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Contribution of VAT to economic growth: A dynamic CGE analysis

Abstract

Aim/purpose – This study sought to assess the impact of an increased historical fixed VAT rate of 14% to the current rate of 15% on the South African economy.

Design/methodology/approach – The method applied in this study was based on a Dynamic Computable General Equilibrium (CGE) model to evaluate the impact of both the VAT rate of 14% and a new rate of 15% on the South African economy. The CGE model has been proven over the years to be a suitable model when evaluating the impact assessment of any shock within an economy. Enhancements were made by the researcher to the direct and indirect tax section of the model, i.e., the direct tax section was disaggregated, such that for both firm and household revenues, a dividend income stream is separated from other income streams. The main reason is to facilitate a detailed analysis of Corporate Income Tax (CIT) and Personal Income Tax (PIT), as well as the latest implemented Dividend Tax (DT).

Findings – When VAT was increased from 14% to 15%, the immediate reaction of the shock from the Dynamic CGE model indicates that the Gross Domestic Product (GDP) declined by 0.0002% in 2018, but increased by 0.0028% in the following year (2019). The trend continued until 2021, hence the 1% increase in the VAT tax rate will increase the expected forecast of VAT collection by approximately R3.2 billion on average.

Research implications/limitations – The findings of this study will be implemented by the South African government, which will use a dynamic CGE model to assess South Africa's VAT contribution to the economy. The database of the CGE model was limited to the Social Accounting Matrix (SAM) for 2015.

Originality/value/contribution – The study recommends the use of this method for assessing the impact of tax policy changes to the South African economy. The CGE model seems to be the best model as far as the impact assessment of a shock in the economy is concerned. This will assist the South African authorities with their decision making regarding future VAT revenue.

1. Introduction

Value Added Tax (VAT) was initiated for the first time when it was implemented in France in 1948. Most countries followed suit as it contributed the largest portion of the revenue collected by governments (Gordon & Nielsen, 1997). VAT is considered a consumption tax due to the fact that the consumer carries the cost of any sales tax when purchasing goods and services. It is seen as an efficient tax that reduces the possible consequences of taxes on intermediate inputs. In contrast with single-stage indirect taxes, which influence a fix in place between a purchaser's and supplier's prices of goods, VAT takes into account the process of the production supply chain (Cevik, Gottschalk, Hutton, Jaramillo, Karnane, & Sow, 2019).

VAT adheres to the principles of a good tax given that it is transparent, and easy to collect. In addition, VAT is an efficient tax as it is generated during the process of production and allocation sequence. VAT is therefore efficient at raising tax revenue and effective as it creates less distortion in the economy. The tax rate plays an important role in determining the proficiency cost of taxes which may have a significant impact on relative prices. Case (2013) pointed out that when the tax rate is adjusted upward, the collected tax revenue could possibly shrink because of the tax rate effect. It is beneficial to maintain a standard rate on a wide-ranging base for the simple reason of maximizing tax revenue. In this respect, the consumer will not change their behavior toward paying sales taxes due to the fact that the consumer does not have this choice.

The Organization for Economic Cooperation and Development (OECD) pointed out that the general application of VAT procedures depends on the following components (OECD, 2017):
– the fundamental characteristics of the tax, such as tariffs, levels, and exemptions,
– the willingness to comply by taxpayers,
– the capability of the leadership to generate more revenue for the government.

VAT is obtained from the amount used to acquire goods or services. Between 1993 and 2018, South Africa's VAT rate remained fixed at 14%, which was lower compared to all other countries (National Treasury, 2018). However, the Minister of Finance, Mulusi Gigaba, revised the VAT rate upwards by 1 percentage point to 15% during his parliamentary budget speech on February 21, 2018. He declared it to be effective from April 1, 2018 as one of the tax proposals designed to generate more tax revenue for the South African Revenue Service's (SARS) in the 2018/19 fiscal year. Nonetheless, basic foodstuffs, such as rice and brown bread, which are consumed by the majority of the population remained zero rated to reduce the shock on the most vulnerable and poorest households (National Treasury, 2018).

The main collector of tax revenue is the government through its agent SARS. The largest portion of the revenue derives from VAT, Company Income Tax (CIT), Personal Income Tax (PIT), gambling taxes, property rates, and automobile licenses. In fact, VAT is imposed on every import of goods and services provided in the country because VAT structure is destination-based (Erero, 2015).

The last few years have seen revenue collection on a lower trajectory, attaining a Compound Annual Growth Rate (CAGR) of just 7.8%, well below the CAGR of 15.6% achieved between 2003/04 and 2008/09. VAT as a percentage of GDP has fluctuated between 5.8% and 6.8% at an average rate of 6.4% since the financial meltdown in 2008. Recently, VAT in South Africa yielded R298 billion in 2017/18, close to 24.5% of total tax revenue, which drastically reduced the expected revenue because it was less than in the previous year (SARS, 2019).

Tax revenue collected in 2017/18 was approximately R1,216.5 billion with an increase of R72.4 billion for that fiscal year. The contribution of PIT was substantial with R38.1 billion increase year-on-year, albeit at a lower rate than in previous years. While continuing tough economic conditions saw a small increase in real GDP growth from 1.0% in 2016/17 to 1.4%, the tax-to-GDP ratio declined from 26% in 2015/16 and 2016/17 to 25% in 2017/18. VAT is an essential and stable source of revenue and the second most important contributor to total tax revenue (SARS, 2019).

South African tax revenue collections have remained buoyant since the 2008/09 financial crisis despite tough economic conditions. However, the VAT buoyancy ratio that evaluates the accuracy of VAT generations for a change in the primary economic tax base (GDP) improved to an average ratio of 0.92 for the period 2008/09 to 2014/15, but thereafter declined to attain an average ratio of 0.66. This lower buoyancy ratio is mainly due to the incapacity of collecting

the targeted tax revenue and shedding of jobs in manufacturing sector. The annual total tax revenue buoyancy recovered from −0.71 in 2009/10, before subsiding to 0.91 in 2017/18 (SARS, 2019).

The big question is that when South Africa's VAT rate increased from 14% to 15% in the 2018/19 fiscal year for the very first time since 1993, what could be the impact of this scenario on the economy and what could be the reaction of the economy to the collection of VAT? The best tool to be used for addressing this question is a Computable General Equilibrium (CGE) model, which has been used extensively by academics and researchers to solve policy issues (Dixon, Parmenter, Sutton, & Vincent,1982; Horridge, 2005; Erero, 2015). The CGE model has been proven over the years to be a suitable model when evaluating the impact assessment of any shock within an economy (Dixon et al., 1982).

The objective of this paper is to assess the result of an adjustment in VAT from 14% to 15% on the South African economy through the application of a dynamic CGE model.

Section 2 sets out a literature review relevant to VAT, Section 3 describes the methodology applied, Section 4 analyzes the simulation results, while Section 5 concludes the paper.

2. Literature review

2.1. Economic growth

Chiricu (2019) analyzed the economic impact of VAT on the economic growth in Southern Europe using an econometric technique. The data used were for the years between 1996 and 2017. The findings of the empirical study indicated a positive impact of VAT on economic growth. The expenditure of the government reflects a statistically significant decline, which points to the wasteful and fruitless use of public expenses. In addition, the economic impact of VAT indicated a shrinking effect on the disposable income of the consumers.

Asogwa & Nkolika (2013) assessed the impact of VAT on economic and human development of Nigeria from 2001 to 2009. They conducted a survey and also considered data from the country's tax administration offices. On the one hand, they found that the results from the secondary data revealed meaningful VAT impact on economic and human development of Nigeria, while on the other, data acquired from primary sources showed marginal VAT impacts.

Ebeke & Ehrhart (2011) examined whether or not the adoption of VAT in industrialized countries is the best option for maximizing tax revenues. Using a considerable panel of 103 industrialized countries, which were monitored from 1980 to 2008, they found strong evidence that the impact of VAT creates less tax revenue volatility. Consequently, countries with VAT undergo 40-50% less tax revenue volatility than countries which do not. These impacts depend mostly on the level of economic growth and the intensity of trade of each country.

Emmanuel (2013) investigated the effects of VAT on economic growth (GDP) of Nigeria using time series data from 1994 to 2010, and found that a 1% rise in VAT revenue could stimulate a 1.47% rise in GDP.

According to Bankman & Schuler (2007), some countries have stimulated investment by decreasing VAT rates, while other countries prefer to increase their VAT rate in order to boost revenues for the purpose of covering the cost of government's expenditure. A correct tax policy and its implementation seems to be a real challenge. Every government has the obligation to establish a solid tax system and strict compliance for all taxpayers. In this respect, an evaluation of the changes in VAT rates, coupled with the reinforcement of tax compliance, should be achieved.

2.2. CGE model

The very simple definition of CGE will be the one given by Dixon et al. (1982), who defines CGE as nothing more than a general equilibrium model that can be used to perform quantitative analysis of economic policy problems. A CGE model therefore needs apart from the theoretical structure provided by a general equilibrium model, some data concerning the economy of interest. Once the general equilibrium model and data have been integrated, an actual solution method needs to be determined in order to solve the equilibrium prices and decision variables in the equilibrium system (Dixon et al., 1982).

CGE models are predominantly convenient for answering 'what if' questions as they have become pillars for policy analysis (Rossouw & Krugell, 2004). What if the rate of productivity increased in the agriculture sector? What if there was a drop in foreign demand for exports? What if there was taxation on emissions? Equilibrium models, households, firms and markets are generally synthesized into a model of the equilibrium of the economy as a whole. These are similar to computable general equilibrium models but specified for many households, sectors and factors that are based on economic data usually pro-

duced by the Statistics Agencies. Scores of simultaneous equations use a large database of matrices. Events within one sector of the economy are led by the CGE analysis, which indicates that they will have knock-on impacts on the other sectors of the economy. Considerable feedback effects on the original sector may arise due to the impact on the other sectors. In effect, the impact of a policy change or specific event on all parts of the economy is captured by general equilibrium analysis by incorporating feedback from all those, while recognizing economy-wide constraints. The advantage of using CGE models is simply on quantifying and analyzing the interactions between a number of agents in the economy.

2.3. Overview of the South African VAT

Recently, SARS introduced a 'near real-time VAT collection system' to ensure a better pioneering and active tax collection setting. SARS launched 'Making Tax Digital' in April 2018 for VAT-registered companies with turnover higher than the VAT threshold, compelling them to maintain digital records and submit their VAT return using electronic filing system. At the time of writing, in 2020, over 400,000 companies have affiliated the service. SARS expects this service to minimize tax lost due to preventable errors by safeguarding companies against committing less mistakes. SARS is progressing in building a healthy tax system by reforming the institution around customer needs rather than the individual taxes they pay. The ambition of SARS is to become one of the world's greatest digital tax authorities (SARS, 2019).

Erero (2015) pointed out that the performance of VAT depends on the rate of inflation and real changes in consumption expenditure, which in turn is sensitive to changes in wage income, consumers' debt levels, the fiscal space of government, interest rates, and confidence in the economy. When analyzing VAT, it is important to distinguish between the components thereof, namely domestic VAT, VAT on imports and VAT refunds, due to the variation in the revenue drivers. Domestic VAT represents close to 70% of the gross VAT collected, while VAT refunds to vendors are close to 80% of total tax refunds. Figure 1, which highlights the composition of domestic VAT payments for the period between the 2014/15 and 2018/19 fiscal years, shows that there has been a constant increase in the net VAT payments over the assessed period.

Figure 1. Composition of domestic VAT payments (output/ input) (2015/16–2018/19)
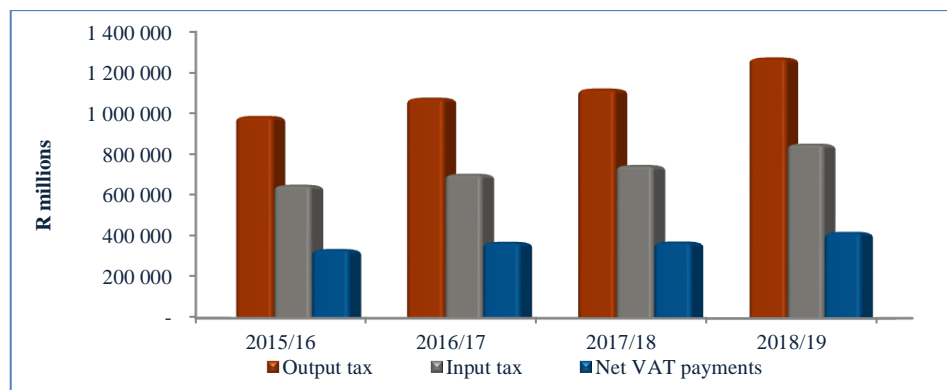
Source: SARS (2019).

In South Africa, VAT provides the biggest portion of revenue, with a share of 70.6% in 2018/19. Previously, VAT was imposed at a flat rate of 14% on goods and services. Nonetheless, certain services – mostly non-fee based financial services, educational services and passenger transport – are exempt from VAT. As indicated earlier, South Africa's VAT structure is broad-based, with moderately limited elementary goods being zero-rated to grant relief to low income households. Figure 1 indicates that more output taxes were paid and the amounts of these increased constantly from the fiscal year of 2015/16 to 2018/19, growing from R98 million to R1,319 million. The same trend is observed for input tax. Firms engaged in international markets benefit the most because the non-taxation of exports is in line with the nature of the tax and all associated input VAT can be reimbursed by SARS as an input credit (SARS, 2019). Table 1 depicts the payment made from domestic VAT by sector during the fiscal years between 2013/14 and 2018/19.

Table 1. Domestic VAT payments by sector (2013/14–2018/2019)

Economic activity	Number of vendors	R millions per Fiscal Year					
		2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Primary sector	35,189	16,941	18,221	19,179	21,190	21,593	23,830
Secondary sector	33,506	48,463	51,657	53,799	57,736	59,465	64,780
Tertiary sector	155,524	138,706	151,398	157,472	168,887	175,842	190,811
Total	224,219	204,110	221,277	230,450	247,814	256,901	279,421
Percentage of total:							
Primary sector	15.7%	8.3%	8.2%	8.3%	8.6%	8.4%	8.5%
Secondary sector	14.9%	23.7%	23.3%	23.3%	23.3%	23.1%	23.2%
Tertiary sector	69.4%	68.0%	68.4%	68.3%	68.2%	68.4%	68.3%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: SARS (2019).

Table 1 indicates that the sector with the highest contribution to VAT payments in 2018/19 included the tertiary sector with 68.3%, followed by the secondary sector (23.2%) and primary sector (8.5%). The contribution of the aggregated sectors into the domestic VAT payment is included in Figure 2.

Figure 2. Domestic VAT payments by economic activity (2018/2019)
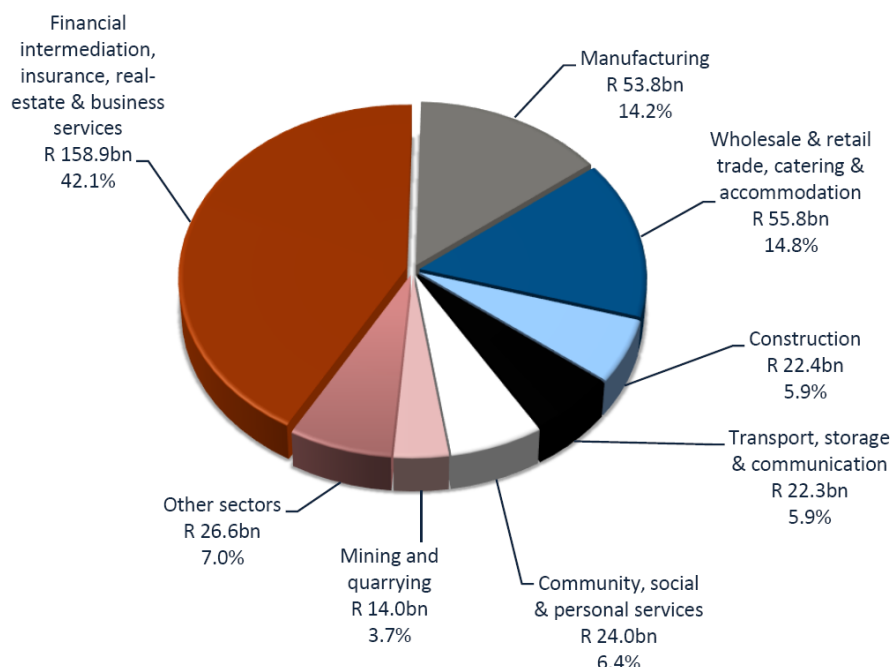
Source: SARS (2019).

Figure 2 indicates that the mining and quarrying industry from the primary sector had the lowest number of active vendors at only 0.7% in 2018/19, and contributed R14 billion (3.7%) of the total domestic VAT payments during the period. However, these vendors received the largest proportion of VAT refunds, namely R39.8 billion (20.9%). The mining and quarrying industry pays less VAT because of the enormous bulk of zero-rated mineral exports. Nonetheless, the highest contributor of domestic VAT payments remains financial intermediation, insurance, real estate and business services at R158.9 billion (42.1%) (SARS, 2019). Figure 3 indicates the major sources of tax revenue as a percentage of GDP between the fiscal year of 1994/95 to 2017/18.

Figure 3. Major revenue sources as a percentage of GDP (1994/95–2018/19)
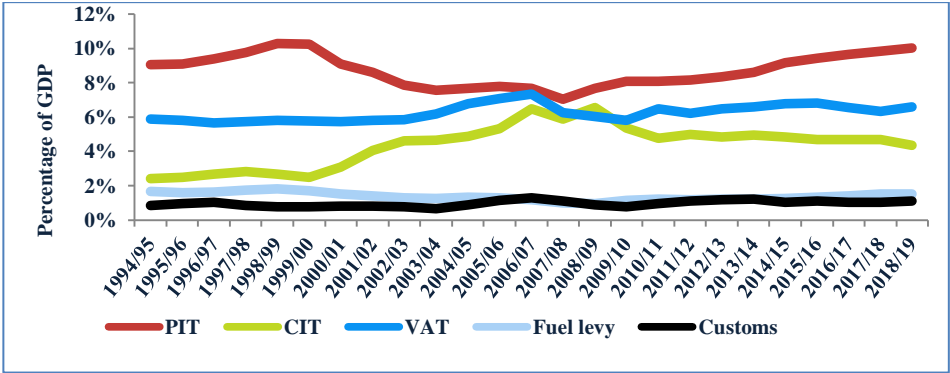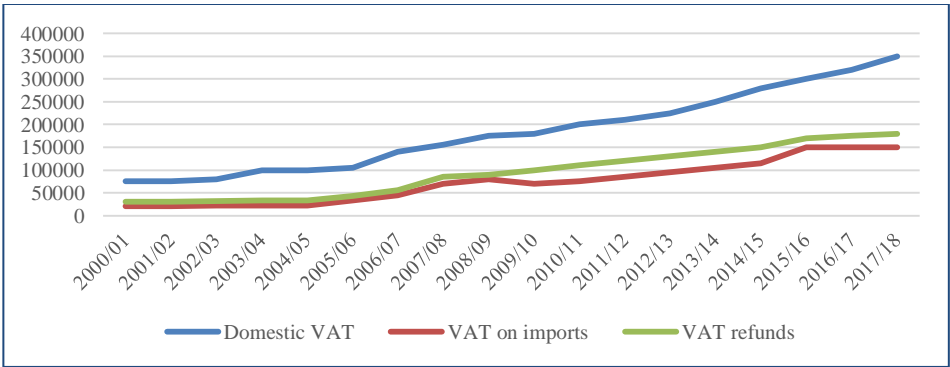

Source: SARS (2019).

Figure 3 depicts a consistent year-on-year (y/y) growth in VAT between 1994/95 and 2006/07, before a sudden drop in 2007/08 because of the world financial crisis. Since then it was noticed that VAT remained constant until 2018/19. In addition, year-on-year growth in CIT is known to exhibit volatile behavior, even in relation to its approximated tax base and net operating surplus. CIT collections as a percentage of GDP dropped marginally from 4.8% in 2012/13 to remain constant at 4.7% for the past four fiscal years (2015/16–2018/19). The volatility in commodity prices, the instability of the exchange rate and the downgrading of the rating of the economy had an adverse impact on CIT collections (SARS, 2019).

It is important for analysis purposes to distinguish between various types of VAT, namely domestic VAT, VAT on imports and VAT refunds, due to the variation in the revenue drivers for each of these components. Figure 4 depicts the components of the VAT system in Rand million during the fiscal year of 2000/01 to 2017/18.

Figure 4. Components of the VAT system in Rand million since 2000/01
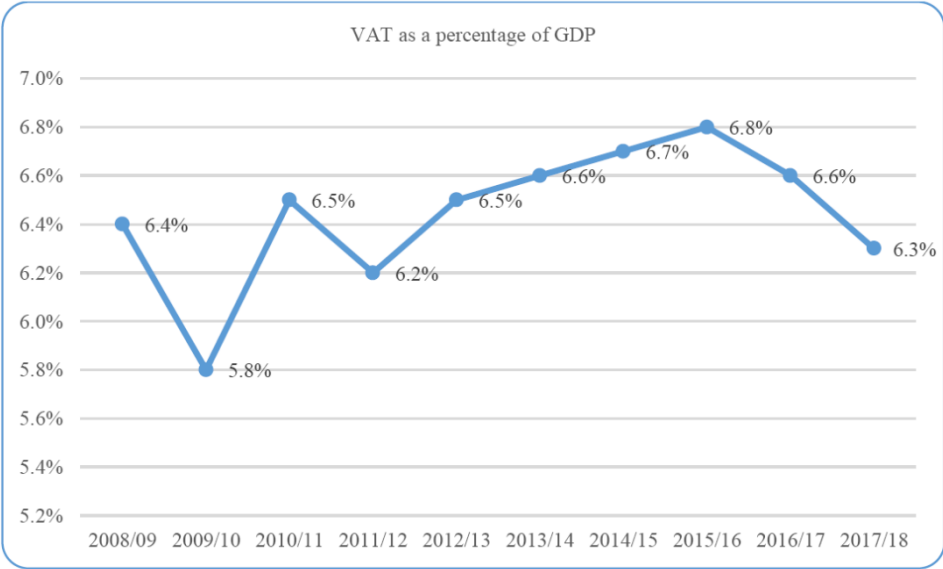

Source: SARS (2018).

As per Figure 4, domestic VAT is dependent on the sales of standard goods and services in the domestic economy, while VAT on imports is dependent on the customs value of imports. A VAT refund is a function of the value of exports and investment in the economy. Domestic VAT tends to be more stable and represents close to 70% of the gross VAT collected in the economy. Consequently, in South Africa, VAT refunds to VAT vendors are close to 80% of total tax refunds, with the remaining being mainly income tax refunds. Figure 4 indicates that more revenues were collected from the domestic VAT over the period between 2000/01 and 2017/18. Figure 5 depicts the VAT performance as a percentage of GDP and tax revenue buoyancy between the fiscal years 2008/09 and 2017/18.

Figure 5a indicates that VAT as a percentage of GDP has varied since the financial crisis in 2008/09, moving between 5.8% and 6.8% at an average rate of 6.4%. The performance of nominal domestic VAT collections is dependent on inflation and real changes in private and government consumption expenditure. In turn, consumption expenditure is sensitive to, i.a., changes in wage income, debt levels of consumers, fiscal space of government, interest rates, and confidence in the economy. A more stable inflation environment, coupled with high consumer debt levels and a strain on higher employment levels and wage increases, hampered the growth in domestic VAT from 2015/16, when a decline in the average buoyancy rate to 0.8 from the 0.9 recorded for the period of 2008/09 to 2014/15 was recorded.

Figure 5b shows a depiction of the VAT buoyancy ratio together with the elasticity line, indicating a decreasing trend. In simplistic terms, tax buoyancy can be defined as the ratio of the percentage change in tax revenue to the percentage change in GDP. Buoyancy is an important economic indicator, assisting the government to assess the effectiveness of its tax system. The VAT buoyancy ratio was at a record high of 0.92 between 2008/09 and 2014/15, before showing a sharp decline of 0.66 in 2015/16, possibly due to the threat of economic recession experienced during the two consecutive quarters' drop in GDP in 2015/16. Another explanation could be that the rate of growth of taxes collected was slower than the rate of growth of GDP. Nonetheless, tax elasticity (blue line) shows a sharp decline in 2009/10 due to financial crisis. This was calculated to determine the volatility of the tax revenues with regards to GDP. The measure gives an idea of how the growth of tax revenues can be measured against the growth of GDP over time.

Figure 5. VAT as percentage of GDP and tax revenue buoyancy (1994/95–2018/19)

a)

b)
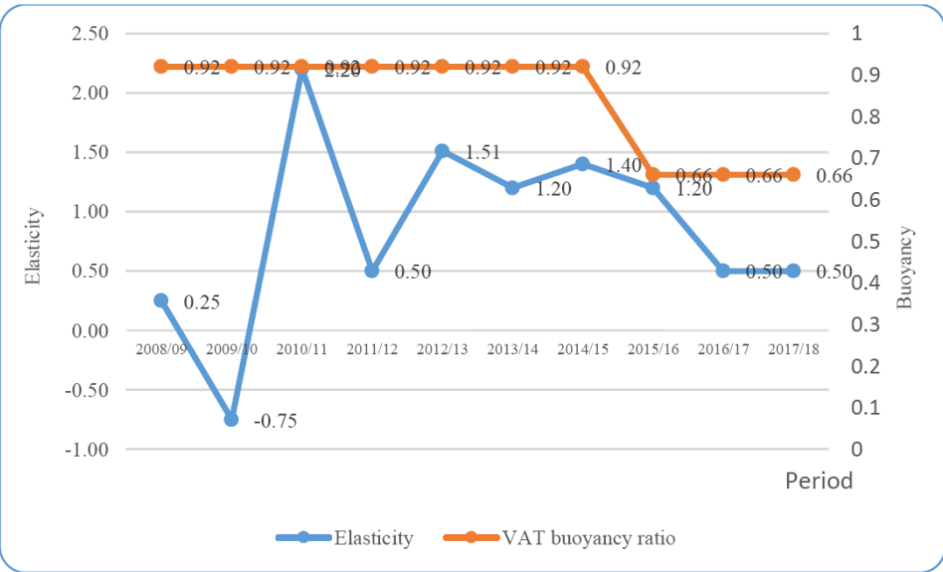
Source: SARS (2019).

VAT on imports is driven by the customs value of imports, which is a function of the exchange value of the currency and the import intensity level of the economy. The VAT on imports recovered after the financial crisis and stabilized at around 3.3% of GDP in 2017/18. The average buoyancy ratio for VAT on imports after the financial crisis was 1.2, much less than the 1.4 average attained during the commodity boom period in the mid-2000s. This is indicative of a decline in the propensity rate to import for South Africa (SARS, 2019).

VAT refunds are dependent on the performance of exports, the magnitude of zero-rated sales, and investment levels in the economy. VAT refunds as a percentage of GDP stabilized around 4% after the financial crisis in 2008/09. Between 2010 and 2015, the buoyancy ratio for VAT refunds was volatile and varied between 0.5 and 2.9, with an average ratio of 0.84. This ratio was mainly due to the lower real domestic growth in GDP over this period, as well as tax administrative measures introduced to curb VAT refund fraud.

Gemmell & Hasseldine (2012) pointed out that every country faces tax gap challenges, and South Africa is not different. SARS, with the collaboration of the Department of Finance, instated the Davis Tax Committee for the purpose of improving the collection of tax revenue. The Committee (2018, p. 3) defined the VAT tax gap as a discrepancy in the tax revenue that should be collected as stipulated by the VAT regulations and the amount of actual VAT generated. The size of the VAT gap was described by the European Commission as a key element determining the efficacy of VAT implementation and compliance procedures (OECD, 2017). The main reason for the tax gap in South Africa is revenue losses due to practices of fraud and tax evasion.

The International Monetary Fund [IMF] (2015) studied the VAT gap in South Africa and pointed out that the essential gap factors should include the VAT policy gap, compliance gap, valuation and collection gap, and the c-efficiency factor. The following results were obtained:

- The policy gap portrays the effectiveness of the VAT policy system when considering the possible revenue as a result of the existing policy structure. The VAT Policy gap in South Africa varies between 27% and 33%, while the average for European states is around 41%. In fact, the VAT policy gap in South Africa is at a minimal level when compared with the international best practices, due to the country's VAT policy system of a broad base with relatively limited zero-rated items and exemptions, and one standard VAT rate.
- In South Africa, the assessed compliance gap for VAT is around 5% and 10% from the prospective VAT revenues.

- Valuation and collection gap is the disparity reflected between the actual VAT generated and the entire amount of VAT stated, whereas the valuation gap is the difference between the amount of VAT stated and the possible amount of VAT to be collected. A gradual increase in the collection of tax gap can stimulate taxpayer to tax compliance.
- The c-efficiency factor constitutes an important element of the productivity of the VAT amount collected. It represents the ratio of actual VAT collected against the total amount of VAT that should be collected if the tax law was enforced accordingly. The latest study indicates that in South Africa the average c-efficiency ratio is approximately 64%, which is quite high (IMF, 2015). Table 2 includes the change in the c-efficiency ratio.

Table 2. Change in the c-efficiency ratio

Data	Turnover (R million)	Payments (R million)	c-efficiency Factor
2009/10	7,093,057	195,585	0.197
2010/11	7,567,219	205,512	0.194
2011/12	8,642,769	219,838	0.182
2012/13	9,423,538	242,356	0.184
2013/14	10,318,338	262,575	0.182
2014/15	11,192,846	285,485	0.182
2015/16	11,700,998	296,348	0.181
2016/17	12,613,531	320,759	0.182
2017/18	13,308,025	336,964	0.181
2018/19	13,698,161	377,675	0.184
Average			**0.185**

Source: SARS (2019).

Table 2 indicates that the average c-efficiency factor is 18.5% in South Africa, which is low when compared to the findings of IMF (2015). The significant difference between the two results could be due to the discrepancies in the data provided to the IMF because SARS is the main data service provider in South Africa. Turnover represents the profit made by various firms during a specific year and payments consist of VAT paid to SARS. The introduction of VAT or an increase in the VAT rate has a fiscal impact on the economic growth and the welfare of population.

2.4. Fiscal impact

The VAT rate increase in South Africa resulted in more revenue as well as a more stable tax revenue system, as VAT is a broad-based tax and VAT revenues tend to be more stable than income taxes, for example, during the upward and downward phases of business cycles. When the economy is expanding, income taxes, especially corporate income taxes, tend to increase at a higher percentage whereby the government collects higher tax revenues. The opposite holds true when the economy is contracting and the government collects less tax revenue. This is defined as the stabilization impact of taxation (Thackray, 2013).

According to the IMF (2015), the VAT efficiency ratio was 27% in Sub-Saharan Africa, 35% in Asia and Pacific, 37% in Americas, 38% in the European Union and 37% in North Africa and Middle East. For instance, if 40% of the GDP was not taxable due to exemptions, the average VAT efficiency would work out to be around 32%, which is lower than international standards.

2.5. Economic impact

Pushing up the VAT rate directly affects prices, given the increase in the VAT inclusive selling price of goods and services. However, this is a once-off level increase in prices. In real terms, there is an adverse effect on the economy as resources extracted from the private sector are transferred to the government to be spent on goods and services. This is due to the higher economic multiplier effect of private spending versus government spending. Industries focused on international markets are more positively impacted as exports are zero-rated and all related input VAT can be claimed as an input credit.

According to Gordon & Nielsen (1997), a considerable factor for evaluating the revenue performance of VAT is the Gross Compliance Ratio or Gross Collection Ratio (GCR). GCR is the ratio of actual VAT collection to potential VAT Collection. In fact, the potential VAT collection is the collection of VAT when there is no tax evasion and maximum compliance. The worldwide benchmark estimate for GCR was 69% for industrial nations and, for Central America, the GCR value was 46% in 2015 (IMF, 2015). Consequently, the GCR value for South Africa is low, as the average ratio was approximately 21% during the period.

2.6. Welfare impact

VAT is a proportional tax – a standard rate is applied to a broad base with few or no zero-rated or exempted sales. In terms of expenditure, VAT is defined as being mildly regressive due to the poor and lower income households' spending a big portion of their earnings on goods and services relative to high-income households, which set aside more of their earnings. However, in absolute terms the wealthy contribute more VAT.

The Davis Tax Committee (2018, p. 37) studied the impact of VAT on the South African economy and welfare of the citizens and found that the Real GDP is to decline by −0.65 percentage points, with household expenditure decreasing by −1.83 percentage points and inequality increasing by 0.013 percentage points. The South African VAT system is a good example of a modern VAT system, with relatively few exemptions, zero-ratings, and exclusions.

3. Methodology

A Dynamic Computable General Equilibrium (CGE) modelling approach was used to examine the impact of a 1% increase in VAT in an economy-wide framework for South Africa. The modelling framework is a dynamic CGE model that was originally developed by Alton et al. (2012). In an attempt to assess the shock of the VAT increase, the structure of the CGE equations was adjusted according to the available data used in the database of the CGE model. The Social Accounting Matrix (SAM) is a widespread structure for depicting CGE data--bases. Data used to build up the SAM were taken from the Supply and Use Tables produced by Statistics South Africa (Stats SA) for 2010. Besides the data from Stats SA, trade and taxes data were provided by SARS, while the South Africa Reserve Bank (SARB) supplied data regarding government and investment. SAM includes 14 household categories and four factor labors (factor labor with primary education, factor labor with medium education, factor labor with secondary education, and factor labor with tertiary education). Some of the particularities of SAM are that both rows and columns relate to a specific economic agent, whereas every cell in the SAM displays the actual amount of certain operation. In every row and column there is a total amount of the income and expenditure used. The classical structure of the model indicates that a Dynamic CGE model takes into account a multitude of variables. In this respect, we will describe few variables related to VAT below.

3.1. Revenue and VAT

The household plays a big role in the contribution of VAT because the largest amount of VAT collected emanates from consumer tax paid by households. VAT was adopted in South Africa in 1991 at a rate of 10%. In 1993, the rate was adjusted upward to 14%, but included additional zero-rated products for the purpose of providing tax relief to the underprivileged. In April 2019, VAT was increased from 14% to 15% after 25 years of a stable rate. The main source of income from household is labor and capital provided. Equation 3.1 represents the household income.

$$Y_h(i) = Y_{PRIM}(i) + Y_{SEC}(i) + Y_{TERT}(i) + Y_{CAP}(i) \tag{3.1}$$

where $Y_h(i)$ symbolizes the total household income, which is composed of income obtained from the labor rendered by the primary ($Y_{PRIM}(i)$), secondary ($Y_{SEC}(i)$) and tertiary ($Y_{TERT}(i)$) sectors. $Y_{CAP}(i)$ is the income received from the capital.

Usually, a government collects its revenue from different taxes, such as import tariffs, excise tax, PIT, VAT, and CIT. The scientific illustration of the government revenue can be portrayed in the following equation:

$$GR = TARIFF + VAT + HHTAX - EXPSUB \tag{3.2}$$

while TARIFF symbolizes import tariffs, VAT stands for value added tax, HHTAX represents household tax, and EXPSUB symbolizes export subsidies.

$$TARIFF = \sum_i p_{wm}(i) * M(i) * t_m(i)\, EXR \tag{3.3}$$

$$VAT = \sum_i (p_q(i) * Q(i) - p_q(i) * INT(i)) * t_{VAT}(i) \tag{3.4}$$

$$HHTAX = \sum_h \sum_i Y_h(i)\, t_h(i) \tag{3.5}$$

$$EXPSUB = \sum_i p_{we}(i) * E(i) * t_e(i) * EXR \tag{3.6}$$

while p_{wm} (i) and p_{we} (i) represent the world price of imports and exports from industry i, respectively, M(i) and E(i) are the imports and exports, respectively, and t_m (i) and t_e (i) are the rates of import and export tariffs, respectively. EXR is the exchange rate, p_q (i) represents the price of composite goods, Q(i) is the quantity produced by the industry i, INT (i) consists of the aggregate intermediate input coefficient, t_h (i) household tax, and t_{VAT} (i) represents the tax rate of the VAT.

3.2. Production factors

Household contributes to the production by providing labor and capital. Equation 3.7 illustrates the labor supply (LS):

$$LS = ls * \left(\frac{W}{w}\right)^{\wedge \varepsilon} = \sum_j L_j \tag{3.7}$$

where ls symbolizes the base-year labor supply, W is the wage, w represents the base year wage, ε the elasticity for the wage supply and L is the labor demands for all sectors.

3.3. Investment and capital

The main agents involved in savings are households, government and the foreign sector. In the model, investment equals savings and the quantity of capital stocks K per sector is treated as endogenous variables by considering the investment's time. The capital apportionment factor SK which varies between 0 and 1, is described in Equation 3.8 below:

$$SK_{jt} = SP_{jt} + SP_{jt} * \left[\frac{SR_{jt} - AR_t}{AR_t}\right] \tag{3.8}$$

where SP symbolizes the actual share of sector from the entire capital stocks, SR symbolizes the profit rate by sector, and AR symbolizes the average profit rate. Any additional capital is flexible while invested capital relates to distinctive sector.

3.4. Government and investment demand

Usually, the government generates its revenue from sources such as direct taxes (td_h), indirect taxes (ts_j) and transfers to government (st_g). The government uses revenue to acquire goods (g_j) and provide social transfers (st_h), and saves the remaining finances (B). The consumption expenses are proportional to base--year amounts g times the exogenous modification element G. Equation 3.9 describes the government revenues and expenditures.

$$\sum_h td_h * Y_h + \sum_j ts_j * P_j * Q_j + \sum st_g = \sum_j P_j * G * g_j + \sum_h st_h + B \quad (3.9)$$

3.5. Production and expenditure descriptions

The costs of production are recovered from the sales of the produced goods and services at a profitable price. The main role players involved in consumption are households, private firms, and government. An entire household's income comprises the sales from the production and the transfers received from the government. In turn, a household spends by purchasing products and paying income and indirect taxes, while saving the remainder of the income received from the labor. The indirect taxes include VAT, which is the purchaser's tax. Although the consumer's income and expenditure are balanced in the database of the model, the assumption is that the utility of the consumer is maximized according to Stone-Geary utility function, based on budget availability. Equation 3.10 includes the summarized Linear Expenditure System (LES) of demand for the 14 categories of household in the model.

$$P_j * H_{jh} = P_j * \gamma_{jh} + \beta_{jh} * ((1 - S_h - td_h) * Y_h - \sum_{jt} P'_j * \gamma_{jh}) \quad (3.10)$$

while P symbolizes the product's price paid by the consumer, Y symbolizes the entire household income, H symbolizes the consumption of product j by household h, γ symbolizes the lowest possible quantity of consumption, β symbolizes the minimal budget portion, S symbolizes the minimal savings and td symbolizes the direct tax rates.

3.6. Closures

Closures relate to the number of key variables and equations described as dependent or independent variables in the CGE model. All the possible assumptions are set in the closures before executing simulations. We considered that the savings drive the investment while the government expenses are constant portions of absorption in the model. Moreover, the savings of government are flexible where tax rates are constant. In the current account of the model, both the exchange rate and the foreign savings are assumed to be flexible. Due to higher rate of unemployment in the country, the factor closure will set labor with primary and secondary education level unemployed. The supply of labor with tertiary education level will be assumed to be entirely employed and flexible. Foreign currency prices of imports are of course exogenous. Population is also held constant. There are other exogenous variables in this closure such as changes in technology, price and quantity shift variables. The shock was applied to VAT variable in the model. The simulation results although meaningful must be understood before developing policy.

4. Shock findings

4.1. Effects of the shock on the macroeconomic variables

Two simulations were performed to evaluate the influences of the shock applied to the VAT rate when it moved from 14% to 15%. The first simulation maintained the VAT rate at 14% as usual business, and in the second we increased the VAT rate to 15% across the year 2018 to 2021, with shock executed in 2018. As indicated in the closure, we considered that savings drive investment, while the government expenses are constant portions of absorption. In addition, the savings of the government are flexible where tax rates are constant. In the current account, both the exchange rate and foreign savings were assumed to be variable. Due to a higher rate of unemployment in the country, the factor closure was set in such a way that the labor with primary and secondary education level remain unemployed. The supply of labor with tertiary education level was assumed to be entirely employed and flexible. The simulation results were assessed against the results from the base scenario representing the 'business as usual' set up. The actual values of the variables of interest are presented in Rand billion in column 3 of Table 3. One of the biggest advantages of this model is that it analyzes the effects of the policy action that has been launched. The best

way to assess the effects of an exogenous shock (increase in VAT) is to compute the difference between the implementation of the increase in VAT (shock that happened) – the policy simulation – and a counterfactual scenario in which the specific shock under assessment did not take place – the baseline scenario. In turn, the results are presented as percentage change variations over time between the initial 'baseline' simulation performed and the second 'policy' simulation performed (Adams, 2005). The results of important macroeconomic variables are included in Table 3.

Table 3. Effect of the shock on the macro-economic variables

Variables	Description	Base (2010 R Billion)	2018		2019		2020		2021	
			VAT (14%)	VAT (15%)	VAT (14%)	VAT (15%)	VAT (14%)	VAT (15%)	VAT (14%)	VAT (15%)
ABSORP	Absorption	2687	−0.0002	−0.0002	0.0020	0.0025	0.0039	0.0041	0.0057	0.0059
PRVCON	Private consumption	1570	−0.0171	−0.0168	−0.0133	−0.0131	0.0100	0.0310	0.0071	0.0087
FIXINV	Investment	516	0.0510	0.0501	0.0518	0.0522	0.0525	0.0652	0.0531	0.0685
DSTOCK	Stock	−3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GOVCON	Government consumption	604	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EXPORTS	Exports	645	0.0090	0.0087	0.0111	0.0261	0.0130	0.0313	0.0147	0.0514
IMPORTS	Imports	−669	0.0086	0.0084	0.0107	0.0210	0.0125	0.0136	0.0142	0.0185
GDPMP	GDP (Market Prices)	2663	0.0002	−0.0002	0.0020	0.0028	0.0040	0.0056	0.0057	0.0088
NETITAX	Net indirect tax	285	0.0018	−0.0017	0.0006	0.0007	0.0028	0.0037	0.0047	0.0065
EXRXY	Exchange rates	1	0.0000	0.0000	−0.4105	−0.4100	−0.4037	−0.4032	−0.3951	−0.3947
YGX	Government income	697	0.0431	0.0402	0.0442	0.0574	0.0451	0.0745	0.0459	0.0935
GDPFC2	GDP (Factor Prices)	2378	0.0000	0.0000	0.0022	0.0025	0.0042	0.0067	0.0059	0.0086

Source: Author's own calculations.

The first reaction is that when the VAT rate increased from 14% to 15% in 2018, the GDP, the net indirect tax and consumption decreased slightly by 0.0002%, 0.0017% and 0.0158%, respectively, as indicated in Table 3. In fact, in the short term the GDP involves additional variables, for example, consumption and absorption, which are negatively influenced by the effect of increasing the VAT. The slight drop in the total absorption (−0.002%) in the economy during the year of shock indicates that the positive change in investment will positively affect absorption in the long run. Even though consumption had an adverse ef-

fect, and if it is assumed to be an indirect means for the welfare of households, its outcome entails that in the short run, welfare is negatively influenced by the VAT shock. Although the purpose of increasing the VAT was to generate more tax revenue for South Africa Revenue Service in the fiscal year of 2018/2019, the decline in GDP could be due to the fact that the higher revenues from VAT are compensated by a decrease in revenues from other sources and tax evasion. Moreover, the slight improvement in exports is possibly due to the substantial increase in domestic demand, which influences the rise in domestic prices. In this case, producers are encouraged to stimulate the exports based on the Constant Elasticity of Transformation (CET) function. In addition, the rise in exports engendered a marginal depreciation of the real exchange rate to stimulate exports, which decreased marginally by 0.41% in the following year of 2019. However, in the long run, the net indirect tax and GDP improved continuously from 2019 to 2021 as the result of the increase in the VAT rate from 14% to 15%. This benefitted mostly government revenue and other macro-economic variables.

Our findings are confirmed by those of Gordon & Nielsen (1997), who discovered that VAT is progressive as the largest contributors of VAT are the consumers of products with no exemption. In addition, our results are confirmed by Emmanuel (2013) who investigated the effects of VAT on economic growth (GDP) of Nigeria and found that a 1% rise in VAT revenue could stimulate a 1.47% rise in GDP.

Erero (2015) pointed out that VAT is levied out on final consumption in South Africa, due to the fact that the VAT generated from the inputs to production is paid back to the producers. For a consistent revenue assessment of the VAT, the base and size of the base upon which VAT is imposed should be determined before performing any simulations. First, the base of VAT is not only limited to the final consumption, but also encompasses exports, investment and components of production. Second, the size of the base of the VAT takes into consideration some elements, such as the legal exemptions, criteria for the VAT credit, number of VAT recordkeeping, and the size of the informal economy.

4.2. Effect of the shock on the terms of trade

The terms of trade can be used to assess the wellbeing of the economy of South Africa. In fact, this terms of trade consists of the relative price of exports against the imports, and depicts the fraction of export prices to import prices. The best way to elucidate this is when considering the quantity of import goods that South Africa could acquire per unit of export goods (OECD, 2017).

When the VAT rate was pushed up from 14% to 15%, the terms of trade dropped, due mostly to a decline in the price of exports in the short run. The price of exports plays an important role, although it is influenced by the price of land and industrial development, which cuts down the charges of manufacturing a number of commodities. Amongst the various products exported by South Africa, the rise in VAT rate does not influence negatively on some of them. The simulation results indicate that both exports and imports increased, possibly due to an expansion in economic activity. During the shock, the imports increased by 0.0084% in 2018 and 0.0139% in 2021 (Table 3).

4.3. Effect of the shock on the GINI coefficient

Inequality in South Africa has long been a challenge as the unemployment rate rises continuously year after year. The GINI coefficient was used in this case as an indicator to point out the income inequality within the working groups in the country. Table 4 presents the simulation results from the CGE model for the GINI coefficient.

Table 4. Effect of the shock on GINI coefficient

VAT shock	Base (2010 R billion)	2018	2019	2020	2021
Base	0.6208	0.62089	0.62101	0.62065	0.62078
VAT (14%)	0.6299	0.62002	0.62017	0.62000	0.61909
VAT (15%)	0.6253	0.62591	0.62645	0.62528	0.62512

Source: Author's own calculations.

Overall, the simulation results indicate that the welfare of the population constantly deteriorated between 2018 and 2019, before improving in 2020 and 2021. The richer households were hit the hardest because they pay more VAT, when compared with the poorer households. Another element that contributed to the worsening of inequality is the high level of unemployment in South Africa. Most unskilled laborers are unemployed and do not pay VAT (Table 4). There is thus still a long way to go before reaching a perfect uniform income distribution between the poor and rich households in South Africa.

4.4. Effect of the shock on the government income

Usually, the main source of income of the government is the tax. Table 5 presents the simulation results for the government income when VAT was increased from 14% to 15%.

Table 5. Effect of the shock on the government income

Year	Base (2010 R billion)	VAT (14%)	VAT (15%)
Base Year	697	0.0431	0.0428
2018	707	0.0431	0.0419
2019	717	0.0442	0.0574
2020	726	0.0451	0.0745
2021	735	0.0459	0.0935

Source: Author's own calculations.

Intuitively, one would assume that the primary effect of raising the tax rate would be an increase in the government income, yet Table 5 indicates that the total government tax revenues decreased slightly by 2.8% (from 0.0431 to 0.0419) when VAT was increased to 15% from 14% in 2018. Although this result seems counterintuitive in the short run, this could be due to a decline in private consumption and increased tax evasion in sales tax. Nonetheless, the downward trend changed from 2019 to 2021, with a continued increase in tax income. Our findings are supported by a study conducted by the World Bank (2014), which indicated that a hike in VAT should be followed with strict tax compliance, as it permits the government to scrutinize the declared sales value of every intermediate product with the actual real value of produced products. One of the practicalities of VAT is that it is usually collected during the course of production chain, which makes its management user friendly.

4.5. Effect of the shock on the employment

Table 6 presents the simulation results for the employment by income category based on the increase of the VAT rate from 14% to 15%.

Table 6. Effect of the shock on the employment by income category

Variables	Description	Base (2010 R billion)	2018 1212.7	2019 1213.2	2020 1213.9	2021 1214.9
flab-p	Factor labor primary education	VAT (14%)	0.0016	0.0043	0.0081	0.0127
		VAT (15%)	0.0014	0.0039	0.0074	0.0118
flab-m	Factor labor medium education	VAT (14%)	0.0012	0.0032	0.0060	0.0094
		VAT (15%)	0.0010	0.0029	0.0055	0.0088
flab-s	Factor labor secondary education	VAT (14%)	0	0	0	0
		VAT (15%)	0	0	0	0
flab-t	Factor labor tertiary education	VAT (14%)	0	0	0	0
		VAT (15%)	0	0	0	0
Fcap	Factor capital	VAT (14%)	0.0878	0.1297	0.1702	0.2092
		VAT (15%)	0.0447	0.0880	0.1299	0.1704

Source: Author's own calculations.

We assumed that skilled labor is fixed while the unskilled labor is elastic in the closure. The simulation results indicate that labor demand improved to some extent throughout factor labor primary and medium education during the years between 2018 and 2021 (Table 6). In this respect, the marginal improvement in the primary and medium education labor symbolizes the employment of unskilled labor in the manufacturing activity that becomes more intense. Overall, the augmentation of the VAT rate positively affected all the factor incomes during the modelling time frame. In conjunction with the high unemployment rate in South Africa, the increase in VAT from 14% to 15% should not have negatively affected low income households, mainly because most of the products they use are exempt.

4.6. Effect of the shock on the sector

Table 7 presents the simulation results by sectors based on the increase of the VAT rate from 14% to 15%.

Table 7. Effect of the shock on the sector

Sectors	Base (2010 R billion)	2018	2019	2020	2021
Agriculture	2	−2.0386	−0.0606	0.0835	0.1062
Mining	10	−1.1264	−0.1058	0.1425	0.1777
Manufacturing	14	−3.0805	−0.1033	0.1212	0.1477
Other industries	6	−1.0186	−0.0432	0.0618	0.0804
Private services	48	−1.0343	−0.0301	0.0418	0.0525
Public services	19	−0.0105	−0.0012	0.0017	0.0012

Source: Author's own calculations.

Table 7 highlights the impacts of VAT rate increase on the six main sectors, namely agriculture, mining, manufacturing, other industries, private services, and public services. The impact of the VAT increase was negative on all sectors of the economy in 2018 and 2019. For instance, the manufacturing, agriculture and mining were hit the hardest in 2018. Indeed, the manufacturing sector suffered considerably from the shock. The negative effect on manufacturing stems from the challenges encountered by the industrial sector for which it is a supplier of raw materials.

4.7. Effect of the shock on household consumption

In reality, these are individuals, not households, who work and receive a compensation for labor provided. Nonetheless, from the System of National Account (SNA93), households can directly receive the generated income of any member of the family. Households can effectively spend more when employment increases and general price levels (CPI) remains fixed. Table 8 includes the simulation results for the household consumption.

Table 8. Effect of the shock on the household consumption

Household	VAT	Base (2010 R billion)	2018	2019	2020	2021
1	*2*	*3*	*4*	*5*	*6*	*7*
POOR	VAT (14%)	272.6	0.03081	0.0599	0.08738	0.11328
	VAT (15%)	274.1	0.03021	0.05882	0.08578	0.11125
hhd-0	VAT (14%)	27.1	0.02439	0.0473	0.06911	0.08943
	VAT (15%)	27.1	0.02398	0.04685	0.06824	0.08853
hhd-1	VAT (14%)	47.1	0.02675	0.05223	0.07601	0.0983
	VAT (15%)	47.3	0.02646	0.05143	0.07492	0.09693
hhd-2	VAT (14%)	56.8	0.02956	0.05736	0.08376	0.10857
	VAT (15%)	57.1	0.02907	0.05638	0.0823	0.10664
hhd-3	VAT (14%)	64.9	0.03328	0.06487	0.09445	0.1225
	VAT (15%)	65.3	0.03262	0.06356	0.09266	0.12023
hhd-4	VAT (14%)	76.7	0.03428	0.06688	0.09751	0.12645
	VAT (15%)	77.3	0.03351	0.06533	0.09534	0.12367
NPOOR	VAT (14%)	1270.8	0.03423	0.0667	0.09752	0.12679
	VAT (15%)	1269.9	0.03426	0.06675	0.09759	0.12688
hhd-5	VAT (14%)	88.5	0.03402	0.06623	0.09675	0.12557
	VAT (15%)	88.6	0.03388	0.06594	0.09632	0.12511
hhd-6	VAT (14%)	106.3	0.03407	0.06644	0.09693	0.12582
	VAT (15%)	106.7	0.03365	0.06552	0.0957	0.12419

Table 8 cont.

1	*2*	*3*	*4*	*5*	*6*	*7*
hhd-7	VAT (14%)	147.7	0.0344	0.06705	0.09793	0.12718
	VAT (15%)	148.8	0.03361	0.06547	0.09564	0.12428
hhd-8	VAT (14%)	278.6	0.0364	0.07097	0.10385	0.13508
	VAT (14%)	282.3	0.03496	0.06822	0.09993	0.13007
hhd-9	VAT (14%)	649.9	0.0333	0.06491	0.09493	0.12347
	VAT (15%)	643.5	0.03425	0.06671	0.09751	0.12677
hhd-9-1	VAT (14%)	81.4	0.03772	0.07373	0.10801	0.14058
	VAT (15%)	82.6	0.0362	0.0707	0.10363	0.13499
hhd-9-21	VAT (14%)	94.5	0.03768	0.07356	0.10775	0.14035
	VAT (15%)	95.2	0.03687	0.07205	0.10556	0.13749
hhd-9-22	VAT (14%)	113.7	0.0373	0.07284	0.10671	0.139
	VAT (15%)	114.1	0.03681	0.07196	0.10553	0.13744
hhd-9-23	VAT (14%)	137	0.03249	0.06322	0.09242	0.12009
	VAT (15%)	135.8	0.03327	0.06471	0.09452	0.12279
hhd-9-24	VAT (14%)	223.4	0.02834	0.05507	0.08032	0.10432
	VAT (15%)	215.8	0.03156	0.08926	0.08926	0.11567
ALLHHD	VAT (14%)	1543.4	0.03363	0.06551	0.09573	0.1244
	VAT (15%)	1543.9	0.06533	0.06533	0.09549	0.1241

Source: Author's own calculations.

If it is assumed that consumption expenditure can be used as a proxy for welfare, it is apparent that the increase in the VAT rate would have positive impacts on welfare of low income households especially, as most of products they acquire are exempt from VAT. Indeed, the simulation results seen in Table 8 confirm that the low income households benefit the most, as compared to the high income households. Given the differential expenditure patterns by consumption decile, the zero-rating of a number of essential food items can lessens the regressivity of VAT and take the edge off the effect of increase in VAT on the low income households. However, the wealthiest not only gain from the zero-rating of food, but also for certain items profit substantially more than low income households (Jansen & Calitz, 2014). Overall, the impact of this policy shock was positive across all household income categories during the modelling period, 2018-2021.

5. Conclusions

5.1. Contribution to research and implications for practice

This paper sought to assess the effect of a change in VAT from 14% to 15% on the South African economy through the application of a dynamic CGE model. The study recommends the use of this method for assessing the impact of tax policy changes to the South African economy. The CGE model seems to be the best model as far as the impact assessment of a shock in the economy is concerned. This will assist the South African authorities with their decision making regarding future VAT revenue.

Between 1993 and 2018, the VAT rate remained fixed at 14%, which was lower than in all other countries. However, during his parliamentary budget speech budget speech on February 21, 2018, the Minister of Finance revised the VAT rate upwards by 1 percentage point to 15%, and declared it to be effective from April 1, 2018 as one of the tax proposals designed to generate more tax revenue for the South African government in the fiscal year of 2018/19. Two simulations were performed to evaluate the influences of the shock applied when the VAT rate rose from 14% to 15%. The first simulation maintained the VAT rate at 14% while the second increased the VAT rate to 15% in 2018. As indicated in the closure, we considered that the savings from government drive the investment while government expenses are constant portions of absorption. In addition, the savings of the government are flexible, whereas tax rates are constant. In the current account, both the exchange rate and the foreign savings were assumed to be variable. Due to a high rate of unemployment in the country, the factor closure was set in such way that the labor with primary and secondary education level remained unemployed. The supply of labor with tertiary education level was assumed to be entirely employed and flexible.

The simulation results were assessed against the results from the base scenario, representing the 'business as usual' set up. The first reaction was that when the VAT rate increased in 2018, the GDP, the net indirect tax and consumption decreased slightly by 0.0002%, 0.0017% and 0.0168%, respectively. In fact, in the short term, GDP is composed of additional variables, for example, consumption and absorption, which were negatively influenced by the effect of increasing VAT. The slight drop in the total absorption (−0.0002%) in the economy during 2018 indicates that the positive change in investment positively affected the absorption in the long run.

Even though consumption had an adverse effect, if it is assumed to be a proxy for the welfare of households, its outcome entails that in the short run, welfare was negatively influenced by the VAT shock. Moreover, the slight improvement in exports was possibly due to the substantial increase in domestic demand, which influenced the rise in domestic prices. In this case, the producers were encouraged to stimulate exports based on the Constant Elasticity of Transformation (CET) function. In addition, the rise in exports engendered a marginal depreciation in the real exchange rate to stimulate exports, which decreased marginally by 0.41% in the following year (2019). However, in the long run, the net indirect tax and GDP improved continuously from 2019 to 2021 as a result of the increase in the VAT rate from 14% to 15%. This benefited mostly government revenue and other macro-economic variables.

Overall, three essential contributions are provided in this study:

- First, a practical policy shock regarding the economic impacts of an increase in VAT. The results show that in the long run, the net indirect tax and GDP improved continuously. This was achieved through the analysis.
- Second, it added to the current debate on the relative roles of institutions versus influence of the VAT rates. This study has found that the increase in VAT is important for the growth, independent of its effects on institutions.
- Third, it has provided a tool for policy analysis in South Africa. As confirmed from the empirical results for policymakers, the policy shock could be applied so that the major concern regarding unemployment, low economic growth and social inequality can be resolved.

Our findings are confirmed by those of Gordon & Nielsen (1997), who discovered that VAT is progressive as the largest contributors of VAT are the consumers of products with no exemption. In addition, our results are confirmed by Emmanuel (2013) who investigated the effects of VAT on economic growth (GDP) of Nigeria and found that a 1% rise in VAT revenue could stimulate a 1.47% rise in GDP. The main contribution of this research was to assist the government in making decision based on the findings of this study through the usage of a CGE model which has been proven over the years to be a suitable model when evaluating the impact assessment of any shock within an economy.

5.2. Limitations and future works

The database of the CGE model was limited to the Social Accounting Matrix for 2015. Further study will require a detailed analysis of the differential expenditure patterns by consumption decile, as well as the zero-rating of a number of essential food items, which lessens the regressivity of VAT and takes the edge off the effect of an increase in VAT on low income households.

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