MACROECONOMIC AND DEVELOPMENTAL IMPACTS OF SELECTED BASIC INCOME GRANT PATHWAYS FOR SOUTH AFRICA

Asghar Adelzadeh

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Abstract

In a highly unequal society like South Africa with half of the population living in poverty, a Basic Income Grant (BIG) is a means of enabling limited redistribution to the poorest. It should be no surprise that the richer citizens will need to pay their fair share. However, when mainstream economic tools, such as CGE and Dynamic Stochastic General Equilibrium (DSGE) models, are used to quantitatively assess the likely economic effects of a social assistance programme like a BIG, they normally predict that the programme will lead to substantially higher costs of borrowing and debt-GDP ratio and lower investment, output and employment. In reality, however, this category of models is built to closely reflect the neoclassical view of a market economy, a view which, according to Storm (2021), suffers from a number of inter-related 'irremediable flaws' (e.g. the crowding-out effect, rational expectations, perfect information, perfect competition and full employment) that are directly responsible for their predictable and comparable projections that any increase in government transfers, such as a BIG, will have negative macroeconomic effects. In this paper, we use the ADRS Dynamically Integrated Macro-Micro Simulation Model of South Africa (DIMMSIM™) to quantify the macroeconomic and development impact of three BIG scenarios, including their funding pathways. The model's macroeconomic model component reflects heterodox economic views that do not adhere to general equilibrium principles and is built in the tradition of structural econometric models. Simulations of the three BIG pathways show that a BIG programme can be funded without changes to the income tax or the VAT. A combination of a relatively small wealth tax and Social Security Tax (SST) can provide the necessary complementary resources that enable government to introduce and sustain the programme over time. Moreover, there is no trade-off between a BIG programme and economic growth and fiscal sustainability. In fact, a BIG programme can produce inter-related win-win outcomes by significantly reducing poverty and inequality and, at the same time, increasing economic growth and employment, taking into account various macro- and micro-feedback effects.

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1. Introduction[1]

The expansion of the social grants system in South Africa has been one the successes of the post-apartheid government. Most notably, the Child Support Grant (CSG) and the old age pension have provided critical support to children, the elderly and their families. However, the exclusive focus on these two groups has left a significant proportion of South Africans without any guaranteed income support – a situation that is dire given the high levels of unemployment. The importance of this issue has not gone unnoticed and the campaign for a Basic Income Grant (BIG) in South Africa has a long history. In the immediate post-apartheid period, there were many campaigns for such a measure to be introduced as part of the processes to address the vast inequalities inherited from apartheid. In particular, there was a significant push from civil society organisations, trade unions, researchers, and some parts of government for what was called a BIG. The 1997 White Paper on Social Welfare committed to comprehensive social security and proposals for a BIG were tabled in the Presidential Jobs Summit in 1998, leading to a commitment to investigate its viability. These discussions culminated in the Taylor Commission Report of 2002, which recommended the introduction of a BIG (Taylor 2002). However, this was opposed by some in government as unaffordable. Since then, although the question of basic income did not disappear completely, it was not a major item on the policy agenda.

The introduction of the Special COVID-19 Social Relief of Distress (SRD) grant in May 2020 and its extensions since then, however, have brought the debate on a BIG once again to the fore and changed the landscape of political possibility. The call for a basic income has also been amplified globally with a number of pilot projects being launched around the world. In addition, many countries have instituted

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other forms of cash transfer programmes. As a result, a growing body of evidence points to the potential benefits of such interventions. These include:

- **A BIG can improve the wellbeing of people by providing the means to meet one's basic needs:** Income is an important determinant of access to basic services in a market economy. By reducing poverty, income support has the potential to assist the most vulnerable and, in doing so, helps to break the relationship between poverty and poor access to social services.[2]

- **A BIG helps shift the significant gender and racial inequalities embedded in the South African political economy:** Research shows that globally women perform the vast majority of both paid and unpaid domestic and care labour.[3] In South Africa, this is also racialised with black women performing most of this work. This labour is often disregarded or treated as extra-economic despite it playing a critical role in the economy given the importance of social-reproduction.[4] Research has shown that unconditional cash transfers can play a role in addressing these imbalances by partly compensating for the care work done by women and by granting them additional security by making them less reliant financially on a male partner or family member (Weeks 2020). It should be noted that research shows that unconditional grants are much more effective in addressing these concerns than those conditional on factors like being a caregiver. (Molyneux and Thomson 2011).

- **A BIG can help improve labour market participation:** Research shows that having some form of basic income to cover basic needs can help free people from the stress of survival and allow greater chance of labour market participation.[5]

- **A BIG can increase the ability for people to generate their own sustainable livelihoods:** Cash transfer programmes have been shown to increase the ability of people to generate their own sustainable livelihoods. The mechanisms through which this happens include increased access to education and skills and greater possibility for self-employment and productive activities.[6]

- **A BIG can improve the economic sustainability and stability of poor communities and the country:** Evidence shows that a properly designed BIG can help stimulate economic growth that is in service of rights realisation and improvement of human wellbeing on a continuous basis in an equitable manner.[7]

[2] See: Mikkonen and Raphael (2010) and Stahl (2019).

[3] For an account of this during COVID-19 in South Africa see: Casale and Shepherd (2021). For a more general account see: Ferrant, Pesando, and Nowacka (2014).

[4] For an account of social reproduction in the economy see: Fraser (2016).

[5] See discussion of this including references to previous studies in South Africa in: Expert Panel on Basic Income Support (2021) pp. 64–68.

[6] See: Davis et al. eds. (2016), Baird et al. (2013) and Evans, Gale and Kosec (2020).

[7] See: Orkin (2020), Davis et al. eds. (2016), Studies in Poverty and Inequality Institute (2021) and Development Pathways (2021).

The rest of this paper is organised as follows. Section 2 provides a brief review of recent South African studies that quantitatively assess the likely impact of a BIG programme for South Africa. Sections 3 and 4 are dedicated to a non-technical presentation of the South African model that is used for the design and impact analyses of various BIG pathways, whose details are presented in section 5. Analyses of model results are provided in section 6, followed by the concluding remarks.

2. Review of Recent Approaches to Modelling a BIG

This paper uses an economic model of South Africa to quantify the likely macroeconomic and developmental impacts of alternative BIG scenarios. It extends Adelzadeh (2021), which examined the impact of several BIG scenarios designed to be as fiscally neutral as possible through a possible mix of tax policies (e.g. wealth tax, land tax, financial transaction tax, income tax, export tax), but did not recommend a specific mix of funding measures for a given scenario. Instead, for modelling purposes, the simulations of the new grant scenarios included adjustments of the income and wealth tax liabilities of the top two quintiles to recoup the amount directly paid to them and to the bottom two quintiles. Individuals from the third quintile that would receive the new grant would return the equivalent amount to the state through adjustments of their income and wealth tax liabilities.

The current paper extends the above study by focusing on the macroeconomic and developmental implications of three adult BIG scenarios and their funding pathways. Analysing the macroeconomic impact of social protection policy interventions requires an understanding of how individual and household income and consumption policies affect aggregate macroeconomic indicators such as employment and economic growth. This is a difficult undertaking since it raises the question of the appropriate methodology to address such questions.

During the last 30 years, poverty analysis and the challenge of designing 'pro-poor' policies have gradually occupied the central attention of development research.[8] This is partly attributed to worsening inequality and the persistence of high rates of poverty in many parts of the world. An important dimension of this research is increased recognition of the need for a better understanding of the interactions between macroeconomic dynamics and household-level poverty and inequality. As Bourguignon et al. (2008) point out, macro models do not account for the poverty and distribution effects of policy changes at household level, and micro models cannot explain the impact of macroeconomic policy changes on poverty.

While new techniques have been developed to use economic modelling as a tool for designing concrete and country-specific pro-poor policies, there has been increasing recognition that the effects of policies need to be traced to changes in the income and expenditure of individuals and households, because changes in household welfare have an important bearing on economic growth. Thus, economic models have been developed to capture the interactions between the macroeconomy and household poverty and inequality. This improvement has paved the way for a more holistic approach to the design of anti-poverty policies. Pioneering works in the early 1980s by Dervis et al. (1982) and Gunning (1983) paved

[8] Kakwani and Pernia (2000) define pro-poor policies as policies that are deliberately biased in favour of the poor so that the poor benefit proportionately more than the non-poor.

the way for a significant leap in linking household-level poverty-distribution analysis and the dynamics of the macroeconomy through what is now known as linked macro-micro modelling techniques.[9]

The range of linked macro-micro techniques is varied and has expanded over time.[10] There are at least four categories of linked macro-micro models. The main distinction between the four rests on the technique used to either represent households in the model or to extend the scope and nature of the dynamic interactions between macroeconomics and households.[11] The first approach is the traditional CGE modelling technique that utilises a small number of representative households to capture households in their design.[12] Although it is widely used, important shortcomings of this approach are generally that it assumes no changes in intra-group income distribution or imposes restrictions on the distribution of income.

The second type of model is a variation of the first with the incorporation of a larger number of representative households into the CGE. This is an attempt to better represent the existing socio-economic stratification within the population.[13] This approach clearly avoids the problem of selecting 'representative households' and, furthermore, allows for detailed analyses of distribution and poverty. However, as Piggot and Whalley (1985) point out, there are important intra-group heterogeneities that a high number of representative households do not capture. The third approach combines microsimulation modelling techniques, pioneered by Orcutt et al. (1961), with CGE modelling to further enhance the rigour and flexibility of household behaviour in the overall model. Examples of this approach include Bourguignon et al. (2003).

Savard (2003) represents a fourth approach within the CGE framework. His work aims to overcome some of the shortcomings of the previously described approaches since his model is designed to keep the feedback mechanism between households and the economy while using microsimulation techniques for households. He addresses some of the issues related to the coherence between the household model and the CGE model, introduces two-way links between the two, and develops an approach to achieve convergence between the results from the two models.

[9] The idea of linking micro and macroeconomic simulation models goes back to Orcutt (1967). The next set of important contributions in this area include: Thorbecke (1991), Bourguignon et al. (1991), De Janvry et al. (1991) and Morrisson (1991). Other contributions include Decaluwe et al. (1999a) and Decaluwe et al. (1999b), Cogneau and Robilliard (2000), Agenor et al. (2003), Cockburn (2001), Bourguignon et al. (2003) and Savard (2003).

[10] Estrades (2013) reviews the different linked macro-micro techniques and presents a brief description of their pros and cons.

[11] The following review uses Savard (2003).

[12] See for example: Dervis et al. (1982), De Janvry et al. (1991) and Agenor et al. (2003).

[13] The three commonly used criteria to disaggregate households in a social accounting matrix are geographical location, household resources and occupation of the head of household (Thorbecke 2000). Examples of this approach are found in the work of Decaluwe et al. (1999b) and Cockburn (2001).

This study contributes to the analysis of BIG in South Africa in three ways.

First, for the impact analysis of BIG scenarios, including their funding pathways, we utilise the Dynamically Integrated Macro and Micro Simulation Model of South Africa (DIMMSIM) that follows Savard (2003) and includes two-way annual interactions and convergence between the macro and micro parts of the model. Moreover, the macroeconomic component of the model is a structural econometric model that has a heterodox orientation where, for example, total savings are determined once the level of investment has been determined, and aggregate demand is a key short- and long-term determinant of the levels of economic activity and employment.

Second, it presents three distinct BIG scenarios that differ in terms of their ambition towards establishing an adult Universal Basic Income Grant. Each scenario's eligibility and entitlement conditions widen over time by gradually providing a greater grant amount to a larger portion of poor adults. Our impact analysis includes the expansion over time of each BIG scenario pathway.

Third, each BIG scenario includes a concrete funding pathway whose macroeconomic implications are an integral part of the dynamic interactions between the micro and macro parts of the model.

Section 3 presents an overview of the model we have used. However, some key technical differences between our empirical approach and at least three related South African studies are worth highlighting.

2.1 Assessment of Three South African Studies

Goldman et al. (2021) update South African 2014/15 Living Conditions Survey to 2019/20 before using the final dataset to examine the 'morning after' cost and poverty impact of several social grant scenarios, including BIG scenarios. Their assessment, which is limited to a micro level static analysis, does not cover macroeconomic feedback and the income distribution impact of the selected scenarios.[14] Due to these limitations, the study is able to provide only single-year estimates of the gross cost of the selected scenarios, using estimates of the number of direct beneficiaries of the scenarios for 2021 multiplied by the grant amount for the same year.[15] The authors' use of 'spending efficiency'[16] as a measure to compare, contrast and rank the selected scenarios is a crude measurement since it does not account for the dynamic impact of the scenarios on the economy and government revenue and on income inequality.

[14] Other shortcomings by Goldman et al. (2021) are that they do not provide funding pathways for the scenarios, measure a scenario's 'efficiency' through the marginal effect of the scenario on only one indicator, namely the poverty gap and, by focusing on the 'morning after' impact of the scenarios, they completely leave out dynamic medium- and long-term impact of selected scenarios.

[15] According to Goldman et al. (2021), their paper 'simulates the poverty reduction impacts of a selection of medium-to-long-term social grant options'. However, the timeframe of the calculations presented and analysed in the paper are limited to one year.

[16] Goldman et al. (2021) define spending efficiency as 'the proportion of scenario spending which contributes to a reduction in the FPL poverty gap' (p. 6).

In the two studies that were undertaken by an expert panel for the Department of Social Development, namely Expert Panel Report 2021 and Expert Panel Report 2022,[17] the quantification of the likely impact of BIG scenarios does not adequately account for the interactions between micro and macro economic indicators.[18] The simulation of the micro impact of each scenario for the period 2021 to 2030 is conducted independently of the evolution of macroeconomic indicators (e.g. employment, wage rates and prices) that are known to affect demand and the cost of means-tested social grants that include BIG.[19] As a result, when, for example, the macroeconomic outcomes of a scenario include an increase in the average unemployment rate, the initial estimates of the scenario of demand and cost of social grants and poverty and inequality remain unaffected.[20] Similarly, the quantification of the macroeconomic impact of BIG scenarios precludes second-round estimates of the cost of scenarios.

In comparison, the Dynamically Integrated Macro-Micro Simulation Model (DIMMSIM) uses its macro model's annual projections of sector employment and more than 50 wage and price inflation rates to endogenously update the database of the model's microsimulation component. This is done in terms of the annual employment status of individuals and their income and expenditure variables before the eligibility tests and cost estimations of the grants are carried out. At the same time, the two-way interactions between the macro and micro parts of the model ensure the adjustments of the models' annual macroeconomic outcomes to second-round re-estimation of demand and cost of social grants.

Another issue concerns the CGE macroeconomic models that were used in the Expert Panel (2021, 2022) reports. It is well established that standard CGE models closely reflect key principles of neoclassical economics such as the crowding-out effect;[21] available savings determine investment and full employment output (i.e. general equilibrium).[22] In a standard CGE model, therefore, government spending above the collected revenue reduces savings, which is translated to lower investment, output, employment and income. Moreover, CGE models reflect the neoclassical assumption that the economy operates at full employment capacity, which implies that any increase in aggregate demand due to government or household consumption expenditure leads to price increases.

It is, therefore, not surprising that the two debt-financing BIG scenarios that were used in Expert Panel (2021) crowd-out investment, negatively impact growth and employment, and increase the consumer

[17] Expert Panel Report 2021 refers to the final report of the Expert Panel on Basic Income Support, December 2021. Expert Panel Report 2022 refers to Supplementary Modelling Report by the Expert Panel on Basic Income Support, November 2022.

[18] Even when the macroeconomic outcomes of a scenario include significant (close to 5%) increase in the average unemployment rate, the scenario's poverty and inequality estimates remain unaffected.

[19] From the Expert Panel reports and SAMOD documentation, it is not clear what the sources are for the future values of key macroeconomic indicators (e.g. wage rates, prices, employment) that are used to annually update the model's database.

[20] See the employment impact of scenario CGE-Sim, Figure 5.12, Expert Panel Report (2021), p. 188.

[21] The crowding-out effect is a macroeconomic argument that suggests that increased government spending eventually lowers private sector spending by raising the cost of borrowing and lowering income when the government increases taxes or its borrowing to finance its spending.

[22] Full employment output refers to the production level when all available resources are utilised.

price index.[23] According to the Expert Panel (2021) report, 'any government dissaving resulting from its increased expenditure without financing the deficit consequently reduces the funds available for investment … thereby causing a negative impact on growth' (p. 177, para. 614.1).

On the other hand, the BIG scenarios in Expert Panel (2021) that are found to produce positive macroeconomic outcomes (e.g. higher growth and employment) achieve these by not restricting investments to the available domestic savings, which decline in the model due to the government undertaking new borrowing to spend on BIG.[24] To bypass the model's crowding-out mechanism, the Panel considers what if 'foreign capital inflows fully support all domestic demands for investment' (p. 166, para. 596.2). In other words, they consider 'what if all government dissaving were to be offset by foreign savings'. The implausibility of this assumption implies the improbability of achieving positive macroeconomic outcomes for BIG through a standard CGE framework.

When the Panel considers limiting the increase in foreign capital inflows to 20% of BIG funding needs and tries to fund the rest by introducing commodity and direct tax increases, the model generates negative economic growth and employment outcomes because the positive effect of the increase in FDI on gross savings is more than offset in the model by the negative impact of the proposed tax increases on savings and investment.

In its final scenario, the Expert Panel considers offsetting the negative impact of its tax proposals on saving by proposing cuts in general government expenditure, under the guise of public sector productivity improvement. Moreover, to loosen the model's underlying capacity constraint (i.e. the CGE models' full employment assumption), the scenario includes an exogenous, unrelated to BIG, increase in private sector productivity. The latter measure is to enable the scenario's aggregate demand increase to lead to output and not price increases. As a result, the scenario produces lower price increases and small increases in economic growth and the unemployment rate.

Overall, BIG programmes include increases in fiscal spending that are expected to stimulate aggregate demand in the economy through increases in household income and expenditure. Using CGE models and neoclassical supply-side economic logic, the Expert Panel had to make some highly implausible (significant increase in FDI) and problematic (government expenditure cuts) assumptions in order for two of its BIG scenarios to produce positive and not, as it is normally the case in CGE models, negative macroeconomic outcomes. The degree of implausibility of these assumptions points to the degree of improbability of receiving positive macroeconomic outcomes for BIG scenarios through a standard CGE framework. This finding also weighs heavily on the Panel's recommendation that, in the future, the government needs to increase the value of BIG to the Upper Bound Poverty Line (UBPL). Based on the economic analysis of the Panel Report (2021), *ceteris paribus*, any increase in government spending to help raise the value of BIG in the future will be considered unsustainable due to its crowding-out and inflationary impact unless there is an equivalent increase in foreign investment inflows or there is a mixture of foreign investment increases, government expenditure cuts and exogenous productivity increases.

Finally, our approach significantly differs from Hollander et al. (2022), who use a Dynamic Stochastic General Equilibrium (DSGE) model to assess 'whether a BIG can be financed sustainably and what the

[23] The scenarios are CGE-Sim 1 and CGE-Sim 2, Panel Report (2021).

[24] The scenario is CGE-Sim 3, Panel Report (2021).

macroeconomic implications of financing it in different ways would be'.[25] The model is a stand-alone macroeconomic model that is not linked to a microsimulation model and does not have sufficient 'representative' households to quantify the impact of the selected BIG scenarios on poverty and inequality. The DSGE model used by Hollander et al. (2022) and the CGE models used by the Expert Panel (2021, 2022) share the same core neoclassical economic theory with channels through which government spending shocks crowd-out investment and raise price inflation. It is, therefore, not surprising that the results of the Hollander et al. (2022) model, namely that a BIG programme will ultimately have a negative impact on investment, growth and employment, are similar to the findings of the Expert Panel BIG scenarios that did not include implausible and problematic assumptions.[26]

The nuances of DSGE models include the use of rational expectations, combined with perfect information assumptions, to characterise households' and firms' responses to policies. In other words, the DSGE models assume that households and firms are forward-looking and rational and have complete and full information about all prices and their own utility and cost function. By possessing these attributes, households and firms anticipate the path of the fiscal intervention and respond by adjusting their current spending and saving behaviours using their rational expectations of future taxation and their expected lifetime after-tax income. Therefore, any government spending in excess of current tax revenues to, for example, fund a government transfer programme will be offset by reduced private consumption and investment spending in anticipation of tax increases in the future.

For the case of South Africa, in their DSGE model, Hollander et al. (2022) divide the household sector into two groups that differ in terms of their consumption behaviour. A well-off group of households, whose private consumption is equivalent to about 50% of GDP, are considered Ricardian households that possess the above attributes of households in the standard DSGE models, namely they practise rational expectations, have perfect information, display the standard neoclassical optimising behaviour, can smooth their consumption intertemporally in response to shocks, invest, accumulate capital and have access to both foreign and domestic financial market.[27]

The remaining share of South African households, which Hollander et al. (2022) refer to as 'hand-to-mouth (H2M)' households and consume equivalent to 12% of GDP, are considered non-Ricardian

[25] Hollander et al. (2022), p. 52.

[26] This specifically refers to the first two scenarios of the Expert Panel (2021).

[27] 'Ricardian equivalence is an economic theory that says that financing government spending out of current taxes or future taxes (and current deficits) will have equivalent effects on the overall economy. This means that attempts to stimulate an economy by increasing debt-financed government spending will not be effective because investors and consumers understand that the debt will eventually have to be paid for in the form of future taxes. The theory argues that people will save based on their expectation of increased future taxes to be levied in order to pay off the debt, and that this will offset the increase in aggregate demand from the increased government spending. This also implies that Keynesian fiscal policy will generally be ineffective at boosting economic output and growth.' See: https://www.investopedia.com/terms/r/ricardianequivalence.asp

households that do not exercise rational expectations, do not have perfect information and do not trade in assets. They simply consume their after-tax disposable income.

Hollander et al. (2022) consider the presence of H2M non-Ricardian households as being generally conducive to raising the level of consumption or demand in response to government spending shocks. However, since the well-off group's share of total household consumption expenditure is significant, for instance four times higher than the share of the lower-income H2M households, the overall consumption behaviour of the household sector in the model is depicted to reflect the hypothesised consumption behaviour of the well-off portion of total households. That means, by design, the model's overall macroeconomic response to a government debt- or tax-financed BIG programme includes reductions in the overall household expenditure, investment, growth and employment.

According to Hollander et al. (2022), the contractionary effects of introducing a BIG, which operates through higher debt and crowding-out of public and private sector expenditure, 'dominate any expansionary effects from higher transfers. Simply put, a large fiscal transfer that has limited direct impact on aggregate demand [through the H2M consumption] will result in a large contraction akin to a negative demand shock.'[28] That is because, on the one hand, a BIG would decrease economic growth through three main channels: an increase in borrowing costs, an increase in taxes and crowding-out of private and public non-transfer spending. On the other hand, it would have a positive impact on economic growth through one main channel, namely an increase in consumption by poor households. Overall, the results suggest that the negative economic effects of an expansion in social grants would outweigh the positive effects.[29] In the final analysis and from a political economy perspective, the DSGE model used by Holland et al. (2022) by design allows well-off households in South Africa, with relatively higher spending power, to dominate the model's BIG macroeconomic outcomes in line with their preferences and interests, rejecting a policy proposal that has the potential to benefit the economy through its positive impact on society's large poor population.

Since much of the final outputs of DSGE models, including the model used by Hollander et al. (2022), relate to the models' rational expectations and perfect information assumptions, the critical question is whether these assumptions are empirically and historically justified. According to Coibion, Gorodnichenko and Kamdar (2018), 'the surveyed empirical micro-evidence appears increasingly at odds with the full-information rational expectation assumption.'[30] Solow (2010) argues that 'DSGE has nothing useful to say' because 'they take it for granted that the whole economy can be thought of as if it were a single, consistent person or dynasty carrying out a rationally designed, long-term plan, occasionally disturbed by unexpected shocks but adapting to them in a rational, consistent way'. Stiglitz (2018) argues that 'most of the core constituents of the DSGE model are flawed – sufficiently badly flawed that they do not provide even a good starting point for constructing a good macroeconomic model. These include (a) the theory of consumption; (b) the theory of expectations – rational expectations and common knowledge; (c) the theory of investment .'[31]

[28] Hollander et al. (2022), p.3.

[29] Ibid.

[30] Coibion, Gorodnichenko and Kamdar (2018).

[31] Stglitz (2018), p. 7.

3. Basic Structure and Features of DIMMSIM

To meet the objectives of the project, we use economic modelling techniques to design alternative BIG pathway scenarios and to simulate their likely macroeconomic and developmental impacts during the rest of the current decade. Over the last 20 years, ADRS has built a suite of South African economic models. This includes the DIMMSIM of South Africa, which, through its macroeconomic and microsimulation components, captures the dynamic interactions between macroeconomic performance, direct and indirect taxes, demand and cost of social grants, poverty and income distribution at individual, family and household levels. Following is a brief non-technical introduction to the DIMMSIM and its features.

3.1 DIMMSIM's Macroeconomic Component

The ADRS Multi-Sector Macroeconometric Model of South Africa (MEMSA) is one of the two modules of DIMMSIM. It allows the design and analyses of macroeconomics and industrial policies and produces projections of the paths of key indicators related to the economy and its economic sectors under various domestic and international contexts and policy options.

MEMSA is a bottom-up model with more than 3200 equations that captures the structure of the National Income and Product Account (NIPA) at sector and aggregate levels and produces projections that are consistent with various national accounting identities in nominal and real terms. MEMSA analytical approach is in the tradition of pluralism of heterodox economics and uses modern time-series specification and estimation methods to estimate the parameters of the model's behavioural equations. It uses the Autoregressive Distributed Lag (ARDL) estimation procedure, developed by Pesaran (1997) and Pesaran et al. (1996, 1999), to estimate its more than 400 estimated cointegration equations. Together they analytically and empirically capture the behaviour of the private and household sectors as part of capturing the working and dynamics of the economy from its production, expenditure and income perspectives. MEMSA's equation system can be broken down into several blocks that include:

- **The Final Demand Block** encompasses 769 equations. It includes sets of estimated equations that capture the behaviour of the private sector as it relates to sectoral-level investment, exports, and imports in 45 sectors; households in terms of expenditure on 27 categories of consumption goods and services; and the public sector in terms of final consumption expenditure and investment. The expenditure block of equations, therefore, produces projections of various components of aggregate demand in the economy that facilitate the model's projection of real and nominal GDP from the expenditure side.

- **The Production Block** includes 712 equations that represent the sector and aggregate production-related activities in the economy. It includes sets of equations that produce projections of sector outputs, potential outputs, capital stock, and capital productivity, all in nominal and real terms. Private sector decisions on how much to produce in various sectors of the economy are captured through 40 estimated equations that link the decisions to various demand, supply, and price factors in the economy. Therefore, the equations of the production block generate consistent projections of nominal and real values for sector and aggregate outputs, namely value added at basic prices. The

aggregate of sectoral value added at basic prices plus the net taxes and subsidies on products provide the model's annual projections of GDP from the production side.

- **The Price and Wage Block** is comprised of 413 equations that include time-series estimated behavioural equations for sector output prices (45), consumer prices (30) and investment prices (45). It also includes equations for sector import and export prices, sector- and economy-wide inflation rates and 45 estimated equations for the sector-level real wage rate (i.e. average remuneration rates) and 45 calculated sectoral-level nominal wage rates.

- **The Labour Market Block** is comprised of 186 equations that include 40 estimated equations that capture factors that determine short- and long-term demand for sector-level employment. In addition, this block includes equations for sectoral labour productivity, labour force, unemployment rate and other labour market indicators.

- **The Income, Expenditure and Savings Block** includes 569 equations that capture a detailed breakdown of income, expenditure and savings of households, incorporated businesses and government, in both nominal and real terms. A combination of variables from this block, the labour market block, the price and wage block and the production block provides forecasts of the real and nominal GDP from the income side.

- **The Financial Block** embodies 88 equations for indicators related to the financial and monetary side of the economy, such as the interest rate, exchange rates, money supply, credit extensions, household financial assets and liabilities, and foreign direct and portfolio investments. The financial block variables are especially important determinants of variables in other equation blocks and include policy variables and time-series estimated variables.

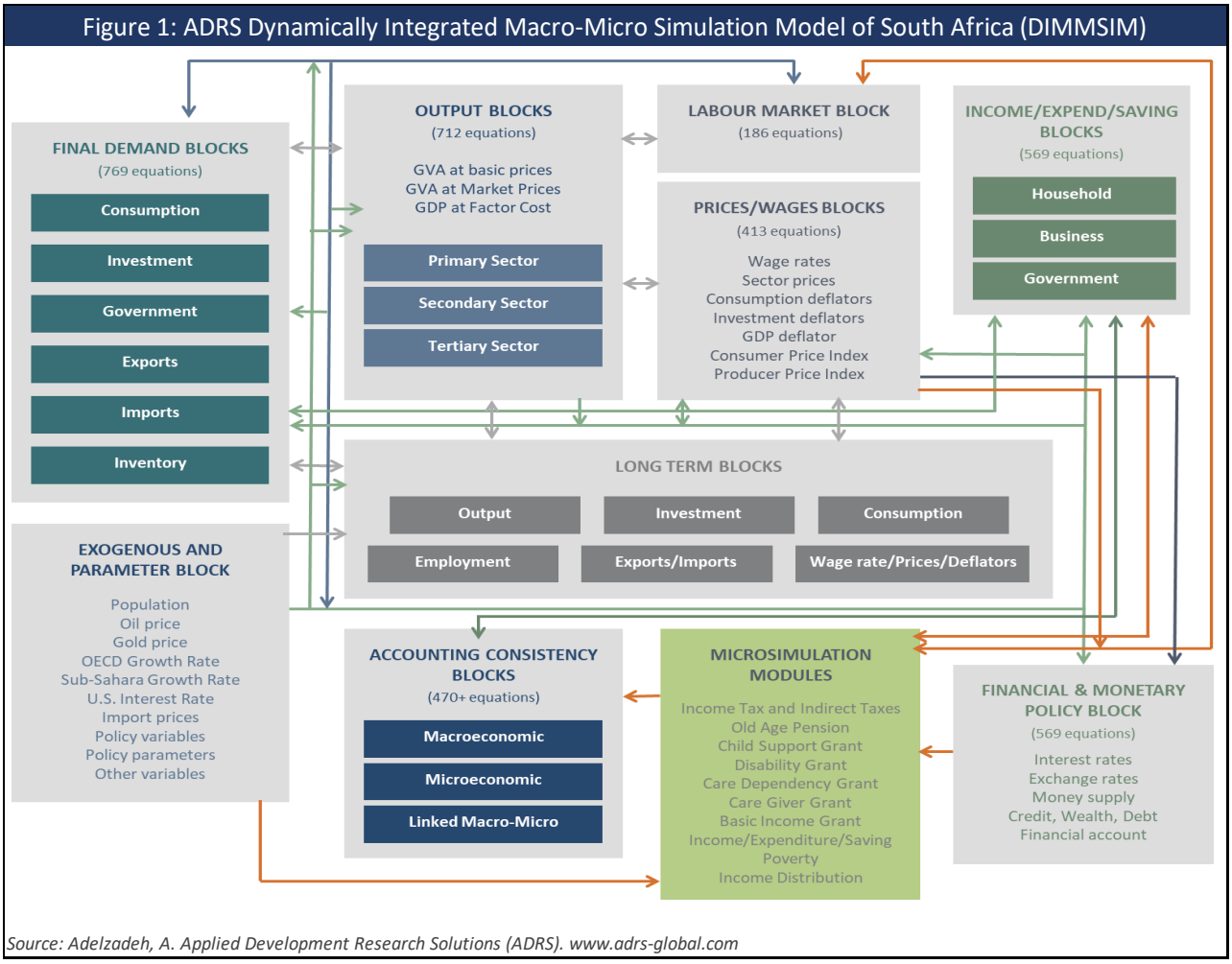
- **The National Account Block** incorporates more than 470 equations. This block of equations is responsible for ensuring consistency and enforcing NIPA relationships within the economic system captured by the model. For example, it ensures that in the model, the calculation of GDP, both real and nominal, from the income, production and expenditure sides are comprised of relevant NIPA components and are consistent with each other at aggregate and sector levels, in nominal and real terms.

MEMSA's list of exogenous variables includes several domestic and international variables. Among exogenous inputs to the model are:

- General government and public corporation investment
- Monetary and fiscal policy rules
- Government current spending
- Tax and subsidy rates
- Population

- Oil prices
- Gold prices
- Annual growth rates of world and regional import demands
- U.S. interest and inflation rates

Figure 1: ADRS Dynamically Integrated Macro-Micro Simulation Model of South Africa (DIMMSIM)



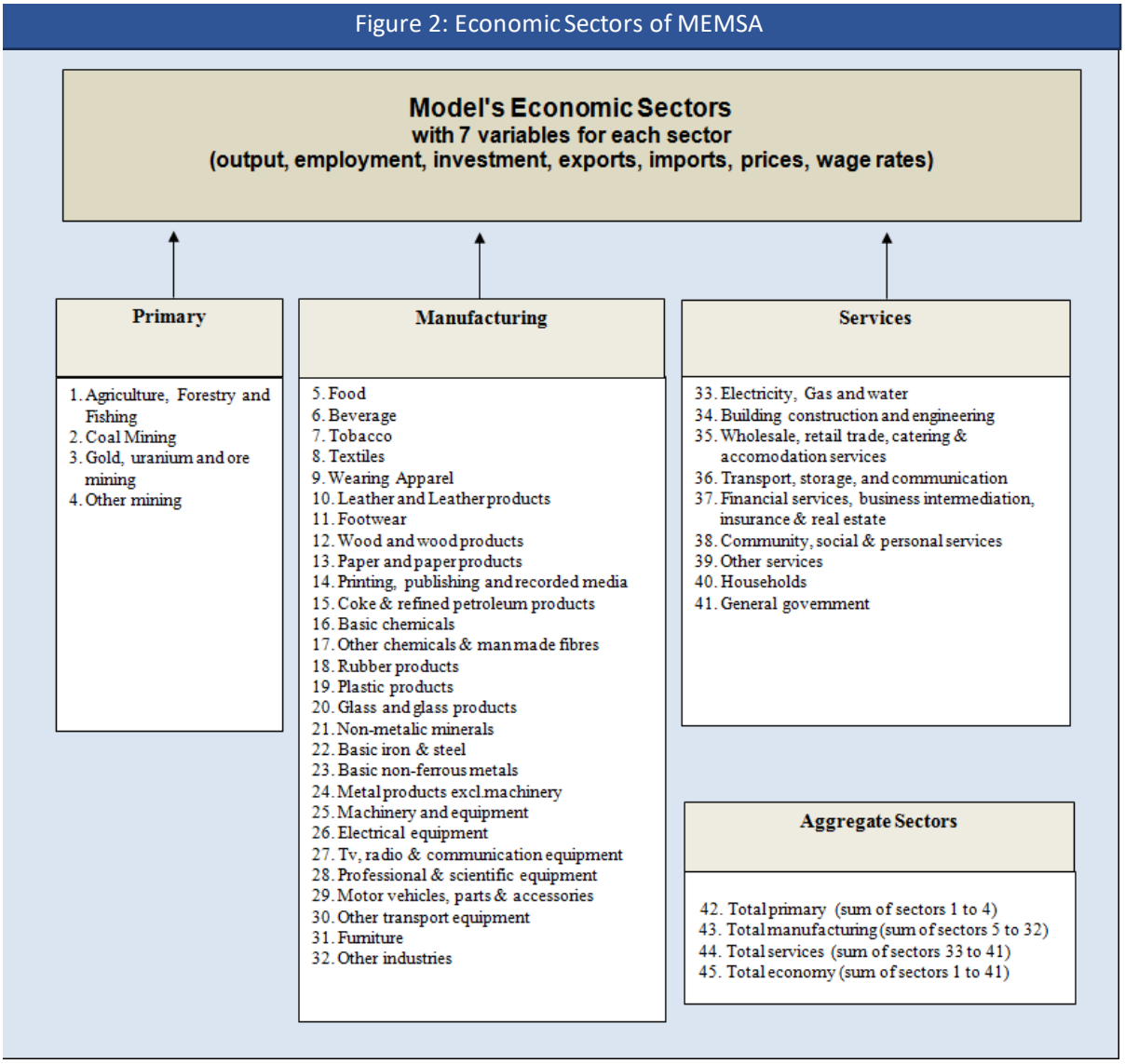
Source: Adelzadeh, A. Applied Development Research Solutions (ADRS). www.adrs-global.com

The macroeconomic module of DIMMSIM generates annual forecasts of a relatively large number of aggregates and sector-level, nominal and real variables and indicators. It includes indicators related to production, labour market, prices, wages, financial variables and incomes and expenditures of households, business and government. The model projections are consistent across aggregation levels, both in nominal and real terms. The model's key outputs include:

- Projection of key macroeconomic indicators
- Projection of demand for employment for 45 sectors of the economy
- Projection of output, investment, exports, imports, wages and prices for 45 economic sectors
- Financial indicators such as the interest rate, exchange rate, credit extensions and money supply
- Trade indicators

- Income and expenditure indicators
- Sustainability indicators
- Labour market indicators
- Production indicators
- Demand (expenditure) indicators

Figure 2: Economic Sectors of MEMSA



3.2 DIMMSIM's Microsimulation Component

In DIMMSIM, the macroeconomic module is linked to a full microsimulation model of individuals and households to capture the interactions between macroeconomics, industrial structure, household poverty and income distribution in South Africa.

The modelling principle employed to build the South African household model is the microsimulation technique, whose application to socio-economic modelling was pioneered by Guy Orcutt in the United States in the late 50s and early 60s.[32] The South African microsimulation model, originally built as a static model (Adelzadeh, 2001), was subsequently expanded and complemented with dynamic properties to capture the interactions between the macroeconomy and the household sector.

The main components of the model are its database and its tax and social policy modules. The South African model uses a micro-database of individuals and households using official Household Surveys, Income Expenditure Surveys, the Census and quarterly Labour Force Surveys, which are the main sources of countrywide economic and demographic microdata. The model's database is prepared in terms of family units because it relates closely to the definition of the financial unit used by many of the government tax and transfer programmes.[33] The model's database includes 125,830 individuals, making up 61,684 families or 29,800 households. The database includes weights for individuals, families, and households, which are used to translate each of the three samples to their corresponding populations for a given year. Each unit record includes more than 400 columns of information for each individual in the family – including demographic, labour force, marital status, housing, income, and expenditure information. More than 50 annual price and wage inflations, generated by the macroeconomic component of DIMMSIM, are used to endogenously uprate the microsimulation model's detailed database of individual and family income and expenditure variables. Statistics South Africa's detailed annual population forecasts are used to age the model's demographic structure, which means that the model's annual projections reflect the official demographic evolution of the country.

The South African microsimulation model includes three modules for the government's taxation policies (i.e. personal income tax, excise tax and value-added tax), six modules for transfer programmes (i.e. old age grant, child support, disability grant, care dependency grant, caregiver support and the BIG), a public works module for government's Expanded Public Works Programme (EPWP) and two modules for poverty and inequality.

3.3 Interactions Among Modules of DIMMSIM

The model includes two-way interactions between its macro and micro components such that (a) changes in macroeconomic variables (e.g. changes in prices, employment, wage rates) influence the welfare of individuals and families at microeconomic level; and (b) at aggregate level, changes in individual and family level economic conditions (e.g. poverty, inequality, consumption, taxes, eligibility for the social grant) influence macroeconomic outcomes. Gauss-Seidel's iterative method is mainly used to solve the overall system. The procedure runs the two models for several interactions, allowing interactions between the macro and micro parts of the model before it converges and generates the final results for each year of the forecast period. This ensures that the results of each period reflect the convergence of the macroeconomic variables and household-level variables at the aggregate level. Therefore, the two

[32] Orcutt (1957), Orcutt et al. (1961).

[33] Since the South African national surveys use 'households', the construction of the unit record of the South African model on the basis of family unit required a substantial amount of programming. The relational codes in the October Household Survey were used to break down households into the appropriate number of families.

models are dynamically integrated and generate time-based results that reflect the actual process of policymaking and evaluation.

4. Model Preparation

The operation of the DIMMSIM model relies on extensive national and sector data that are up-to-date and consistent with each other in accounting terms. The main sources of data for the model are various time-series data, including the NIPA (Reserve Bank); Statistics South Africa sector data prepared by Quantec and in line with the national aggregate data; national input-output data (Quantec); consolidated general government income and expenditure and its functional breakdown (Reserve Bank and National Treasury); national capital expenditure (National Treasury); public corporations' capital expenditure (National Treasury), and demographic and labour force data (Statistics South Africa).

The model's simulations and projections are also based on various inputs that are exogenous to the model. These include demographic data, policy parameters and other national and international parameters. For the duration of the forecast (2023–2030), the values of these variables and parameters had to be carefully prepared and fed into the model.

5. Policy Scenarios

This section focuses on the specifics of the Business-As-Usual (BAU) scenario followed by features that are shared by the three BIG scenarios (i.e., Low, Medium and High Ambition Scenarios) and their distinguishing attributes.

The BAU Scenario: The BAU (or Baseline) Scenario envisages government economic policy continuing on its current and recent historical path for the rest of the decade. It is assumed that, for example, through the Medium-Term Strategic Framework (MTSF) and the Medium-Term Expenditure Framework (MTEF), fiscal policy will continue to prioritise lowering the debt-GDP ratio through government expenditure cuts, tax rates will remain unchanged, and monetary authorities will continue to set the interest rate to enforce strict adherence to inflation targeting, with a 6% ceiling for the inflation rate.[34] A few other features of the BAU Scenario are:

[34] Adelzadeh et al. (2021) used ADRS Linked National-Provincial-District-Municipal economic model of South Africa (LNP-SA) to design post Covid-19 recovery scenarios and simulate their impact on key economic indicators for the rest of this decade. One of the scenarios asked what the likely economic outlook would be if the recovery plan implemented more conservative economic policies than those of the post-1996 period. The scenario is represented by the following austere policy roadmap: Government spending on goods and services is cut by 10%; capital spending by the government is reduced by 5%; monetary policy is tightened by lowering the current 6% upper bound for inflation to 4%; and the localisation policy is abandoned and subsidies on products and production are cut by 5%.

- All components of general government investment increase annually by 6.5%. These are investments in economic infrastructure, social infrastructure and business services.
- Investment by public corporations also increases annually by 6.5%.
- General government final consumption expenditure increases annually by 5%.
- No new micro, macro or social policy measures are introduced between 2023 and 2030.
- The pre-COVID-19 social security programme, that did not include the Social Relief of Distress Grant, will be implemented during the rest of the decade with the grant amounts adjusting by 6% annually.

The following features are shared by the three BIG Scenarios:

Continuity of Economic Policy: The three BIG Scenarios assume that outside the proposed reform of social security, government economic policy will continue on its current and recent historical path for the rest of the decade.

Individual Grant: The three BIG programmes provide an individual grant and not a family grant. This implies that means tests are conducted at an individual level and grants are paid out to individuals.[35]

Adult Grant: The grant is an adult grant, designed for individuals of working-age (between 18 and 59) who do not receive any other grants for themselves.[36]

Means-Tested Grant: The three BIG scenarios limit eligibility to individuals whose incomes fall below a pre-determined threshold.

No Conditionalities: There are no conditionalities attached to receiving the grant. This means that beyond the above eligibility conditions, the grant is not conditional on certain other requirements that recipients must comply with, for instance regular drug testing or participation in job training programmes. Conditionalities add a layer of bureaucracy to the grant system and open up the possibility for corruption and patronage as they typically require officials to sign-off on whether a conditionality has been met by an applicant.

Less than 100% Take-up Rate: In line with experience from the CSG we assume a take-up rate for the new grant of 60% in the first year.[37] Thereafter, the rate will increase annually by 3% until it reaches a maximum of 81% by 2030.

[35] National Treasury has previously proposed replacing the SRD grant with a household grant (among other options). For a discussion on this, see https://www.iej.org.za/statement-treasury-and-presidency-proposed-srd-grant-replacements/.

[36] Caregivers who collect a Child Support Grant (CSG) are included in the BIG since the CSG is received on behalf of their child.

[37] DSD, UNICEF and SASSA (2016).

The Grant Amount: In order to link the grant amount to existing measures of poverty, we make use of the three official National Poverty Lines, namely Food Poverty Line (FPL), Lower Bound Poverty Line (LBPL) and Upper Bound Poverty Line (UBPL) as explained in Box A.[38] Built into the poverty module of DIMMSIM is the annual adjustment of all poverty lines, thus the BIG values, to an average inflation rate of 5%.[39]

Box A: South Africa's National Poverty Lines

StatsSA (2022) provides three official National Poverty Lines. These are:

Food Poverty Line (FPL): This is the monthly amount that an individual need to afford the minimum required daily energy intake. The FPL for 2022 was R663.

Lower Bound Poverty Line (LBPL): This is the FPL plus an austere minimum expenditure on non-food basic needs. For 2022, the monthly LBPL was R945 per person.

Upper Bound Poverty Line (UBPL): The UBPL is obtained by adding to the FPL the average non-food expenditure of the reference households for this poverty line. For 2022, the UBPL per person was R1417 per month.

Targeted versus Universal: A major debate over the design of cash transfer programmes relates to targeting and universality.[40] Targeting requires the use of various tests, typically around the level of poverty or level of income an individual or family may receive. A universal approach is when there is no targeting and all individuals are able to access the grant regardless of their income level.[41]

In this research, we examine the impact of three targeted BIG scenarios over the 2023- 2030 period that represent different ambitions in terms of coverage of the adult population and the grant amount.

[38] Alternative suggestions include setting the grant value at the National Minimum Wage or the income tax threshold (around R95 000 p/a in 2023).

[39] The 5% annual increase of the poverty lines used in the model is consistent with the average annual increase of the official poverty lines provided by Statistics South Africa (Stats SA, 2022). In May 2023, few moths after the modelling work on this project had finished, the Statistics South Africa released the official poverty lines for 2023 (Stats SA, 2023). The document shows that the values of the three poverty lines have increased between 2022 and 2023 by 14.63% (FPL), 11.96% (LBPL), and 9.95% (UBPL).

[40] See: Akkerman et al. (2006), Köhler et al. (2009), Zelleke (2007) and Hasdell (2020).

[41] Universality has been found to have a wide-range of benefits, including that it limits exclusion errors (people who should get the grants are not getting them); reduces the administrative burden on both the state *and* beneficiaries that comes with complex application systems; and limits the stigma attached to receiving income support creating instead a common right that all people feel they are entitled to. A full discussion on the benefits of universality can be found in Howson and Mncube (2022).

Pathway 1 is a Low-Ambition scenario because the value of the grant does not rise above the LBPL, and the means test does not rise above the UBPL. The value of the grant begins at the level of the current SRD grant, rises to the FPL value and then to the LBPL. The means test begins at the level of the FPL and then rises to the LBPL and then to the UBPL.

Pathway 2 is a Medium-Ambition scenario. Under this scenario the value of the grant starts with the FPL, which is above the R350 of the SRD, rises to the LBPL and then to the UBPL. It employs a moderate means test throughout, starting at the LBPL, increasing to the UBPL and then doubling that amount.

Pathway 3 is our highest ambition scenario within the medium-term timeframe constraints. It follows the same path in terms of increasing the grant to the UBPL as pathway 2, but vastly expands the number of poor and low-income individuals eligible for the grant using a means test at double, 4 times and 6 times the UBPL respectively. Relative to the first two scenarios, the High-Ambition Scenario is designed as a step closer to a universal adult BIG. If the High-Ambition Scenario is implemented during the rest of this decade, its economic and developmental outcomes can pave the way for the adoption of a universal adult BIG during the 2030s. Table 1 summarises the eligibility and entitlement conditions of the three BIG pathways.

Table 1: Summary of Design Differences in Three BIG Pathways

Pathway	Period	Means Test	Grant Value
Low Ambition	2023–2024	FPL	R350
	2025	LBPL	R350
	2026–2027	UBPL	FPL
	2028–2030	UBPL	LBPL
Medium Ambition	2023–2025	LBPL	FPL
	2026–2027	UBPL	LBPL
	2028–2030	2xUBPL	UBPL
High Ambition	2023–2025	2x UBPL	FPL
	2026–2027	4x UBPL	LBPL
	2028–2030	6x UBPL	UBPL

Funding of BIG: The international literature on the sources of funding for a BIG programme includes debt financing, budget restructuring and the use of one or more tax instruments.[42] Given the current tight or restrictive fiscal policy environment in South Africa, financing a BIG programme primarily through borrowing is unlikely. At the same time, after years of fiscal consolidation, cutting the budgets for important state functions to pay for a BIG is an undesirable option, especially since it runs the risk of eroding the capacity of the state in the long term and undermining the poverty alleviation impacts of a

[42] Venter *et al.* (2021) examines several revenue generation options that can be potentially used as part of the financing of a BIG programme in South Africa, such as a Financial Transactions Tax.

BIG. Finally, it is possible that the government will finance a BIG programme by increasing government revenue by significantly increasing the income tax rate and/or the VAT rate.[43]

For the funding pathways of the three BIG scenarios, we have chosen (a) an indirect channel through the increase in VAT revenue that is enabled not by increasing the VAT rate, but by the scenarios' positive impact on the GDE, and (b) a combination of a wealth tax and a Social Security Tax (SST).[44] As the world's most unequal society, with the richest 10% of the population owing more than 85% of household wealth in South Africa, using a wealth tax to partially finance a BIG programme seems justified, especially since the allocation of assets continues to shape wealth inequality.[45] At the same time, an SST, which will be collected from all formal employment wages and earmarked for the BIG programme, will help increase financing for contemporaneous benefit expansion to poor adults who are currently outside the government's social security programme.

Therefore, to examine the financial feasibility of the three BIG pathways, a wealth tax and an SST module were added to the DIMMSIM's existing direct and indirect tax modules.

The wealth tax module of DIMMSIM is connected to both the macroeconomic and microsimulation components of the model. For each period, it uses the model's annual projection of the household net wealth at the macro level to establish the taxable portion of household wealth (e.g. 50%) before estimating the overall total wealth tax, using a wealth tax rate (e.g. 0.5%). Next, the microsimulation part of the model annually allocates the estimated total wealth tax among individual taxpayers in the top quintile, using their income shares of the top quintile's total household income as weights.

DIMMSIM's SST module annually applies a flat tax rate (e.g. 3%) to formal employment wages up to a taxable maximum (e.g. R2.5 million), which increases annually, according to the growth in the national average wage index.[46] The model's SST module is built as part of the microsimulation component of DIMMSIM. For each year of the forecast period, the model uses its detailed database of individuals' labour

[43] Since the introduction of Growth, Employment and Redistribution (GEAR) in 1996, the government's fiscal policy strategy has pursued at least two aims: to avoid permanent increases in the overall tax burden and to use medium-term deficit targets to eliminate government dissaving (National Treasury, 1996: 4, 8). In practice, these aims have curtailed the government's ability to raise taxes and/or to borrow as part of financing the expected post-apartheid socio-economic transformations (Adelzadeh 2023, forthcoming).

[44] It should be noted that a variety of other tax measures add further options to improve the financial feasibility of a BIG and present possibilities for future research. One notable financing option, for example, would be a financial transactions tax (Stoddard 2023) which can help address speculation in financial markets and the increasing disconnect between the financial sector and the real economy. IEJ (2021) outlines these options in detail.

[45] Chatterjee et al. (2021), Francis and Webster (2019).

[46] This is a simple approach to a SST programme that can be further developed to include additional options, such as an employer contribution, and a progressive, rather than flat SST See Venter *et al.* (2021)..

market participation and sources of income to test their eligibility and to calculate their SST amounts. SST is normally deducted from employee earnings by employers who pay the final amount to the government social security programme.

For each BIG scenario, its final funding pathway was developed through multiple simulations using 'what if' scenarios for the wealth tax and SST parameters. The model projections of the annual VAT revenue were estimated by its VAT module.

6. Analysis of Scenario Results

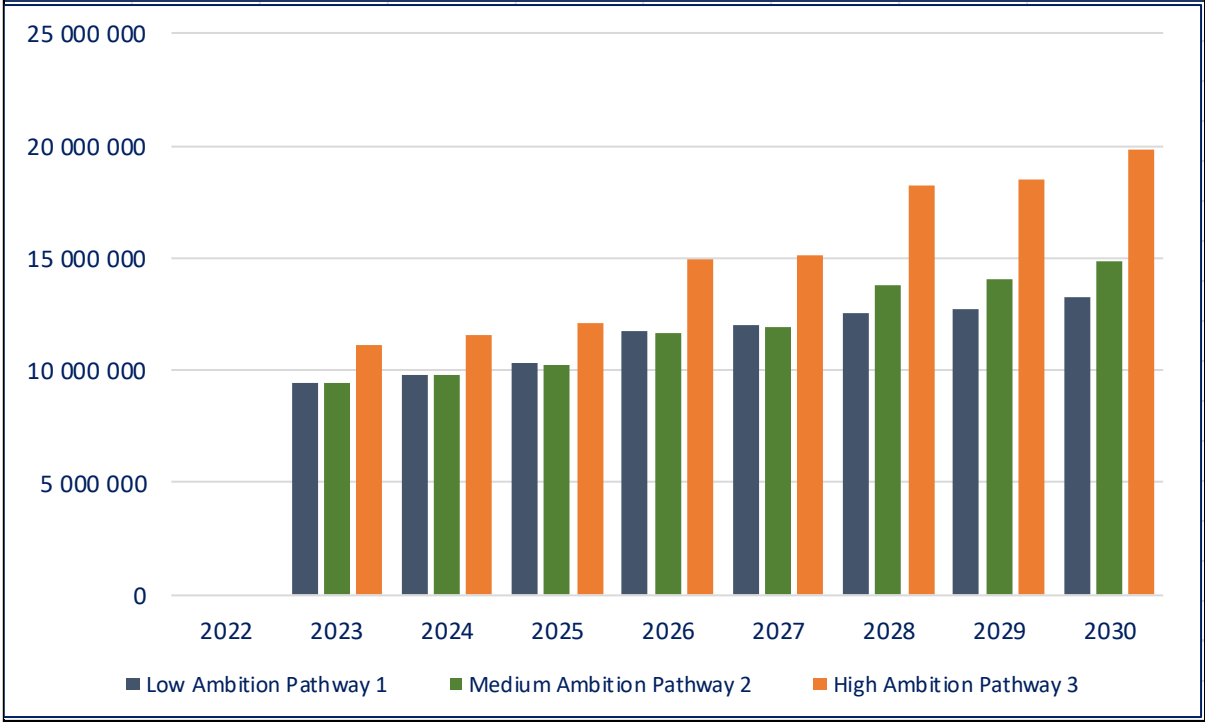
This section presents simulation results for the four aforementioned pathway scenarios using DIMMSIM. The model generates extensive results for a wide range of indicators related to the macroeconomy, industrial sectors and households' poverty and inequality.[47] Due to space limitations, we compare scenarios in terms of their implications for the evolution of key economic and development indicators to identify and substantiate key findings.

6.1 Model Results: Projections of Number of Beneficiaries

The number of individuals who will be direct beneficiaries of the Low and Medium-Ambition BIG scenarios is projected to gradually increase from 9.4 million in 2023 to 13.3 million (Low-AmbitionLow-Ambition) and 14.9 million (Medium-Ambition) by 2030. In the case of the High-Ambition Scenarios, model projections show that the number of grant recipients will start at 11.1 million in 2023 and gradually increase to 19.8 million by 2030 (Figure 3). Overall, the direct beneficiaries of the three BIG scenarios are expected to annually change due to: (a) population growth, (b) the gradual upward shifts of the scenarios' means tests, (c) the annual increase in the grant's uptake from 60% in 2023 to 80% in 2030, and (d) income fluctuations .

[47] The macroeconomic component of the model generates annual results in real and nominal terms for 45 economic sectors. The results include annual values for sector outputs, investments, employment, exports, imports, wage rates and prices. The model produces results for 26 household consumption expenditures categories in real and nominal values. Moreover, the model's projections include more than 100 prices and deflators, 16 categories of private sector income and expenditure, 16 categories of households' income and expenditure, and 28 categories of government sector income and expenditure. The microsimulation component of the model estimates annual forecasts of poverty, inequality, budget for and distribution of social grants, and direct and indirect taxes in aggregate levels and the cross-tabulation of results by region, gender, race, locality and family type.

Figure 3: Comparison of Pathways: Number of Beneficiaries



Source: Dynamically Integrated Macro-Micro Simulation Model of South Africa (DIMMSIM), www.adrs-global.com.

6.2 Model Results: Cost and Finance Impact

Table 2 provides the model estimates of the annual cost of the three BIG scenarios for the period 2023 to 2030. Moreover, the table contains the annual contributions of the three sources of financing to the BIG scenarios, including the additional VAT revenue that BIG Pathways generate compared to the VAT revenue under the Business-As-Usual (BAU) Scenario. Table 2 and Figure 4 depict DIMMSIM's projections of the costs and financing pathways of the three BIG scenarios:

- The model estimates of the annual gross cost of the Low-Ambition BIG scenario are between R39.4 and R47.8 billion during the first three years (2023–2025), when 9.4 to 10.3 million eligible adults are expected to receive the grant. After 2025, the scenario is expected to serve a larger portion of the country's poor adults by using the UBPL for the means test and increasing the monthly grant amount from SRD to FPL during 2026–2027 and to LBPL starting from 2028. Consequently, both the number of BIG recipients and the gross cost of the grant are expected to substantially increase after 2025 and reach 13.3 million and R222.6 billion by 2030 respectively (Table 2a and Figure 4a).

  Concerning the financing needs of the Low-Ambition pathway, DIMMSIM results show that they can be met through (a) the introduction of a wealth tax at 0.5% between 2023 to 2025 and 1.0% between 2026 and 2030; and (b) the increase in VAT revenue due to the scenario's positive impact on the GDE (Table 21 and Figure 4a).[48] The latter outcome implies that the annual net cost of the Low-Ambition BIG programme, i.e., the gross cost minus the increase in earnings derived from

[48] See section 5.1.3.

the programme, will be lower than its estimated annual gross cost by 29% to 40% during 2023 to 2030. Overall, the model simulation results show that the average annual Gross Cost and Net Cost of the Low-Ambition Scenario as a percentage of GDP will be 1.55% and 1.01% respectively.

- Relative to the Low-Ambition Scenario, the Medium-Ambition BIG Pathway benefits a comparable number of poor adults during the 2023 and 2027 period but at a higher cost since the pathway includes higher grant amounts during the same period. After 2027, the pathway's amount of transfer to eligible poor adults, and thus the financing needs of the scenario, increases by 82% due to a combination of using twice the UBPL amount for the means test and increasing the grant amount to the UBPL (Table 2b). Overall, the financing needs of the Medium-Ambition Scenario can be met through (a) the introduction of a wealth tax at 1.0% from 2023 onward; (b) the introduction of an SST in 2008 at 3% of formal employment wages up to the taxable maximum of R2.5 million; and (c) the increase in VAT revenue due to the positive impact of the scenario on the GDE, which indicates that the annual net cost of the Medium-Ambition BIG programme will be lower than its estimated annual gross cost by 32% to 44% during 2023 to 2030 (Table 2b and Figure 2b). Overall, during the projection period, the model simulation results show that the average annual Gross Cost and Net Cost of the Medium-Ambition Scenario as a percentage of GDP will be 2.60% and 1.59% respectively.

- The High-Ambition pathway is a BIG scenario designed as a step closer to a universal adult BIG programme. Therefore, the means test for the High-Ambition Scenario is two, four and six times the value of the UBPL during 2023–2025, 2026–2027 and 2028–2030 respectively. Consequently, the model results for the High-Ambition Scenario show that relative to the Low and Medium-Ambition Scenarios, the annual number of grant recipients will be on average 25.8% and 30.7% higher, respectively. As a result, by 2030, , 44.2% of the working-age population is expected to receive the grant under the High-Ambition pathway, which translates to a high gross cost of the scenario (Table 2c). This is compared to 29.6% and 33.1% of the working age population that are expected to receive the grant under the Low-Ambition and Medium-Ambition scenarios by 2030.

  Our simulation of financing options for this scenario indicates that the financing needs of the scenario can be met through (a) the introduction of a wealth tax at 1.0% from 2023 onward; (b) the introduction of an SST in 2028 at 4% of wages up to the taxable maximum of R2.5 million; and (c) the increase in VAT revenue due to the significant positive impact of the scenario on the GDE (Table 2c and Figure 2c), which is estimated to lower the annual net cost of the High-Ambition Scenario by 35% to 48% during 2023 to 2030. Overall, the model simulation results show that relative to GDP, the average annual Gross Cost and Net Cost of the Low-Ambition Scenario will be 3.36% and 1.98% respectively.

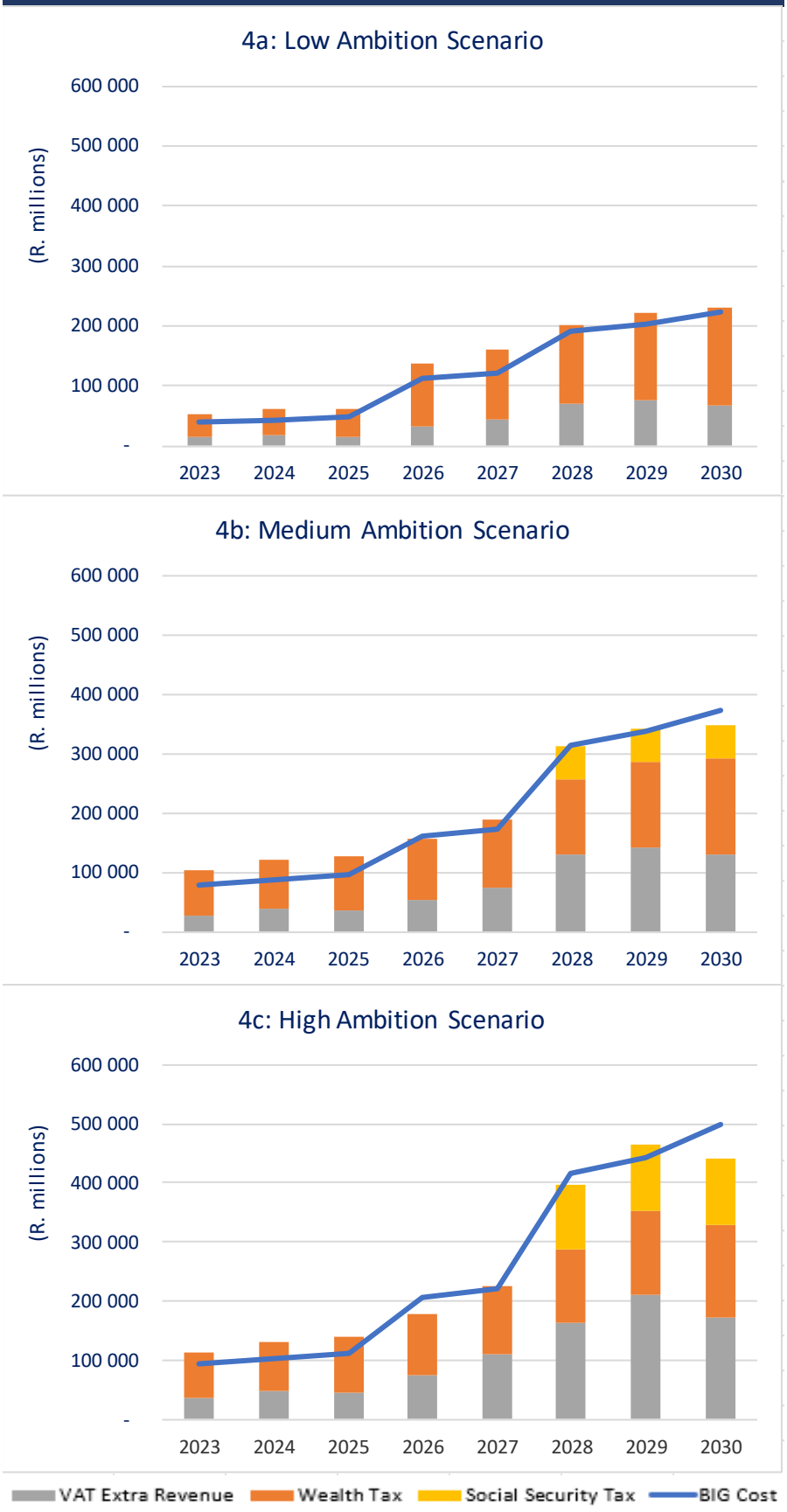
  The fiscal implications of the three BIG pathways are further discussed in section 5.1.4.

Table 2: Cost and Finance of Alternative BIG Pathways	2023	2024	2025	2026	2027	2028	2029	2030
Low Ambition Scenario (Rand million)								
BIG Gross Cost[1]	39 425	43 344	47 839	113 418	121 876	191 271	203 296	222 562
BIG Finance	54 071	60 289	62 383	137 606	161 777	200 751	222 008	230 021
Wealth Tax	*38 376*	*42 946*	*47 566*	*105 039*	*116 539*	*129 507*	*145 233*	*162 441*
Social Security Tax	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
VAT Extra Revenue	*15 695*	*17 343*	*14 818*	*32 567*	*45 237*	*71 245*	*76 775*	*67 579*
Excess BIG Revenue (+)/Cost (-)[2]	14 646	16 945	14 544	24 188	39 901	9 480	18 712	7 459
Cumulative Savings[3]	14 646	31 591	46 135	70 323	110 224	119 704	138 416	145 875
BIG Net Cost[4]	23 730	26 001	33 021	80 851	76 639	120 026	126 521	154 983
Net Relative to Gross Cost	-40%	-40%	-31%	-29%	-37%	-37%	-38%	-30%
Medium Ambition Scenario (Rand million)								
BIG Gross Cost	78 916	86 101	94 399	160 587	171 900	313 703	336 147	373 448
BIG Finance	102 871	121 583	128 100	156 489	189 989	311 023	341 284	346 442
Wealth Tax	*75 797*	*83 689*	*93 748*	*104 441*	*116 219*	*127 429*	*143 681*	*159 365*
Social Security Tax	*0*	*0*	*0*	*0*	*0*	*55 208*	*55 689*	*56 250*
VAT Extra Revenue	*27 074*	*37 895*	*34 352*	*52 048*	*73 770*	*128 386*	*141 913*	*130 827*
Excess BIG Revenue (+)/Cost (-)	23 955	35 482	33 701	-4 098	18 089	-2 680	5 137	-27 006
Cumulative Savings	23 955	59 437	93 138	89 040	107 129	104 449	109 586	82 580
BIG Net Cost	51 842	48 206	60 047	108 539	98 130	185 317	194 234	242 621
Net Relative to Gross Cost	-34%	-44%	-36%	-32%	-43%	-41%	-42%	-35%
High Ambition Scenario (Rand million)								
BIG Gross Cost	92 622	101 151	111 234	206 567	219 301	415 969	442 197	498 245
BIG Finance	111 856	129 981	137 991	177 592	225 471	397 943	464 315	442 351
Wealth Tax	*75 351*	*83 175*	*93 168*	*102 993*	*115 821*	*125 972*	*142 182*	*157 710*
Social Security Tax	*0*	*0*	*0*	*0*	*0*	*110 416*	*111 378*	*112 500*
VAT Extra Revenue	*36 504*	*46 806*	*44 823*	*74 599*	*109 650*	*161 554*	*210 754*	*172 141*
Excess BIG Revenue (+)/Cost (-)	19 234	28 830	26 757	-28 975	6 170	-18 026	22 118	-55 894
Cumulative Savings	19 234	48 064	74 820	45 845	52 015	33 989	56 107	213
BIG Net Cost	56 118	54 345	66 411	131 968	109 651	254 415	231 443	326 104
Net Relative to Gross Cost	-39%	-46%	-40%	-36%	-50%	-39%	-48%	-35%

Source: Dynamically Integrated Macro-Micro Simulation Model of South Africa (DIMMSIM), www.adrs-global.com.

Notes: [1] The gross cost represents the initial, total cost without taking into account any cost reductions. [4] The Net Cost, or the actual cost, is the Gross Cost minus the increase in VAT earnings derived from the programme. [2] Excess BIG Revenue represents the magnitude of likely annual overshooting or undershooting of the programme's Finance relative to the Gross Cost, two endogenously determined variables in the model. [3] Cumulative Savings refers to using a dedicated account for the programme to save positive Excess BIG Revenue annually or use the cumulated saving to fund the negative Excess BIG Revenue. This mechanism is not employed for this report. However, if it is included, it has the potential to partially or fully eliminate the need for the fiscus to provide additional funding to the programme when Excess BIG Revenue is negative. For example, in the case of the three BIG Pathways, as the table shows, the cumulated annual saving mechanism would have made it possible to fully fund the three Pathways using proposed tax policies.

Figure 4: Cost and Financing of BIG Pathways



Source: Dynamically Integrated Macro-Micro Simulation Model of South Africa (DIMMSIM), www.adrs-global.com.

6.3 Model Results: Macroeconomic Impact

The assessment of the macroeconomic impact of the BIG pathways starts with the BAU Scenario, which assumes that the government will continue its current policy path for the rest of the decade, without the introduction of an income grant in the form of BIG or continuation of the Social Relief of Disaster (SRD) grant. Using the DIMMSIM, the simulation of the BAU Scenario produces the baseline projections of economic indicators, including macroeconomic indicators such as GDP, employment, inflation and government finances. After establishing the baseline outlook for the economy, the model is used to simulate the potential impact of the three BIG pathways. Using the BAU Scenario results as a reference point, the comparative analysis of the impact of the BIG pathways on the economy provides policymakers and other stakeholders with a range of insights into the potential economic and development impact of each pathway.

The BAU Scenario: The simulation of the BAU Scenario shows (Table 3, Baseline column) that during the rest of the decade (i.e. 2023–2030), GDP growth will be on average 2.2% per annum. Moreover, the average unemployment rate (narrow definition) will be 32.1%. At the end of the period, namely 2030, the unemployment rate will be 32.4%.

The Low-Ambition Scenario: Using DIMMSIM, the scenario's revenue and expenditure channels directly and indirectly affect macroeconomic indicators.

From the expenditure side, the disbursement of a BIG amount to eligible poor adults will have a direct positive impact on the recipient's gross family income. Under the Low-Ambition Scenario, this translates to an annual injection in the household gross income of between R39.4 billion (2023) to R222.6 billion (2030). Since the financial pathway of the scenario does not include an SST, there will be no annual leakage from household income related to the scenario. Overall, relative to the BAU Scenario, the annual BIG disbursement leads to the corresponding relative increases in household gross disposable income[49] and household final consumption expenditure. The model results show that under the Low-Ambition Scenario, and relative to the Baseline Scenario, the Compound Annual Growth Rates (CAGRs) of the total household disposable income and household final consumption expenditure will be 0.9% and 0.3% higher respectively.

The positive impact of BIG pathways on household expenditure fosters relatively higher rates of domestic investment, employment and output (Table 3, the Low-Ambition column). Consequently, while under the Baseline Scenario, total real investment is projected to grow by 21% between 2022 and 2030, it is projected to expand by an additional 8 percentage points under the Low-Ambition BIG pathways. Similarly, the average annual employment will increase by 80 000 workers under the Low-Ambition Scenario, thus reducing the average annual unemployment rate by 2.4 percentage points, from 32.1% under the BAU Scenario to 29.7%. Finally, the CAGR of real aggregate supply (i.e. the sum of sectoral gross value added) for the period 2023 to 2030 will be 0.3 percentage points higher than the corresponding results for the BAU Scenario (i.e. 2.6% compared to 2.3%). Overall, relative to the BAU Scenario, the Low-Ambition BIG Pathway is projected to increase the average annual real GDP growth by

[49] Household Gross Disposable Income includes Gross Primary Income plus Social Benefits and Other Current Transfers Received, minus Current Taxes on Income and Wealth and Social Contributions and Other Transfers Paid.

0.6 percentage points from 2023 to 2030. Column two of Table 3 provides DIMMSIM results for a wider range of macroeconomic indicators for the Low-Ambition Scenario.[50]

Medium and High-Ambition Scenarios: Relative to the Low-Ambition Scenario, the Medium and High BIG scenarios involve annual injections into the economy of much larger amounts. The channels through which the two BIG pathways impact macroeconomic indicators are similar to the Low-Ambition Scenario channels but with one key difference. The proposed financial pathways of the two scenarios include leakage from the household gross income in the form of an SST payment. However, for both scenarios, the leakage is limited to the latter part of the decade, namely 2028 to 2030, and the aggregate amount is small relative to the scenarios' annual injections into households' income. Over the period from 2023 to 2030, under the Medium and High-Ambition Scenarios, the total amounts of households' contributions to the SST account (i.e. the leakage from households' income) will be equivalent to 11% and 8% of the total injection amounts, respectively. Overall, therefore, relative to the Low-Ambition Scenario, the Medium and High Scenarios are expected to have a higher positive impact on the CAGRs of the household gross disposable income (by 0.8 and 1.3 percentage points respectively) and household consumption expenditure (by 0.4 and 0.7 percentage points respectively). The relatively higher amounts of net injections into the economy will create larger economic ripples through the economy, in terms of investment, employment and output, which DIM'MSIM helps quantify (Table 3, the Low-Ambition column)

Hence, aggregate demand, aggregate supply and employment are projected to grow at faster rates under the Medium and High-Ambition BIG Scenarios. According to the model results, if the government begins to implement the Medium or the High-Ambition BIG pathway in 2023, during the rest of the decade, the average GDP growth rate will be 1% (Medium Scenario) or 1.3% (High Scenario) higher than the BAU Scenario that does not include a BIG programme. Relative to the Low-Ambition Scenario, the average GDP growth rates associated with the Medium and High-Ambition Scenarios will be higher by 0.4 and 0.7 percentage points. During the same period, the average unemployment rate will be 3.9 percentage points (Medium Scenario) and 4.9 percentage points (High Scenario) lower than the Baseline results, and 1.5 and 2.5 percentage points lower than the Low-Ambition Scenario results.

The positive impacts of the three BIG scenarios on key macroeconomic indicators take into account all relevant interactions and dynamics in the economy. The results reflect the direct and indirect impact of the BIG scenarios on various intermediary indicators that include fiscal indicators (e.g. revenue-GDP, expenditure-GDP and debt-GDP), financial indicators (e.g. interest rate, exchange rate, access to credit, money supply), supply and demand indicators (e.g. GDE, exports, labour productivity), price indicators (e.g. sector PPI inflation, CPI inflation) and household, business and government income and expenditure indicators. Table 3 compares DIMMSIM projections of macroeconomic indicators for the BAU and the three BIG scenarios.

[50] In a World Bank Study, Bracco et al. (2021) estimate the macroeconomic effects of social transfer payments to individuals for a sample of 23 developed and Latin American countries. Their findings show that the social transfer multiplier is 0.3 in developed countries, but 0.9 in Latin American economies. The paper suggests that a larger social transfer multiplier may be expected for emerging countries.

Table 3: Projections of Macroeconomic Impact of BIG Pathways (2023-2030)				
Macroeconomic Indicators	**Baseline**	**BIG PATHWAY: Low Ambition**	**BIG PATHWAY: Medium Ambition**	**BIG PATHWAY: High Ambition**
GDP Growth (Ave)	2.2	2.8	3.2	3.5
Gross Domestic Expenditure (CAGR, Real)	2.2	2.5	2.8	3.0
GDP Per Capita (CAGR, Real)	0.8	1.3	1.5	1.8
Aggregate Supply (CAGR, Real)	2.3	2.6	2.8	2.9
Aggregate Demand (CAGR, Real)	2.4	2.6	2.7	2.8
Unemployment Rate (Ave)	32.1	29.7	28.2	27.2
CPI (Ave)	3.8	3.6	4.5	5.1
Interest Rate (Ave)	6.9	6.9	7.1	7.2
Current Account-GDP Ratio (Ave)	-4.3	-4.3	-4.5	-4.6

Source: Dynamically Integrated Macro-Micro Simulation Model of South Africa (DIMMSIM), www.adrs-global.com.

6.4 Model Results: Fiscal Impact

The three BIG pathways will have significant implications for government income and expenditure. Table 4 provides DIMMSIM summary results related to the impact of BIG scenarios on some key fiscal indicators.

The category Benefits Paid refers to current cash transfers from government to households.[51] Under the BAU Scenario and relative to GDP, the yearly Social Benefits Paid will be 4.9% on average for the period 2023 to 2030. The implementation of either the Low, Medium or High-Ambition BIG programme is projected to raise government cash transfer payments to households to 8.5% (Low), 10.8% (Medium) or 12.6% (High) relative to GDP.[52] As a result, relative to the BAU Scenario, the average government gross expenditure-GDP ratio for the period 2023 to 2030 is projected to increase from 31.8% (Baseline Scenario) to 35.6% (Low), 38.4% (Medium) and 40.7% (High) Ambition Scenarios.

[51] Government Social Benefits Paid refers to government cash transfers to households that households can use indistinguishably from income coming from other sources. (https://www.oecd-ilibrary.org/docserver/9789264075108-21-en.pdf?expires=1682902348&id=id&accname=guest&checksum=33BABB8E548A2A7E8677DAD9E462172B.

[52] Despite the extent of poverty, unemployment and inequality in South Africa, government spending on social benefits, including social grants, relative to GDP has significantly and consistently lagged behind peer countries during the last 25 years (Adelzadeh, 2023). According to OECD data, between 1996 and 2019, on average, South African government annually spent 3.7% of GDP on social benefits to households, which was the third lowest among 42 OECD countries after Mexico (2.1%) and Korea (3.2%). During the same period, the average annual spending on social benefits to households among 42 OECD countries was 11.7% of GDP (OECD Data (https://data.oecd.org/socialexp/social-benefits-to-households.htm).

At the same time, the financial pathways of the three BIG scenarios are projected to raise the average government revenue-GDP ratio from 28.8% (Baseline Scenario) to 32.3% (Low), 34.3% (Medium) and 35.7% (High) Ambition Scenarios. Therefore, overall, based on the suggested Wealth and Social Security tax rates, the average deficit-GDP ratio during the next eight years is only expected to increase by 0.3 (Low-Ambition), 1.1 (Medium-Ambition) and 2 (High-Ambition) percentage points, and the average debt-GDP ratio is projected to remain below 80% (Table 4). It is worth noting that in practice, by marginally adjusting the new tax rates (e.g., using 0.53% instead of 0.5% Wealth Tax rate) the pathways can be designed to have a relatively neutral effect on the average deficit-GDP and debt-GDP ratios.

Table 4: Projections of Fiscal Impact of BIG Pathways (2023-2030)

Fiscal Indicators (2023-2030)	Baseline	BIG PATHWAY: Low Ambition	BIG PATHWAY: Medium Ambition	BIG PATHWAY: High Ambition
Total Benefit Paid-GDP Ratio (Annual Ave)	4.9	8.5	10.8	12.6
Taxes on Income and Wealth-GDP Ratio (Annual Ave)	15.7	16.9	17.3	17.5
Government Expenditure-GDP Ratio (Annual Ave)	31.8	35.6	38.4	40.7
Government Revenue-GDP Ratio (Annual Ave)	28.8	32.3	34.3	35.7
Deficit GDP Ratio (Annual Ave)	-3.0	-3.3	-4.1	-5.0
Debt GDP Ratio (Annual Ave)	74.2	73.8	75.5	77.3

Source: Dynamically Integrated Macro-Micro Simulation Model of South Africa (DIMMSIM), www.adrs-global.com.

6.5 Model Results: Household Impact

In post-1994 South Africa, income poverty has remained significantly high despite the government's stated commitment to eradicating poverty and the constitutional framework that commits government to the progressive realisation of socio-economic rights of the public.[53] At the same time, it is generally acknowledged that BIG is an anti-poverty policy tool and DIMMSIM's simulation results show the extent that the three BIG pathway scenarios are expected to reduce income poverty. The model's poverty module produces the impact of policy scenarios on six poverty measures.[54] This section summarises the model results for two of the six poverty indicators, namely headcount poverty and poverty gap. We have also included DIMMSIM's results on the impact of the three BIG scenarios on income inequality, measured by the Gini-Coefficient:

[53] Section 27:2 of the South African Constitution notes that 'The state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of these rights.' Progressive realisation means that the government must move forward and ensure that the rights are realised over time. It may do so by adopting a comprehensive and coordinated programme with timeframes, goals and targets, and must be able to monitor its own progress.

[54] DIMMSIM's poverty measures include: Poverty Level, Headcount Poverty, Poverty Gap, Foster-Greer-Thorbecke, Watts Index, Sen Index and Sen-Shorrocks-Thon Index.

- Relative to the Baseline Scenario results for the next 8 years, the Low, Medium and High-Ambition BIG Scenarios are expected to help lower the national poverty rate by an additional 7.3, 33.5 and 39.2 percentage points respectively. Therefore, between 2022 and 2030, the national poverty rate will decline from 38.7% to 27.4% (Low-Ambition Scenario), 17.4% (Medium-Ambition Scenario) and 15.1% (High-Ambition Scenario) (Table 5).

- The results for the poverty gap, which measures the depth of poverty, are even more significant. Relative to the Baseline results, the Low, Medium and High-Ambition Scenarios are projected to reduce the poverty gap in the next 8 years by an additional 38.5, 57.1 and 58.5 percentage points respectively. The poverty gap at national level is therefore expected to decline between 2022 and 2030 from 13% to 4.7% (Pathway 1), 2.3% (Pathway 2) and 2.1% (Pathway 3) (Table 5).

- In addition to the estimation of poverty, DIMMSIM's inequality module calculates the impact of policies on income inequality.[55] The model results show that the three BIG pathway scenarios are likely to reduce income inequality more significantly than the BAU Scenario, which does not include a BIG programme. The results show that relative to the Baseline Scenario, the Low, Medium and High-Ambition Scenarios are expected to reduce the Gini-Coefficient in the next 8 years by an additional 5.4, 7.9 and 9.3 percentage points respectively. The Gini-Coefficient is therefore projected to decline from 68.1% in 2022 to 57.7% (Pathway 1), 56.0% (Pathway 2) and 55.1% (Pathway 3) in 2030 (Table 5).

[55] DIMMSIM measures of inequality include Gini-Coefficient, Palam Ratio, Atkinson Index, Generalised Entropy Index, Hoover Index, Theils L Index and Theils T Index.

Table 5: Projections of Household Impact of BIG Pathways (2023-2030)				
Household Impact (2023-2030)	**Baseline**	**BIG PATHWAY: Low Ambition**	**BIG PATHWAY: Medium Ambition**	**BIG PATHWAY: High Ambition**
Poverty Rate (SA) (% change)	-21.8	-29.1	-55.3	-61.0
Male	-22.6	-30.8	-61.8	-67.3
Female	-21.1	-27.6	-49.6	-55.5
African	-20.8	-28.0	-53.8	-59.8
Coloured	-43.6	-51.9	-76.4	-78.2
Quintile 1	-15.2	-21.8	-41.5	-47.3
Quintile 2	-16.6	-26.5	-52.0	-63.4
Poverty Gap (SA) (% change)	-25.1	-63.6	-82.2	-83.6
Male	-23.5	-66.3	-86.4	-87.6
Female	-26.6	-60.9	-77.9	-79.5
African	-24.1	-62.6	-81.4	-82.9
Coloured	-45.7	-79.1	-92.3	-92.6
Quintile 1	-20.5	-54.7	-73.7	-75.6
Quintile 2	-22.9	-61.7	-80.2	-83.0
Gini SA (% change)	-9.8	-15.2	-17.7	-19.1
Male	-9.7	-14.3	-16.5	-18.1
Female	-8.8	-18.0	-22.3	-23.5
African	-9.8	-16.4	-19.5	-21.0
Coloured	-10.1	-15.0	-17.4	-19.9

Source: Dynamically Integrated Macro-Micro Simulation Model of South Africa (DIMMSIM), www.adrs-global.com.

6.6 Model Results: Overall Comparison of Impact

Figure 5 allows comparison of the outlook for the SA economy without a BIG policy with three likely outlooks that include the three BIG pathways. The Baseline, or the Business-as-Usual, Scenario depicts a future that the current economic policy continues into the future without the SRD and a BIG programme. The model results for this scenario include a 2.2% CAGR growth of GDP, a high average annual unemployment rate of 32.1% and an average debt-GDP ratio of 74.2% for the period 2023 to 2030. During the same period, the national poverty rate is projected to decline by 21.8%, the poverty gap by 25.1% and income inequality by 9.8%. In comparison, the model results for the three BIG pathways show that, depending on the policy ambition, the programme will have a significantly higher positive impact on key macroeconomic, poverty and inequality indicators:

(a) The BIG pathways are effective in significantly reducing headcount poverty and the depth of poverty. They can reduce the current poverty rate by half (Medium-Ambition) and nearly two-thirds (High-Ambition) in the next eight years (Figures 5c and 5d).

(b) They are effective in reducing income inequality but not as effective as reducing poverty. A means-tested adult BIG programme has the potential to reduce income inequality by one-and-half (Low-Ambition) to almost twice (High-Ambition) as fast as the current Business-as-Usual policy scenario. Achieving a significantly higher reduction in income inequality, such as halving the Gini-Coefficient, demands additional measures and probably a longer timeframe (Figure 5e).

(c) A BIG programme can potentially help South Africa raise its low GDP growth performance (Baseline Scenario) to a moderate level (Medium and High-Ambition). This result is highly significant, especially when one considers that for only 10 out of 27 years between 1996 and 2022, the GDP growth was above 3% (Figure 5a).

(d) A BIG programme has the potential to reduce the unemployment rate by a few percentage points. However, in a country with an official unemployment rate of above 30%, the government clearly needs to utilise a range of additional direct and indirect policies to address the extremely high unemployment rate (Figure 5b).[56]

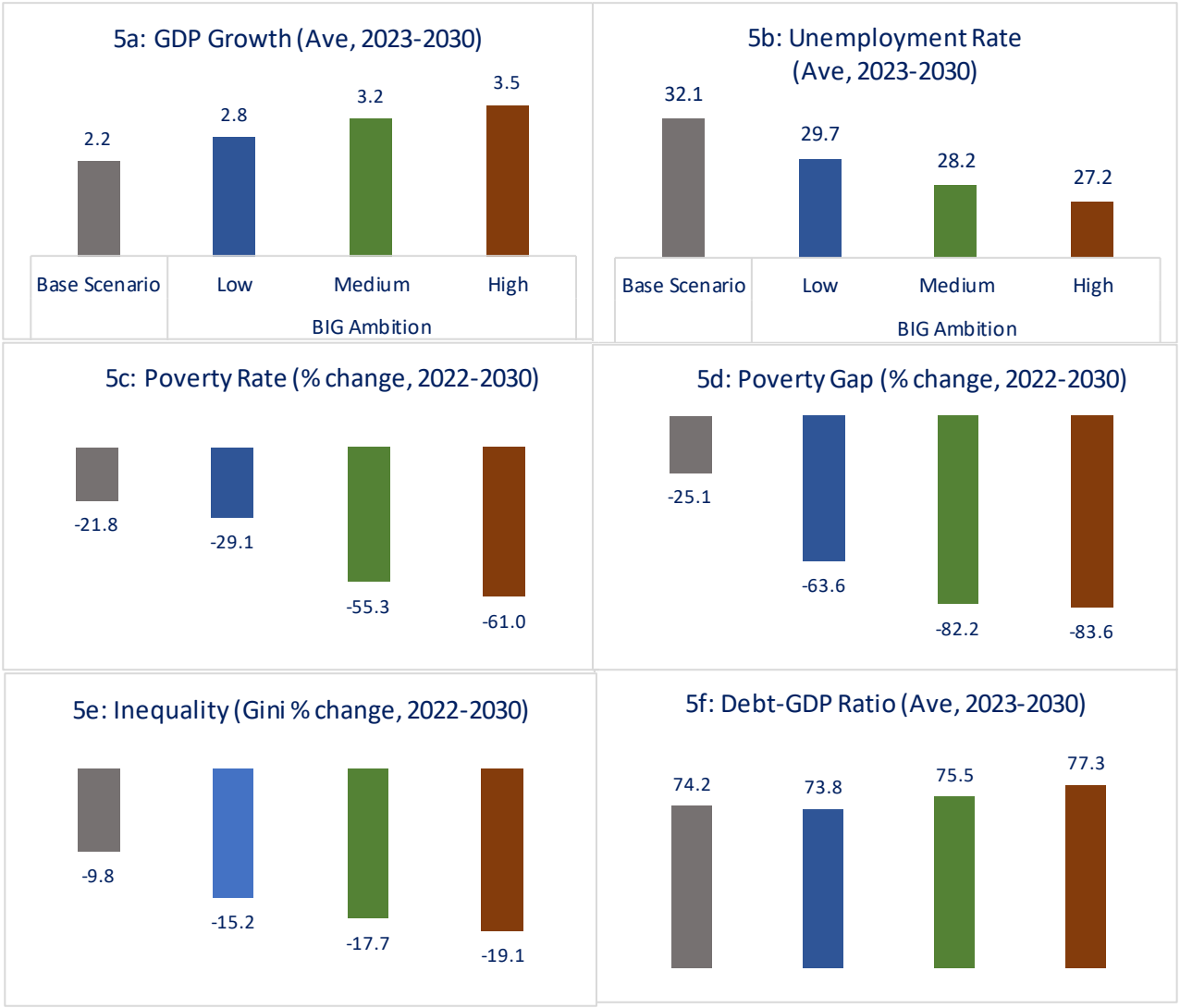
(e) A mix of reasonable tax measures and the positive impact of a BIG programme on the VAT revenue can sufficiently raise government revenue-GDP to accommodate the increase in government expenditure-GDP ratio due to the implementation of BIG . The financial pathways of BIG scenarios can include sustainable deficit-GDP and debt-GDP ratios (Figure 5c).

(f) Despite its likely significant economic and development contributions, a BIG programme can only be part of larger policy reforms to realise targets such as a 6% average growth rate, zero poverty rate and a 6% unemployment rate by 2030.[57]

[56] The Adelzadeh (2019) and Adelzadeh (2022) multi-pillar policy proposals and simulation exercises are examples of this approach.

[57] See footnote 52.

Figure 5: Comparison of Pathways With and Without BIG



Source: Dynamically Integrated Macro-Micro Simulation Model of South Africa (DIMMSIM), www.adrs-global.com.

7. Summary and Conclusions

In a highly unequal society like South Africa with half of the population living in poverty, BIG is a means of enabling limited redistribution to the poorest. It should be no surprise that the richer citizens will need to pay their fair share. However, when mainstream economic tools, such as CGE and DSGE models, are used to quantitatively assess the likely economic effects of a social assistance programme like BIG, they normally predict that the programme will lead to a higher cost of borrowing and debt-GDP ratio and lower investment, output and employment. The problem arises when, due to their technical underpinnings, these findings are not critically assessed.

In reality, however, this category of models is built to closely reflect the neoclassical view of a market economy, a view which suffers from a number of inter-related 'irremediable flaws' that have been extensively criticised in theoretical and empirical literature, including the crowding-out effect, rational expectations, perfect information, perfect competition, full employment, representative household and

firm, and loanable funds approach to saving and investment. As discussed in relation to the Expert Panel Reports and Hollander et al. (2022), the above features of the general equilibrium models are directly responsible for their predictable and comparable projections that any increase in government transfers, such as a BIG, will have negative macroeconomic effects.

In this paper, we used the ADRS Dynamically Integrated Macro-Micro Simulation Model of South Africa (DIMMSIM™) to quantify the macroeconomic and development impact of three BIG scenarios, including their funding pathways. The model's macroeconomic model component does not adhere to general equilibrium principles. It reflects heterodox economic views built in the tradition of structural econometric models. DIMMSIM uniquely includes two-way annual interactions between its macroeconomic model and a full microsimulation model of taxes, social security, poverty and inequality. DIMMSIM does not include full employment restrictions of general equilibrium models and therefore shows that with reasonable funding pathways, a BIG programme can produce inter-related win-win outcomes by significantly reducing poverty and inequality and at the same time increasing economic growth and employment, taking into account various macro- and micro-feedback effects.

More specifically, our analysis shows that:

- The three BIG pathways are to varying degrees effective policies to significantly reduce poverty and inequality to varying degrees. For example, the Medium and High-Ambition BIG Scenarios are able to reduce income poverty by half and by almost two-thirds by 2030, respectively. The BIG programme is undoubtedly a pro-poor social policy programme.

- In addition to their significant positive impact on poverty and inequality, the scenarios have tangible positive macroeconomic impacts that are quantified by DIMMSIM, taking into account annual feedbacks and jointly determined aggregate indicators (e.g. inflation rates, interest rate, exchange rate, debt-GDP ratio), sector-level indicators (e.g. prices, productivity, wage rate, trade) and individual level indicators (e.g. demand and cost of social grants, direct and indirect taxes). This includes positive real growth of household disposable income and final consumption expenditure, positive growth of investment, employment and GDP, sustainable deficit and debt-GDP ratios, balanced growth of real aggregate demand and supply, sustainable inflation and balance of payments.

- Our simulations of the three BIG pathways show that a BIG programme can be funded without changes to the income tax or the VAT. A combination of a relatively small wealth tax and SST can provide the necessary complementary resources that enable government to introduce and sustain the programme over time. This finding is informed by the model's annual projections of sector-level employment and wage rates and household net wealth. Moreover, it takes into account the dynamic macroeconomic and industry effects of the new taxes on business and household disposable incomes, household consumption expenditure, business investment expenditure and fiscal indicators.

8. References

Adelzadeh, A. (2023). 'Why Is the South African Economy Stuck in Chronic Crises.' In S. Mohammed, A. Ngoma and B. Baloyi (Eds.), *The Evolving Structure of South Africa's Economy: Faultlines and Futures*. Johannesburg: Mapungubwe Institute for Strategic Reflection, pp. 86:134.

Adelzadeh, A. (2021). 'Fiscally Neutral Basic Income Grant Scenarios: Economic and Development Impacts.' An ADRS Simulation Policy Brief, Issue 7, May. The Bridge. Available at: https://adrs-global.com/resources/static/downloads/ADRS_Fiscally_Neutral_BIG_for_South_Africa__The_Bridge_May_2021_.pdf

Adelzadeh, A., S. Malumisa, and J. Benecke. (2021). 'COVID-19 and South Africa's Future Economic Outlook.' A country report produced by the Applied Development Research Solutions (ADRS). Available at: https://adrs-global.com/resources/static/downloads/adrs_report_on_covid_19_and_SA_future_economic_outlook.pdf

Adelzadeh, A. (2019). "Economic Policy Scenarios for Growth and Development of South Africa: 2019:2030. ADRS Research Report produced for the Department of Trade and Industry. Available at: https://adrs-global.com/resources/static/downloads/18973169_ADRS_Report_on_Growth_and_Development_Strategy_for_South_Africa_2019_to_2030.pdf

Adelzadeh, A. (2001). 'Social Policy Model for Fighting Poverty in South Africa.' Report prepared for the UNDP.

Agenor, P.R., A. Izquierdo, and H. Fofack. (2003). 'The Integrated Macroeconomic Model for Poverty Analysis: A Quantitative Macroeconomic Framework for the Analysis of Poverty Reduction Strategies.' World Bank Policy Research Working Paper No. 3092. Washington DC: The World Bank.

Akerman, B., A. Alstott, and P. van Parijs. (2006). *Redesigning Distribution: Basic Income and Stakeholder Grants as Cornerstones for an Egalitarian Capitalism*. The Real Utopias Project Volume V. London: Verso.

Baird, S., F.H.G. Ferreira, B. Özler, and M. Woolcock. (2013). 'Relative Effectiveness of Conditional and Unconditional Cash Transfers for Schooling Outcomes in Developing Countries: A Systematic Review.' *Campbell Systematic Reviews*, 9: 1-124. https://doi.org/10.4073/csr.2013.8

Bracco, J., L. Galeano, P. Juarros, D. Riera-Crichton, and G. Vuletin. (2021). 'Social Transfer Multipliers in Developed and Emerging Countries: The Role of Hand-To-Mouth Consumers.' *Policy Research Working Paper No. 9627*, World Bank, Washington, DC.

Bourguignon, F., J. de Melo, and A. Suwa. (1991). 'Modelling the Effects of Adjustment Programs on Income Distribution.' *World Development*, 19(11): 1527-1544.

Bourguignon, F., A.S. Robilliard, and S. Robinson. (2003). 'Representative Versus Real Households in the Macro-Economic Modeling of Inequality.' Working Paper. DIAL, CIPRE. Available at: https://dial.ird.fr/wp-content/uploads/2021/12/2003-10.pdf

Bourguignon, F., M. Bussolo, and L.A. Pereira da Silva (Eds.). (2008). *The Impact of Macroeconomic Policies on Poverty and Income Distribution: Macro-Micro Evaluation Techniques and Tools*. Washington: Palgrave MacMillan and The World Bank.

Casale, D. and D. Shepherd (2021). 'The Gendered Effects of the COVID-19 Crisis and Ongoing Lockdown in South Africa: Evidence from NIDS-CRAM Waves 1–5.' Available at: https://cramsurvey.org/wp-content/uploads/2021/07/3.-Casale-D.-_-Shepherd-D.-2021-The-gendered-effects-of-the-Covid-19-crisis-and-ongoing-lockdown-in-South-Africa-Evidence-from-NIDS-CRAM-Waves-1-%E2%80%93-5..pdf

Chatterjee, A., L. Czajka, and A. Gethin. (January 2021). 'A Wealth Tax for South Africa.' Working Paper No. 2021/02. World Inequality Lab. Available at: https://wid.world/document/a-wealth-tax-for-south-africa-world-inequality-lab-wp-2021-02/

Cockburn, J. (2001). 'Trade Liberalization and Poverty in Nepal: A Computable General Equilibrium Micro-Simulation Analysis.' Working Paper 01-18. CREFA, University of Laval.

Cogneau, D. and A.S. Robillard. (2000). 'Income Distribution, Poverty and Growth in Madagascar: Micro Simulations in a General Equilibrium Framework.' IFPRI TMD Discussion Paper No.61.

Coibion, O., Y. Gorodnichenko, and R. Kamdar. (2018). 'The Formation of Expectations, Inflation, and the Phillips Curve.' *Journal of Economic Literature*, 56(4): 1447-1491.

Davis, B., S. Handa, N. Hypher, N.W. Rossi, P. Winters, and J. Yablonski (Eds.). (2016). *From Evidence to Action: The Story of Cash Transfers and Impact Evaluation in Sub Saharan Africa*. Oxford University Press.

Decaluwé, B., J.C. Dumont, and L. Savard (1999). 'Measuring Poverty and Inequality in a General Equilibrium Model.' CREFA Working Paper #99-20. Laval University. Available at: https://core.ac.uk/reader/7227120

De Janvry, A., E. Sadoulet, and A. Fargeix. (1991). *Adjustment and Equity in Ecuador*. Paris: OECD Development Center.

Dervis, K., J. de Melo, and S. Robinson. (1982). *General Equilibrium Models for Development Policy*. Cambridge: Cambridge University Press.

Development Pathways. (2021). 'Investments in Social Protection and Their Impacts on Economic Growth.' International Trade Union Confederation. Available at: https://www.ituc-csi.org/investments-in-social-protection

DSD, UNICEF, and SASSA. (2016). 'Removing Barriers to Accessing Child Grants: Progress in Reducing Exclusion from South Africa's Child Support Grant.' Available at: https://www.unicef.org/southafrica/media/1226/file/ZAF-removing-barriers-to-accessing-child-grants-2016.pdf

Estrades, C. (2013). 'Guide to Microsimulations Linked to CGE Models: How to Introduce Analysis of Poverty and Income Distribution in CGE-Based Studies.' AGRPDEP Technical Note TN 09, May.Available at: https://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/128238/filename/128449.pdf

Expert Panel on Basic Income Support. (2021). 'Report into the Appropriateness and Feasibility of a System of Basic Income Support for South Africa.' A report produced for the Department of Social Development. Available at: BISExpertPanel2021-FinalReportDSD.pdf

Expert Panel on Basic Income Support. (2022). 'Supplementary Modelling Report.'

Evans, D.K., C. Gale, and K. Kosec. (2020). *The Educational Impacts of Cash Transfers for Children with Multiple Indicators of Vulnerability*. Center for Global Development. Available at: https://www.semanticscholar.org/paper/The-Education-Impacts-of-Cash-Transfers-for-with-of-Evans-Gale/f9375d7a67d37b3ed734ba71448ceda6686f604f#citing-papers

Ferrant, G., L.M. Pesando, and K. Nowacka. (2014). 'Unpaid Care Work: The Missing Link in the Analysis of Gender Gaps in Labour Outcomes.' Boulogne Billancourt: OECD Development Center.

Francis, D. and E. Webster. (2019). 'Poverty and Inequality in South Africa: Critical Reflections.' *Development Southern Africa*, 36(6): 788-802. https://doi.org/10.1080/0376835X.2019.1666703

Fraser, N. (2016). 'Contradictions of Capitalism and Care.' *New Left Review,* 100. https://newleftreview.org/issues/ii100/articles/nancy-fraser-contradictions-of-capital-and-care

Goldmann M., I. Bassier, J. Budlender, L. Mzankomo, I. Woolard, and M. Leibbrand. (November 2021). 'Simulation of Options to Replace the Special COVID-19 Social Relief of Distress Grant and Close the Poverty Gap at the Food Poverty Line.' SA-TIED Working Paper #202. Available at: https://sa-tied.wider.unu.edu/sites/default/files/SA-TIED-WP-202.pdf

Gunning, W.J. (1983). 'Income Distribution and Growth: A Simulation Model for Kenya.' In D.G. Greene (principal author), *Kenya: Growth and Structural Change*. 2 vols. Washington, DC: World Bank, pp. 487-621.

Hasdell, R. (2020). 'What We Know About Universal Basic Income: A Cross-Synthesis of Reviews.' Stanford, CA: Basic Income Lab. Available at: https://basicincome.stanford.edu/uploads/Umbrella%20Review%20BI_final.pdf

Hollander, H., R. Havemann, and D. Steenkamp. (2022). 'The Macroeconomics of Establishing a Basic Income Grant in South Africa.' ERSA Working Paper 881, September. Available at: https://econrsa.org/wp-content/uploads/2022/09/Working-paper-881.pdf

IEJ (Institute for Economic Justice). (2021). Designing A Basic Income Guarantee: Targeting, Universality and Other Considerations.' Social Protection Policy Brief #3. Available at: https://www.iej.org.za/wp-content/uploads/2021/10/IEJ-policy-brief-UBIG-3_2.pdf

Kakwani, N. and E. Pernia. (2000). 'What is Pro Poor Growth?' *Asian Development Review*, 18: 1-16.

Köhler, G., M. Calì, and M. Stirbu. (2009). 'Rethinking Poverty and Social Exclusion Responses in Post-Conflict Nepal: Child-Sensitive Social Protection.' *Children, Youth and Environments*, 19(2): 229-249. http://www.jstor.org/stable/10.7721/chilyoutenvi.19.2.0229

Mikkonen, J. and D. Raphael. (2010). 'Social Determinants of Health: The Canadian Facts.' desLibris. Available at: https://preventionconversation.org/wp-content/uploads/2015/04/the_canadian_facts.pdf

Morrisson, C. (1991). 'Adjustment, Incomes and Poverty in Morocco.' *World Development*, 19(11): 1633-1651.

Molyneux, M. and M. Thomson. (2011). 'Cash Transfers, Gender Equity and Women's Empowerment in Peru, Ecuador and Bolivia.' *Gender and Development*, 19(2): 195-212. https://doi.org/10.1080/13552074.2011.592631

Orcutt, G. (1957). 'A New Type of Socio-Economic System.' *Review of Economics and Statistics*, 58: 773-797.

Orcutt, G., M. Greenberg, J. Korbel, and A. Rivlin. (1961). *Microanalysis of Socioeconomic Systems: A Simulation Study*. New York: Harper and Row.

Orkin, K. 2020. 'The Evidence Behind Putting Money Directly in the Pockets of the Poor.' Oxford News Blog. Available at: https://www.ox.ac.uk/news/science-blog/evidence-behind-putting-money-directly-pockets-poor

Pesaran, M.H. (1997). 'The Role of Economic Theory in Modelling the Long Run.' *Economic Journal*, 107(440): 178-191. https://www.jstor.org/stable/2235280

Pesaran, M.H., Y. Shin, and R.J. Smith (1996). 'Testing for the Existence of a Long-Run Relationship.' DAE Working Paper No. 9622. Department of Applied Economics, University of Cambridge.

Pesaran M.H., Y. Shin, and R.J. Smith. (1999). 'Bounds Testing Approaches to the Analysis of Long Run Relationships.' ESE Discussion Paper 46. Edinburgh School of Economics, University of Edinburgh. Available at: https://api.repository.cam.ac.uk/server/api/core/bitstreams/3dc112dc-f831-44ae-a3e6-7afaf66c3dbf/content

Piggott, J. and J. Whalley. (1985). *U.K. Tax Policy and Applied General Equilibrium Analysis: New Developments in Applied General Equilibrium Analysis*. Cambridge: Cambridge University Press.

Savard, L. (2003). 'Poverty and Income Distribution in a CGE-Household Micro-Simulation Model: Top-Down/Bottom Up Approach.' Working Paper 03-43. CIRP' EE Centre Interuniversitaire sur le Risque, les Politiques Economiques et L'emploi.

Solow, R. (2010). 'Statement of Dr. Rober Solow to the House of Representatives, Subcommittee on Investigations and Oversight, Committee on Science and Technology: Building a Science of Economics for the Real World.' Washington, DC. Available at: https://www.govinfo.gov/content/pkg/CHRG-111hhrg57604/pdf/CHRG-111hhrg57604.pdf

Statistics South Africa. (2023). 'National Poverty Lines 2023.' Statistical Release P0310.1. Available at: https://www.statssa.gov.za/publications/P03101/P031012023.pdf

Statistics South Africa. (2022). 'National Poverty Lines 2022.' Statistical Release P0310.1. Available at: https://www.statssa.gov.za/publications/P03101/P031012022.pdf

Stoddard, E. (27 March 2023). 'Exploring a Compelling Case for Why a Basic Income Grant Would Benefit All.' *Daily Maverick.* Available at: https://www.dailymaverick.co.za/article/2023-03-27-exploring-a-compelling-case-for-why-a-basic-income-grant-would-benefit-all/

Stiglitz, J.E. (2018). 'Where Modern Macroeconomics Went Wrong.' *Oxford Review of Economic Policy*, 34(1-2): 70-106.

Storm, S. (2021). 'Cordon of Conformity: Why DSGE Models are not the Future of Macroeconomics.' *International Journal of Political Economy*, 50(2): 77-98. https://doi.org/10.1080/08911916.2021.1929582

Stahl, A.F. 2019. 'Health Promoting Potentials of Basic Income: An Analysis of the Psychosocial Environment in Work and Welfare.' A Discussion Paper from the Centre for Welfare Reform. UBI and Health. Available at: https://citizen-network.org/uploads/attachment/631/ubi-and-health.pdf

Studies in Poverty and Inequality Institute. (2021). 'The Efficacy of Fiscal Policy in South Africa: Fiscal Multipliers and the Financing of a Basic Income Guarantee.' Available at: http://spii.org.za/wp-content/uploads/2022/02/The-Efficacy-Of-Fiscal-Policy-in-South-Africa.pdf

Taylor, V. (2002). 'Transforming the Present–Protecting the Future: Consolidated Report.' Committee of Inquiry into a Comprehensive Social Security System for South Africa. Available at: https://sarpn.org/CountryPovertyPapers/SouthAfrica/march2002/report/Transforming_the_Present_pre.pdf

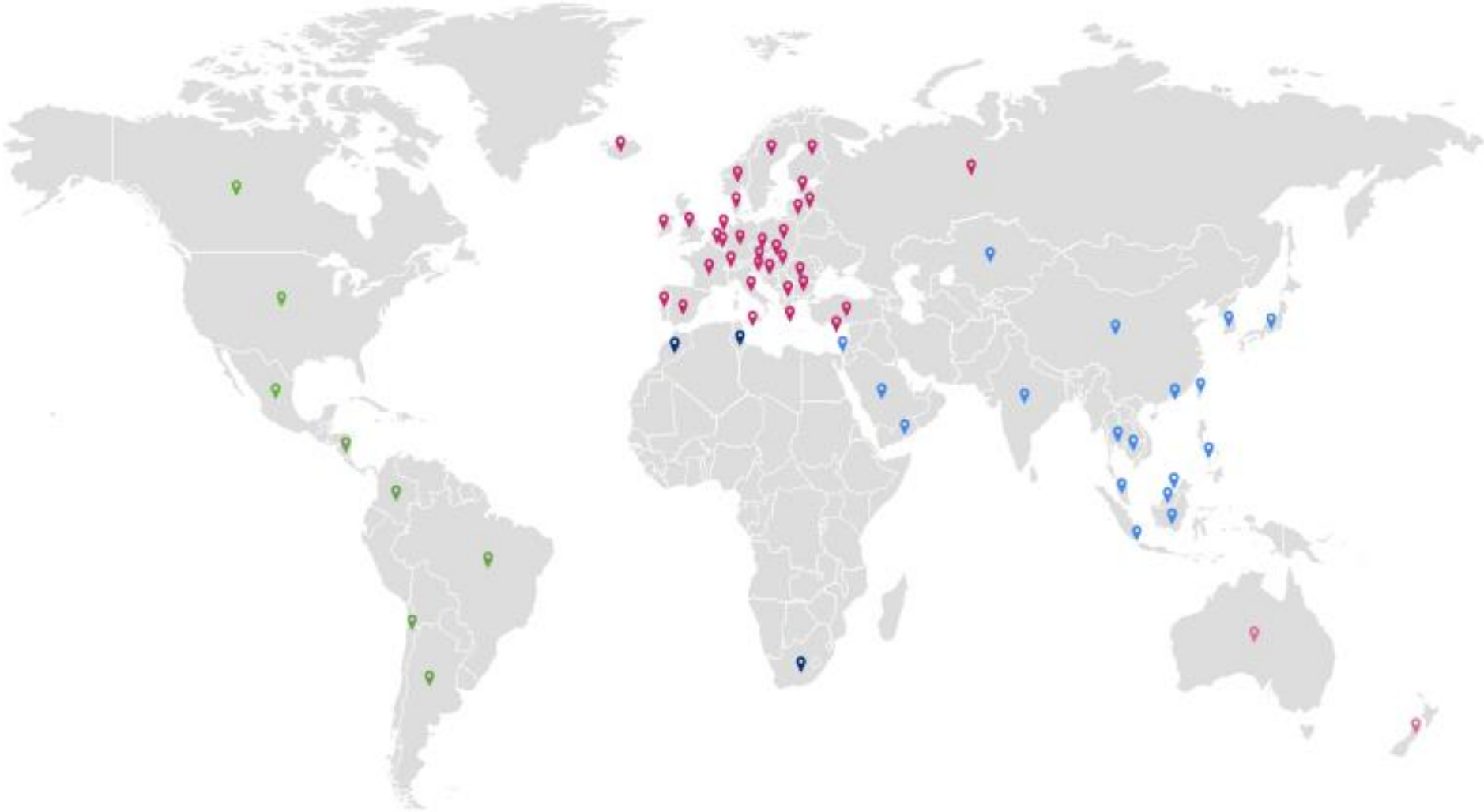
Thorbecke, E. (1991). 'Adjustment, Growth and Income Distribution and Equity in Indonesia.' *World Development*, 19(11): 1595-1614. https://doi.org/10.1016/0305-750X(91)90008-6

Venter, F., A. Ismail, B. Capazario, and M. Capazario. (2021). 'Universal Basic Income Guarantee: Financing Options Analysis.' A report for the Institute for Economic Justice, July. DNA Economics.Available at: https://www.iej.org.za/wp-content/uploads/2021/07/DNA_UBIG-Financing-Options_Final-report.pdf

Weeks, K. (2020). 'Anti/Postwork Feminist Politics and a Case for Basic Income.' *tripleC: Communication, Capitalism and Critique: Open Access Journal for a Global Sustainable Information Society*, 575-594. http://doi.org/10.31269/triplec.v18i2.1174

Zelleke, A. (2007). 'Targeting Benefit Levels to Individuals or Families?' *Basic Income Studies*, 2(1). https://doi.org/10.2202/1932-0183.1054

ADRS INTERNATIONAL COUNTRY MODELS



AFRICA

Morocco | Tunisia | South Africa (IO-Model, Suite of Macro and Micro Models)

ASIA

Brunei | Cambodia | China | Hong Kong | India | Indonesia | Israel | Japan | Kazakhstan | South Korea | Malaysia | Philippines | Saudi Arabia | Singapore | Taiwan | Thailand | Yemen

EUROPE

Austria | Belgium | Bulgaria | Croatia | Cyprus | Czech Republic | Denmark | Estonia | Finland | France | Germany | Greece | Hungary | Iceland | Ireland | Italy | Latvia | Lithuania | Luxembourg | Macedonia | Malta | Netherlands | Norway | Poland | Portugal | Romania | Russian | Federation | Slovakia | Slovenia | Spain | Sweden | Switzerland | Turkey | United Kingdom

NORTH & CENTRAL AMERICA

Canada | Mexico | United States of America

SOUTH AMERICA

Argentina | Brazil | Chile | Colombia | Costa Rica

OCEANIA

Australia | New Zealand

APPLIED DEVELOPMENT RESEARCH SOLUTIONS (ADRS)

ORGANISATIONAL PROFILE

Our vision: a world of people empowered to advance human development.

Our mission: helping people gain economic insight and foresight to shape policy that matters.

Applied Development Research Solutions (ADRS) is an economic consultancy organization registered in South Africa and the United States, driven by the idea that successful economic development relies on good policy design. We are an independent, forward thinking specialized consultancy committed to economic development through high quality quantitative analysis, evidence-based policy research, expert advice and innovative training. ADRS proudly offers state-of-the-art economic modelling tools and services that provide the insight and foresight needed to make informed policy choices. We view ourselves as partners with our clients and the constituencies they serve.

ADRS offers expertise in economic modelling, policy research, advisory services, training and capacity building to assist our clients in government, non-governmental organizations, development agencies, and the private sector. ADRS services in economic analysis, policy analysis, economic modelling, innovative web-based modelling interface, and capacity building equip policymakers and others with the tools to design policies that go to the heart of development challenges. To date, ADRS has built economic models for more than 60 countries, exemplifying expertise that enables users to design and test the effectiveness of wide-ranging policy choices.

In South Africa, ADRS has extensive experience in economic research, policy analysis, economic model building and capacity building. Since 1994, ADRS members have worked closely with the South African government at national and provincial levels. ADRS has exclusively built ten web-based user-friendly economic models for South Africa, at national, provincial, district and municipal levels, that researchers and policy analysts use to design macroeconomic, industrial, poverty, income distribution, education, and energy-emissions policies.

The Economic Modelling Academy (EMA) uses ADRS economic models as part of its executive certificate courses in various economic modelling topics (e.g., macroeconomic, poverty and inequality, skills demand and supply, and green economy modelling) that are offered in partnership with the GIBS Business School. For the upcoming courses visit the course pages on GIBS or EMA websites.

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INSTITUTE FOR ECONOMIC JUSTICE (IEJ)

ORGANISATIONAL PROFILE

Our vision: A just society where an equitable distribution of resources, the democratisation of economic decision making, and systemic change are secured and entrenched for the realisation of rights and planetary wellbeing.

Our mission: To advance economic justice by collaborating in the provision of rigorous, accessible research and policy alternatives that empower progressive social forces to create systemic change from above and below in South Africa and the continent.

The Institute for Economic Justice (IEJ) is focused on bringing about systemic change that institutionalises social and structural transformation of the economy and society, and the sustainable distribution of economic resources in South Africa and the continent. Such a systemic change is predicated on the just distribution of power that democratises participation in economic decision-making within a normative framework that centres rights realisation and planetary wellbeing. The IEJ's contribution to effecting such a systemic change is derived from the full exploitation of our research-policy-advocacy nexus.

Central to this is the production and co-production of knowledge around which progressive social forces coalesce to advocate for policy change from above and below. Together with its partners, the IEJ translates the knowledge co-produced into viable policy options and proposals. Collaborative engagement in the process of analysis and development of policy options and proposals is mutually empowering for the IEJ and its partners. The IEJ strengthens the collective power of progressive social forces – working specifically with worker organisations, feminist formations, and social-economic rights and climate justice activists – as well as elements in government and business. These take the form of strategic partnerships, coalitions, alliances, and networks of action, to mobilise support and advocate for alternative policy proposals.

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