Realizing the Millennium Development Goals through socially inclusive macroeconomic policies

Country Study

Assessing Development Strategies to Achieve the MDGs in

The Republic of South Africa

Marna Kearney
Quantec Research

Ayodele Odusola
UNDP South Africa

United Nations Department for Social and Economic Affairs

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This (unedited) report was elaborated as part of the capacity-development project “Realizing the Millennium Development Goals through socially-inclusive macroeconomic policies”, which was implemented by the Development Policy an Analysis Division of the United Nations Department of Economic and Social Affairs (DPAD/UN-DESA), in close collaboration with the World Bank and the United Nations Development Programme in South Africa.

The overall objective of the project was to strengthen the capacity of policymakers to formulate and evaluate socially-inclusive macroeconomic policies aimed at facilitating the achievement of the MDGs through the adaptation of an integrated modelling framework to country-specific conditions. The methodological framework is based on the adaptation of the economy-wide model system, known as ***Ma****quette* for **M**DGs **S**imulation (MAMS) – a dynamic computable general equilibrium (CGE) model that includes a special module for the “production” of services associated with the Millennium Development Goals (MDGs). It also compromises methodologies at the micro level to identify determinants of MDG achievement, on the one hand, and to quantify effects on poverty and inequality, on the other.

The views and opinions expressed herein are those of the authors and do not necessarily reflect those of the United Nations and the World Bank or their member states.

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1. Introduction

South Africa was readmitted to the international community after successful free elections in April 1994 following years of international isolation imposed on the country due to its racially motivated apartheid policies. 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. Inflation has been within target, and the budget deficit has been falling in recent times. Since 1994, the government has channelled substantial resources into social programs and services. Despite these impressive policy reforms, the economy has failed to grow in sufficient amounts to make inroads into the high unemployment and poverty (Hoogeveen and Özler, 2004).

Following the 2004 elections the government has outlined five key development goals in the Government's Contract with the People of South Africa, namely:

- *Reduce poverty by half through economic development, comprehensive social security, land reform and improved household and community assets;*
- *Provide the skills required by the economy, build capacity and provide resources across society;*
- *Reduce unemployment by half through new jobs, skills development, assistance to small businesses, opportunities for self-employment and sustainable community livelihoods;*
- *Massively reduce cases of TB, diabetes, malnutrition and maternal deaths, turn the tide against HIV and AIDS, strive to eliminate malaria and improve services to achieve a better national health profile; and*
- *Reduce preventable causes of death, including violent crime and road accidents.*

Furthermore, government adopted the UN Millennium Declaration alongside other countries as an unprecedented declaration of solidarity to rid the world of poverty. This declaration is encapsulated in the Millennium Development Goals (MDGs). Heads of states agreed in 2000 to use the MDGs to work together to reduce poverty by 2015 or earlier. The MDGs provide an indication of the results that the country wants to obtain (outcomes) based on certain inputs (resources), outputs (understanding of activities and changes) and impact (change/effect of intervention). Some of the outcomes indicators as expressed by the MDGs are closely related to the rights that are mentioned in the Constitution.

This paper is linked to the project entitled “Realizing the Millennium Development Goals through Socially Inclusive Macroeconomic Policies” which aims to answer three key questions relating to South Africa achieving its MDGs, namely what is the likelihood of South Africa achieving the goals under current policies and investments? What changes in South Africa’s strategies and policies are required to achieve these goals? What are the costs of the different strategies, policies, and investment alternatives? This project is a joint collaboration between UNDP, UN-DESA and the World Bank.

The benefits of this project are more than providing the answers to the questions mentioned above. The methodology used is a comprehensive framework to evaluate developmental policies as it links the various developmental objectives and may be applied to other policy questions and strategies within South Africa for example evaluating the success and cost of AsgiSA, as well as the Medium Term Strategic Framework (MTSF) and the New Growth Path policy. The capacity building objective of this project is also very important for South Africa as it enables South Africa to build its own capacity in this field.

In conformity with the brief provided by UN-DESA, this Country Background Report includes an overview of the main reforms, macroeconomic policy, economic performance and vulnerabilities, social policy and MDG achievement in South Africa. The report is divided into nine sections. The *first section* provides a brief introduction. The *second section* offers details of economic reforms and policy during the period 1994 to 2008, as well as an overview of the performance of the economy during the same period. The *third* section discusses the economic constraints and vulnerabilities within the South African economy. The *fourth section* provides a brief summary of the status of achieving the MDGs in South Africa, attempts to identify gaps in achieving the MDGs as well as policies that may assist South Africa to achieve the MDGs. The next section, *section five*, provides a brief description of the methodology used and *section six* discusses the data used and data problems experienced. S*ection seven* is the main section of the report and provides the results of the General Equilibrium Analysis the analysis of which attempts to answer the questions listed above. *Section eight* discusses the results relating to the poverty reduction goal. The last section, section *five* provides a brief conclusion and policy recommendations.

2. Economic Performance 1994-2008

2.1. Economic policy during the period 1994 to current

RDP and GEAR

Before launching AsgiSA, there were two other major development strategies since 1994. The first was the Reconstruction and Development Programme (RDP), which was part of the election platform of the African National Congress in the 1994 elections. Its primary objective was to remove racial biases in a bid to address poverty and socio-economic inequalities inherited from the previous regime. Achieving poverty alleviation and a stronger economy were seen as deeply interrelated and mutually supporting objectives – "development without growth would be financially unsustainable, while growth without development would fail to bring about the necessary structural transformation within South Africa's deeply inequitable and largely impoverished population". The RDP included interventions to stimulate the economy such as restraint on fiscal spending, tax reduction, government debt reduction and trade liberalisation, social service extension to previously

disadvantaged groups and infrastructure programs. Monetary policy objectives focused on the maintenance of the independence of the South African Reserve Bank, protecting the value of the currency, to keep inflation relatively low, and to improve access to financial services of previously excluded groups. There were no specific numerical goals identified within the RDP framework in terms of growth and employment targets, fiscal deficits, tax ratios, debt as a percentage of GDP, and inflation targets. The implementation of the RDP required substantial resources and other complementary policy initiatives that were not yet in place. Although an RDP Fund was created to finance RDP projects, and a separate RDP office set up to administer the Fund and coordinate the programme across ministries, this office was disbanded and the programme was deemphasized from 1996.

Government introduced a macroeconomic policy framework called the Growth, Employment and Redistribution (GEAR) strategy in 1996. This was an economic strategy meant to cover 1996-2000. It set a goal of achieving sustained annual real gross domestic product (GDP) growth of 6% or more by the year 2000 while creating 400,000 new jobs each year. The following strategy was identified to assist in achieving the target growth rate:

- Accelerated export growth, especially non-gold exports,
- Increase in private sector capital formation,
- Increase in infrastructure development,
- Increased employment intensity of investment and output,

A suitable environment for the strategy needed to be created; the core elements included:

- Increased competition to facilitate the expansion of the tradable sector,
- Improved investor confidence,
- Improved service delivery by public sector,
- Sectoral and regional emphasis for industrial and infrastructural development,
- Improved labour market flexibility, and
- Human resource development. (Treasury,1996)

The redistributive measures linked to GEAR focussed on education as a strategy to promote economic growth and improved income distribution. Other, shorter term measures, included access to free basic health care, accelerated housing development, improved water and sanitation, and land reform. (Treasury, 1996)

GEAR had mixed outcomes. It is credited with bringing greater financial discipline and macroeconomic stability. A key pillar of GEAR was to reduce the fiscal deficit from over 9% of GDP during the 1993/4 fiscal year. It succeeded and the deficit remained below 3% thereby improving the country's fiscal health. In fact, the 2002 budget began to introduce moderate increases in spending to promote faster growth and poverty alleviation. However, critiques argue that it failed to bring about increased formal employment and more evenly distributed wealth (Gelb, 2005). FDI did not materialise and growth targets were not met. A decision was taken therefore to look closely at how to accelerate growth and ensure rising living standards for the majority and this culminated in AsgiSA.

AsgiSA

The Government of South Africa launched the Accelerated and Shared Growth Initiative for South Africa (AsgiSA) in 2006. AsgiSA was launched as a coordinating framework to enable achievement of new government goals of halving unemployment and poverty between 2004 and 2014. There was an explicit aim of accelerating economic growth to an average of at least 4.5% between 2005 and 2009 and further to a sustainable 6% average annual rate between 2010 and 2014. The framework identified six binding constraints to economic growth, namely: the volatility and level of the currency; the cost, efficiency and capacity of the national logistics system; shortages of suitably skilled labour, amplified by the impact of apartheid spatial patterns on the cost of labour; barriers to entry, limits to competition and limited new investment opportunities; the regulatory environment and the burden of small and medium businesses; and deficiencies in state organisation, capacity and leadership. Specific strategies are set in place through AsgiSA which attempts to address the constraints identified, including:

- Infrastructure programmes
- Sector investment (or industrial) strategies
- Skills and education initiatives
- Second economy interventions
- Macro-economic issues such as the volatility of the exchange rate
- Public administration issues such as improved service delivery.

(The Presidency of South Africa, 2006).

The driving rationale behind AsgiSA was an understanding that although the country had made substantial economic achievements since the transition to democracy in 1994, distribution outcomes were skewed towards a few at the expense of the majority.

Medium Term Strategic Framework (MTSF)

Recently the government has developed a MTSF that links government policy to achieve the objective set by AsgiSA, among other. The MTSF is a planning document that attempts to align resource allocation of all government spheres to the objectives set. The MTSF identifies the following 5 developmental objectives:

- Halve poverty and unemployment by 2014 from 2004.
- A more equitable distribution of the benefits of economic growth and reduce inequality.
- Improve the health profile of the nation, the skills base, and access to basic services.
- A nation free of all forms of racism, sexism, tribalism, and xenophobia.
- Improve the safety of citizens by reducing incidents of crime and corruption. (UNDP, 2010).

New Growth Path (NGP)

The NGP is the latest economic policy announced by government. During October 2010 President Jacob Zuma proposed a new growth path for South Africa that place employment at the centre. It identifies key areas where jobs can be created and include:

- Infrastructure expansion of transport, energy water, communications capacity, and housing;
- The agricultural value chain;
- The mining value chain;
- The green economic;
- Manufacturing sectors as identified in government's industrial policy action plan; and
- Tourism and certain high-level services.

The target set is to create five million jobs in the next ten years, thereby reducing unemployment from 25 percent to 15 percent. In order to achieve this, the economy needs to be growing at an accelerated growth. The macroeconomic approach that government plans to follow entails more active monetary policy interventions, a more competitive exchange rate and lower cost of capital, a more restrained fiscal stance, reprioritisation of public spending to ensure fiscal sustainability. The microeconomic approach involves targeted measures to support jobs and competitiveness including skills development, competition, industry and small business development, labour market reforms, rural and African development, and trade policy reforms (The Presidency, 2010).

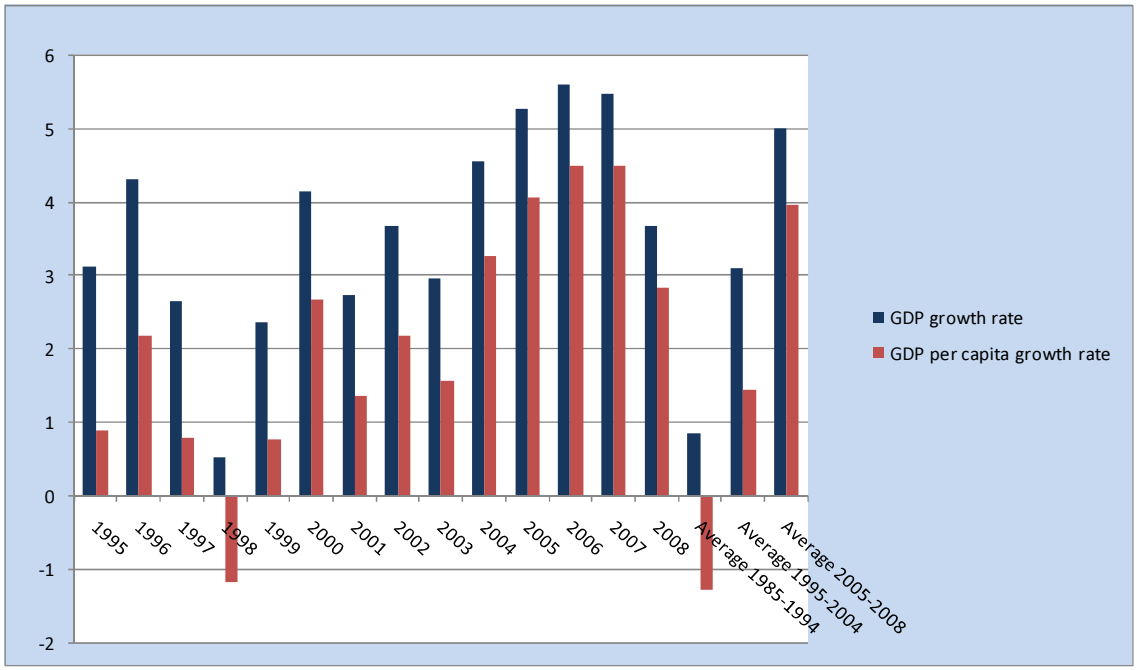
2.2. Economic performance during the period 1994 - 2008

2.2.1. Economic growth

South Africa experienced a long period of decline in the last decades of apartheid, with growth being particularly poor in the 1980s and early 1990s (Fedderke and Vase, 2001). Reasons for the low growth, according to Fedderke and Vase (2001), was increasing international isolation and civil conflict, as well as the deliberate suppression of the majority black population which meant that accumulation of human capital would be low and exert a negative impact on potential growth. The picture reversed somewhat as growth became positive in the initial years of the new democratic regime that began in 1994.

Economic performance of post apartheid South Africa has been relatively impressive, averaging 3.3% growth rate for real GDP and 1.7% in per capita terms for the period 1995 to 2005. 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% (Figure 1). Economic growth has picked up substantially from 2004, averaging over 5% annually through 2007. In 2008 economic growth slowed somewhat to 3.06% as a result of the global economic crisis.

Figure 1. GDP and GDP per capita growth rates, 1995-2008 (constant 2000 prices)



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

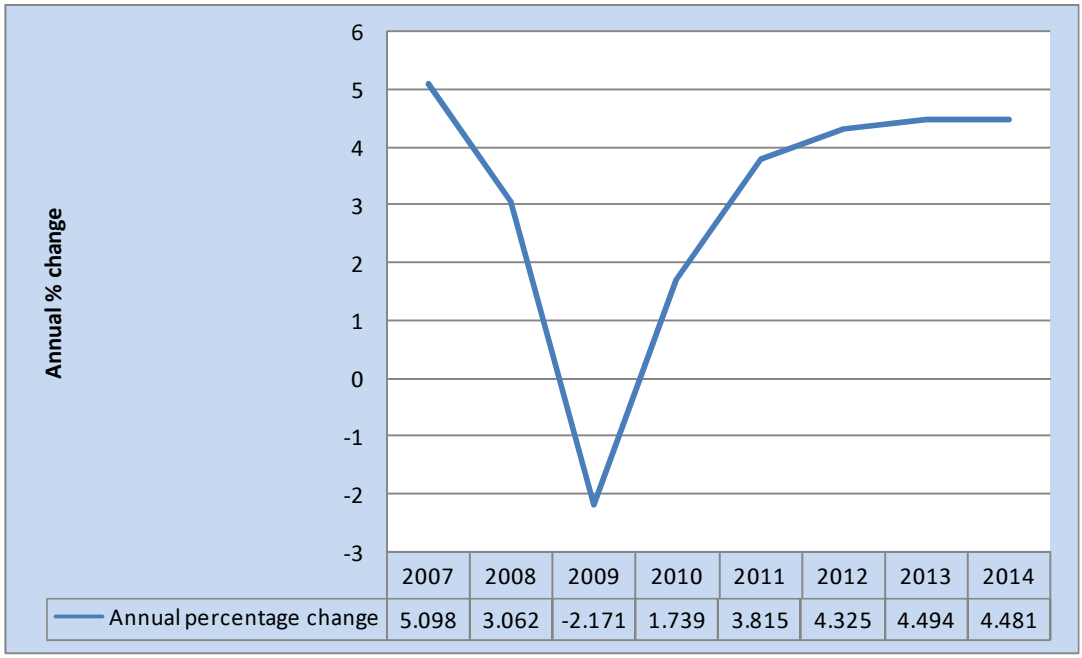
Du Plessis and Smit (2006) attributes most of the positive economic growth to improvements in total factor productivity; openness to international trade being the leading cause of rising productivity. Fedderke et al (2007) also includes increased competition at a sectoral level as factors contributing to increased productivity. The increase in economic growth was also driven by higher investment rates in South Africa, which in turn was stimulated by lower user cost of capital and lower risk in the economy due to improved economic stability. However, employment growth lagged economic growth; one reason for this is strong real wage growth. (Du Plessis and Smit, 2006).

The slow-down in 2008 was linked to the global economic downturn. The global economic downturn influences the South African economy through various channels including a decline in trade, a decline in foreign direct investments, and lower portfolio inflows. The sectors influenced the most were mining and manufacturing which saw a relative large contraction in economic activity mainly associated with lower commodity prices and lower trade. The banking sector in South Africa has not been severely affected as the balance sheets of most banks are relatively sound. The exposure of South African banks to the global crisis is limited due to exchange controls and relative conservative lending practices. There has been a slow down of credit extension in the period, but this may also be linked to the introduction of the new National Credit Act in 2006. The government is attempting to offset the impact of the global economic crisis through stimulatory fiscal policy; most of which will be provided through strong public infrastructure programs. Government investment rose sharply in 2006 (average of 16 percent year-on-year) and remained strong during 2007 and 2008; however, in 2009 investment by the general government showed to be on the decline

(on average by 1 percent year-on-year), though investment by public corporation was rising strongly.

The International Monetary Fund (IMF) has recently downgraded its forecasts for economic growth in advanced economies quite dramatically due to the global economic crisis. To the extent that South Africa's historical economic growth rate has been very closely linked to that of the world economy since 1993/94, such downward revisions in the forecasts of these major economies imply that one must similarly look for reduced domestic growth in the economy in the face of the global economic crisis. According to International Monetary Fund, World Economic Outlook Database, October 2009, indeed, South Africa's economic growth rate is likely to fall to its lowest level in five years in terms of year on year basis (Figure 2). Bearing in mind the closeness of the correlation between domestic economic growth and that of the global economy, this slowdown in economic growth should come as no surprise.

Figure 2. IMF Growth Projections for South Africa, 2007-2014 (Estimates start after 2008)



	2007	2008	2009	2010	2011	2012	2013	2014
Annual percentage change	5.098	3.062	-2.171	1.739	3.815	4.325	4.494	4.481

Source: International Monetary Fund, World Economic Outlook Database, October 2009

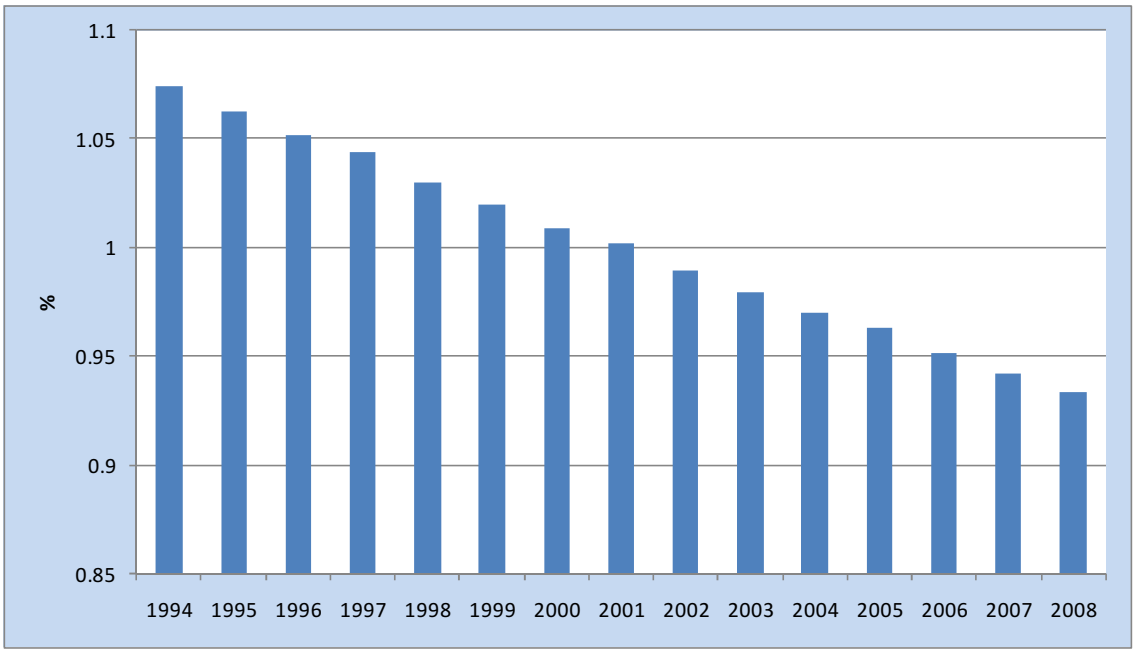
National Treasury forecasts that GDP will contract by 1.9% in 2009, where after growth will start to pick up. Growth of 1.5% is forecasted for 2010 rising to 3.2% by 2012 (National Treasury, 2009).

2.2.2. Employment

Despite embarking on strategies oriented at growth and redistribution, the most disappointing economic performance of post apartheid South Africa is persistence of extreme levels of unemployment, particularly for less-skilled younger blacks, together with the continuation of widespread poverty and the widening of inequalities.

Employment growth, although positive, has declined from above 1 percent in 1994 to below 1 percent in 2008.

Figure 3. Employment Growth in Non-Agricultural Sectors, 1994-2008



Source: SARB

Unemployment remains high despite positive employment growth over the period 1994 to 2008. Although there has been positive employment growth over the period, labour force participation has grown more over the same period so that unemployment has not declined significantly. According to a paper by Banerjee et al (2006) unemployment (according to the narrow[1] definition of unemployment) has increased from 15.6 percent in 1995 to 30.3 percent in 2001. In 2008 the official unemployment rate as published by Statistics South Africa was 23.6 percent. At the same time labour force participation increased from 1995 to 2005 by 6 percent from 51.4 percent to 57.2 percent. Labour force participation in 2008, according to Statistics South Africa is 57.7 percent.

More recently employment has been declining due to the economic recession in South Africa. According to the Quarterly Labour Force Survey of quarter 3, 2009 (Statssa, 2009) the unemployment rate was 23.6% which is an increase of 0.5% on a year-on-year basis. Employment in the agricultural sector decreased by 10.1% and in mining by 7.8%; these sectors saw the largest decline in employment at a sectoral level. Women lost as employment

[1] In the official definition, the unemployed are those people within the economically active population who: did not work during the seven days prior to the interview; want to work and are available to start work within two weeks of the interview; and have taken active steps to look for work or to start some form of self-employment in the four weeks prior to the interview. In the expanded definition, the third criterion (some sort of work-seeking activity) is dropped and will therefore include, as unemployed, those who might be termed "discouraged job seekers".

decreased by 3.3% while employment of males increased by 7.2%. All race groups have seen a decline in employment, with coloured being the most affected (Banerjee et al., 2006).

Table 1. Recent Employment, Unemployment and Labour Force Participation Statistics

	Jul-Sept 2008	Apr-Jun 2009	Jul-Sep 2009	Qrt-to-qrt change	Year-on-year change
Employment (thousands)	13655	13369	12885	-484	-770
Unemployment (thousands)	4122	4125	4192	67	70
Labour Force Participation (thousands)	17777	17495	17077	-418	-700
Unemployment Rate (%)	23.2	23.6	24.5	0.9	1.3
Labour Force Participation Rate (%)	57.7	56.3	54.8	-1.5	-2.9

Source: Statssa Quarterly Labour Force Survey, Quarter 3, 2009.

Reasons for poor employment performance identified by Rodrik (2006) are:

- Insufficient growth,
- High real wages due to strong union participation in wage determination,
- Poor performance of tradable sector (this also affects growth performance),
- Shrinkage of manufacturing sector and a linked decline in demand for unskilled workers,
- Relatively small informal market fails to absorb unemployed (Rodrik, 2006).

Banerjee et al (2006) investigated why unemployment has risen in the New South Africa and found that the demand for unskilled labour has declined, while the supply thereof has increased. This was mostly in the form of increased labour force participation by African women. This resulted in a structural change in labour supply in South Africa. Other structural shifts resulting in higher unemployment include mines becoming more capital intensive rather than labour intensive, a decline in agricultural employment as the economy shifts from primary to tertiary sectors, the pool of employed has become more skilled resulting from skill-biased technical change, the legacy of education of the past, and the geographical distance between where a person live and the availability of jobs. The authors conclude that macroeconomic policy is not likely to solve the unemployment problem due to the structural nature of the unemployment problem. Policy options identified include focusing on finding the first job for school-leavers, a wage subsidy, a search subsidy, reduced regulations for first jobs, and government employment, as well as transportation subsidies to reduce search costs. Other longer-term policy options include educational reform, training programs, and training subsidies.

2.2.3. Fiscal Policy

Fiscal policy management towards the end of apartheid had been poor. The new government in 1994 inherited serious fiscal and other imbalances. The budget deficit in 1993/94 was equivalent to over 7% of GDP, and was still above 5% when determined macroeconomic stabilisation efforts began under the GEAR programme. The authorities had notable success in strengthening revenue collection – the independent Revenue Authority is seen as a model of effective government policy implementation – but government also succeeded in restraining expenditure growth between 1997 and 2003.

The improvement in the fiscal situation accelerated with the pick-up in growth from 2003. Whereas under GEAR the aim was to reduce public deficits to 3 per cent of GDP, by 2006/07 the budget was in surplus, and the 2007 Medium Term Budget Plan projected further surpluses through 2010/11. The turnaround in budgetary performance has given rise to a sharp reduction in the ratio of public debt to GDP since 1996. This has contributed to an improvement in investor sentiment towards South African assets, which has seen its reflection in strong portfolio inflows since 2003. The major credit rating agencies have upgraded South Africa several times since the mid-1990s, and Standard and Poor's recently reaffirmed its BBB+ sovereign rating, despite the financial market turbulence and rand weakness in late-2007 and early-2008, citing South Africa's solid coordination of fiscal and monetary policies and the continued build-up of international reserves.

The period 1994 to 2004 was associated with strong budget consolidation in order to bring the deficit down to the target level of 3 percent of GDP.

Table 2. Government Main Budget (As % of GDP)

			Prelim		Projected	
	**2006/07	**2007/08	**2008/09	**2009/10	**2010/11	**2011/12
Total Revenue and grants	**26.6**	**27.1**	**26.2**	**24.4**	**24.6**	**24.7**
Tax revenue	26	26.5	25.7	23.9	24.1	24.3
Income tax	15.5	16.1	16.5	14.7	14.6	14.9
Personal income tax	7.8	8.2	8.4	8.1	8.3	8.5
Corporate taxes (CIT+STC)	7.4	7.8	8	6.5	6.2	6.3
Indirect taxes	9.6	9.4	8.7	8.6	8.8	8.7
VAT	7.4	7.3	6.7	6.2	6.5	6.4
Excises	2.1	2	1.9	2.1	2.1	2
Trade and other	0.9	1	0.5	0.6	0.7	0.7
Trade taxes	1.3	1.3	1	0.9	0.9	0.9
SACU	1.4	1.2	1.2	1.1	1	1
Nontax revenue	0.6	0.6	0.5	0.5	0.5	0.5
Grants	0	0	0	0	0	0
Total Expenditure	**26**	**26.2**	**27.4**	**30.1**	**29.2**	**28.3**
Interest	2.9	2.6	2.3	2.3	2.5	2.6
Transfer to subnational government	11.5	11.9	12.6	13.6	13.2	12.9
Provinces	10	10.1	10.7	11.6	11.3	11
Municipalities	1.5	1.8	1.9	2	1.8	1.9
Other	11.6	11.7	12.5	14.2	13.6	12.8

			Prelim		Projected	
	**2006/07	**2007/08	**2008/09	**2009/10	**2010/11	**2011/12
Budgetary balance	**0.6**	**0.9**	**-1.2**	**-5.7**	**-4.6**	**-3.6**
Extraordinary payments (Net)[1]	0	-0.1	-0.2	-0.2	0	0
Augmented balance	0.6	1	-1	-5.5	-4.6	-3.6
Financing	-0.6	-1	1	5.5	4.6	3.6
Domestic borrowing (Net)	0.3	0.2	1.5	5.4	4.1	3.2
Foreign borrowing (Net)	0	-0.2	-0.2	0.2	0.3	0.3
Change in cash and other items	-0.9	-1	-0.3	-0.1	0.2	0.1
Memorandum items						
GDP (billion Rands)	1,811	2,068	2,320	2,456	2,736	3,041
Real GDP growth (%)	5.5	4.6	1.9	-1.8	2.9	4.1
GDP deflator (% change)	8.1	9.1	10.1	7.9	8.3	6.7
Primary balance (% of GDP)	3.5	3.4	1.2	-3.4	-2.2	-1
Cyclically adjusted overall balance	0.2	0.2	-1.5	-3.9	-2.8	-2.1
National government debt (% of GDP)	30.6	27.9	27.1	31.3	32.7	33.2
Domestic	26	23.3	23	27.1	28.4	28.8
Foreign	4.6	4.6	4.1	4.2	4.3	4.4

Sources: National Treasury

[1] Mainly related to debt management transactions

The 2009/10 budget provides for a further sizable discretionary fiscal impulse based on a continued increase in infrastructure investment and an expansion of the social safety net (Table 3). The cyclically-adjusted public sector borrowing requirement (PSBR) is expected to narrow over the next few years as the growth of public investment and consumption spending slows.

Table 3. Non-financial Public Sector Operations (As % of GDP)

			Prelim		Projected	
	**2006/07	**2007/08	**2008/09	**2009/10	**2010/11	**2011/12
Consolidated national and provincial governments						
Total Revenue and grants	28.2	28.7	27.7	26.2	26.3	26.3
National government	26.6	27.1	26.2	24.6	24.6	24.7
Provincial government (own revenue)	0.4	0.5	0.4	0.4	0.4	0.4
Social security funds (own revenue)	1.1	1.2	1.1	1.3	1.3	1.2
Extrabudgetary and other	0.1	0	0	0	0	0
Total Expenditure	**27.3**	**27.5**	**29**	**31.4**	**30.4**	**29.5**
Current	26	26.2	27.6	29.8	28.6	27.3
Wages and salaries	8.5	8.6	9.1	9.4	9.2	8.8
Other goods and services	3.8	3.8	4.2	4.3	4.3	4.3
Interest	2.9	2.6	2.3	2.3	2.5	2.6
Transfers	10.8	11.3	12	13.8	12.6	11.6
Capital	1.3	1.3	1.4	1.4	1.4	1.5
Contingency	0	0	0	0.2	0.4	0.4
Primary balance	**3.9**	**3.8**	**1.1**	**-2.9**	**-1.7**	**-0.6**
Overall balance	**1**	**1.3**	**-1.2**	**-5.1**	**-4.1**	**-3.2**

			Prelim		Projected	
	**2006/07	**2007/08	**2008/09	**2009/10	**2010/11	**2011/12
Public sector borrowing requirement (PSBR)	**-0.3**	**-0.6**	**4**	**9.4**	**7.9**	**6.7**
National government	-0.6	-1	1	5.3	4.6	3.7
Other government borrowing	-0.3	-0.1	0.6	0.4	0	0
Provincial governments	0	-0.1	0.4	0.1	-0.1	-0.1
Local government and local enterprises	0.4	0.7	0.7	0.8	0.7	0.6
Extrabudgetary funds and institutions	-0.7	-0.8	-0.6	-0.5	-0.5	-0.5
Nonfinancial public enterprises	0.6	0.5	2.5	3.7	3.3	3
Memorandum items						
Nonfinancial public sector debt (gross)	38.1	35.4	35.3	42.8	46.5	48.7
SOE Investment	2.1	2.8	3.7	4.4	4.7	4.7
Social spending (health, education, welfare and CD)	14.6	14.7	15.7	16.1	16.1	15.7
Defence spending	1.4	1.3	1.2	1.4	1.3	1.2

Sources: National Treasury

One of the key policy objectives of government since 1994 has been the maintenance of a sustainable debt level. Steps taken since 1996 to reduce public debt, and hence debt interest costs, have provided a degree of flexibility that is essential to manage the effects of the present downturn. As shown in Table 3 and Table 4, the growth in total government debt shows a steady increasing trend since 1994. However, the trend shows a marked increase over the forecast medium term. The trend in domestic borrowing versus external borrowing remains steady from 1994 till about 1999, thereafter a countercyclical trend is evident. External borrowing appears to remain relatively stable from about 2003 onward, where domestic borrowing shows some marked increases in 2003 and 2008. It is forecast to remain high on a slight decreasing trend over the forecast medium term (National Treasury, Budget Reviews: 1994 to 2009). Total debt as a percentage of GDP decreased from 48 percent to 22.8 percent in 2008 (from Table 4), due to government's efforts to reduce debt to sustainable levels.

However, given the current level of social spending in South Africa, there is not much scope for further increases in social spending in terms of financial feasibility both from the spending and revenue sides. In terms of tax revenue, there is not much government can do to broaden receipts given the work done over the past decade, as explained before, also given that employment is not growing sufficiently the scope to broaden the tax base is limited. On the spending side there is already pressure on meeting deficit targets and with the debt levels rising there is not much scope to increase spending. South Africa is also not a major recipient of Official Development Assistance (ODA): it received ODA in the region of R5 billion in 2005 which constitutes about 1.5 percent of the government budget and is below 1 percent of GDP.

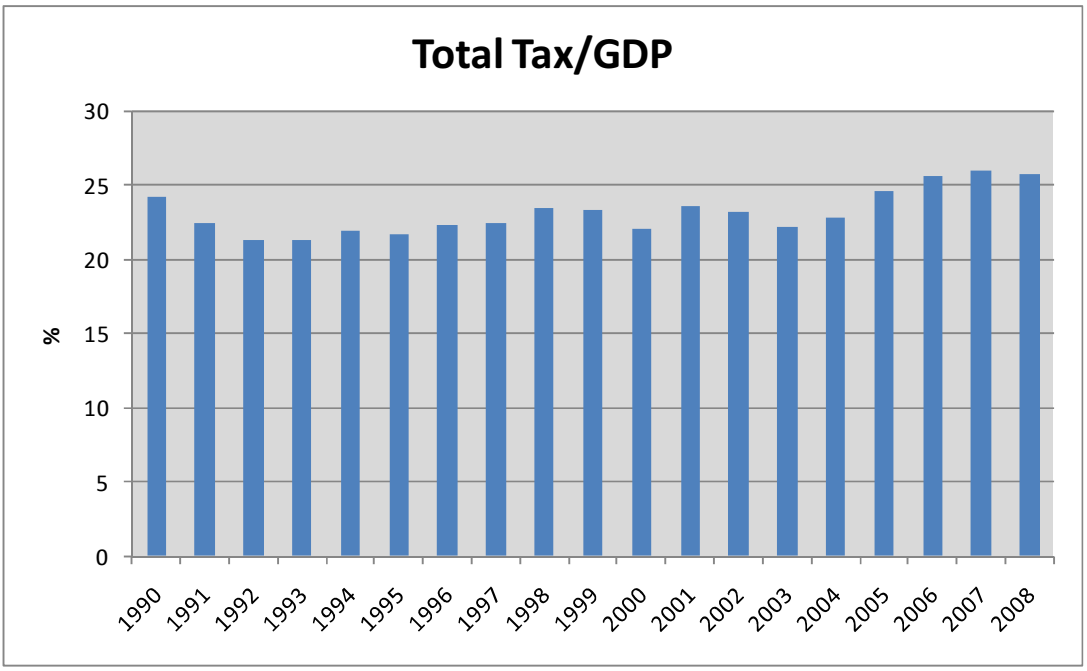
Table 4. Total government debt, external borrowing and domestic borrowing (1994/95-2011/12)

R million	Total loan debt (net) (Government)	Domestic short-term loans (net)	Domestic long-term loans (net)	Total Domestic borrowing (net)	% Domestic borrowing of Total debt	% Domestic borrowing of GDP	External borrowing (net)	% External borrowing of Total debt	% External borrowing of GDP	%Total debt of GDP
1994/95	233486	-857	25697	24840	10.6	5.2	2604	1.1	0.5	48.4
1995/96	270858	-1314	29666	28352	10.5	5.2	1715	0.6	0.4	49.4
1996/97	305482	1740	20870	22610	7.4	3.7	338	0.1	0.1	49.4
1997/98	331313	1897	17687	19584	5.9	2.9	3156	1.0	0.7	48.3
1998/99	358061	1353	18215	19568	5.5	2.6	-678	-0.2	-0.1	48.2
1999/00	374218	1884	3032	4916	1.3	0.6	8514	2.3	1.8	46.0
2000/01	396901	4978	6406	11384	2.9	1.2	1901	0.5	0.4	43.0
2001/02	426905	-7966	-9871	-17837	-4.2	-1.7	33130	7.8	6.9	41.9
2002/03	417336	4214	-3017	1197	0.3	0.1	14310	3.4	3.0	35.7
2003/04	442300	6720	31123	37843	8.6	3.0	1045	0.2	0.2	35.1
2004/05	470627	6132	33409	39541	8.4	2.8	4538	1.0	0.9	33.7
2005/06	470137	5716	23086	28802	6.1	1.9	518	0.1	0.1	30.4
2006/07	478368	5334	892	6226	1.3	0.4	182	0.0	0.0	27.4
2007/08	483230	5673	-2448	3225	0.7	0.2	-4745	-1.0	-1.0	24.2
2008/09	520664	13200	20675	33875	6.5	1.5	-3955	-0.8	-0.8	22.8
2009/10	634570	15400	61522	76922	12.1		3837	0.6	0.8	
2010/11	728064	12400	61589	73989	10.2		8291	1.1	1.7	
2011/12	810283	6000	51947	57947	7.2		7798	1.0	1.6	

Source: National Treasury, Budget Reviews: 1994 to 2009 and own calculations

The tax to GDP ratio for South Africa is far below the OECD average of 36 percent, as can be seen in Figure 4. In 2008 the tax to GDP ratio for South Africa reached 26 percent. Although this ratio seems low there is not much room for government to increase this rate much further. Due to the skew income distribution in South Africa a large portion of the tax is paid by a very small proportion of the population which makes the effective tax rate relatively high. Most of the tax in South Africa is derived from income tax (65.6 percent) and Value Added Tax (VAT) (25.9 percent), the rest is made up from other taxes. Since VAT was imposed in 1991 not many chances have been made to the tax structure. VAT was imposed at a statutory rate of 10 percent and was increased to 14 percent in 1993, but since then the rate has remained at that level. The government is unwilling to make any significant changes to VAT due to its impact on the poor and the inherent regressive nature of the tax. This means that there is not a lot of room in the budget to increase tax revenue to finance more expenditure relating to social welfare.

Figure 4. Tax to GDP ratio, 1990-2008



Source: SARB

2.2.4. Monetary Policy

In 1994, with the introduction of the RDP, the focus was to ensure that the Reserve Bank remains independent and that the main goal of the bank was the broader goals of development and the maintenance of the currency in the framework of a flexible exchange rate regime. The main functions of the Bank were to maintain the value of the currency, to keep inflation low, and to ensure the soundness of the financial system (ANC, 1994).

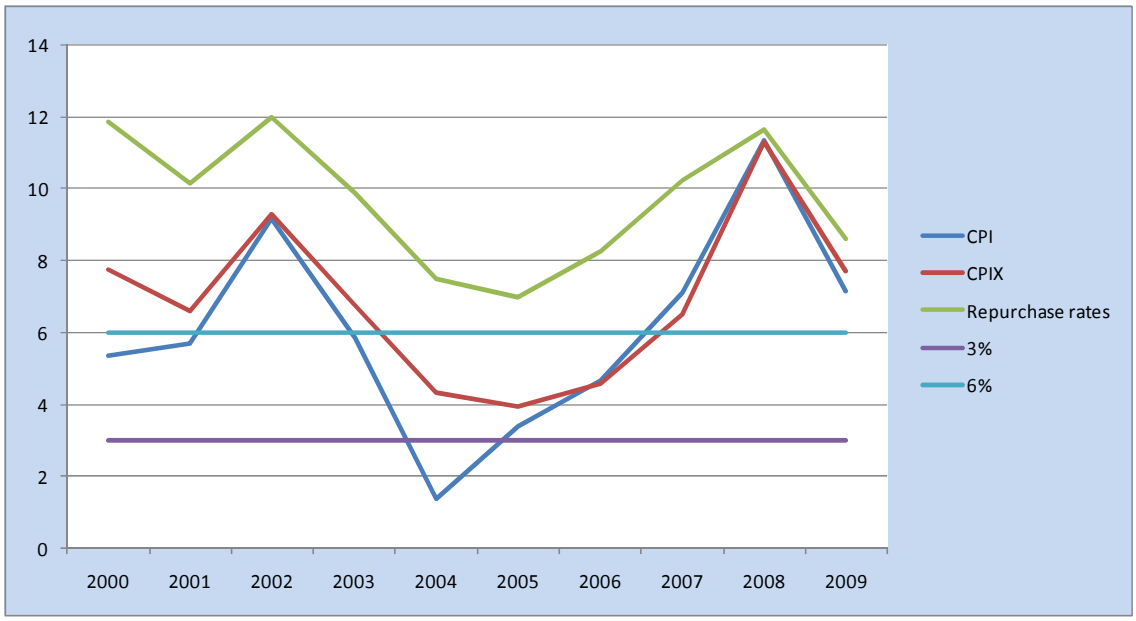
With the introduction of GEAR in 1996, the main objective of monetary policy remained to be financial stability and the reduction of the inflation rate. The aim was to maintain lower (but positive) real interest rates to encourage savings and investment and also to promote economic growth. The strategy to achieve this included sustained lower rates of inflation; a reduction in government dissaving which will reduce pressures on the capital markets; and the attraction of long term capital inflows, particularly direct investment flows, the commitment to a stable real exchange rate and higher growth will also reduce the risk premium facing foreign capital inflows and this would then allow for lower real interest rates. By combating domestic inflation the monetary authorities will also contribute to stabilising the external value of the rand (Treasury, 1996).

In 2000 the South Africa Reserve Bank (SARB) introduced inflation targeting as their primary policy goal to stabilise the internal value of the South African currency. An inflation

target of 3 to 6% of CPIX[2] was set. A Monetary Policy Committee (MPC) was established to function as a decision body on potential interest movements aimed at stabilising prices within the target range; the MPC meets bi-monthly to decide on interest rate movements. The benefits of inflation targeting include:

- Clear objectives for monetary policy
- Anchor for inflation expectations
- Formalised and transparent approach to inflation management
- Improved accountability

Figure 5. Inflation Targeting: CPIX, CPI and repurchasing rate



Source: Statssa and SARB

The CPIX has come down from double-digit levels in early 1990s to single digits, reaching the target of 3 to 6% in 2001. In 2002 the CPIX went up to double digit levels again due to a sharp depreciation of the currency, but went back to target levels thereafter. From 2007 inflation has increased mainly due to external pressures on food and oil prices. More recently inflation has been declining, but in November 2009 it is still marginally above the target at 6.1%. The Monetary Policy Review indicated that inflationary pressures should ease and that inflation will be within the target range by the second quarter of 2010 (SARB, 2009).

2.2.5. Trade Policy

Trade liberalisation in South Africa started in the 1970's with the introduction of export subsidies and the replacement of quantity restriction on imports. Various trade reforms have been implemented through the years. In the 1990's South Africa introduced a General Export

[2] CPIX is derived by excluding the owner's equivalent rent from the basket of goods and services included for the calculation of the CPI. The CPIX therefore excludes interest rates on mortgage bonds.

Incentive Scheme (GEIS) which was an economy-wide package based on value-added and local content to provide a significant export incentive. When South Africa became a signatory to GATT, GEIS was phased out. In the 1990's South Africa became a member of the World Trade Organisation (WTO) and more substantial trade liberalisation followed; there was a substantial reduction in tariffs and tariff lines following this (Cassim et al., 2004).

In the eighties, primary products were still the dominant export products of South Africa. In the period 1991 and 2000 South Africa experienced significant export growth, but was also faced with high import penetration. A worrying factor is that employment seemed to have declined under liberalisation and that there was also a shift into higher skilled labour, although findings on this differ (Cassim et al., 2004). Today South Africa's export basket is more diversified with primary products contributing around 30% of total exports, manufacturing over 50% percent, and services the rest.

Although South Africa has made large move towards trade liberalisation since the 1990s there is still room for further liberalisation. South Africa's tariff structures are still complex with too many tariff lines and bands. Some tariffs also remain relatively high. Various factors including non-tariff related factors still result in relative high levels of effective rates of protection. Furthermore, the volatility of the exchange rate influence trade especially on the export side.

South Africa signed various trade agreements, including free trade agreements with the South African Development Community (SADC), the European Union (EU), Mecosur, EFTA, India, China and so forth.

3. Current Economic Constraints and Vulnerabilities

The Harvard Team appointed by the National Treasury to analyze the South African economy and its growth aspect has presented a paper with their final recommendations in 2008. They found that the economic growth experienced was driven mainly by domestic demand and has been financed through a rising current account deficit. Domestic demand has risen faster than GDP and investment faster than savings. The composition of domestic demand was for consumer durables and in investment in the non-tradable sector. Investment in tradables has been relatively low indicating that external borrowing is not used to finance capacity to pay back debt. The government may also not be able to finance the large government investment program from external sources. This will put constraints on growth as domestic demand will have to slow to close the external imbalance. The Harvard team proposed the promotion of exports as a strategy towards growth. (Hausmann, 2008).

The economic constraints and vulnerabilities specifically linked to AsgiSA, the New Growth Path, as well as other constraints identified are highlighted below.

3.1. Constraints to growth as identified by AsgiSA

In 2006, the government introduced an accelerated growth initiative AsgiSA. The aim of this is to reach South Africa's goal of halving poverty by 2014. The government realised that in order to achieve this more balanced growth needs to be achieved. Two imbalances that need to be addressed in this are the worsening trade balance and further income redistribution. The strategy used by the government was to adopt a growth diagnostic analysis which seeks to identify the 'binding constraints' on achieving our objectives. The underlying foundation behind this is that successful economies have common characteristics such as well-managed fiscal and monetary policy and competent government administration. The government identified six specified binding constraints in the economy through a process of government consultation. The binding constraints identified, include:

(a) Volatility and level of the currency.

The volatility of South Africa's currency has an impact on potential exports and investment, while the level of the currency lowers the competitiveness of South African exports.

(b) The cost, efficiency and capacity of the national logistics system.

South Africa is experiencing major backlogs in infrastructure and investment, mainly due to low government investment over the last two decades. Various utilities have not made sufficient investment in infrastructure so that service delivery is severely hampered, this include Eskom (the electricity supplier), Transnet (freight rail) and other such as Telkom (telecommunications). This influence production capacity and cost within South Africa. The lack of sufficient and suitable infrastructure, as well as poor efficiencies in the movement of goods also put cost pressure on the movement of goods within South Africa and hampers growth.

(c) Shortage of suitably skilled labour amplified by the impact of apartheid spatial patterns on the cost of labour.

South Africa lacks skilled professionals, managers, and artisans due to a lack of sufficient education as a result of apartheid policies. Currently the quality of education remains a factor that contributes to this problem.

(d) Barriers to entry, limits to competition and limited new investment opportunities.

The concentrated nature of the South African economy hampers entry, industry development and therefore growth. It also puts pressure on prices in the economy that hampers the competitiveness of South African goods. Upstream sectors that are

relatively concentrated include iron and steel, paper, chemicals, telecommunications, and energy.

(e) Regulatory environment and the burden on small and medium businesses.

The regulatory burden faces by small, medium and micro businesses causes a lack of sufficient entry and growth of these businesses. The regulatory impact associated with the administration of tax, planning (such as Environmental Impact Assessment), municipal regulation, labour law, and specific sectoral regulatory environment hampers the development of businesses.

(f) Deficiencies in state organisation, capacity and leadership.

The lack of proper service delivery by government constrains growth. Issues around the way in which government is organised, the capacity of institutions, the provision of economic services, and governance need to be addressed to improve service delivery by government (Asgisa, 2006).

3.2. Challenges in the economy as identified in the New Growth Path

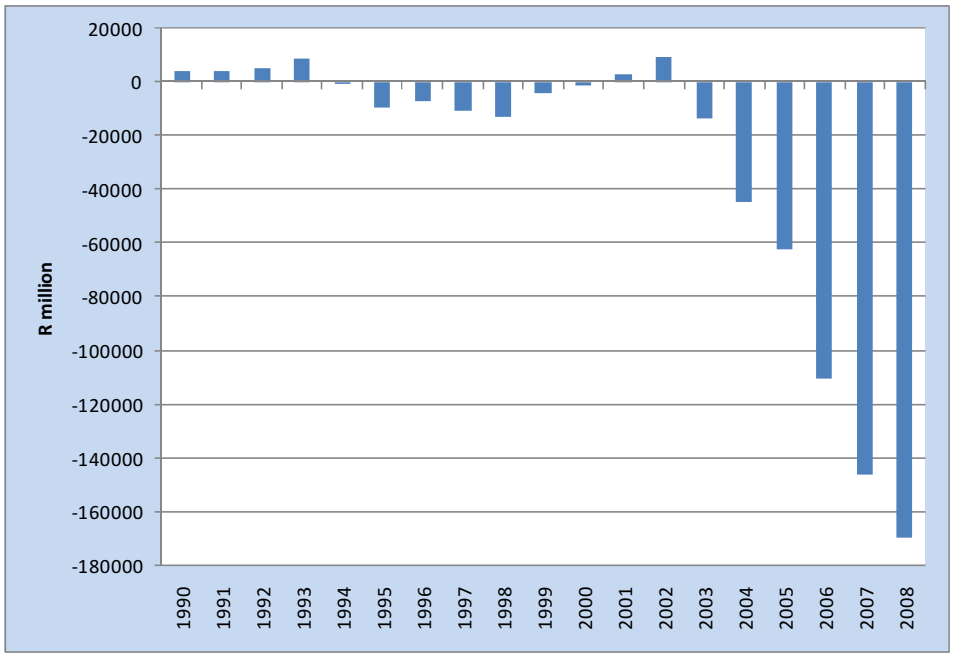
The challenges identified within the New Growth Path correspond to those identified within AsgiSA and include:

- Bottlenecks and backlogs in logistics, energy infrastructure and skills;
- Low domestic savings and inadequate levels of investment in productive sectors of the economy;
- Economic concentration and price collusion;
- An uncompetitive currency; and
- A persistent balance-of-trade deficit funded by short-term capital inflows attracted largely by high interest rates by international standards. (The Presidency, 2010). This challenge is discussed in more detail in the section below.

3.3. Current account deficit

Macroeconomists in South Africa are generally agreed that the current account deficit is the main source of vulnerability. Prior to 2003, the country had moderate current account surpluses and deficits, with no systematic tendency in one direction or another. However, after 2003 deficits have been growing steadily, reaching 7.4 per cent of GDP in 2008 (see Figure 6).

Figure 6. Balance on the Current Account, 1994 – 2008



Source: SARB

The deterioration in the trade balance, which moved from an almost balanced position in 2004 to a deficit of more than 2 per cent of GDP in less than two years, has been a large contributory factor to the current account deficit (see Table 5). Transfer payments to other South African Customs Union members have steadied at about 1 per cent of GDP after rising sharply between 2003 and 2005. Growing service and income payments to international investors, in part due to higher dividend and interest payments arising from strong capital inflows have also been a source of pressure on the current account. The trade and services and income payments deficits are expected to decline in 2009 and 2010 as growth slows and import prices moderate.

Table 5. Summary of South Africa's balance of payments, 2004-2008 (% of GDP)

Percentage of GDP	**2004**	**2005**	**2006**	**2007**	**2008**
Total current account	**-3.2**	**-4.0**	**-6.3**	**-7.3**	**-8.1**
Trade balance	-0.1	-0.4	-2.3	-2.0	-2.1
Net services, income and transfer payments	-3.1	-3.6	-4.0	-5.3	-6.0
Net service payment	-0.3	-0.4	-0.9	-1.1	-1.6
Net income payments	-2.0	-2.0	-2.0	-3.2	-3.3
Net dividend payments	*-1.3*	*-1.6*	*-1.6*	*-2.9*	*-2.7*
Net transfer payments (mainly SACU)	-0.8	-1.2	-1.1	-1.0	-1.1
Current account excluding SACU transfers	-2.4	-2.8	-5.2	-6.3	-7.0

Percentage of GDP	2004	2005	2006	2007	2008
Financial account balance	**5.9**	**6.2**	**8.0**	**9.7**	**9.2**
Net portfolio investment	2.9	1.9	7.4	4.2	-0.7
Net foreign direct investment	-0.3	2.4	-2.6	1.0	3.2
Net other investment	0.6	0.6	1.3	3.0	4.5
Unrecorded transactions	2.6	1.3	1.9	1.5	2.2
Change in net reserves due to BoP transactions	**2.7**	**2.2**	**1.7**	**2.4**	**1.2**

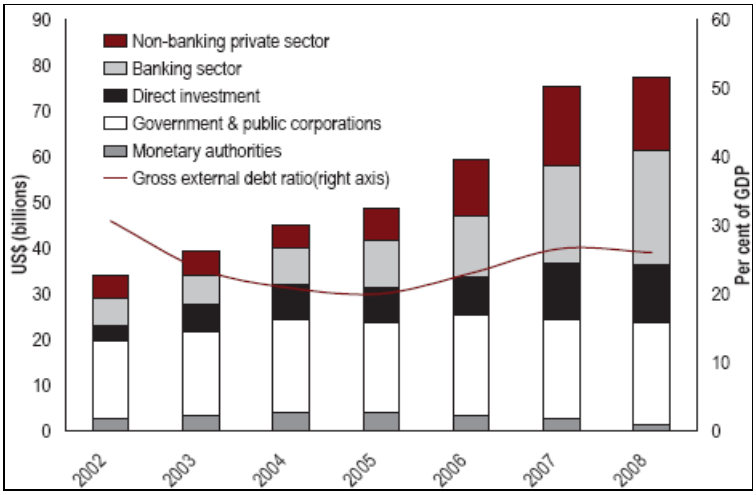
1. Includes data for the first three quarters of the year, seasonally adjusted and annualised.
Source: Reserve Bank

The current account deficit does not correspond to public dissaving, but to private savings-investment behaviour. While increases in investment have been increasingly responsible for the widening of the current account deficit, South Africa has not anomalously strong investment but unusually low savings. Over the past five years the financing of the current account deficit has been heavily dependent on portfolio inflows to the equity and bond markets. Though still adequate to finance the current account deficit, the composition of inflows changed significantly in 2008. Net portfolio outflows were recorded in the third quarter and outflows accelerated in October and November at the height of global deleveraging. International investors were net sellers of R54.4 billion in equities and R12.8 billion in bonds in 2008. Portfolio outflows were offset by inward FDI, increased use of loan financing, repatriation of foreign assets by the banking sector and unrecorded transactions. Inward FDI totalled R69.4 billion during the first nine months of 2008, with net FDI of R53.7 billion. The sectors that attracted foreign inflows were financial services, motor vehicles and beverages.

Analysts point to several factors mitigating the current account deficit risk. For instance external debt is not only low (26 percent of GDP at end-2008) but over 40 percent of it is denominated in rands (domestic currency). Banks, corporations, and households have limited foreign currency balance sheet exposure (Figure 7). Capital inflows are predominantly in the form of equity, and hence denominated in rand, while the exchange rate floats. Should capital outflows re-emerge, foreign investors would share the adjustment burden—as they did in late 2008 when the stock market declined and the rand depreciated sharply[3].

[3] Note though that although South Africa's overall level of foreign debt remains low, the private sector has made increased use of foreign loans to finance investment over the past three years. Gross foreign debt increased to about 26 per cent of GDP in September 2008 from 20 per cent in 2005. This includes rand-denominated debt instruments issued by the public and private sectors that are purchased by non-residents.

Figure 7. South Africa's gross external debt, 2002 - 2008



Calculations based on year-end debt stock, except 2008 which is up to September.

3.4. Government Borrowing Requirement

The public sector borrowing requirement represents the funds needed to cover any deficit in the financing of public-sector activities, including non-financial public enterprises. It is expected that public sector borrowing will increase over the next few years as a result of (1) large infrastructure programmes and (2) a widening of the main budget balance as a result of the worsening economic outlook. The borrowing requirement is expected to increase to 7.5 per cent of GDP by 2009/10, but is expected to decline in following years as the budget balance improves.

A large component of the borrowing requirement is a result of the investment program of the utilities, including Eskom and Telkom, which is set at R90 billion per year over the period. Recognising the scale of this investment programme and the need to raise the required finance at the lowest possible cost, fiscal support to Eskom through a loan and guarantees has been agreed.

Table 6. Public sector borrowing requirement, 2007/08-2011/12

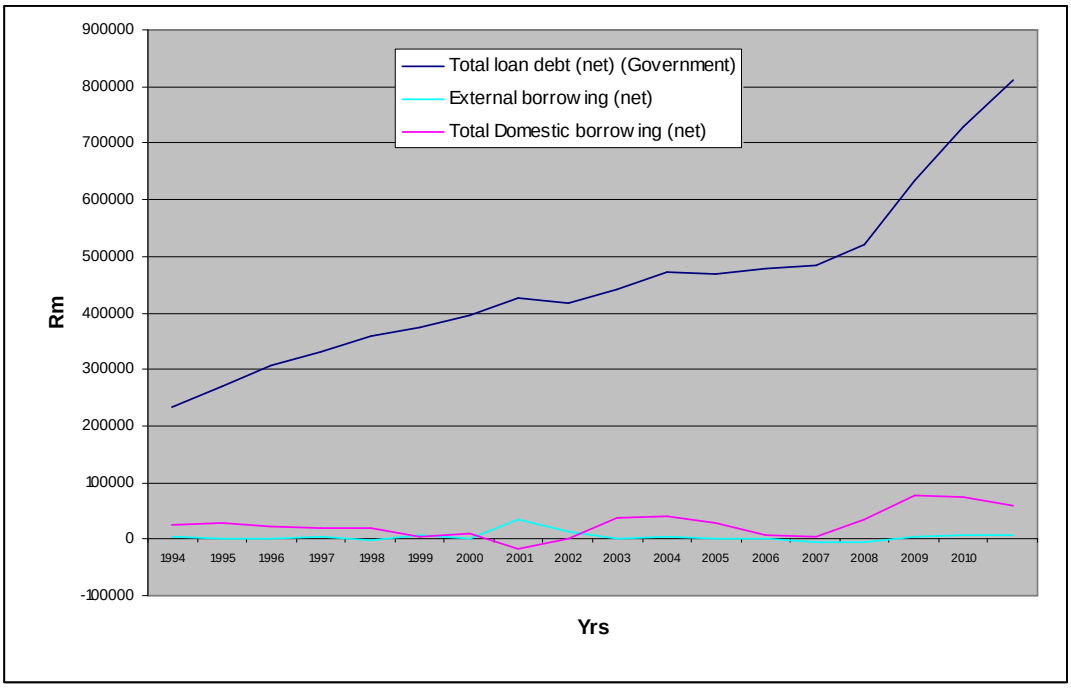
	Outcome	Estimate	Projection		
R million	**2007/08**	**2008/09**	**2009/10**	**2010/11**	**2011/12**
Main budget	**-18 275**	**22 783**	**95 573**	**83 280**	**67 745**
Extraordinary payments	776	5 246	900	-	-
Extraordinary receipts	-2 871	-8 123	-6 100	-1 000	-1 000
RDP Fund	-48	-200	-200	-200	-200

	Outcome	Estimate		Projection	
R million	**2007/08**	**2008/09**	**2009/10**	**2010/11**	**2011/12**
Borrowing requirement	-20 418	19 706	90 173	82 080	66 545
Social security funds	-8 709	-9 158	-9 488	-11 238	-11 946
Provinces	-1 239	9 873	-917	-2 408	-2 749
Extra-budgetary institutions	-6 988	- 3719	-3 014	-3 034	-3 186
Local authorities	14 004	16 394	17 558	18 005	18 995
General government borrowing	-23 351	33 097	94 312	83 405	67 660
Percentage of GDP	*-1.1%*	*1.4%*	*3.8%*	*3.1%*	*2.3%*
Non-financial public enterprises[1]	11 182	57 362	91 434	90 069	90 103
Public sector borrowing requirement	-12 169	90 459	185 746	173 474	157 763
Percentage of GDP	*-0.6%*	*3.9%*	*7.5%*	*6.5%*	*5.3%*
Gross domestic Product	2 067 884	2 304 111	2 474 214	2 666 254	1 952 989

1. Estimates are based on National Treasury projections.

Government's net borrowing requirement is financed through domestic short- and long-term loans, foreign loans and changes in cash balances.

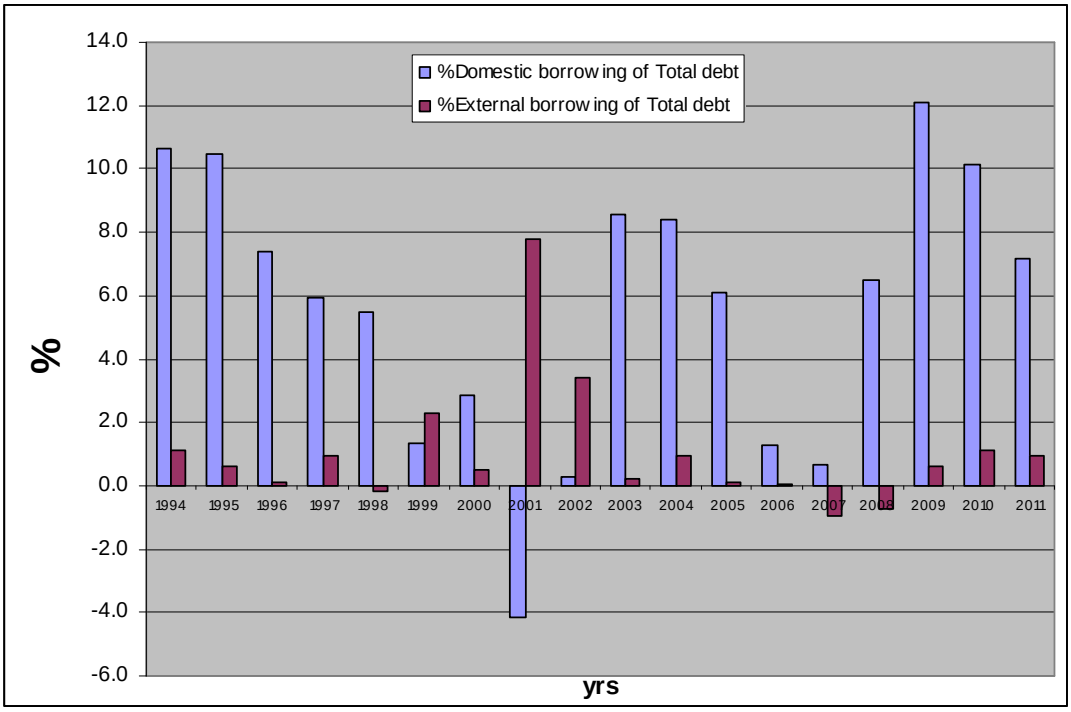
Figure 8. Trends in total government debt, external borrowing and domestic borrowing, 1994/95-2011/12



Source: SARB

Figure 9 shows that domestic borrowing as a percentage of total debt is much greater than that of external borrowing, except during 2001 to 2002, where the situation is reversed.

Figure 9. Trends in percent domestic and external borrowing of total debt, 1994/95 – 2011/12



Source: SARB

Thus, following several years of either small deficits or budget surpluses, government's borrowings increased in 2008/09 and are set to grow over the next three years as a result of slower revenue growth, sustained public spending increases and support to state-owned enterprises. Government realizes that while public debt is set to rise, this expansion must be kept in check so as not to reduce the space to finance development in the longer term. However, the overall level of total public debt in South Africa in 2008 (from Table 4) was R52 billion (22.8 percent of GDP) which is still sustainable and below that of many advance economies. South Africa also managed to reduce public debt from 48 percent in 2000 to 22.8 percent in 2008.

4. Status of MDG achievement in South Africa

4.1. Summary

Given that the national priorities should be aligned with the MDGs, how has South Africa progressed since 1994 in reaching these goals? The latest report by the UNDP (2010) indicates that South Africa is likely to meet its poverty targets, depending on which measure is used, but less likely to meet its inequality target. The results for MDG1, to eradicate extreme hunger and poverty, are therefore mixed. South Africa is also likely to meet MDG2,

that is achieve universal primary education and has already achieved, or is very likely to achieve MDG3 (promote gender equality and empower women). There are gaps for South Africa to achieve the health-related MDGs (MDG 4, 5 and 6). Child and maternal mortality rates are rising, good progress is being made in combating malaria, and the country is not likely to reach its targets in combating HIV/AIDS or tuberculosis. South Africa is also likely to meet the targets for MDG 7 and 8 which respectively deal with environment sustainability and the development of a global partnership for development.

Goal 1 – Eradicate poverty and hunger

Whilst the poverty gap[4] has declined from 0.24 to 0.20 from 1994 to 2007 respectively, the Gini Coefficient which measures income inequality increased over most of the period from 0.672 to 0.685 (Presidency, 2008). According to May and Hunter (2004: 2) a figure of 0.685 shows larger poverty than in Brazil, the Bahamas, Jamaica and 33 other developing countries. The overall increase in inequality shows that the beneficial impact of social grants and some job expansion was not enough to overcome widening income inequality, particularly between more and less skilled black workers (UNDP, 2007). The latest UNDP country report indicates that the percentage of the population that lives below the poverty line of $1 per day has declined from 11.3 percent in 2000 to 5.0 in 2006, which is below the target set of 5.7 percent, while the poverty line of $1.25 per day has declined from 17.0 percent to 9.7 percent from 2000 to 2006 (UNDP, 2010). South Africa's growth projections show that GDP growth is expected to slow during 2009 mainly due to the international financial crisis and it is therefore expected that the goal of reaching this target will be under temporary pressure as grows resumes again after 2009.

Bhorat and van der Westhuizen (2008) provide a comprehensive overview of changes in poverty and inequality for the first full decade of democracy in South Africa. The results from the paper suggest firstly, that South Africa has witnessed a significant decline in absolute and relative measures of poverty. This is true by race and gender of household head and indeed is robust for any number of feasible poverty lines. In turn, however, the analysis has shown that inequality levels within the population have increased. For a population already beset with a stubbornly high Gini coefficient, this is a simultaneously remarkable and worrying result. Furthermore, and contrary to all previous evidence in this arena, the data suggest that it is between-race inequality which is driving the shifts in the national distribution. Put simply, the differences between African and White expenditures – rather than that within the African populace - have been fuelling rising inequality levels since 1995 (Bhorat and van der Westhuizen, 2008). South Africa is unlikely to reach its inequality target of 0.3 by 2015, even after growth resume as of 2010.

[4] The poverty gap is a measure of the depth of income poverty compared to the poverty line of R3000 per capita per annum.

Goal 2 – Primary education for all

According to Hollenbeck (1999) educational attainment of individuals may be important on equity grounds; that is, individuals' education may be the key to their own economic situations. Education determines the distribution of income, not just its growth. Studies conducted in developing countries indicate that maternal schooling is also a very strong and consistent predictor of reduced child mortality and morbidity (Pavalavalli, G & Ramesh, B.M, 2001). Given that education may play a major role in attaining equity and the realisation of health-related goals, education goals are therefore also discussed in more depth along with the three areas of concern. With regard to education, Target 2 is to ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling. The functional literacy rate (as reported in the GHS, 2007), which is based on educational achievement of up to grade 7, came close to 90% in 2006, increasing by approximately 4 percentage points from 2002. Conversely, the number of 15 to 24 year olds that are not literate has been decreasing steadily from 14% in 2002 to 10% in 2006. Illiteracy has declined from 30.4% in 1995 to 25.6% in 2007 (Presidency: 2008). According to the UNDP's latest country report, net enrolment rates increased further to 98.8% in 2009, while primary completion rates for 18 year olds are 93.8 percent, indicating that South Africa is likely to meet the target of 100 percent completion by 2015 (UNDP, 2010)[5].

Goal 3 – Gender equality

With regard to gender equality the overall Gender Parity Index (1.06) shows that slightly more girls are attending schools than boys. The GPI for primary schools are below 1 which suggest that at primary school level more boys than girls attend, however at secondary and tertiary level the situation is reversed so that more girls than boys attend (UNDP,2007).

South Africa is also committed to promote gender equality throughout South Africa. Currently about a third of Members of Parliament are women, 43% of Cabinet is women, while 5 out of the 9 provinces have women Premiers. In business women are not represented to the same extent, but if compared to international trends South Africa compares well to some developed countries. A recent survey by Nedbank shows that 19.8% of executive managers and 10.7% of directors of the 372 companies surveyed are women.

However, women are still more likely to be poor, unemployed or working in the informal sector.

Goal 4 – Reduce child mortality

Progress with regard to MDG Target number 4, i.e. the reduction of child mortality is assessed against three main indicators, namely under-five mortality rate, the infant mortality

[5] The completion rates mentioned here are gross completion rates and not net or on time completion rates. The MAMS model applies a more stringent test of net and on time completion rates.

rate and proportion of one-year-old children immunised against measles. Statistics SA (2008b) indicated a decline in the infant mortality from 51.5 during 2001 to 45.2 during 2007, however the latest UNDP report indicate that infant mortality is again rising to 53 deaths per 1,000 birth in 2007 (UNDP,2010). Although some progress was made in the right direction, lately infant deaths increased indicating that South Africa is still far from the set target of 15 per 1,000. The latter is mainly as a result of HIV/AIDS. The latest UNDP report also reports a rise in under-five mortality rates from 59 per 1,000 live births to 104 in 2007.

In an attempt to address this, the MTBPS (2008c: 49) states that the public health system would be strengthened, with a particular focus on enhancing human resource capacity and reducing infant and child mortality, maternal mortality, HIV and Aids, and tuberculosis.

Specific measures to reduce child mortality included an amount of R 50 million which were set aside for reducing child mortality by introducing three new child vaccines: i) pneumococcal to prevent the most common type of pneumonia, ii) rotovirus to prevent the most common type of diarrhea and iii) pentavalent, which incorporates five existing vaccines. South Africa's MDGs Report in 2005 (UNDP, 2005) reflected overall immunisation coverage of 78%, based on 2002 estimates. Routine data subsequently indicated that the national immunisation coverage had increased to 83% as at the end of 2006 (UNDP, 2007: 24). Notwithstanding this achievement, there are still districts and sub-districts with low immunisation coverage, which require focused intervention. These areas have been identified, and the public health sector has begun implementing the WHO's strategy known as Reach Every District (RED), aimed at improving coverage and protecting SA's children against vaccine preventable diseases.

Goal 5 – Improve maternal health

Target number 5, maternal mortality, as a largely avoidable cause of death, is an important focus of international development efforts. According to the Presidency (2008) the South African Maternal Mortality Ratio is increasing and has more than doubled between 1998 (84.25) and 2003 (165.50). Data from the Health Systems Trust (HST) in 2004 indicates an increase in the maternal mortality from 150 per 100 000 to 400 per 100 000. The latest UNDP report reports an even larger increase in maternal deaths to 625 deaths per 100 000 births in 2007. It is argued that the increase could partly be due to an increase in reporting, but the extent to which it increased may also have indicated a real increase. This rate is high given that the target was set as 38 per 100 000 by the Department of Health. According to the Health Systems Trust (2008:118) HIV infections are the key reason why South Africa is unlikely to achieve the MDG target of reducing maternal deaths by 75% by 2015

Policies implemented that should assist in reducing the maternal mortality rate, include among other:

- The development of protocols in managing the conditions causing maternal deaths.
- Training doctors and midwives on the use of these protocols.

- Emergency transport facilities
- Promote contraceptive use

Goal 6 – Combat illnesses such as HIV and Aids, TB, and malaria

Goal 6, Target 7 focuses on combating HIV and Aids. An antenatal survey conducted in between 2005 and 2006 shows that the prevalence of HIV and Aids has declined for most provinces, except for the Free State. The survey also showed that the prevalence between the age group less than 20 years have declined indicating that new infections have slowed. The findings of the latest UNDP report (UNDP, 2010) is in line with this, indicating the HIV and Aids prevalence has declined from 9.3 percent of the population between the ages 15 and 24 years in 2002 to 8.7 percent in 2008.

To combat HIV and Aids the Department of Health has introduced a Comprehensive Plan for HIV and Aids for 2007 to 2011. The plan include the provision of Voluntary Counselling Treatment (VCT), Preventing Mother-to-child Transmission treatment, Nutritional supplementation as well as the provision of antiretroviral treatment to patients infected with HIV and Aids. (UNDP, 2007)

Goal 6, Target 8 indicates that South Africa should have halted the incidence of malaria by 2015 and begins to reverse the latter and other major diseases. South Africa is on its way to reverse the trend, though the number of fatalities is a major concern. According to Treasury (2009a) a total of 553 malaria cases were reported from 2007 to 2008, compared to 886 in 2007/08. This is a reduction of 36%. Only 3 malaria deaths were reported by September 2008, compared to 13 by September 2007/08, which reflects a 66 per cent decrease. This was consistent with the 2008/09 target of a 10 per cent reduction in malaria cases and deaths annually. This indicator is adopted in the performance framework as published by the ENE. Factors that contributed to the success in malaria control include:

- Indoor spraying with DDT for targeted households
- The use of artemisinin-based combination therapy to reduce parasite carriage
- Early detection of increases in malaria cases in high risk areas
- Epidemic preparedness to respond to seasonal outbreak
- Mass community mobilisation and training of health workers
- Collaboration with neighbouring countries. (UNDP,2007)

Goal 7 – Environmental sustainability

South Africa has increasingly become more committed to improve environmental sustainability. Conservation efforts currently focus on:

- Improving biodiversity
- Expanding protected areas in hot spots such as Wolkberg, Wakkerstroom, Drakensberg Alpine, Maputuland, Pondololand, and so forth.

- Establishing Transfrontier Conservation Areas with neighbouring countries where national parks are situated next to borders
- Establishing cross-sectoral programmes that focus on development and poverty alleviation including the Working for Water, Working for Wetlands, LandCare, Coat Care, and Integrated Rural Development programmes.

In 1995 5.4% of land surface in South Africa was protected, currently almost 6% is protected. The target is to increase this number to 8% by 2010 and 10% thereafter.

Carbon dioxide is the most significant greenhouse gas for South Africa with the energy sector being the largest contributor.

South Africa has made substantial progress on Goal 7, target 10. Since 1994, South Africa as started to address the backlog in providing basic services to all. The percentage of households with access to water has increased for 61.7% in 1994 to 84.7% in 2007 and to 92.4% in 2009 (UNDP, 2010), while access to basic sanitation increased from 50% to 71% and to 72.2% over the same periods.

From 1994 to 2006, South Africa has provided 2.4 million new houses with the assistance of a state subsidy. (UNDP, 2007)

Goal 8 – Global partnerships towards development

South Africa supports various initiatives within Africa, and the rest of the developing community, including:

- Championing the New Partnership for Africa's Development (NEPAD)
- Becoming a member of the India Braxil South Africa Dialogue Forum
- Becoming a member of the WTO in pursuit of a fair, rule-based, non-discriminatory multilateral trading system
- Becoming a member of the G-20
- Reforming the international financial architecture, especially relating to the IMF and World Bank
- Committing to the objectives of the "Programme of Action for the Least Developed Countries (2001 – 2010)
- Establishing the African Renaissance and International Co-operation Fund
- Calling for debt relief for developing countries by engaging the G-8 leaders

4.2. Government Spending and the MDGs

The MTSF may be linked to the MDGs. For example, the strategic element such as speeding up growth and transforming the economy to create employment and sustainable livelihoods may be linked to MDG 1, 2, 3 and 8. The section below discusses how government spending

links up with the MDGs (UNDP, 2010). The table below provides a summary of how the MTSF elements link with the MDGs.

Table 7. Linking the MTSF Strategic Elements and the MDGs

MTSF Strategic Elements	Relevant MDGs
Speeding up growth and transforming the economy to create decent work and sustainable livelihoods	1, 2,3, and 8
Programme to build economic and social infrastructure	1,3, and 8
Rural development strategy linked to land and agrarian reform and food security	1,2, and 7
Strengthen the skills and human resource base	2
Improve health profile of all South Africans	4,5, and 6
Intensify the fight against crime and corruption	2,and 3
Cohesive, caring and sustainable communities	2,3, and 7
African advancement and enhanced international cooperation	8
Sustainable resource management and use	2,3, and 7
Developmental state, improving public services, and strengthening democratic institutions	1,2,3, and 8

Source: UNDP, 2010

The biggest spending components in the budget are education, social spending, and health. Education remains the most important spending allocation from 1995 onwards. In the 2009/10 budget spending on public education was equal to R14.0 billion representing 16.8% of total spending which is approximately 5.8 percent of GDP.

Social spending

Since 1994, the government has channelled substantial resources into social programs and services, with varying degrees of success. A number of programmes have been aimed at addressing poverty. These include policies of no fee schools, free basic electricity, free basic water and other forms of social wage (e.g., bus transport subsidies). The most far reaching social policy by government, however, has been social protection, in particular social grants.

General government spending on social protection increased from 6.2 percent of total outlays in 1982/83 to 13.4 percent in 2005/06 (i.e. from 1.8 percent to 4.4 percent of GDP).[6]

According to van der Berg and Siebriets (2009), the number of beneficiaries of social grants increased from 2.4 million in April 1998 to a projected 12.4 million in 2008. Projections published by the National Treasury (2008: 96) in February 2008 suggested that 66.6 percent of all grants paid in April 2008 would have been child support grants; other large categories would have been old-age pensions (17.9 percent), and disability grants (11.4 percent). Although all the grant types except the war veteran grant and grant-in-aid experienced significant growth in beneficiary numbers during the past decade, the child support grant clearly was the major driver of such growth in the system as a whole. Because it is the smallest of the grants in rand terms, however, the child support grant does not dominate social assistance expenditure. The 2008/09 Budget provides for social assistance expenditure of R70.7 billion, of which R26.4 billion is allocated for old-age pensions, R21.6 billion for child support grants, R17.7 billion for disability grants and R5.0 billion for other grants (National Treasury, 2008: 319).

Table 8. Beneficiaries of social assistance grants (1998 – 2008)

Grant	Number of beneficiaries		
	1998	2003	2008[1]
Old age	1 697 725	2 009 419	2 225 354
War veterans	10 525	4 594	1931
Disability	660 528	953 965	1 409434
Grant-in-aid	9 183	12 787	–
Foster care	43 520	138 763	446 994
Care dependency	8 172	58 140	110 153
Child support	–	2 022 206	8 208 334
Total	2 429 653	5 808 494	12 402 200

Source: National Treasury *Budget review* (various issues)

Note: [1] Projections made in February 2008

The estimated 12.4 million beneficiaries in April 2008 represented more than one quarter of the South African population – a figure unmatched by any other developing country. Social assistance spending in South Africa, which amounted to 3.5 percent of GDP in 2006, is high even when compared to that of Western European countries at the height of the welfare state in 1980. Only Denmark had a higher social expenditure ratio than is presently the case for South Africa. South Africa's government spending on social grants exceeds the GDPs of 88 countries, including some 35 African countries (van der Berg and Siebriets, 2009).

[6] The sharp spike in both ratios in 1993/94 reflected a special transfer of R7 340 million to the Government Employees Pension Fund.

According to National Treasury (2009a) spending per capita on the poorest 20% of the population was R 4 079 in 2006. Not only has government spending per person on these programmes increased by 70% in real terms. Spending on the poorest 40% has also grown by 83% in real terms.

Education

Education functions are funded by the equitable share through the division of revenue because education is a concurrent function. Expenditure in education increased from R12.4 billion in 2005/06 to R19.7 billion in 2008/09 at an average annual rate of 16.7%, and it is expected to grow at an average annual rate of 12.5% over the medium term to reach R28.1 billion in 2011/12 (Treasury, 2009a) which is approximately 1.2 percent of GDP. This is mainly due to increases in the national school nutrition programme, the higher education subsidy and the mass literacy campaign.

Various policies are in place to improve the quality of and access to education. This includes no-fee schools, free transport for learning who live far away from school, the Primary School Nutrition Programme, the monitoring of learner attendance, improved school infrastructure, and so forth.

Health

Similar to education, health is mainly funded from the equitable share (see Table 9). The conditional grants that pertain to health are the health revitalization grant, the comprehensive HIV/AIDS grant, the Forensic Pathology services, Health Professions Training and Development Grant and the National Tertiary Services Grant. The Millennium Development Goals are not required in any reporting of the conditional grants because it would not be relevant to those particular grants. Most of the relevant indicators are taken up in the Estimates of National Expenditure, but it should be noted that the indicators that would support the target are not published in the Estimates of National Expenditure either.

Table 9. Expenditure estimates for strategic health programmes

Sub-programme	**Audited outcome**			**Adjusted Appropriation**	**Medium-term expenditure estimate**		
R million	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
Maternal, Child and Women's Health and Nutrition	16.4	19.3	20.0	25.0	26.5	28.1	29.8

Source: National Treasury, 2009a. Estimates of National Expenditure. Pretoria: Government Printers

The Estimates of National Expenditure indicates that 25 million were spent on Maternal, Child and Women's Health and Nutrition during 2008/2009. This is expected to increase nominally by 16.8% to 29.8 million in 2011/2012 which is approximately 1.2 percent of GDP. An average annual growth of 6.03% is projected over the MTEF period.

Has Spending Been Pro Poor?

One of the more vexing issues within the economic policy terrain in post-apartheid South Africa though, has been the impact of this consistently positive growth performance on social welfare. In particular, there has been a rich debate within South Africa around the impact of economic growth on poverty and inequality in the post-1994 era. Thus far, we have been hamstrung, within this debate, by the lack of recent data. In particular, the debates around shifts in household poverty and inequality in South Africa have relied on the income and expenditure surveys of 1995 and 2000 – together with a range of unofficial or less than satisfactory datasets. The consensus position, and it is a carefully constructed one based on these data, is that in the period 1995 to 2000, income poverty levels using a range of realistic poverty lines – have probably not changed significantly. The early evidence from the World Bank did suggest a rise in national household poverty from 32 to 34% on a $2 a day line and no change in poverty on a slightly higher poverty line (R322 per month) between 1995 and 2000 (Hoogeveen, J and Özler, B, 2006). Subsequent work also suggested that income poverty may have declined between 1995 and 2000 (Van der Berg, S et al., 2006), relying on a slightly different set of poverty lines. Ultimately, on the basis of the choices made around these data, economists have arrived at marginally different conclusions regarding poverty shifts in the 1995-2000 period. The key common denominator in all these different results however, is that the increase or decrease reported is in fact relatively minor. This is precisely the reason that the current consensus position in the first five years after democracy is that there have been no major shifts in household poverty.

4.3. *Based on current achievements, what policies should the country put in place to achieve the MDGs?*

Until recently, government can be said to have succeeded with AsgiSA on the growth front. Real GDP has risen by 5% a year since 2004, exceeding the AsgiSA target of 4.5% for this period. However, the reduction of unemployment and poverty and inequality, despite some progress, has lagged. Therefore, the following general thrust of policies is proposed by the Financial and Fiscal Commission for further analysis:

1. The diagnosis of the constraints to growth is broadly sensible and continuation of AsgiSA seems warranted. However, there is too much emphasis and concern with rand overvaluation and exchange rate volatility.
2. The challenge is to make growth policies inclusive and pro-poor:
    a. This could involve the inclusion of major issues with serious economic consequences, such as HIV/AIDS and crime, which are not touched in AsgiSA.
    b. It seems sensible that government through the Department of Health should prioritize programmes and projects that aim to reduce maternal mortality.
    c. Improve the quality of service delivery, especially with regard to education and health.

d. Address data issues on the monitoring of the progress towards achieving the MDG goals.

3. Further increases in spending on key areas such as social welfare, education, and health will assist in South Africa to achieve its MDGs, but ultimately the focus should be on the quality of service delivery as there is limited scope to increase spending and in some cases spending is already high.

For effective monitoring and evaluation of MDGs, we have noted that currently the MDGs are not an integral part of the performance framework as published in the Estimates of National Expenditure. Therefore, there is a need for the MDG indicators to be linked to output indicators in the performance framework and be included in the performance framework as published in the Estimates of National Expenditure.

5. Methodology and Data

5.1. Methodology

A dynamic, computable general equilibrium (CGE) model called MAMS (Maquette for MDG Simulations) is used to analyse the budgetary efforts required to achieve the MDGs and takes the relationship between these goals into account within a general economic framework. The economic mechanisms included in the model are labour markets, relative prices, government resources, household income and consumption.

The specific features of MAMS are (1) that it links government spending and MDG outcomes in a dynamic way, (2) it allows for the effectiveness of government spending to depend on many variables for example education outcomes linked to health outcomes, infrastructure spending, wage premiums and so forth, and (3) that the cost of service delivery may have macroeconomic impacts, especially if one considers how the increase in spending is financed.

The MAMS model is a set of simultaneous equations (linear and non-linear) divided into two modules with the first being the core CGE model and the second the MDG model. The CGE model is a dynamic-recursive model meaning that it includes a time dimension. The MDG module captures the process of achieving the MDGs and how the various MDGs are inter-linked. The MDG module also provides feedbacks into the rest of the economy through the labour market. For a detailed description of the MAMS model see Lofgren and Diaz-Bonilla (2010).

5.2. Data

The data required by the MAMS model is divided into two sets, namely a general dataset that calibrates the core MAMS model and an MDG dataset that calibrates the MDG module of the model. The most important components of the two datasets are discussed below.

5.2.1. Social Accounting Matrix for South Africa for MAMS

The United Nations' (1993) System of National Accounts (SNA) defines a Social Accounting Matrix (SAM) as a presentation of SNA accounts in a matrix that elaborates the linkages between a supply and use table and institutional sector accounts. A SAM therefore contains data on production activities, intermediate inputs, primary factors, commodities, households and other institutions like enterprises, the government and the rest of the world and represents the flow of transactions in the economy. The data within a SAM is based mainly on national accounts data and supply and use tables, but also includes data from household surveys as well as from other sources. The data in the SAM is more disaggregated to incorporate structural and behavioural aspects of an economy.

A SAM is another method of stating the circular flow in an economy. The circular flow results from commodities produced through activities[7] with the available production factors. A SAM portrays the system of inter-industry linkages in an economy. For example intermediate inputs purchased by one industry at the same time represent sales of another industry (Devarajan et al., 1994: 3-2). The data contained within a SAM shows that the distribution of employment, living standards, the distribution of resources and the structure of production are interlinked (Pyatt and Round, 1985: 2). A SAM also shows government involvement and the role of the foreign sector (Devarajan et al., 1994: 3-2).

Technically, a SAM is a square matrix within which each account is represented by a row and a column (Löfgren et al., 2001:3). The columns represent expenditures, and the rows incomes. The double-accounting principle ensures that the totals in the rows will equal the totals in the columns, that is the income from each activity or institution must equal expenditure (Pyatt and Round, 1985:17). A SAM usually focuses on the real side of the economy, it is static, and it gives an account of a country's economic structure at one point in time.

Because a SAM provides a comprehensive set of data on almost all economic participants, a SAM is easily applied to policy analysis. It links policy, data and models (Pyatt and Round, 1985: 53). A SAM may be used by economic planners or by development economists towards policy analysis, to test behavioural assumptions of a model, or to test a model's validity. SAMs have been applied to analysis of interrelationships between structural features of an economy and the distribution of income and expenditure among household groups (United Nations, 1993).

Various SAMs have been drawn up representing the South African economy. Recently, Conninghart (2001), Statistics South Africa (2002) and Quantec (2003 to 2010) compiled SAMs for the South African economy. The latest SAM released by Quantec[8] is based on 2008 National Accounts figures. However, it was decided to use the Quantec 2005 SAM for

[7] Each producer is represented by an activity (Löfgren et al, 2001:9).
[8] Quantec (Pty) Ltd is a privately owned company in South Africa selling data, software and consultancy services to various agents and institutions in South Africa, including government and academia.

this modelling exercise as it still allows a sufficient number of years before the MDGs are suppose to be met.

Data shortcomings in the officially released SAMs meant that the SAMs could not be used for the purpose of this analysis. The latest SAM released by Statistics South Africa is based on 2002 National Accounts data as well as other sources of data (from the same or earlier years). The SAM is constructed on the specifications set by the SNA of 1993. The emphasis of the SAM is on income distribution. There are 27 industries in the SAM. Household are disaggregated according to population groups and income level. A shortcoming of the Statistics South Africa SAM is that is does not include a breakdown of the sources of income for the represented households in the SAM; income from all factors of production is rather pooled into one cell in the SAM and then divided between households. Knowing, for example, whether households get the majority of their income from labour or capital becomes essential for policy analysis. The exclusion of the breakdown of the sources of income makes this SAM unsuitable for use in CGE modelling (Statistics South Africa, 2008).

In addition, the SAM for MAMS has a particular setup that takes one to face more data challenges. The SAM for MAMS is different to a standard SAM as it requires further disaggregation:

- with respect to activities and commodities to include government and non-government accounts for most government provided services (such as education, health, and infrastructure);
- labour groups by education level;
- private capital and government capital accounts;
- institution related accounts including capital and interest payment flows;
- one investment account per capital stock;

The Quantec 2005 SAM

The purpose of this section is to discuss the contents of the 2005 SAM as compiled by Quantec as well as how it is adapted to be used within the MAMS modelling framework.

The macroeconomic SAM defines a set of control totals for the subsequent disaggregation and guarantees that the SAM is consistent with national accounting figures (Round as in Bourguignon, 2002: 309). The main data source for a macroeconomic SAM is national accounting figures. The 2005 SAM as compiled by Quantec is based on 2005 national accounting figures as published in the South African Reserve Bank's Quarterly Bulletin of March 2006.

The 2005 Quantec SAM consists of 46 commodities and activities (see Table A1). There are four primary sector commodities and activities, 30 secondary (including manufacturing industries), as well as 20 services industries. The government sector is well disaggregated which is very useful for the purposes of getting the SAM in the MAMS framework;

government is disaggregated by function: general administration, defence, law and order, education, health, social, and economic.

The SAM includes trade margins, four production factors (capital and three labour categories by skill), as well as institutions such as households, enterprises, government and the rest of the world, it also provides a full set of factor quantities for capital and labour.

Various data sources are used in the compilation of the Quantec SAM, including:

- Statistics South Africa Input-Output Tables for 1971-1993
- Statistics South Africa Supply and Use Tables 1993-2002
- Statistics South Africa SAM 1998, and 2002
- SARB published and unpublished data for 1970-2005
- Statistics South Africa industry censuses and surveys
- Statistics South Africa Population censuses
- Statistics South Africa Household Survey for 1994-2005
- Labour Force Survey for 2000-2005
- Household Income and Expenditure Survey for 2000
- RSA Standardized Industry Database developed by Quantec
- Trade data from SARS and Comtrade (Van der Merwe,2005)

The 2005 Quantec SAM is widely used by academic and government institutions for modelling purposes; the modelling fraternity is relatively familiar with the content of the 2005 Quantec SAM.

Adjustments Required to get the Quantec SAM into the MAMS Format

Various adjustments are required to get the 2005 Quantec SAM in the required format for MAMS. The first step was to construct an expanded macro SAM. A macro SAM is used as a framework for compiling the micro SAM; it is based on National Accounting figures which serve as control totals for the micro SAM. The macro SAM from the Quantec SAM was used as a basis for this exercise. Adjusting the Quantec macro SAM into the MAMS macro SAM involves the following changes:

1) Divide gross operating surplus in the Quantec SAM into private and public gross operating surplus. Gross operating surplus (or capital accounts) for government activities were created including capital accounts for water and sanitation, tertiary education, secondary education, primary education, health, infrastructure, and other government services. Most of the data for this was already contained within the Quantec SAM, capital for the respective education sectors was estimated based on education data provided by the Department of Education and the World Bank.

2) Combine the institutions households and enterprises from the Quantec macro SAM into one institution; the MAMS framework does not require separate specification for households and enterprises.
3) Expand the savings and investment block in the 2005 Quantec SAM to show flow of savings, capital, and interest payments between the institutions in the SAM. Figures from National Accounts as published by SARB as well as data from National Treasury were used to compile the savings and investment block.

The totals in the macro SAM were used as control totals for the micro SAM. The micro SAM is much more disaggregated as it contains various industries and services, and different factor accounts compared to the macro SAM. Various further changes to the disaggregated 2005 Quantec SAM were required to get it into the MAMS format. The following changes were incorporated:

1) The government services account for education was split into no secondary, secondary and tertiary education. Data published by the Department of Education and the World Bank was used for this purpose.

2) A government services account for water and sanitation was created. Water and sanitation is shown as a private sector activity within the Quantec SAM. It was therefore necessary to split water and sanitation into private and public provision. This was done using data from the Department of Water Affairs and Forestry as well as company data.

3) A government services account for infrastructure was created. Government infrastructure such as electricity provision, telecoms, railway, air transport, water and pipelines were included in this account. All of these accounts were included in the Quantec SAM, but regrouped and split according to private and public provision using company level data.

4) Separate private education service accounts were created for no secondary, secondary and tertiary education. Education formed part of the personal services account in the Quantec SAM, such that it was therefore necessary to split education from personal services in SAM and then divide private education into no secondary, secondary and tertiary education. Data provided by the Department of Education and the World Bank on the size of private schooling in South Africa was used to isolate private education from personal services. The data used in point (1) was then also used to split private education into no secondary, secondary and tertiary education.

5) Private health was split from medical and other services industry as in the Quantec SAM. Company data for the largest health providers in South Africa was used to do this.

6) The allocation of Gross Domestic Fixed Investment (GDFI) across the institutions responsible for it was required as part of the savings and investment block added for MAMS. The base data used for this is the GDFI data by commodity as included in the Quantec SAM, as well as figures published by the SARB on investment spending by asset type and institution.

Various data sources were used for the adjustment of the Quantec SAM into the MAMS framework as can be seen from the adjustments listed above. Data sources used include data from the Department of Education, the Department of Water and Forestry Affairs, Department of Health, National Treasury, the SARB and company level data.

The resultant micro SAM for MAMS was unbalanced. The SAM was balanced using a cross-entropy method as described in Robinson and El-Said (2000). Cross-entropy is a technique used to estimate a consistent SAM from inconsistent data estimated with error. The method is very flexible, incorporating errors in variables, inequality constraints, and prior knowledge about any part of the SAM (not just row and column sums) (Robinson, Cattaneo and El-Said, 1998:1). The control totals from the macro SAM was used as underlying assumptions maintaining key aggregates such as the GDP components and factor payments.

The South African SAM for MAMS in Pictures

The balanced SAM provides a picture of the structure of the South African economy at a certain point in time. The following section aims to provide information of the structure of the South African economy as contained in the 2005 SAM. Table 10 provides a summary of the South African economy as contained in the 2005 SAM.

Table 10. Structure of the South African economy according to SAM for MAMS

Contribution (% of total)	Value-added	Exports	Imports
Primary sector	9.6	28.6	12.4
Secondary sector	21.4	55.5	70.3
Tertiary sector	69.1	15.8	17.3
Largest sectors / industry			
	Wholesale and retail trade	Other mining	Vehicles
	Business services	Basic iron and steel	Machinery
	Financial services	Machinery	Other mining
	Government other	Vehicles	Communications equipment
	Other mining	Gold mining	Basic Chemicals

Source: Quantec 2005 SAM

South Africa has a diverse economy with the tertiary sector being the largest sector contributing 69 percent to total value added at current prices in 2005. Within the tertiary sector, industries that make relative large contributions include wholesale and retail trade (13.5 percent), business services (11.8 percent), and financial services (9.3 percent). Other mining (which is mostly platinum) also makes a relative large contribution to value added in South Africa (4.3 percent).

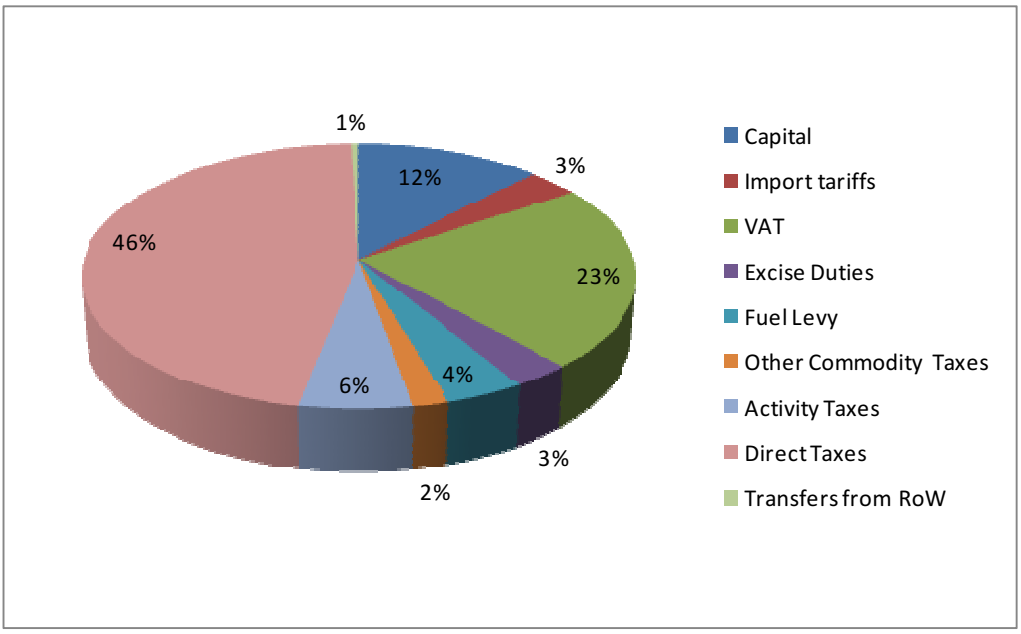
Value added comprises gross operating surplus, labour remuneration and indirect taxes. In South Africa the contribution of gross operating surplus and labour remuneration, respectively to value added is around 49 percent and the rest is indirect taxes. Industries with a high gross operating surplus to labour remuneration ratio (more capital intensive sectors)

include petroleum and non-ferrous metals while sectors with a low gross operating surplus to labour remuneration ratio (more labour intensive sectors) include service sectors such as government education and health, and publishing and printing. The tertiary sector is the highest remunerating sector in the economy.

When looking at trade, the manufacturing sector is the largest export sector in South Africa contributing 55.5 percent to total exports in current terms in 2005. Industries that make significant contributions to exports include other mining (mostly platinum) (12.8 percent), basic iron and steel (10.5 percent), machinery (7.1 percent), motor vehicles and parts (6.7 percent) and gold mining (6.6 percent). The manufacturing sector is also the largest import sector and imports 70.1 percent of total imports in South Africa.

The institutions in the SAM include government, households and the rest of the world. The SAM also provides a picture of the flow of transactions between the institutions in the economy. The most important source of revenue for government is direct taxes (company and personal taxes), followed by Value Added Tax (VAT).

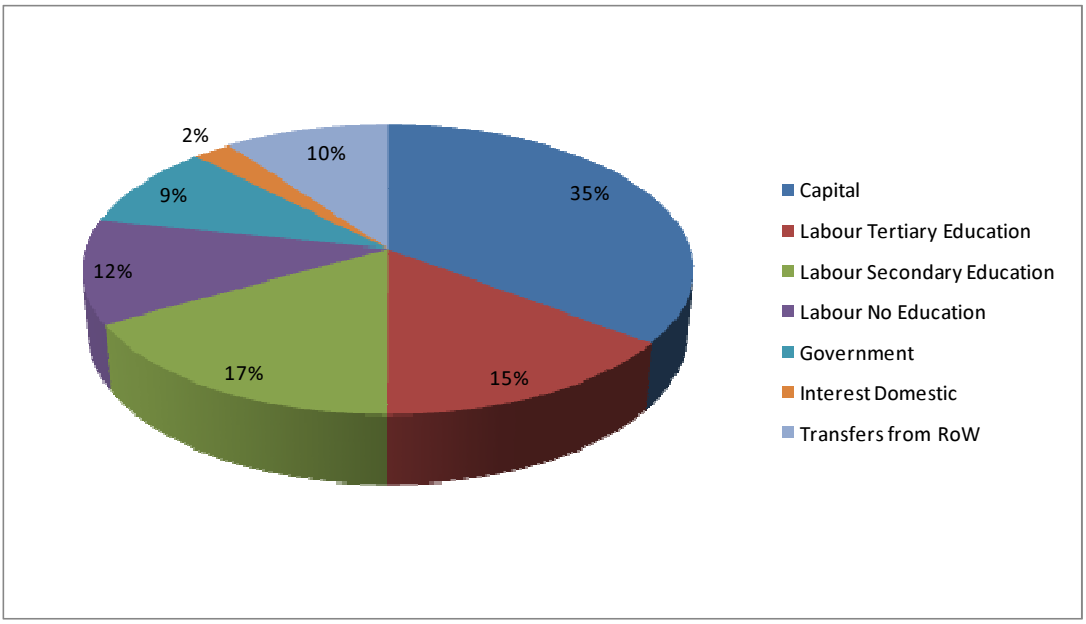
Figure 10. Sources of Revenue for Government



Source: SA SAM for MAMS

Households receive most of their income from capital (mostly because enterprises and households are now grouped into one institution), followed by income from labour. Government transfers in the form of social welfare contribute 10 percent to household income.

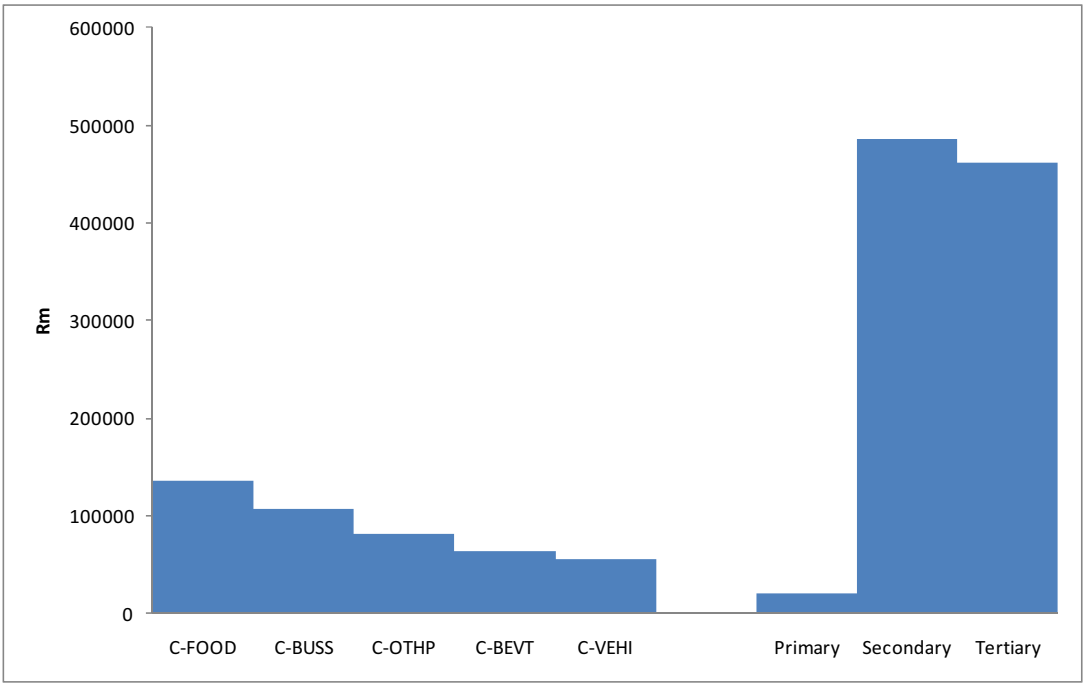
Figure 11. Sources of Income for Households



Source: SA SAM for MAMS

Households consume typical consumption goods such as food, business services, beverages and tobacco and vehicles. Most of household consumption is manufacturing goods (50.1 percent), followed closely by services (47.7 percent).

Figure 12. Household Consumption by Commodity and Sector



Source: SA SAM for MAMS

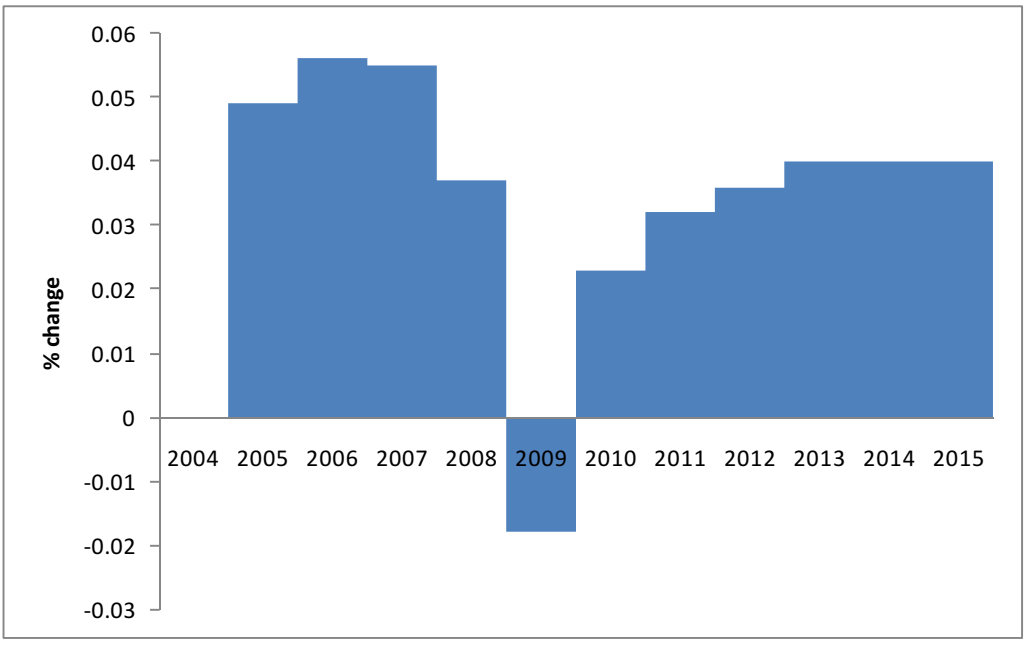
The MAMS model will follow the 2005 SAM's disaggregation of activities, factors, commodities, and institutions. The South African SAM contains comprehensive data on the South African economy, specifying the structure and behavioural aspects of the economy. Using this SAM in the CGE model will transfer these structural and behavioural aspects to the model, making it an applied model.

5.2.2. Other Data in the General Data Set

GDP Growth Forecast

The GDP growth forecast in the general data set is based on historical numbers for 2005 to 2009 as published by the SARB, on the forecast by National Treasury published in February 2010 for 2010 to 2012, while trend growth of 4 percent is assumed for the years 2013 to 2015.

Figure 13. Real GDP Growth Rate Forecast

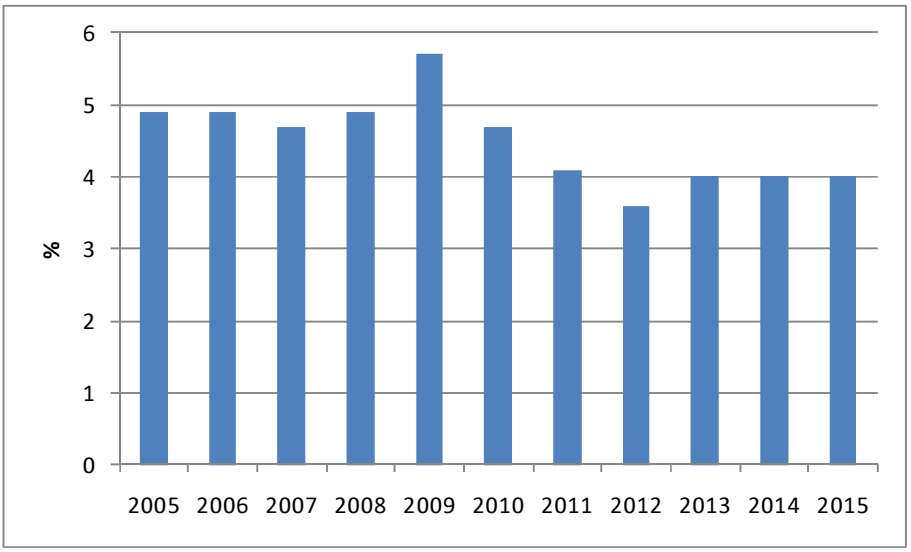


Source: SARB and National Treasury 2010

Growth in Government Consumption, Receipts, and Debt

Growth in government consumption is assumed from 2006 to 2015. Growth from 2006 to 2009 is based on historical numbers as published by the SARB, while the forecast numbers from 2010 to 2012 is based on National Treasury projections as published in the 2010 Budget Review. From 2013 to 2015 a growth rate of 4 percent is assumed for government consumption. The figure below shows the assumption on government consumption growth.

Figure 14. Growth in Government Consumption



Source: SARB and National Treasury 2010

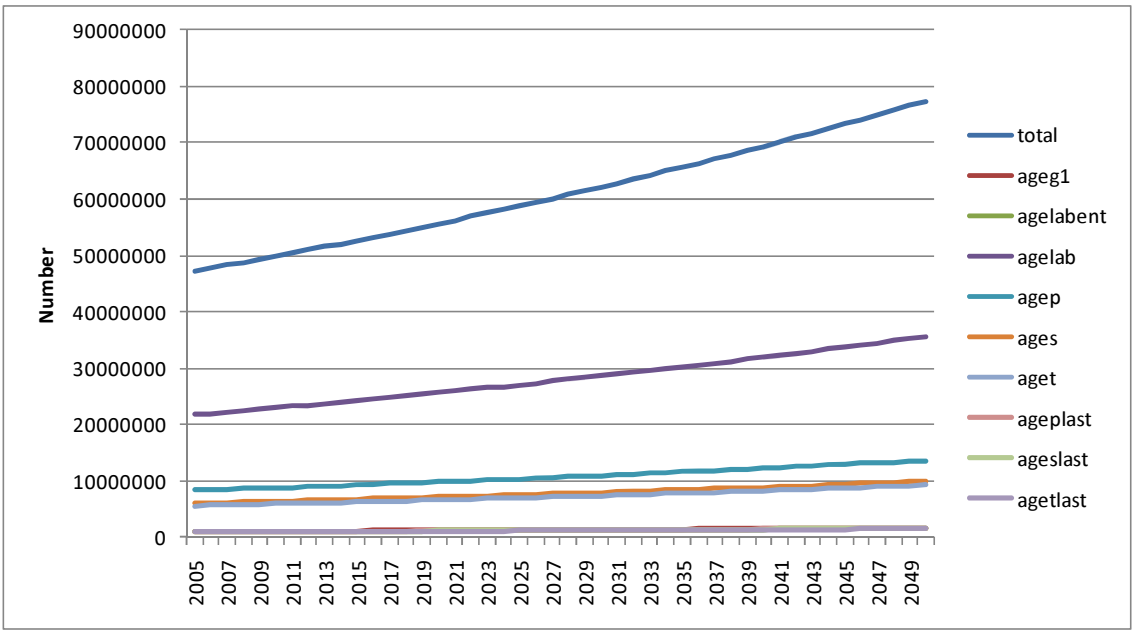
It is assumed that the share of income and commodity taxes to GDP remain at predetermined rates based on historical figures from 2005 to 2009 and on National Treasury Forecast figures from 2010 to 2012. From 2013 to 2015 the share of these taxes to GDP remains constant at 2012 levels.

It is also assumed that government debt grow through the period 2005 to 2015 in line with historical figures from 2005 to 2009, with National Treasury figures from 2010 to 2012, and with GDP growth from 2013 to 2015.

Population Growth Forecast

Population numbers for the historical period 2005 to 2008 are based on estimates as published by Statistics South Africa and UNESCO. Future growth trends are based on historical growth patterns: a constant growth rate of around one percent is assumed for all population categories. This is in line with average population growth rates for the past ten years.

Figure 15. Population Growth Trends

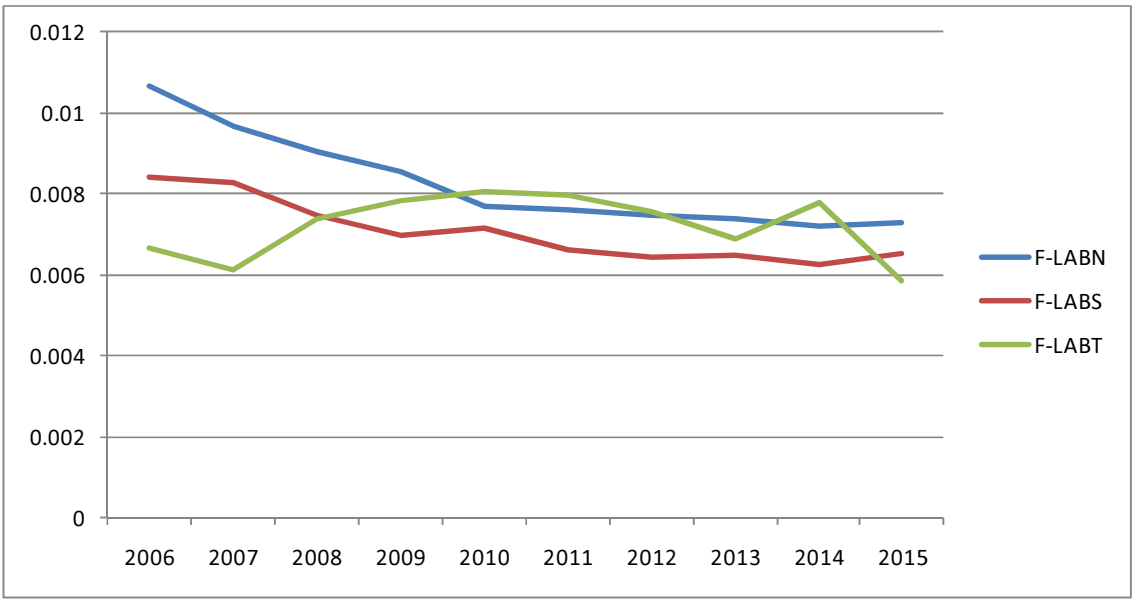


Source: Statistics South Africa, UNESCO and own forecast

Labour Force Growth Forecast

The labour force growth assumptions are based on historical labour force numbers as published by Statistics South Africa. Growth rates of around 0.7 percent are assumed for the respective labour categories.

Figure 16. Labour Force Growth Rates



Source: Statistics South Africa and own forecast

Trade, Production and Consumption Elasticities

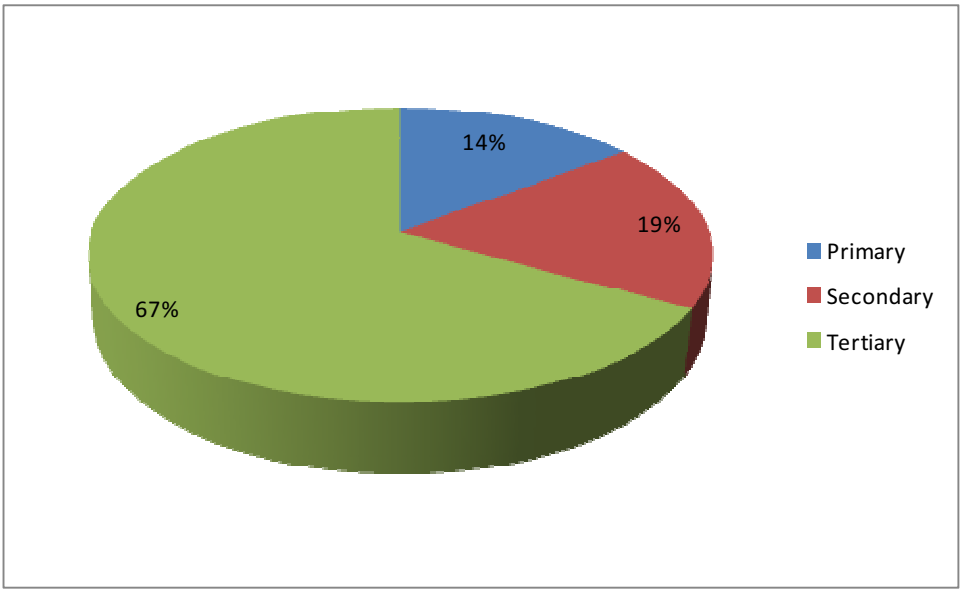
The CGE model requires elasticities for trade, production, and consumption. Various sources for these elasticities are available within South Africa, such as Thurlow (2003), De Wet (2003), and K Gibson (2001). See Table A.4 in the Appendix for a detailed list of the most important elasticities used.

Factor Quantities

Labour quantities are provided by Quantec with the 2005 SAM.

The tertiary sector is the largest employer in South Africa. In 2005 the tertiary sector contributed 67 percent to total employment in South Africa.

Figure 17. Employment Share by Sector



Source: SA SAM for MAMS

Industries that are large employers include wholesale and retail trade (18.5 percent), business services (11.4 percent), agriculture (10.8 percent) and construction (6.6 percent). Industries that employ more unskilled labour (labour with no secondary school education) are agriculture, hotel and accommodation services, water and sanitation, coal mining and wholesale and retail trade.

Adjustments to the labour quantities were required for activities not previously included in the SAM. The following table shows the assumption on labour quantities used in the MAMS model.

Table 11. Employment Quantities by Skill and Industry

Industry	Labour with no secondary schooling	Labour with secondary schooling	Labour with tertiary schooling
Agriculture	1109455	189472	18282
Coal mining	39168	11287	3692
Gold mining	122996	26922	11911
Other mining	171848	43669	18973
Food	123470	51769	11506
Beverages and Tobacco	26904	9989	3661
Textiles	36752	17700	3917
Apparel	64516	38354	3846
Leather and leather products	5726	3350	425
Footwear	7388	5063	440
Wood and wood products	46123	15052	2205
Paper and paper products	26049	11050	3770
Printing and publishing	24967	23494	8014
Petroleum	8608	7630	3606
Basic chemicals	10965	5422	2111
Other chemicals	34434	17861	8061
Rubber and rubber products	12040	4603	1372
Plastic and plastic products	36080	10962	2829
Glass and glass products	4446	2691	665
Non-metal products	54270	12464	2751
Basic iron and steel	26732	11081	2503
Non-ferrous metals	16614	6447	1707
Metal products	58386	49237	13938
Machinery	68159	44309	13692
Electrical machinery	32404	14095	3908
Communications equipment	3529	3625	1113
Scientific equipment	5235	5257	1522
Motor vehicles and parts	69892	47660	15364
Other transport equipment	9280	7233	2216
Furniture	26484	17598	2684
Other industries	42941	24616	5864
Water and sanitation - non-government	426	149	56
Construction	708938	66950	23865
Wholesale and retail trade	1440496	676725	132968
Hotel and accommodation	239136	130696	24812
Road transport	213782	18538	6061
Water transport	5905	4239	1683
Other transport	66217	35214	11280
Communication services	32882	26938	9801
Financial services	31655	130994	71391
Business services	355882	777946	254657
Health services non-government	19773	21243	5543
Medical and other related services (excl health services)	65331	70187	18313
Primary education non-government	12560	517	160
Secondary education non-government	27450	1129	349
Tertiary education non-government	35685	1467	454
Other services	1438205	59142	18280
Government services - water and sanitation	8092	2832	1055
Government services - primary education	50961	161428	57945
Government services - secondary education	39201	124175	44573
Government services - tertiary education	17937	56819	20396
Government services - health	41511	131492	47200
Government services - infrastructure	57161	41729	16160
Government services - other	134005	424484	152371
Total	**7369052**	**3704992**	**1095916**

Source: Quantec 2005 and SAM for MAMS

5.2.3. MDG Dataset

The MDG dataset requires the estimation of various elasticities that show how the attainment of various MDGs impact on one another and how various determinants affect the MDGs. For example, the achievement of the MDG health may have an influence on the achievements of other MDGs such as education provision. MAMS includes an MDG module which generates the MDG indicators and it is for this purpose that various elasticities are required. The following table summarises the variables for which elasticities could be provided:

MDG	Variable					
4 Child mortality	Household consumption per capita	Stock of other infrastructure capital	Per capita consumption of health services commodity		Proportion of population with access to improved water source	Proportion of population with access to adequate sanitation
5 Maternal mortality	Household consumption per capita	Stock of other infrastructure capital	Per capita consumption of health services commodity		Proportion of population with access to improved water source	Proportion of population with access to adequate sanitation
7 Water	Household consumption per capita	Stock of other infrastructure capital		Per capita consumption of water and sanitation services commodity		
7 Sanitation	Household consumption per capita	Stock of other infrastructure capital		Per capita consumption of water and sanitation services commodity		
2 Education						
Grade 1 entry	Household consumption per capita	Stock of other infrastructure capital	Indicator of education quality in each cycle	Wage premium for those with secondary education compared to those with less than secondary education		MDG4 Child mortality rate
Graduates from primary education (year)	Household consumption per capita	Stock of other infrastructure capital	Indicator of education quality in each cycle	Wage premium for those with secondary education compared to those with less than secondary education		MDG4 Child mortality rate
Graduates from secondary education (year)	Household consumption per capita	Stock of other infrastructure capital	Indicator of education quality in each cycle	Wage premium for those with secondary education compared to those with less than secondary education		MDG4 Child mortality rate

MDG	Variable					
Graduates from tertiary education (year)	Household consumption per capita	Stock of other infrastructure capital	Indicator of education quality in each cycle		Wage premium for those with tertiary education compared to those with secondary education	MDG4 Child mortality rate
Graduates from primary education (cycle)	Household consumption per capita	Stock of other infrastructure capital	Indicator of education quality in each cycle	Wage premium for those with secondary education compared to those with less than secondary education		MDG4 Child mortality rate
Graduates from secondary education (cycle)	Household consumption per capita	Stock of other infrastructure capital	Indicator of education quality in each cycle	Wage premium for those with secondary education compared to those with less than secondary education		MDG4 Child mortality rate
Graduates from tertiary education (cycle)	Household consumption per capita	Stock of other infrastructure capital	Indicator of education quality in each cycle		Wage premium for those with tertiary education compared to those with secondary education	MDG4 Child mortality rate

Source: MAMS

The 2008 General Household Survey was used to estimate (1) the determinants of education attainment and (2) the determinants of water and sanitation in South Africa.

Determinants of Education

The second MDG is achieving universal primary education. Achieving this goal will have a feed through impact on further education cycles and the labour market participation rate which will in turn have an impact on employment, factor productivity and wages (Sanchez and Sbrana, 2009: 1). How universal primary education impacts on the different determinants in the MAMS model is determined through a set of elasticities.

The methodology used to estimate the determinants of education and attainment in South Africa is based on literature by Sanchez, M and Sbrana G. (2009) which looked at the determinants of education attainment and development goals in Yemen. The factors that influence education attainment as identified in the paper include the levels of parental

education which in turn influence the level of education attainment in children (this may also influence the level of child labour), income and poverty levels, public expenditure on education, the quality of education including pupil/teacher ratios, class size and infrastructure, as well as factors such as gender, and delays in school enrolment (the age of the pupil when enrolled) (Sanchez and Sbrana, 2009: 4-7).

Primary school education in South Africa is seven years from Grade 1 to 7. Most pupils enrol in Grade 1 at the age of seven (although six year olds are also allowed to enrol) and finish with primary school at age thirteen. The secondary school phase is from Grade 8 to 12 followed by tertiary education. The following table shows enrolment numbers in South Africa with selected parameters:

Table 12. Enrolment Numbers and Other Selected Parameters for Education in South Africa

Selected Education Statistics	2005	2006	2007
Primary School Enrolment	7314449	7256518	7312258
Secondary School Enrolment	4430708	4544205	4549341
Other	472608	493062	539618
Total	12217765	12293785	12401217
Learner-Educator-Ratio	32	31.9	31.5
Learner-School-Ratio	459	468	476
Gross Enrolment Rates			
Primary	103	102	99
Secondary	89	91	88
Total	97	98	94
Gender Parity Index			
Primary	0.96	0.96	0.98
Secondary	1.08	1.09	1.1
Total	1	1.01	1.01

* Other includes basic adult education as well as further education and training or tertiary education.
Source: Department of Education 2005-2007

In 2007, gross enrolment rates in South Africa are around 99 percent in total for primary schools and 88 percent for secondary schools. Before 2007 gross enrolment rates at primary school level are above 100 percent due to a number of scholars who still attend primary school above the age of thirteen, if only seven to thirteen year olds were included the gross enrolment rates in 2006 was 98.16 percent. Statistics on universal primary education indicate that in 2006, 98 percent of 18 year olds have completed Grade 7 or above (UN,2007:18), for 2007 the figure is much lower at 94 percent.

The econometric estimation of the elasticities associated with education in MAMS will cover the three cycles of schooling in South Africa. For this purpose the 2008 General Household Survey (GHS) was used due to the extended scope of the survey with respect to education and education quality, the GHS is also the most recent general household survey. The 2008 GHS was conducted by Statistics South Africa and focuses on living standards of private

households in South Africa. There are 24 293 respondents to the survey. The 2008 GHS aims to provide information on the determinants of education including the required distance to travel to school, the tuition fees, problems at schools which pertain to the quality of schooling, and general reasons for not attending school. Other factors that were considered for the purpose of this study are income, the province, population group, government spending per capita on education, and access to infrastructure. A limitation of the survey is that it does not allow the user to estimate elasticities regarding entry behaviour as it only focus on attendance and it also do not indicate the immediate grade passed of failed or whether the individual is repeating a grade.

The 2008 GHS contains information of individuals attending primary school, secondary school or tertiary education. From the 64 913 observations in the GHS, 177 individuals attended primary school, 9 850 secondary school, and 1 960 tertiary education. Ninety two of the individuals attending primary school are males (52 percent), 5 126 of the secondary school attendant are males (52 percent), and 911 of the tertiary education attendees are males (46 percent). Of the attendants of primary school and tertiary education above 90 percent have a head of household with some school attendance, while it is much lower (77 percent) for attendants of secondary school. Spousal attendance rates are much lower from as low as 9 percent for primary school attendants to 43 percent for tertiary education attendants. Access to infrastructure is the highest for individuals attending tertiary education where access to any form of infrastructure is above 99 percent.

Table 13. Summary Statistics from GHS 2008 on Access to Education

		Gender				Acess to two forms of infrastructure			
	Total	Male	Female	Head of household attends school	Spouse attends school	No access	Access to one form of infrastructure	Acess to two forms of infrastructure	Access to three forms of infrastructure
Primary School	177	92	85	166	16	7	25	63	82
%		*51.98*	*48.02*	*93.79*	*9.04*	*3.95*	*14.12*	*35.59*	*46.33*
Secondary School	9850	5126	4724	7595	2978	211	652	1511	7466
%		*52.04*	*47.96*	*77.11*	*30.23*	*2.14*	*6.62*	*15.34*	*75.80*
Tertiary Education	1960	911	1049	1854	857	8	18	109	1825
%		*46.48*	*53.52*	*94.59*	*43.72*	*0.41*	*0.92*	*5.56*	*93.11*

Source: GHS 2008

Logistic regressions for enrolment behaviour in South Africa were run based on characteristics identified by Sanchez and Sbrana (2009) and characteristics measured in the 2008 GHS in order to identify factors that affect the probability of attending school for all cycles in the schooling system. This methodology is used as it is developed specifically for application within the MAMS framework. The specification of the logistic regression function is shown below:

$$y = \alpha_1 Gender + \alpha_2 Disability + \alpha_3 Province + \alpha_4 Popgrp + \alpha_5 Headattendedschool + \alpha_6 Spouseattendedschool + \alpha_7 Educquality + \alpha_8 Incomepercap + \alpha_9 Accessinfrastr + \alpha_{10} Wageprem$$

where

y	dependent variable that takes the value 1 if the person attended primary school (or then secondary or tertiary education where relevant) when the survey was conducted and 0 otherwise;
Gender	variable specifying the gender of the individual; 1 is male and 2 is female;
Disability	variable indicating whether the person has a disability that impacts on his/her daily activities whether at home, at work, or at school. This is a proxy of health status of individual; 1 is yes person has a disability and 2 is no;
Province	variable specifying the province in which the individual lives;
Popgrp	variable indicating the population group of the individual;
Headattendedschool	indicates whether the head of the household attended school during his/her lifetime;
Spouseattendedschool	indicates whether the spouse in the household attended school during his/her lifetime;
Educquality	variable that provides a proxy for education quality within schools. Variable is 1 if the quality of education is deemed satisfactory and 0 if not. Indicators for poor quality of education used are if there is a lack of books, a lack of teachers, or if the facilities are in a bad condition;
Incomepercap	income per capita;
Accessinfrastr	Indicates the access to infrastructure; the value is 0 if the individual does not have access to infrastructure and 1 if the individual has access to one source of infrastructure, 2 if individual has access to 2 sources of infrastructure and 3 if the individual has access to water, sanitation and electricity infrastructure;
Wageprem	measures the ratio of the average wage of an individual who achieved a certain level of education to the average wage of an individual who achieved an immediate lower level of education. The wage premium is classified according to level of education, namely individuals with tertiary education compared to those with secondary education, and those with secondary education compared to those with no secondary education. Wage premium is further classified according to province.

The results for the estimations are reported below and provide the value for the estimated parameter, the test statistics below that in brackets and the marginal effects and elasticities for those variables which were found to be statistical significant at a 10 percent level or higher.

Primary School Education

The table below shows the estimation results for primary school education:

Table 14. Estimation Results for Attendance of Primary School

	Parameter estimates	Marginal effects	Elasticities
Gender	-0.105		
	(-0.45)		
Disability	0.244	0.001	0.479
	(3.15 ***)		
Province	-0.167	-0.001	-0.850
	(-2.67***)		
Population group	-0.803	-0.003	-1.226
	(-2.26**)		
Head of household attended school	2.319	0.009	2.045
	(3.41***)		
Spouse attended school	-1.994	-0.008	-0.959
	(-5.04***)		
Education quality	0.672	0.003	-0.423
	(4.531***)		
Per capita income	-4.518	-0.017	-2.074
	(-3.96***)		
Infrastructure	-0.646	-0.003	-1.785
	(-5.06***)		
Wage premium	0.107		
	(0.24)		

Source: Regression Results

*** the statistical significance is at the 1% level

** the statistical significance is at the 5% level

* the statistical significance is at the 10% level

Highly statistical significant determinants for the probability of attending primary school include whether or not a person has a disability, whether or not the head of the household attended school, the per capita income of the individual and access to infrastructure. The strongest marginal effect is per capita income: the marginal effect is negative indicating that an individual who is currently attending primary school has a higher probability to have a lower per capita income[9]. Other strong marginal effects is whether or not the head or spouse of the household attended school. This is in line with studies conducted in developing countries which indicate that maternal schooling is a very strong and consistent predictor of reduced child mortality and morbidity (Pavalavalli, G & Ramesh, B.M, 2001). Gender and the wage premium are not statistically significant determinants of the probability of attending primary school.

[9] The results may be explained by how the regression was constructed: it look at individuals currently attending primary school and not individuals with primary school education. This estimation may be improved by restricting the sample to individuals in the age group 7 to 13, and will be done in future applications to improve the results.

Secondary school education

The table below shows the estimation results for secondary school education:

Table 15. Estimation Results for Attendance of Secondary School

	Parameter estimates	Marginal effects	Elasticities
Gender	-0.181	-0.018	-0.237
	(-4.71***)		
Disability	0.372	0.038	0.642
	(6.53***)		
Province	0.052	0.006	0.244
	(4.79***)		
Population group	-0.020		
	(-0.54)		
Head of household attended school	-0.073	0.011	0.082
	(1.95*)		
Spouse attended school	0.055		
	(1.55)		
Education quality	-0.277	-0.029	0.150
	(-10.30***)		
Per capita income	-3.849	-0.407	-1.638
	(-15.53***)		
Infrastructure	0.143	0.015	0.350
	(4.01***)		
Wage premium	0.074		
	(1.37)		

Source: Regression Results
*** the statistical significance is at the 1% level
** the statistical significance is at the 5% level
* the statistical significance is at the 10% level

The determinants gender, whether or not the individual have a disability, province, education quality, per capita income, and infrastructure are statistically significant at a 1 percent level and therefore have an influence on the probability of an individual of attending secondary school. The largest marginal effect is again from per capita income, indicating that an individual's income (who is currently attending secondary school) is likely to be lower[10]. The population group of the individual, whether or not the spouse in the household attended school, or the wage premium do not have a statistical significant impact on the probability of the individual attending secondary school. These results are consistent with other studies; for

[10] The results may again be explained by how the regression was constructed: it look at individuals currently attending secondary school and not individuals with secondary school education. The results may be improved by restricting the sample to individuals in the age group 14 to 18 and will be done in future applications.

example a study in Kenya has shown that parental education is among other an important determinant of education (Kabubo-Mariara and Mwabu, 2007:586).

Tertiary education

The table below shows the estimation results for tertiary education:

Table 16. Estimation Results for Attendance of Tertiary Education

	Parameter estimates	Marginal effects	Elasticities
Gender	0.188	0.007	0.272
	(2.84***)		
Disability	0.330	0.012	0.624
	(4.98 ***)		
Province	0.051	0.002	0.250
	(2.75***)		
Population group	-0.142	-0.005	-0.208
	(-2.87***)		
Head of household attended school	0.921	0.034	0.781
	(5.72***)		
Spouse attended school	-0.295	-0.011	-0.136
	(-3.49***)		
Education quality	-0.178		
	(-1.32)		
Per capita income	7.527	0.275	3.308
	(15.88***)		
Infrastructure	0.596	0.022	1.584
	(4.02***)		
Wage premium	-0.036		
	(-1.22)		

Source: Regression Results

*** the statistical significance is at the 1% level

** the statistical significance is at the 5% level

* the statistical significance is at the 10% level

Variables that are highly significant include gender, disability, province, population group, whether the head of the household attended school, whether the spouse attended school, per capita income, and access to infrastructure. All these factors influence the individual's probability of attending tertiary education. The largest marginal effect is per capita income indicating that as per capita income increase an individual's probability to attend tertiary education increase by 27.5 percent. Here the variables education quality and the wage premium are not statistical significant in determining an individual's probability of attending tertiary education. The reason why education quality is not significant is that most individuals who attend tertiary education do not have a negative perception of the quality of tertiary education. The wage premium is not statistical significant as it compares the wage of individuals currently attending high school with individuals currently attending tertiary

school: the demographics of the wage earners in these two groups are similar so that the wage premium is not significant in determining tertiary education attendance.

Determinants of Water and Sanitation

One of the targets of MDG seven focuses on increasing the proportion of the population with access to improved water sources, and sanitation. The South African government has made a lot of progress towards achieving the target since the abolishment of apartheid. Under the Reconstruction and Development Programme (RDP) the percentage of households with access to water has increased from 61.7 percent to 84.7 percent, while access to basic services has increased from 59 percent of the population in 1994 to 94 percent in 2007 (UN,2007:44).

Achieving MDG seven has again further feedback effects for the overall achievement of the MDGs, such as improved health. The determinants of water and sanitation were estimated using the methodology as derived in Sbrana (2009). Sbrana (2009) identifies the variables wealth, area (rural or urban), spending per capita on water and sanitation, and access to infrastructure as factors that influence an individual's probability to have access to improved water and sanitation services. This methodology is preferred as it was developed with specific application to the MAMS framework.

Logistic regressions for access to water and sanitation in South Africa were run based on the characteristics identified by Sbrana (2009) and characteristics measured in the 2008 GHS. The specification of the logistic regression function is shown below:

$$y = \alpha_1 Income + \alpha_2 Province + \alpha_3 Popgrp + \alpha_4 PercapitaSpendInfr + \alpha_5 Accessinfrastr$$

where

y	access to improved water and sanitation
$Income$	income per capita
$Province$	variable specifying the province in which the individual lives
$Popgrp$	variable indicating the population group of the individual
$PercapitaSpendInfr$	variable specifying the per capita spending by government by province on improved water and sanitation
$Accessinfrastr$	indicates the access to infrastructure; the value is 0 if the individual do not have access to infrastructure and 1 if the individual have access to one source of infrastructure, 2 if individual have access to 2 sources of infrastructure and 3 if the individual have access to water, sanitation and electricity infrastructure.

The 2008 GHS was used for the purpose of the analysis. Dummy variables were constructed to indicate whether or not a person has access to improved water and sanitation. It is assumed that an individual have access to improved water and sanitation services if the following conditions were met:

Table 17. Conditions for Improved Water and Sanitation Services

Improved water services	Improved sanitation services
Piped water in dwelling	In dwelling: Flush toilet with offsite disposal
Piped water on site or in yard	In dwelling: Flush toilet with on site disposal
Borehole on site	On site: Flush toilet with offsite disposal
Rainwater tank on site	On site: Flush toilet with on site disposal
Neighbour's tap	On site: Chemical toilet
Public tab	On site: Pit latrine with ventilation pile
Water-carrier or tanker	On site: Pit latrine without ventilation pile
Borehole off site or communal	On site: Bucket toilet
	Off site: Flush toilet with offsite disposal
	Off site: Flush toilet with onsite disposal
	Off site: Chemical toilet
	Off site: Pit latrine with ventilation pipe
	Off site: Pit latrine without ventilation pile
	Off site: Bucket toilet

The results for the logistic regression are shown below and include the value of the estimated parameters, the test statistics, the marginal effects and the elasticities. The marginal effects measure how the probability of having access to water or sanitation services would change as a result of a change in one of the determinants.

Table 18. Estimation Results for Water

	Parameter estimates	Marginal effects	Elasticities
Income	0.000	0.000	0.006
	(16.31***)		
Province	0.174	0.010	0.058
	(25.81 ***)		
Population group	2.001	0.119	0.152
	(20.92***)		
Per capital government spending on water and sanitation	0.109	0.006	0.067
	(8.09***)		
Access to infrastructure	1.904	0.113	0.064
	(58.41***)		

Source: Regression Results

*** the statistical significance is at the 1% level

** the statistical significance is at the 5% level

* the statistical significance is at the 10% level

Table 19. Estimation Results for Sanitation

	Parameter estimates	Marginal effects	Elasticities
Income	0.000	0.000	0.004
	(11.16***)		
Province	0.089	0.005	0.028
	(13.13 ***)		
Population group	1.038	0.056	0.071
	(16.08***)		
Per capital government spending on water and sanitation	0.259	0.014	0.135
	(19.13***)		
Access to infrastructure	2.100	0.113	0.058
	(60.52***)		

Source: Regression Results
*** the statistical significance is at the 1% level
** the statistical significance is at the 5% level
* the statistical significance is at the 10% level

All the determinants are significant for both access to improved water and access to improved sanitation services. Large marginal effects for access to both improved water and sanitation services are the population group and access to infrastructure, indicating for example that access to sanitation will increase by 11.3 percent if the individual have access to other infrastructure such as electricity.

Summary of MDG elasticities

The process of calibrating the MAMS model is very data intensive. Various data sources were used for this purpose. However, were data was not available various assumptions had to be made (as discussed above). There were also some inconsistencies between different sources of data which had to be dealt with. These shortcomings were all addressed by the author(s), but in some cases there were a total lack of data which could not be addressed. The estimation of elasticities of child and maternal mortality was not possible as the author did not have access to a survey that covers these aspects. The GHS 2008 did not cover any form of mortality whether child or maternal. The 2003 Department of Health Survey does cover these aspects, but is not publicly available. In the case were estimated elasticities were not available, guesstimates were used based on other sources. The elasticities used (both estimated and guesstimated) are shown in Table 21, while Table 20 shows the MDG-scenario related ratios.

In Table 20, the second and third columns give the ratio between per capita real health services and water and sanitation services, respectively, in the target year and the base year, in the scenario that is used to provide MAMS with the starting point to generate its calibrated logistic functions for the corresponding MDG. The fourth column gives the ratio between education quality in the target year and the base year, as does the stock of infrastructure column. The sixth column gives the household per capita consumption ratio between the target year and the base year. The next three columns give the ratio between the respective indicated in the target and base year, while the last column provides the ratio between relative

wages in the next higher and current labour segments in the target and base year. For example, the table shows that spending on the health commodity (from column one) needs to be 1.26 times higher in 2015 compared to the base year for MDG4 and MDG5 to be achieved.

Table 20. MDG (2015/base year) ratios for MDG dataset

	Commodity health	Commodity water and sanitation	Education quality	Stock of infrastructure capital	Household per capita consumption	MDG4	MDG7 water	MDG7 sanitation	Wage premium
MDG4 child mortality	1.26			1.89	2.13		2.56	4.50	
MDG5 maternal mortality	1.26			1.89	2.13		2.56	4.50	
MDG7 water		5.65		1.89	2.13				
MDG7 sanitation		5.65		1.89	2.13				
Entry into primary cycle			1.52	1.63	1.79	0.55			1.00
Pass from primary cycle			1.52	1.63	1.79	0.55			1.00
Pass from seondary cycle			1.04	1.89	2.13	0.60			1.00
Pass from tertiary cycle			1.10	1.89	2.13	0.60			1.00
Continue in secondary cycle			1.04	1.89	2.13	0.60			1.00
Continue in tertiary cycle			1.10	1.89	2.13	0.60			1.00

Source: Author's estimates

The elasticities used (as shown in Table 21) in the MDG dataset show how the MDGs are linked as well as how spending on commodities impacts on the various MDGs: for example, how spending on the health commodity are linked to MDG4 and 5. A negative elasticity indicates that the determinant and indicator moves in opposite directions. Child and maternal mortality are positively influenced by increased spending on the health commodity, increased spending on infrastructure, increased household per capita consumption spending, and improved access to water and sanitation. In each instance maternal mortality is affected more than child mortality indicating that child mortality is inherently more difficult to address compared to maternal mortality. The elasticities permitted to calibrate the logistic functions such that trends generated by MAMS for MDGs 4 and 5 turned out to be consistent with past trends.

Table 21. MDG elasticities for MDG dataset

	Commodity health	Commodity water and sanitation	Education quality	Stock of infrastructure capital	Household per capita consumption	MDG4	MDG7 water	MDG7 sanitation	Wage premium
MDG1 poverty					-1.00				
MDG4 child mortality	-0.49			-0.05	-0.05		-0.10	-0.10	
MDG5 maternal mortality	-0.86			-0.09	-0.09		-0.09	-0.09	
MDG7 water		1.00		0.06	0.01				
MDG7 sanitation		1.00		0.06	0.00				
Entry into primary cycle			1.00	0.10	0.10	-0.10			0.10
Pass from primary cycle			1.00	0.10	0.10	-0.10			0.10
Pass from seondary cycle			1.00	0.10	0.10	-0.10			0.10
Pass from tertiary cycle			1.00	0.10	0.10	-0.10			0.10
Continue in secondary cycle			1.00	0.10	0.10	-0.10			0.10
Continue in tertiary cycle			1.00	0.10	0.10	-0.10			0.10

Source: Author's estimates

5.2.4. Microsimulation Model for South Africa

For the purposes of this study, results of the labour market generated by the MAMS model are linked with a microsimulation model to estimate income distribution and poverty indicators.

The methodology used for this purpose is explained in detail in Vos and Sanchez (2010). First the key determinants for estimating income distribution and poverty are determined, which includes employment status and per capita household income. The approach used here does not explicitly model labour market behaviour. Instead, the labour market is segmented and individuals move between segments according to their labour market status where they get assigned a new labour income (the average of workers in that segment). The non-parametric approach used here considers individual characteristics of workers and certain labour market segmentation, and allows workers to move across segments at the margins; from unemployment to employment or from employment in one sector to another. The probability that a person moves between segments is approximated by a randomized process. The order of the randomized process is as follows:

(1) Change in labour force status (active vs. inactive, employed vs. unemployed)
(2) Change in labour market segments (changes in sectors and/or occupational categories)
(3) Change in mean labour incomes as assigned to individuals.
(4) Change in level of education

Following this a new income distribution is generated from which poverty and inequality indexes are calculated. The microsimulation model then generates results on the income distribution and poverty impact including poverty lines, Gini coefficients, Theil indices, and mean incomes.

The microsimulation model is linked with the MAMS model using a top-down approach where results from the CGE model on employment are fed into the microsimulation model.

The 2008 General Household Survey was used to specify the microsimulation model for South Africa. The variables used from the GHS include age, gender, level of skill according to level of education, employment status, labour income, sector of employment. As already mentioned above, the 2008 GHS was conducted by Statistics South Africa and focuses on living standards of private households in South Africa. There are 24 293 respondents to the survey. The base year results for the microsimulation model estimates the percentage of the population that lives below the 1-dollar-a-day poverty line to be in the region of 38.4 percent compared to other estimates of 44.5 percent. The Gini coefficient based on labour income is estimated to be around 0.63 which is also somewhat lower than other estimates. (UN, 2007:15) The differences may be attributed to the difference in data sources used, and the methodologies employed to estimate labour income and per capita household income.

6. General Equilibrium Analysis of the Achievement of the Millennium Goals

6.1. Assumptions and Results of the Baseline Scenario

A baseline that defines the trajectory of the economy for the period 2005 to 2015 was simulated. The baseline provides a realistic growth path for the economy against which deviations may be compared. In the baseline GDP growth is determined exogenously while productivity is allowed to adjust. However, when alternative scenarios are conducted the GDP growth path is determined endogenously.

The following macroeconomic closure rules were made:

Government:	Transfers from abroad to government is the endogenous adjustment factor. The difference between government spending and its financing is covered by adjusting transfers from abroad. At the same time it is assumed that government consumption and debt grow at a predetermined rate as forecasted by National Treasury (see data section), while the share of income and commodity taxes to GDP remain at a predetermined rate based on the National Treasury forecast. Transfers from abroad are therefore not the only adjusting mechanism.
External sector:	A flexible adjustment of the real exchange rate is assumed, while the capital account variables of the balance of payments are fixed.
Private investment:	Household savings rates adjust to clear private investment. Private investment is assumed a fixed share of absorption.
Factors:	Capital is assumed to have an exogenous unemployment rate, while all the labour groups in the model are assumed to have an endogenous unemployment rate. Wages clear the factor capital market while this is so in the case of labour only if the unemployment rate reaches its minimum.

The baseline scenario uses the National Treasury GDP growth forecast for the period 2010 to 2012 and trend GDP growth thereafter. As an alternative an optimistic growth path is assumed which is akin to the AsgiSA growth forecast: under AsgiSA an average growth rate of around 5 percent is assumed for the period 2004 to 2014 (The Presidency, 2006: 3), therefore for the purpose of this analysis a growth rate of 6 percent is assumed for the period 2010 to 2015. Historical data are used for the period 2005 to 2009. This will enable one to determine the impact of accelerated growth on South Africa's ability to reach its millennium development goals and also provides a benchmark for the growth figures required under the new policy called The New Growth Path.

However, the only change assumed is additional growth, while government spending and all other variable are assumed to remain unchanged. The higher growth must therefore be associated with government's success in increasing efficiencies in the economy, productivity, and improved service delivery and not necessarily increased spending by government, infrastructure spending, or any other changes.

Table 22. Initial Value and Annual Growth Rate of Key Macroeconomic Aggregates in the Baseline Scenario, 2005 to 2015

	Initial value in 2005 (R billion)	Annual growth rate (%)	
		GDP Trend Growth	GDP Optimistic Growth
GDP	1291.9	3.39	4.50
Household consumption	942.5	4.98	6.03
Government consumption	306.6	2.83	2.84
Investment			
- Private	188.3	4.92	6.02
- Public	64.2	0.92	1.36
Exports of goods and services	407.8	0.39	2.73
Imports of goods and services	433.0	4.21	5.45

Source: MAMS Results

Under the first baseline scenario GDP is assumed to grow by 3.4 percent per year from 2005 to 2015. Domestic absorption is growing stronger compared to GDP; export growth is marginal as a result of a strong appreciation of the real exchange rate between 2005 and 2015 (by 15.0 percent between 2005 and 2015). Investment spending remains strong with public investment spending mostly financed through increased domestic borrowing. Strong growth in household consumption expenditure remains a strong driver of GDP growth.

Under the more optimistic baseline scenario GDP growth is assumed to be 4.5 percent on average from 2005 to 2015. Household consumption and both public and private investment spending are strong drivers of this growth. Export growth is somewhat stronger at 2.7 percent over the period, but import growth remains strong at 5.5 percent again as a result of a strong appreciation of the real exchange rate (by 17.3 between 2005 and 2015).

The baseline scenario shows that if the economic conditions (including external conditions and policies) do not change, there will be progress in achieving some MDGs, but not sufficiently to achieve them all. South Africa will be able to achieve MDG1, but not any of the other MDGs, even when more optimistic GDP growth numbers are assumed, unless more efforts are made in terms reaching these MDGs: when higher GDP growth is assumed, more progress is made towards achieving the targets, but this is not sufficient.

The growth in government consumption assumed from 2006 to 2015 is based on historical growth figures for 2006 to 2009 (average of 5 percent over this period) and on National

Treasury forecast figures for 2010 to 2012 (average of 4.1 percent for this period). From 2013 to 2015 a growth rate of 4 percent is assumed for government consumption.

Table 23. MDG Achievement in the two alternative baseline scenarios, 2005 to 2015

		GDP Trend Growth			GDP Optimistic Growth			
MDG and associated indicator		2005	2006	2015	2005	2006	2015	Target for 2015
MDG1	Percentage of the population living on less than 1.25 dollar	38.40	34.20	23.05	38.40	34.20	20.19	25.40
MDG2	Completion rate for primary education	74.94	76.20	83.40	74.94	76.20	84.13	100.00
MDG4	Child mortality rate (per 1,000 live births)	57.60	100.13	97.63	57.60	100.13	90.59	26.40
MDG5	Maternal mortality rate (per 100,000 live births)	124.00	144.34	142.98	124.00	144.34	139.30	112.50
MDG7a	Access to drinking water (% of population)	84.70	85.26	86.50	84.70	85.26	87.31	99.00
MDG7b	Access to sanitation services (% of population)	94.00	94.15	94.49	94.00	94.15	94.72	99.00

Source: MAMS and microsimulation results

The MDG indicators as generated by the MAMS and microsimulation model may differ from MDG indicators as published in the UN reports. For example, MDG1 in the UN report is at 9.7 percent in 2006, much lower than the 38.4 percent as generated by the microsimulation model. The estimation of these indicators is based on different sources; the UN report uses the Income and Expenditure Survey of 2005 and 2006, while the microsimulation model uses the GHS of 2008. The methodologies used may also differ, for example, in how the income variable is constituted. The target for 2015 was then also rebased, based on the higher poverty figures. From the results shown above, it seems that South Africa is on track for meeting MDG1, which is in line with the UN report which also found that South Africa is likely to reach this target.

There are still gaps in achieving the other MDGs including education, child, and maternal mortality rates (that is MDGs 3, 4, and 5). A large gap remains for achieving universal primary education for all. The target is to achieve a 100 percent net completion rate for primary education for the population. Although attendance rates in South Africa is fairly high, completion rates remain unsatisfactory and is declining over the period. As one can see from Table 24, gross enrolment rates for primary education fall from 2006 to 2013 but then start to rise. Completion rates increase steadily over the period 2006 to 2015. Government spending on education remains relatively strong. The largest gaps for South Africa to achieve its MDGs are with the health goals; the MDG achievement has actually worsen from 2000 to most recent. The baseline shows that this MDG will improve slightly, but only at the end of the period, while there is still a large gap to reach the respective targets.

Table 24. Behaviour of the Determinants of the Primary Education Goal in the Baseline Scenario, 2005 to 2015

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GDP Trend Growth											
Gross enrolement rates for primary education (%)	86.3	84.4	83.0	81.8	80.6	79.9	79.5	78.9	79.3	79.8	80.4
Gross completion rate for primary education (%)	74.9	76.2	76.3	80.4	81.5	82.0	86.4	80.9	80.3	81.6	83.4
Real government consumption (% growth)	29.0	4.9	4.7	4.9	5.7	4.7	4.1	3.6	4.0	4.0	4.0
Real household consumption spending on non-government primary education (% growth)	2.10	20.67	3.88	2.19	-0.35	2.50	2.30	2.28	3.22	3.16	3.16
GDP Optimistic Growth											
Gross enrolement rates for primary education (%)	86.3	84.4	83.0	81.8	80.6	79.9	79.6	79.0	79.4	80.1	80.7
Gross completion rate for primary education (%)	74.9	76.2	76.3	80.4	81.5	82.0	86.6	81.2	80.7	82.1	84.1
Real government consumption (% growth)	29.0	4.9	4.7	4.9	5.7	4.7	4.1	3.6	4.0	4.0	4.0
Real household consumption spending on non-government primary education (% growth)	2.10	20.67	3.88	2.19	-0.35	2.50	4.47	4.25	4.78	4.62	4.55

Source: MAMS Results

The measure used for the modelling may also differ from what is used in the UNDP reports. In MAMS, the MDG 2 is defined as the net ON-TIME primary completion rate; it is computed as product of 1st grade net intake rate and primary cycle promotion rates for the relevant series of years. Alternatively, the MDG2 is defined as the product of the rates of entry and passing during the years of study for the cohort that is scheduled to graduate from (1st) cycle primary in t. The measure reported here is therefore lower than the 93.8 percent in 2009, the completion rate of primary education for 18 year olds, reported by the UNDP in 2010.

Child and maternal mortality rates initially worsen; child mortality increase from 57.6 per 1 000 live births to 100.13, and maternal mortality increase from 124 per 100 000 live births to 144.34. At the end of the period there is a slight improvement in the mortality rates, but both these MDGs are short of the respective targets; child mortality decrease to 97.6 per 1 000 live births with the target at 26.4 and maternal mortality to 142.98 per 100 000 live births with the target at 112.5. Government spending on health is assumed to decline by 2 percent per year from 2006 over the baseline period to achieve this result as government spending on health and its infrastructure is the main drivers of the outcome of MDGs 4 and 4 in the model. In reality government consumption in real terms has growth and is expected to grow over the baseline period. Child and maternal mortality decline somewhat more when more optimistic growth figures are used (to 90.59 deaths per 1 000 live births and 139.3 deaths per 100 000 live births, respectively) but is still not sufficient to reach the MDG targets. The target for the health MDGs are adjusted somewhat

The gap in reaching the MDGs of universal access to drinking water and sanitation is closed somewhat over the period 2005 to 2015. In 2005 84.7 percent of the population had access to drinking water, while 94.0 percent had access to sanitation services. The target for 2015 is for 99 percent of the population to have access to both drinking water and sanitation services. According to the baseline projections 86.5 percent of the population will have access to drinking water and 94.5 percent to sanitation services by 2015 therefore there are still gaps in achieving universal access. Although the baseline projects strong spending on water and sanitation services, it is insufficient to close the gap.

As already mentioned above, the only MDG that is achieved is MDG1. In 2005 the percentage of the population living on less than $1.25 a day is 38.4 percent. The MAMS model in combination with the microsimulation model projects that in 2015 that number will be 23.05 percent, with the target 25.4 percent. According to the modelling, (as can be seen in Table 25) the underlying factor that contributes to South Africa reaching this target is a reduction in unemployment of unskilled workers which decreases from 33 percent in 2005 to 24.1 percent if trend GDP growth is assumed, and to 22.8 percent if more optimistic growth is assumed. Strong growth in real wages for most skill groups also contributes to the decline in poverty.

Table 25. Labour Supply, Employment, Unemployment, and Real Wages (Growth Rates)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GDP Trend Growth											
Labour supply (% Growth)											
- Labour with no secondary schooling	1099.7	-2.4	-1.9	-1.5	-1.7	-1.9	-2.5	-2.5	-2.4	-2.8	-2.5
- Labour with secondary schooling	480.5	7.1	8.9	7.9	8.8	6.1	6.8	3.7	6.1	2.8	5.8
- Labour with tertiary education	128.9	-2.5	-2.8	-3.6	-3.3	-2.9	-2.8	-1.9	-1.6	-0.2	-0.3
Employment (% Growth)											
- Labour with no secondary schooling	736.9	0.3	-0.4	-0.4	-1.6	-1.0	-1.3	-1.3	-1.2	-1.5	-1.3
- Labour with secondary schooling	370.5	6.6	6.5	4.7	1.3	3.9	4.4	4.1	5.0	4.4	4.8
- Labour with tertiary education	109.6	2.5	-2.2	-3.6	-3.3	-2.9	-2.8	-1.9	-1.6	-0.2	-0.3
Unemployment (% of Labour Force)											
- Labour with no secondary schooling	33.0	31.1	30.1	29.4	29.3	28.6	27.8	26.9	26.0	25.0	24.1
- Labour with secondary schooling	22.9	23.2	24.9	27.1	32.1	33.5	35.1	34.8	35.5	34.5	35.2
- Labour with tertiary education	15.0	10.6	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Real wages (% Growth)											
- Labour with no secondary schooling	0.2	6.4	6.0	4.2	-0.4	3.5	4.7	5.1	5.6	6.0	5.8
- Labour with secondary schooling	0.7	-3.0	-0.6	-0.9	-1.3	-0.2	-0.2	0.2	-0.1	0.4	-0.1
- Labour with tertiary education	2.1	2.8	9.5	9.0	3.6	7.4	8.0	7.0	7.4	5.6	5.6
GDP Optimistic Growth											
Labour supply (% Growth)											
- Labour with no secondary schooling	1099.7	-2.4	-1.9	-1.5	-1.7	-1.9	-2.5	-2.5	-2.5	-2.9	-2.6
- Labour with secondary schooling	480.5	7.1	8.9	7.9	8.8	6.1	6.8	3.5	6.1	2.7	5.8
- Labour with tertiary education	128.9	-2.5	-2.8	-3.6	-3.3	-2.9	-2.8	-1.8	-1.5	0.1	0.2
Employment (% Growth)											
- Labour with no secondary schooling	736.9	0.3	-0.4	-0.4	-1.6	-1.0	-0.9	-0.9	-1.0	-1.3	-1.2
- Labour with secondary schooling	370.5	6.6	6.5	4.7	1.3	3.9	6.6	5.9	6.5	5.8	6.2
- Labour with tertiary education	109.6	2.5	-2.2	-3.6	-3.3	-2.9	-2.8	-1.8	-1.5	0.1	0.2
Unemployment (% of Labour Force)											
- Labour with no secondary schooling	33.0	31.1	30.1	29.4	29.3	28.6	27.4	26.3	25.1	23.9	22.8
- Labour with secondary schooling	22.9	23.2	24.9	27.1	32.1	33.5	33.6	32.1	31.8	29.8	29.5
- Labour with tertiary education	15.0	10.6	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Real wages (% Growth)											
- Labour with no secondary schooling	0.2	6.4	6.0	4.2	-0.4	3.5	7.0	7.1	7.2	7.7	7.5
- Labour with secondary schooling	0.7	-3.0	-0.6	-0.9	-1.3	-0.2	0.0	0.4	0.0	0.6	0.0
- Labour with tertiary education	2.1	2.8	9.5	9.0	3.6	7.4	11.0	9.4	9.2	7.1	6.8

Source: MAMS Results

In summary, under the assumptions of the baseline scenario there will be some progress in achieving the MDGs, but most of them will be not be fully met. Even though government spending on some functions such as education and health is already strong, it would have to be scaled up further and/or used more efficiently in order to meet all the MDG targets for 2015.

6.2. Results of the Scenarios for Achieving the Millennium Goals

A set of scenarios that investigate the impact on public spending in achieving the MDGs separated and simultaneously (excluding MDG 1 of reducing extreme poverty) were simulated. The model allows one to analyse the impact of achieving each MDG separately and simultaneously. Since the MDGs are interlinked, achieving the MDGs simultaneously should be more cost effective: for example, achieving the health MDGs should also have a positive impact on achieving the education MDG. These MDG-achieving scenarios differ depending on the source of financing that is used to scale up public spending. Their results are compared against the results of the two baseline scenarios in order to determine: (1) the macroeconomic viability of achieving the MDGs (2) and the financing cost required to achieve the MDGs and (3) the most effective means of financing.

6.3. The Cost of Achieving the Millennium Goals

The table below shows the increase in public spending (current and capital) required to achieve the MDGs on its own and simultaneously. Relative to the baseline scenario (where GDP trend growth is assumed) spending on primary education increases from 2.3 percent of GDP to 3.5 percent of GDP when only this goal is targeted and to 3.1 percent of GDP when all MDG targets are met (if one focus on the average spending from 2010 to 2015). Health

spending increases from 0.1 percent[11] of GDP to 5.6 percent of GDP when only the mortality targets are met and to 5.5 percent of GDP when all the targets are met. Water and sanitation spending increases from very low numbers in the base year to 2.5 percent of GDP when only this target is met remains at 2.5 percent of GDP when all targets are met. It is therefore more cost effective for reaching the education MDG (that is MDG2) if all the MDGs are targeted, as there are benefits for education from reaching the health MDGs. The benefits from reaching the MDG simultaneously are not so strong for the water and sanitation MDG as there are no links between any of the MDGs and water and sanitation - see Table 21.

Where higher GDP growth number are assumed the cost of achieving the MDGs are lower as can be seen in Table 26, using as an example the tax-financing MDG scenarios.

Table 26. Cost of Achieving the MDGs: GDP Trend Growth Baseline with Tax Financing

At the end of the period simulated, and average for period as a whole (Percentage of GDP)					
		Additional public spending needed to achieve the following MDGs:			
GDP Trend Growth	Public spending in baseline	Only the primary education goal	Only the mortality goals	Only the water and sanitation goals	All MDGs
		(a) Annual average for the period 2005 to 2009			
Primary education					
- Current spending	2.00	2.66	2.00	1.99	2.47
- Public investment	0.19	0.50	0.18	0.19	0.42
Health					
- Current spending	0.85	0.85	3.34	0.85	3.36
- Public investment	0.06	0.06	0.50	0.06	0.52
Water and sanitation					
- Current spending	0.01	0.01	0.01	0.34	0.35
- Public investment	0.32	0.31	0.31	1.24	1.23
Total spending	33.86	34.92	36.72	35.09	38.77
		(b) Annual average for the period 2010 to 2015			
Primary education					
- Current spending	2.31	3.46	2.31	2.30	3.06
- Public investment	0.12	0.07	0.12	0.12	0.07
Health					
- Current spending	0.10	0.10	5.57	0.10	5.54
- Public investment	0.00	0.00	0.92	0.00	0.90
Water and sanitation					
- Current spending	0.01	0.01	0.01	2.48	2.51
- Public investment	0.23	0.23	0.22	3.18	3.17
Total spending	35.71	37.06	41.93	40.96	48.04
		(c) = (a) + (b) Annual average for the period 2005 to 2015			
Primary education					
- Current spending	2.17	3.09	2.17	2.16	0.76
- Public investment	0.15	0.29	0.15	0.15	0.27
Health					
- Current spending	0.44	0.44	4.55	0.44	4.55
- Public investment	0.03	0.03	0.73	0.03	0.73
Water and sanitation					
- Current spending	0.01	0.01	0.01	1.51	1.52
- Public investment	0.27	0.27	0.26	2.30	2.29
Total spending	34.87	36.09	39.56	38.29	43.83

Source: MAMS Results

[11] Government spending on health is assumed to be very low and declining to enable the model to follow the worsening path of MDG4 and 5 as government spending on health is the main driver of the health MDGs. In reality spending on health is increasing in real terms.

Table 27. Cost of Achieving the MDGs: More Optimistic Growth Baseline with Tax Financing

At the end of the period simulated, and average for period as a whole (Percentage of GDP)					
		Additional public spending needed to achieve the following MDGs:			
GDP Optimistic Growth	Public spending in baseline	Only the primary education goal	Only the mortality goals	Only the water and sanitation goals	All MDGs
(a) Annual average for the period 2005 to 2009					
Primary education					
- Current spending	2.00	2.66	2.00	1.99	2.47
- Public investment	0.19	0.50	0.18	0.19	0.42
Health					
- Current spending	0.85	0.85	3.34	0.85	3.36
- Public investment	0.06	0.06	0.50	0.06	0.52
Water and sanitation					
- Current spending	0.01	0.01	0.01	0.34	0.35
- Public investment	0.32	0.31	0.31	1.24	1.23
Total spending	33.86	34.92	36.72	35.09	38.77
(b) Annual average for the period 2010 to 2015					
Primary education					
- Current spending	2.22	3.28	2.22	2.21	2.91
- Public investment	0.12	0.07	0.11	0.12	0.07
Health					
- Current spending	0.10	0.10	5.21	0.10	5.19
- Public investment	0.00	0.00	0.79	0.00	0.77
Water and sanitation					
- Current spending	0.01	0.01	0.01	2.29	2.33
- Public investment	0.31	0.31	0.30	2.92	2.91
Total spending	34.84	36.09	40.59	39.59	46.14
(c) = (a) + (b) Annual average for the period 2005 to 2015					
Primary education					
- Current spending	2.12	3.00	2.12	2.11	0.74
- Public investment	0.15	0.31	0.15	0.15	0.29
Health					
- Current spending	0.44	0.44	4.36	0.44	4.36
- Public investment	0.03	0.03	0.66	0.03	0.65
Water and sanitation					
- Current spending	0.01	0.01	0.01	1.41	1.43
- Public investment	0.31	0.31	0.30	2.15	2.15
Total spending	34.40	35.56	38.83	37.55	42.79

Source: MAMS Results

The results show that the cost of achieving the MDGs increase as one gets closer to the target year (2015) due to the decreasing marginal returns to other determinants the closer one gets to the target. The results also show that there is interconnectedness between the targets. One must also note that the results (especially the results associated with more optimistic growth) do not take the improvements in efficiency, productivity, and service delivery into account. One may expect that if service delivery and the quality of say education improve that it may be easier to reach the targets.

Compared to the baseline, total public spending as a percentage of GDP will have to increase from 35.7 percent in the baseline (annual average from 2010 to 2015) to 48.0 percent (12.3 percentage points) if all the MDGs are met and if trend growth is assumed; if more optimistic growth is assumed, total public spending increases from 34.4 to 42.8 percent (8.3 percentage points)[12].

As summarised in Table 28, the alternative financing scenarios conducted indicate that GDP growth is lower when utilising domestic resources compared to utilising foreign sources. In 2015 GDP growth is 0.03 percentage points higher when using foreign sources compared to using direct tax financing, and 2.0 percentage points higher when using domestic sources also compared to foreign sources. Private consumption spending is lower when using domestic sources, but the largest impact is on private investment: private investment declines by 18.6 percent when using domestic sources alluding to domestic crowding out.

The results in Table 28 also show that when direct taxes are used to finance the increase in spending required to meet the education MDG, income taxes as a percentage of GDP increase to 15.8 percent of GDP. This is not such a big impact as income taxes to GDP were 15.5 percent in 2006. The foreign debt as a percentage of GDP increases from 26.0 percent of GDP in 2006 to 42.2 percent of GDP in 2015 when external borrowing is used to finance the spending. The domestic debt increases to 45.0 percent of GDP when domestic sources are used, which is a large increase from 8.6 percent in 2006. The comparative results for the more optimistic growth baseline are shown in Table 29.

For financial sustainability it is advisable to finance current spending from current income that is taxes. The model results also suggest that direct taxes are a more suitable financing option compared to domestic borrowing. However, the tax base in South Africa is relatively narrow as discussed in the fiscal policy section. Therefore policies to broaden the base should be followed; currently policies focusing on economic growth and increased employment should also broaden the tax base. Excessive debt levels are not financially sustainable, high debt raises the risk profile of the country which in turn raises the cost of both domestic and foreign debt. The achievement of the MDGs will be at the expense of future generations if debt levels reach unsustainable levels.

[12] The period 2010 to 2015 is considered as this is the period in which the government must scale up spending to reach the MDG targets, the period 2005-2009 is historical and indicates government spending that the government already must have scaled up but did not spend to put the country in full MDG achievement path.

Table 28. Alternative Financing Scenarios: GDP Trend Growth Baseline

Selected macroeconomic results simulated with MAMS, 2005 to 2015			
GDP Trend Growth: Variable and scenario	**2006**	**2010**	**2015**
GDP (annual growth rate)			
Base	5.60	2.30	4.00
Achieving goals with direct tax financing	5.65	2.18	3.90
Achieving goals with external borrowing	5.62	2.29	3.93
Achieving goals with domestic borrowing	5.64	1.45	1.93
Private consumption (annual growth rate)			
Base	22.85	3.06	4.16
Achieving goals with direct tax financing	22.09	3.66	4.18
Achieving goals with external borrowing	22.86	3.04	4.11
Achieving goals with domestic borrowing	22.95	2.79	3.60
Private investment (annual growth rate)			
Base	12.79	3.82	5.01
Achieving goals with direct tax financing	11.97	4.45	5.02
Achieving goals with external borrowing	12.81	3.79	4.94
Achieving goals with domestic borrowing	7.61	2.61	-18.56
Exports (annual growth rate)			
Base	-14.33	-2.25	3.20
Achieving goals with direct tax financing	-14.56	-2.34	3.21
Achieving goals with external borrowing	-16.42	0.04	3.61
Achieving goals with domestic borrowing	-14.90	-3.14	0.14
Domestic borrowing (% of GDP) (flow)			
Base	2.45	2.21	2.33
Achieving goals with direct tax financing	2.45	2.21	2.33
Achieving goals with external borrowing	2.45	2.21	2.33
Achieving goals with domestic borrowing	3.07	5.40	10.94
External borrowing (% of GDP) (flow)			
Base	-0.50	5.34	1.47
Achieving goals with direct tax financing	-0.50	5.33	1.48
Achieving goals with external borrowing	0.01	6.51	2.20
Achieving goals with domestic borrowing	-0.50	5.42	1.60
Domestic public debt (% of GDP) (stock)			
Base	7.95	7.83	7.66
Achieving goals with direct tax financing	7.95	7.84	7.72
Achieving goals with external borrowing	7.94	7.81	7.68
Achieving goals with domestic borrowing	8.57	17.62	44.91
External public debt (% of GDP) (stock)			
Base	25.56	30.81	34.40
Achieving goals with direct tax financing	25.54	30.79	34.60
Achieving goals with external borrowing	25.96	35.59	42.18
Achieving goals with domestic borrowing	25.53	31.26	37.41
Income taxes (% of GDP)			
Base	14.95	14.23	14.92
Achieving goals with direct tax financing	15.48	15.58	15.79
Achieving goals with external borrowing	14.95	14.23	14.92
Achieving goals with domestic borrowing	14.95	14.23	14.92

Source: MAMS Results

Table 29. Alternative Financing Scenarios: GDP More Optimistic Growth Baseline

Selected macroeconomic results simulated with MAMS, 2005 to 2015			
GDP Optimistic Growth: Variable and scenario	**2006**	**2010**	**2015**
GDP (annual growth rate)			
Base	5.60	2.30	6.00
Achieving goals with direct tax financing	5.65	2.18	5.90
Achieving goals with external borrowing	5.62	2.29	5.93
Achieving goals with domestic borrowing	5.64	1.45	3.83
Private consumption (annual growth rate)			
Base	22.85	3.06	5.95
Achieving goals with direct tax financing	22.09	3.66	5.98
Achieving goals with external borrowing	22.86	3.04	5.89
Achieving goals with domestic borrowing	22.95	2.79	5.20
Private investment (annual growth rate)			
Base	12.79	3.82	6.83
Achieving goals with direct tax financing	11.97	4.45	6.86
Achieving goals with external borrowing	12.81	3.79	6.75
Achieving goals with domestic borrowing	7.61	2.61	-15.52
Exports (annual growth rate)			
Base	-14.33	-2.25	7.58
Achieving goals with direct tax financing	-14.56	-2.34	7.63
Achieving goals with external borrowing	-16.42	0.04	8.13
Achieving goals with domestic borrowing	-14.90	-3.14	5.08
Domestic borrowing (% of GDP) (flow)			
Base	2.45	2.21	2.46
Achieving goals with direct tax financing	2.45	2.21	2.47
Achieving goals with external borrowing	2.45	2.21	2.47
Achieving goals with domestic borrowing	3.07	5.40	10.55
External borrowing (% of GDP) (flow)			
Base	-0.50	5.34	1.30
Achieving goals with direct tax financing	-0.50	5.33	1.31
Achieving goals with external borrowing	0.01	6.51	1.91
Achieving goals with domestic borrowing	-0.50	5.42	1.42
Domestic public debt (% of GDP) (stock)			
Base	7.95	7.83	7.68
Achieving goals with direct tax financing	7.95	7.84	7.74
Achieving goals with external borrowing	7.94	7.81	7.70
Achieving goals with domestic borrowing	8.57	17.62	41.87
External public debt (% of GDP) (stock)			
Base	25.56	30.81	30.32
Achieving goals with direct tax financing	25.54	30.79	30.53
Achieving goals with external borrowing	25.96	35.59	37.20
Achieving goals with domestic borrowing	25.53	31.26	33.07
Income taxes (% of GDP)			
Base	14.95	14.23	14.92
Achieving goals with direct tax financing	15.48	15.58	15.64
Achieving goals with external borrowing	14.95	14.23	14.92
Achieving goals with domestic borrowing	14.95	14.23	14.92

Source: MAMS Results

7. Analysis of the Poverty Reduction Goal

The baseline scenarios indicate that poverty is expected to fall from 38.4 percent of the population earning less than $1.25-a-day to around 23.1 percent, while the distribution of income according to the Gini coefficients using labour income also improves (see Table 30).

Table 30. Indicators for Poverty and Inequality - Baseline

	Base Year (2005)	Target year (2015)	
		GDP Trend Growth	GDP Optimistic Growth
Incidence of poverty (% of the population)			
1.25-dollar-a-day poverty line at PPP	38.403	23.049	20.189
2-dollar-a-day poverty line at PPP	43.215	28.066	23.877
Gini coefficient	0.633	0.621	0.610

Source: MAMS for SA using 2008 GHS

The largest impact on poverty and inequality, according to the results of the microsimulation model, is from the decline in unemployment (as can be seen from Table 25). The unemployment of labour with no secondary schooling falls from 33 percent in the base year to 24.1 percent in 2015, which results in a decline in poverty from 38.4 percent to 24.5 percent. The rest of the impact on poverty is from other factors such as the increase in real wages of labour for most of the labour groups which is also positive for most of the period 2005 to 2015. When all these factors are combined poverty declines to 23.1 in GDP trend growth is assumed.

The scenarios indicate that poverty falls the most when all the MDGs are targeted simultaneously; poverty falls from 23.1 percent to 21.9 percent. When individual MDGs are targeted poverty falls the most when the health MDGs only are targeted; the 1.25-dollar-a-day poverty rate falls from 23.1 percent in the baseline in 2015 to 22.3 percent. In all the scenarios, the largest gain in poverty reduction is from the decline in unemployment, and poverty falls the most when the health MDGs only are targeted as a result of the change in the wages (see Table 31).

The Gini coefficient declines the most when the health MDG only is targeted; the Gini coefficient declines from 0.621 in 2015 in the baseline to 0.618 (see Table 31). The largest impact on the Gini coefficient are the decline in unemployment; however when the health MDG only is targeted the changes in the remuneration structure has a relative large impact on inequality compared to the other MDGs. From Table 31 one observes that poverty rates are lower and inequality falls when GDP growth is higher.

Table 31. Indicators for Poverty and Inequality- Scenarios

	The end of the period (2015)				
	Baseline	**Only the primary education goal**	**Only the mortality goals**	**Only the water and sanitation goals**	**All MDGs**
GDP Trend Growth					
Incidence of poverty (% of the population)					
1.25-dollar-a-day poverty line at PPP	23.049	22.779	22.282	23.627	21.901
2-dollar-a-day poverty line at PPP	28.066	27.429	26.149	28.612	26.155
Gini coefficient	0.621	0.620	0.618	0.626	0.619
GDP Optimistic Growth					
Incidence of poverty (% of the population)					
1.25-dollar-a-day poverty line at PPP	20.189	19.979	19.253	20.669	19.249
2-dollar-a-day poverty line at PPP	23.877	23.438	22.776	24.530	22.794
Gini coefficient	0.610	0.606	0.605	0.614	0.608

Source: MAMS for SA using 2008 GHS

8. Conclusion and Policy Recommendations

South Africa's economic growth performance has been satisfactory over the last decade. However, the economic growth experience was not necessarily shared by all as unemployment is still high, poverty remains an issue, and inequality has actually risen during the period. Current policies initiatives are aimed at promoting shared growth that is increased growth and employment. The challenges that government will focus on in doing this include the backlogs in logistics, low domestic savings, economic concentration, an uncompetitive currency, and the balance-of-trade deficit. Other concerns for South Africa's positive economic growth outlook include the increasing borrowing requirement of government to finance large infrastructure spending projects, as well as increased spending on social welfare programmes.

South Africa has made some progress on achieving its MDGs. There are, however some gaps that need to be given attention to, these include the inequality, child mortality and maternal mortality – it is likely that South Africa will meet the poverty MDG (that is MDG1). There are various policies in place that should address these gaps, however more effort needs to be made to achieve the MDGs related to education, and health. The MAMS model estimate that spending on education will have to increase from 2.3 percent of GDP in the baseline (on average over the period 2010 to 2015) to 3.1 percent of GDP, while spending on health will have to increase from 0.1 percent to 5.6 percent of GDP when the respective MDGs only are targeted and when trend growth is assumed. Total spending increases from 35.7 percent of GDP to 48.0 percent annually on average over the period 2010 to 2015. Policy includes increasing economic growth and employment as the results show that these can make a significant contribution in reaching the poverty MDGs and reducing inequality. The comparative spending figures when more optimistic growth is assumed are much lower: the MAMS model estimates that spending will now only have to increase to 2.9 percent of GDP and 5.2 percent of GDP, respectively for education and health. Total spending now will

only have to increase from 34.8 percent of GDP annually on average over the period 2010 to 2015 to 46.1 percent.

The analysis also indicates that policies focused on addressing unemployment among unskilled workers may have a significant impact on addressing poverty. The poverty results as estimated by the microsimulation model shows the benefits from lowering unemployment. The unemployment of labour with no secondary schooling falls from 33 percent in the base year to 24.1 percent in 2015, which by itself results in a decline in poverty from 38.4 percent to 24.5 percent.

Policies that focus on improving the quality of education and health services should be essential as higher spending on health or education services and infrastructure is not sufficient to reach the targets; more needs to be done to improve education outcomes. Spending on education and health (as estimated by the MAMS model) may have to increase by up to 3.1 and 5.5 percent of GDP if these MDGs are targeted independently. The government should increase the fiscal space to enable higher spending, but there is limited scope in terms of taxes and domestic borrowing as the model results shows that domestic debt has to increase substantially and the analysis has shown that there is limited scope to increase taxes as the total tax burden in South Africa is relatively high (the tax to GDP rate was 26 percent in 2008). If only education is targeted, domestic debt already increase from 8.6 percent of GDP in 2005 to 44.9 percent of GDP in 2015. The ability of the government to raise funds externally may also put pressure on the solvency of government as the modelling results have shown that foreign debt as a percentage of GDP has to increase from 26.0 percent of GDP in 2005 to 42.2 percent of GDP in 2015 to reach MDG 2 only. For fiscal sustainability current spending should be financed from current revenue such as income taxes. Policies, such as The New Growth Path, which aims to promote economic growth and employment opportunities, should also result in a broader tax base.

At the same time spending by government on education and health are already high and is expected to increase in real terms. There also do not seem to be a relationship between spending and MDG achievement in terms of education and health. Therefore it is important to address issues such as the quality of service delivery by government and improved monitoring of the MDG achievements.

Therefore, in conclusion, policies should focus on increasing economic growth as this by itself reduces the cost of achieving the MDGs. In conjunction with this more effort should be made to reduce unemployment as this has strong positive impacts on poverty reduction. Government should also aim to target the MDGs simultaneously as this may reduce the cost of closing the gaps. However the way in which the spending is financed has different impacts on growth. From the analysis domestic borrowing may be least costly compared to direct tax financing and foreign borrowing; however the extent of domestic borrowing required to finance the additional spending required may be substantial.

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Appendix

Table A1. Macroeconomic SAM for the 2005 SAM Compiled by Quantec

Macro SAM for South Africa - 2005, Rm - Standard Format (© - Quantec Research (Pty) Ltd)

				Production activity		Margins			Production factors			Institution		Institution - government										Savings & investment		ROW		
						ROW				Capital				Net tax on products						Net tax on production		Direct taxes		Expenditure	GDFI	Inventory change	Exports	Residual	Total: Columns
				Commodites	Industries	Export	Import	Domestic	Labour	Net operating surplus	Consumption of fixed capital	Enterprise	Household	Taxes on products: Vat	Taxes on products: Customs	Taxes on products: Excise	Taxes on products: Fuel levy	Taxes on products: Other	Subsidies on products	Taxes on production	Subsidies on production	Household	Enterprise						
				C01	I01	MX	MM	MD	V1	V2	V3	E1	HH01	V4	V5	V6	V7	V8	V9	V10	V11	ITH	ITE	Cg	GDFI	CII	MP	RES	COLTOT
Production activity	Commodites		C01		1,846,342	29,906	64,683	261,107					967,940											307,395	256,590	16,491	412,727	-2,856	4,160,324
	Industries		I01	3,199,294																									3,199,294
Margins	ROW	Export	MX	29,906																									29,906
		Import	MM	64,683																									64,683
	Domestic		MD	261,107																									261,107
Production factors	Labour		V1		680,056																								680,056
	Capital	Net operating surplus	V2		454,281																						29,304		483,585
		Consumption of fixed capital	V3		189,952																								189,952
Institution	Enterprise		E1							425,963	189,952													48,930					664,845
	Household		HH01						677,340			339,697												79,627			592		1,097,256
Institution - government	Net tax on products	Taxes on products: Vat	V4	109,274																									109,274
		Taxes on products: Customs	V5	17,136																									17,136
		Taxes on products: Excise	V6	14,928																									14,928
		Taxes on products: Fuel levy	V7	19,716																									19,716
		Taxes on products: Other	V8	13,113																									13,113
		Subsidies on products	V9	-3,864																									-3,864
	Net tax on production	Taxes on production	V10		33,848																								33,848
		Subsidies on production	V11		-5,185																								-5,185
	Direct taxes	Household	ITH										124,285																124,285
		Enterprise	ITE									98,931																	98,931
	Expenditure		Cg									8,293	3,249	109,274	17,136	14,928	19,716	13,113	-3,864	33,848	-5,185	124,285	98,931				944		434,668
Savings & investment	GDFI		GDFI									204,102	1,462											-13,348			64,374		256,590
	Inventory change		CII									16,491																	16,491
ROW	Imports & payments		MP	435,032					2,716	57,622		187	320											12,064					507,941
Residual			RES									-2,856																	-2,856
Total: Columns			COLTOT	4,160,324	3,199,294	29,906	64,683	261,107	680,056	483,585	189,952	664,845	1,097,256	109,274	17,136	14,928	19,716	13,113	-3,864	33,848	-5,185	124,285	98,931	434,668	256,590	16,491	507,941	-2,856	12,466,024

Source: Quantec

Table A2. Commodities and Activities Included in the Quantec SAM

Commodity Nr	Activity Nr	SIC	Description
C01	A01	11-13	Agriculture, forestry & fishing
C02	A02	21	Coal mining
C03	A03	23	Gold & uranium ore mining
C04	A04	22, 24, 25, 29	Other mining
C05	A05	301-304	Food
C06	A06	305-306	Beverages & tobacco
C07	A07	311-312	Textiles
C08	A08	313-315	Wearing apparel
C09	A09	316	Leather & leather products
C10	A10	317	Footwear
C11	A11	321-322	Wood & wood products
C12	A12	323	Paper & paper products
C13	A13	324-326	Printing, publishing & recorded media
C14	A14	331-333	Coke & refined petroleum products
C15	A15	334	Basic chemicals
C16	A16	335-336	Other chemicals & man-made fibres
C17	A17	337	Rubber products
C18	A18	338	Plastic products
C19	A19	341	Glass & glass products
C20	A20	342	Non-metallic minerals
C21	A21	351	Basic iron & steel
C22	A22	352	Basic non-ferrous metals
C23	A23	353-355	Metal products excluding machinery
C24	A24	356-359	Machinery & equipment
C25	A25	361-366	Electrical machinery
C26	A26	371-373	Television, radio & communication equipment
C27	A27	374-376	Professional & scientific equipment
C28	A28	381-383	Motor vehicles, parts & accessories
C29	A29	384-387	Other transport equipment
C30	A30	391	Furniture
C31	A31	392	Other industries
C32	A32	41	Electricity, gas & steam
C33	A33	42	Water supply
C34	A34	51-53	Building construction
C35	A35	61-62	Wholesale & retail trade
C36	A36	63	Catering & accommodation services
C37	A37	711	Railway transport
C38	A38	712	Road transport
C39	A39	713	Transport via pipeline
C40	A40	72	Water transport
C41	A41	73	Air transport
C42	A42	74	Transport support services
C43	A43	75	Communication
C44	A44	81-82	Finance & insurance
C45	A45	83	Business services
C46	A46	93	Medical, dental & other health & veterinary services
C47	A47	97	Community, social & personal services
C48	A48	98	Government: General administration
C49	A49	98	Government: Defence
C50	A50	98	Government: Law and order
C51	A51	98	Government: Education
C52	A52	98	Government: Health
C53	A53	98	Government: Social
C54	A54	98	Government: Economic

Source: Quantec 2005

Table A3. Adjusted Macroeconomic SAM

Macro SAM for South Africa - 2005, Rm - Standard Format (© - Quantec Research (Pty) Ltd)

			Production activity		Margins			Production factors										Institution - government																										ROW	
					ROW													Net tax on products						Net tax on production		Direct taxes	Expenditure																			
			Commodities	Industries	Export	Import	Domestic	Labour	Capital Private	F-CAPWT	F-CAPEDU	F-CAPEDU	F-CAPEDU	F-CAPHLT	F-CAPOIN	F-CAPOGOV	Household	Taxes on products: Vat	Taxes on products: Customs	Taxes on products: Excise	Taxes on products: Fuel levy	Taxes on products: Other	Subsidies on products	Taxes on production	Subsidies on production	Household		INT-DOM	INT-ROW	SAV-HHD	SAV-GOV	SAV-ROW	CAP-HHD	CAP-GOV	CAP-ROW	INV-PRV	INV-WTSN	INV-EDUT	INV-EDUS	INV-EDUP	INV-HLTG	INV-OINF	INV-OGOV	Inventory change	Exports	Total: Columns
			C01	I01	MX	MM	MD	V1								V3	HH01	V4	V5	V6	V7	V8	V9	V10	V11	ITH	Cg																	CII	MP	COLTOT
Production activity	Commodites	C01		1,846,342	29,906	64,683	261,107										967,940										307,395									193,236	4,219	1,409	3,080	4,003	4,122	29,465	17,055	13,635	412,727	4,160,324
	Industries	I01	3,199,294																																											3,199,294
Margins	ROW: Export	MX	29,906																																											29,906
	ROW: Import	MM	64,683																																											64,683
	Domestic	MD	261,107																																											261,107
Production factors	Labour	V1		680,056																																										680,056
	Capital Private	V2		587268																																									29,304	616,572
	F-CAPWTSN			3,306																																										3,306
	F-CAPEDUT			1,736																																										1,736
	F-CAPEDUS			3,794																																										3,794
	F-CAPEDUP			4,933																																										4,933
	F-CAPHLTG			1,728																																										1,728
	F-CAPOINF			28,833																																										28,833
	F-CAPOGOV			12,635																																										12,635
Insitutions	Household	HH01						677,340	558,950																		148,053	37,469																	157,162	1,578,974
Institution - government	Net tax on products: Taxes on products: Vat	V4	109,274																																											109,274
	Net tax on products: Taxes on products: Customs	V5	17,136																																											17,136
	Net tax on products: Taxes on products: Excise	V6	14,928																																											14,928
	Net tax on products: Taxes on products: Fuel levy	V7	19,716																																											19,716
	Net tax on products: Taxes on products: Other	V8	13,113																																											13,113
	Net tax on products: Subsidies on products	V9	-3,864																																											-3,864
	Net tax on production: Taxes on production	V10		33,848																																										33,848
	Net tax on production: Subsidies on production	V11		-5,185																																										-5,185
	Direct taxes: Household	ITH															223,216																													223,216
	Expenditure	Cg								3,306	1,736	3,794	4,933	1,728	28,833	12,635	11,542	109,274	17,136	14,928	19,716	13,113	-3,864	33,848	-5,185	223,216																			2,411	493,100
	INT-DOM																										37,469																			37,469
	INT-ROW																157,077										13,531																			170,608
	SAV-HHD																219,197																													219,197
	SAV-GOV																										-13,348																			-13,348
	SAV-ROW																																												64,374	64,374
	CAP-HHD																													219,197					8,186											227,383
	CAP-GOV																														-13,348		60,050		15,600											62,302
	CAP-ROW																															64,374														64,374
	INV-PRV																																152,648	-	40,588											193,236
	INV-WTSN																																-	4,219	-											4,219
	INV-EDUT																																-	1,409	-											1,409
	INV-EDUS																																-	3,080	-											3,080
	INV-EDUP																																-	4,003	-											4,003
	INV-HLTG																																-	4,122	-											4,122
	INV-OINF																																-	29,465	-											29,465
	INV-OGOV																																-	17,055	-											17,055
	Inventory change	CII																															14,685	-1,050	-											13,635
ROW	Imports & payments	MP	435,032					2,716	57,622								-												170,608																	665,978
Total: Columns		COLTOT	4,160,324	3,199,294	29,906	64,683	261,107	680,056	616,572	3,306	1,736	3,794	4,933	1,728	28,833	12,635	1,578,972	109,274	17,136	14,928	19,716	13,113	-3,864	33,848	-5,185	223,216	493,100	37,469	170,608	219,197	-13,348	64,374	227,383	62,304	64,374	193,236	4,219	1,409	3,080	4,003	4,122	29,465	17,055	13,635	665,978	12,466,024

Source: Quantec 2005, SARB and Statssa

Table A4. Elasticities used in MAMS

Commodities/Activities	Expenditure elasticity of market demand by commodity and household	Armington-demand elasticities by commodity	CET-export elasticities by commodity	Elasticity of substitution at (optional) lower levels of VA nest -- between factors aggregated to ac (=f) for use in activity a
C-AGRI	0.70	1.27	4.00	0.500
C-COAL	0.27	2.77	4.00	0.500
C-GOLD	1.00	0.50	4.00	0.500
C-OTHM	1.00	0.50	4.00	0.500
C-FOOD	0.70	0.94	4.00	0.100
C-BEVT	0.65	1.57	4.00	0.232
C-TEXT	0.95	1.26	4.00	0.101
C-APPA	0.95	1.16	4.00	0.500
C-LEAT	0.95	1.47	4.00	0.500
C-FOOT	0.95	2.04	4.00	0.293
C-WOOD	0.99	1.21	4.00	0.139
C-PAPR	0.99	0.79	4.00	0.602
C-PRNT	0.99	0.08	4.00	0.342
C-PETR	0.27	0.73	4.00	0.435
C-BCHM	0.99	0.68	4.00	0.500
C-OCHM	0.99	0.79	4.00	0.500
C-RUBB	0.99	1.14	4.00	0.435
C-PLAS	1.11	0.28	4.00	0.435
C-GLAS	1.11	0.94	4.00	0.347
C-NMMP	0.99	0.66	4.00	0.610
C-IRON	0.99	0.45	4.00	0.086
C-NFRM	0.99	0.60	4.00	0.086
C-METP	0.99	0.75	4.00	0.500
C-MACH	0.99	0.49	4.00	0.096
C-ELMA	1.11	0.94	4.00	0.500
C-COME	1.11	0.44	4.00	0.500
C-SCIE	1.11	0.51	4.00	0.500
C-VEHI	1.23	0.79	4.00	0.190
C-TRNE	0.99	0.93	4.00	0.226
C-FURN	1.11	1.08	4.00	0.213
C-OTHI	0.99	0.42	4.00	0.500
C-WTSNNG	1.36	0.50	4.00	0.500
C-CONS	1.36	0.58	4.00	0.500
C-TRAD	0.99	0.60	4.00	0.500
C-HCAT	1.48	0.42	4.00	0.500
C-ROAD	1.23	0.86	4.00	0.500
C-WTRT	1.23	0.86	4.00	0.500
C-OTHT	1.23	0.86	4.00	0.500
C-COMM	1.11	0.57	4.00	0.500
C-FINS	1.34	0.62	4.00	0.500
C-BUSS	1.36	1.07	4.00	0.500
C-HLTNG	1.41	1.14	4.00	0.500
C-MAOS	1.41	1.07	4.00	0.500
C-EDUPNG	0.99	0.50	4.00	0.500
C-EDUSNG	0.99	0.50	4.00	0.500
C-EDUTNG	0.99	0.50	4.00	0.500
C-OTHP	0.99	1.07	4.00	0.500
C-WTSN	1.36	0.96	4.00	0.500
C-EDUP	1.48	0.50	4.00	0.500
C-EDUS	1.48	0.50	4.00	0.500
C-EDUT	1.48	0.50	4.00	0.500
C-HLTG	1.48	0.50	4.00	0.500
C-OINF	0.87	0.50	4.00	0.500
C-OGOV	1.48	0.50	4.00	0.500

Source: MAMS model