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# Poverty and inequality effects of a high growth scenario in South Africa: A dynamic microsimulation CGE analysis

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ABSTRACT

The debate about the consequences of economic growth on poverty and welfare was recently rekindled in South Africa by announcements that the government would be targeting a sustainable growth rate of 6 percent per annum under the Accelerated and Shared Growth Initiative for South Africa (ASGISA). This paper uses a sequential dynamic computable general equilibrium model linked to a nationally representative household survey to assess the poverty and economic consequences of a higher economic growth scenario. The main findings are that higher economic growth induces reductions in poverty both in the short and long run. It enhances capital accumulation, particularly in the agriculture and textiles sectors. An interesting observation is that the Mining industry benefits the least from a high economic growth scenario. However, this is not related to domestic savings/investment. Mining is strongly dependent on foreign investments and the industry return to capital is less profitable to domestic institutions, particularly households and this is what explains the lower benefits to the sector. African and Coloured households reap most of the benefits, with greater gains among urban unskilled dwellers. These findings suggest that lifting of growth constraints rather than macroeconomic stimulation would induce higher growth with the resulting beneficial effects. Economic growth of the levels simulated does not appear to be inconsistent with macroeconomic balance, as reflected in price stability, balance of payments and sectoral effects.

Keywords: Sequential dynamic CGE, microsimulation, ASGISA, poverty, welfare, growth, South Africa
JEL codes: D58, E27, F17, I32, O15, O55

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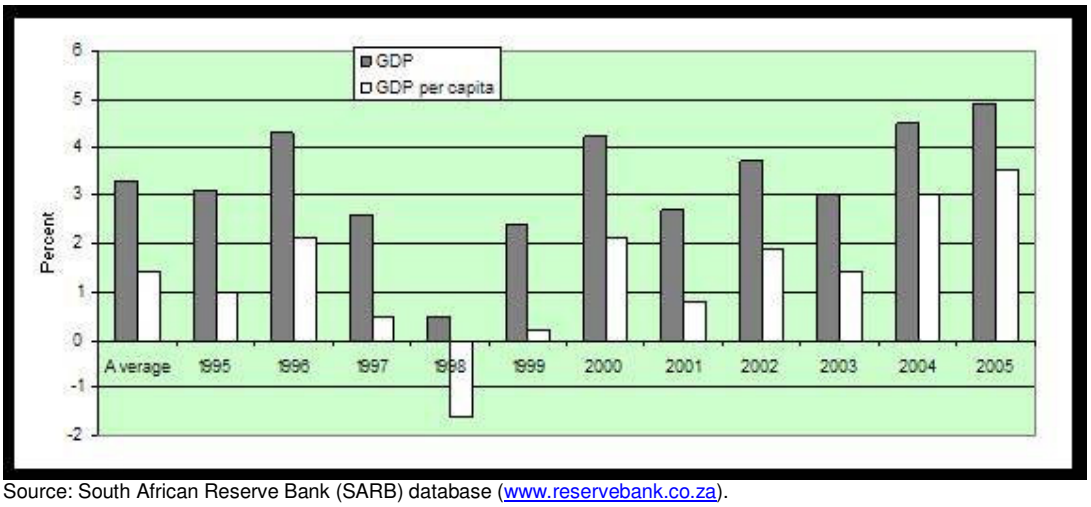
## INTRODUCTION

South Africa has followed orthodox macroeconomic management policies following successful free elections in April 1994 under the Reconstruction and Development Plan (RDP) and the Growth, Employment and Redistribution (GEAR) macroeconomic strategies. Trade liberalization has been accompanied by responsible monetary and fiscal management and this has largely allowed South Africa to continuously experience moderate economic growth since 1994. As shown in Figure 1, the economic performance of post apartheid South Africa has been improving gradually, from an average real GDP growth rate of about 3 percent between 1995 and 1993 to 4.5 percent in 2004 and 4.9 percent in 2005. Per capita GDP growth has followed a similar trend.

*Figure 1: GDP and GDP per capita growth rates (constant 2000 prices)*




Source: South African Reserve Bank (SARB) database (www.reservebank.co.za).

This growth trend was an improvement, if one compares with the rates of the 1985 to 1994 period, where the respective average rates were 0.8 and –1.3 percent. The improved growth performance is largely attributable to strong domestic demand and a large foreign capital inflow in the face of low inflation and interest rates (Frankel et al. (2006)). Although disputed, many authors have argued that poverty has been increasing (Hoogeveen and Özler 2004)[3]. Less disputed is the fact that South Africa has income inequality that is amongst the highest in the world. At the same time, there was an increase in unemployment as a result of insufficient economic growth and the growing cost of labor relative to capital. Thus, despite carrying out sustained stabilization and trade liberalization, the South African economy has failed to grow in sufficient amounts to make inroads into high

[3] van der Berg et al. (2005) have recently presented evidence showing that poverty has sharply declined in the last few years largely as a result of increases in social grants, which have significantly alleviated poverty. However, they agree that poverty levels are still very high.

unemployment, inequality and poverty.

The debate about the consequences of economic growth on poverty and welfare was recently rekindled in South Africa by announcements that the government would be targeting a sustainable growth rate of 6 percent per annum under the Accelerated and Shared Growth Initiative for South Africa (ASGISA). As priorities shifted from stabilization towards development, government commenced work on a new initiative in 2003 and subsequently launched officially the ASGISA in February 2006. In broad terms, ASGISA aims to lift GDP growth to a sustained 6 percent per annum by 2014 by reducing obstacles to growth, share this growth more equitably, and allow South Africa to achieve its Millennium Development Goals (MDGs). Labour absorption is another target to come out of this increased growth. While generally welcomed, a number of analysts have raised several cautions, including issues of capacity in key public sector areas, skills shortage and infrastructure backlogs.

The purpose of this study is to contribute to this ongoing debate by exploring systematically the welfare and poverty consequences of a high economic growth scenario. In order to assess the impact of the growth strategy, the study uses a sequential dynamic computable general equilibrium (CGE) model. The endogenous changes obtained from the sequential dynamic CGE model are then fed into a national survey for predicted household poverty effects. There is a growing tradition of CGE modelling in South Africa[4]. While informed by the ASGISA logic of growth induced by removal of constraints, the growth scenario in this paper is one that reaches 6 percent growth in steps by 2018 (compared to a business as usual (BAU) growth scenario). The study does not address the issue of whether the growth target is achievable or not, but works on the assumption that these targets are attained[5].

The rest of the paper is organized in the following way: Section 2 presents a description of the development of the model while section 3 is devoted to a discussion of the database used to run the model and carry out poverty analysis. Section 4 discusses simulations and results obtained. Section 5 summarizes the results and discusses policy observations emanating from the study.

## METHODOLOGY – SEQUENTIAL DYNAMIC POVERTY CGE MODEL

This section presents the structure of the sequential dynamic CGE model applied to South African data. The model used is based on Mabugu and Chitiga (2007a,b). A complete list of equations and variables is available from the authors upon request. The model can conveniently be split into static, dynamic and poverty modules as explained below.

[4] For a recent review of trade focused CGE modeling in South Africa, see Mabugu and Chitiga (2006).
[5] Readers interested in a discussion of the consistency of the ASGISA program are referred to Frankel et al (2006).

**Static module**

*Activities*: It is assumed that in each sector there is a representative firm that generates value added by combining labor and capital. A nested structure for production is adopted. Overall output is modelled using a Leontief production structure. Value added in turn is a constant elasticity of substitution (CES) combination of labor and capital in the non-agricultural sectors and a CES function of land and a composite factor in agriculture. The latter is also represented by a CES function of primary factors, namely agricultural capital and labor. Value added in the public sector is generated by labor alone. Total capital demand is derived from cost minimization subject to the CES function. Labor is a CES aggregation of skilled and unskilled labor. All labor categories are assumed mobile across sectors and wages are crucial for income distribution. Capital, on the other hand, is sector-specific in the short run, implying rising supply curves on the real side. Capital is allowed greater mobility in the long run when dynamics set in. As a result of this asymmetry, greater volatility in the rental capital return would be expected in the short run while broader convergence would be expected in the long run. The choice between domestic and imported inputs is specified as a CES function.

*Households*: Households earn income from factors of production as well as receiving dividends, intra-household transfers, government transfers and remittances. They pay direct income tax to the government. Household savings are a fixed proportion of total disposable income. Household demand is derived from a Stone Geary type utility function. The model includes all households from the 2000 Income and Expenditure Survey.

*Firms*: There is one representative firm which earns capital income, pays dividends to households and foreigners and pays direct income taxes to the government.

*Foreign Trade*: It is assumed that foreign and domestic goods are imperfect substitutes. This geographical differentiation is introduced by using the standard Armington assumption of a CES function between imports and domestic goods. On the supply side, producers make an optimal distribution of their production between exports and domestic sales according to a constant elasticity of transformation (CET) function. Furthermore, a finite elasticity export demand function is assumed.

*Government:* The government receives direct tax revenue from households and firms and indirect tax revenue on domestic and imported goods. Its expenditure is allocated between the consumption of goods and services (including public wages) and transfers. The model accounts for indirect or direct tax compensation in the case of a tariff cut.

*Equilibrium*: General equilibrium requires that the goods and factor markets are in

equilibrium and the fundamental macroeconomic identity is satisfied. The goods market clears when demand and supply are equated via the material balance condition in each period. The fundamental macroeconomic identity requires the equality between investment and savings.

**Dynamic module**

The static model is made sequential dynamic by a set of cumulation and updating rules from one year to the next.

*Labor Supply and Minimal Consumption*: Growth in the total supply of labor is endogenous and is driven by an exogenous population growth rate. Since we lack data about the evolution of the labor participation rate in the future, we use the growth rate of population instead of the labor force and this implies that the labor participation rate is constant over time. It is also assumed that minimal consumption in the linear expenditure system grows according to the population growth rate. All other variables that are nominally indexed such as transfers are also subject to dynamic updating.

*Capital Accumulation*: Current period's investment augments the capital stock in the next period. Capital stock for each sector is updated by an accumulation function that equates next-period capital stock ( $K_{i,t+1}$ ), to the depreciated capital stock of the current period and the current period's quantity of investment ( $INV_{i,t}$ ) as follows:

$$K_{i,t+1} = (1-\delta)K_{i,t} + INV_{i,t}$$

*Investment demand*: A key question to resolve is how to allocate new investments between the different competing sectors. The literature suggests two approaches: using a capital distribution function (see Abbink et al. (1995)) or using an investment demand equation. We opt for the investment demand approach that fits in well with the data that we have available on investment by destination. There are now a number of alternative specifications of the investment by destination functions in the literature (see for example Bchir et al. 2002). The most well known in dynamic CGE circles and one that we use in this work follows from the work of Bourguignon et al. (1989) and later elaborated on in Jung and Thorbecke (2000) and Annabi (2004). It takes the following form:

$$\frac{INV_t^i}{K_t^i} = \kappa_{1i}\left(\frac{R_t^i}{U_t}\right)^2 + \kappa_{2i}\left(\frac{R_t^i}{U_t}\right)$$

where $\kappa_{1i}$ and $\kappa_{2i}$ are positive parameters calibrated on the basis of the investment elasticity and the investment equilibrium equation. The investment rate is increasing with respect to the ratio of

the rate of physical return to capital ($R_t^i$) and its user cost ($U_t$). The user cost is the resulting dual price of investment multiplied by the sum of the depreciation rate and exogenous real interest rate. Investment by destination is used to satisfy the equality condition by being set equal to the investment by origin observations found in the benchmark data. It is also used to calibrate the sectoral capital stocks in the base run.

*Unemployment*: The conventional approach in modeling unemployment in CGE models in South Africa is by nominally fixing the wage rate (see for example van Heerden et al. (2006)). We have experimented with this ad hoc way of modelling unskilled unemployment and found it unsatisfactory for several reasons. With factor prices being driven by value added prices, this way of modelling unemployment led to very high volatility and hence instability in skilled wage rates and the return on capital. The reason is that the return on capital and skilled wages are being forced to handle more than their share of the factor market adjustment burden. The level of volatility and instability that resulted was deemed unrealistic and broadly out of line with observation. Instead, what we have done is to make the the supply of labour endogenously determined. Total demand for workers will no longer be equal to the total supply and there will be an excess supply of labour which will remain unemployed. This should be understood to imply that the current structure and stock of unemployment remains the same into the future. Consequently, the market clearance assumption is extended to incorporate unemployment. Markets are not cleared in the strict sense of microeconomic theory, since at an equilibrium wage rate, the quantities offered and supplied will not be equal. Therefore, market clearance must be understood in a broad sense, since the unemployment rate which results from the interaction between supply and demand must be compatible with the equilibrium wage rate. In the future, it is recommended modelling explicitly the relationship between the wage rate and the unemployment rate, which is conveniently represented by a wage curve (see Blanchflower and Oswald (1995); and Card (1995))[6].

The model is solved over a twenty-year time horizon (up to 2020). It is also checked to confirm that it is homogeneous of degree zero in prices and that it satisfies Walras Law.

**Poverty module**

A top down approach is followed when modelling poverty. The procedure involves first obtaining results summarizing the effects of trade liberalization from the sequential dynamic CGE model. In a second step, these results are fed into a micro simulation household model to obtain the predicted household effects. Data from the 2000 Household Income and Expenditure Survey of

[6] This concept results from a series of empirical studies carried out with data compiled from several countries, which show a downward sloping relationship between the rate of unemployment and the wage rate in the local labour market.

South Africa and Labor Force Survey were used (Statistics South Africa, 2001, 2002)[7]. The survey is nationally representative and has detailed information on household consumption patterns, income and household characteristics such as area, gender, number of persons and socio-economic characteristics. Non-parametric approaches are used based on the observed distribution of these households in the survey, their sample weights, number of individuals in the household and their independent characteristics of ethnicity, skill type and region. The publicly available and efficient software for distributive analysis ( DAD: A Software for Distributive Analysis / Analyse Distributive) developed by Duclos et al. (2002)) is used for poverty analysis. The well known Foster, Greer and Thorbecke (FGT) measures are used for poverty analysis and can be summarized as follows (see Foster et al. 1984):

$$P_\alpha = \frac{1}{Nz^\alpha}\sum_{j=1}^{J}\left(z - y_j\right)^\alpha$$

where j is a subgroup of individuals with consumption below the poverty line (z), N is the total sample size, y is expenditure of a particular individual j and $\alpha$ is a parameter for distinguishing between the alternative FGT indices[8].

## DATA

To capture the base year structure of the South African economy, we have relied on a 2000 South African SAM that was developed by Thurlow and van Seventer (2002) under the auspices of the International Food Policy Research Institute (IFPRI). The original SAM includes 43 sectors, 14 household types, a government sector, enterprise and the rest of the world. The SAM has 4 factors of production, namely capital, unskilled, semi-skilled and skilled labor. In this study, an aggregated version of this SAM that includes 10 sectors, 3 factors of production (capital, skilled and unskilled labor) and 16 household types distinguished by region, skill and ethnicity is used.

The following are the 10 sectors used including their constituent parts:

[7] It should be noted that there is an active literature discussing the merits and demerits of this household survey (see for example Simkins, 2003; Hoogeveen and Özler, 2004). The main criticism centers on the perceived inadequacies of the sampling weights used, the lack of information required to impute comparable values on home produced goods and the lack of relevant quantities data to compute 'unit values' and price data to compute food prices at the community level. The latter two criticisms are largely irrelevant for this work since the CGE model is used to generate price and quantities information while Simkins (2003) has demonstrated that the 2000 sampling weights are not as unreliable as first feared.

[8] When $\alpha = 0$ the expression simplifies to $\frac{J}{N}$, or the headcount ratio. This is a measure of the incidence of poverty. When $\alpha = 1$ the expression gives us poverty depth measured by the poverty gap. When $\alpha = 2$ the expression gives us the severity of poverty measured by the squared poverty gap.

1. Agriculture – comprising agriculture, fishing and forestry, referred to as AGRI
2. Mining – comprising gold, coal and other mining, referred to as MINI
3. Food – comprising food, beverages and tobacco, referred to as FOOD
4. Textiles – comprising textiles, apparel, leather and footwear, referred to as TEXT
5. Manufacturing – comprising paper products, printing, rubber, plastic, glass, non metal mineral products, iron, non ferrous metals, machinery, electric machinery, communication equipment, scientific equipment, other industries, wood, metal products and furniture, referred to as MANF
6. Petroleum, referred to as PETRO
7. Chemicals – comprising basic chemicals and other chemicals, referred to as CHEM
8. Vehicles – comprising vehicles and transport equipment, referred to as VEHI
9. Capital Goods – comprising electricity, water and construction, referred to as CONS
10. Services – comprising wholesale, trade, hotels and accommodation, transport services, communication, finance and insurance, business services, medical and other services, other producers and government services, referred to as SERV

According to Table 1, services is the largest sector in terms of value added, making up over 66 percent of value added, followed by manufacturing, mining and capital goods which together account for about 20 percent of value added. Unlike other sub-Saharan African countries, the share of the agriculture and food sectors in value added is very small, each contributing roughly 3 percent of value added. While the economywide tariff is relatively low at about 3.2 percent, this masks significant sectoral variation which highly distorts the trade regime. The highly protected sectors are textiles (11.9 percent), food (6.2 percent), vehicles (4.3 percent) and chemicals (3.6 percent). Agriculture is mildly protected, facing an average protection of 1 percent. The remaining sectors, notably mining, capital goods, petroleum and services are receiving little to no protection.

Mining is the most dominant sector on the trade scene, contributing about 34 percent of total exports. This is followed by manufacturing (26 percent) and then services (15 percent). An almost similar pattern is repeated by looking at export intensity. This measure shows that mining, manufacturing, petroleum and chemicals are very important intensive exporters of their output. Notice that these sectors are the most capital intensive in the economy. The relatively labor intensive sectors of textiles and services have small export intensities. With the exception of capital goods and services, the rest of the sectors face significant competition from foreigners for the domestic market.

<Table 1>: Initial sectoral shares

| | Tariff | **Sectoral share in** | | | Import | Export | **Share in Value Added** | | Sectoral | Sectoral |
|---|---|---|---|---|---|---|---|---|---|---|
| | rate | Value Added | Imports | Exports | Penetration | Intensity | Wages | Capital | Wage Share | Capital Share |
| Agriculture | 0.70 | 3.16 | 1.60 | 2.71 | 6.39 | 11.37 | 1.07 | 2.09 | 2.10 | 4.27 |
| Mining | 0.01 | 6.49 | 10.20 | 33.44 | 49.48 | 78.08 | 3.09 | 3.40 | 6.05 | 6.95 |
| Food | 6.15 | 3.11 | 4.60 | 5.28 | 7.97 | 9.92 | 1.38 | 1.73 | 2.70 | 3.54 |
| Textiles | 11.87 | 1.05 | 3.51 | 2.16 | 17.00 | 12.25 | 0.81 | 0.24 | 1.59 | 0.49 |
| Manufacturing | 5.42 | 8.77 | 35.58 | 26.07 | 26.82 | 22.95 | 5.05 | 3.72 | 9.89 | 7.61 |
| Petroleum | 0.07 | 1.39 | 1.21 | 3.53 | 31.56 | 30.12 | 0.20 | 1.19 | 0.39 | 2.43 |
| Chemicals | 3.58 | 2.05 | 9.74 | 5.67 | 25.43 | 18.05 | 1.10 | 0.95 | 2.15 | 1.95 |
| Vehicles | 4.28 | 1.50 | 15.37 | 6.14 | 35.63 | 19.69 | 0.89 | 0.61 | 1.73 | 1.25 |
| Capital Goods | 0.00 | 5.53 | 0.47 | 0.53 | 0.90 | 1.13 | 2.63 | 2.90 | 5.14 | 5.93 |
| Services | 0.00 | 66.95 | 17.73 | 14.48 | 4.57 | 4.16 | 34.88 | 32.07 | 68.25 | 65.59 |
| TOTAL | 3.21 | 100.00 | 100.00 | 100.00 | 12.56 | 13.74 | 51.10 | 48.90 | 100.00 | 100.00 |

Source: Own computations based on constructed SAM 2000

The IFPRI SAM identifies 14 representative households according to their levels of income. Unlike the IFPRI SAM where households are identified according to income level, in this paper households are defined taking into account exogenous characteristic of the representative groups such as region (rural-urban), ethnicity and skill level. We have used the Income and Expenditure Survey (IES) of 2000 and the Labor Force Survey (LFS) of September 2000 to form the following 16 households:

UASK Urban African Skilled Households
UCSK Urban Coloured Skilled Households
UISK Urban Asian Skilled Households
UWSK Urban White Skilled Households
UAUSK Urban African Unskilled Households
UCUSK Urban Coloured Unskilled Households
UIUSK Urban Asian Unskilled Households
UWUSK Urban White Unskilled Households
RASK Rural African Skilled Households
RCSK Rural Coloured Skilled Households
RISK Rural Asian Skilled Households
UWSK Rural White Skilled Households
RAUSK Rural African Unskilled Households
RCUSK Rural Coloured Unskilled Households
RIUSK Rural Asian Unskilled Households
RWUSK Rural White Unskilled Households

Urban households spend disproportionately more of their income on services than rural households. It is important to recall that services have no nominal protection. On the other hand, rural households spend disproportionately more on primary agriculture commodities and foodstuffs than their urban counterparts. Both these commodities receive some amount of protection. When it

comes to manufactured goods, we notice that urban households consume marginally more than rural households. Ethnicity also plays a role. Whites are the most important consumers of services, followed by Asians. Whites also consume disproportionately more of primary agriculture than other racial groups. Africans and Coloureds are by far the most important consumers of foodstuffs. Asians consume disproportionately more of the mining good than any other group while Whites consume significantly fewer textiles than other groups. Coloureds consume less manufactured goods than all other groups. These consumption patterns imply that changes in the consumer prices of these goods resulting from trade policy intervention have quite differential impacts on each household category depending on which goods experience price rises or falls.

The choice of what poverty line to use is made difficult by the fact that South Africa does not have an official poverty line. As a result different analysts use different poverty lines (Hoogeveen and Özler (2004), Deaton (1997)). In this study we make use of the 3864 South African rands per year as suggested by Hoogeveen and Özler (2004), Mabugu and Chitiga (2007b) and Cockburn et al. (forthcoming). The poverty profiles are reported together with the simulation results.

# SIMULATION AND RESULTS

This section discusses the macro and sectoral effects of a higher economic growth rate scenario and ends up analysing the implications for poverty and welfare in South Africa. As discussed earlier, the increased economic growth rate is understood in the context of this work to be induced by the lifting of growth constraints rather than from macroeconomic stimulation. Indeed, this understanding is broadly in line with the understanding of growth drivers described in ASGISA. The motivation for this simulation is to explore, albeit in an ad hoc fashion, the likely influence on the economy of a high economic growth scenario compared to the BAU scenario. In the simulation government budget equilibrium is met through a neutral indirect tax adjustment. Saving-Investment equilibrium is met with an adjustment variable introduced in the investment demand function. While in static CGE models counterfactual analysis is made with reference to the base run that is represented by the initial SAM, in dynamic models the economy grows even without a policy shock. As a result, analysis using dynamic models should be done with respect to the growth path in the absence of any shock. This has led us to begin the analysis with an examination of the evolution of poverty and inequality along the BAU path.

**Poverty and Inequality in the BAU scenario**

Poverty and inequality levels on the BAU path (for base run, year 2000 and 2020) are reported in Table 2. According to Table 2, 53 percent of South Africans were poor in 2000 according to the lower bound ‘cost of basic needs approach’ poverty line of 3864 South African rands per year. The poverty gap was 25 percent while the poverty gap squared (severity) was 15

percent. Poverty headcount, its incidence and severity are more widespread in rural areas than in urban areas (see Table 2). It is clear that poverty affects mainly unskilled African and Coloured households where 61 and 36.2 percent respectively are classified as poor. Poverty is very low among Asian households and is even lower amongst White households at 0.1 percent. All skilled households are not poor.

*<Table 2>: Poverty under the BAU scenario (in percent)*

| | Short Run =2009 | | | Long Run =2020 | | |
|---|---|---|---|---|---|---|
| | *P0* | *P1* | *P2* | *P0* | *P1* | *P2* |
| **South Africa** | 53.00 | 25.30 | 15.00 | 38.37 | 15.51 | 8.11 |
| **Residential Area** | | | | | | |
| Urban | 42.40 | 18.40 | 10.20 | 14.85 | 5.18 | 2.56 |
| Rural | 68.30 | 35.40 | 22.10 | 56.37 | 23.37 | 12.52 |
| **Ethnic group** | | | | | | |
| African household | 61.00 | 29.50 | 17.60 | 44.16 | 18.08 | 9.51 |
| Coloured household | 36.20 | 14.70 | 7.80 | 28.21 | 10.01 | 5.21 |
| Asian household | 6.40 | 2.30 | 0.80 | 3.63 | 1.10 | 0.42 |
| White household | 0.10 | 0 | 0 | 0.07 | 0 | 0 |
| **Region, Ethnic and skill group** | | | | | | |
| Urban African Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Urban Coloured Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Urban Asian Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Urban White Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Urban African Unskilled | 17.90 | 10.08 | 5.50 | 7.27 | 3.84 | 2.38 |
| Urban Coloured Unskilled | 8.30 | 5.02 | 2.10 | 1.90 | 2.40 | 0.53 |
| Urban Asian Unskilled | 1.80 | 0.78 | 0.25 | 0.63 | 0.21 | 0.06 |
| Urban White Unskilled | 0.02 | 0 | 0 | 0 | 0 | 0 |
| Rural African Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rural Coloured Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rural Asian Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rural White Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rural African Unskilled | 43.6 | 15.40 | 11.20 | 35.98 | 10.17 | 6.34 |
| Rural Coloured Unskilled | 29.70 | 11.60 | 3.40 | 24.51 | 7.66 | 1.92 |
| Rural Asian Unskilled | 3.90 | 1.50 | 0.40 | 2.21 | 0.99 | 0.23 |
| Rural White Unskilled | 0.06 | 0 | 0 | 0.05 | 0 | 0 |

*Legend: P0=Poverty headcount; P1= Poverty gap; and P2= Poverty severity*
Source: Authors' calculations.

The path generated by a recursive expansion of the economy shows that accumulation effects captured by the model contribute to a substantial decrease in poverty. Our assumptions imply that economic growth plays a major role in reducing poverty headcount, its incidence and severity especially in the rural areas and among unskilled African and Coloured households (see Table 2).

**High economic growth scenario**

*Macroeconomic effects*

According to Table 3, a high growth scenario has very pronounced and beneficial effects compared to a BAU scenario. We see that GDP in this scenario will rise between about 3 percent in 2009 to over 6 percent in 2020. It is important to note that this is growth over and above the BAU growth scenario. This growth in turn will positively impact on incomes, which then raises savings and consequently investment. Private consumption rises sharply compared to the "do nothing" scenario, both in the short and long run. Capital good price rises in the short run before falling in the long run. However, because of the induced output growth, the user cost of capital falls from 2009 until 2020. The rising rental to user cost of capital ratio coupled with the higher induced savings results in a boom in investment by destination, with the long run response being stronger than the short run response. Imports increase dramatically because a growing economy requires a higher level of imports to meet higher production levels and increased household demands. Indeed imports rise much faster than exports in the short run, in part due to a growth induced real exchange rate appreciation. In the long run, exports grow more than imports. The consumer price index increases initially in the short run before declining in the long run. Skilled and unskilled wages increase in both periods following increased demand for labor to meet higher growth needs. Welfare rises dramatically in line with the observed falling consumer price index and consumption developments. Finally, the policy leads to reductions in poverty, both in the short and long run.

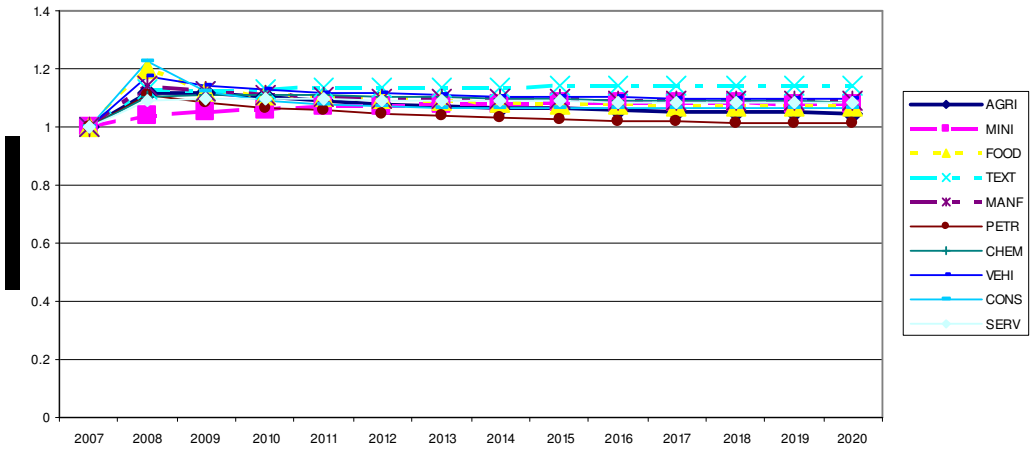
<Table 3>: Macroeconomic effects of a higher economic growth (% change from Business As Usual (BAU) path)

| | GDP PATH | CONSUMPTION | INVESTMENT | EXPORTS | IMPORTS | SKILLED WAGE | UNSKILLED WAGE | CONSUMER PRICE INDEX | CAPITAL GOOD PRICE | CAPITAL USER COST |
|---|---|---|---|---|---|---|---|---|---|---|
| 2009 | 2.91 | 9.34 | 18.86 | 4.63 | 11.03 | 9.41 | 9.98 | 0.15 | 7.93 | -0.93 |
| 2010 | 2.88 | 10.29 | 18.96 | 6.14 | 11.62 | 10.94 | 11.48 | -0.17 | 5.60 | -1.87 |
| 2011 | 3.76 | 11.17 | 18.57 | 7.63 | 12.07 | 12.31 | 12.85 | -0.50 | 3.93 | -2.43 |
| 2012 | 3.83 | 11.93 | 17.99 | 9.00 | 12.40 | 13.49 | 14.06 | -0.79 | 2.55 | -2.79 |
| 2013 | 4.18 | 12.58 | 17.36 | 10.22 | 12.66 | 14.49 | 15.09 | -1.02 | 1.37 | -3.03 |
| 2014 | 4.72 | 13.12 | 16.74 | 11.26 | 12.85 | 15.32 | 15.94 | -1.20 | 0.38 | -3.18 |
| 2015 | 5.16 | 13.55 | 16.16 | 12.14 | 12.98 | 16.00 | 16.64 | -1.34 | -0.44 | -3.28 |
| 2016 | 5.51 | 13.90 | 15.63 | 12.87 | 13.08 | 16.53 | 17.19 | -1.44 | -1.11 | -3.33 |
| 2017 | 5.78 | 14.17 | 15.15 | 13.46 | 13.15 | 16.94 | 17.61 | -1.51 | -1.66 | -3.36 |
| 2018 | 5.99 | 14.37 | 14.72 | 13.93 | 13.18 | 17.24 | 17.93 | -1.56 | -2.09 | -3.37 |
| 2019 | 6.15 | 14.51 | 14.34 | 14.30 | 13.20 | 17.46 | 18.16 | -1.59 | -2.43 | -3.36 |
| 2020 | 6.26 | 14.60 | 14.00 | 14.58 | 13.19 | 17.61 | 18.31 | -1.60 | -2.70 | -3.34 |

*Sectoral effects*

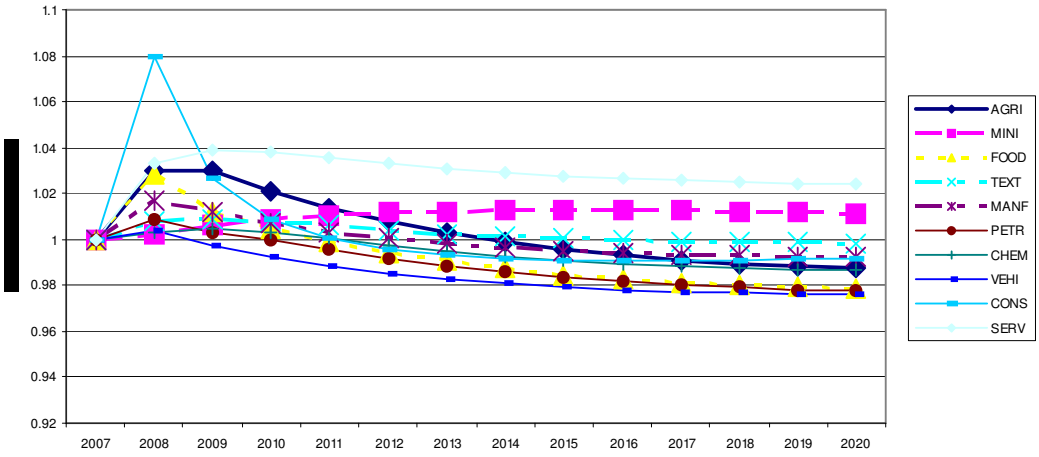
Obviously, the initial impact of the higher growth rate is felt in value added prices that rise across the board as shown in Figure 2. The increase in value added prices is related directly to increased induced factor demand. These price movements are important for developments of factor prices and overall domestic price movements as will be discussed further on.

**Figure 2: Changes in the price of value added induced by a high economic growth scenario**



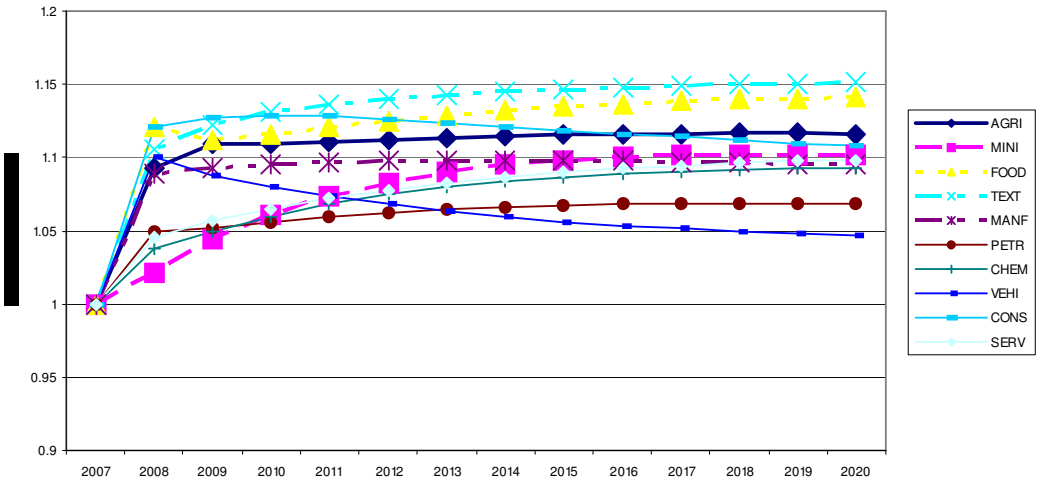

The change in value added prices triggers changes in domestic prices as shown in Figure 3. Domestic prices rise the most for textiles, followed by agriculture (primary) and then food. The increase is higher in the short run compared to the long run.

**Figure 3: Changes in domestic prices induced by a high economic growth scenario**



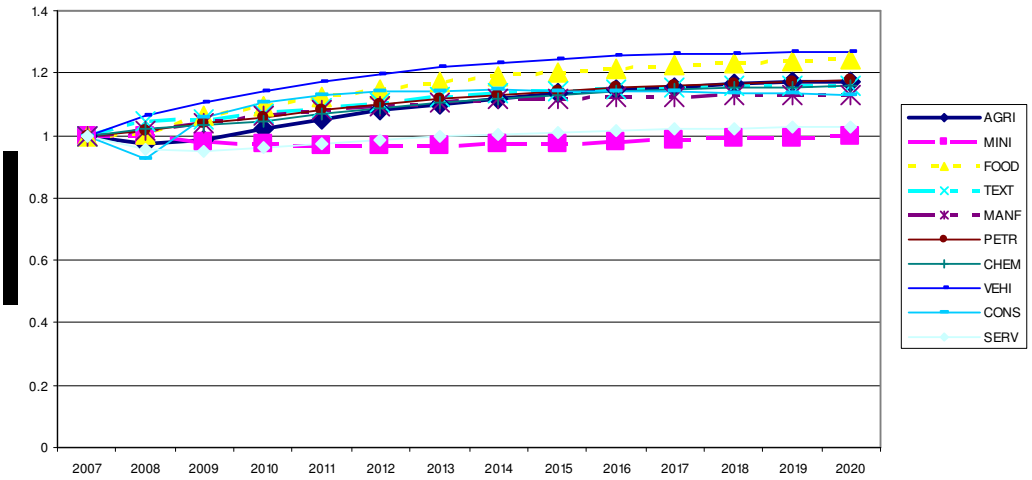

The growth increase impacts heavily on import demand. Thus, from Figure 4 we notice that imports are higher. The textiles sector experiences the highest increase in imports due to the demand stimulus injected by higher growth.

**Figure 4: Changes in imports induced by a high economic growth scenario**



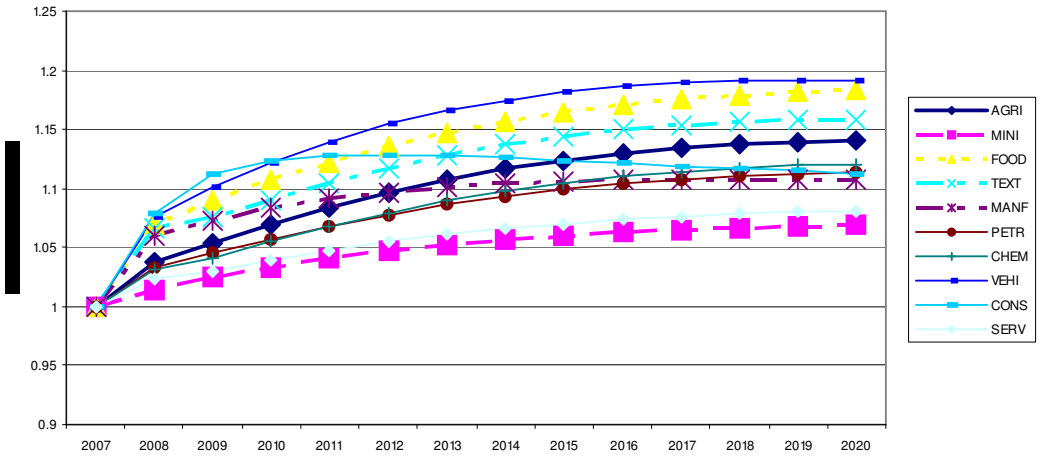

With both the nominal exchange rate and the current account fixed in the short run and then growing at a fixed rate thereafter, the increase in imports means that the exchange rate should depreciate in order to stimulate exports required to offset the deterioration in the current account balance in the short run. With world export prices given by the small country assumption, the exchange rate depreciation leads to increases in domestic export prices which induces an increase in export volumes. As can be observed in Figure 5, exports go up both in the short run and in the long run for almost all sectors.

**Figure 5: Change in exports induced by a high economic growth scenario**



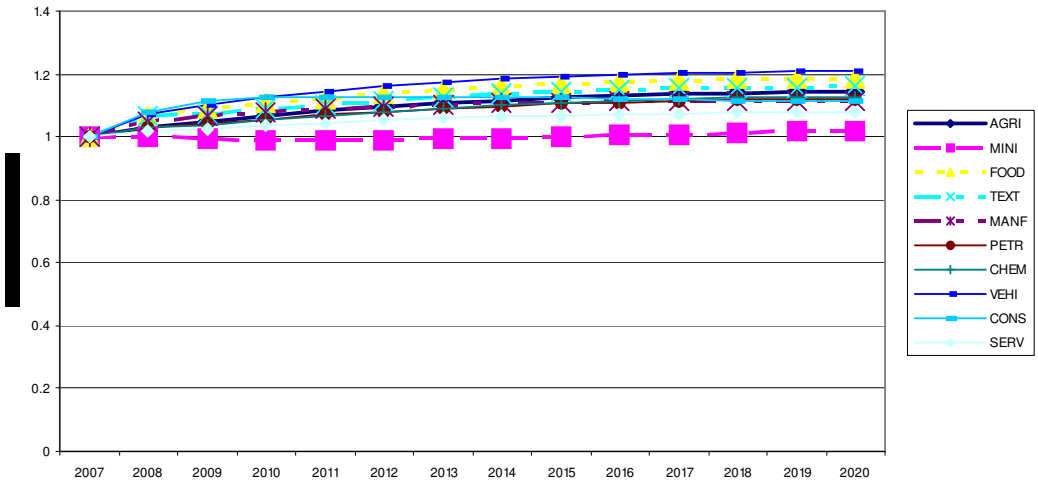
Looking at domestic sales development gives us an idea of which sectors are driven out of the market by the increased economic growth scenario. As Figure 6 shows, it turns out that there are no outright losers, with all sectors experiencing increasing domestic sales. Primary agriculture benefits the most whilst mining experiences the smallest gains. The changes in domestic market shares are relatively large compared to the changes in exports and imports because of the relatively small initial import intensities as well as the imperfect substitution between local and imported sales which both have the tendency to limit further import substitution of domestic production.

**Figure 6: Changes in domestic sales induced by a high economic growth scenario**




The effect on gross supply follows a similar trend as the outcome in domestic demand that has just been discussed (see Figure 7). All sectors benefit from increased growth. Sectors such as Food, Vehicles, Construction and Agriculture with higher initial production scale parameters gain the most. Services benefits from the high growth scenario because its output is an important input for most of the sectors which are experiencing gains in economic activity.

**Figure 7: Changes in gross supply induced by a high economic growth scenario**




On the factor markets, wages increase for both skilled and unskilled workers in the short and long run in response to increased value added prices (Figure 8 and 9). Unskilled wage rates rise slightly more than skilled wage rates. Labour is now being drawn from mining sectors towards the other sectors. Overall, employment increases for all skill categories although skilled labour experiences marginally higher growth. The reason why workers are being drawn away from mining towards other sectors is because it is the sector growing the least, as was discussed above. But why is it growing relatively slowly? The slower growth in mining is not related to domestic savings/investment. Mining is strongly dependent on foreign investments and the industry return to capital is less profitable to domestic institutions, particularly households and this is what explains the lower benefits to the sector. In future work, domestic savings/investment should, at least partially, exclude the mining industry whose investments should be determined exogenously.

How do we justify wage rises which seem unwarranted in the face of high unemployment? It is important to understand that this result is being driven by how we have modelled unemployment and labor force growth. Although a key innovation of this work is modelling unemployment by making labor supply endogenous as opposed to fixing nominal wages, we still make the assumption of uniform skilled and unskilled labour force growth. While this assumption is clearly unrealistic in an economy that faces a shortage of skilled workers and a plethora of unskilled workers, sensitivity analysis using alternative growth rates guestimated showed that indeed this will affect labour supply behaviour and in turn their remuneration. Indeed unskilled wage rates need not rise in the high growth scenario if one assumes a labour force growth rate above the population growth rate. However, since we lack data about the evolution of the labor participation rate in the future, we have opted to use the growth rate of population for all labour categories instead of the labor force and this implies that the labor participation rate is constant over time. This must remain an area of future study.

**Figure 8: Change in skilled labour demand induced by a high economic growth scenario**

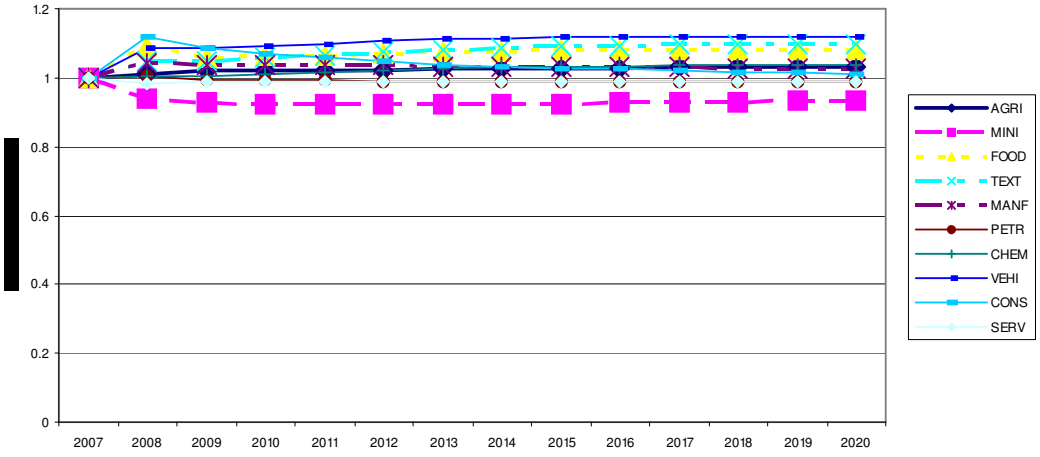
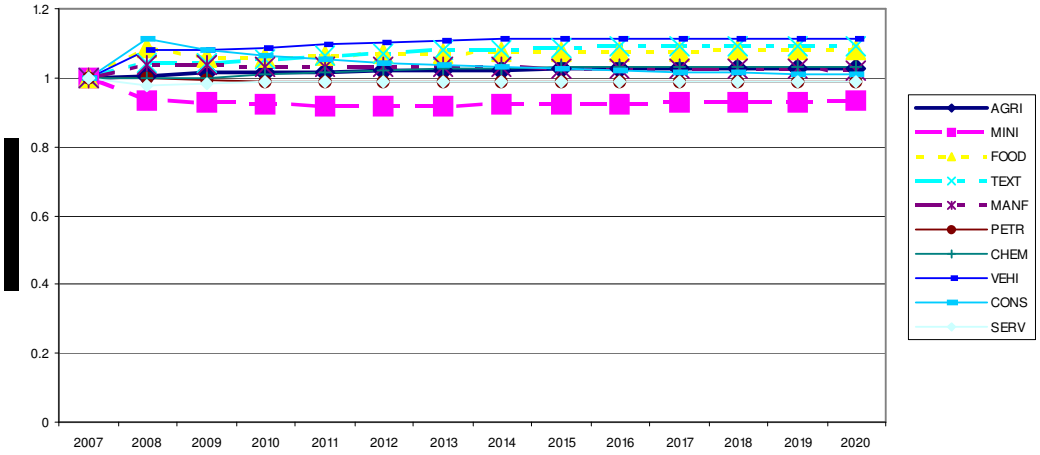



**Figure 9: Changes in unskilled labour demand induced by a high economic growth scenario**




Together with increases in value added prices and wage rates, the return on capital increases for all sectors in the short run and subsequently declines for all sectors in the long run (Figure 10). However, the decline in the return on capital in the long run is relatively less than the decline in the user cost of capital. As a result, investment by origin increases in both the short and long run following a growth increase (Figure 11).

**Figure 10: Changes in return to capital induced by a high economic growth scenario**

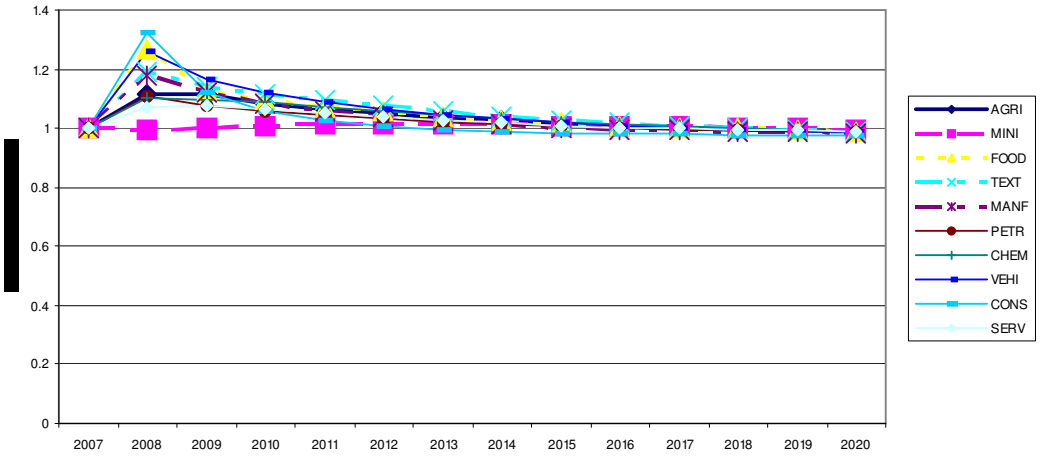
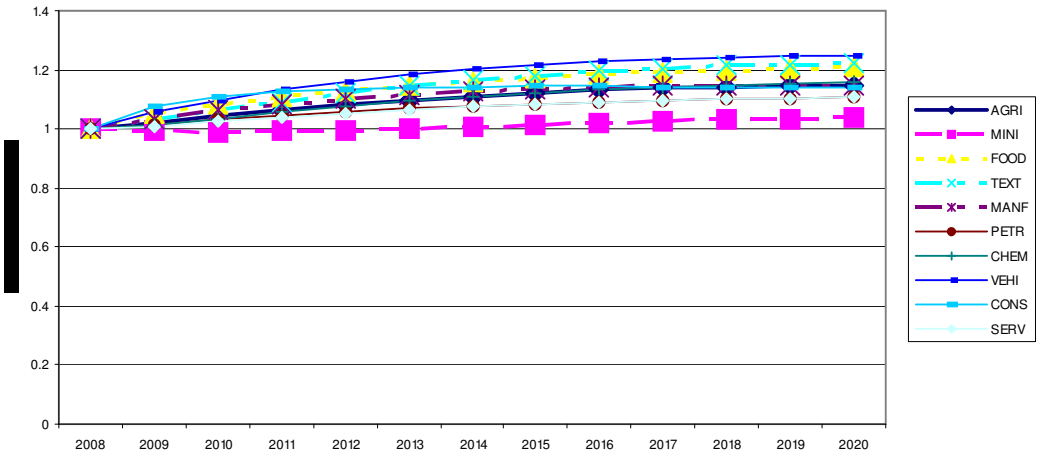
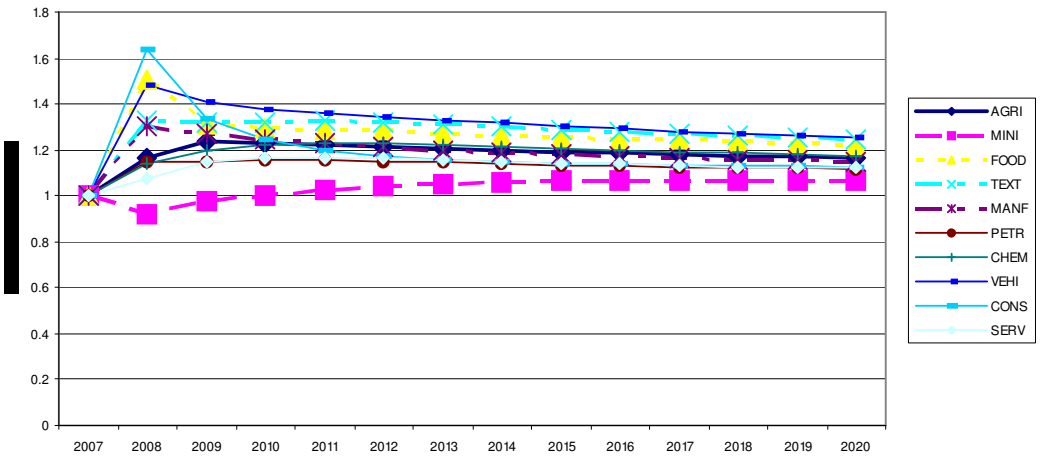



**Figure 11: Change in investment by origin induced by a high economic growth scenario**




Due to higher induced savings and the movements in capital rates of return and capital accumulation discussed above, growth increases investment by destination for all sectors (Figure 12). The increases are higher in the short run than in the long run. Construction receives the highest positive stimulus to investment in the short run while in the long run capital accumulation is more evenly spread.

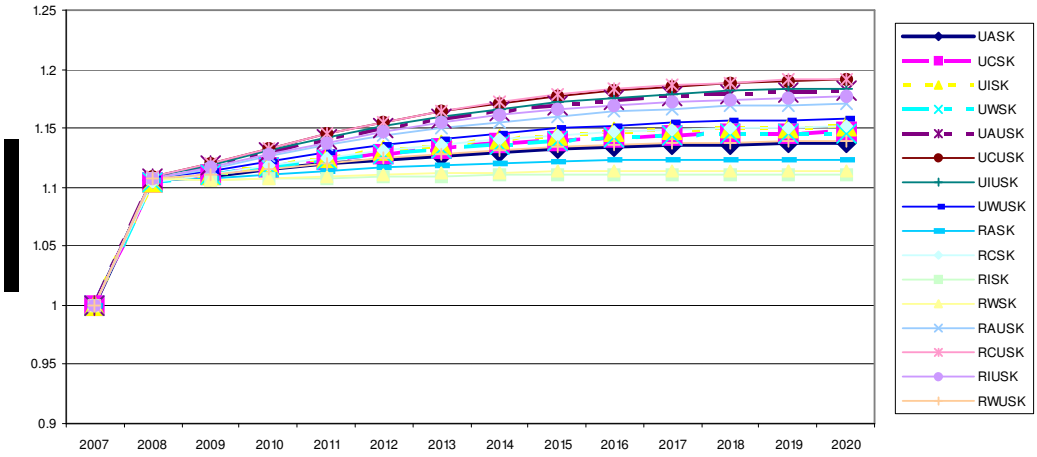
**Figure 12: Change in investment by destination induced by a high economic growth scenario**




*Welfare effects*

We have observed that a main consequence of higher economic growth is the increase in factor prices. Given that factor prices are the main driving force behind household income, it is not surprising that the scenario results in all household incomes increasing (Figure 13). The gain is higher in the long run. African, Asian and Coloured Unskilled households reap most of the benefits while Rural White households[9] benefit the least.

**Figure 13: Evolution of household income induced by a high economic growth scenario**




The increase in household income is higher than the increase in consumer price index in the short run so that real consumption and welfare increases for all households (Figure 14). In the long run, the falling consumer price index reinforces the income effects so that the equivalent variation goes up by even more for all households. Total household consumption follows the same

[9] We should perhaps refrain from making much from this observation given the small size in the sample of this group.

trend as household incomes, increasing for all households both in the short and long run. Unskilled households gain more than skilled households while rural households stand to gain more than urban households.

**Figure 14: Evolution of household consumption induced by a high economic growth scenario**

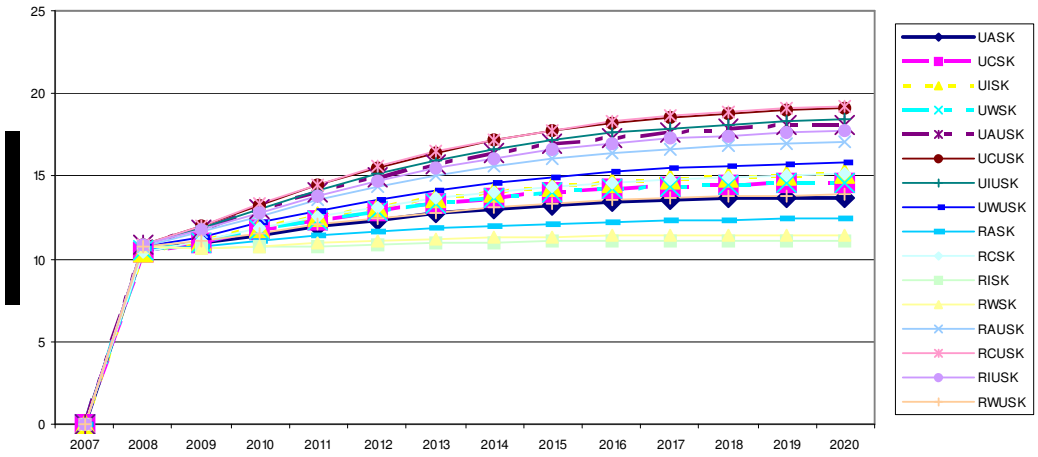
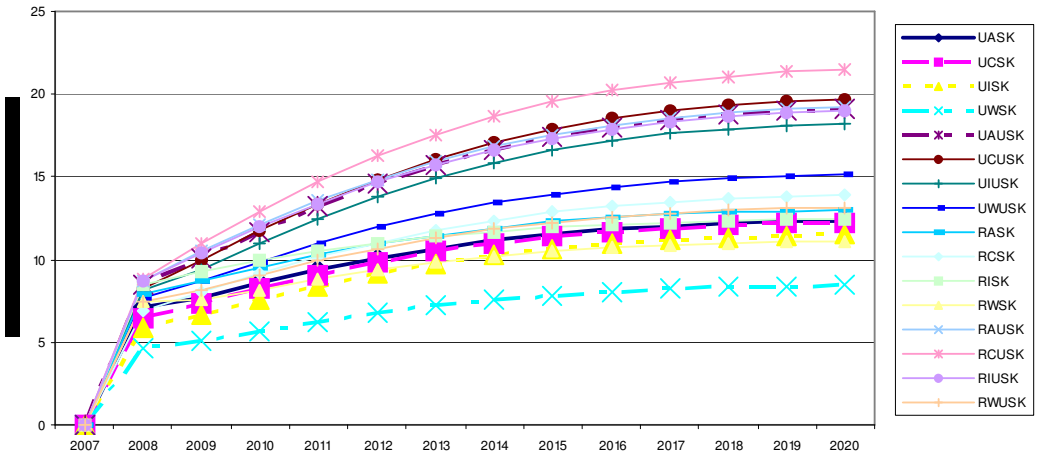



**Figure 15: Evolution of welfare (Equivalent Variation) induced by a high economic growth scenario**




As shown in Figure 15, welfare as measured by the equivalent variation broadly follows the patterns displayed by real consumption. Welfare rises for all households in both the short and long run.

*Poverty effects*

The high growth scenario has a very significant impact on poverty as shown in Table 4. Compared to the business as usual poverty evolution, the poverty headcount ratio falls by 0.34 percent to 52.82 percent in the short run and by 4.34 percent to 36.7 percent in the long run. Most of the poverty reduction is felt amongst African and Coloured households while urban households benefit

less than their rural counterparts from the ensuing fall in poverty. The average poverty gap and the squared poverty gap also follow a similar pattern to the headcount ratio.

*<Table 4>: Poverty rates in a high economic growth scenario*

| | Short Run =2009 | | | Long Run =2020 | | |
|---|---|---|---|---|---|---|
| | *P0* | *P1* | *P2* | *P0* | *P1* | *P2* |
| **South Africa** | 52.82 | 25.25 | 14.81 | 36.70 | 14.84 | 7.48 |
| **Residential Area** | | | | | | |
| Urban | 42.26 | 18.37 | 10.03 | 14.07 | 4.91 | 2.39 |
| Rural | 67.92 | 35.24 | 21.80 | 52.16 | 21.83 | 11.48 |
| **Ethnic group** | | | | | | |
| Black household | 60.30 | 29.12 | 17.21 | 41.32 | 17.10 | 8.78 |
| Coloured household | 35.73 | 14.59 | 7.66 | 25.98 | 9.29 | 4.78 |
| Indian household | 6.37 | 2.30 | 0.79 | 3.42 | 1.05 | 0.39 |
| White household | 0.10 | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 |
| **Region, Ethnic and skill group** | | | | | | |
| Urban African Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Urban Coloured Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Urban Indian Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Urban White Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Urban African Unskilled | 17.77 | 10.04 | 5.42 | 6.59 | 3.40 | 2.09 |
| Urban Coloured Unskilled | 8.20 | 4.99 | 2.06 | 1.71 | 2.09 | 0.44 |
| Urban Indian Unskilled | 1.80 | 0.78 | 0.25 | 0.62 | 0.20 | 0.06 |
| Urban White Unskilled | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rural African Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rural Coloured Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rural Indian Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rural White Skilled | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rural African Unskilled | 42.99 | 15.20 | 10.98 | 32.19 | 9.16 | 5.63 |
| Rural Coloured Unskilled | 29.15 | 11.33 | 3.32 | 21.84 | 6.98 | 1.69 |
| Rural Indian Unskilled | 3.87 | 1.49 | 0.39 | 2.12 | 0.97 | 0.22 |
| Rural White Unskilled | 0.06 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 |

# CONCLUSIONS

South Africa has undergone significant macroeconomic stabilization and trade liberalization since the end of apartheid. The macroeconomic performance in this era of liberalizing trade has been unimpressive, with GDP growing by insufficient amounts to make inroads into the high unemployment levels. Inequality has risen and poverty levels may have also risen. As priorities shifted from stabilization towards development, government commenced work on a new initiative and subsequently launched the Accelerated and Shared Growth Initiative for South Africa (ASGISA). The launch of ASGISA has rekindled debate about the consequences of economic growth on poverty and welfare.This paper uses a sequential dynamic computable general equilibrium model linked to a nationally representative household survey to assess the poverty and economic consequences of a higher economic growth scenario.

The paper's main findings are that higher economic growth induces reductions in poverty

both in the short and long run. It enhances capital accumulation, particularly in the agriculture and textiles sectors. The mining industry benefits the least from a high economic growth scenario. However, this is not related to domestic savings/investment. Mining is strongly dependent on foreign investments and the industry return to capital is less profitable to domestic institutions, particularly households and this is what explains the lower benefits to the sector. African and Coloured households reap most of the benefits, with greater gains among urban unskilled dwellers.

Some useful policy conclusions emerge from these results. Without exception, there is substantial scope for pursuing activities that remove impediments to accelerated economic growth. However, it is important to be aware that there is an asymmetry in the timing of the welfare gains that can only be picked up by dynamic analysis. These results suggest therefore the need for patience, for most of the gains come in the long run. The findings do not suggest that macroeconomic policy should be a long term growth instrument. Instead, they suggest that lifting of growth constraints rather than macroeconomic stimulation would induce higher growth with the resulting beneficial effects. Economic growth of the levels simulated does not appear to be inconsistent with macroeconomic balance, as reflected in price stability, balance of payments and sectoral effects.

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