was initially proposed, the greatest controversy surrounding it was its effect on retail prices. If VAT increased, prices would increase. The whole of the VAT increase would not be reflected in prices. The extent to which prices will increase, due to an increase in VAT, depends on the ability of producers to shift the tax burden on to the consumer. The ability of producers to shift the tax burden on to the consumer, in turn, depends on the demand and supply elasticities.

The effect of changes in prices due to an increase in VAT may be classified as either a shift or an acceleration effect. A shift occurs when VAT leads to a higher CPI. The increase in VAT is a once-and-for all increase. The CPI will continue at a higher level. The intercept of the CPI changes but not the slope. The acceleration effect is associated with a change to the rate of the CPI. The acceleration effect *per se,* is not due to an increase in VAT, because VAT cannot be inflationary in itself. Rather changes in the tax burden, uncertainty and inflationary expectations may introduce acceleration in the rate of change of the CPI. (World Bank Symposium,1990:17-19).

To reduce the shift effect of VAT, the increase in prices (via an increase in VAT) may be accompanied by an increase in the money supply. This will finance trade at higher prices. The CPI will shift, but the rate of change in the CPI will not be affected. (World Bank Symposium,1990:19)

2.4.3   VAT and the Balance of Payments

Changes in VAT, and therefore relative prices, will have an effect on exports, imports, domestic production, and domestic consumption. The magnitude of the change in the foreign trade balance will depend on:

1)   The response of producers to the shift in the ratio export prices to domestic prices,

2)   The response of consumers to the price change, and

3)   The response of domestic consumers to the shift in the ratio of domestic prices to import prices. (World Bank Symposium,1990:29)

The CGE model used for the analysis of changes in the VAT structure will reflect the effect on exports, imports, domestic supply and domestic consumption via the CES type demand and CET type supply functions. Not only will one be able to observe the aggregate effect of changes in VAT on domestic supply, domestic consumption, exports and imports, one would also be able to observe the distribution effect between the large number of commodities included in the model.
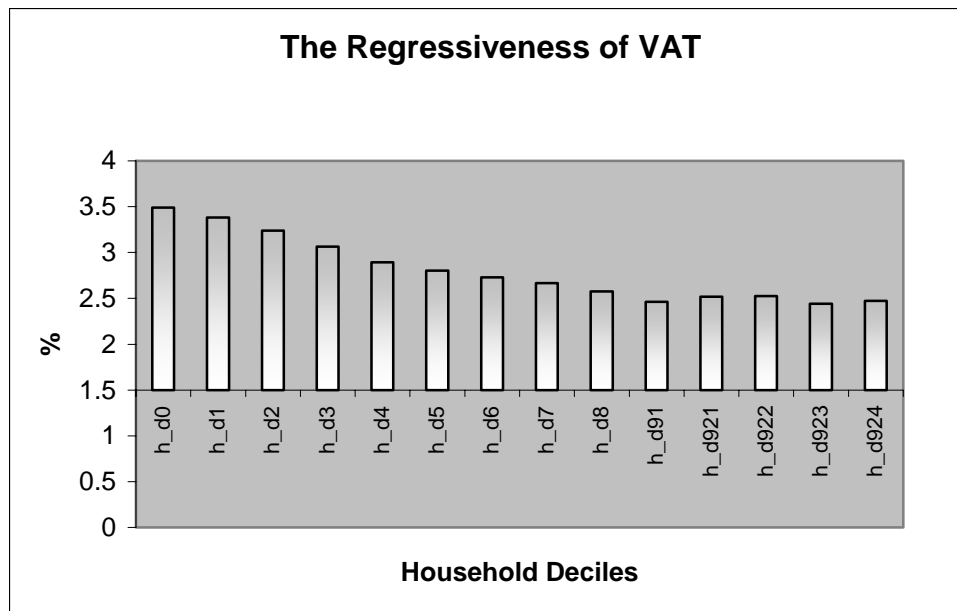
2.4.4   The Regressiveness of VAT

A tax is regressive when lower income groups spend a larger proportion of their income on the tax, than higher income groups. Indirect taxes, including VAT are generally seen as regressive: a single positive rate of VAT applied to the broadest possible base is essentially a proportional tax on consumption and is therefore regressive in nature. (Ebrill et al,2001:106). Lower income groups spend the largest portion of their income on necessities like foodstuff in contrast to higher income groups, and for this reason lower income groups also spend a larger proportion of their income on indirect taxes. Excluding goods from VAT will improve the regressiveness of such a tax system. To reduce the regressiveness of VAT in South Africa, a large number of basic food items were exempted from VAT at inception and in 2001 paraffin was also exempted. Reducing the regressiveness of VAT would aid redistribution and improve equity.

Fourie and Owen (1993) evaluated the regressiveness of VAT in South Africa since the inception of VAT in 1991. They found that VAT is mildly regressive. They measured regressiveness as the ratio of total VAT payments by a household group to total the household group's respective income. This should be seen as an index of regressiveness. Davis and Kay (1985) also used this measurement to evaluate the regressiveness or progressiveness of UK VAT. The same measurement will also be used in the simulations to aid comparison. Figure 2.8 shows that VAT in 2001 was still regressive.

VAT in 2001 was mildly regressive[1]. The lower-income households spent a larger portion of their income (3.5 percent) on VAT than higher-income households (2.5 percent).

Figure 2.8:   *The Regressiveness of VAT in 2001 from (SA SAM 2003)*

Davis and Kay (1985) as well as Fourie and Owen (1993), stressed that the progressiveness of the complete tax system should be taken into account and not only the regressiveness of VAT. The progressiveness of the taxes takes into consideration direct taxes paid by households as well as VAT. One should not focus on the distributional impact of VAT in isolation: what affects poverty and fairness is the impact of the tax

system as a whole. (Ebrill et al,2001:105). Figure 2.9 in turn shows the progressiveness of the complete tax system.

Figure 2.9:   The progressiveness of the complete tax system in 2001 from (SA SAM 2003)
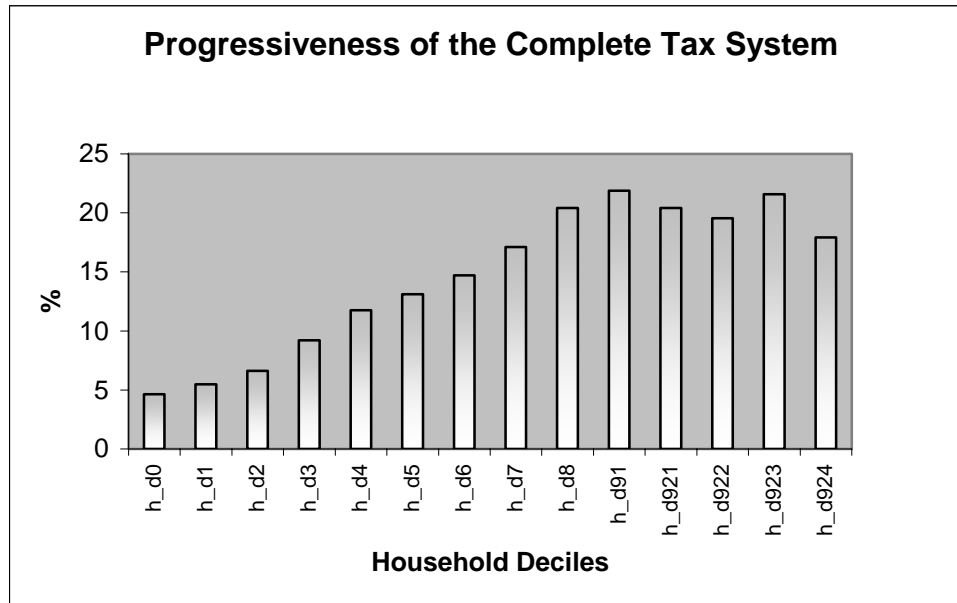
The tax system, overall is progressive when low-income households pay less than five percent of their income to taxes, compared to high-income households which pay about 20 percent.

It is generally accepted that income tax is more effective to achieve a progressive tax system than VAT. However, the higher the proportion of revenue raised through income tax compared to a consumption tax, the less progressive that income tax is likely to be. The last statement can be explained by (Davis and Kay,1985 :11). A combination of a broad-based sales tax with a progressive income tax is more likely to earn more revenue, while maintaining an overall progressive tax system.

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[1]   The formula for the calculation of the index of regressiveness is shown in Chapter 5.

2.4.5   Developing an Equation for VAT Collections for South Africa

As seen in section 2.4.1 VAT collections as a percentage of GDP increased over the last decade. The main reasons are an increase in imports as a percentage of GDP and improved collection methods. In this section the issue is further analyzed, by answering the question concerning those variables, which determine VAT collections in the long- and short run.

Using the definition of VAT to Estimate VAT Collections

Under section 1 of the Value Added Tax Act of 1991 VAT is levied on
a)   The supply by any vendor of goods and services in the course or furtherance of any enterprise carried on by him or her;
b)   The importation of any goods into South Africa; and
c)   The supply of any imported service by any person. (SA Tax, 2001)

Exports are usually exempt from VAT and to avoid escalation of VAT payments each trader is refunded for input taxes paid. The definition indicates the variables that will possibly explain the variance in VAT receipts, namely consumption expenditure by households (C), government consumption on goods and services (G), gross fixed capital formation (I), as well as imports (M). However, as imports (M) are already included in consumption expenditure (C) when consumption is determined, M will be excluded from the estimation.

Nominal quarterly data from the fourth quarter of 1993 is used. From the fourth quarter 1993 the VAT rate was 14 percent. Therefore for the purpose of this analysis a constant VAT rate is assumed. Consumption expenditure, gross fixed capital formation and government expenditure already include a VAT component. This is removed by dividing VAT collections by the VAT collection rate.

The following variables are used in the estimation process:

Table 2.6:   Variables Used in the Estimation of a VAT Collection Equation from

         SARB Time Series Data

Variable	Description
TIVAT	VAT collections
VATRR	VAT collection rate[2]
CONSE	Consumption expenditure
INVES	Investment
GCOTH	Government consumption expenditure (excl wages and salaries)

KBP4578, KBP6007, KBP6008, KBP6256, KBP6009

Table 2.7: Data Plots of Variables
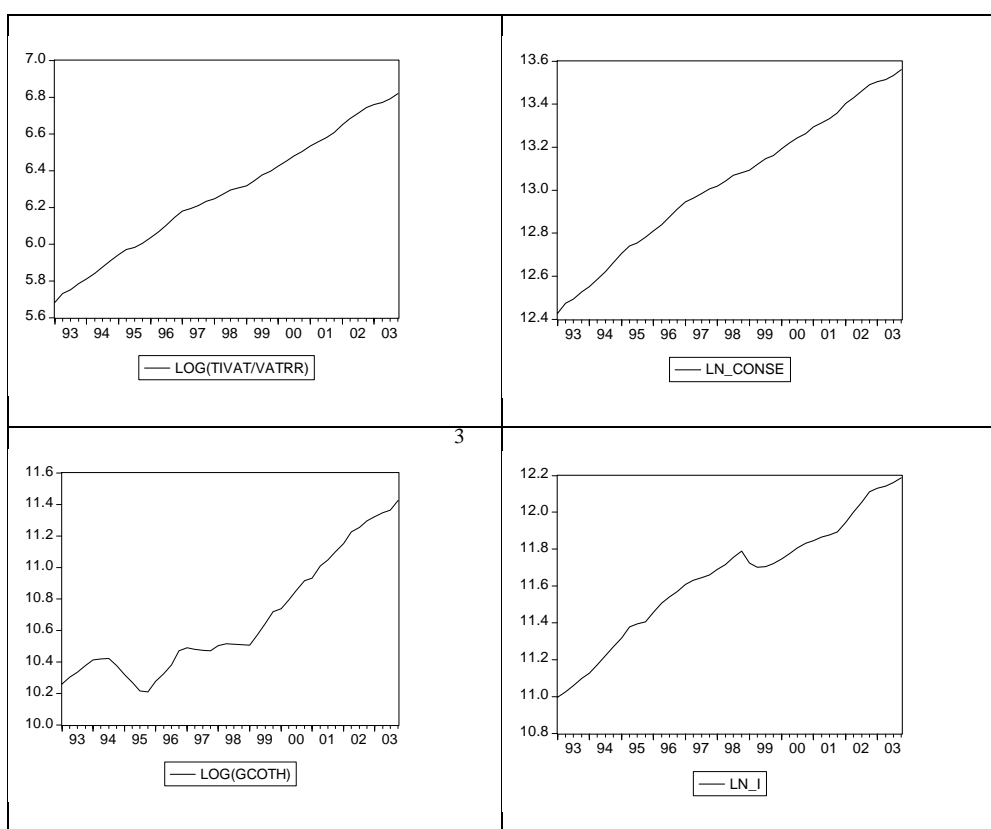
A series of unit root tests were performed to test for the presence of unit roots. Table 2.8, and 2.9 give the results of the Augmented Dickey-Fuller tests for non-stationarity for levels and first differences respectively.

Table 2.8:   *Augmented Dickey-Fuller Tests for Non-stationarity, Levels 1991-2003*

Series	Model	Lags	$\delta_\delta, \delta_:, \delta$	McKinnon Critical Values 5%(1%)
$\ln\_CONSE$	Trend	1	-2.248[*]	-2.929(-3.585)
	Constant	1	-2.267	-3.514(-4.178)
	None	6	1.597	-1.948(-2.616)
$\ln\_INVES$	Trend	2	-2.106	-2.929(-3.585)
	Constant	2	-1.394	-3.514(-4.178)
	None	2	3.396	-1.948(-2.616)
$\ln\_GCOTH$	Trend	1	-1.388	-2.929(-3.585)
	Constant	1	0.570	-3.514(-4.178)
	None	2	2.100	-1.948(-2.616)
$\ln\_TIVAT/VATRR$	Trend	6	-14.601[**]	-2.929(-3.585)
	Constant	6	-4.069[*]	-3.514(-4.178)
	None	1	3.512	-1.948(-2.616)

[*]   Significant on a 5 percent level
[**]   Significant on a 1 percent level

From the tables 2.8 and 2.9 it follows that $\ln\_CONSE \sim I(1)$, $\ln\_INVES \sim I(1)$, and $\ln\_GCOTH \sim I(1)$ on a five percent significance level.

Table 2.9:   *Augmented Dickey-Fuller Tests for Non-stationarity, First Differences 1991-2003*

Series	Model	Lags	$\delta_\delta, \delta_:, \delta$	McKinnon Critical Values 5%(1%)
$\ln\_CONSE$	Trend	1	-4.709[**]	-3.514(-4.178)
	Constant	1	4.023[**]	-2.929(-3.585)
	None	4	-0.629	-1.948(-2.616)
$\ln\_INVES$	Trend	0	-4.202[**]	-3.514(-4.178)
	Constant	1	-4.103[**]	-2.929(-3.585)
	None	0	-2.187[*]	-1.948(-2.616)
$\ln\_GCOTH$	Trend	1	-3.269	-3.514(-4.178)
	Constant	1	-2.939[*]	-2.929(-3.585)
	None	1	-2.031[*]	-1.948(-2.616)
$\ln\_TIVAT/VATRR$	Trend	6	-4.718[**]	-3.514(-4.178)
	Constant	5	-4.166[**]	-2.929(-3.585)
	None	1	-2.960[**]	-1.948(-2.616)

[*]   Significant on a 5 percent level
[**]   Significant on a 1 percent level

Cointegration Equation

The following equation will be used as a priori.

$$\ln(TIVAT \, / \, vatrr) = f(\ln(CONSE), \ln(GCOTH), \ln(INVES))$$
$$\qquad\qquad\qquad + \qquad\qquad\quad + \qquad -/+$$

It is expected that consumption expenditure (CONSE) will contribute positively to VAT collections, as an increase in consumption will increase VAT contributions and in turn VAT collections. Although the government is not a registered VAT vendor, the government is also a contributor to VAT as the government buys goods from VAT vendors. The government therefore is not excluded in total from the VAT base. It is therefore expected that an increase in government consumption will contribute positively to VAT collections via VAT vendors. Whether or not gross fixed capital formation INVES) will contribute positively or negatively to VAT collections is debatable. VAT payments on investment goods can be credited against VAT liability by registered VAT vendors. In this sense it is expected that an increase in gross fixed capital formation will lower VAT collections as a registered firm's VAT liability is reduced. However, it is also not clear how many investors are not registered as VAT vendors and will not be able to get a credit for VAT paid on gross fixed capital formation. These investors will increase the VAT base and contribute positively to VAT collection.

The long-run VAT collection equation:

$$\ln(TIVAT \, / \, vatrr) = c_1 \cdot \ln(CONSE) + c_2 \cdot \ln(GCOTH) + c_3 \cdot \ln(INVES) + c_4$$

The estimated equation exhibit cointegration at a 10 percent significance level under the constant, no trend, model (see table 2.11).

Table 2.10:   Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
(C_4)	-6.551442	0.004735	-1383.748	0.0000
LOG(CONSE) (C_1)	0.910711	0.002313	393.7641	0.0000
LOG(GCOTH) (C_2)	0.082639	0.000592	139.4927	0.0000
LOG(INVES) (C_3)	0.006292	0.001947	3.232041	0.0025
R-squared	0.999998	Durbin-Watson stat		0.512122
Adjusted R-squared	0.999998	F-statistic		5811371
S.E. of regression	0.000518	Prob(F-statistic)		0.000000

Table 2.11:   Augmented Dickey-Fuller Test Statistics on Testing for the Null

Hypothesis of No Cointegration

Model	Percent significance	McKinnon Critical Value (T=44)	ADF	Outcome
Constant No trend	1	-4.6355		No cointegration
	5	-3.9396	-3.661^4	No cointegration
	10	-3.5951		Cointegration
Constant Plus trend	1	-5.1134		No cointegration
	5	-4.3994	-3.605	No cointegration
	10	-4.0457		No cointegration

Figure 2.10: Residual Plot
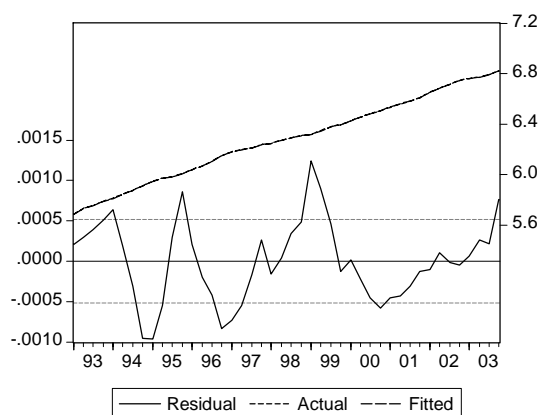
ADF-test statistics has to be less than the critical value in order for the null of no cointegration to be rejected in favor of stationary residuals and cointegration between the variables of the tested cointegration equation.

[4]

The Estimated Long-run Equation

$$\ln(TIVAT / vatrr) = 0.9107 \cdot \ln(CONSE) + 0.083 \cdot \ln(GCOTH) + 0.006 \cdot \ln(INVES) + c_4$$

In the long run, a one percent increase in consumption will lead to a 0.91 percent increase in VAT collections. The coefficient of ln(CONSE) is less than one as a one percent increase in consumption does not necessarily mean that VAT collections will increase to the same extend due to tax evasions and exclusions. A one percent increase in government consumption (GCOTH) will only increase VAT collections by 0.083 percent. The government is mostly excluded from VAT payments and it is therefore expected that government consumption is not a major contributor. Gross fixed capital formation (INVES) contributes positively to VAT receipts, as some firms might not be able to claim VAT inputs on investment due to non-registration. For example, firms earning below R300 000 per year are not allowed to register for VAT and therefore can also not claim VAT credits on inputs. A one percent increase in gross fixed capital formation only increase VAT collections by 0.006 percent.

The Error Correction Model

$$\Delta \ln(TIVAT / vatrr) = d_1 \cdot \Delta \ln(CE) + d_2 \cdot \Delta \ln(GCOTH) + d_3 resid(-1) + d_4$$

Therefore gross fixed capital formation (INVES) does not have a short-run impact on VAT tax collections. Short-run fluctuations in VAT collections depend on changes in consumption expenditure (CONSE) and government consumption (GCOTH). Consumption expenditure (CONSE) determines to a very large extent (both in the short- and long-run) how much VAT revenue is going to be collected. As imports are already included in consumption expenditure, it also plays a role.

Table: 2.12:   Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
d_4	0.000465	0.000149	3.128468	0.0033
RESVATI(-1) (d_3)	-0.003859	0.002123	-1.817661	0.0768
D_LN_CE (d_1)	0.904961	0.005155	175.5517	0.0000
D_LN_GCOTH (d_2)	0.078055	0.001260	61.95077	0.0000
R-squared	0.998916	Durbin-Watson stat		1.333906
Adjusted R-squared	0.998832	F-statistic		11975.92
S.E. of regression	0.000300	Probability (F-statistic)		0.000000
Breusch-Godfrey Serial Correlation LM Test[5]:				
F-statistic	1.853395	Probability		0.170960
Obs*R-squared	3.915611	Probability		0.141168

2.5.   Future Issues to Consider Within a VAT System

The government has used VAT as a revenue source now for more than 10 years. At this point in time it would also be valuable to look at issues arising within the VAT structure. Some of the issues that are investigated in the rest of this study are:

- The government lowered the direct tax rate for the last two budget years (2003 and 2002) as an expansionary measure. The alternative of lowering the statutory VAT rate needs to be investigated. The effect of a reduction in the VAT rate on welfare, and other economic variables need to be determined.
- VAT is mildly regressive, and zero-rating food may possibly reduce the regressiveness of VAT. The loss in revenue, due to the zero-rating of food, needs to be absorbed by alternative sources. The effect of zero-rating food and the use of alternative sources on welfare and tax efficiency, need to be investigated.

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[5]   The null hypothesis of no serial correlation up to order two cannot be rejected on a 10 percent level of significance.

- The possibility of applying zero-rating to labor-intensive industries with the aim to create jobs needs to be investigated as well. Again the loss in revenue needs to be absorbed by alternative sources. The effect of zero-rating labor-intensive industries and the use of alternative sources on employment, welfare and tax efficiency, needs to be investigated.

2.6.   Summary

VAT in South Africa is a consumption type tax as it is levied on final goods and services. Exports are zero-rated while imports are taxed. Various basic food items were exempt from VAT when VAT was initially introduced; the VAT system in South Africa also makes provision for the exemption of small firms: firms supplying goods below R300 000 per year are exempt from taxes. VAT is levied according to the invoice method whereby suppliers are allowed credit for VAT paid on inputs, if the suppliers can provide proof thereof.

VAT was introduced in South Africa in 1991 at a rate of 10 percent; in 1993 the statutory rate was increased to 14 percent. Since the inception of VAT various changes have been made to the VAT system. The changes aimed at reducing the regressiveness of VAT, as well as improving the tax administration system to ease the compliance burden of small firms.

VAT is an important revenue source for government. In 2001 VAT was the second largest revenue source for government after income tax, and it contributes 25 percent of total tax receipts. The government currently sees VAT as a dependable and broad-based revenue source.

Although the overall performance of VAT seems satisfactory, there are issues that need to be considered within the VAT system. These issues will be the focus of the rest of this study.

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McKinnon Critical Values for the ADF-statistic on testing for the null of no cointegration

N	Model	Percentage significance	θ_∞	θ_1	θ_2	Critical value T=44
1	Constant	1	-3.9001	-10.5340	-30.0300	-4.1550
	No trend	5	-3.3377	-5.9670	-8.9800	-3.4780
		10	-3.0462	-4.0690	-5.7300	-3.1416
1	Constant	1	-4.3266	-15.5310	-34.0300	-4.6972
	Plus trend	5	-3.7809	-9.4210	-15.0600	-4.0028
		10	-3.4959	-7.2030	-4.0100	-3.6617
2	Constant	1	-3.9001	-10.5340	-30.0300	-4.1550
	No trend	5	-3.3377	-5.9670	-8.9800	-3.4780
		10	-3.0462	-4.0690	-5.7300	-3.1416
2	Constant	1	-4.3266	-15.5310	-34.0300	-4.6972
	Plus trend	5	-3.7809	-9.4210	-15.0600	-4.0028
		10	-3.4959	-7.2030	-4.0100	-3.6617
3	Constant	1	-4.2981	-13.7900	-46.3700	-4.6355
	No trend	5	-3.7429	-8.3520	-13.4100	-3.9396
		10	-3.4518	-6.2410	-2.7900	-3.5951
3	Constant	1	-4.6676	-18.4920	-49.3500	-5.1134
	Plus trend	5	-4.1193	-12.0240	-13.1300	-4.3994
		10	-3.8344	-9.1880	-4.8500	-4.0457
4	Constant	1	-4.6493	-17.1880	-59.2000	-5.0705
	No trend	5	-4.1000	-10.7450	-21.5700	-4.3553
		10	-3.8110	-8.3170	-5.1900	-4.0027
4	Constant	1	-4.9695	-22.5040	-50.2200	-5.5069
	Plus trend	5	-4.4294	-14.5010	-19.5400	-4.7691
		10	-4.1474	-11.1650	-9.8800	-4.4063

Test Results for a Structural Break in GCOTH in 1994 Fourth Quarter

Chow Breakpoint Test: 1994:4			
F-statistic	67.02585	Probability	0.000000
Log likelihood ratio	64.70081	Probability	0.000000

The null hypothesis of no structural change can be rejected on a one percent significance level.