A Partial General Equilibrium Analysis of Fiscal Policy Injection on Poverty and Inequality in South Africa

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Abstract: This study employs a partial general equilibrium approach calibrated on the Social Accounting Matrix (SAM) and a contemporaneous dynamic computable general equilibrium (CGE) model to assess the effect of expansionary fiscal policy on economic growth, income inequality, poverty, employment and inequality reduction in South Africa. The simulation results reveal that expansionary fiscal policy i) benefits rich 'white' households the most and poor 'coloured' households the least ii) improves adult employment more than youth employment iii) improves employment in urban areas as proposed to employment in rural areas iv) has a very small effect on improving economic growth and reducing the Gini coefficient v) benefits 'well-off' households more than it does 'poor' households vi) promotes 'low-skilled' employment more than it does for 'high-skilled' labourers. Associated policy implications based on our findings are also discussed.

Keywords: Social accounting matrix (SAM); Computable General Equilibrium (CGE); New Development Plan (NDP); Inequality; Poverty; Employment; South Africa

JEL Classification: C68; D58; E16; I32

1. Introduction

Despite recently celebrating just over 25 years of democracy, South Africa remains a country highly divided along racial lines, with one of the highest Gini coefficients in the World (Collins et al., 2019). From the onset of being liberated from the former oppressive Apartheid regime in 1994, South Africa's ANC government has dedicated large fiscal spending towards eradicating the 'big three' social ills namely poverty, unemployment and inequality. In retrospect, South African fiscal authorities have conjured a handful of social expenditure programmes such as the Reconstruction and Development Programme (RDP) in 1994, Growth, Employment and Re-distribution (GEAR) programme in 1996, Accelerated and Shared Growth Initiative South Africa (ASGISA) in 2003, Millennium Development Goals (MDG) in 2010, the New Growth Path (NGP) in 2011 and the most recent New Development Programme (NDP)-Vision 2030 introduced in 2014. Collectively, these social

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spending programmes set-out specific macroeconomic targets such as attaining a 6 percent annual economic growth rate, halving of the unemployment rate by 2020 through job creation as well as eradicating poverty by 2030 and, so far fiscal authorities have had little success in attaining these macroeconomic objectives.

Internationally, the World Bank (2018) has recently ranked South Africa as the most unequal country in the world, coupled with post-recession slow growth trajectory and high levels of poverty. The World Bank (2018) describes poverty in South Africa has having a 'strong spatial dimension' which demonstrates the enduring legacy of apartheid, and setback of marginalised groups of people. The groups worst affected by poverty are the black population, the youth, the less educated, female-headed households, large families and children. For example, the top 1% of South Africans own 70.9% of the country's wealth while the bottom 60% only controls 7% of the country's assets. More than half of South Africans (55.5%) people live below the national poverty line of R992 per month (World Bank, 2018). Altogether, poverty in South Africa has multiple dimensions and its depths can vary when assessed by race (African vs non-African), income (less privileged v privileged households), age (youth vs adult), area (urban v non-urban) and by education (primary v tertiary).

The research question posed in this study is whether it is possible for the domestic policymakers to concurrently achieve the objectives of high economic growth, improved employment levels and fair income redistribution, as stated in the most recent NDP-Vision 2030 directives, under the current constraint of fiscal austerities. This challenge can be formulated as an optimisation problem in which stimulation of high economic growth is the objective function that must be maximised under the constraints of fiscal austerity and poverty reduction. Traditional econometric models like the vector autoregressive (VAR), vector error correction (VEC) and autoregressive distributive lag (ARDL) models have a common limitation in that they do not provide economy-wide solutions to the constrained optimisation problem. For this reason, the study employs a dynamic computable general equilibrium (CGE) model that is designed to solve constrained optimisation problems (Löfgren, 2002). Given the South African context of poverty and inequality among the marginalised group of people and side-lined areas, the study makes use of a social accounting matrix (SAM), a tool that shows how income is generated in the economy and how that income is redistributed.

Besides the limitations of econometric models in solving constrained optimisation problem, previous economy-wide empirical studies on the South African economy (see Mabugu et al. (2013), van Wyk et al. (2014), Erero and Gavin (2015), Eroro (2016), Herault (2006) and Bonga-Bonga et al. (2016)) rely on a variety of input-output (I-O), Supply and Use (SUT), SAM and CGE models to assess the effect of government strategies on socio-economic variables and yet fail to reflect the dynamics of selected marginalised groups of people and marginalised areas. This is a noteworthy hiatus in the current literature since poverty and inequality remain high amongst previous disadvantaged population and have not been reversed even after 20 years of democracy. Ideally, the analysis of poverty and inequality must cover the economy-wide dynamics of racial, gender, age disparities and spatial incongruences. Moreover, disparities between urban and non-urban, formal and informal, skilled and unskilled are prominent in South Africa and the impact assessment must quantify how these variables respond to changes in government spending. Quantifying the impact of expansionary fiscal policy on vulnerable group of people is critical for monitoring progress of 'inclusive economy' strategy of the NDP. To achieve the research objectives set in this study, we run policy simulations on the SAM and the CGE models.

The remainder of the study is structured as follows. Section 2 presents the methodological framework. It discusses different functional forms underpinning the behavioural equations of economic agents in a CGE model, how the model was calibrated, and highlights the macro-closures in the model. Section 3 presents the micro-simulation results from the SAM. Section 4 presents the simulations from the CGE model. Section 5 concludes the study with policy implications.

2. Methodological Framework

The study employs Statistics South Africa (StatsSa) 2015 Supply and Use Tables (SUT's) as input data to compile a new SAM. The methodology used in this study is consistent with the latest 2008 System of National Accounts (SNA, 2008) released by the United Nations and hence our constructed SAM-Leontief models comply with international best practices (United Nations, 2009). The employment multipliers were computed in line with the international Labour organisation recommendations (ILO, 2015). The standard SAM was extended to include external matrices that disaggregate households by race (African, white, Coloured, and Indian), employment by age (youth and adults), education (primary v tertiary), and by areas (urban and non-urban) for micro-simulation purposes (Quantec Research, 2012). This uniqueness sets this study's model apart from other economy-wide simulation models found in the previous South African literature (i.e. Mabugu et al. (2013), van Wyk et al. (2014), Erero and Gavin (2015), Eroro (2016), Herault (2006) and Bonga-Bonga et al. (2016)). Hence, the CGE was calibrated with a recent and modified SAM which better represents current structures and dynamics of the South African economy.

Transitioning from SAM to CGE was achieved by including a Cobb-Douglas production function, the constant elasticity of transformation (CET), the constant elasticity of substitution (CES), and on the other side, by incorporating the behaviour of institutions like households, government and private firms into the CGE model

(Humphrey, (1997). Following the standard CGE model developed by Löfgren *et al* (2001), we construct a dynamic CGE model to use for policy analysis. The model is solved through a set of linear and non-linear equations using GAMS software. The model was calibrated from the disaggregated 2015 SAM. The data used in the model comprised mainly of the disaggregated SAM, other sets of income elasticities for households and commodities, trade elasticity for commodities, and external matrices four households and labour. The economic optimisation behaviour and the production and consumer decisions were captured by parameters, through optimising first-order conditions subject to a set of constraints. Incorporating the SAM into the CGE model enabled transfer of these structural and optimisation behavioural features into the CGE model, hence making it an applied CGE model. Adding time dimensions, and a set of time series elasticities, further converts it into a dynamic CGE model (Taylor and Black, 1974).

As background to CGE modelling, it is important to understand how goods and services are produced, and how industries and institutions interact in the economy. The CGE literature refers extensively to what is known as the multi-level or nested production function, which combines capital (K) and labour (L) as factor inputs. The CGE model comprises a set of behavioural equations that first need to be specified, then solved numerically and simultaneously. The specification is instrumental to the type of solution anticipated in the model and hence CGE modellers are confronted with the task of linking the behavioural equation to the true functioning of the economy to be analysed as accurately as possible (Humphrey, 1997). Since the CGE model requires reconciling the behaviour of different sectors for a general equilibrium solution, the functional form representing the behaviour of different economic agents is discussed in this paper along with the appropriate institutions, factors and specific economic sectors of the South African economy (Kehoe, 1998).

Household optimisation behaviour: The household aims to sell its endowed factors to the firms to earn income in the form of wages and salaries. Households also derive other income in the form of rent or interest from the supply of capital. From all income received, households will spend the money on certain commodities of their choice. The household is assumed to choose the consumption that maximises their utility, and in this case, it is assumed that the utility function (Equation 1) is the Cobb–Douglas type presented as follows (Boehringer *et al*, 2003):

$$U = A_c\, C_1^{a1}\, C_2^{a2}\, C_3^{a3}\, \ldots\, C_N^{an} = A_c \prod_{i=1}^{N} C_i^{ai} \qquad (1)$$

Where A_c is a scaling parameter, C_i consumption of the i[th] good ($C_i \geq 0$) and the exponent parameters a_i are the share of each good in expenditure on consumption so that $a_1 + \ldots + a_n = 1$. At this stage, prices of goods and factors are assumed to be given in the household utility maximisation problem. Defining P_i^c demand price of the i[th] good ($P_i^c \geq 0$), P_h^f price of the h[th] factor ($P_h^f \geq 0$), F_h endowments of the h[th] factor for the household, U_h household utility function and α_i share parameter in the utility function ($0 \leq \alpha_i \leq 1$), the household maximises its utility (i.e. U_h ($C_1 + \ldots + C_n$) = $\prod_{i=1}^{N} C_i^{ai}$) subject to its balanced budget constraint in this manner $\sum_i P_i^c C_i = \sum_h P_h^f F_h$, with the Lagrange multiplier solution, ϕ, defined as:

$$L\ (C_i\ ;\ \phi) = \prod_{i=1}^{N} C_i^{ai} + \phi\ (\sum_h P_h^f F_h - \sum_i P_i^c C_i\ ) \quad (2)$$

Firms or producer optimisation behaviour: The firms have one single objective, that is to maximise profit. The firm's total cost is made up of two input costs (intermediate cost and factor cost) and maximise profit π_j by choosing levels of intermediate inputs X_{ij} and primary factors V_{ij} to produce output Y_i, subject to the constraint of its production technology φ_j (Boehringer *et al*, 2003). In other words we maximize $\pi_j = P_j\ Y_j - \sum_{i=1}^{N} Pi\ Xij - \sum_{f=1}^{F} Pi\ V_{ij}$ subject to $Y_i = \varphi_j\ (X_{1j}, \ldots, X_{Nj}\ ;\ V_{1j}, \ldots, V_{Fj}\ )$. Note that one can also maximise its profits π_j subject to its production technology constraint φ_j under given output Y_i and only the factor input $F_{h,j}$ i.e. Maximise $\pi_j = P_i^z\ Y_j - \sum_{f=1}^{F} F_{hj}$ subject to $Y_j = \varphi_j \prod_{i=1}^{N} F_{h,j}^{ai}$. This optimisation problem can be solved using the Lagrange multiplier δ_j defined as:

$$L_j(Y_j\ ;\ F_{h,j}\ ;\ \delta_j) = (P_i^z\ Y_j - \sum_{f=1}^{F} F_{hj}) + \delta_j\ (\ \varphi_j \prod_{i=1}^{N} F_{h,j}^{ai} - Y_j) \quad (3)$$

Market-clearing conditions in the CGE model: The optimisation problems explained so far have shown how households and firms determine their demand and supply of goods and factors due to their optimisation behaviour, which at this stage is not dependent on other agents' decisions but only on the given good and factor prices (Boehringer *et al*, 2003). Firstly, there is no guarantee that the prices assumed by the households are the same as those assumed by the firms. Secondly, there is no guarantee that total supply will necessarily be equal to total demand for each good and for each factor in the economy. So, to ensure the market equilibrium of each good and factor in terms of quantity and price, it was necessary to impose the following market clearing conditions in the CGE model:

- $C_i = Y_i\ \forall_i$ is the market-clearing condition for the i^{th} good, which ensures equality of its demand and supply quantities in the economy.

- $\sum V_{hj} = \sum F_h$ is the market-clearing condition for factors indicating that the total demand for each factor must be equal to its given endowments. In other words, the sum of demand quantities for the h^{th} factor must equal the sum of endowments of each factor given in the economy.

- $P_i^z = P_i^c\ \forall_i$ is the market-clearing condition that equates to the firm's supply price of the i^{th} good P_i^z to the corresponding demand price for the household P_i^c.

The CGE analysis mimics the real economic world and treats all markets simultaneously, and the effect of a policy shock in a specific market is translated to other markets (Donzelli, 2006). In reality, actions in one market are transmitted to other markets. Similarly, actions in one institution are conveyed to other institutions as well as other markets. For example: an increase in households' income through compensation of employees (wages and salaries) will affect taxes received by government (pay-as-you earn = PAYE tax). As households spend the additional income on goods and services, firms will react by increasing production output to meet the new demand. Both households and firms will pay VAT for each item purchased. These interactions between markets and institutions are well modelled in the CGE which is categorized among tools suited for general equilibrium analysis (Luenberger, 1995). A CGE framework is considered as an economy-wide model that includes feedback between demand, income and production structure, and where all prices adjust until decisions made in production are consistent with decisions made in demand (Dervis and Robinson, 1982).

CGE and macroeconomic closure rules: As in econometric models, exogenous variables and exogenous variables within the CGE model must be chosen carefully. The choice is more complex in CGE models because these models often contain more variables than equations, implying that some variables must be kept outside the model as exogenous variables; while the remainder of the variables are determined by the model as endogenous variables. The choice of which variables are to be exogenous is called the *model closure rules or macroeconomic adjustment rules* (Shoven and Whalley, 1984, 1992).

In selecting macro closure rules, the study attempted not to deviate much from the anatomy and structure of South Africa's economy. For example, the determination of factor market closures was guided by the realities in the labour market, such as the oversupply of unskilled labour and undersupply of highly-skilled labour. The factor market closures used in this study assumed that tertiary-educated workers (highly skilled labour) is fully employed and activity specific. It assumed that the unemployment rate is high among people with less than primary education (low-skilled labour), hence the factor market closure allows for mobility of these factors of production. As far as the CGE model is concerned, this type of factor market closures implies that the change in the supply of labour will occur in the low-skilled category, but not in the high-skilled labour category. Also, it is assumed that the wage rate of low-skilled labour is fixed at real wage level. The real wage was included in the model as the initial wage level multiplied by the consumer price index relative to the initial CPI level.

The model also assumed that capital is fully employed and activity-specific such that both capital and highly skilled labour may not move between activities. For fully employed factors, the wage levels will vary to clear the market. The model assumed a savings-driven investment closure, which implies that the savings level will determine investment. This savings-driven investment closure is supported by Herault (2006), who argued that the marginal propensity to save will be fixed for all non-government institutions, while capital formation is flexible. It is assumed that government instruments (like tax rates) are regarded as exogenous variables. The CPI published by Statistics SA was considered in this model as the numeraire.

Expansionary fiscal policy within the CGE refers to government spending regarding three items: government final consumption expenditure, government spending on its investment, and government transfer payments. In terms of financing mechanism, the model has assumed a balanced budget. As the government increases its investment spending and transfers to households, it is anticipated that demand for goods and services in the economy will rise, firms will respond to the increased demand by producing more output and employ more people. Newly employed people receive wages and salaries, others are beneficiaries of government transfers. Household income will be spent, creating second waves of demand for goods and service. Again, firms will respond to the increased demand by producing more output and employ more people. Consequently, tax on commodities will increase, VAT will increase, and household income tax, p*ay-as-you*-e*arn* (PAYE) tax will also increase to compensate for the new spending. In this way, the government cannot run into a budget deficit, making fiscal policy sustainable over time.

3. Microsimulations Based on SAM Model

We firstly calibrate the *economy-wide SAM-Leontief multiplier-based model* to assess the extent to which an injection of government expenditure exerts on different demographic populations of the economy. To this end, three policy microsimulations were run with the SAM. The first scenario presents a simulation of the effect of an additional R100 income on households disaggregated by race (African, White, Coloured and Indian) and further classified these households into 12 income deciles representing low-income (decile 1-4), middle-income (decile 5-9) and high-income (decile 10-12) households. The findings from these simulations are reported in Table 1. Under the second and third scenarios, the SAM was extended by constructing an external matrix that disaggregated employment according to age group (i.e. youth (15-34 years) versus adults (35-64 years)) and area types (i.e. urban versus non-urban areas) for 10 strategic sectors (i.e. Agriculture, Mining, Manufacturing, Electricity, Construction, Trade, Transport, Finance, Community Services and General Government) and then simulated the model with a R1 million fiscal injection. We then asses the economy-wide effect on employment creation for youth versus adults (Scenario 2) and urban versus urban (Scenario 3) across the 10 sectors and plot the computed Leontief multipliers in Figures 1 and 2, respectively.

The simulation results from the first scenario reported in Table 1 shows that from a R100 injection by government into the economy has high disparities amongst the different race and income groups. We summarize these findings as follows. Firstly, Coloured (R5.88) and Indian (R 7.19) households receive the smallest gains from the fiscal injection whereas White (R48.66) and African (R38.27) households receive the greatest gains. Secondly, low-income (R7.50) and middle class (R29.14) households across all population groups receive the smallest portions from government spending whilst high-income households (R63.17) receive the highest share. Lastly, white, high-income households dominated all sub-population groups receiving a share of R42.39 per R100 fiscal injection whereas Coloured and White low-income households received the lowest share at R0.07 and R0.13, respectively.

On the other hand, the simulation outcomes for Scenarios 2 and 3 as summarized in Table 2, respectively, reveal that fiscal expansion in all strategic sector favours adult employment more than it does for youth employment (Scenario 2) as well as favouring employment in urban areas compared to non-urbanized areas (Scenario 3). To demonstrate the extent of disparities between youth and adult employment multipliers note that the third lowest sectoral employment multiplier for adults (i.e. 4.633 in Manufacturing) is larger than highest sectoral employment multiplier for youth employment (i.e. 4.624 in Trade). Also note that the government sector – the biggest employer accounting for more than 22% of total employment in the country – will generate 2.826 jobs for the youth against 5.783 jobs for adults. We further observe youth employment multipliers are highest in the trade sector, followed by the community services sector. This implies that increasing government spending will create jobs for the youth mainly in the wholesale and retail trade sector. In contrasting the employment multipliers for urban versus non-urban areas for scenario 3 as depicted in Figure 2, we also note that the second lowest sectoral employment multiplier for adults (i.e. 4.633 in Mining) is larger than highest sectoral employment multiplier for youth employment (i.e. 4.624 in Agriculture). In urban areas, employment multipliers are high in three sectors: community services, finance and trade, whereas in non-urban areas, employment multipliers are high in the agriculture sector.

Table 1. The Distribution of an Additional R100 Fiscal Injection on Different Race and Income Households

Income class	Income group	African	Coloured	Indian	white	Total	Total (RSA)
low (poor)	Inc. 1	1.45	0.01	0.08	0.00	1.55	7.50
	Inc. 2	1.10	0.01	0.06	0.02	1.19	
	Inc. 3	1.70	0.02	0.13	0.03	1.87	
	Inc. 4	2.53	0.03	0.25	0.08	2.90	
middle class	Inc. 5	2.53	0.03	0.24	0.09	2.89	29.14
	Inc. 6	2.99	0.06	0.29	1.18	4.52	
	Inc. 7	3.67	0.14	0.53	1.23	5.57	
	Inc. 8	4.07	0.29	0.68	1.13	6.17	
	Inc. 9	5.01	0.77	1.69	2.51	9.98	
high (rich)	Inc. 10	5.53	1.33	0.61	5.39	12.86	63.37
	Inc. 11	4.45	1.35	1.54	11.20	18.54	
	Inc. 12	3.23	1.85	1.09	25.80	31.97	
Total (RSA)		38.27	5.88	7.19	48.66	100.00	100.00

Source: Micro-simulation results from the RSA SAM Model, 2015

Table 2. Summary of Employment Elasticities from Scenarios 2 and 3

Sector	Scenario 2 (Figure 1)			Scenario 3 (Figure 3)	
	Youth	Adult		Urban	Rural
Agriculture	4.042	6.379		6.396	4.624
Mining	2.570	3.920		4.633	1.857
Manufacturing	3.262	4.854		6.058	2.061
Electricity	2.030	3.263		3.951	1.342
Construction	4.148	5.649		7.380	2.417
Trade	4.674	6.344		8.517	2.501
Transport	3.722	5.270		7.174	1.817
Finance	4.014	6.763		9.010	2.467
Community services	4.460	7.186		8.937	2.704
General government	2.826	5.234		6.110	1.950
Total (weighted by output)	3.907	5.783		7.355	2.335

Source: Micro simulation results from the RSA SAM Model, 2015

4. Macrosimulations Based on Dynamic CGE Model

This section of the paper presents the three policy simulations run on the contemporaneous dynamic CGE model to assess the effect of expansionary fiscal policy on the macroeconomy. The first CGE simulation (Scenario 4) examines the economy-wide impact of public expenditure on i) demand-side components of economic activity ii) GDP at market prices and iii) the Gini coefficient. The second CGE simulation (Scenario 5) evaluates the impact of fiscal expansion on the household consumption patterns for the 12 deciles of income groups. The third CGE simulation (Scenario 6) evaluates the impact of fiscal expansion on employed people with different levels of educational attainment (i.e. primary, middle, secondary and tertiary). Tables 3, 4 and 5 report the simulation results for scenario 4, 5 and 6, respectively, and within these tables the effect of a 5% increase in government spending is reported in panel A whereas the effect of a 10% increase in government spending is presented in panel B. The reported results quantify the effect of these two shocks which are reported as percentage changes between the values in the baseline run (2015) and the policy run (2018, 2019, 2020) for each variable.

Starting with the results from the first CGE simulation (Scenario 4) in Table 3, we note that both a 5% and 10% fiscal shock improves investment and transfer payments to households with the effect being higher in investment than on household consumption throughout the policy run periods of 2018 to 2020. These results are not surprising as governments tends to invest in infrastructure that improves conditions for businesses to create value and develop innovative business ideas (Decaluwé et al., 2005). These, in turn, exert spillover effects to the trade sector as reflected by increased import and export activity. Further note that the effect of government spending on GDP is positive but minute and these findings are comparable to those in Mabugu et al. (2013) who similarly find South African expansionary fiscal policy to have a positive but very slight effect on GDP. Another interesting result from the model is that government spending contributes positively (but close to zero) to the reduction of income inequality, measured by the Gini coefficient. However, this effect is very small and almost negligible, with the percentage reduction in inequality being below 0.00% from 2018 to 2020.

In turning to the results for the second CGE simulation (Scenario 5) in Table 4, we observe fiscal spending to exert a positive effect on all household income deciles, although this effect is more pronounced for NON-POOR households (deciles 1-4) than it is for POOR households (i.e. deciles 5-10). For example, with a 5% increase in government spending, POOR households' consumption expenditure increases by 0.0301% compared with 0.0685% of their counterpart NON-POOR households' consumption expenditure in 2018 and, in 2020, it rises slightly to 0.0362% and to 0.0832% respectively for POOR and NON-POOR households. These findings obtained from the CGE model are in perfect harmony with those obtained from the

SAM model and knitting these results together suggests that income is still unevenly distributed, and consequently the gap between poor and rich is not narrowing. It can be thus concluded that the current fiscal expansion favours the rich households more than the poor households.

In the last CGE simulation (Scenario 6) in Table 5, we observe that an increase in government spending would contribute to creating jobs in favour of low-skilled as compared to high-skilled labourers. For instance, a 5% (10%) fiscal shock in 2018 is associated with a high employment growth rate of 0.0515% (0.1091%) among employees with primary education levels (low-skilled) compared with 0.0194% (0.0374%) among employees with tertiary education levels (high-skilled). The effect is positive and progressive, rising by 0.0429% (0.1084%) between 2018 and 2019 for employees with primary education levels. Our results are expected since South Africa's labour market is overpopulated with low-skilled labour, which does not contradict the type of factor market closures in the CGE model that allow for mobility of factors of production in the low-skilled category. Hence, a change in the supply of labour will occur in the low-skilled category, while the labour market for high skilled workers is assumed to be fully employed and activity-specific. The inference drawn from this simulation is that, in transitioning into the fourth industrial revolution, government spending should be strategically geared toward creating more jobs in the high-skilled category as low-skill routine jobs redundant and obsolete due to rapid changes in technology.

Table 3. Macroeconomy-Wide Effects of 5% and 10% Fiscal Injection

		Panel A: 5% fiscal injection			Panel B; 10% fiscal injection		
variables	Base (2013) R billion	2018	2019	2020	2018	2019	2020
ABSORP	3 158	0.0058	0.0678	0.1349	0.0089	0.1014	0.2016
PRVCON	2 410	0.5690	0.4519	0.3440	0.8535	0.6782	0.5171
FIXINV	827	0.7012	0.6895	1.6743	1.5510	1.9337	2.0109
GSTOCK	-5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GCONS	828	0.0018	0.0543	0.1031	0.0028	0.0814	0.1543
EXP	1 229	0.2984	0.3713	0.4379	0.4477	0.5570	0.6565
IMP	1 273	0.2876	0.3573	0.4206	0.4314	0.5358	0.6306
GDP	3 063	0.0059	0.0685	0.1363	0.0090	0.1024	0.2036
GINCOME	905	0.0006	0.0743	0.1416	0.0009	0.1112	0.2118
GINI	0.63	-0.0048	-0.0047	-0.0045	-0.0072	-0.0071	-0.0067

Source: Simulation results from the CGE model, 2015

Table 4. Effects of 5% and 10% Fiscal Injection of on Households Disaggregated by Income Level

Households	Base (2013)	Panel A: 5% fiscal injection			Panel B; 10% fiscal injection		
	R billion	2018	2019	2020	2018	2019	2020
POOR	**415**	**0.0301**	**0.0323**	**0.0362**	**0.0843**	**0.0904**	**0.1013**
10% of population - 1st decile	41	0.0106	0.0189	0.0277	0.0295	0.0527	0.0772
10% of population - 2nd decile	71	0.0124	0.0196	0.0284	0.0342	0.0540	0.0781
10% of population - 3rd decile	87	0.0232	0.0254	0.0309	0.0669	0.0731	0.0889
10% of population - 4th decile	99	0.0318	0.0376	0.0382	0.0863	0.1020	0.1036
10% of population - 5th decile	117	0.0355	0.0395	0.0424	0.0969	0.1078	0.1157
NON-POOR	**1 995**	**0.0685**	**0.0788**	**0.0832**	**0.1971**	**0.2269**	**0.2397**
10% of population - 6th decile	135	0.0407	0.0512	0.0593	0.1137	0.1430	0.1656
10% of population - 7th decile	164	0.0426	0.0516	0.0603	0.1158	0.1404	0.1639
10% of population - 8th decile	229	0.0551	0.0632	0.0691	0.1476	0.1693	0.1851
10% of population - 9th decile	436	0.0582	0.0647	0.0739	0.1573	0.1747	0.1994
5% of population - 10th decile	514	0.0673	0.0771	0.0806	0.1898	0.2173	0.2271
1% of population - 10th decile	64	0.0696	0.0805	0.0859	0.1934	0.2238	0.2387
1% of population - 10th decile	74	0.0718	0.0839	0.0911	0.2024	0.2366	0.2570
1% of population - 10th decile	90	0.0743	0.0878	0.0924	0.2076	0.2455	0.2583
1% of population - 10th decile	109	0.0862	0.0907	0.1017	0.2410	0.2536	0.2843

1% of population - 10th decile	178	0.0867	0.1075	0.1208	0.2705	0.3062	0.3614
ALL HOUSEHO DS	**2 410**	**0.0504**	**0.0582**	**0.0671**	**0.1409**	**0.1625**	**0.1874**

Source: Simulation results from the CGE model, 2015

Table 5. Effects of 5% and 10% Fiscal Injection of on Employment Disaggregated by Education

Employment category	Base (2013)	Panel A: 5% fiscal injection			Panel B; 10% fiscal injection		
	R billion	2018	2019	2020	2018	2019	2020
Employed with primary education	3 696	0.0515	0.0944	0.0944	0.1091	0.2013	0.2175
Employed with middle-education	5 969	0.0456	0.0664	0.0785	0.0911	0.1327	0.1569
Employed with secondary education	4 029	0.0296	0.0365	0.0408	0.0596	0.0734	0.0820
Employed with tertiary education	1 996	0.0194	0.0249	0.0286	0.0374	0.0480	0.0552

Source: Simulation results from the CGE model, 2015

5. Conclusions

Overcoming poverty, inequality unemployment in the post-global recession era has saturated public policy debates in South Africa and fiscal intervention is considered as the most effective domestic tool towards addressing these challenges. Our study uses a partial general equilibrium approach to assess the effectiveness of government expenditure on performing its dual obligation of improving economic growth and income distribution, on one hand, and reducing poverty, inequality and unemployment, on the other hand. We use Statistics South Africa (StatsSA) 2015 SAM to construct an economy-wide Leontief multiplier base model, micro-simulation, and a dynamic CGE model and we use these models to calibrate the effect of expansionary fiscal policy on the general macroeconomy as well as on marginalised group of people contrasted by age (Youth v Adult), race (African v non-African), income (less privileged v privileged households), education (primary v tertiary), and by area (Urban v non-urban). To reach our research objectives we performed a total of six microsimulations with three based on the SAM and the other three based on the CGE.

The findings from our microsimulations can be summarized as follows. From the first simulation we find discrepancies in the distribution of fiscal expenditure across racial groups with rich, 'white' households benefiting the most and poor 'coloured' households benefiting the least. We also observe a greater 'income-gap' more than 'racial-gap' across South African households. Our second simulation shows how fiscal injections benefit the adult employment more than it benefits youth unemployment. The third simulation further shows fiscal injections create employment in urban areas more than it does in rural areas. The fourth simulation demonstrates on how government injections exert very small economy-wide effects on improving economic output and the Gini coefficient. The fifth simulation demonstrates the economy-wide discrepancies in the effect of government spending across different income groups, with richer households benefiting much more from such expenditure compared to poor households. The last simulation demonstrates how fiscal injections improve employment for low-skilled labourers with low educational attainment as opposed to high-skilled labourers with more education.

Our simulations demonstrate why, after 20 years of democracy, inequality and poverty in the country has remained among the highest in the world, as government spending has exerted a minimal effect on historically marginalised groups of people and marginalised areas. Our simulations explain why there has been a tortoise pace in government's efforts to reduce poverty and inequality through social expenditure programmes. The study hence recommends that governments should follow a priorities-based government spending policy which fits well with the current situation of the country. Furthermore, South Africa needs to adopt international standards and best practices of '*science-based strategies*' rather than that of '*evidence-based strategies*' and ensure that only programmes that have proved to be effective should be financed in the fiscal budget. Lastly, future government spending should be strategically geared towards creating more jobs in the high-skilled category so that the economy can respond to rapid changes in technology.

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