EFFECTS OF INCREASES IN VALUE ADDED TAX: A DYNAMIC CGE APPROACH

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Abstract

This paper analyses the effects of increases in value added tax (VAT) through a dynamic computable general equilibrium model. The database of the model encompasses a social accounting matrix (SAM) for the year 2010. All the important South African taxes are included in the SAM and the household sectors are disaggregated according to income deciles, with the top decile being further split into five groups. Five different simulations are performed, ranging from 1% increase in the VAT to 5% over the period 2012 to 2018. Our findings show that the percentage increase in VAT would not affect lower income households negatively if the higher government revenue flowed to the lower income households. For example, the 1% increase in the VAT rate impacts on the investment through the price of capital. The change in investment means that any adjustment in capital stock will affect the production and demand for labour that might impact on the standard of living of all income groups. The GDP increases slightly by 0.02173% in 2013 and reports a positive change for the period between 2013 and 2018. This shows that in the short run the GDP depends on other variables such as investment and consumption, which likewise are positively affected by this shock.

JEL Codes: C68, E62, H21
Key words: value added tax, computable general equilibrium model, South Africa

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1. Introduction

The most crucial challenges facing South Africa 21 years after the transition to democracy are breaking the grip of poverty and redistributing income and wealth to a substantial portion of the population. This cannot be fixed if we do not address the ultimate challenge of generating high and sustainable economic (real GDP/GNP) growth. Specific policies attending to these concerns could contribute toward solutions to the challenges. There is thus a crucial need for policies that could stimulate employment growth. There is a widely held view amongst the academics that a reduction in unemployment should also address the skew income distribution that characterises the South African economy. This study aims to contribute to addressing this shortcoming by following the economic modelling approach and examining the effect of changes in VAT on the South African economy. A recent World Bank study (2014) indicated that approximately 40% of South Africans are living in poverty – with the poorest 15% in a desperate struggle to survive. This means that approximately 20.4 million out of 51 million people have not benefited from the outcomes of the deserved democracy. This tenders a moral challenge to all South Africans – to work together towards the economic and social integration of the poorer section of the population. According to Stats SA (2014) females are more impoverished than males in South Africa, with a poverty headcount of 58.6% as compared to 54.9% for males. Indeed, South Africa is experiencing slow economic growth, passive private investment, increasing fiscal and external deficits, and high unemployment. Real GDP growth declined from a post crisis peak of 3.6% in 2011 to just 1.9% in 2013. Due in part to labour unrest, power shortages and weak external demand, real GDP rose by just 1.3% in 2014 - the lowest headline growth rate since the onset of the global financial crisis. Private investment growth stagnated in 2014, down from 4.6% in 2011. The slowdown in growth has in turn put increased pressure on the fiscal and current account deficits. The fiscal deficit and gross debt burden of the general government stood at 4.0% and 45.9% of GDP in 2013/14, leading the government to embark on a fiscal adjustment programme. The current account deficit rose to 5.8% of GDP in 2013 and is largely funded through capital portfolio inflows, as Foreign Direct Investment (FDI) inflows have remained relatively modest.

In South Africa, the three spheres of government, namely national, provincial and local government, collect both tax and non-tax revenue. The provincial governments collect tax revenue from gambling taxes and motor vehicle licences, whilst local governments collect

property rates. The bulk of tax revenue (around 98%) is collected nationally by the South African Revenue Service (SARS). According to SARS (2013), personal income tax (PIT), company income tax (CIT) and value-added tax (VAT) remain the largest sources of tax revenue, collectively comprising around 80% of total tax revenue. The South African VAT system is destination-based, which means that only the consumption of goods and services in South Africa is taxed. VAT is therefore payable on the supply of goods and services in South Africa, as well as on the importation of goods into South Africa.

During the past decade the South African government granted substantial tax relief to personal income taxpayers. Real tax relief was granted through effective tax base broadening reform, supported by buoyant revenue collections. For the period 2003/04 to 2008/09 (prior to the global financial crisis), revenue collections achieved a Compound Annual Growth Rate (CAGR) of 15.6%. This declined to 10.7% during the period 2009/10 to 2013/14 (post the global financial crisis). Furthermore, between 2009/10 and 2013/14 tax relief of R45 billion accrued directly to individual taxpayers. Indirect taxes were increased by R35.4 billion to contain the net outflow from the fiscus to R13.9 billion. Specific indirect taxes are levied at a rate per unit as opposed to a rate per value (ad valorem), and are therefore adjusted annually for inflation to maintain the indirect tax burden in real terms (SARS, 2014).

In comparison with other countries, the South African tax system proved resilient during and post the 2008 global crisis. Despite this, there was an expectation that the percentage of VAT would increase because of the slow economic downturn. This did not occur and the last percentage increase in VAT was in April 1993, when VAT increased from 10% to 14%. Kearney and van Heerden (2003) pointed out that an increase in VAT would not necessarily alleviate poverty, due to the economic theory which indicates that indirect taxes usually burden lower income households the most. In this respect, it is important to assess the effect of a change in VAT on different income households, particularly lower income households, as well as the effect on government revenue. We have noticed that the standard rate of VAT is applicable to almost all goods and services supplied in the economy, with a limited number of goods and services supplied at the zero-rate or being exempt from VAT. The purpose of zero-rating is to free VAT on exports of goods and services and to provide relief of the tax on certain merit goods and services. For instance, in order to assist poor households, some supplies such as basic food items as well as petrol, diesel and illuminating paraffin are zero-rated.

In this paper we analysed the effect of a change in VAT on the South African economy using the dynamic CGE model. In Section 2 we present an overview of VAT and a literature review, in Section 3 we introduce the methodology used, in Section 4 we present the simulation results, and in Section 5 we present concluding comments.

2. VAT overview and literature review

According to SARS (2014), VAT is a significant source of revenue for the government and requires businesses (referred to as vendors that act as agents of the government) to register and to charge and collect VAT on the supply of goods and services. The mechanism of charging, collecting and paying VAT to government is based on self-assessment, which allows a business to determine its liability or refund of tax. It adopts a subtractive or credit input method, which allows businesses (vendors) to deduct the VAT incurred on business expenses (input tax) from the VAT collected on the supplies made by the business (output tax). The vendor may deduct the VAT paid during the preceding stages of the production and distribution chain, i.e. the burden of the VAT is on the final consumer whilst maintaining neutrality in the business chain.

In South Africa, VAT is a broad-based tax on consumption as opposed to a selective tax on particular products. It is intended to tax all consumption of goods and services (except those that are exempt or zero-rated) in the economy. It is levied at each stage of the production and distribution chain and the tax is ultimately borne by the end consumer. Although the number of registered VAT vendors increased significantly over previous years from 578 138 in 2004/05 to a high of 745 487 in 2007/08, the number declined by 8.0% to 685 523 in 2009/10. The decline was due to a register clean-up project initiated by SARS, as well as the slowdown in the economy. In 2012/13 there were 650 540 registered VAT vendors, of which 425 576 (65.4%) were active. As a result of more stringent registration requirements and improved risk-based vetting of refunds, the number of vendors registered for VAT continues to decline (SARS, 2014).

Regarding import VAT and customs duties, VAT is levied on the importation of goods and services into South Africa. Customs duties, which include specific excise duties on imports, are imposed on designated imported goods. Additional *ad valorem* import duties are levied

on a wide range of luxury or non-essential items, such as specific motor vehicles, perfumes, firearms, cellular phones and television games. The VAT vendor may deduct the VAT paid during the preceding stages of the production and distribution chain. There are, however, some expenses for which input tax cannot be claimed. These include the acquisition of motor vehicles as well as entertainment expenses.

The latest statistics produced by SARS (2014) indicate that the largest number of VAT vendors in 2013/14 were in the financial intermediation, insurance, real-estate and business services sectors (41.7%), followed by the wholesale and trade, catering and accommodation (19.8%) and agriculture, forestry and fishing (13.5%) sectors. As we have noted, the financial intermediation, insurance, real-estate and business services sector made the largest contribution to domestic VAT payments by a single sector of R108.0 billion (41.2%). In contrast, the mining and quarrying sector comprised only 0.6% of vendors and contributed just 3.8% of the total domestic VAT payments. The large volume of zero-rated mineral exports makes the mining and quarrying sector a negative contributor to net VAT. Furthermore, VAT vendors with a turnover of R1 million or less constituted 41.4% of the total number of VAT vendors. For each R1 in domestic VAT declared, R3.29 in output tax was declared and R2.29 in input tax was claimed, while for each R1 in VAT refund claimed, R1.35 in input tax was declared and R2.35 in input tax was claimed.

Mazur (2006) pointed out that a commonly quoted advantage of VAT is that it is collected during the course of the production chain. In particular, VAT should be associated with uncomplicated enforcement, as it allows the fiscal authority to compare reported sales of each intermediate product with reported purchases of producers, using that intermediate product as an input in a vertical production chain. Although VAT may undeniably be an easier tax to enforce than income tax, it is not a universal remedy. Enforcing VAT requires employing resources for collecting and processing information, as well as prosecuting and penalising agents found to be underpaying.

Gordon and Nielsen (1997) indicated that VAT collection efficiency improves with the resources spent on enforcement, and with the efficiency of monitoring, collecting and processing information. Economic theories recommend that the enforceability of taxes is impacted by political economy considerations. Major opposition and political instability tend to reduce the efficiency of tax collection, reducing the resources devoted to tax enforcement.

Furthermore, collection is impacted by structural factors that affect the ease of tax evasion, such as the urbanisation level, the share of agriculture, and trade openness.

Rosen (2004) found that in various countries, corporate income tax, VAT and a range of labour taxes are levied on businesses. Taxes generated and collected by business are indeed a significant source of revenue for governments. The impact of these taxes, as well as the tax systems used to generate them, on business is significant, both in terms of their direct cost and in terms of the compliance costs that they impose on business as an unpaid tax collector for government. Moreover, paying taxes includes both the cost of the taxes which are generated by the firm, as well as the administrative burden of the taxes that the firm carries and those that it collects on behalf of government. In this case, both the tax cost and the tax compliance burden are significant from the business' point of view. These are assessed through the number of tax payments and the time required to comply with the main taxes such as profit taxes, labour taxes, mandatory contributions, and consumption taxes.

Bankman and Schler (2007) argued that some countries persist in reducing their VAT rates for the purpose of creating an attractive environment for investment, while others are concerned about increasing tax revenues to provide funding for public services and to assist in reducing public sector deficits. Nonetheless, taxes are needed to generate revenues so that governments can fund social programmes and public investments that stimulate economic growth and development. Attaining the right equilibrium is therefore a great challenge for governments when designing tax policies. One way to promote compliance and have an effective tax system is to keep the rules as clear and simple as possible. It is thus essential to assess both the level of tax rates and the administrative burden of compliance.

According to the World Bank (2003), the main driver for raising revenue has been the replacement of the cascading sales taxes by VAT in a number of African economies and Yemen. 'Other' taxes have consistently been the largest component of the Total Tax Rate in South America and Africa. The introduction of a VAT system in a country's economy would certainly result in an additional compliance burden; governments will need to ensure that simple and efficient VAT systems are implemented which encourage voluntary compliance and which keep the cost of implementation to a minimum for business. Reductions in profit tax rates are often combined with efforts to widen the tax base by eliminating exemptions and with increases in the rates of other taxes, such as VAT.

Gemmell and Hasseldine (2012) claimed that the estimates of the VAT gaps and the econometric analysis give some indication of the importance of tax enforcement and tax compliance considerations in determining how VAT should be reformed to respond to Europe's fiscal pressures. Certainly these results are consistent with the notion that reforms to a VAT policy and VAT enforcement could be an important part of fiscal consolidation exercises in some European countries.

CASE (2013) developed an 'Index of Policy-Induced VAT Changes' in order to assess the effects of changes in VAT rates. The index was used as a synthetic measure which aimed to capture the degree by which changes in VAT rates are used by countries over time. The index was based on the year 2000 structure of the VAT tax base in each country in Europe, and sought to separate the effects of rate increases from those which were due to the composition of the VAT total theoretical liability. Increases in rates led to an increase in the index, and the opposite for rate decreases. The amplitude of the change in the index is an approximation of the potential effect on revenues that can be expected from the policy measures. As indicated earlier, while South Africa is facing challenges with unemployment and economic growth, it is necessary to evaluate the effect of a change in VAT on the South African economy and its implication on government revenue.

3. Methodology

The modelling framework used in this paper is a dynamic computable general equilibrium model that captures all the important South African taxes. We use the National Treasury's model (t-SAGE) which was built by UN-WIDER. It is a recursive dynamic model which allows for the observation of inter-temporal changes to the economy as well as the analysis of policy intervention impacts as they unfold over time. The parameters of the CGE equations are calibrated to observed data from a social accounting matrix (SAM) for the year 2010. In fact SAM is a popular format for presenting CGE databases (Horridge, 1993). For instance, each row or column of the SAM corresponds to a particular agent, activity, or account, while each cell in the SAM shows the value of some transaction. Row totals show total income to each account – these should match the corresponding column totals showing the total (expenditure + savings) of each account. The model evaluates the level of changes in the volume and structure of trade on macroeconomic variables; the effect of contractionary fiscal policy on the economy; and the outline of the elements of a growth strategy for the long term. One of the particularities of this model is that it has a special focus on energy consumption

and production across the economy. Besides, both corporate and personal income taxes are represented in the model and three indirect taxes are captured: an activity tax, customs duties and a general sales tax. We used the model to conduct our analysis on the effect of a change in the VAT rate over the period 2012 to 2018.

The primary data sources used in developing the 2010 SAM were the 2010 Statistics South Africa (Stats SA) supply and use tables, 2010 South Africa Reserve Bank (SARB) macroeconomic data and the 2010 Quarterly Labour Force Survey (QLFS). The supply and use tables were used to establish the sector links and relationships, while the QLFS data provided information regarding employment levels and average wages across different labour groups and sectors. The Income and Expenditure Survey data were used to model household factor income distribution and consumption behaviour.

The 2010 SAM consists of 14 households, 48 activities and 85 commodities. Labour is divided according to education level. Specifically, four labour groups are identified: primary educated (Grades 1-7), middle educated (Grades 8-10), secondary educated (Grades 11-12) and tertiary educated. The household sector is disaggregated according to income into deciles, with the top decile being further split into five groups. In addition, we considered specific macroeconomic government closures for the purpose of allowing new taxes such as a carbon tax to be re-injected back into the economy, leaving government revenue neutral.

The direct and indirect tax components are also disaggregated in the model based on the realities of the South African tax system. In the case of direct taxes, the model makes the distinction between regular and dividend income earned by enterprises and households. Allowances are made for these incomes to be taxed differently as is currently the case. Regular income is subject to Company Income Tax (CIT) in the case of firms and Personal Income Tax (PIT) in the case of households, while dividend income to households is subject to dividend tax. Data from the SARB were used to disaggregate enterprise income that flows to households in the form of regular and dividend income revenue streams and the associated tax revenue components. The important types of accounts included in the SAM can be described as follows:

3.1 Production and consumption accounts

In production accounts, commodities related to goods and services are sold on the market at a price that covers their cost of production. They are comprised of both domestically produced goods and imports. The rows for activities in the SAM consist solely of the domestic supplies that firms produce, which comprises gross domestic production. The columns for activities in the SAM show expenditures on commodities considered during the production process, including value added tax and indirect taxes collected by the government. The income received is dispensed in the consumption category because the display of income distribution is a very important component of the SAM, and may play an essential role in development planning.

The consumption accounts consist of institutions, which represent the various economic actors in the economy. These include accounts for households, private firms and government[2]. Total income of households is equal to income from the sales of production factors via the allocation matrix, plus all transfers from government (transfers take the form of social welfare). Household expenditure includes the consumption of commodities, income tax, indirect taxes (VAT and import tariffs) and private savings. VAT is calculated on the value added by producers and is equal to the amount of VAT paid by consumers minus the VAT paid by producers on intermediate products. VAT is seen as a consumer tax. A balanced accounting matrix requires household income to be equal to household expenditure. Consumers are assumed to maximise their utility, represented through a Stone-Geary utility function, subject to their budget constraints. Each of the 14 representative households were assumed to adopt this behaviour. The derived Linear Expenditure System (LES) of demand for each household is shown in equation 3.1 below.

$$P_j \bullet H_{jh} = P_j \bullet \gamma_{jh} + \beta_{jh} \bullet \left((1 - S_h - td_h) \bullet Y_h - \sum_{jt} P_{j'} \bullet \gamma_{j'h}\right) \qquad \text{(Equation 3.1)}$$

Where H is consumption of good *j* by household *h*, γ is a minimum committed consumption level, β is the marginal budget share, *P* is the market price of each good, *Y* is total household income and *S* and *td* are the marginal savings and direct tax rates, respectively. LES functions are widely used in CGE models because they are easier to calibrate than many other functional forms. They allow income elasticities to vary across household groups and price elasticities to vary across goods. Income elasticities in the model are based on the study by Case (2000).

[2] These accounts are often referred to as final demand, which also includes other accounts, most notably investment and exports.

3.2 Government and investment demand

Government revenue consists of various taxes and it is treated as a separate institution, where revenue is the sum of direct (td_h) and indirect taxes (ts_j) and transfers to government (st_g), as shown on the left-hand side of equation 3.2:

$$\sum_h td_h \bullet Y_h + \sum_j ts_j \bullet P_j \bullet Q_j + \sum st_g = \sum_j P_j \bullet \bar{G} \bullet g_j + \sum_h st_h + B \qquad \text{(Equation 3.2)}$$

As described by Alton *et al.* (2012), revenues are used to purchase goods g_j and make social transfers st_h. Any remaining funds are (dis)saved, as shown by B on the right-hand side of the equation. Our macroeconomic closure for the government assumes that consumption spending is equal to base-year quantities g multiplied by an exogenous adjustment factor G. The recurrent fiscal balance B adjusts to equalise total revenues and expenditures.

A savings-driven investment closure implies that total investment adjusts to the level of total savings. This is shown below where i is fixed base-year investment quantities multiplied by an endogenous adjustment factor I.

$$\sum_h s_h \bullet Y_h + B + \bar{F} \bullet X = \sum_j P_j \bullet I \bullet i_j \qquad \text{(Equation 3.3)}$$

3.3 Factor and product market equilibrium

Production factors flow from households to producers. The labour and capital owned by households form the supply of production factors. The total labour supply LS is determined by upward-sloping supply curves that depend on the prevailing wage W, the base-year wage w, base-year labour supply ls, and a wage supply elasticity ε. In equilibrium, total labour supply LS must equal the sum of all sector labour demands L:

$$LS = ls \bullet (W / w)^{\varepsilon} = \sum_j L_j \qquad \text{(Equation 3.4)}$$

Unlike labour, which is mobile across industries, capital is sector-specific. Both factor demand K and the rental rate r are fixed, while the distortion term Z (which shows sector specific variation in the rental rate r) adjusts to equate capital demand and supply in each sector.

Product market equilibrium requires that the composite supply of each good Q equals private and public consumption and investment demand. Market prices P adjust to maintain

equilibrium. Producers' abilities to pass-through other taxes to consumer prices are moderated by demand's response to higher prices.

$$Q_j = \sum_h H_{jh} + \bar{G} \bullet g_j + I \bullet i_j \qquad \text{(Equation 3.5)}$$

All prices in the model are relative to a numeraire. The consumer price index (CPI) was chosen as the numeraire in our model.

3.4 Investment and capital accumulation

Total savings consist of savings by households, the government and the foreign sector. Sector-level capital stocks *K* are determined endogenously based on previous period investment. As shown below, the quantity of new capital *N* is based on the value of investment and the capital price *PK* (i.e., market prices *P* weighted by investment shares *i*). New capital is allocated to sectors after applying a depreciation rate υ and a capital allocation factor *SK* ($0<SK<1$; $\Sigma\ SK = 1$ for each *j)*, as described by Devis, de Melo and Robinson (1982).

$$N_t = \sum_j (P_{jt} \bullet I_t \bullet i_j) \bullet PK_t^{-1} \qquad \text{(Equation 3.6)}$$

$$\bar{K}_{jt+1} = \bar{K}_{jt} \bullet (1-\upsilon) + SK_{jt} \bullet N_t \qquad \text{(Equation 3.7)}$$

$$SK_{jt} = SP_{jt} + SP_{jt} \bullet \left[(SR_{jt} - AR_t)/(AR_t) \right] \qquad \text{(Equation 3.8)}$$

SP is a sector's current period share in total capital stocks, *SR* is a sector's profit rate (i.e. $r \cdot Z_j$), and *AR* is the average profit rate. Thus new capital is allocated in proportion to a sector's share of current capital stocks, adjusted by its own profit rate relative to the economy-wide profit rate. Sectors with above-average profit rates receive a greater share of investible funds than their share in the existing capital stocks. This specification also implies that new capital is mobile but installed capital is sector-specific.

3.5 Income and VAT

In relation to households, VAT is considered to be a consumer tax because it is calculated on the value added by producers and is equal to the amount of VAT paid by consumers minus that paid by producers on intermediate products. Household income consists of income from labour and capital sold. The income from capital is equal to the return on capital less depreciation.

$$Y_h(i) = Y_{PRIM}(i) + Y_{SEC}(i) + Y_{TERT}(i) + Y_{CAP}(i) \quad \text{(Equation 3.9)}$$

Government revenue consists of all the different taxes, namely import tariffs, income tax, company tax, and indirect tax (VAT). The mathematical representation of government revenue is as follows:

$$GR = TARIFF + VAT + HHTAX - EXPSUB \quad \text{(Equation 3.10)}$$

where TARIFF is the import tariffs, VAT the value added tax, HHTAX is the household tax and EXPSUB is the export subsidies.

$$TARIFF = \sum_i p_{wm}(i) * M(i) * t_m(i)\, EXR \quad \text{(Equation 3.11)}$$

$$VAT = \sum_i (p_q(i) * Q(i) - p_q(i) * INT(i)) * t_{VAT}(i) \quad \text{(Equation 3.12)}$$

$$HHTAX = \sum_h \sum_i Y_h(i)\, t_h(i) \quad \text{(Equation 3.13)}$$

$$EXPSUB = \sum_i p_{we}(i) * E(i) * t_e(i) * EXR \quad \text{(Equation 3.14)}$$

3.6 Closures

The behaviour of the model is dependent on the macroeconomic and factor closures chosen. These closures allow for the placement of constraints into the model which is crucial in the analysis of large-scale policy changes (Alton *et al.*, 2012). In addition, we can choose from a possible set of factor and macro closures. Within the factor closure, there is possibility to make factors fully employed and mobile, fully employed and activity-specific, unemployed and mobile or partially unemployed whereby supply is increased according to an upward-sloping supply curve. The following macroeconomic closures are allowed in the model:

- ***Savings and investment***: where one can choose between investment driven savings; savings-driven investment, and investment and government expenditure being fixed shares of absorption;
- ***Government***: where government savings can either be fixed or flexible with the implication that tax rates are either flexible or fixed. The model allows for the option of changing the direct or indirect tax rate at a uniform or scaled rate; and
- ***Current Account***: where the exchange rate may either be flexible or fixed with the consequence that foreign savings is either fixed or flexible.

4 Simulation results

4.1 Macroeconomic results

Five simulations were carried out to assess the impacts of changes in the VAT rate. In the five simulations we increased the VAT rate by 1, 2, 3, 4 and 5% over the period 2012 to 2018, with shocks imposed in 2012. We adopted a balanced investment closure in which investment as a share of absorption remained constant so it was allowed to change with absorption. The main variable that absorbs the change in tax rates remains the savings rate. In line with the stylised facts of the South African economy, primary educated labour is assumed to be unemployed and mobile (i.e. the supply of unskilled labour is perfectly elastic at a fixed wage in each period), while tertiary educated labour is assumed to be fully employed and mobile (i.e. the total supply of skilled labour is fixed but can move between sectors, while wages are flexible). Middle and secondary educated labour are assumed to be semi-employed with upward sloping supply curves, allowing for an increase in supply and wages.

All results were compared relative to the base (baseline) scenario, which represents the business as usual scenario. It is evident from the macroeconomic results that the increase in the trade balance holds significant consequences for South Africa's exports and therefore also for the country's competitiveness. Outstandingly, the result seems somewhat counter-intuitive for a tax policy simulation, as one would expect the VAT rate hike to increase exports prices, which should have negative effect on South Africa's competitiveness. Examination of the change in the balance of trade denotes that the drop in export prices can be attributed to the fact that the significant drop in the price of the fixed factors of production offsets the inflationary effect of the VAT rate increase. Furthermore, it seems as if South Africa's biggest export products are intensive in the use of unskilled labour. These sectors represent mostly the primary sector of South Africa's production and include agricultural and mining sectors. For instance in tracing the impact of the first shock (1% increase in VAT rate) on the economy, the slight increase in the gross domestic product at market prices and marginal increase in the trade balance showed that real domestic consumption should increase. If consumption is considered as a proxy for welfare, the increase in consumption implies that welfare in South Africa increases as a result of the VAT shock. Given a direct relationship between consumption and disposable income, it is expected that domestic consumption will increase. The aggregate expenditure identity clearly confirmed that an

increase in domestic consumption and exports leads to an increase in gross domestic product. In fact, the increase in GDP at market prices on the demand side aggregates depends on the closure assumptions. Besides, any increase in the demand for exports should result in an increase in output. Table 1 reports the key macroeconomic variables such as gross domestic product, consumption and net indirect tax increase.

Table 1: Macroeconomic variables

			2013					2014					2015					2016					2017					2018				
Variables	Description	base	sim1 (1%)	sim2 (2%)	sim3 (3%)	sim4 (4%)	sim5 (5%)	sim1 (1%)	sim2 (2%)	sim3 (3%)	sim4 (4%)	sim5 (5%)	sim1 (1%)	sim2 (2%)	sim3 (3%)	sim4 (4%)	sim5 (5%)	sim1 (1%)	sim2 (2%)	sim3 (3%)	sim4 (4%)	sim5 (5%)	sim1 (1%)	sim2 (2%)	sim3 (3%)	sim4 (4%)	sim5 (5%)	sim1 (1%)	sim2 (2%)	sim3 (3%)	sim4 (4%)	sim5 (5%)
ABSORP	Absorption	2687	0.02153	0.02150	0.02039	0.02114	0.02112	0.04204	0.04198	0.03984	0.04129	0.04126	0.06143	0.06134	0.05834	0.06038	0.06034	0.07978	0.07967	0.07593	0.07849	0.07843	0.09716	0.09703	0.09267	0.09566	0.09560	0.11364	0.11350	0.10860	0.11197	0.11190
PRVCON	Private consumption	1570	0.01598	0.01621	0.02294	0.01833	0.01842	0.04732	0.04748	0.05209	0.04889	0.04895	0.07703	0.07713	0.07991	0.07794	0.07797	0.10521	0.10526	0.10645	0.10556	0.10557	0.13195	0.13196	0.13177	0.13181	0.13181	0.15734	0.15731	0.15592	0.15679	0.15677
FIXINV	Investment	516	0.06349	0.06265	0.03640	0.05432	0.05395	0.07493	0.07414	0.04899	0.06627	0.06592	0.08550	0.08474	0.06064	0.07730	0.07697	0.09531	0.09459	0.07147	0.08753	0.08722	0.10446	0.10376	0.08160	0.09706	0.09677	0.11303	0.11236	0.09110	0.10600	0.10572
DSTOCK	Stock	-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GOVCON	Government consumption	604	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EXPORTS	Exports	645	0.03143	0.03120	0.02547	0.02940	0.02932	0.05281	0.05255	0.04604	0.05053	0.05044	0.07316	0.07289	0.06571	0.07068	0.07058	0.09257	0.09228	0.08453	0.08991	0.08980	0.11108	0.11079	0.10256	0.10828	0.10817	0.12876	0.12846	0.11984	0.12584	0.12573
IMPORTS	Imports	-669	0.03029	0.03006	0.02454	0.02834	0.02826	0.05089	0.05065	0.04437	0.04870	0.04861	0.07051	0.07025	0.06332	0.06811	0.06802	0.08921	0.08894	0.08147	0.08665	0.08654	0.10705	0.10677	0.09884	0.10435	0.10424	0.12409	0.12380	0.11549	0.12128	0.12117
GDPMP	GDP (Market Prices)	2663	0.02173	0.02170	0.02058	0.02133	0.02132	0.04242	0.04236	0.04021	0.04167	0.04164	0.06199	0.06190	0.05887	0.06093	0.06089	0.08051	0.08040	0.07662	0.07920	0.07915	0.09805	0.09792	0.09351	0.09653	0.09647	0.11468	0.11453	0.10959	0.11299	0.11292
NETITAX	Net indirect tax	285	0.02221	0.02228	0.02181	0.02207	0.02206	0.04495	0.04498	0.04333	0.04440	0.04437	0.06652	0.06651	0.06385	0.06562	0.06557	0.08699	0.08695	0.08342	0.08579	0.08574	0.10644	0.10637	0.10210	0.10498	0.10492	0.12492	0.12483	0.11992	0.12325	0.12318
EXRXY	Exchange rates	1	0.00001	0.00002	0.00002	0.00001	0.00001	-0.00042	-0.00041	-0.00018	-0.00034	-0.00033	-0.00085	-0.00083	-0.00038	-0.00069	-0.00068	-0.00125	-0.00123	-0.00060	-0.00103	-0.00102	-0.00164	-0.00162	-0.00082	-0.00136	-0.00135	-0.00202	-0.00199	-0.00104	-0.00169	-0.00168
YGX	Government income	697	0.04418	0.04416	0.04323	0.04385	0.04384	0.04512	0.04508	0.04339	0.04453	0.04450	0.04591	0.04586	0.04356	0.04513	0.04509	0.04661	0.04653	0.04374	0.04565	0.04562	0.04723	0.04714	0.04394	0.04613	0.04609	0.04778	0.04767	0.04414	0.04656	0.04652

Source: Simulation results from the CGE model

By considering the case of 1% increase in the VAT rate, we noticed that the GDP increases slightly by 0.022% in 2013 and reports a positive change for the period between 2013 and 2018. This indicates that the GDP depends on other variables such as investment and consumption, which likewise are positively affected by this shock. Total absorption in the economy follows the same trend, resulting in non-adjustment in investment as investment is allowed to change with absorption. In fact, the 1% increase in VAT impacts on the investment through the price of capital. Therefore, the change in investment will mean that any adjustment in capital stock will affect the production and demand for labour that might impact on the standard of living of all income groups. The immediate effects of the shock indicate that private consumption and real GDP increase by 0.016% and 0.022% respectively. The positive impact on the private consumption and real GDP, however, will increase in the outer years of the modelled scenario. Private consumption will increase in the outer years as the rise in government savings will crowd out private savings through lowering returns on investment. Our finding is in line with the study of Aizenman and Jinjarak (2005) as investment is allowed to change with absorption. The net indirect tax rate increased constantly during the period between 2013 and 2018 when the VAT rate was raised by 1%. This benefits mostly the government revenue. As mentioned earlier, our simulation results indicate that there is a move towards trade surplus. We can argue that the movement to trade surplus requires an improvement in international competitiveness, i.e., a reduction in domestic costs relative to foreign prices. We might speculate that the improvement in competitiveness would favour the traded goods industries, i.e., those industries that sell a large share of their output to foreigners and/or which compete in domestic markets with imports. Nonetheless, the increase in exports can be attributed to the fact that the increases in domestic demand push up domestic prices and producers are then tempted to promote exports, according to the Constant Elasticity of Transformation (CET) function. The increase in exports did prompt a slight appreciation of the real exchange rate to support exports which increased slightly by 0.031% and 0.129% in 2013 and 2018 respectively. Our findings are confirmed by the supporters of VAT who claim that VAT is progressive. Their theory indicates that consumers who spend more pay more VAT (Gordon and Li, 1997). In South Africa, VAT is understood as a tax on final consumption, because VAT paid on inputs to production is refunded. However in practice, the base of the VAT is much broader than final consumption, encompassing elements of production, investment and export. The size of the base on which VAT is ultimately levied depends on a number of factors, including legal exemptions, VAT registration rates, the size of the informal sector, and limitations on VAT

credit. Giesecke and Tran (2010) argue that Linkages between commodity specific exemptions and the capacity of industry to reclaim VAT on their inputs are not straightforward if industries exhibit multi-production, and if exemptions on a given commodity differ across users of that commodity. Yet these features of real world VAT systems are critical to correctly calculating the VAT revenue that South Africa can reasonably expect to collect from its VAT system as illustrated by our simulation results.

4.2 The terms of trade

According to World Bank (2003), using the terms of trade to determine the health of a country's economy can draw the wrong conclusions. Nonetheless, it is important to know why exports increase relative to imports, especially since the terms of trade are directly impacted by changes in export and import prices. Terms of trade measurement is often recorded in an index for economic monitoring.

The VAT shock indicates that there is a decrease in the terms of trade, which is the result of a fall in the price of exports. Nonetheless, the increase in VAT rate is offset by a number of factors that allow the price of exports to decrease. These factors include the price of land and the technological innovation that reduces the cost of production of some products. In this respect, the exports of primary factor products contribute significantly towards South Africa's aggregate exports. The fall in the prices of fixed factors of production, however, hold positive effects for the exports of some products that are not affected by the increase in VAT rate. Apart from the increase in exports, there is an increase in imports. For instance the results of our first simulation indicate that the increase in imports by 0.03% in 2013 and 0.12% in 2018 is the result of the increased economic activity.

Overall, the VAT shock results in a decrease in the price of intermediate goods, and, although there are economy-wide increases in the prices of the fixed factors of production, these increases are not enough to offset the intermediate price decreases. As a result the aggregate price of exports decreases. Because the nominal exchange rate is fixed by assumption, the price of exports decreases which results in an increase in aggregate exports.

4.3 GINI Coefficient

Table 2 reports the GINI coefficients from the simulation results. With regard to the welfare implications over the period between 2012 and 2018, the model results indicated a marginal increase in inequality. For instance in 2012, when the VAT rate was increased by 1% (sim1), the GINI coefficient was found to increase to 0.621 in 2018 from 0.619 in the baseline scenario. This is mainly due to the percentile income ratio between poor and rich households. The income percentile ratio of the poorest 20% to 50% of households increases by more than the income percentile ratio of the richest 50% to 90%. The decline in inequality however could be sustained only if South Africa' average incomes could converge and be kept under control. While Gini coefficient is a statistical measure of inequality, the constant increase noticed in all simulation results means that there was no systematic slower growth in inequality between the poor and rich households. Divergence started after the shock in 2013 and went on until 2018 where the distribution of income between poor and rich households deviated from a perfect equal distribution. Despite these marginal negative impacts inherent to the increasing of the VAT rate, the tax instrument generates a slight increase in revenue, as reported in Table 3.

Table 2: GINI Coefficient

VAT shock	Base (2010 R billion)	2013	2014	2015	2016	2017	2018
Base	0.62080	0.62089	0.62101	0.62117	0.62136	0.62159	0.62185
sim1 (1%)	0.61990	0.62002	0.62017	0.62036	0.62058	0.62083	0.62113
sim2 (2%)	0.61533	0.61591	0.61645	0.61697	0.61747	0.61798	0.61850
sim3 (3%)	0.61857	0.61881	0.61907	0.61934	0.61964	0.61996	0.62030
sim4 (4%)	0.61925	0.61944	0.61965	0.61988	0.62014	0.62044	0.62076
sim5 (5%)	0.61943	0.61960	0.61979	0.62001	0.62026	0.62054	0.62086

Source: Simulation results from the CGE model

4.4 Government income

Mazur (2006) argues that a higher level of income should be associated with higher VAT collection efficiency. He expects higher VAT performance in countries with a more stable political regime and highly regulated political participation (hence, more homogeneous societies with relatively fluid political participation), than less stable, more polarized political systems. A frequently cited advantage of the VAT is that this tax is collected throughout the production chain, giving it a practical advantage (World Bank, 2003). In particular, the VAT should be associated with easier enforcement, as it allows the fiscal authority to compare

reported sales of each intermediate product with reported purchases of producers using that intermediate product as an input in a vertical production chain. Table 3 reports the government income from the simulation results. The increase in the VAT rate benefits mostly the government; total government tax revenues rose over the period between 2013 and 2018 proportionally to the rise in net indirect tax during the first year of the shock. The immediate effect of the shocks indicated that total government tax revenues rose by about 10.8% (sim1) and 3.2% (sim5) respectively over the modelled period.

Table 3: Government income

	Base (2010 R billion)	sim1 (1%)	sim2 (2%)	sim3 (3%)	sim4 (4%)	sim5 (5%)
Base Year	697	0.04313	0.04314	0.0431	0.04311	0.04311
2013	707	0.04418	0.04416	0.04323	0.04385	0.04384
2014	717	0.04512	0.04508	0.04339	0.04453	0.0445
2015	726	0.04591	0.04586	0.04356	0.04513	0.04509
2016	735	0.04661	0.04653	0.04374	0.04565	0.04562
2017	743	0.04723	0.04714	0.04394	0.04613	0.04609
2018	751	0.04778	0.04767	0.04414	0.04656	0.04652

Source: Simulation results from the CGE model

4.5 Factor income

Table 4 reports the factor income by income categories. As defined in the closure, labour is everywhere in elastic supply at fixed real wages for the unskilled labour (primary and middle education), but the skilled labour (secondary and tertiary education) is fixed by assumption. The increase in employment represents an increase in labour in the production process. Usually a decline in capital stock will result in lower production and also lower demand for labour, which might impact negatively on the standard of living of all income groups. Nonetheless, our simulation results showed that labour demand increased slightly across all primary and middle factor incomes when the VAT rate was increased between 1% and 5% during the period between 2012 and 2018. The slight increase in the primary and middle educated labour represents an increase in the use of unskilled labour in the production process. Besides, the prices of capital and unskilled labour fall. Household income increases slightly as a result of an increase in the employment and real wages of unskilled labour.

Overall the change in VAT rate had a positive impact on most factor incomes for the modelling period.

Table 4: Factor income

Variables	Description	Base (2010 R billion)	2013	2014	2015	2016	2017	2018
			1212.651	1213.183	1213.936	1214.883	1216.002	1217.272
flab-p	Factor labour primary education	sim1	0.001554	0.004291	0.008054	0.012709	0.018140	0.024244
		sim2	0.001565	0.004309	0.008076	0.012733	0.018164	0.024267
		sim3	0.001390	0.003916	0.007435	0.011822	0.016969	0.022781
		sim4	0.001499	0.004165	0.007847	0.012414	0.017751	0.023760
		sim5	0.001496	0.004159	0.007837	0.012399	0.017733	0.023737
flab-m	Factor labour medium education	sim1	0.001143	0.003164	0.005960	0.009439	0.013521	0.018136
		sim2	0.001145	0.003167	0.005961	0.009438	0.013517	0.018129
		sim3	0.001018	0.002879	0.005489	0.008764	0.012629	0.017019
		sim4	0.001101	0.003068	0.005802	0.009213	0.013224	0.017766
		sim5	0.001099	0.003064	0.005795	0.009203	0.013211	0.017749
flab-s	Factor labour secondary education	sim1	0	0	0	0	0	0
		sim2	0	0	0	0	0	0
		sim3	0	0	0	0	0	0
		sim4	0	0	0	0	0	0
		sim5	0	0	0	0	0	0
flab-t	Factor labour tertiary education	sim1	0	0	0	0	0	0
		sim2	0	0	0	0	0	0
		sim3	0	0	0	0	0	0
		sim4	0	0	0	0	0	0
		sim5	0	0	0	0	0	0
Fcap	Factor capital	sim1	0.044667	0.087974	0.129896	0.170424	0.209560	0.247317
		sim2	0.087822	0.129681	0.170153	0.209238	0.246950	0.042078
		sim3	0.122894	0.161557	0.199032	0.235314	0.043778	0.086299
		sim4	0.167442	0.206041	0.243327	0.043742	0.086230	0.127430
		sim5	0.205899	0.243166	0.042350	0.083578	0.123638	0.162503

Source: Simulation results from the CGE model

4.6 Household consumption

Case (2013) points out that VAT is an indirect tax because the government receives the payment from the seller (the business) rather than the person who ultimately bears the economic burden of the tax (the consumer). In this respect, higher taxes should increase the prices of domestically produced and imported goods. This will reduce purchasing power and as a result lowers demand. In addition, weaker domestic demand, assuming no or a limited

switch to supplying foreign markets, will have a negative impact on production and hence employment and wages. This in turn has an effect on household saving and consumption. Table 5 reports the pattern of consumption by household categories. Our simulation results show that the lower income groups benefit the most from the policy shock. This is mainly due to the fact that most provisions used by the lower income groups are exempt from VAT. Giesecke and Tran (2010) argue that VAT exemptions have two opposing effects. On the one hand, they reduce the VAT final consumption and investment base, because households, government and investors do not have to pay VAT on exempt commodities. On the other hand, they expand the tax base on inputs to production, because producers of exempt goods can no longer claim VAT paid on inputs used to produce those goods. Nonetheless, any policy measures aimed at promoting economic growth, employment and the redistribution of income can consider an increase in VAT mostly in the short term. The impact of the change in VAT rate seems positive across household categories for the period between 2013 and 2018.

Table 5: Household consumption

		Base (2010 R billion)	2013	2014	2015	2016	2017	2018
POOR	sim1	272.60	0.03081	0.05990	0.08738	0.11328	0.13764	0.16053
	sim2	274.06	0.03021	0.05882	0.08578	0.11125	0.13519	0.15774
	sim3	273.06	0.02889	0.05632	0.08236	0.10701	0.13030	0.15235
	sim4	272.82	0.03009	0.05861	0.08559	0.11106	0.13507	0.15765
	sim5	272.76	0.03010	0.05862	0.08561	0.11105	0.13506	0.15768
hhd-0	sim1	27.06	0.02439	0.04730	0.06911	0.08943	0.10865	0.12639
	sim2	27.11	0.02398	0.04685	0.06824	0.08853	0.10771	0.12541
	sim3	27.02	0.02332	0.04515	0.06588	0.08549	0.10400	0.12139
	sim4	27.05	0.02403	0.04658	0.06802	0.08799	0.10684	0.12495
	sim5	27.04	0.02404	0.04660	0.06805	0.08839	0.10725	0.12500
hhd-1	sim1	47.10	0.02675	0.05223	0.07601	0.09830	0.11932	0.13907
	sim2	47.25	0.02646	0.05143	0.07492	0.09693	0.11788	0.13735
	sim3	47.11	0.02526	0.04903	0.07175	0.09319	0.11335	0.13246
	sim4	47.11	0.02632	0.05116	0.07451	0.09658	0.11738	0.13691
	sim5	47.11	0.02611	0.05094	0.07429	0.09637	0.11717	0.13670
hhd-2	sim1	56.83	0.02956	0.05736	0.08376	0.10857	0.13180	0.15379
	sim2	57.11	0.02907	0.05638	0.08230	0.10664	0.12957	0.15111
	sim3	56.91	0.02776	0.05412	0.07907	0.10262	0.12493	0.14602
	sim4	56.87	0.02884	0.05627	0.08212	0.10638	0.12942	0.15105
	sim5	56.86	0.02884	0.05628	0.08213	0.10640	0.12944	0.15090
hhd-3	sim1	64.90	0.03328	0.06487	0.09445	0.12250	0.14884	0.17381
	sim2	65.29	0.03262	0.06356	0.09266	0.12023	0.14612	0.17047
	sim3	65.05	0.03105	0.06072	0.08885	0.11545	0.14066	0.16449

	sim4	64.97	0.03248	0.06326	0.09250	0.12006	0.14591	0.17039
	sim5	64.95	0.03264	0.06343	0.09253	0.12009	0.14611	0.17059
hhd-4	sim1	76.71	0.03428	0.06688	0.09751	0.12645	0.15383	0.17951
	sim2	77.30	0.03351	0.06533	0.09534	0.12367	0.15032	0.17555
	sim3	76.97	0.03209	0.06262	0.09159	0.11901	0.14512	0.16968
	sim4	76.82	0.03359	0.06535	0.09542	0.12393	0.15074	0.17613
	sim5	76.80	0.03359	0.06536	0.09544	0.12383	0.15078	0.17617
NPOOR	sim1	1270.84	0.03423	0.06670	0.09752	0.12679	0.15461	0.18106
	sim2	1269.86	0.03426	0.06675	0.09759	0.12688	0.15472	0.18120
	sim3	1285.25	0.03117	0.06095	0.08941	0.11661	0.14259	0.16741
	sim4	1275.73	0.03312	0.06464	0.09463	0.12318	0.15036	0.17627
	sim5	1275.99	0.03307	0.06455	0.09450	0.12301	0.15017	0.17605
hhd-5	sim1	88.48	0.03402	0.06623	0.09675	0.12557	0.15280	0.17868
	sim2	88.56	0.03388	0.06594	0.09632	0.12511	0.15221	0.17796
	sim3	88.85	0.03163	0.06179	0.09060	0.11784	0.14384	0.16849
	sim4	88.61	0.03318	0.06467	0.09457	0.12290	0.14976	0.17515
	sim5	88.61	0.03318	0.06467	0.09457	0.12279	0.14964	0.17504
hhd-6	sim1	106.26	0.03407	0.06644	0.09693	0.12582	0.15312	0.17899
	sim2	106.69	0.03365	0.06552	0.09570	0.12419	0.15128	0.17677
	sim3	107.21	0.03134	0.06119	0.08954	0.11650	0.14224	0.16659
	sim4	106.60	0.03311	0.06454	0.09428	0.12251	0.14925	0.17458
	sim5	106.60	0.03302	0.06445	0.09418	0.12242	0.14916	0.17448
hhd-7	sim1	147.66	0.03440	0.06705	0.09793	0.12718	0.15488	0.18116
	sim2	148.78	0.03361	0.06547	0.09564	0.12428	0.15143	0.17717
	sim3	149.50	0.03130	0.06107	0.08950	0.11659	0.14241	0.16702
	sim4	148.34	0.03323	0.06478	0.09478	0.12323	0.15033	0.17595
	sim5	148.32	0.03324	0.06479	0.09473	0.12325	0.15028	0.17590
hhd-8	sim1	278.57	0.03640	0.07097	0.10385	0.13508	0.16481	0.19309
	sim2	282.31	0.03496	0.06822	0.09993	0.13007	0.15880	0.18614
	sim3	283.84	0.03245	0.06356	0.09333	0.12183	0.14910	0.17520
	sim4	280.53	0.03490	0.06816	0.09985	0.13008	0.15888	0.18640
	sim5	280.45	0.03487	0.06814	0.09984	0.13008	0.15889	0.18641
HHD-9	sim1	649.87	0.03330	0.06491	0.09493	0.12347	0.15065	0.17654
	sim2	643.51	0.03425	0.06671	0.09751	0.12677	0.15462	0.18116
	sim3	655.85	0.03049	0.05965	0.08752	0.11419	0.13971	0.16414
	sim4	651.65	0.03233	0.06310	0.09241	0.12034	0.14698	0.17241
	sim5	652.01	0.03225	0.06294	0.09218	0.12004	0.14664	0.17202
hhd-9-1	sim1	81.38	0.03772	0.07373	0.10801	0.14058	0.17166	0.20128
	sim2	82.60	0.03620	0.07070	0.10363	0.13499	0.16501	0.19358
	sim3	83.05	0.03371	0.06598	0.09693	0.12655	0.15497	0.18218
	sim4	82.00	0.03622	0.07073	0.10378	0.13524	0.16537	0.19415
	sim5	81.98	0.03611	0.07075	0.10368	0.13515	0.16528	0.19407
hhd-9-21	sim1	94.48	0.03768	0.07356	0.10775	0.14035	0.17146	0.20110
	sim2	95.21	0.03687	0.07205	0.10556	0.13749	0.16794	0.19714
	sim3	96.18	0.03379	0.06623	0.09732	0.12716	0.15575	0.18330

	sim4	95.09	0.03628	0.07088	0.10390	0.13545	0.16574	0.19455
	sim5	95.09	0.03618	0.07078	0.10380	0.13535	0.16553	0.19445
hhd-9-22	sim1	113.67	0.03730	0.07284	0.10671	0.13900	0.16979	0.19917
	sim2	114.09	0.03681	0.07196	0.10553	0.13744	0.16803	0.19721
	sim3	115.38	0.03371	0.06604	0.09707	0.12689	0.15549	0.18287
	sim4	114.28	0.03588	0.07027	0.10308	0.13449	0.16451	0.19330
	sim5	114.28	0.03596	0.07027	0.10308	0.13441	0.16442	0.19321
hhd-9-23	sim1	136.98	0.03249	0.06322	0.09242	0.12009	0.14652	0.17156
	sim2	135.84	0.03327	0.06471	0.09452	0.12279	0.14973	0.17535
	sim3	138.66	0.02942	0.05755	0.08438	0.10998	0.13450	0.15801
	sim4	137.51	0.03142	0.06123	0.08959	0.11657	0.14239	0.16690
	sim5	137.58	0.03133	0.06106	0.08940	0.11637	0.14210	0.16659
hhd-9-24	sim1	223.35	0.02834	0.05507	0.08032	0.10432	0.12707	0.14869
	sim2	215.78	0.03156	0.06127	0.08926	0.11567	0.14075	0.16447
	sim3	222.57	0.02691	0.05252	0.07687	0.10006	0.12216	0.14328
	sim4	222.77	0.02797	0.05445	0.07959	0.10338	0.12605	0.14760
	sim5	223.08	0.02784	0.05415	0.07916	0.10288	0.12543	0.14685
ALLHHD	sim1	1543.43	0.03363	0.06551	0.09573	0.12440	0.15161	0.17744
	sim2	1543.92	0.03354	0.06533	0.09549	0.12410	0.15126	0.17704
	sim3	1558.31	0.03076	0.06014	0.08818	0.11493	0.14043	0.16477
	sim4	1548.54	0.03260	0.06358	0.09304	0.12105	0.14767	0.17300
	sim5	1548.75	0.03255	0.06350	0.09293	0.12090	0.14751	0.17282

Source: Simulation results from the CGE model

5 Conclusion and suggestion for further research

The major concern for South African policy makers is the high level of unemployment that persists in the economy. There is thus a vital need for policies that could stimulate employment growth. There is a widely held view that a decrease in unemployment should also address the skew income distribution that characterises the South African economy. Any policy that would address these issues would undoubtedly be welcomed by the policy makers. Nonetheless, there was an expectation that the percentage of VAT would increase because of the slow economic downturn. This did not occur and the last percentage increase in VAT was in April 1993, when VAT increased from 10% to 14%. Given these issues, the purpose of this study was to determine whether policy makers in South Africa could increase the VAT rate without aggravating the problem of unemployment and the skew welfare distribution. The literature pertaining to the VAT motivated the possibility of achieving this result.

Because the achievement of increasing the VAT rate could hold significant political consequences for policy makers, the attainment of change in VAT rate was tested through the

usage of a Computable General Equilibrium technique. The dynamic CGE model of the National Treasury was used to perform this study. Five simulations were carried out to assess the impacts of changes in the VAT rate. We adopted a balanced investment closure in which investment as a share of absorption remained constant to allow it to change with absorption. The increase in the VAT rate resulted in a marginal increase in the GDP for the period between 2013 and 2018. GDP increases by 0.022% and 0.115% in 2013 and 2018 respectively are seen from the first simulation results. The increase in VAT rate also resulted in a slight increase in the government revenue, which could be used for the redistribution and alleviation of poverty. Although these results hold important consequences for policy makers, it should also be interesting to determine if this attractive source of revenue for the government could be used to fund a labour subsidy for unskilled labour.

While the standard of living of both the middle and high-income households improved, the low income households benefited mostly from the increase in government revenue, which is likely due to government transfers in the form of social services. In addition, most necessities used by the lower income households are exempt from VAT. The immediate effect of the shocks indicated that total government tax revenues rose by about 10.8% (sim1) and 3.2% (sim5) respectively over the modelled period. Therefore, any policy measures aimed at stimulating economic growth, employment and redistribution of income can consider an increase in VAT. Our simulation results are in line with the findings of Kearney and Van Heerden (2003). Evaluating the trade-offs between a VAT and other taxes remains a topic worthy of future research.

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