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SUBMISSION FOR THE DIVISION OF REVENUE

TECHNICAL REPORT

FINANCIAL AND FISCAL COMMISSION

For an Equitable Sharing of National Revenue

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FINANCIAL AND FISCAL COMMISSION

For an Equitable Sharing of National Revenue

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ACRONYMS

ALGA	Australian Local Government Association
BPF	best practising frontier
BRT	bus rapid transit
CAB	cyclically adjusted budget balance
CBDs	central business districts
CECM	city efficiency costing model
CFO	chief financial officer
CoGTA	Department of Corporate Governance and Traditional Affairs
DBSA	Development Bank of Southern Africa
DEA	data envelopment analysis
DFA	Development Facilitation Act
DMU	decision-making unit
DoH	Department of Health
DoHS	Department of Human Settlements
DOR	Division of Revenue
FBS	free basic services
FDH	free disposable hull
FFC	Financial and Fiscal Commission
FLISP	Finance-Linked Individual Subsidy Programme
GDP	gross domestic product
GEAR	Growth Employment and Reconstruction Programme
GER	gross enrolment rate
GHG	greenhouse gases
GPI	Gender Parity Index
GVA	gross value added
IGFR	Intergovernmental fiscal relations
IGRT	Intergovernmental Revenue Transfers
LES	local government equitable share
LGTAS	Local Government Turnaround Strategy
LUMB	Land Use Management Bill
MDG	Millennium Development Goal
MFMA	Municipal Finance Management Act
MHS	Municipal Health Services
MIG	Municipal Infrastructure Grant
MSA	Municipal Systems Act
MSFM	Municipal Services Finance Model
MTEF	Medium-Term Expenditure Framework
NFC	non-financial census
NGO	non-governmental organisation
NGP	New Growth Path
NHI	national health insurance
NSDP	National Spatial Development Perspective
OECD	Organisation for Economic Cooperation and Development
OLS	ordinary least squares
OSD	occupational specific dispensation
PES	Provincial Equitable Share
PIE	Prevention of Illegal Evictions from and Unlawful Occupation of Land
PFMA	Public Finance Management Act
PPF	production possibility frontier
PRASA	Passenger Rail Agency of South Africa
SALGA	South African Local Government Association
SBB	structurally adjusted budget balance
SFA	stochastic frontier analysis
SPLUMB	Spatial Planning and Land Use Management
SSA	sub-Saharan Africa
StatsSA	Statistics South Africa
USDG	Urban Settlements Development Grant

EDITORIAL

The Financial and Fiscal Commission (the Commission) provides independent, impartial advice and recommendations on intergovernmental fiscal relations, including the technical evaluation and design of provincial and local fiscal and economic policy. Established by the Constitution of South Africa in 1994, the Commission provides information to all organs of state to help them make informed decisions about complex fiscal issues. In this respect, one of the Commission's main objectives is to help inform the following year's budget by making recommendations on the Division of Revenue among the three spheres of government, as well as recommendations to support government's policy-making on intergovernmental fiscal relations. It does this by submitting annually to Parliament an advisory document summarising the recommendations for the following year, which the executive should take into account when crafting the next budget. This submission for the Division of Revenue is made in terms of Section 214(2) and Section 229(5) of the Constitution, and Section 9 of the Intergovernmental Fiscal Relations Act of 1999.

In May 2011 the Commission tabled with Parliament its latest Submission Document for the Division of Revenue 2012/13. This volume of technical research reports is published as a companion document to that Submission Document. The volume taken as a whole argues that, although South Africa is recovering from the recession induced by the 2008/2009 global economic crisis, unemployment, poverty, inequality and low growth persist. Poverty is still high among African and female-headed households, despite an unprecedented extension of government social grants that have helped to reduce absolute poverty. Poor educational and health outcomes are similarly skewed against the poor. Distorted settlement patterns, which mean that the poor often locate at the urban periphery and in remote rural areas, further exacerbate the challenges. By international standards South African cities are inefficient, as measured by low-density development, high travel times and distances, and high carbon footprints.

The vulnerability of cities implies that a large proportion of South Africa's population and the bulk of economic activity residing there are exposed to climate change-related hazards. While all income groups are worse off financially because of an inefficient urban form, low-income households are most adversely affected by the urban sprawl, having to pay significantly more for transport. There are therefore enormous challenges to face in upgrading human capital skills and well–being, while addressing spatial distortions that are reinforcing the social ills. These challenges are made more urgent by the realisation that the dates for attaining the Millennium Development Goals – many of which are directly linked to issues that provinces have a constitutionally assigned mandate to deliver on – are a mere four years away. While some targets have already been achieved, some gaps remain, particularly in child and maternal mortality, and the environment.

A direct impact of the 2008/2009 recession is the availability of revenue for division among the three spheres of government, as the growth in sub-national government baselines can be expected to slow down considerably. Because sub-national governments have their own strategic goals to deal with within their mandates over the short to medium term, these goals will now need to be adjusted or delayed for later implementation, or (where funds are locked into the provision of basic services), the funds will now buy less basic services than before, especially for the poor. As the cost of services increases (e.g. electricity, water and food) austerity can be expected to lead to reduced growth in budgets, with the result that fewer services will be provided, or the quality of existing services will be reduced. It therefore becomes important to develop strategies that emphasise a need to protect programmes (such as those for combating HIV/AIDS) from being underfunded or re-prioritised downwards.

At the national level, ever larger social reforms are being proposed to address the problems of poverty, growth and inequality. The national health insurance (NHI) promises to be the largest reform yet undertaken in the health sector since the end of apartheid. Cabinet also approved the New Growth Path for South Africa, launched in October 2010, which aims to accelerate the creation of decent jobs and the reduction of inequality and poverty. There is, by definition, a tension between fiscal restraint and finding resources for the expenditure needs of all three spheres of the government, including these big social programmes.

The Commission's perspective is that staying the course and delivering on the constitutional imperatives is critical to sustaining the current growth momentum. The bedrock of sustainable growth is macroeconomic stability. Maintaining macroeconomic stability, as characterised by low inflation, stable interest rates and a comfortable balance of payments, is critically dependent on redressing fiscal imbalances, re-prioritising and getting full value for money spent. On the way forward to fiscal responsibility and attaining constitutional imperatives, two important qualifications are necessary. First,

fiscal correction is needed, not just at central government level but also in the provinces and local governments. Second, macroeconomic stability is necessary but not sufficient for sustaining and accelerating growth. Attention needs to be paid not only to achieving the targets in quantitative terms but also to the quality of adjustment, which means in particular, improving both the allocative and technical efficiencies of public expenditures. This year's Technical Report explores alternative approaches to tackling these pressing issues from an intergovernmental fiscal relations perspective.

The volume is in three parts. Part 1 is on Macroeconomic and Fiscal Outlook and consists of five chapters. It sets out the background for the report and sketches alternative fiscal policy adjustment paths. Four main observations are made regarding fiscal policy and economic outlook. First, the gap between spending and revenues is likely to remain wide even though the country has emerged from the 2008/09 global economic crisis. Second, fiscal policy cannot be put on a sustainable path just by eliminating waste and inefficiency; further policy changes are needed for consolidation. Third, policy-makers face difficult trade-offs in deciding how quickly to implement policy changes that would reduce future budget deficits. Fourth, the greater focus on job creation and meeting MDGs poses fiscal risks that need to be managed.

Part 2's theme is Vibrant Urban Economy and comprises seven chapters, which focus on local government issues, giving specific attention to the role and conduct of municipalities in their unique spatial environments. Like most aspects of South African society, municipalities are diverse and operate in unique social, demographic and economic spaces. These unique characteristics significantly affect municipal performance and the strategies required to ensure a well-functioning local government sphere. Sustainable development is anchored in a well-functioning local government sector and, in particular, vibrant urban economies, which spur robust developments in all areas of the economy, including rural areas.

Part 3 of the submission consists of three chapters under the theme of Improving Development Outcomes of the IGFR (intergovernmental fiscal relations) System. An argument is made that provinces need to exercise increased fiscal responsibility in the context of government's overall fiscal consolidation stance. This implies slower growing Medium-Term Expenditure Framework allocations coupled with cost pressures (e.g. for occupation specific dispensation – OSD), as well as rising demand for services. In this regard, improving the quality and efficiency of services in education, health and rural development are central. Government should protect such services within existing medium-term allocations so as to cushion the effects of the fiscal consolidation on the most vulnerable and to assist in building the human and social capital critical for future growth development.

Ensuring intergovernmental fiscal institutional arrangements that can robustly and flexibly support these goals would include effectively using equitable and conditional grant allocations, as well as management arrangements of other division of revenue-related issues such as OSD. The issue of unfunded mandates – and the financial (legal) impact on housing, health and library services – and improving assignment of powers/functions becomes critical for service delivery and human capital development. In this regard, the Commission is of the view that what is central is the extent to which such goods or services can be delivered efficiently and, if not, whether or not appropriate mechanisms and/or incentives can be put in place to ensure efficient delivery.

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PART 1: MACROECONOMIC AND FISCAL OUTLOOK

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CHAPTER 1: SOUTH AFRICA'S TRANSITION TO A CONSOLIDATED BUDGET

C. Jooste[1] and M. Marinkov[2]

1.1 Introduction

The 2008/2009 global financial crisis put pressure on fiscal balances of most economies. The limited scope (ability) of monetary policy to stimulate economies in recession meant that fiscal deficits (and hence public debt) had to increase. South Africa's small budget surplus in 2008/09 was used to avert the contagion effects of the financial crisis. Gross domestic product (GDP) growth became negative in the final quarter of 2008 and peaked in the second quarter of 2009 at -7.43% (SARB, 2010). However, positive growth was registered in the latter half of 2009 and peaked at 4.56% in 2010Q1 (SARB, 2010). Even when considering the uncertainty around a true economic recovery, the focus of policymakers now shifts to fiscal sustainability. In South Africa, debt is projected to reach a maximum of 44% in 2015/16 according to the Budget Review (National Treasury, 2010a,b). Given the sovereign debt crisis in Greece and other euro area peripheries, it comes as no surprise that austerity measures are called for, which implies immediate budgetary changes in the form of (for example) cuts in expenditure and/or widening of the tax base.

As incorrect diagnoses can lead to fiscal over- or under-adjustment, it is therefore important to distinguish between transitory and permanent influences on the budget. In addition to the composition of fiscal consolidation,[3] timing considerations are also important – for example, a premature and untimely fiscal exit may harm growth and ultimately lessen fiscal effectiveness. This chapter decomposes fiscal policy into three components that measure overall fiscal effectiveness on output: automatic stabilisers, discretionary policy related to the economic cycle, and discretionary policy that is independent of the business cycle (Debrun and Kapoor, 2010). First, the standard budget balance is decomposed into automatic stabilisers and discretionary policy components in order to see which component minimises output volatility and which presents a good policy option regarding uncertainty in real economic recovery. The second objective is to study the effects on debt sustainability and output of various paths of fiscal consolidation.

1.2 Background and Methodology

Before simulating the effects of fiscal policy shock output and debt, it is important to understand which fiscal policy components contribute to lower output volatility. Fiscal policy is divided into three components: automatic stabilisers, discretionary fiscal actions reflecting systemic responses, and discretionary fiscal actions reflecting changes in the economic cycle.

- Automatic stabilisers smooth output fluctuations without any explicit policy action by the government.[4] Hence, automatic stabilisers, in particular strong automatic stabilisers (typically when fiscal policy is countercyclical[5]), help to facilitate the process of fiscal consolidation.

- Discretionary fiscal actions reflect deliberate attempts by government to obtain a certain objective and can thus be

1 National Treasury.

2 Financial and Fiscal Commission.

3 Fiscal consolidation refers to government policies aimed at reducing government deficits and debt accumulation.

4 An example of automatic stabilisers is that during a recession taxes will decrease because of individuals and companies earning less, which in effect gives them more money to spend (or invest), boosting GDP. Another example of automatic stabilisers is unemployment benefits (Unemployment Insurance Fund, UIF) which tend to increase in line with unemployment and then feed through to consumer spending, eventually helping to boost the consumer market.

5 There are a number of definitions of countercyclical fiscal policy. According to the Keynesian view, fiscal policy is countercyclical if government expenditure increases during a recession while the tax rates fall. Neoclassical economists view countercyclical fiscal policy as a fiscal policy that follows the tax-smoothing principle by holding tax rates and discretionary spending constant over the cycle. Generally, countercyclical fiscal policy is defined as a policy where public debt falls during booms and rises during recessions.

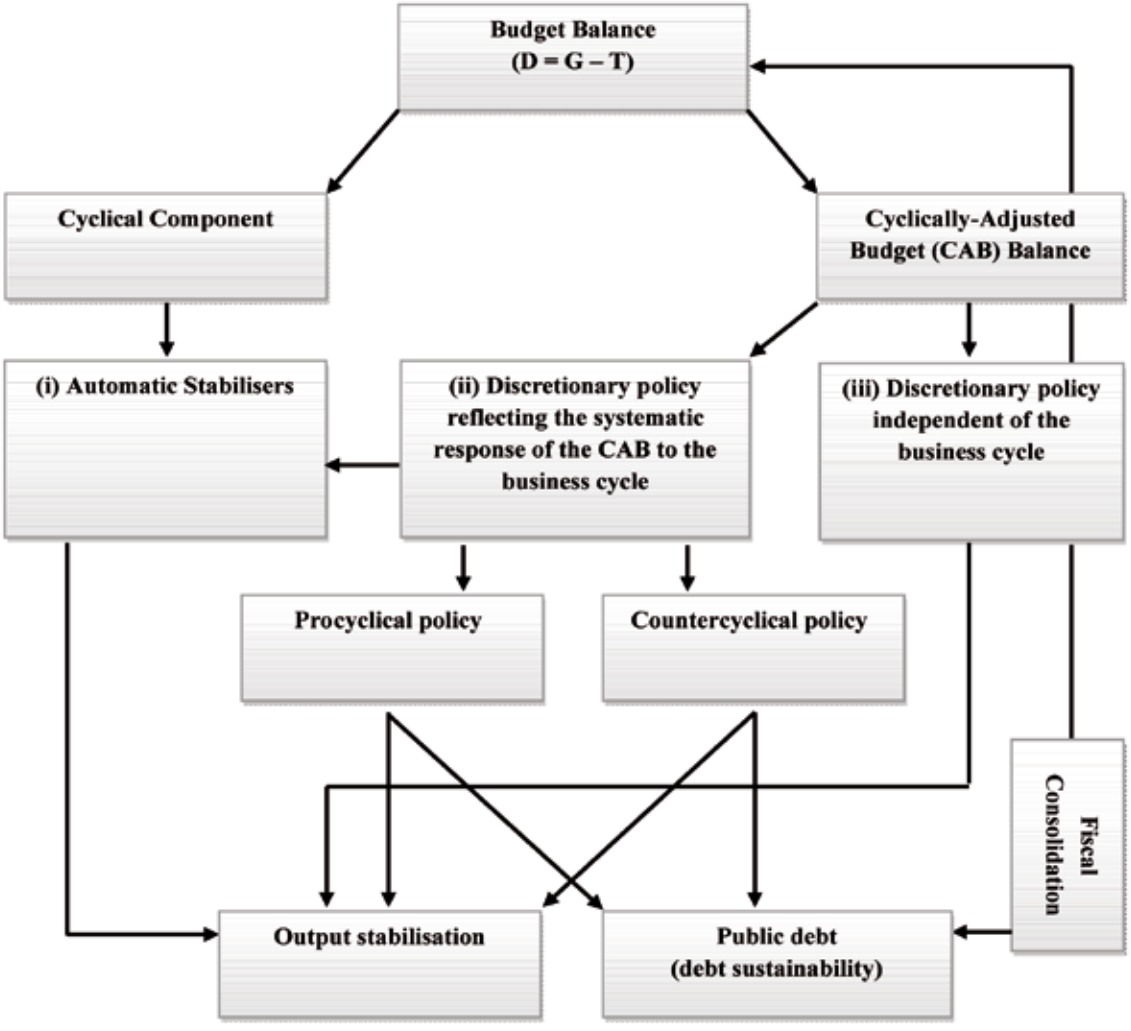
understood as changes in fiscal variables that are unrelated to changes in economic activity (Swanepoel and Schoeman, 2003). Such expenditure can be either pro- or countercyclical. In the South African context, an example of discretionary fiscal policy is the R60 billion loan to Eskom that arose when the country experienced power failures.

- Discretionary fiscal actions reflecting changes in the economic cycle consist of expenditure and tax decisions that are made to save as best as possible on spending during economic booms, and to spend or cut taxes as much as possible to avert 'deep' recessions.

In addition, the budget balance effect needs to be measured and compared to its impact on public debt. Public debt is the outcome of any fiscal policy stance and is often used as a gauge of overall fiscal sustainability. Higher fiscal deficits increase not only the stock of debt, but also debt service costs. The impact of debt on the economy is difficult to disentangle. Accruing debt for investment purposes can often yield longer run growth, but debt will not contribute to growth if composed of low multiplier expenditures. Threshold effects are another important issue of public debt. Rogoff and Reinhart (2010) show that debt levels breaching 60% for developed countries reduce economic growth. Debt sustainability here is simply defined as finite increases in debt which stabilises over time.

Figure 1.1 presents the framework for the chapter. General budget balance can be broadly decomposed into a cyclical and a cyclically adjusted component, which in turn can further be broken down into the three components discussed earlier. Both the procyclical and countercyclical discretionary fiscal policies can contribute towards output stabilisation and debt sustainability. In addition, as they smooth output fluctuations, automatic stabilisers contribute towards output stabilisation, whereas discretionary policy independent of the cycle can contribute towards debt sustainability through fiscal consolidation.

Figure 1.1 Framework



Source: Authors

1.3 Methodology

The methodology used is described in a non-technical manner.[6] The analysis starts by decomposing the deficit into the three afore-mentioned components. While numerous[7] studies decompose fiscal policy into various components, the gap methods employed here are from Debrun and Kapoor (2010).

A simple gap model of fluctuations is employed to address the main objectives of this study.[8] A gap model allows the effects of fiscal policy to be simulated in a general equilibrium environment. It is called a gap model because most dependent variables are expressed as deviations from their equilibrium trend.

The gap model uses a New Keynesian Phillips curve together with an IS curve relationship to model the supply and demand side of the economy (which is a fairly standard representation of an economy). Policy variables include the fiscal balance and the South African Reserve Bank's central interest rate (i.e. repo rate). The economy is open with long-run movements in the exchange rate modeled by an uncovered interest parity condition.

The model is used to answer questions such as the optimal fiscal deficit reduction in terms of output and debt and the impact of an increase in aggregate fiscal expenditure on output, debt and interest rates.

1.4 Results

Figure 1.2 shows the possible scenarios for different fiscal consolidation strategies for South Africa. The top left panel of the figure shows the possible fiscal consolidation paths, which can be defined as follows:

- Path 1 (solid line): the ratio of budget balance to potential output remains unchanged over the medium term (i.e. 2010Q1–2012Q1 Medium-Term Expenditure Framework, MTEF).
- Path 2 (dotted line): the ratio of budget balance to potential output decreases by 0.4 percentage points every quarter over the medium term.
- Path 3 (dashed line): the ratio of budget balance to potential output decreases by 0.6 percentage points every quarter over the medium term.
- Path 4 (dot-dashed line): the ratio of budget balance to potential output decreases by one percentage point every quarter over the medium term.

The top right and two bottom panels show how different macroeconomic variables (i.e. public debt, output gap and output volatility) respond to the four different consolidation paths described above. The patterns used in these graphs correspond to the patterns that are assigned to the four consolidation paths, so, for example, the dashed line in the bottom left panel illustrates the output gap trajectory over the medium term that is associated with consolidation strategy under Path 3 (i.e. when the ratio of budget balance to potential output decreases by 0.6 percentage points every quarter).

In this analysis, fiscal shocks (i.e. decreases in the ratio of budget balance to potential output) are treated as exogenous (i.e. in control of fiscal authorities) and take various paths that are plausible. As mentioned above, Path 1 keeps the budget deficit at a constant level through the MTEF. From the bottom left panel, it can be seen that the output gap associated with Path 1 (solid line) closes very quickly (i.e. moves quickly towards 0).

However, the shape of the output gap is curved, implying that keeping the budget deficit relatively high might result in a lower output in the future. This is most likely due to the feedback effects of debt, interest rates and inflation on economic growth. The top right panel shows that debt associated with Path 1 increases in a linear fashion above 50% in 2011, which poses a potential risk for future fiscal policy in South Africa. Taking the other extreme of reducing the deficit very

6 In the interest of the reader, overly technical details have largely been omitted from the paper. For a more technical version of this paper, the reader is referred to the full paper of the same title posted under the Economic Research Southern Africa (ERSA) website: www.econrsa.org/workshops.htm.

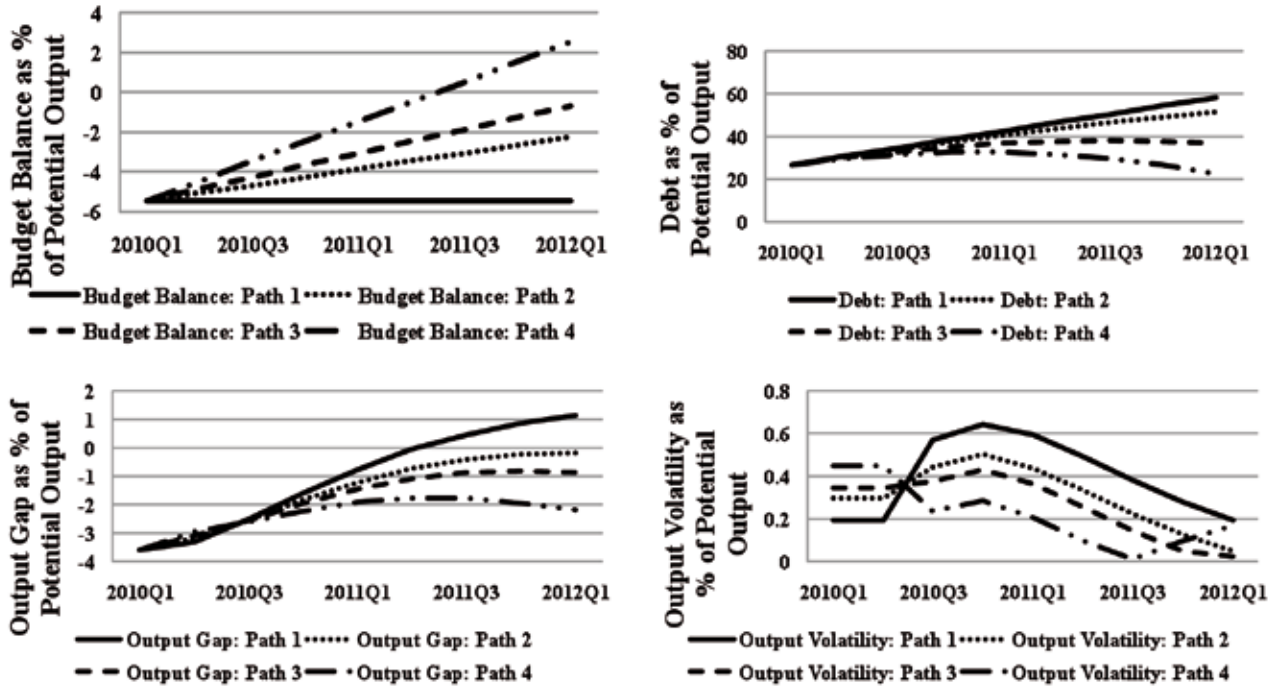
7 See Swanepoel and Schoeman (2003), Du Plessis and Boshoff (2007), as well as Jooste and Naraidoo (2010).

8 Gap models have been applied previously to South African data for forecasting purposes as well as to assess monetary policy (IMF, 2005; Harjes and Ricci, 2008). However, to the authors' knowledge, no attempt has been made to study the effects of South African fiscal policy in a gap framework.

quickly (Path 4, and to some extent Path 3) does not ensure a closing output gap even though debt levels decline to very low levels over the medium term (dashed and dot-dashed lines in the four panels of Figure 1.2). This implies that fiscal multipliers are negligible and ineffective in addressing poverty issues or averting a recession.

Choosing a fiscal deficit reduction in the fashion of Path 2 (dotted line) seems to be a plausible policy option. Under this scenario the output gap closes towards the beginning of 2012, and debt levels stabilise around the same period, which means that the deficit should be reduced in line with output gap movements. Under the Path 2 scenario, the concerns of public finances are balanced in terms of social outcomes as well as in terms of output volatility (which decreases at a reasonable rate throughout the forecasting period: see the dotted line in the bottom right panel of Figure 1.2).

Figure 1.2 The effects of different fiscal consolidation paths on public debt, output gap and output volatility

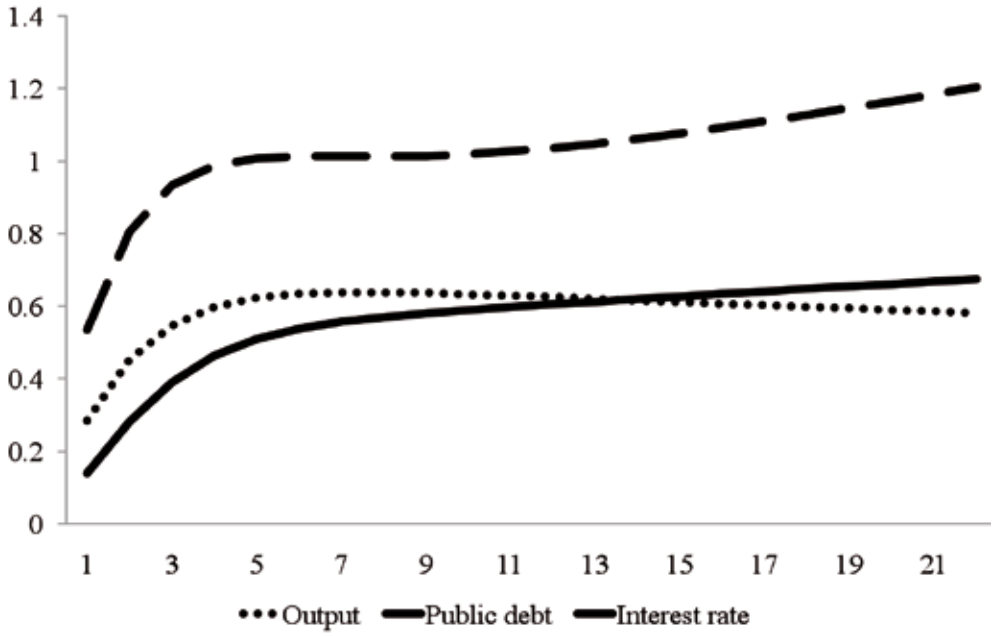


Source: Authors

Along with most of the world, South Africa faces tough decisions regarding the size of the deficit and how to reduce it. This analysis shows that extreme views, such as leaving the fiscal deficit unchanged (Path 1) or decreasing it rapidly (Path 4), should be ignored. A negative output gap will persist even when closing the deficit at a faster rate (i.e. faster than the rate at which the output gap closes), as it limits the impact of fiscal multipliers (which will result in a slower closing of the output gap). Conversely, if the deficit is kept at the current level, or decreased at a very slow rate, the result will be higher debt levels and hence higher debt service costs. Over the long run, its contribution to the output gap also becomes negative. These findings therefore suggest that a gradual response is the optimal response to fiscal consolidation in South Africa.

Next to be examined is the cumulative impact of a 1% government expenditure shock on GDP, debt and the repo rate. Figure 1.3 shows the impact of the fiscal shock (impulse responses are the tools used for this purpose). The government fiscal multiplier on GDP reaches a peak after four quarters and increases to a maximum of 0.63. This means that actual GDP increases by 0.63% for every increase of fiscal expenditure equal to 1% of GDP. To increase this multiplier, government must either re-organise its expenditure priorities or ensure that fiscal policy becomes more countercyclical. Interest rates, and therefore debt service costs and debt, increase by significant amounts. The impact on debt increases over time as higher interest rates contribute to higher debt service costs.

Figure 1.3 Impulse responses of GDP, debt and interest rate to a fiscal shock



Source: Authors

1.5 Conclusion

In extending the current literature (Kibambe and Schoeman, 2009; Du Plessis and Boshoff, 2007; Swanepoel and Schoeman, 2003) on the role of automatic stabilisers and fiscal policy in South Africa, this chapter addressed South Africa's 'optimal' path to fiscal consolidation.

During the 2000s, as fiscal policy became more geared towards countercyclical objectives, the size of automatic stabilisers increased. However, if South Africa had been more countercyclical prior to the financial crisis, a more efficient response would have been possible when the crisis eventually occurred. Another important consideration is the effect of additional budgetary spending on decreasing the size of automatic stabilisers. Often, this additional budgetary spending is procyclical, and either it does not allow for further increases of the unemployment insurance fund or it forces additional tax hikes.

South Africa, along with most of the world, faces tough decisions over the size of the deficit and how to close it. This chapter shows that extreme views should be ignored because a negative output gap would persist even when closing the deficit at a quicker rate (than the rate at which the output gap closes), as this limits the impact of fiscal multipliers (which will result in a slower closing of the output gap). The other extreme, of keeping the deficit at the current level, or decreasing it at a very slow rate, will result in higher debt levels and therefore higher debt service costs. Over the long run, its contribution to the output gap also becomes negative. Hence, a gradual response is suggested as the optimal response.

Lastly, implementing a fiscal rule can only contribute to and complement existing fiscal policies. This not only ensures that fiscal policy remains sustainable, but allows for proper countercyclical fiscal policy, which has maximum spending impact during recessions and contributes to savings during expansions that crowd in investment. However, the difficulty of such a rule lies not in the rule itself, but in the numerical target set by the rule. The policy-maker has to convince the ruling party that such a rule ties in well with developing the economy and the related social context.

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CHAPTER 2: FISCAL RULES FOR SOUTH AFRICA

Ramos Mabugu[9] and Marina Marinkov[10]

2.1 Introduction

Over the last few years, internationally, public finance has been characterised by rising deficits and public debt. In a bid to achieve the goal of sustainable public finances (as well as to reduce debt to sustainable levels), many countries have adopted some form of fiscal rule (or a combination of fiscal rules). Generally, a government with a strong reputation of fiscal prudence does not necessarily need to be constrained by rules. However, when this is not the case, international evidence shows that fiscal rules can provide a useful framework for fiscal policy and can ultimately contribute to macroeconomic stability and economic growth. Furthermore, to enhance their effectiveness, the rules need to be well-designed at both national and sub-national level, which has implications for the intergovernmental fiscal relations (IGFR). For South Africa (as well as for many other countries emerging from the crisis), the question becomes whether or not the government has been fiscally prudent (and pursued stable public finances). And if the answer is in the negative, what type of fiscal rules should be followed to entrench the current efforts of fiscal consolidation. Also important is the question of whether or not the South African government is expected to have stable and sustainable public finances.[11] In order to achieve the goals of fiscal sustainability and stability, the government should pursue two broad strategies:

- Fiscal discipline based on fiscal frameworks that are focused on credible and transparent strategies (i.e. the focus is on proper/effective fiscal institutions);[12] and
- The adoption of a fiscal rule to entrench fiscal prudence.

As in the case with most other countries, South Africa needs to take account of potential long-term structural development and risks. Many of these risks have fiscal dimensions, and so the fundamental uncertainties need to be dealt with. Dealing with long-term issues requires a multi-pronged approach that involves strong policy analysis, budget process reform, sustained fiscal consolidation and sectoral policy reforms. This chapter assesses the need for stronger national fiscal frameworks and independent fiscal institutions as a way of strengthening South African fiscal rules.

2.2 What Are Fiscal Rules?

Fiscal rules are defined as permanent constraints on fiscal policy through simple numerical limits on budgetary aggregates (IMF, 2009). In order for fiscal rules to guide fiscal policy, a fiscal indicator (instrument) is needed to create a rule that is relatively simple and which can be easily monitored and communicated to the public. Fiscal rules are generally adopted with the aim of achieving fiscal (debt) sustainability, yet these rules can have different roles, such as stabilising the economy and limiting (expanding) government size.[13] The different rules can be summarised as (IMF, 2009):

- Budget balance rules, which can be based on the overall balance, structural balance or cyclically adjusted balance (CAB).[14]
- Debt rules, which generally target a certain level of debt-to-GDP ratio and are most effective in achieving the goal of debt convergence.

9 Financial and Fiscal Commission.

10 Financial and Fiscal Commission.

11 It is reported that the US public debt-to-GDP is expected to double by 2018, whereas UK is facing many years of budget deficits and a rising debt burden.

12 Countries like Australia, New Zealand and Canada all reduced their debt-to-GDP ratios without strictly enforced fiscal rules. Generally, countries are more likely to reduce their debt burdens during times of strong economic growth (e.g. Spain and UK).

13 Fiscal rules also need to be growth oriented.

14 It should be noted that the CAB is most linked to the debt sustainability goal (IMF, 2009).

- Expenditure rules, which, for example, permanently limit total, primary or current spending (i.e. spending of the ordinary state budget plus spending of the public investment budget) in relation to GDP.

- Revenue rules, which aim to boost revenue and/or prevent tax burden (by, for example, restricting the debt-to-GDP ratio).

In addition, a distinction must be made between hard rules and broader rules (Emmerson *et al*., 2004). Hard rules can result in an accumulation of tax reserves as safety margins, which can reduce welfare. Broader rules, on the other hand, specify a central target with an acceptable range. A summary of the trade-offs involved with fiscal rules is provided by Kilpatrick (2001):

- Transparency vs. rigidity: the higher the transparency, the less the need for a rigid rule. The assumption here is that, if fiscal authorities behave in a transparent, credible manner, a fiscal rule can allow for some cyclical variation in spending and some flexibility in the budget planning process.

- Rigidity vs. tax/revenue smoothing: the more rigid the rule, the less the government can smooth tax/revenue. A rigid rule implies a lower possibility that fiscal policy can adapt to changing economic conditions.

Box 2.1 A Brief Background to Fiscal Policy in South Africa

Since the Franzen (1969), Margo (1986) and Katz (1995) Commissions, South Africa's fiscal and finance policies have become more transparent and efficient. Over the last two decades, various tax reforms and expenditure decisions have improved the effectiveness of fiscal policy. In addition, the income tax system has become more progressive in an attempt to reduce income inequality.

Public spending has focused on education and health, which are necessary driving forces behind economic growth. With a greater focus on countercyclical fiscal policy, the government was able to reduce debt levels from around 50% of GDP in the 1990s to around 20% of GDP just prior to the 2008 financial crisis. South Africa also recorded budget surpluses, which helped minimise the impact of the financial crisis on the domestic economy. In addition, most of South Africa's debt is denominated in local currency, which reduces exchange rate and foreign risks of meeting its debt repayments.

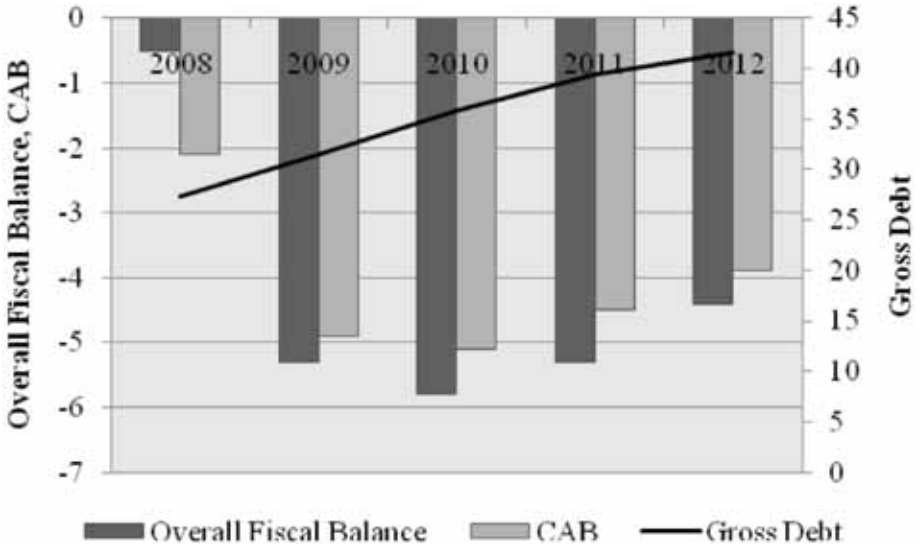
2.2.1 Cyclically adjusted budget balance (CAB)

During a recession/slowdown phase of the economic cycle, government finances usually worsen, as tax revenues slow down and social payments rise. The cyclically adjusted budget balance (CAB) or structurally-adjusted budget balance (SBB)[15] seeks to make an adjustment for the effects of the economic cycle and thus provide a more accurate representation of the budget. The CAB takes out the effect of economic swings that are above or below the natural rate of economic growth. In essence, it is the balance that accords with the long-run natural economic growth rate of the country. A CAB rule generally requires a constant numerical target, and movements in the CAB can be seen as discretionary fiscal expansion.

In South Africa, the CAB was introduced in the 2007 Medium-Term Budget Policy Statement and is currently reported regularly with the estimates of the structural revenue and expenditure. For an example, see the Budget Review (National Treasury, 2010: Chapter 4, Figure 4.8). More recently, the International Monetary Fund (IMF) has started publishing similar figures in their Fiscal Monitor Updates (IMF, 2011). Figure 2.1 contains information on the actual budget balance, the CAB and gross debt as a percentage of GDP. The CAB measure shows a deficit of less than 4% by the end of the forecast period. Interpreting the forecasts, government's commitment to control its spending can be considered successful, and tax revenues are expected to grow as the South African economy further recovers from the recession.

15 Technically speaking there is a small difference between the CAB and SBB. Jacobsen (2002) defines CAB as the total balance less the cyclically neutral balance, whereas the SBB is the cyclical effect of the budget plus a benchmark balance. In policy analysis, CAB figures are used to construct indicators of the SBB and the discretionary element of fiscal policy (Brunila *et al*., 1999), so the two are closely linked. Hein and Truger (2008) define the difference simply as SBB being the CAB in relation to potential GDP.

Figure 2.1 South African fiscal indicators (% of GDP)



Source: IMF (2011)

Some rules may be more suitable for national levels, while others are more suitable for the sub-national levels (Kennedy and Robbins, 2001). In fact, some studies argue that fiscal rules are more suited to sub-national governments than to national governments (Corsetti and Roubini, 1996; Bayoumi and Eichengreen, 1995).

2.2.2 Sub-national fiscal rules

Since fiscal discipline is greater at national level, fiscal rules at this level are generally found to be more effective than those implemented at the local government level (IMF, 2009). Some reasons for the inefficiency of fiscal rules at sub-national level are: limited authority and dependence on central government transfers, which creates situations of moral hazard; spillovers from higher spending jurisdictions; and differences in the timing and size of economic cycles across sub-national government that may spur procyclical behaviour, when countercyclical fiscal policy is desirable. Countercyclical fiscal policy aids the government by acting as a stabiliser; in other words, spending occurs during downturns and saving during upturns in the business cycle. However, sub-national fiscal rules should optimally be introduced simultaneously at all levels of government, which is hardly ever the case. Internationally, fiscal rules have either been first introduced at national level and then at sub-national level (e.g. Argentina) or the other way around (e.g. Canada).

Before a sub-national fiscal rule is introduced, some elements need to be in place. First, fiscal legislation needs to be imposed at corresponding government level(s) so that policymakers can be held accountable (Kopits, 2001). In South Africa, the Public Finance Management Act (PFMA of 1999) and Municipal Finance Management Act (MFMA of 2003) cover this aspect. Secondly, the underlying vertical (regional) imbalances need to be offset by a sufficient mechanism of intergovernmental compensation transfers (Kopits, 2001), such as the equitable share mechanism in South Africa. While the national government raises the bulk of aggregate revenues, its expenditure responsibilities are much lower, which means a mismatch between raised revenues and expenditure responsibilities. A converse mismatch exists at the provincial and local government level. This vertical mismatch is known as vertical fiscal imbalance (pre-transfer fiscal deficit). There are also horizontal imbalances, as the revenue-raising capacity of sub-national governments varies, and different regions may face different cost and demand pressures when they attempt to meet their assigned expenditure responsibilities.

The gap between revenue and spending in sub-national jurisdictions is met through intergovernmental transfers (grants and revenue sharing), borrowing by governments in deficit, or a combination of the two. While the equitable share transfers may appear to be free of rules, it is important to note that many institutional and legal arrangements are in place for the use of these transfers. In terms of the Intergovernmental Fiscal Relations Act (IGFRA of 1997) the Minister of Finance has a legal obligation to convene the Budget Council twice a year and the Budget Forum once a year. The Council and the Forum may be convened in order to solve any disputes, in line with the scheme provided for in the IGRFA of 2005. Reporting requirements are also governed by the PFMA and MFMA as well as the Appropriation Act, which regulates the conditional allocation of national revenue directly. Local governments in South Africa are required to enact balanced budgets. Therefore, strictly speaking, the equitable share is supposed to be used to deliver on constitutional mandates. Where a province (or a municipality) fails to deliver on these mandates, the national government (or a province) can intervene through Sections 100 and 154 of the

Constitution. It is the responsibility of national departments to implement 'emergency' measures to bring provincial spending and revenue into balance.

Some provinces (notably Gauteng and KZN) are once again over-spending (particularly on hospitals and health professionals), but only time will tell whether Section 100 interventions will be made. This raises an interesting politico-economic point about the government's goal of fiscal consolidation and rules. Some forces within the government would like to increase spending countercyclically and encourage employment, while others emphasise savings and deficit reduction; it is clearly a matter of balancing the trade-offs. It goes without saying that budget and/or debt rules should be viewed as complementary rather than substitutes for the equitable share mechanism. There are two general approaches to fiscal responsibility at sub-national level: sub-national autonomy and a coordinated approach (Shah, 1994; Kopits, 2001). In the autonomous approach, the sub-national government seeks to gain credibility for its own fiscal policy, while in the coordinated approach all sub-national governments are subject to uniform rules in order to establish credibility for overall macroeconomic policy. In the latter case, a free-rider problem could arise, so penalties for non-compliance need to be introduced at the sub-national level as well. Flexibility is also an important consideration; for example mechanisms need to be put in place to correct unanticipated deviations from target (unless these stem from cyclical fluctuations). In addition, revenue shortfalls and over-expenditure need to be met with automatic measures.

The purpose of fiscal rules is to bind government to responsible behaviour, which may not always be in its short-term interests.[16] In addition, fiscal rules can address the problem of time inconsistency (Gutiérrez and Revilla, 2010), where the government's favoured choice (action) changes over time. In other words, fiscal rules increase the political cost of breaking past commitments and foster credibility because the government adopts rules, sets targets and adheres to them. Fiscal rules can be part of a broader legal framework (statutory requirement) making them more difficult to reverse. Policy rules (guidelines) that are not legislated do not impose binding constraints on government (Kennedy and Robbins, 2001). In South Africa, fiscal responsibility laws are outlined in the PFMA and the MFMA as well as in different sections of the Constitution.[17] The advantage is that such legislation limits the government from selectively focusing on policy that would reflect in its favour. However, more stringent frameworks for accountability, monitoring and enforcement need to be put in place, together with clear penalties for non-compliance (such as administrative sanctions, financial penalties and/or loss of reputation).

2.3 Why Fiscal Rules?

One of the main problems with completely discretionary fiscal policy is that the government's record of fiscal policy cannot really be assessed without firm guidelines (Emmerson *et al*., 2004). In addition, a number of factors lie outside the government's control such as the position in the economic cycle, shocks to the international economy and levels of debt and deficit from previous years. As mentioned in the previous section, the usual motivation for fiscal rules is that they create a de-politicised policy framework (i.e. they correct the government's short-sightedness that results from electoral prospects). In addition, fiscal rules have been known to contain the size of government and promote intergenerational equity. Although fiscal rules have been associated with improved fiscal performance (for example in EU countries), it is difficult to isolate the direction of causality and the effect. In other words, the introduction of rules might make government more responsible, but responsible governments are also more likely to make rules. Internationally, fiscal rules have been found to foster consolidation efforts (for example IMF, 2010a). A major disadvantage of fiscal rules is that they constrain discretion when discretion is needed and may force fiscal policy to be procyclical when it needs to be countercyclical (Kennedy and Robbins, 2001; IMF, 2009).[18] In addition, fiscal rules, especially expenditure rules, may result in capital spending cuts that could harm long-term economic growth. Kennedy and Robbins (2001) cite the following reasons for adopting fiscal rules:

- Fiscal rules ensure macroeconomic stability through the promotion of countercyclical fiscal policy.
- Fiscal rules enhance the credibility of governments' fiscal policy and aid in eliminating deficits.
- Fiscal rules ensure the long-term sustainability of fiscal policy.

The timing of implementing fiscal rules is a major consideration, as it is vital to implement rules at the correct time.

16 Kennedy and Robbins (2001) argue that what underlies fiscal rules is a sense that present (future) governments may not be able to implement optimal fiscal policy measures without external pressure.

17 It should be noted that New Zealand was the forerunner in the fiscal responsibility legislation with the introduction of the Fiscal Responsibility Act in 1994 (Emmerson *et al*., 2004).

18 In the South African context, the general opinion is that fiscal policy needs to be more countercyclical so as to maintain low future capital costs and inflation, support a more competitive exchange rate, reduce debt service costs and provide fiscal space (Loewald, 2010).

Box 2.2 Brief History and Evolution of Fiscal Rules

Fiscal rules have a long history (Kopits, 2001; Kennedy and Robbins, 2001; IMF, 2009). Since the 1990s, an increasing number of countries have adopted fiscal rules (to eliminate deficits and ensure the stability of public finances), with the sharpest increases being those of emerging and low-income countries. Another recent trend is that countries have moved away from a single fiscal rule to a combination of rules that focus on debt sustainability. Generally, the result was that a number of countries adopted a budget balance rule combined with a debt rule (expenditure rules have been used to curtail the size of government). In addition, custom-made rules are sometimes deemed necessary because of differences in institutional capacity and exposure to external shocks. Finally, rules based on the CAB have been getting more popular in recent years. For a more detailed report on recent trends in international fiscal rules please refer to IMF (2009).

2.3.1 Preconditions that need to be in place for fiscal rules to be effective

First of all, adequate public finance management systems need to be in place. Adequate data also needs to be available, which is generally the case for South Africa. In addition, the National Treasury needs to have a good track record in technical forecasting capacity because budgetary aggregates need to be predictable with a certain degree of accuracy, so as to avoid the risk of large fluctuations from the announced fiscal policy stance which would undermine a rule's credibility (Emmerson *et al*., 2004; Favero and Massimiliano, 2005). Budget reporting systems need to be extensive, and fiscal data should be publicly released, which is the case for South Africa at the national level. However, this could prove problematic at provincial and particularly municipal levels, if fiscal rules are introduced for sub-national governments in South Africa. Political commitment is also key, as without it, fiscal rules are unlikely to be sustained and may even harm the credibility of fiscal policy.

Furthermore, for a fiscal rule to operate optimally requires the following (IMF, 2010b):

- An unambiguous and stable link between the numerical target and the ultimate goal. Fiscal rule methods, linkages and outcomes must be clearly announced in advance. In addition, a clear reaction function must be formulated; one that explains how government will respond to failures to meet the rules.
- Sufficient flexibility to be able to respond to shocks: specifying a clear reaction function does not mean that government must always follow the rule. However, when it does not, the government must have a good reason and explain why.
- A clear institutional mechanism to map deviations from numerical targets and take corrective action. In addition, a decision needs to be made about how the rule will be judged (i.e. retrospective or prospective).

Box 2.3 Forecasting Performance of National Treasury

National Treasury should publish (or provide an indication of) past forecast errors for fiscal aggregates (Emmerson *et al*., 2004). The idea is to publish data series of forecasting errors (i.e. comparing the initial forecast with the final outcome, preferably adjusted for subsequent policy changes), as this information will provide an indication of the degree of uncertainty surrounding current forecasts (and also indicate the probability distribution within which these forecasts should be based). Variables that can be considered include public sector net borrowing, public sector net debt, current budget balance, current receipts, current spending and public sector net investment (Favero and Massimiliano, 2005).

Regular summaries about the size and variability of the forecasting errors could be summarised, and the National Treasury could use this information to indicate and quantify the uncertainty surrounding the current set of fiscal forecasts (graphical representation can take the form of fan charts). This will also make communication to the public easier, in the sense that government will be able to determine and communicate the probability of breaking the rule and plan accordingly. Furthermore, fan chart representation (for example) can make the public more aware that outcomes do not necessarily align with the forecasts (Emmerson *et al*., 2004).

2.4 Fiscal Variables and the South African Economy

There is a considerable quantity of literature on the influence of fiscal variables (expenditure on government programmes and taxes) on the economy.

2.4.1 Effect of fiscal variables on economic growth in South Africa

Most fiscal variables related to economic growth are reported in the form of tax and/or revenue elasticities. Although these elasticities are difficult to obtain and strictly speaking are meant for closed economies, they offer a useful indication of the effect of fiscal policy on economic growth. Simply defined, elasticities are measures of the responsiveness of a variable to a change in another variable. For South Africa, a number of studies have estimated tax elasticities (albeit using different methods and sample periods). In addition, the Fiscal and Financial Commission (the Commission) has estimated revenue elasticities for different components of public expenditure. Tables 2.1 and 2.2 provide summaries of these estimated elasticities.

Table 2.1 Summary of tax elasticities for South Africa

Study → Tax ↓	Swanepoel and Schoeman (2002)	IMF (2006)	Du Plessis and Boshoff (2007)	Jooste (2009)
Personal income tax	-	1.43	-	0.84
Corporate income tax	-	2.52	-	1.79
Value added tax	-	0.99	1.14	1.01
Income and profit	1.04	-	1.05	-
Goods and services	1.24	-	-	-

Source: Jooste and Naraidoo (2010)

Table 2.1 shows the responses of taxes to the economic cycle, which has important implications for calculating the CAB. Most countries assume that taxes respond in a one-to-one relationship with the cycle. However, recent studies, such as Wolswijk (2007) and Jooste and Naraidoo (2010), show that taxes respond asymmetrically to the economic cycle. Thus, depending on the elasticity, significantly different CAB outcomes may be obtained. There is an obvious trade-off between technical sophistication and a communicable method of calculating the CAB. While technical rigour may improve the 'exact' outcome of the CAB, it is not as transparent as a communicable method and may be subject to manipulation. In contrast, whereas a communicable method is transparent, it is sometimes off the mark.

Table 2.2 Summary of revenue elasticities for South Africa

Expenditure Category	Elasticity Estimate
Agriculture, forestry and fishing	2.41
Defence	0.22
Education	1.51
Fuel and energy	0.61
Health	1.87
Housing and community amenities	0.37
Mining, manufacturing and construction	-1.86
Public order and safety	-1.38
Recreation, culture and religion	-0.25
Social protection	0.39

Source: FFC calculations

Table 2.2 shows the responses of economic growth to changes in public expenditure components. Positive elasticities larger than 1 are considered conducive to economic growth (i.e. a 1% increase in government spending leads to more than a 1% increase in economic growth, all other things being constant). Therefore, agriculture, education and health are the key contributors to economic growth in South Africa. Negative elasticities can indicate a reverse causality, i.e. from growth to expenditure.

2.4.2 Effect of fiscal variables on local government economic activity

According to Tiebout (1956) in an efficient federal system, many local governments and people are able to choose their preferred service-tax package. All else being equal, service responsibilities are assigned to small local governments. The resulting limits (perceived or real) seriously reduce the fiscal autonomy of sub-national governments, enabling a stronger, but more distant, national government to impose its will on local voters. Public choice theory shows that combining uncompetitive market structure and self-interest can have unwelcome effects on tax and expenditure outcomes. At any sphere of government, perfectly rational, self-interested officials tend to raise taxes and spend more than the median voter would prefer. Using their monopolistic position to decide how much to tax and what levels of public service to provide, public officials can obtain 'rents' and will find it in their interest to expand the role and size of provincial and local governments – referred to as

a 'leviathan'. Therefore, public choice theorists argue for the use of fiscal rules (in the form of stringent limits on taxation and spending) as a means of controlling the ambition and fiscal excess of the 'leviathan' or public officials (Brennan and Buchanan, 2000).

From a quantitative viewpoint, Tiebout's theorem implies that decentralised government would lead to increases in public tax-spending combinations that are efficient in the sense that they are proportional to the increase in the median voter's income – with identical effects on local government expenditure (Wyckoff, 1988; Turnbull, 1992). However, a number of empirical studies find that available data consistently rejects the median-voter model prediction of equivalence (for example Gramlich, 1977; Fisher, 1982; and Hamilton, 1983), leading to an empirical phenomenon that has come to be known as the 'flypaper effect'. The flypaper effect explains the observed tendency for local government authorities to spend intergovernmental grant transfers rather than pass on such transfers to constituents/residents through, for example, tax cuts.

There is no consensus about the cause of the flypaper effect, which is considered by some to represent a kind of illusion on the part of voters, and by others to be a mis-measurement of some kind. Estimates of the flypaper effect vary widely. In the United States, a typical estimate finds that $1 of aid has the same impact as $3 of income. Downes and Figlio (2007) surveyed empirical literature on the impact of state-level tax and expenditure limits on primary and secondary education performance and conclude that small spending reductions (due to tax and expenditure limits) can cause disproportionately large, presumably unintended, negative effects on student achievement. They also report evidence that suggests teacher wage contracts may shift the greatest impact of tax and expenditure limitations to students and new teachers, away from teachers with long tenure.

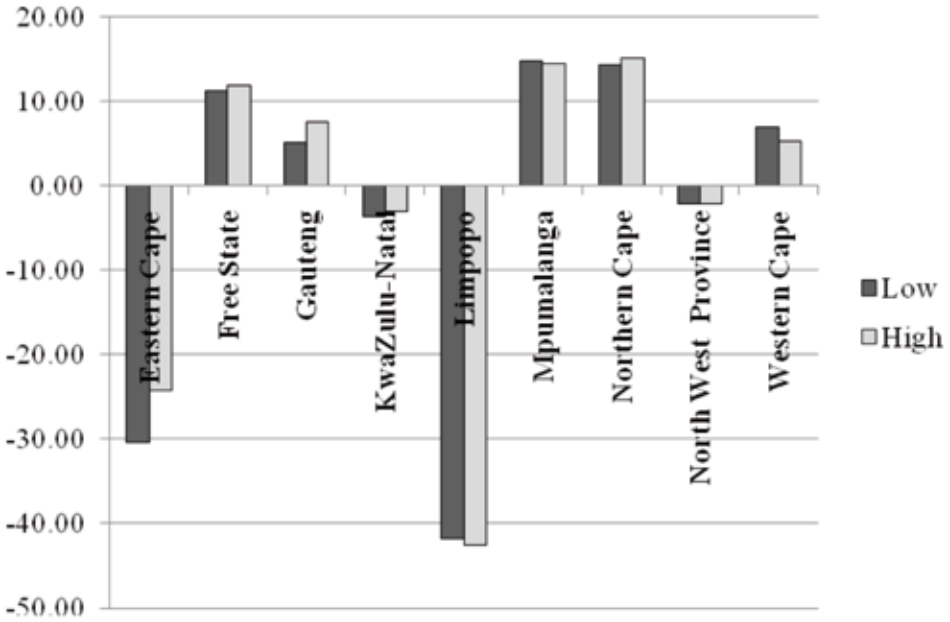
A study on the multiple dimensions of the intention and implementation of fiscal rules for sub-central governments in the Organisation for Economic Cooperation and Development (OECD), finds that fiscal rules are generally designed to control the size of the public sector and to prevent large increases in debt or public spending (Sutherland *et al*., 2005). Instead of directly restraining sub-central government spending, most OECD governments use rules limiting tax autonomy and restricting the amount of borrowing to control the outstanding debt of sub-central governments. The study finds that fiscal rules generate side effects and trade-offs that create inefficiencies in public finance and short-change critical public services. In particular the study found that constraints associated with balanced-budgets rules might create incentives to spend unnecessarily near the end of a budget cycle, and that tax and expenditure limits can distort public spending patterns. When applying across-the-board tax and expenditure limits, law-makers may find that they cannot prevent other policymakers from funding public programmes and services. Such across-the-board limits force policymakers to allocate funds for programmes and services in inefficient ways (Sutherland *et al*., 2005).

In the context of the South African local government grant process, using the flypaper effect hypothesis, Amusa *et al*. (2008) offer empirical evidence of the concept of fiscal illusion. The study used an empirical framework that has its foundations in the median voter model developed in the article by Wyckoff (1988, 1991) and adapted in Heyndels and Smolders (1994). Their results suggest the absence of a flypaper effect on municipal expenditures from intergovernmental transfers. In other words, fiscal rules implemented through conditions on various grants have not had unduly discernible negative effects on local government. Two major implications of these findings for fiscal rules would be the need to (i) improve the overall administrative, institutional and financial capacity of municipalities (in particular enhancing the ability and innovation of municipalities to spend effectively their grant allocations) and (ii) further understand the potential effects that current reform proposals could have on the fiscal autonomy and revenue-raising capacity of municipalities.

2.4.3 Effect of fiscal variables on provincial government economic activity

At provincial level in South Africa, empirical evidence is scant owing mainly to data deficiencies (such as interregional mobility and expenditure profiles). Furthermore, many complex responses, which arise from the interaction of the different spheres of government, are difficult to capture effectively. Using a multiple provincial/regional computable general equilibrium model, recent work by the Commission provides a picture of how altering existing fiscal rules affect efficiency and equity goals in South Africa. The model is the first of its kind for South Africa and accounts for three spheres of government: national, provincial and local governments. Each government sphere spends on providing public services, subsidising the national economy (activities and products) and transferring revenues to other governments and institutions. Fiscal rules are loosely embodied in the conditions and restrictions associated with intergovernmental fiscal transfers discussed earlier. Therefore, a reduction of intergovernmental transfers with tax compensation is interpreted as a loosening of fiscal rules. A loosening of fiscal rules is found to have heterogeneous effects on households' well-being, which is measured by changes in the equivalent variation of initial consumption expenses. The nationwide welfare does not change significantly (0.6% in both scenarios), but its distributional effect among regions is important (Figure 2.2).

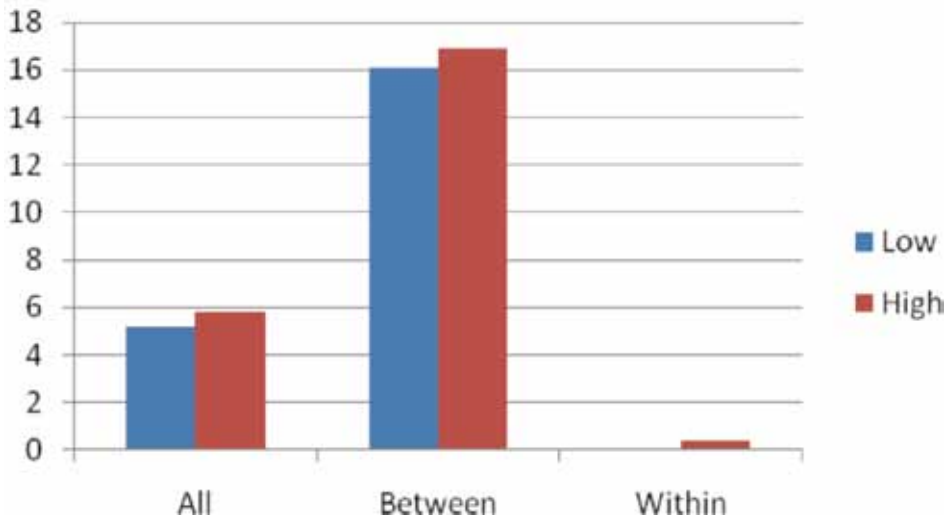
Figure 2.2 Equivalent variation of initial consumption expenses (%)



Source: FFC calculations

The overall regional disparity increases by 5–6% when Theil indices are used to measure regional disparities within and between regions. (Figure 2.3 is essentially imputed to the increase in disparities between regions.)

Figure 2.3 Variation in Theil indices (%)



Source: FFC calculations

The results are varied but pertinent for the use of fiscal rules. Firstly, sub-national governments play a key role in successful fiscal consolidation, which supports the argument that understanding sub-national government behaviour is important in overall macroeconomic stabilisation. Grant allocations provide a mechanism whereby national government retains considerable effective control over aggregate sub-national government expenditures. Secondly, cuts in grants can play an important role in fiscal consolidation.

However, the findings demonstrate that the interregional equity effects are significant, although the overall impact is less important. Concerns about intra-generational equity appear to be well justified, if deficit reduction is implemented through cuts in social assistance or less regressive taxes. A programme of fiscal consolidation could easily conflict with ambitious (re)distributive objectives, not least from a South African welfare state perspective. Thirdly, cuts in grants can be offset by increases in compensatory taxation. However, after an episodic cut in grants, an increase in sub-national taxation results in falling household gross income and widening income disparity.

2.5 Design, Timing and Implementation of Fiscal Rules

The implementation of fiscal rules would require the government to publish in advance these key pieces of information: how the rules will be met, what happens if the rules are not met or are not on course to be met (i.e. corrective action and penalties), and the time frames for when the targets will be reached (Emmerson *et al*., 2004). In terms of the design of fiscal rules, two requirements need to be satisfied:

i. The rule must deliver the required adjustment and put debt on a sustainable path.

ii. The rule has to have a certain degree of built-in flexibility in order to deal with shocks.

Head of Hungarian Fiscal Council, George Kopits (2001), claims that a fiscal framework should have the following main features:

- A numerical policy rule.
- A set of 'procedural' rules.
- Monitoring by an independent, authoritative body.
- Full and clear public accounts (including future costs).

Other issues to consider include:

- Coverage of rules.
- Whether or not rules should respond to past deviations.
- Effective monitoring and evaluation.

In addition, when choosing the fiscal instrument, the following need to be considered (IMF, 2009):

- The instrument has to be closely linked to the ultimate objective of fiscal policy.
- The instrument must be controllable.
- The instrument must be transparent and easy to monitor – commentators must be able to audit fiscal policy, which means that fiscal authorities need to publish as much data and information as possible.[19]

The budget balance-to-GDP ratio generally fulfills the above requirements and thus makes a good instrument. However, constraining the debt ratio is more difficult because of the lags that are involved before any budgetary slippages can be detected and because debt is more volatile. Generally, if debt is targeted, it is targeted together with a budget balance. In addition, targeting revenue is tricky because it is not linked directly to debt ratio unless the expenditure side is considered. A growth-based balance rule (an augmented one) performs well in a low-growth environment (however, the price is the reduced countercyclicality).

In terms of the implementation, the following are important points (Anderson and Minarik, 2006; IMF, 2009):

- Before a rule is introduced, countries need to make an effort at fiscal consolidation and macroeconomic stability, which is likely to make the rule more credible.
- Speed of adjustment is also an issue, as the rule might require an excessive speed of adjustment, or not mandate enough adjustment as is needed/feasible/optimal.

19 Although it is understandable that government would want/need to withhold some information to manage expectations. In South Africa, fiscal authorities publish budget documentation that is consistent with the IMF's *Revised Code of Good Practices on Fiscal Transparency.* South Africa is currently considered one of the most transparent fiscal authorities in the world (out of a sample of 94 countries). It publishes information on forthcoming policies and policies under consideration, provides consistent data and presents estimates of the budgetary aggregates over the medium term.

- Fiscal rules should not be introduced in a markedly uncertain macroeconomic environment.

The main points to keep in mind are that the cost (of breaking the rule) needs to be higher than the benefit, and while fiscal rules can anchor medium-term expectations, they are not ideal when dealing with extreme shocks.

Box 2.4 The Case for an Independent Fiscal Agency in South Africa?

National Treasury faces a clear conflict of interest in acting as judge and jury on its performance. Despite their similarities, fiscal policy and monetary policy are very different. The argument for an independent fiscal agency centres on bolstering trust (especially in countries where it is hard to promise fiscal credibility), by putting fiscal policy on the same footing as monetary policy. In other words, budgetary decisions are outsourced to independent councils with a mandate to preserve fiscal solvency (Daban, 2011; Debrun *et al*., 2009; Kennedy and Robbins, 2001). The problem is that, whereas monetary policy has one instrument, fiscal policy has many. However, a number of countries have opted for this approach: Chile (independent expert panels), Netherlands (Central Planning Bureau), Hungary (Fiscal Council), Sweden (Fiscal Policy Council), and the USA (Congressional Budget Office). A less extreme case of independent guidance of fiscal policy is technocratic (econocratic) governance of fiscal rules, where technical experts exercise a certain degree of control over decision-making. For example, in Sweden, a fiscal council monitors compliance with the budget-balance target (consistent with a chosen debt burden), leaving politicians to make tax and spending decisions within those limits. Fiscal institutions such as the Financial and Fiscal Commission (the Commission) play a complementary role to effective fiscal rules. Their role is limited, as it has no executive power, although the advisory role may be its strength. When multiple agencies have executive authority over fiscal rules, often the tendency is not to take responsibility and shift blame to the other for non-compliance/enforcement. In this regard, the Commission must continue to rely on influence and the requirement to respond to its recommendations in Parliament. The Commission can still have a beneficial effect through its work on improving the level of public debate and, in the future, producing reliable fiscal variable forecasts (e.g. debt).

2.6 International Experience

Internationally, combining budget balance and expenditure rules has been particularly effective, even more so when the countries have wide coverage and strong monitoring. The following are some examples of international experience with fiscal rules.

UK and Australia: Neither country's framework has legislated numerical targets. Instead, the emphasis is on requiring government to set its fiscal st*rategy and tar*gets out clearly. Australia's reduction in debt is mainly due to privatisation proceeds, and the current objective is to balance the budget over the economic cycle by running short-term surpluses and (as a supplementary objective) to improve its net worth.

Japan: The country has had some form of fiscal rules since 1947. However, since 1997, its rules address the deficit as well as ensure that the sum of national and local government debt does not exceed 3% of GDP. In addition, deficit financing bonds need to be reduced every year, and numerical limits are set on expenditures.

New Zealand: The Fiscal Responsibility Act places more emphasis on transparency than on numerical targets. The government set some targets for fiscally prudent levels of debt. Temporary departures are allowed as long as government specifies reasons for doing so (and also when it plans to return to the principles). In general, improved fiscal performance in New Zealand can be attributed to fiscal rules plus improved reporting requirements, better economic conditions and political commitment.

Canada: The country set limits on programme spending (overspending is permitted in one year if offset in the following two years, and unspent amounts can be allocated to the subsequent fiscal year). The government has also introduced a number of non-legislated rules that contribute to better federal finances (two-year rolling deficit targets with an ultimate goal of a balanced budget; credible short-term fiscal targets combined with commitment).

Chile: Often cited as a success story of fiscal rules' implementation, the country introduced a new fiscal framework in 2001 (codified in the Fiscal Responsibility Law). The target is a structural fiscal surplus, and an expert committee determines the cyclical stance. Between 2004 and 2008 the country had a cumulative surplus of 28.5% of GDP. In 2009, real public spending grew by 14.5% despite a 28.5% fall in fiscal revenue (implying a fiscal deficit of 4%).

Box 2.5 Debt Brake Fiscal Rule

In Sweden, the 'debt brake' rule was approved by referendum as a flexible instrument for limiting public debt (Brandner *et al*., 2005). The aim was to establish a long-term countercyclical policy and to prevent the accumulation of permanent structural deficits. The model also accounts for the 'time-lag' problem (i.e. recognition and decision lags of fiscal policy) that is normally associated with discretionary fiscal policy, which aims to smooth the business cycle. Discretionary fiscal policy is still allowed to stimulate the economy when the 'debt brake' rule is found to be lacking. The rule is characterised by an expenditure rule (with a binding clause), consideration of exceptional circumstances (to aid flexibility), introduction of a stabilisation account (i.e. an analytical instrument used to distinguish between estimated and actual budgets over the medium term), and stipulations for the use of extraordinary revenue (Brandner *et al*., 2005).

2.7 Recommendations

South Africa has come a long way in operating fiscal rules, which are implemented through constitutional amendments, statutory provisions or policy guidelines and enforced through a variety of mechanisms. When rules are violated, sub-national governments may be subject to administrative sanctions, financial penalties, or a loss of prestige and reputation. For instance, when sub-national governments fail to adhere to such rules, 'peer pressure' is available in the form of recommendations by the Commission to restore fiscal discipline. In some instances, local-level authorities have been removed from office for violating fiscal rules. Furthermore, a constitutional provision, which allows Parliament to adjust the budget proposed by government, has proven to act as if allocations are indeed rules.

The government's medium-term horizon for fiscal policy, which gave fiscal policy some discipline without making it rules-based, also proved useful because markets could easily detect any deviation from medium-term targets. The entrenched recognition and clear demonstration of fiscal prudence by South African authorities permeates through to sub-national government. A key issue that arises in the context of South Africa is whether and how to strengthen fiscal rules.

This preliminary and tentative analysis suggests that sub-national government fiscal policy has been disciplined without necessarily being rules-based in the conventional sense. Furthermore, the emerging empirical evidence appears to reject the notion of the flypaper effect, suggesting that rules embedded in intergovernmental transfers to local governments have not had discernible perverse effects. For the provincial government, rules embedded in intergovernmental transfers appear to have delivered government's equity goal, while the efficiency objective has largely not materialised. In view of these considerations, a more nuanced view is needed of the appropriate role of fiscal rules at national and sub-national government level, which recognises that a sophisticated intergovernmental system is in place and looks at how to improve an existing and functioning system.

Therefore, the first aspect should be to recognise the existence of fiscal rules that are working reasonably well. The second aspect is that National Treasury is certainly conflicted by acting as both judge and jury on its performance. This calls for a separation of function and, in this regard, the Swedish model of an independent fiscal policy council is a good guide and needs to be considered.

On the basis of these considerations, a possible option for fiscal rules would be to target a balanced budget or surplus over the cycle, without any limits, which would allow for automatic stabilisers to operate and also for discretionary countercyclical action. In addition, limits need to be imposed on the government wage bill. Generally, if an expenditure rule is to be proposed, then limiting capital expenditure (which is thought to contribute to long-run growth) is not an option. However, transparent, unambiguous and operationally sensible definitions of capital expenditure are needed (so that the focus is on productive capital expenditure).

To use the example of Australia and New Zealand, as is generally the case for macroeconomic policy in South Africa. These two countries have strengthened their fiscal frameworks without having to announce numerical fiscal targets. The establishment of a South African Fiscal Policy Council appears plausible. Such an institution would be given executive powers, assess cyclical position and fiscal risk distribution, recommend appropriate cyclical policies, monitor compliance with fiscal rules, evaluate debt management strategy, and monitor transparency of fiscal data and research on South African fiscal policy. Issues that need to be considered include:

- Establishing accountability lines (to Parliament or Executive) and who reviews this Council.

- Public sector pay and its potential destabilising effect on budget. For example, would there be political/civil buy-in if such a Council pronounces on annual wage adjustments? While the recently created National Planning Commission and/or Monitoring and Evaluation Departments in the Presidency may play this role, the conflict issue would not be entirely eliminated, as the Council would need to be depoliticised or at least be independent.

Fiscal institutions such as the Commission should continue to play a complementary role, in particular ensuring compliance to IGFR through its periodic advisories.

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CHAPTER 3: FISCAL IMBALANCES AND INTERTEMPORAL CGE MODELLING

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3.1 Introduction

Post-apartheid South Africa's economic performance has been relatively impressive, after a long period of economic decline in the final decade of apartheid (1985–1994). Reasons for the decline included increasing international isolation and civil conflict, the negative impact on potential growth caused by the deliberate suppression of the majority black population and the subsequent low accumulation of human capital (Fedderke and Vase, 2001). However, in the immediate post-apartheid period (1995–2003), economic growth rates improved and then picked up substantially from 2004 to 2007.

Between 1995 and 2005, the average growth rate was 3.3% for real GDP and 1.7% in per capita terms, a considerable improvement when compared to 0.8% and -1.3% respectively for the period 1985–1994. From 2004, economic growth averaged over 5% annually until 2008, when the global economic crisis resulted in a slowdown in economic growth. By 2010 the country was moving steadily out of the recession, with domestic demand being supported by automatic stabilisers and monetary accommodation, increased public investment and greater social support. Economic growth (in real terms) increased from -1.7% in 2009 to 2.8% in 2010. This growth has been driven by (a) stronger than expected global economic recovery, (b) ongoing lagged benefits of a 6.5% decline in short-term interest rates between December 2008 and the present and (c) a substantial decline in inflation, with the consequent increase in disposable income.

In 2010/11, although the country has recovered from the recession induced by the global economic crisis, unemployment, poverty, inequality and low growth still persist. Poverty remains high, especially among African and female-headed households, despite an unprecedented extension of government social grants that contribute to reducing absolute poverty. Poor educational and health outcomes are similarly skewed against the poor. These social realities, together with the realisation that dates for attaining the Millennium Development Goals (MDGs) are a mere four years away, have galvanised government to seek alternative ways of using public expenditures to grow the economy in order to address poverty and inequality. Ambitious social reforms are being proposed to address poverty, growth and inequality problems. The national health insurance (NHI) promises to be the largest reform undertaken in the health sector since the end of apartheid.[24] In November 2010, Cabinet also approved the New Growth Path (NGP)[25] for South Africa, which aims to accelerate the creation of decent jobs and reduce inequality and poverty. Through the various measures discussed in the document,[26] the government envisions creating five million jobs by 2020, which

20 Financial and Fiscal Commission, South Africa.

21 CIRPEE, Université Laval, and PEP network, Canada.

22 CIRPEE, Université Laval, and PEP network, Canada.

23 Human Sciences Research Council, Economic Performance and Development, South Africa.

24 Its cost remains unknown at this stage but best estimates suggest huge figures. The Finance Minister has already identified three possible tax sources for financing NHI: value added tax (VAT), a surcharge on income tax and a payroll tax (paid by employers).

25 Since 1994, and prior to the launch of the NGP, three other major development strategies were introduced. The first was the Reconstruction and Development Programme (RDP) whose primary objective was to remove racial bias in a bid to address poverty and socio-economic inequalities inherited from the previous regime. The second (in 1996) was a macroeconomic policy framework called the Growth, Employment and Redistribution (GEAR) strategy, with 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 third (in 2006) was the Accelerated and Shared Growth Initiative for South Africa (AsgiSA). AsgiSA was launched as a coordinating framework to enable the achievement of new government goals of halving unemployment and poverty between 2004 and 2014 (through 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).

26 The main strategies for achieving the NGP targets, by leading the economy to higher growth, fall within three broad areas: (1) macroeconomic policies, (2) microeconomic measures and (3) stakeholder commitments. Five job drivers have been identified: (a) infrastructure (including housing, public works, input manufacture and improved competitiveness); (b) main economic sectors (including agriculture value chain, mining value chain, manufacturing tourism and high level services, (c) seizing the potential of new economies (including the green economy, the knowledge economy); (d) investing in social capital (including cooperatives, social investment, community and social initiatives and the public sector); and (e) spatial development (including rural development and the African regional development).

will enable the narrow unemployment rate to fall from the current 25% to 15%. Achieving this goal will contribute significantly to reducing inequality and poverty in the country.[27]

Fiscal authorities also intend reducing the high fiscal deficit induced by the 2007–2009 global economic crisis and public debt, but fiscal sustainability may be jeopardised by the intensified use of expansionary fiscal strategies. A vital component of the NGP is spending on the provision of infrastructure and public services, and the fiscal policy is geared towards implementing an accelerated investment program of social and economic infrastructure as well as general government spending. This raises a number of critical policy questions, including the proposed composition of spending and whether the expanded spending should be financed through reducing government expenditure, increasing the government's budget deficit, or through increased taxation.

These questions are critical not only to the science of economics, but also for the practice of fiscal policy (Mountford and Uhlig, 2009). This chapter reflects on the current state and likely future of South African fiscal policy, focusing specifically on how the composition of government spending and alternative financing arrangements will affect the economy, both in the short and longer-term developmental sense. Resource allocation is also examined, as increased public expenditures can have a positive impact on the economy. However, increased spending (assuming all else is held constant) will also translate into greater debt, which might not be sustainable in the long run. Indeed, increasing spending may mean that, in the future, government will either need to reduce spending or increase taxes in order to get back to its original debt-to-GDP ratio. To evaluate the impact of such policies, an intertemporal model is used. In such a model, firms and households adopt a forward-looking behaviour, and all future prices in their investment and consumption decisions are taken into account.

This is the first known study that uses an integrated, intertemporal model to analyse empirically the macroeconomic effects of fiscal policy in an open, middle-income sub-Saharan African economy like South Africa's. This approach can provide important insights into the fiscal constraints and their impact on the economy as a whole, and the research contributes to existing literature on the transmission mechanism of fiscal policy in African economies. After the literature review, a discussion of the data used to implement the model and the model itself is followed by the analysis of several fiscal policy simulations and their impacts on the economy.

3.2 Literature Review

(Neo-)economics generally assumes that increasing employment and production does not require an activist fiscal policy. Government expenditure is believed to be consumptive and will crowd out private investment if financed with public debt. Wagner's law assumes that public expenditure is endogenous and hence cannot be used as a policy lever; at best, politicians should pursue balanced budget strategies. However, Keynesian economists believe that public expenditure is important for determining the level and distribution of income, as the market mechanism will not be sufficient to restore full employment. The body of empirical literature related to the public expenditure–economic growth is substantial. Moreno-Dodson (2009) contains a review of government spending and economic growth studies. Of direct relevance for this study is the idea that the composition of public expenditures (capital versus current) can have differential impacts on economic growth.

3.2.1 Public investment and growth

The literature on the effects of public capital spending on output dates back to Arrow and Kurz (1970) and Aschauer (1989). During the 1980s and 1990s, the link between public investment in infrastructure and economic growth was of particular interest, especially in the USA. The research trend has moved from initial headline estimates of a production elasticity of 0.4 in 1989 to the more modest assessments of 0.1 in 1997. When exploring the 'public infrastructure debate', the complexity of the subject matter means that empirical controversies are to be expected. Many of the benefits of public investment (e.g. improved health and a cleaner environment) are difficult to measure and are not always included in the calculation of gross value added. As Gramlich (1994) points out: "it will always be difficult to relate infrastructure investment to its goals, or changes in them".

27 The NGP document contains additional proposals aimed at reducing inequality other than by increasing employment. One such proposed measure is to cap bonuses and salaries that are above R550,000 per annum, and put in place policies that will moderate price increases.

International literature

In 1989, Aschauer's seminal paper found that public investment in infrastructure was a very important source of economic growth. Aschauer looked at the relationship between aggregate output and the stock and flow of government spending variables. He concluded that 'core' infrastructure (streets, highways, airports and mass transit systems) should be given more weight when assessing the role that government plays in promoting economic growth and productivity improvements. Aschauer's work suggested that the elasticity of output with respect to government capital was highly positive, within a range of 0.38 to 0.56, which implies extremely high returns. The marginal product of government capital would be in the region of 100% or more per annum, which means that one unit of government capital would pay for itself through higher output in a year or less. Given these results, it is not surprising that Aschauer's work initiated the 'public infrastructure debate'.

Munnell (1992) provides an excellent assessment of the early literature on the public infrastructure debate. She shows that the main problem with Aschauer's work is that his results do not rule out the possibility that the direction of causality runs from growth to infrastructure. In other words, economic growth might lead to an increase in the need for investment and/or an increase in the availability of funding. Munnell provides evidence to suggest the claim – that the wide range of estimates of public capital's impact on output "make the empirical linkages fragile" – is misleading. As Table 3.1 illustrates, in almost all cases the impact of public capital on private output has been found to be positive and statistically significant.

Table 3.1 The impact of an increase in the stock of public capital on output

Author	Focus of study	Output elasticity of public capital
Aschauer (1989)	US national	0.39
Holz-Eakin (1988)	US national	0.39
Munnell (1990a)	US national	0.34
Costa, Ellson and Martin (1987)	US states	0.20
Munnell (1990b)	US states	0.15
Duffy-Deno and Eberts (1989)	US metropolitan areas	0.08
Eberts (1986, 1990)	US metropolitan areas	0.03

Source: Table adopted from Munnell (1992)

Munnell concludes that, in addition to providing an immediate demand-side economic stimulus, public infrastructure investment appears to have a significant, positive effect on output and growth. However, in a policy making context, "[a]ggregate results cannot be used to guide actual investment spending. Only cost-benefit studies can determine which projects should be implemented".

Gramlich's influential paper (in 1994) begins by defining public sector ownership as the stock of infrastructure capital, but highlights that a broader definition could include private infrastructure capital, human capital investment and research and development spending. This emphasises the importance of definition – what type of investment is being classified as infrastructure and what type is then being linked to economic growth. Gramlich notes that a new highway might provide a very high return, whereas maintenance of rural roads might provide low or even negative economic rates of return; in such areas, investment objectives may be primarily social rather than economic. He shows that Aschauer's claims about infrastructure's major positive influence on economic growth are less plausible, as only two-thirds of the capital stock analysed by Aschauer even purport to raising national output – and to varying degrees.

As research in the field progressed, disputes over the direction of causality between changes in productivity and investment in infrastructure arose. Evans and Karras (1994) analysed infrastructure and productivity data for seven Organisation for Economic Cooperation and Development (OECD) countries between 1963 and 1988. The study found strong correlations between the two variables, but concluded that the direction of causality was the opposite of that reported by Aschauer and Munnel. That is, increased stocks of public capital were the result, not the cause, of increased productivity and economic growth. In analysing the correlation between average annual gross domestic product and government net capital stock, they concluded, "there is no evidence that government capital is highly productive" [Evans and Karras, 1994: 278]. In support of this view, Aklilu Zegeye (2000) found the output elasticity between public infrastructure and private investment to be just 0.02, concluding that infrastructure is a normal good, where wealthy countries will tend to have more and poor countries less.

Several other authors have attempted to resolve the causality question, refining their methodologies to capture the results of infrastructure investments, not the results of economic growth. A 2000 OECD study by Demetriades and Mamuneas, and a 2003 study by Esfahani and Ramirez handled the causality issue by introducing a 'time-lag' between public infrastructure

and productivity variables. Afterwards, investments were compared to the productivity data from several years later, which allowed time for the benefits of infrastructure investments to manifest in the productivity data and reduced the chance of misrepresenting economic growth impacts as productivity impacts. Using this technique, both studies found that public infrastructure does have a measurable impact on increasing productivity and economic growth, although not of the magnitude reported by Aschauer.

Lau and Sin (1997) published an important econometric paper on public infrastructure and economic growth, which The Standing Advisory Committee on Trunk Road Assessment (SACTRA, 1999) referred to as "the most sophisticated subsequent econometric studies" and commended for circumventing the "causality" and "definition" difficulties highlighted by Munnell and Gramlich among others. Lau and Sin estimate the elasticity of output with respect to public capital to be 0.11, which implies a much lower marginal product of public investment than that indicated by Ashauer's original paper. However, it still suggests that infrastructure investment has a significant impact on output.

South African literature

The literature on the impact of infrastructure investment on economic growth is still small and relatively recent in South Africa, but it follows a similar path to the trends observed for the international literature. Fourie (2006) offers a good account and Table 3.2 summarises known studies on this topic.

Early studies relied on classical econometric tools, but later studies use more recent techniques of Vector Error Correction Models (VECMs) and Vector Autoregressions (VARs). In spite of differences in methodology, the studies report a positive output elasticity. Bogetic and Fedderke (2005) find that infrastructure has positive effects on labour productivity but negative effects on total factor productivity. Their explanation for this counterintuitive result is that infrastructure only has direct effects and no indirect effects! This is grossly at odds with predictions from received theory that finds indirect effects are most important. A study by Fourie (2006) finds bi-directional causality between infrastructure and growth and large positive returns to infrastructure on equity. Using sophisticated VAR methodology, the recent study by Amusa (2008) finds that infrastructure on equity has larger positive effects on growth than economic infrastructure. In brief, irrespective of the methodology used, the South African studies reviewed show that infrastructure spending has favourable effects on growth. Some go further and argue that infrastructure on equity has higher returns than economic infrastructure.

Table 3.2 The impact of an increase in the stock of public capital on output in South Africa

Author	Infrastructure measure (on economic growth)	Econometric technique	Output elasticity
Abedian and Van Seventer (1995)	Public authorities capital stock	OLS	0.33
	Public sector capital stock	OLS	0.17
Coetzee and Le Roux (1998)	Public sector infrastructure stock	OLS	0.3
DBSA (1998)	Public authorities capital stock	OLS	0.25
		Cointegration	0.3
	Public sector capital stock	OLS	0.15
		Cointegration	0.28
	Public sector infrastructure stock	OLS	0.17
		Cointegration	0.25
Fedderke, Perkins and Luiz (2005)	Electricity generation	VECM	0.1-0.2 and rising to 0.5 after controlling for institutions
Bogetic and Fedderke (2005)	Infrastructure measures on labour productivity	VECM	0.2-0.4
	Infrastructure measures on total factor productivity	VECM	-0.6
Fourie (2006)	Electricity generation	VECM	0.2
	Electricity generation on a measure of equity performance	VECM	0.38
Amusa (2008)	Economic infrastructure	VAR	0.01-0.02
	Social infrastructure	VAR	0.01-0.02

Note: OLS ordinary least squares.
Source: Table adopted from Fourie (2006) and extended by authors

3.2.2 Current public expenditure and growth

As with public investment, evidence is mixed concerning the relationship between public expenditures and economic growth. Alm and Embaye (2010) find evidence in support of Wagner's law, while Ansari *et al*. (1997) find evidence for the Keynesian hypothesis. Ziramba (2008) on the other hand finds bi-directional causality, with no evidence for either the Keynesian or the Wagnerian hypotheses for South Africa. Marinkov (2011) recently constructed elasticity estimates for public expenditure variables for South Africa. Unlike the previous studies mentioned, disaggregated expenditures are employed: GDP, public expenditure, growth rate of total factor productivity, investment output ratio, as well as the marginal product of capital, are used to compute public expenditure GDP elasticities.[28]

In most of the studies reviewed, the output elasticity of public expenditure is positive and significant. However, the magnitudes of the effects vary considerably. This variance may be because of the different econometric estimation methods used and specification of the production function assumed (e.g. Cobb-Douglas or Translog).

Table 3.3 Summary of revenue elasticities for South Africa

Expenditure category	Elasticity estimate
Agriculture, forestry and fishing	2.41
Defence	0.22
Education	1.51
Fuel and energy	0.61
Health	1.87
Housing and community amenities	0.37
Mining, manufacturing and construction	-1.86
Public order and safety	-1.38
Recreation, culture and religion	-0.25
Social protection	0.39

Source: SAM 2005

Although the original headline elasticity claims of Aschauer (1989) have been reduced over time, more recent research suggests that infrastructure investment still has a significant impact on output. Perhaps the most important message to draw from all of the academic literature covered here is given by Gramlich (1994), "the best approach is not to try and analyse the numbers and tell how short the supply is and how much national or state spending or grants should be increased. A far more sensible approach is to find the optimal stock".

This suggests that the issue is not simply about increasing the level of public investment, but about investing in the right projects and managing this investment better.[29]

3.3 Data Description

The data used is based on a 57-activity social accounting matrix (SAM) of 2005. However, in order for the model to solve numerically for a long period of time, the SAM needed to be aggregated. In an intertemporal model where agents have forward-looking behaviour, all periods need to be taken into account and solved simultaneously. Furthermore, such a model needs many periods to allow the economy time to get back to a steady-state path after a shock has been introduced. Hence, the SAM was aggregated into 19 activities and commodities. The correspondence between the 19 sectors in the aggregated SAM and the 57-activity SAM is shown in Table 3.4.

28 The data for the variables listed above was obtained from Quantec's quarterly industrial database (www.quantec.co.za).

29 Ayogu (2005) also surveys the theoretical literature on infrastructure and growth and then reviews the empirical evidence globally and within the African region. Overall, he concludes that the question is not whether infrastructure matters but precisely how much it matters in different contexts. Ultimately, this is an empirical question that the literature has not yet resolved satisfactorily. In contrast, according to Ayogu, the crucial issue understanding policymaking processes in infrastructure remains little understood and largely under-researched.

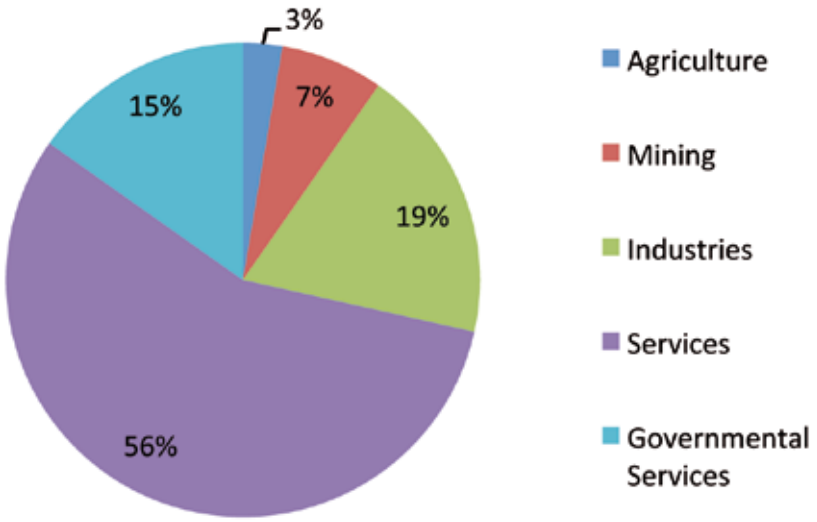
Table 3.4 Activities in the SAM

Sectors	Correspondence
Agriculture, forestry and fishing	Agriculture, forestry and fishing
Mining	Coal, gold, uranium ore and other mining
Food and beverages	Food, beverages and tobacco
Textiles	Textiles, wearing apparel, leather and leather products and footwear
Wood and paper	Wood and wood products, paper and paper products, and printing, publishing and recorded media
Petrochemicals	Coke and refined petroleum products, basic chemicals, other chemicals and man-made fibres, rubber and plastic products
Metals	Basic iron and steel, basic non-ferrous metals, metal products excluding machinery
Machinery and equipment	Machinery and equipment, electrical machinery, television, radio and communication equipment, professional and scientific equipment, motor vehicles, parts and accessories, other transport equipment
Other industries	Glass and glass products, non-metallic minerals, furniture, and other industries
Electricity, gas and steam	Electricity, gas and steam
Water supply	Water supply
Building construction	Building construction
Wholesale and retail trade	Wholesale and retail trade
Catering and accommodation services	Catering and accommodation services
Transportation	Railway transport, road transport, transport via pipeline, water transport, air transport, and transport support services
Other services	Communication, finance and insurance, business services, medical, dental and other health and veterinary services, and community, social and personal services
Government – education	Primary education, secondary education, and tertiary education
Government – health	Health
Government – other	General administration, defence, law and order, social and economic

Source: SAM 2005

In order to better appreciate the relative size of each sector in the South African economy, Figure 3.1 presents the contribution of grouped sectors to GDP, while Table 3.5 shows the sectoral contribution. Although South Africa shows a rather diversified economy, the importance of the services sector is clear; services contribute to more than half of GDP, whereas agriculture represents less than 3%.

Figure 3.1 Share of grouped sectors in GDP



Source: SAM 2005

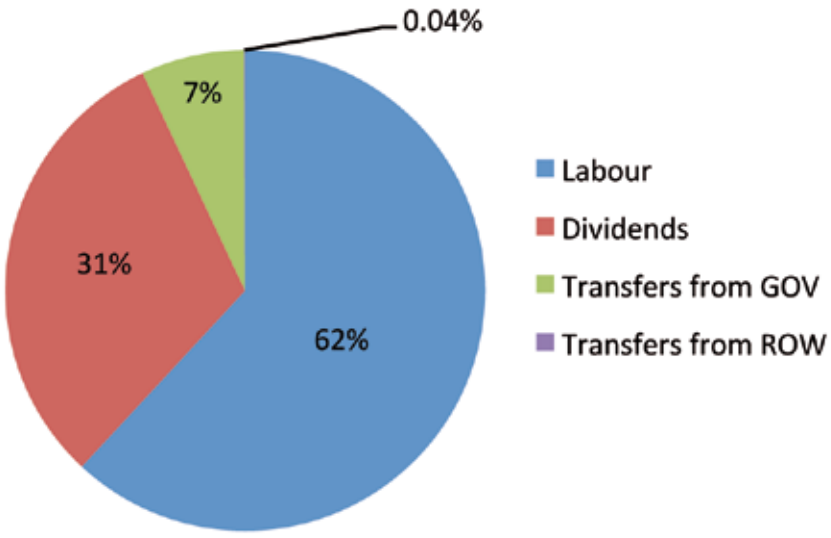
Table 3.5 Sectoral value added in GDP in 2005

Sectors	Share of VA in GDP
Agriculture, forestry & fishing	2.7%
Mining	7.0%
Food and beverages	3.1%
Textiles	0.8%
Wood and paper	1.6%
Petrochemicals	4.5%
Metals	3.5%
Machinery and equipment	3.5%
Other industries	2.4%
Electricity, gas and steam	0.5%
Water supply	0.2%
Building construction	0.1%
Wholesale & retail trade	13.5%
Catering & accommodation services	1.1%
Transportation	3.2%
Other services	30.7%
Government: education	5.9%
Government: health	2.1%
Government: other	7.3%

Source: SAM 2005

The SAM displays four institutional accounts. Households receive payment (for the factors of production they supply to the activities) and receive transfers from other agents. They use their income to consume, save, pay direct taxes and transfer to other agents (government (GOV) and the rest of the world (ROW)). Figure 3.2 shows the contribution of each source of revenue to total households' income.

Figure 3.2 Source of income for households



Source: SAM 2005

Firms' income is mainly composed of capital revenues, as well as minor transfers from other institutions. Firms distribute dividends to other agents, pay direct taxes and save. Firms' savings is a huge component in financing total investment.

Government collects direct taxes (from households and firms) as well as indirect taxes (on products, production and imports). It also receives dividends from the firms and transfers from other agents. Figure 3.3 displays the relative importance of each income source and highlights the reliance of public receipts on direct taxation.

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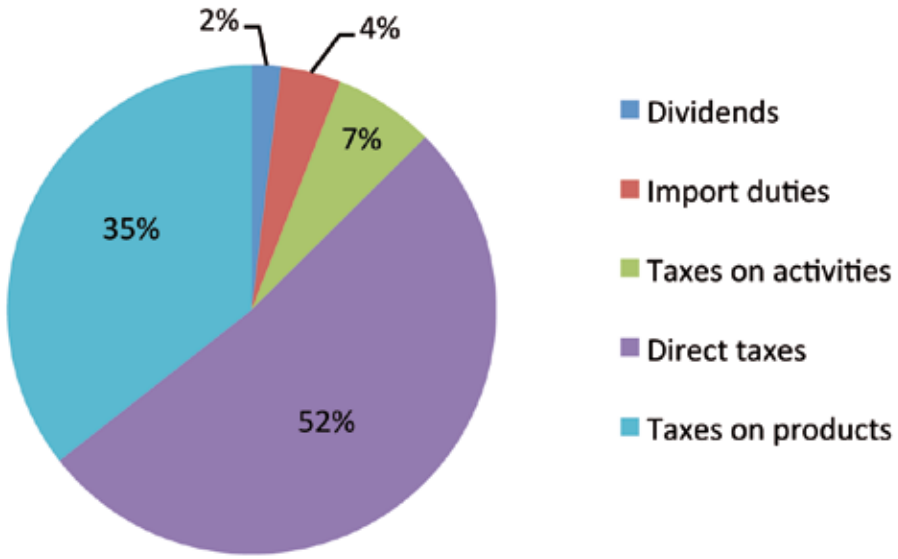
Figure 3.3 Sources of income for government



Source: SAM 2005

3.4 Model Description

The multi-sector, forward-looking, dynamic, general equilibrium model for South Africa presented draws largely from the family of PEP standard CGE models developed by Decaluwé *et al*. (2010). It is a neo-classical growth model in which the economy's steady-state growth rate is solely determined by the population growth rate augmented by Harrod-neutral technological progress. South Africa is considered a small-open economy producing tradable and non-tradable goods, which takes world prices and international interest rates as given. As discussed in the previous section, the economy is disaggregated into 19 industries, producing 19 products.

The model is real in the sense that only relative prices affect real variables. The numéraire is the nominal exchange rate or, more specifically, the conversion factor between local and foreign exchange units. All real variables are expressed in labour-efficiency units, in order to disentangle the dynamics resulting from the exogenous growth of the population from the dynamics induced by policy shocks.

3.4.1 Production

The representative firm in each industry combines labour, capital and intermediate inputs to produce composite commodities that can either be sold locally or exported. The firm has access to constant returns, in order to scale technology, and capital installation costs. It operates in a competitive environment in the goods markets, as well as in factor markets.

A nested structure is used to represent the production function of each activity. At the first level, output $(XST_{j,t})$ is a Leontief function of value-added input $(VA_{j,t})$ and of the aggregate of intermediate inputs $(CI_{j,t})$:

$$XST_{j,t} = \min\left[\frac{VA_{j,t}}{v_j}, \frac{CI_{j,t}}{io_j}\right]$$

where v_j and io_j are parameters.

Labour $(LD_{j,t})$ is combined with capital $(KD_{j,t})$ using a CES function to produce value added. Total factor productivity is influenced by the level of infrastructures (IND^{INF}) available in the economy. Hence:

$$VA_{j,t} = \left(KD_t^{INF}\right)^{\sigma^{INF}} B_j^{VA}\left[\beta_j^{VA} LD_{j,t}^{-\rho_j^{VA}} + \left(1-\beta_j^{VA}\right) KD_{j,t}^{-\rho_j^{VA}}\right]^{-\frac{1}{\rho_j^{VA}}}$$

where σ^{INF}, B_j^{VA}, β_j^{VA} and ρ_j^{VA} are parameters. σ^{INF} reflects the amplitude of the impact an increase in infrastructures would have on output (elasticity). The value of this elasticity was set to 0.3 (taken from the literature),[30] which can be considered to be in line with South African literature cited above.

The total stock of infrastructure at a given period depends on its depreciated level inherited from the previous period plus the new investment made by the government, IND^{INF},

$$(1+n)\, KD_{t+1}^{INF} = (1-\delta) KD_t^{INF} + IND_t^{INF}$$

Finally, the aggregate of intermediate inputs is a Leontief function of the composite inputs $(DI_{i,j,t})$:

$$DI_{i,j,t} = aij_{i,j} CI_{j,t}$$

where $aij_{i,j}$ is a parameter.

Further, assuming that capital stock at each period is determined by the depreciated stock from the previous period plus investment, $IND_{j,t}$,

$$(1+n)\, KD_{j,t+1} = (1-\delta_j) KD_{j,t} + IND_{j,t}$$

where δ_j is the depreciation rate and n is the rate of growth of the labour force, adjusted to take into account technical progress[31].

The representative forward-looking firm maximises the actualised value of profits, net of investment expenditures:

$$\max \sum_{t=1}^{T} \left[\frac{1}{1+ir_t}\right]^t \left(r_{j,t} KD_{j,t} - PK_t IND_{j,t}^T\right)$$

Where profits are given by

$$r_{j,t} KD_{j,t} = PP_{j,t} XS_{j,t} - w_t (1+ttiw_{j,t}) LD_{j,t} - \sum_i PC_{i,t} DI_{i,j,t} - ttik_{j,t} KD_{j,t}$$

with ir_t, $r_{j,t}$, $PP_{j,t}$, w_t, $ttiw_{j,t}$,, $ttik_{j,t}$ and $PC_{i,t}$ being respectively the interest rate, the rate of return to capital, the price received by the firm for its aggregated output, the wage rate, taxes paid on the labour, taxes paid on capital and the price paid for input i.

Following Hayashi (1982), a convex adjustment cost function is considered, which is linear homogeneous in both of its arguments, i.e. investment and capital stock. In mathematical terms:

$$IND_{j,t}^T = \left(1 + \frac{\phi_j}{2} \frac{IND_{j,t}}{KD_{j,t}}\right) IND_{j,t}$$

where ϕ_j is the adjustment parameter.

In maximising a firm's value, managers determine the optimum paths for investment, labour and other intermediate inputs. Apart from investment decisions, the first-order conditions of the firm's intertemporal optimisation problem are the standard ones encountered in static optimisation problems. Firms use the production factor up to the point where its marginal product equals its price.

$$\frac{LD_{j,t}}{KD_{j,t}} = \left[\frac{\beta_j^{VA}}{1-\beta_j^{VA}} \frac{r_{j,t}(1+ttik_{j,t})}{w_t(1+ttiw_{j,t})}\right]^{\sigma_j^{VA}}$$

The optimum level of investment is determined so as to equalise the marginal cost of investment to the shadow price of capital, i.e. the marginal benefit q_j (evaluated in terms of change in firms' value) of changing the capital stock by a unit. The firm's marginal cost of investment includes not only the purchase price of capital goods, but also the additional capital installation

30 See Dissou and Didic (2011) and Calderón *et al*. (2009).

31 The intertemporal model is thus defined per unit of effective worker.

costs incurred. This behaviour refers solely to the business sectors, bus. In the public sectors, investment does not follow an optimisation process but is rather determined exogenously by the government.

$$q_{bus,t} = PK_t \left(1 + \phi_{bus} \frac{IND_{bus,t}}{KD_{bus,t}}\right)$$

The marginal benefit of the investment takes into account the marginal impact of investment on current and future profits. Thus, the marginal benefit is the discounted sum of present and future marginal gain of physical capital. The marginal gain is the sum of the marginal product and the gain associated with the reduction in installation costs linked to the increase in the capital stock.

$$q_{bus,t+1}(1-\delta_{bus}) = q_{bus,t}(1+ir_t) - r_{bus,t+1}(1-ttik_{bus,t+1}) - PK_{t+1}\left[\frac{\phi_{bus}}{2}\frac{IND_{bus,t+1}}{KD_{bus,t+1}}\right]^2$$

It appears that two main channels can affect firms' investment decisions: the purchase price of capital goods and the marginal product of capital, which depends mostly on the producer price received by the firm. An increase in the purchase price of capital goods has a negative impact, whereas an increase in the producer price has a positive impact on investment demand. Assuming that total private and public investment demand is a Cobb-Douglas composite of several commodities, the demand for each commodity entering this composite is a fixed share γ_i (in value) of total gross fixed capital formation $(GFCF)$.

$$PC_{i,t} INV_{i,t} = \gamma_i^{INV} GFCF_t$$

It follows that the average price of the capital goods is given by the following equation:

$$PK_t = \frac{1}{A^K}\prod_i \left[\frac{PC_{i,t}}{\gamma_i^{INV}}\right]^{\gamma_i^{INV}}$$

where A^K is a scale parameter.

Finally, total financial wealth at each period is given by:

$$Wealth_t^{TOT} = \sum_{bus} q_{bus,t} KD_{bus,t+1}$$

3.4.2 Households

Consider an economy populated by a finite number of infinitely lived households. The representative household makes consumption and savings decisions, derives its current income from wages and profits paid by firms, and pays income tax. It maximises an intertemporal utility function subject to a sequence of budget constraints and an intertemporal solvency constraint. The intertemporal utility function, which is additively separable, features a constant rate of time preference (ρ^H) and an instantaneous logarithmic utility function that is weakly separable and defined over aggregate consumption CTH_t,

$$\max u = \sum_{t=1}^{T}\left[\frac{1}{1+\rho^H}\right]^t \ln CTH_t$$

subject to:

$$SH_t = w_t LS_t + \lambda_{HH}^{RK}\sum_j r_{j,t} KD_{j,t} + \sum_{ag} TR_{HH,ag} + INT_t^{DOM} - TDH_t - \sum_{ag} TR_{ag,HH} - CTH_t$$

where SH_t represents savings, LS_t labour supply, λ_{hh}^{RK} the share of capital income received by households, INT_t^{DOM} domestic interest paid on the public debt, TDH_t income taxes and $TR_{HH,ag}$ and $TR_{ag,HH}$ transfers respectively received and paid by households from and to other agents.

By solving its optimisation problem, the representative household determines the optimal paths for consumption expenditures. The first-order condition of this standard optimisation problem is the consumption Euler equation, which specifies the trade-off between consumption in two consecutive periods. This trade-off depends on the ratio of real interest rate (in terms of consumption) and the discount factor. More precisely, an anticipated rise in the real interest rate relative to the rate of time preference induces households to substitute current consumption for future consumption.

$$CTH_{t+1}\left(1+\rho^{H}\right)=CTH_{t}\left(1+ir_{t}\right)$$

Based on the optimal path for aggregate consumption (or consumption expenditures), in each period the representative household allocates these expenditures among the available commodities (C_i). A linear expenditure system (LES) function is used as the aggregator function to specify the relation between aggregate consumption and the quantities of various commodities consumed by the representative household.

$$C_{i,t}PC_{i,t}=\overline{C_{i,t}^{MIN}}PC_{i,t}+\gamma_{i}^{LES}\left(CTH_{t}-\sum_{ij}\overline{C_{ij,t}^{MIN}}PC_{ij,t}\right)$$

where $\overline{C_{i,t}^{MIN}}$ represents the minimum consumption of commodity i and γ_i^{LES} the marginal share of commodity i in the household's consumption budget.

3.4.3 Government

The government's behaviour is simple. It collects direct and indirect taxes, receives and pays transfers, and consumes goods and services. It also pays interest (INT_t^{DOM} and INT_t^{ROW}) on the public domestic and foreign debt ($Debt_t^{DOM}$ and $Debt_t^{ROW}$ respectively) for which interest rates $\overline{ir}_t^{DOM}$, $\overline{ir}_t^{ROW}$ can differ and are exogenous.

$$INT_{t}^{DOM}=\overline{ir}_{t}^{DOM}Debt_{t}^{DOM}$$

$$INT_{t}^{ROW}=\overline{ir}_{t}^{ROW}Debt_{t}^{ROW}$$

The distribution between domestic and foreign borrowings is assumed to be fixed, although different closure could be assumed. The government issues bonds (SG) to finance current and investment expenditures that exceed its revenue.

$$SG_{t}=YG_{t}-\sum_{agng}TR_{agng,GVT,t}-\overline{G}_{t}-INT_{t}^{DOM}-INT_{t}^{ROW}-IT_{t}^{PUB}$$

A positive balance implies that the government would reimburse part of its debt, whereas a negative balance would increase it. Hence,

$$\begin{aligned}\left(1+n\right)Debt_{t+1}^{TOT}&=\left(1+\overline{ir}_{t}^{ROW}\right)Debt_{t}^{ROW}+\left(1+\overline{ir}_{t}^{DOM}\right)Debt_{t}^{DOM}-\left(SG_{t}+INT_{t}^{DOM}+INT_{t}^{ROW}\right)\\&=Debt_{t}^{ROW}+Debt_{t}^{DOM}-SG_{t}\end{aligned}$$

A wide variety of taxes have been introduced in the model to allow many tax instruments to be taken into account. Although some of these are not used, the SAM enables users to easily implement new taxes in order to evaluate alternative financing options and their impacts on the South African economy.

3.5 Simulations and Results

Three sets of simulations are run under three different financing options or scenarios. In Simulation 1, government current expenditures are increased by 10% in 2011 and 2012, and 2% for the three following years. In Simulation 2, government investment expenditures are increased by the same percentage, i.e. 10% in 2011 and 2012 and 2% in 2013–2015. Both simulations assume that government expenditures would go back to their business as usual (BAU) values from 2016. In Simulation 3, investment spending increases by 10% every year for 10 years (2011–2020) and then, from 2021, stays at the 2020 level.

Different financing mechanisms are envisaged in all these scenarios. The first assumption is that the government cannot run a greater deficit, and therefore taxes will have to be increased in order to compensate for this new spending. To keep the deficit constant, two different taxes are alternatively set endogenous: tax on households' income and tax on commodities. As a third experiment, all taxes are kept constant, and the government increases its deficit. In other words, the public administration finances its additional expenditures through increased debt. Table 3.6 presents the impact of increased current public spending under the three financing mechanisms, for three years: 2011, 2015 and 2025.

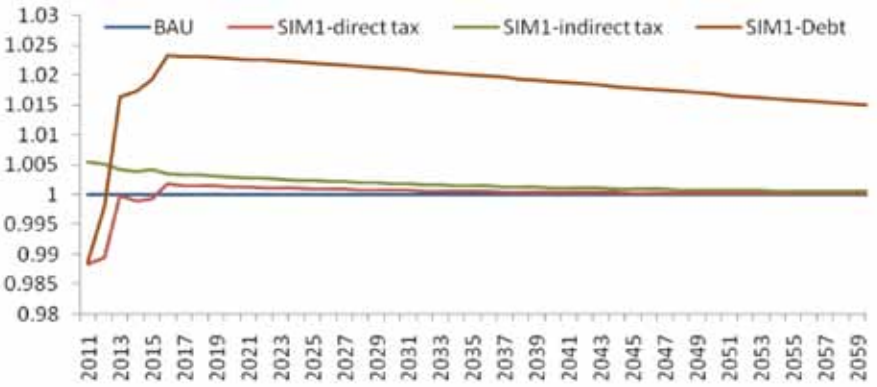
Table 3.6 Simulation 1 – Impact of increased current public expenditures on macroeconomic variables (deviation from BAU in %)

	Direct tax financing			Indirect tax financing			Debt financing		
	2011	2015	2025	2011	2015	2025	2011	2015	2025
GDP	1.18%	0.07%	-0.10%	-0.54%	-0.42%	-0.23%	1.14%	0.04%	-0.12%
GDP deflator	1.19%	0.38%	0.11%	-0.56%	0.15%	0.16%	1.15%	0.35%	0.10%
Real GDP	-0.01%	-0.31%	-0.20%	0.02%	-0.57%	-0.39%	-0.01%	-0.32%	-0.21%
Real consumption	-1.07%	-0.71%	-0.24%	-1.65%	-0.81%	-0.40%	-1.09%	-0.74%	-0.27%
Real investment	-5.56%	-0.77%	-0.05%	-2.54%	-1.27%	-0.28%	-5.69%	-0.81%	-0.07%
Debt	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.97%	2.08%
Gov. expenditures	5.92%	1.22%	0.03%	6.23%	1.36%	0.07%	5.91%	1.43%	0.25%
Increase in tax rate	2.65%	0.63%	0.06%	1.01%	0.26%	0.04%	n.a.	n.a.	n.a.

Source: Simulation results

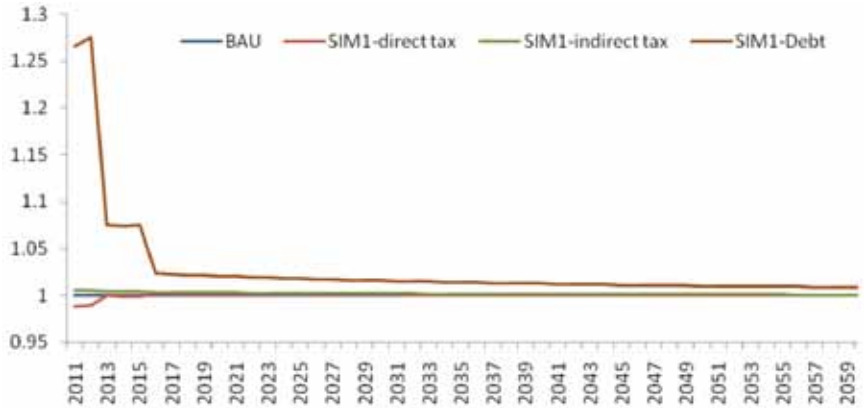
In order to finance its additional expenditures, the government would need to raise the actual income tax by 2.65 percentage points in the short run. However, the increase would be temporary because income tax rates slowly return to their original levels, as public expenditures revert to their BAU values. If the government chooses to finance new spending through indirect taxation, an additional tax of 1% on all commodities would be necessary to keep the deficit constant. In the longer run, this new tax would no longer be necessary, for the same reasons as in the direct taxation scenario. Under all three financing schemes, the impacts on macroeconomic variables are rather small. In the short run, real GDP stays about the same as in BAU, but the impact on investment is greater, which affects the long-run value of GDP. This impact on investment is greater in the income tax scenario and under the debt-financed scheme, as these financing mechanisms have a greater effect on savings from households and public deficit. Although in the short run, an indirect tax affects investment less, its impact is more even across periods, leading to a similar decrease of the real GDP in the longer run. Figures 3.4 and 3.5 show the debt-to-GDP ratio and the deficit-to-GDP ratio respectively over the next 60 years for the first scenario (increased government expenditure).

Figure 3.4 Simulation 1 – Impact of increased public current expenditure on debt-to-GDP ratio (BAU = 1)



Source: Simulation results

Figure 3.5 Simulation 1 – Impact of increased public current expenditure on deficit-to-GDP ratio (BAU = 1)



Source: Simulation results

Although the impacts of the three financing mechanisms are about the same for the macroeconomic variables, the two ratios (debt-to-GDP and deficit-to-GDP) do vary. Indeed, in all cases the ratios would be greater than they would have been without the increased current spending. However, the impact is much more important if the government chooses to finance its extra spending through increased debt (SIM1-debt). In the very long run, the debt-to-GDP ratio is 1.5% greater than what it would have been and close to 1% for the deficit-to-GDP ratio. In other words, increased government spending for a short period of time will have a long-lasting impact on these two indicators.

Increased public spending in education and health would probably have a positive impact on the productivity of the factors of production, as a more educated and healthy work force is more likely to be more productive. However, in its current version, the model does not attempt to capture this impact.

Adding this feature into the CGE model would be straightforward, but would probably not be sufficient to generate such impacts given the relatively short period for which current spending is higher. In any case, the results presented here could be considered as the worst-case scenario, as any positive impact on productivity would generate a positive impact on GDP and other economic variables. Furthermore, assuming all else is held constant, a positive impact on GDP would translate into smaller debt-to-GDP and deficit-to-GDP ratios.

In Simulation 2, the government increases its investment spending (see Table 3.7).

Table 3.7 Simulation 2 – Impact of increased public investment (2011 to 2015) on macroeconomic variables (deviation from BAU in %)

	Direct tax financing			Indirect tax financing			Debt financing		
	2011	2015	2025	2011	2015	2025	2011	2015	2025
GDP	0.02%	0.15%	0.17%	-0.22%	0.16%	0.26%	0.02%	0.15%	0.17%
GDP deflator	0.02%	-0.34%	-0.27%	-0.22%	-0.33%	-0.25%	0.02%	-0.34%	-0.27%
Real GDP	0.00%	0.49%	0.44%	0.00%	0.49%	0.51%	0.00%	0.49%	0.44%
Real consumption	0.07%	0.30%	0.37%	-0.09%	0.23%	0.37%	0.07%	0.30%	0.38%
Real investment	-0.21%	0.89%	0.51%	0.46%	1.12%	0.79%	-0.25%	0.88%	0.51%
Debt	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.17%	-0.15%
Gov. expenditures	0.73%	0.07%	-0.07%	0.76%	0.06%	-0.10%	0.73%	0.08%	-0.08%
Increase in tax rate	0.34%	-0.03%	-0.11%	0.13%	-0.01%	-0.04%	n.a.	n.a.	n.a.

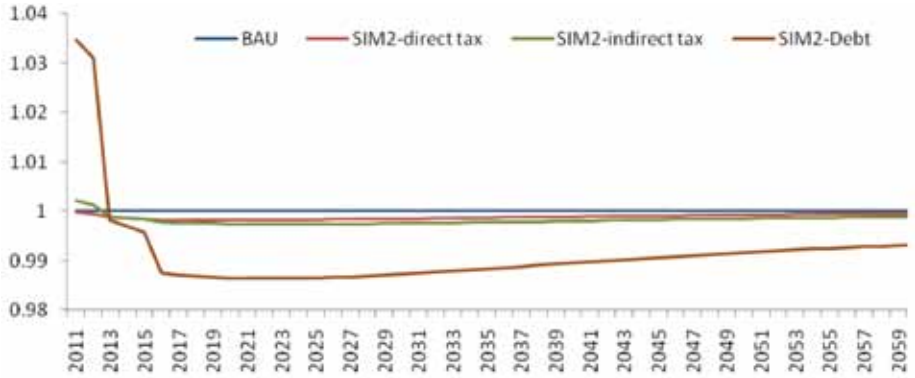
Source: Simulation results

Although the amplitude of the shock is the same as in Simulation 1 (10% for the first two years, then 2% for the following three years), current expenditures represent a greater part of public expenditures. Hence, in the first simulation, government expenditures increase by about 6% compared to less than 1% here. Therefore, it is not surprising that the required rise in taxes (direct or indirect) is much less than the one presented in Table 3.6. Similarly, impacts on real GDP in the short run are negligible.

However, as these expenditures finance investment, thus increasing total infrastructure and output, the GDP is positively affected in the medium and longer run. In fact, under a rigid deficit, taxes would eventually go down, as a result of greater production in the economy.

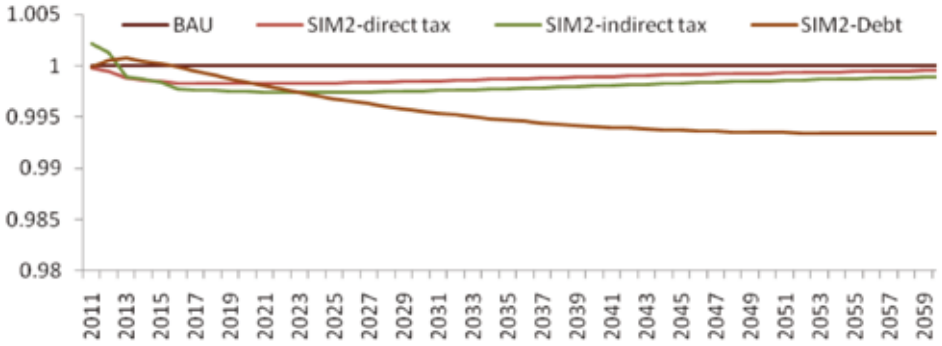
Figures 3.6 and 3.7 display different trends for the debt-to-GDP and deficit-to-GDP ratios compared to those seen in Simulation 1. In fact, as the GDP grows over time, a constant deficit translates into an improvement of both ratios. More surprisingly, this improvement is the greatest under the debt-financed scenario. In fact, keeping the same tax rates throughout the modelling horizon, would increase government revenues in the longer run and thus allow for a smaller deficit in the future.

Figure 3.6 Simulation 2 – Impact of increased public investment on debt-to-GDP ratio (BAU = 1)



Source: Simulation results

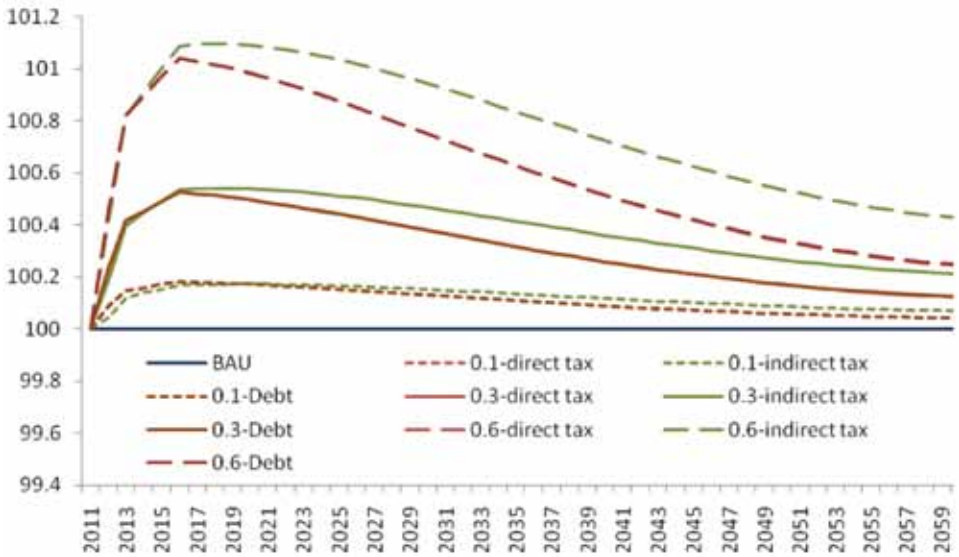
Figure 3.7 Simulation 2 – Impact of increased public investment on deficit-to-GDP ratio (BAU = 1)



Source: Simulation results

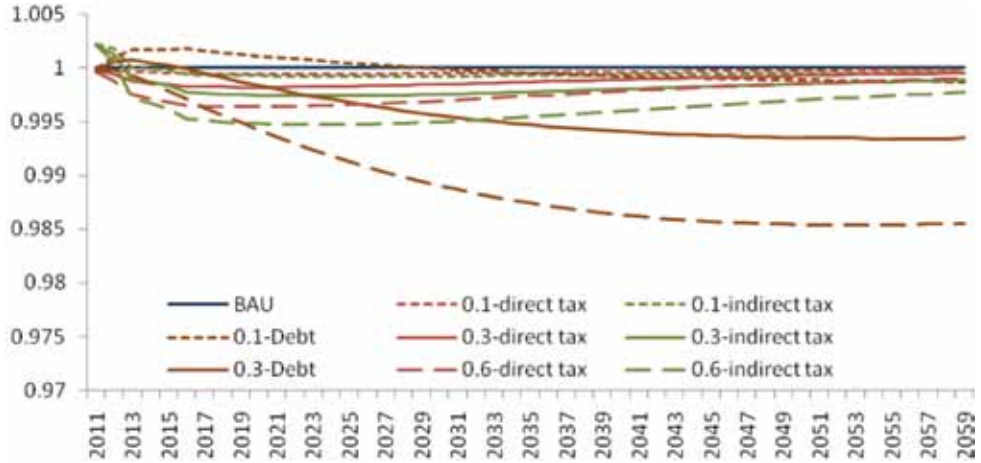
In order to test the robustness of the model to the elasticity values, Simulation 2 is run under the three different financing mechanisms using the lowest (0.1) and the highest (0.6) values of elasticity shown in Table 3.2. Figures 3.8 and 3.9 present the impact on real GDP and debt-to-GDP ratio respectively. The results are qualitatively similar, whatever the value of the elasticity of the total factor productivity to infrastructure. In fact, the conclusions discussed above still hold when comparing the different financing schemes. As might be expected, the magnitude is a bit different, but impacts are not significantly different, being in a range of less than 1%.

Figure 3.8 Simulation 2 – Impact of increased public investment on GDP (BAU = 100)



Source: Simulation results

Figure 3.9 Simulation 2 – Impact of increased public investment on debt-to-GDP ratio (BAU = 1)



Source: Simulation results

3.6 Conclusion

The simulations focused on the impact of increased current and investment spending, using an intertemporal CGE model built for South Africa with elaborated government features. An expansive fiscal policy had a short-run, positive impact on GDP but translated into a greater debt-to-GDP ratio. This impact was mitigated by financing the increased spending through taxation, direct or indirect, but also had a negative short-run impact on macroeconomic variables. Under any financing scheme, increased investment spending improved long-run GDP and decreased debt-to-GDP and deficit-to-GDP ratios. Driving this outcome is the positive impact that infrastructure has on total factor productivity. Without this feature, increased public investment would have almost no impact on the South African economy.

Although the positive impact of infrastructure on growth is well documented, less is known about the effect that current expenditures on education and health may have on total factor productivity. More conclusive econometric work for South Africa would allow for a better modelling of public spending and, therefore, a better understanding of how this spending affects economic growth.

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CHAPTER 4: REALISING MILLENNIUM DEVELOPMENT GOALS THROUGH INTERGOVERNMENTAL FISCAL TRANSFERS

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4.1 Introduction

After successful free elections in April 1994, South Africa was readmitted to the international community, following years of international isolation imposed on the country due to its racially motivated apartheid policies. Since 1994, trade liberalisation, accompanied by responsible monetary and fiscal management, has allowed South Africa to experience continuous, moderate economic growth. Inflation has been kept within target, and the budget deficit has been falling, while the government has channelled substantial resources into social programmes and services. However, the economy has failed to grow sufficiently to make inroads into the high unemployment and poverty (Hoogeveen and Özler, 2004). Following the 2004 elections the government outlined five key development goals in the Government's Contract with the People of South Africa:

i. Reduce poverty by half, through economic development, comprehensive social security, land reform and improved household and community assets;

ii. Provide the skills required by the economy, build capacity and provide resources across society;

iii. Reduce unemployment by half, through new jobs, skills development, assistance to small businesses, opportunities for self-employment and sustainable community livelihoods;

iv. Massively reduce cases of TB, diabetes, malnutrition and maternal deaths, turn the tide against HIV/AIDS, strive to eliminate malaria and improve services to achieve a better national health profile; and

v. Reduce preventable causes of death, including violent crime and road accidents.

Furthermore, South Africa adopted the UN Millennium Declaration, together with other countries, in an unprecedented declaration of solidarity to rid the world of poverty. In 2000, heads of states agreed to use the Millennium Development Goals (MDGs) to reduce poverty by 2015 or earlier. The MDGs indicate the results that the country wants to achieve (outcomes) based on certain inputs (resources), outputs (understanding of activities and changes) and impact (change/effect of intervention). Some of the MDG outcome indicators are closely related to the rights mentioned in the South African Constitution. As MDGs are a costly programme, most developing countries include them within national policies. In South Africa, MDGs are rolled out with the help of Statistics South Africa (StatsSA), the custodians of data in the country. An often-overlooked aspect of MDGs is intergovernmental fiscal relations (IGFR). This chapter assesses the feasible strategies within an intergovernmental fiscal framework to achieve MDG goals and tries to answer the following questions:

- What does it take to achieve the MDG goals for South Africa using the IGFR financing framework?

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- Is South Africa on track to achieve its MDG goals, and what does 'on track' mean?
- What is the cost of achieving selected MDG goals?
- How do various financing strategies impact on the results?

4.2 Status of MDG achievement in South Africa

As national priorities should be aligned with the MDGs, Table 4.1 shows the progress made by South Africa since 1994 in reaching these goals.

Table 4.1 South Africa – Millennium Development Goals, 1990–2015

	1990	1995	2000	2005	2006	2007	2008
1. Eradicate extreme poverty and hunger	2015 target: half 1990 $1-a-day poverty/malnutrition rates						
Population below $1 a day (%)	..	6.3	11.3	..	5	..	..
Poverty gap at $1 a day (%)	..	0.6	3.2	..	1.1	..	..
Percentage share of consumption held by poorest 20%	..	3.6	2.9	..	2.8	..	..
Prevalence of child malnutrition (% of children under 5)	..	3	..	..	3	..	..
2. Achieve universal primary education	2015 target: net enrolment of 100%						
Net primary enrolment ratio male (%)[36]	90	..	96	98.1	97.9	98.1	98
Net primary enrolment ratio female (%)[37]	90	..	96	98.4	98.6	98.2	98.8
Youth literacy rate (% ages 15–24)	..	93.9	93.5	88.8	89.5	90.1	90.3
3. Promote gender equality	2005 target is to have education ratio to 100						
Ratio of girls to boys in primary education	1:1.05	1:1.03 (1996)	1:1.02 (1999)	..	1:1.05	..	1:1.04 (2009)
Ratio of girls to boys in secondary education	1:0.89	1:0.88 (1996)	1:0.89 (1999)			1:0.95	1:0.94
Ratio of young illiterate females to males (% ages 15–24)	..	101	99.9	..	..	..	..
Share of women employed in the non-agricultural sector (%)	42.6	43.6	44.6	44	42.9	42.9	..
Proportion of seats held by women in national parliament (%)	3	25	30	32.8	32.8	33	..
4. Reduce child mortality	2015 target = reduce 1990 under 5 mortality by two thirds						
Under 5 mortality rate (per 1,000) [38]	61.7	63.2	77.4	78.5	74.6	69.4	65.3
Infant mortality rate (per 1,000 births)	45	45	50	55	56	56	48
Immunisation, measles (children under 12 months)	79	76	77	80.1	86.6	87.6	93.3
5. Improve maternal health	2015 target = reduce 1990 maternal mortality by three quarters						
Maternal mortality ratio (modelled estimate per 100,000 births)	230	260	380[39]	440[40]	400	400	410[41]
Births attended by skilled health staff (% total)	..	82	84	92 (2003)	..	..	94.3 (2009)
6. Combat HIV/AIDS, malaria and other diseases	2015 target = halve and begin to reverse prevalence of diseases						
Prevalence of HIV (% ages 15–49) [42]	0.8	6.2	15.9	18.2	18.2	18.1	8.7
Contraceptive prevalence rate (% women aged 15–24) [43]	57	..	56.3 (1998)	59.9 (2003)	14.8	12.7	..
Number of children orphaned by HIV/AIDS (thousands)	..	..	660	1200[44]	..	1400[45]	1800[46]

36 Overall before 2005 and by gender from 2005.

37 Overall before 2005 and by gender from 2005.

38 http://data.worldbank.org/country/south-africa.

39 http://www.indexmundi.com/facts/south-africa/maternal-mortality-ratio (sourced from WHO, UNICEF, UNFPA and the World Bank).

40 http://data.worldbank.org/indicator/SH.STA.MMRT.

41 http://data.worldbank.org/indicator/SH.STA.MMRT.

42 http://www.tradingeconomics.com/south-africa/prevalence-of-hiv-total-percent-of-population-ages-15-49-wb-data.html for 1990 to 2007.

43 http://www.tradingeconomics.com/south-africa/contraceptive-prevalence-percent-of-women-ages-15-49-wb-data.html.

44 http://www.un.org/esa/population/publications/AIDS_Wallchart_web_2007/HIV_AIDSchart_2007.pdf.

45 http://www.nationsencyclopedia.com/WorldStats/HNP-children-orphaned-hiv-aids.html.

46 http://www.aids.org.za/page/orphaned-children.

	1990	1995	2000	2005	2006	2007	2008
Incidence of tuberculosis (per 100,000 people)	224	392.4	580[47]	645[48]	940	948[49]	960[50]
Tuberculosis cases detected under DOTS (%)[51]	72.8	41.2	62.6	71.7	76.6	78.	72.13
7. Ensure environmental sustainability	2015 target = various						
Forest area (% of land area) [52]	7.58	7.58	7.58	7.58	7.58	7.58	7.58
Nationally protected areas (% of total land area) [53]	..	6.1	..	..	6.1	..	6.05
GDP per unit of energy use (2005 PPP $ per kg of oil equivalent) [54]	3.03	2.74	2.99	3.15	3.25	3.29	..
CO2 emissions (metric tons per capita) [55]	9.47	9.03	8.37	8.72	8.74	8.82	..
Access to an improved water source (% of population)	83	84	89	91.7	92.2	92.7	92
Access to improved sanitation (% of population)	55	56	57	66.7	68.2	70.1	69.7
8. Develop a global partnership for development	2015 target = various						
Youth unemployment rate (% of total labour force ages 15–24)	..	..	44.2	..	..	46.9	..
Fixed line and mobile telephones (per 1,000 people)	94.3	116	302.3	825.1	825.1	889	..
Fixed line and mobile telephones (per 100 people) [56]	9.43	11.6	30.23	82.51	93.49	97.87	101.52
Personal computers (per 1,000 people)	7.1	28.1	66.4	84.60	84.6	..	..
Personal computers (per 100 people) [57]	0.71	2.81	6.59	8.46			
General Indicators							
Adult literacy rate (% of people ages 15 and over) [58]	..	82.4	85.2	..	..	88	89
Total fertility rates (births per woman) [59]	3.66	3.11	2.87	2.67	2.63	2.58	2.54
Life expectancy at birth (years) [60]	61.9	60.49	55.79	2	52	51	51

Note: Where data is not available for a specific year, data is given for the closest year; where possible. Worked up to MDG6 (Prevalence of HIV). Some explanations and sources are given in footnotes.
Sources: StatsSA, 2010, World Bank (1999) and various sources as in the notes above

4.2.1 Goal 1 – Eradicate extreme poverty and hunger

Between 2000 and 2006, the proportion of people experiencing extreme poverty (those living on less than $1 a day) fell by over half, from 11.3% to 5%, thus achieving the MDG1. However, while the poverty gap has declined, from 0.24 in 1994 to 0.20 in 2007, during the same period the Gini coefficient, which measures income inequality, increased from 0.672 to 0.685 (The Presidency, 2008). The figure of 0.685 is worse than Brazil, the Bahamas, Jamaica and 33 other developing countries (May and Hunter, 2004:2). 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). According to National Treasury (2009a) spending on the poorest 20% of the population was R4,079 per capita in 2006. Not only has government spending per person on these programmes increased by 70% in real terms, but spending on the poorest 40% has also grown by 83% in real terms.

47 http://www.who.int/whosis/whostat/2010/en/index.html.
48 http://www.hsrc.ac.za/research/output/outputDocuments/5632_Setswe_TBandHIVAIDS.pdf.
49 http://www.usaid.gov/our_work/global_health/id/tuberculosis/countries/africa/safrica_profile.html.
50 http://www.who.int/whosis/whostat/2010/en/index.html.
51 http://www.nationsencyclopedia.com/WorldStats/MDI-tuberculosis-case-detection-rate.html for 1990 and 2008.
52 http://www.nationsencyclopedia.com/WorldStats/ADI-tuberculosis-cases-detected-dots.html for 1995 to 2007.
53 http://www.nationsencyclopedia.com/WorldStats/WDI-environment-land-forest-area-of.html; http://data.worldbank.org/indicator/AG.LND.FRST.ZS.
54 http://www.tradingeconomics.com/south-africa/terrestrial-protected-areas-percent-of-total-surface-area-wb-data.html.
55 http://www.tradingeconomics.com/south-africa/gdp-per-unit-of-energy-use-constant-2005-ppp-dollar-per-kg-of-oil-equivalent-wb-data.html.
56 http://www.tradingeconomics.com/south-africa/co2-emissions-metric-tons-per-capita-wb-data.html from 1990 to 2006.
57 http://www.tradingeconomics.com/south-africa/personal-computers-per-100-people-wb-data.html.
58 http://data.un.org/Search.aspx?q=literacy+rates+africa.
59 http://www.tradingeconomics.com/south-africa/fertility-rate-total-births-per-woman-wb-data.html.
60 http://www.tradingeconomics.com/south-africa/life-expectancy-at-birth-total-years-wb-data.html; http://data.worldbank.org/indicator/SP.DYN.LE00.IN.

4.2.2 Goal 2 – Primary education for all

According to Hollenbeck (2001), educational attainment of individuals may be important on equity grounds, as an individual's education may be the key to their economic situation. Education determines the distribution, not just the growth, of income. Studies conducted in developing countries indicate that maternal schooling is also a very strong and consistent predictor of reduced child mortality and morbidity (Pavalavalli and Ramesh, 2001). As education can play a major role in attaining equity and health-related goals, education goals are discussed in more depth later. Target 2 for education is that by 2015 children everywhere, boys and girls alike, will be able to complete a full course of primary schooling. The number of 15 to 24 year olds who are not literate has been decreasing steadily, from 14% in 2002 to 10% in 2006, (The Presidency, 2008). School attendance rose from 96.7% in 2002 to 98.6% in 2009, while functional literacy rate, based on Grade 7 educational achievement, rose from 88% to 91% between 2002 and 2009, (StatsSA, 2010). Although South Africa has reportedly achieved the MDG target on primary education outcome before 2015, issues of educational quality and functionality remain critical within the country.

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

4.2.3 Goal 3 – Gender equality

The overall Gender Parity Index (GPI) of 1.06 shows that slightly more girls than boys attend schools. The GPI for primary schools is below 1, which suggests that more boys than girls attend primary school; however at secondary and tertiary level, the situation is reversed, with more girls than boys attending (UNDP, 2007).

South Africa is also committed to promoting gender equality across other spheres in the country. Currently about one-third of Members of Parliament, 44% of Cabinet and 5 out of 9 provincial premiers are women. Between 1994 and 2009, the percentage of women in government rose from 25.4% to 42.4%. However, women are not represented to the same extent in business, but South Africa fares well compared to international trends and some developed countries. A recent survey of 372 companies by Nedbank found that 19.8% of executive managers and 10.7% of directors are women.

Although women are still more likely to be poor, unemployed or working in the informal sector, South Africa can be considered to have reached most of the MDG gender equity targets (Stats SA, 2010).

4.2.4 Goal 4 – Reduce child mortality

Progress in the reduction of child mortality is assessed against three main indicators: under-five mortality rate, the infant mortality rate and the proportion of one-year-old children immunised against measles. Infant mortality declined from 51.5 in 2001 to 45.2 in 2007 (StatsSA, 2008). Although progress is in the right direction it is still far from the set target of 15 per 100,000. The high numbers are mainly as a result of HIV/AIDS.

The target for under-five child mortality was set at 20 per 1,000 live births. Between 1993 and 1998, estimated under-five mortality rates were 59 per 1,000 live births. However, this figure has since risen, from 97 in 2001 to 104 per 1,000 live births in 2007 (The Presidency, 2010). South Africa's child mortality rate is mainly due to the HIV/AIDS pandemic, which is responsible for more than half (57%) of child deaths (Hill *et al*., 2007). South Africa is one of 12 countries in which the child mortality rate has increased instead of fallen since 1990 (Health Systems Trust, 2008). As a result, to meet MDG4, South Africa has to achieve an average yearly rate of reduction of 14% by 2015, which is unlikely to be met (The Presidency, 2010).

The public health system could be strengthened with a particular focus on enhancing human resource capacity and reducing infant and child mortality, maternal mortality, HIV/AIDS, and tuberculosis. An amount of R50 million was 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 diarrhoea and iii) pentavalent, which incorporates five existing vaccines.

South Africa's MDGs Report (UNDP, 2005) reflected overall immunisation coverage of 78%, based on 2002 estimates. The rate of primary vaccinations increased from 66.4% in 2001 to 95.3% in 2009 (StatsSA, 2010). 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, districts and sub-districts still have low immunisation coverage and require focused intervention. These areas have been identified, and the public health sector has begun implementing Reach Every District, a strategy of the World Health Organisation (WHO) that aims to improve coverage and protect children against vaccine-preventable diseases.

4.2.5 Goal 5 – Improve maternal health

Maternal mortality is a largely avoidable cause of death and an important focus of international development efforts. The South African maternity mortality rate is increasing, more than doubling between 1998 and 2003, from 84.25 to 165.50 per 100, 000 (The Presidency, 2008). In 1998, maternal mortality was 150 per 100,000, but increased to 369 in 2000 and 625 by 2007 (StatsSA, 2010). The increase could be due in part to better reporting, but the extent of the increase indicates a real increase. This rate is too high compared to the Department of Health's target of 38 per 100,000. HIV infections are the key reason why South Africa is unlikely to achieve the MDG target of reducing maternal deaths by 75% by 2015 (Health Systems Trust, 2009).

The following should assist in reducing the maternal mortality rate:

- Develop protocols in managing the conditions causing maternal deaths
- Train doctors and midwives on the use of these protocols
- Expand emergency transport facilities
- Promote contraceptive use
- Improve staffing and infrastructure at health care facilities.

4.2.6 Goal 6 – Combat illnesses such as HIV/AIDS, TB and malaria

Target 7 of Goal 6 focuses on combating HIV/AIDS. An antenatal survey conducted in 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 less than 20 years age group has declined, indicating that new infections have slowed. HIV prevalence among the population aged 15–24 years fell from 9.3% to 8.7% between 2002 and 2008, (Shisana *et al*. 2009).
To combat HIV/AIDS, the Department of Health introduced a Comprehensive Plan for HIV/AIDS 2007–2011. The plan includes the provision of voluntary counselling treatment, preventing mother-to-child transmission treatment, nutritional supplementation and antiretroviral treatment to patients infected with HIV and AIDS (UNDP, 2007).

Target 8 of Goal 6 is that South Africa will have halted the incidence of malaria by 2015 and have begun to reverse this and other major diseases. Between 2000 and 2008, the incidence of malaria fell from 64,600 to 6,800 cases. Death rates associated with malaria also fell, from 2.0 in 2002 to 0.6 in 2007. This shows promise for the achievement of these specific MDG targets (StatsSA, 2010). As Table 4.1 shows, South Africa is on its way to reversing the trend, although the number of fatalities is a major concern. In 2007/2008, a total of 553 malaria cases were reported, compared to 886 in 2007/08 – a reduction of 36% (National Treasury, 2009a). Only three malaria deaths were reported by September 2008/09, compared to 13 by September 2007/08, a decrease of 66%. This is consistent with the 2008/09 target of an annual 10% reduction in malaria cases and deaths. This indicator is adopted in the performance framework as published by the Estimates of National Expenditure. Factors that contributed to the success in malaria control include (UNDP, 2007):

- 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.

4.2.7 Goal 7 – Environmental sustainability

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

- Improving biodiversity
- Expanding protected areas in hot spots, such as Wolkberg, Wakkerstroom, Drakensberg Alpine, Maputuland, Pondoland
- 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, Coast Care, and Integrated Rural Development programmes.

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

Carbon dioxide is the most significant greenhouse gas emission for South Africa, with the energy sector being the largest contributor, and the MDG target of 34 is likely to be achieved.

South Africa has also made substantial progress in reaching Target 10 of Goal 7, which relates to access to safe drinking water. Since 1994, South Africa has started to address the basic services backlog. Between 1994 and 2007, households with access to water increased from 61.7% to 84.7%, while access to basic sanitation increased from 50% to 71%, and access to sanitation infrastructure increased from 59% to 94%. However, despite this progress, South Africa is unlikely to meet the targets of Goal 7 (The Presidency, 2010). From 1994 to 2006, South Africa has provided 2.4 million new houses with the assistance of a state subsidy (UNDP, 2007).

4.2.8 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-Brazil-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 G20
- 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 Cooperation Fund
- Calling for debt relief for developing countries by engaging the G8 leaders.

Not all the MDGs will be included in the modelling. The focus will be on MDGs 2, 4, 5, 6, (representing education and health goals). However, MDGs 7 and 8 (water/sanitation investment and investment over GDP respectively) will also be considered, but not in great detail because South Africa has already reached these goals.

4.3 Data Description

The data is based on the social accounting matrix (SAM) of 2005, which contains 57 activities and 57 commodities (after adjustment for education), two broad factors (labour and capital), four institutional sector accounts (households, enterprises, government and the rest of world), and two saving and investment accounts. The sectors are shown in Table 4.2.

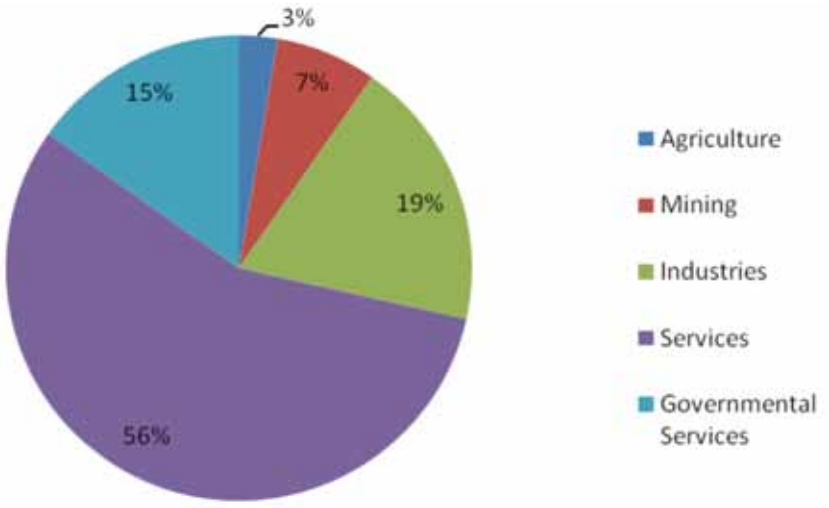
Table 4.2 Activities in the SAM

Sectors	Sectors
Agriculture, forestry & fishing	Other transport equipment
Coal mining	Furniture
Gold & uranium ore mining	Other industries
Other mining	Electricity, gas & steam
Food	Water supply
Beverages & tobacco	Building construction
Textiles	Wholesale & retail trade
Wearing apparel	Catering & accommodation services
Leather & leather products	Railway transport
Footwear	Road transport
Wood & wood products	Transport via pipeline
Paper & paper products	Water transport
Printing, publishing & recorded media	Air transport
Coke & refined petroleum products	Transport support services
Basic chemicals	Communication
Other chemicals & man-made fibres	Finance & insurance
Rubber products	Business services
Plastic products	Medical, dental & other health & veterinary services
Glass & glass products	Community, social & personal services
Non-metallic minerals	Government: general administration
Basic iron & steel	Government: defence
Basic non-ferrous metals	Government: law and order
Metal products excluding machinery	Government: primary education
Machinery & equipment	Government: secondary education
Electrical machinery	Government: tertiary education
Television, radio & communication equipment	Government: health
Professional & scientific equipment	Government: social
Motor vehicles, parts & accessories	Government: economic

Source: SAM, 2005

To better appreciate the relative size of each sector, Figure 4.1 presents the contribution of grouped sectors to GDP, while Table 4.3 presents the sectoral contribution.

Figure 4.1 Share of grouped sectors in GDP



Source: SAM, 2005

Whereas agriculture only represents 2.68% of GDP, services account for more than half of GDP (51,8%); more precisely, trade and business services are the two main contributors. This shows that South Africa has a well-diversified economy.

Table 4.3 Share of sectoral value added in GDP in 2005

Sectors	Share of VA in GDP	Sectors	Share of VA in GDP
Agriculture, forestry & fishing	2.68%	Other transport equipment	0.21%
Coal mining	1.38%	Furniture	0.24%
Gold & uranium ore mining	1.30%	Other industries	1.41%
Other mining	4.34%	Electricity, gas & steam	1.92%
Food	1.92%	Water supply	0.41%
Beverages & tobacco	1.16%	Building construction	2.48%
Textiles	0.29%	Wholesale & retail trade	13.47%
Wearing apparel	0.38%	Catering & accommodation services	1.09%
Leather & leather products	0.06%	Railway transport	0.68%
Footwear	0.07%	Road transport	3.36%
Wood & wood products	0.46%	Transport via pipeline	0.07%
Paper & paper products	0.64%	Water transport	0.40%
Printing, publishing & recorded media	0.50%	Air transport	0.14%
Coke & refined petroleum products	1.41%	Transport support services	1.58%
Basic chemicals	1.02%	Communication	3.87%
Other chemicals & man-made fibres	1.19%	Finance & insurance	9.23%
Rubber products	0.19%	Business services	11.32%
Plastic products	0.67%	Medical, dental & other health & veterinary services	2.28%
Glass & glass products	0.17%	Community, social & personal services	3.96%
Non-metallic minerals	0.60%	Government: general administration	1.92%
Basic iron & steel	1.18%	Government: defence	0.96%
Basic non-ferrous metals	0.66%	Government: law and order	2.63%
Metal products excluding machinery	1.06%	Government: primary education	2.47%
Machinery & equipment	0.84%	Government: secondary education	1.82%
Electrical machinery	0.52%	Government: tertiary education	1.59%
Television, radio & communication equipment	0.17%	Government: health	2.08%
Professional & scientific equipment	0.10%	Government: social	1.00%
Motor vehicles, parts & accessories	1.69%	Government: economic	0.75%

Source: Own calculations from SAM, 2005

Each activity uses labour and capital, as well as intermediates, to produce goods and services. There are four different types of labour: highly skilled, semi-skilled, low-skilled and informal. Every activity produces at least one good. Table 4.4 provides the contribution of each factor to value added for each activity, revealing (for instance) that agriculture, other mining and coke & refined petroleum products rely heavily on capital.

Table 4.4 Repartition of the value added between factors

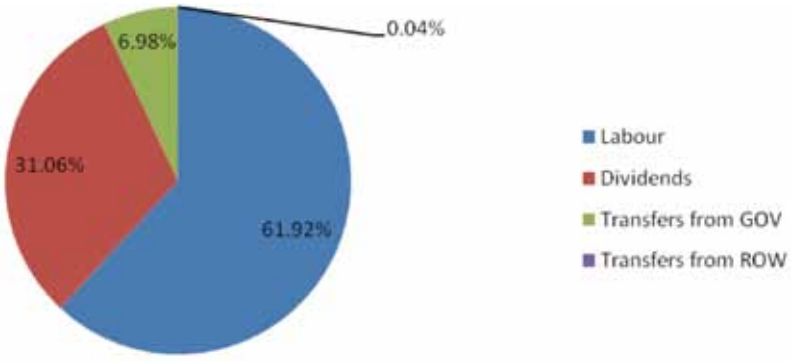
	Capital	Highly skilled	Semi-skilled	Low-skilled	Informal	Total
Agriculture, forestry & fishing	66.1%	4.9%	15.0%	11.3%	2.8%	100%
Coal mining	58.6%	10.2%	10.4%	20.0%	0.8%	100%
Gold & uranium ore mining	19.4%	27.0%	14.9%	37.3%	1.3%	100%
Other mining	70.2%	8.3%	6.2%	14.7%	0.5%	100%
Food	47.9%	14.7%	17.4%	17.7%	2.4%	100%
Beverages & tobacco	70.5%	11.2%	8.3%	8.9%	1.2%	100%
Textiles	38.5%	18.7%	21.1%	19.0%	2.7%	100%
Wearing apparel	21.1%	12.0%	32.6%	30.1%	4.3%	100%
Leather & leather products	54.9%	7.0%	19.4%	16.3%	2.5%	100%
Footwear	51.3%	7.0%	19.5%	19.5%	2.6%	100%
Wood & wood products	28.9%	14.9%	21.0%	31.7%	3.6%	100%
Paper & paper products	56.5%	15.6%	14.9%	11.2%	1.8%	100%
Printing, publishing & recorded media	10.7%	38.1%	33.6%	14.3%	3.3%	100%
Coke & refined petroleum products	89.6%	5.6%	3.0%	1.5%	0.3%	100%
Basic chemicals	64.0%	12.7%	12.8%	9.0%	1.5%	100%
Other chemicals & man-made fibres	45.6%	22.8%	17.1%	12.6%	2.0%	100%
Rubber products	28.9%	23.0%	21.1%	23.8%	3.1%	100%
Plastic products	27.1%	20.1%	19.3%	30.2%	3.4%	100%
Glass & glass products	49.6%	14.5%	17.5%	16.2%	2.3%	100%
Non-metallic minerals	70.1%	8.0%	6.5%	14.0%	1.4%	100%
Basic iron & steel	63.1%	9.2%	11.7%	14.3%	1.8%	100%
Basic non-ferrous metals	81.3%	4.3%	6.0%	7.6%	0.9%	100%
Metal products excluding machinery	31.1%	27.8%	25.6%	13.0%	2.6%	100%
Machinery & equipment	29.9%	24.6%	26.5%	16.1%	2.9%	100%
Electrical machinery	32.8%	21.6%	24.4%	18.2%	2.9%	100%
Television, radio & communication equipment	43.5%	20.9%	23.6%	9.7%	2.3%	100%
Professional & scientific equipment	51.5%	19.6%	19.0%	8.0%	1.9%	100%

	Capital	Highly skilled	Semi-skilled	Low-skilled	Informal	Total
Motor vehicles, parts & accessories	45.5%	19.1%	19.8%	13.3%	2.3%	100%
Other transport equipment	21.7%	30.7%	28.4%	16.2%	3.1%	100%
Furniture	24.5%	15.6%	33.5%	22.5%	3.8%	100%
Other industries	79.3%	6.4%	8.7%	4.7%	0.9%	100%
Electricity, gas & steam	59.8%	16.7%	11.6%	10.9%	1.0%	100%
Water supply	64.2%	13.5%	8.4%	13.0%	0.9%	100%
Building construction	43.7%	14.0%	7.3%	26.8%	8.2%	100%
Wholesale & retail trade	51.1%	16.2%	20.5%	6.8%	5.4%	100%
Catering & accommodation services	60.7%	12.8%	17.0%	5.2%	4.4%	100%
Railway transport	44.1%	8.5%	30.2%	17.2%	0.0%	100%
Road transport	54.9%	5.9%	20.9%	11.9%	6.3%	100%
Transport via pipeline	84.8%	2.3%	8.3%	4.7%	0.0%	100%
Water transport	74.5%	3.7%	13.0%	7.4%	1.4%	100%
Air transport	29.9%	10.7%	37.8%	21.6%	0.0%	100%
Transport support services	58.7%	5.7%	20.4%	11.6%	3.6%	100%
Communication	69.1%	13.4%	11.6%	3.5%	2.4%	100%
Finance & insurance	53.3%	26.9%	15.1%	2.2%	2.4%	100%
Business services	70.1%	15.3%	10.1%	2.8%	1.8%	100%
Medical, dental & other health & veterinary services	48.3%	17.3%	27.0%	5.8%	1.6%	100%
Community, social & personal services	21.5%	6.5%	7.3%	61.5%	3.2%	100%
Government: general administration	7.5%	32.7%	51.6%	8.1%	0.0%	100%
Government: defence	27.5%	25.6%	40.5%	6.4%	0.0%	100%
Government: law and order	13.0%	30.7%	48.6%	7.6%	0.0%	100%
Government: primary education	13.0%	30.7%	48.6%	7.6%	0.0%	100%
Government: secondary education	13.0%	30.7%	48.6%	7.6%	0.0%	100%
Government: tertiary education	13.0%	30.7%	48.6%	7.6%	0.0%	100%
Government: health	6.3%	33.1%	52.4%	8.2%	6.3%	100%
Government: social	13.7%	30.5%	48.2%	7.6%	13.7%	100%
Government: economic	8.8%	32.2%	50.9%	8.0%	8.8%	100%

Source: Own calculations from SAM, 2005

As mentioned previously, there are four institutional accounts. A representative household gets its income from labour and capital payments and from transfers from the other institutions. Households buy consumption goods, pay direct taxes, make transfers to other institutions and save. As Figure 4.2 shows, labour is the source of more than 60% of households' income. Table 4.5 gives the breakdown of the income sources in more detail.

Figure 4.2 Source of income for households[61]



Source: Own calculations from SAM, 2005

Table 4.5 Sources of income for households (in %)

Highly skilled labour	Semi-skilled labour	Low-skilled labour	Informal	Dividends	Transfers from GOV	Transfers from ROW	Total
20.98%	24.27%	13.68%	2.98%	31.06%	6.98%	0.04%	100.00%

Source: Own calculations

61 Note that ROW stands for Rest of the World and GOV stands for government.

Table 4.6 provides the structure of households' spending. Most of households' income is used to buy commodities, and households' savings are very low in South Africa (0,13%).

Table 4.6 Structure of households' spending

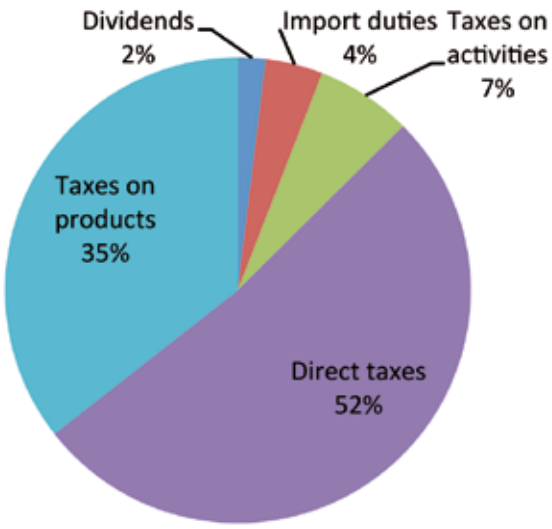
Consumption	88.49%
Direct taxes	11.36%
Transfers ROW	0.01%
Savings	0.13%

Source: Own calculations from SAM, 2005

Firms' income is mainly composed of capital revenues, along with minor transfers from other institutions. Firms distribute dividends to other agents, pay direct taxes and save. Firms' savings is a huge component in financing total investment.

Government collects direct taxes (from households and firms) as well as indirect taxes (on products, taxes on production and import taxes). It also receives dividends from the firms and transfers from other agents.

Figure 4.3 Sources of income for government



Source: Own calculations from SAM, 2005

As Figure 4.3 shows, direct taxes (from households and firms) represent more than a half of government's revenue.

On the expenditure side, Table 4.7 shows that government buys commodities (which are all produced by itself), gives transfers to the other agents and saves. Government's savings are actually negative.

Table 4.7 Structure of government expenditures

Public consumption	Transfer to firms	Transfer to households	Savings	Transfer to the rest of the world
71%	11%	18%	-3%	3%

Source: Own calculations from SAM, 2005

4.3.1 Education data

Government spending on education

In the Quantec SAM is a sector called General Government: Education, which is split into three subsectors in accordance with the Maquette for Analysis of MDGs (MAMS): primary, secondary and higher education (tertiary). Table 4.8 summarises what is contained in the initial SAM.

Table 4.8 Levels of government spending and shares

	Government's spending R'000 million	Percentage of government spending
Government administration	51,769	16.8%
Government defence	22,316	7.3%
Government law	46,188	15.0%
Government education	92,168	30.0%
Government health	42,775	13.9%
Government social	28,441	9.3%
Government economics	23,739	7.7%

Source: Own calculations

As Table 4.8 shows, the government buys R92,168 million worth of education, which is equivalent to 30% of its total spending. According to the Reserve Bank, in 2005 primary education represented 6.6%, secondary education 4.8% and tertiary education 4.3% of total government spending. Applying these rates to government spending on education (R92,168 million), primary education takes up 42%, secondary education takes 31%, while tertiary education represents 27% of the total (see Table 4.9).

Table 4.9 Levels and share of different education cycles in education spending

Cycle	Level of spending R'000 million	Share in education spending
Primary	38,746	42%
Secondary	28,179	31%
Tertiary	25,243	27%

Source: Own calculations

Gross enrolment rate

The gross enrolment rate (GER) measures enrolment regardless of age, at a specific level of education, as a proportion of the appropriately aged population for the given education level. A GER of over 100%, or one that is greater than the net enrolment rate, is possible and is usually due to the inclusion of over-age and under-age learners in the system, as a result either of early or late entry into the education system, or of repetition.

Repetition rates

Repetition rates reflect the proportion of learners from a given group repeating a grade. The rate is calculated by dividing the number of repeaters in a given grade in school year t+1 by the number of pupils from the same group enrolled in that same grade the previous school year t and multiplying the result by 100.

Table 4.10 Repetition rates in 2008

Grade	Repeaters in 2008	Learner enrolment in 2007	Repetition Rate
Grade 1	92,464	118,0641	7.8
Grade 2	56,122	1,043,647	5.4
Grade 3	51,795	1,060,081	4.9
Grade 4	57,901	1,087,013	5.3
Grade 5	40,741	1,028,775	4.0
Grade 6	31,398	994,762	3.2
Grade 7	25,620	894,921	2.9
Grade 8	56,993	924,443	6.2
Grade 9	79,358	949,859	8.4
Grade 10	191,131	110,5648	17.3
Grade 11	134,712	892,733	15.1
Grade 12	5,573	635,398	0.9
All Grades	823,808	11,797,921	7.0

Source: Department of Education, 2008

Table 4.11 Enrolment in public schools in 2005

Primary						
Gr. 1	Gr. 2	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7
1,207,996	1,094,373	1,054,304	1,038,669	930,871	878,680	951,641

Secondary				
Gr. 8	Gr. 9	Gr. 10	Gr. 11	Gr. 12
1,023,329	905,393	1,043,081	814,589	511,884

Source: Department of Education, 2008

Table 4.12 Enrolment in private schools in 2005

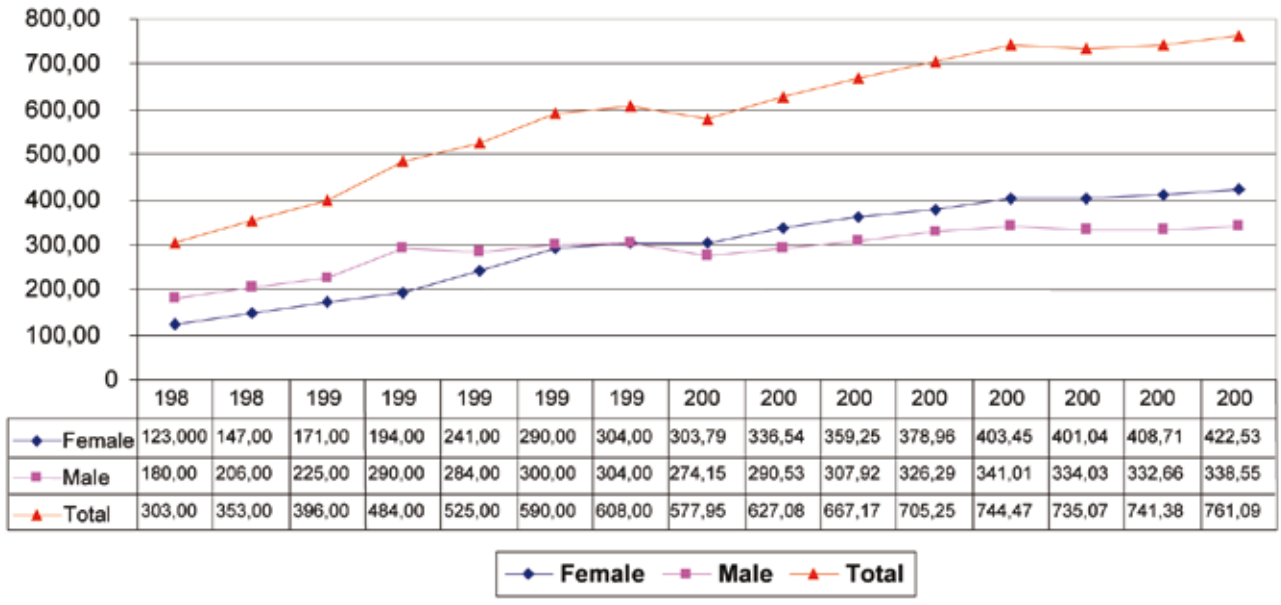
Primary						
Gr. 1	Gr. 2	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7
25,585	24,317	23,697	23,101	20,501	19,813	20,901

Secondary				
Gr. 8	Gr. 9	Gr. 10	Gr. 11	Gr. 12
29,170	25,404	26,413	24,420	27,025

Source: Department of Education, 2008

Figure 4.4 shows tertiary enrolment over the years: 735,072 students were enrolled in tertiary education in 2005.

Figure 4.4 Total headcount enrolment in tertiary education, 1986–2007



Source: Trends in Education, Macro-Indicator report (2009), p.26, 1986 to 1998; Bunting and Cloete 2007; 2000 to 2007, Department of Education, 2007

Behaviours of students

Using the South African Department of Education's descriptions, primary education goes from Grade 1 to Grade 7, secondary education from Grade 8 to Grade 12, while tertiary (higher) education includes universities, technikons and further education technical (FET) colleges. Table 4.13 shows the number of years per school cycle.

Table 4.13 Years in school cycles

Primary	Secondary	Tertiary
7	5	3

Source: Department of Education, 2008

The Department of Education considers that the appropriate age bands are 7–13 years for primary school and 14–18 for secondary school. For compulsory or basic schooling, the age band is 7–15 years.

To build the table of students' behaviours, the following shares need to be determined:

- Intake rate (g1entry)
- Pass rate for each cycle (grd)
- Repetition rate for each cycle (rep)
- Dropout rate for each cycle (drop)
- Share of students that end a cycle and get into the next cycle (grdcont)
- Share of students that end a cycle and enter the labor market (grdquit).

The new intake is the age at which children enter Grade 1 for the first time, which in South Africa is compared to the population of 7-year-olds for each year. This age is referred to as the appropriate age for intake and enrolment in Grade 1.[62] Although the legal age for entry into Grade 1 was changed to 6 years old in 2008, the intake rate used here is 7 years old (as it was in 2005).

Table 4.14 Learners entering Grade 1 for the first time, by age, 1997–2005 (%)

Age	1997	1998	1999	2000	2001	2002	2003	2004	2005
<6	4.9	4.1	2.5	0.0	0.0	18.1	1.6	2.6	3.7
6	51.3	47.0	43.7	24.0	24.6	30.7	38.2	35.4	27.2
7	28.1	32.2	38.0	57.5	59.2	37.1	46.8	45.7	51.5
>7	14.6	16.5	15.7	18.6	16.2	14.0	13.3	16.2	17.6
Unknown	1.1	0.2	0.2	0.0	0.0	0.0	0.1	0.1	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: DoE (2009), p.13, Data obtained from Department of Education databases

Shares for primary

Subcategory Primary1 corresponds to Grade 1–Grade 3, and Primary2 is from Grade 4–Grade 7.

For graduation rates, data from the DoE (2009:47) is used and shows that 99% of students pass. However, repetition rates for 2005 could not be found. As the Department of Education could provide repetition rates for 2008, the rates were assumed to be the same for 2005, as there is no obvious reason for the rates to have changed in three years. The problem is that the data then becomes irreconcilable: the repetition rate is 4.9% (see Table 4.10), yet the pass rate is 99%, which is too great a difference. To correct for this inconsistency, the following assumption was made: accepting the figure for graduation rates as given, the remaining 1% was split between repetition and dropout rates. Repeating in primary education is relatively low, and so it was assumed that 3% of the students in Grade 3 are repeating and 7% drop out.

For Primary2, the table can be filled easily, as the pass and repetition rates for Grade 7 are available. The dropout rates are computed by subtracting the sum of these two shares from 100%. The transition rate, which is defined as the share of students that end a cycle and get into the next cycle, from Grade 7 to Grade 8, is taken from the Department of Education figures and is quite high, at 96%.

62 Note that in South Africa you can enter Grade 1 at 5, 6 or 7 years old.

Shares for secondary

For graduation rates, the results of the matric (exam at the end of Grade 12) were taken. For Grade 12, the repetition rate is 0.9% (Table 4.10), and the difference constitutes the dropout rate.

To compute transition rates, the following assumption was made: the Department of Education provided the share of students that pass matric and are allowed to proceed to university (17%). However, to be highly skilled, students can also attend technikons and FET colleges. Therefore, this share is increased to 75% because most of the students that complete secondary education continue into higher education; in the absence of another share, this is assumed to be the correct one.

Shares for tertiary

As no data exists for higher education, the following assumptions were made: 50% of the students graduate and very few of them repeat (5%). Informal discussions indicated that the number of students repeating a whole programme (as opposed to a course) is very low at tertiary institutions, as students will just rewrite the subjects they fail. For the transition rate, the share of students that graduate and enter the labour market is obviously equal to 100% as students cannot go further. Table 4.15 summarises the discussion.

Table 4.15 Shares of students' behaviours

		2005
g1entry	primary	0.515
grd	primary	0.930
grd	secondary	0.683
grd	tertiary	0.500
grdcont	primary	0.960
grdcont	secondary	0.750
grdcont	tertiary	0.000
grdquit	primary	0.040
grdquit	secondary	0.250
grdquit	tertiary	1.000
rep	primary	0.003
rep	secondary	0.009
rep	tertiary	0.050
dropout	primary	0.007
dropout	primary	0.041
dropout	secondary	0.308
dropout	tertiary	0.450

Source: Various publications and own assumptions

4.3.2 Health, water and sanitation

In the SAM, there is a public sector (Government: health) and a private sector (Medical, dental & other health & veterinary services) for health. According to the Water Services Act, the supply of drinking water to the public is the responsibility of the Water Services Authorities. As private entities cannot provide water without having an agreement with the WSAs, they must be regulated by the local WSA. Thus, the activity 'Water supply' in the SAM is assumed to be provided only by public sector. As previously mentioned, South Africa has already reached this MDG.

4.3.3 Interest accounting and capital accounts

Since the model is going to compute debt stocks over time and institutional borrowing flows, the SAM for MAMS needs to account for interest payments. Institutional accounts of the national accounts should record current transactions among institutions, and these contain interest payments. The resulting matrix is named the 'Interest Accounting Matrix' (IAM). With regard to the interest paid, the interest on South African debt shows an amount of R58,743 million as interest

on public debt (includes amortised discount), R158,931 million as interest paid by firms and R58,677 million as interest paid by households.

To split these amounts into flows to domestic debt holders and foreign holders, the shares in total public debt of corresponding domestic and foreign debt for 2005 are assumed to apply.

For firms, 10% of interest is assumed to be paid to foreigners. This is intended to reflect the assumption that overall external debt is not only low at 20% of GDP at end-2005 but over 40% of it is denominated in rands (domestic currency). Banks, corporations, and households have limited foreign currency balance sheet exposure. Finally interest payments are then assumed to be paid to firms and the rest of the world (ROW column). The resulting macro interest accounting matrix (IAM) is shown in Table 4.16.

Table 4.16 Interest accounting matrix 2005

	Households	Firms	Govt	ROW	Interest-Domestic	Interest-Foreign	Total
Households							
Firms					246914.7		
Govt							
ROW						29135.3	
Interest-Domestic	52809.3	143037.9	51067.5				246914.7
Interest-Foreign	5867.7	15893.1	7374.5				29135.3
Total					246914.7	29135.3	

4.4 The Model Used

The model is based on the model developed by Chitiga *et al*. (2010) to which a specific module for studying the MDGs is added. This module is taken from Maisonnave and Robichaud (2010) and is an adaptation of the framework developed by Lofgren *et al*. (2006).

Step 1: The MDG related equations

The first equation defines an index for education quality, which is defined as an index of the real services per student in the current year.

$$EDQ_{edi,t} = \frac{DD_{edi,t}}{NST_{edi,t}}$$

With:
$EDQ_{edi,t}$: Education quality index by cycle edi for the period t
$DD_{edi,t}$: Volume of education by cycle edi
$NST_{edi,t}$: Volume of students of type h enrolled in cycle edi

Per capita consumption

This variable is defined as the ratio of consumption of households divided by the population.

$$CPC_t = \frac{\sum_i PCO_i C_{i,t}}{POP_t}$$

With:
CPC_t: Consumption per household
PCO_i: Composite price of good i at the base year
$C_{i,t}$: Volume of consumption of good i by household h at the period t
POP_t: Population of households h at the period t

Step 2: Introducing education variables

Lofgren *et al*. (2006) is followed to evaluate students' behaviours. Eight education behaviours are distinguished for each period:

- grd: share of students who graduate their current year in a cycle
- rep: share of students who repeat their year
- drop: share of students who drop out of school
- grdcont: share of students who graduate a cycle and decide to go on in the upper education cycle
- grdquit: share of students who graduate a cycle and decide to leave school
- g1entry: share of children aged six who go to school (out of the whole aged six population)
- grdcyc: share of students who graduate the last year of a cycle
- contcyc: share of students who graduate a year within a cycle.

Three of these variables, (g1entry, grd, grdcont) are computed by the logistic function while the others are computed in a residual way.

Before explaining the equations, the following needs to be kept in mind:

- Each year, a student can graduate (grd), repeat (rep) or drop out (drop). Thus the sum of these shares is equal to one.
- When a student graduates (grd), he/she can be graduated within the cycle (cont_cyc) or the last year of the cycle (grd_cyc).
- Finally, when a student finishes a cycle, he/she can go on to the next cycle (grd_cont) or decide to leave the education system and enter the labour market for instance (grd_quit). Thus, the sum of these two shares is equal to one.

With these assumptions, the residual behaviours are calibrated.

The next equation defines the behavior grd_cyc and is computed by dividing the graduation rate by the number of years that a cycle lasts.

$$SHR_{edi,'grd\_cyc',t} = SHR_{di,'grd',t} / NY_{edi}$$

With:

$SHR_{edi,'grd\_cyc',t}$: Average graduation rate by cycle
$SHR_{edi,'grd',t}$: Graduation rate by cycle
NY_{edi}: Number of years in the cycle

Then, the share of those who graduate in the cycle (i.e. graduating from Grade 3 to Grade 4) is defined as follows. Given hypothesis B above, this share can easily be computed.

$$SHR_{edi,'cont\_cyc',t} = SHR_{edi,'grd',t} - SHR_{edi,'grd\_cyc',t}$$

With:

$SHR_{edi,'cont\_cyc',t}$: Graduation rate at the end of the cycle by cycle
$SHR_{edi,'grd',t}$: Graduation rate by cycle
$SHR_{edi,'grd\_cyc',t}$: Graduation rate within the cycle

The next equation defines the share of students who have graduated but decide to leave the education system. Given the hypothesis C above, this share can easily be found:

$$SHR_{edi,'grd\_quit',t} = 1 - SHR_{edi,'grd\_cont',t}$$

With:

$SHR_{edi,'grd\_quit',t}$: Share of students who graduate a cycle and decide to leave the education system

$SHR_{edi,'grd\_cont',t}$: Share of students who graduate a cycle and decide to go on in the education system

Hypothesis A above allows the shares of students who drop out and repeat to be computed. The share of students who repeat is computed regarding the initial shares. The first term $\left[1 - SHR_{edi,'grd',t}\right]$ corresponds to those who have repeated and dropped out.

$$SHR_{edi,'rep',t} = \left[1 - SHR_{edi,'grd',t}\right]\left[\frac{SHRO_{edi,'rep'}}{\left(1 - SHRO_{edi,'grd'}\right)}\right]$$

$$SHR_{edi,'drop',t} = \left[1 - SHR_{edi,'grd',t}\right]\left[\frac{SHRO_{edi,'drop'}}{\left(1 - SHRO_{edi,'grd'}\right)}\right]$$

With:

$SHR_{edi,'rep',t}$: Share of students who repeat a grade

$SHR_{edi,'drop',t}$: Share of students who drop out a grade

The next equation allows, with a logistic function, to compute three behaviour shares each year. Having computed the other shares (i.e. residual shares), now are determined endogenously the share of 1st year in cohort entry, the share of graduate (grd), and the share of graduate that decide to go on to the next cycle (grd_cont).

As explained in Lofgren *et al*. (2006), in the expression of the equation below, the only endogenous variable is $SHR^{I}_{edi,\log,t}$. Indeed, $ext_{edi,\log}$, $\alpha^{ED}_{ed,\log}$, $\chi^{ED}_{edi,\log}$, $\beta^{ED}_{edi,\log}$, and $SHRO_{edi,\log}$ are parameters.

$SHRO_{edi,\log}$ represents the different shares at the base year for each cycle. This data is calibrated for the base year in Table 4.15. Then, the model will compute it endogenously.

$\alpha^{ED}_{ed,\log}$, $\beta^{ED}_{edi,\log}$ and $\chi^{ED}_{edi,\log}$ are parameters in the logistic function. The parameter $\chi^{ED}_{edi,\log}$ can be used to reflect knowledge on the inflexion point in the logistic function. If this type of information is not available, then gamma=0; when gamma=0, one is at the inflexion point.

$ext_{edi,\log}$ represents the highest value the behaviour can reach; here, it is equal to 1. For instance, 100% of an aged 6 cohort entering school, 100% of graduation.

Given $\chi^{ED}_{edi,\log}$ and $ext_{edi,\log}$, knowing that at benchmark, $SHR^{I}_{edi,\log,t} = SHRO_{edi,\log}$, then it is easy to compute $\alpha^{ED}_{edi,\log}$

$$SHR_{edi,\log,t} = ext_{edi,\log} + \frac{\alpha^{ED}_{,ed,\log}}{1 + \exp\left(\chi^{ED}_{edi,\log} + \beta^{ED}_{edi,\log}\left[SHR^{I}_{edi,\log,t} - SHRO_{edi,\log}\right]\right)}$$

SHR_I is the only endogenous variable in the previous equation and is the intermediate values for the logistic function. This variable depends on the initial shares of behaviours for students (SHRO) and different proxy. The first one measures the evolu-

tion of the education quality index. The assumption is that a greater value of the index compared to the base year will have a positive impact on students' behaviours. Thus, if quality improves, the share of students that graduate and go on to the next level increases.

Then, SHR_I depends on two differential wages: wage between skilled and semi-skilled, and wage between semi-skilled and low-skilled. In other words, if the skilled wage rate relatively increases more than that of the semiskilled, students in secondary will have an incentive to go on studying to earn a skilled wage rate. The last two proxies represent a health indicator measured by MDG4, assuming that an improved health situation will have an impact on students' behaviours. Finally, consumption per capita has a positive impact on students' behaviour.

$$SHR\_I_{edi,\log,t} = SHRO_{edi,\log}\left(\frac{EDQ_{edi,t}}{EDQO_{edi}}\right)^{\sigma_{edi}^{EDQ}}\left(\frac{\frac{W_{'labms',t}}{W_{'labls',t}}}{\frac{WO_{'labms'}}{WO_{'labls'}}}\right)^{\sigma_{edi}^{WP1}}\left(\frac{\frac{W_{'labhs',t}}{W_{'labms',t}}}{\frac{WO_{'labls'}}{WO_{'labhs'}}}\right)^{\sigma_{edi}^{WP12}}$$

$$\left(\frac{MDGVAL_{'mdg4',t}}{MDGVALO_{'mdg4'}}\right)^{\sigma_{edi,\log}^{MDG4}}\left(\frac{CPC_t}{CPCO}\right)^{\sigma_{eedi}^{CH}}$$

With:

$SHR\_I_{edi,\log,t}$: Intermediate value for student behaviours
$SHRO_{edi,\log}$: Initial shares of students' behaviours
$EDQ_{edi,t}$: Education quality index by cycle edi for the period t

The number of students is the sum of old students NST_O (meaning students already in the cycle) and new students (NST_N).

$$NST_{edi,t} = NST\_O_{edi,t} + NST\_N_{edi,t}$$

For primary, new students are computed as the share of children aged 6 that go to school for the first time (intake rate) over children aged 6.

$$NST\_N_{'CGOVPRIM',t} = SHR_{'CGOVPRIM','ENTRY',t}\ POP\_H6_t$$

For secondary and tertiary, new students are computed as students who were in the previous cycle the year before, who graduate the cycle and decide to go on to the next cycle.

$$NST\_N_{'CGOVSEC',t} = NST_{'CGOVPRIM',t-1} SHR_{'CGOVPRIM','grd\quad cyc',t-1}\ SHR_{'CGOVPRIM",grd\quad cont',t-1}$$

$$NST\_N_{'CGOVTERT',t} = NST_{'CGOVSEC',t-1} SHR_{'CGOVSEC','grd\quad cyc',t-1}\ SHR_{'CGOVSEC",grd\quad cont',t-1}$$

Old students in a cycle are represented by students who are graduating within the cycle and students who repeat the cycle.

$$NST\_O_{edi,t} = SHR_{edi,'cont\quad cyc',t-1}\ NST_{edi,t-1} + SHR_{edi,'rep',t-1}\ NST_{edi,t-1}$$

To compute the value of the education MDG, the intake rate and the graduation rate for the length of the primary school are multiplied. It is then possible to see, across a cohort, how many reach the end of primary school without dropping out or repeating.

$$MDG2VAL_{t,t\geq NY_{ped'}} = \frac{\left[SHR_{hped','entry',t-(NY_{ped'}-1)}\prod_{tj}SHR_{'ped','grd',tj}\cdot POP^{H7}_{t-NY_{PED'}-1}\right]}{POP^{H7}_{t-NY_{PED'}-1}}$$

For the other MDGs, a logistic function is used, with the same properties as the one for education.

$$MDGVAL_{mdg,t} = ext^{MDG}_{mdg} + \frac{\alpha^{MDG}_{mdg}}{1+\exp\left(\chi^{MDG}_{mdg} + \beta^{MDG}_{mdg}\left[MDGVAL^{I}_{mdg,t} - MDGVALO_{mdg}\right]\right)}$$

For these MDGs, the intermediate variable depends on the initial values, on health services and water services supplied by government and per capita consumption. These three proxies positively affect the value of the MDG.

$$MDGVAL\_I_{mdg,t} = MDGVALO_{mdg}\left(\frac{DD_{'CGOVHLTH',t}/POP\_H_t}{DDO_{'CGOVHLTH'}/POP\_HO}\right)^{\sigma^{HLT}_{mdg}}\left(\frac{DD_{'CWATR',t}/POP\_H_t}{DDO_{'CWATR'}/POP\_HO}\right)^{\sigma^{WAT}_{mdg}}\left(\frac{CPC_t}{CPCO}\right)^{\sigma^{CH2}_{mdg}}$$

The education system is related to labour supply. Each type of labour depends on the performances of the students. The volume of highly skilled workers is computed as the number of skilled workers in the previous year, less those who retire, plus students who graduated the tertiary level. Semi-skilled workers are the sum of those who were already in the market in the previous year, less than those who retire, plus secondary students who have graduated and decide to enter the labour market, plus students who were in tertiary level and drop out (they enter the next lower level). The same applies for unskilled labour.

$$LS_{'labls',t} = (1-ret_{'labls'})LS_{'labls',t-1} + NST_{'CGOVPRIM',t-1}SHR_{'CGOVPRIM','grd\ \ cyc't-1}SHR_{'CGOVPRIM'',grd\ \ quit,t-1} + NST_{'CGOVSEC,t-1}SHR_{'CGOVSEC,'drop't-1}$$

$$LS_{'labms',t} = (1-ret_{'labms'})LS_{'labms',t-1} + NST_{'CGOVSEC',t-1}SHR_{'CGOVSEC','grd\ \ cyc't-1}SHR_{'CGOVSEC'',grd\ \ quit,t-1} + NST_{'CGOVTERT,t-1}SHR_{'CGOVTERT,'drop't-1}$$

$$LS_{'labhs',t} = (1-ret_{'labhs'})LS_{'labhs',t-1} + NST_{'CGOVTERT',t-1}SHR_{'CGOVTERT','grd\ \ cyc't-1}SHR_{'CGOVTERT'',grd\ \ quit,t-1}$$

To take into account the interest revenues, for households the share of domestic interests they receive is added.

$$YH_t = YHL_t + YHK_t + YHTR_t + \lambda^I_h\sum_{ag} INT\_DOM_{ag,t}$$

Their budget of consumption also has to be adjusted. Indeed, now it becomes their disposable income less their savings, less the transfers to non-governmental agents, less the foreign and domestic interests they pay.

$$CTH_t = YDH_t - SH_t - \sum_{agng} TR_{agng,'h,'t} - INT\_DOM_{'h',t} - INT\_ROW_{'h,'t}$$

To compute their investment is the sum of their savings, plus what they borrow from other agents, less what they lend to the other agents.

$$I\_PRI_t = SH_t + \sum_{ag} BOR_{'h,'ag} - \sum_{ag} BOR_{ag,'h'}$$

Exactly the same reasoning applies for firms, government and the rest of the world. Note that for government, this variable represents public investment, IT_PUB.

$$YF_t = YFK_t + YFTR_t + \lambda^I_f\sum_{g} INT\_DOM_{ag,t}$$

$$SF_t = YDF_t - \sum_{ag} TR_{ag,'f',t} - INT\_DOM_{'f',t} - INT\_ROW_{'f',t}$$

$$I\_PRI_{'f',t} = SF_{'f',t} + \sum_{ag} BOR_{'f',ag} - \sum_{ag} BOR_{ag,'f'}$$

$$YG_t = YGK_t + TDHT_t + TDFT_t + TPRODN_t + TPRCTS_t + YGTR_t + \lambda^I\sum_{ag} INT\_DOM_{ag,t}$$

$$SG_t = YG_t - \sum_{agng} TR_{agng,gvt,t} - G_t - INT\_DOM_{'gvt',t} - INT\_ROW_{'gvt',t}$$

$$IT\_PUB_t = SG_t + BOR\_DOM_t + BOR_{'gvt','row',t} - \sum_{ag} BOR_{ag,'gvt',t}$$

$$YROW_t = e_t \sum_m PWM_{m,t} IM_{m,t} + \sum_k \lambda^{RK}_{row,k} \left(\sum_j R_{k,j,t} KD_{k,j,t} \right) + \sum_{agd} TR_{row,agd,t} + \sum_{agd} INT\_ROW_{agd,t}$$

$$I\_PRI_{'row',t} = SROW_t + \sum_{agd} BOR_{row,'agd',t} - \sum_{agd} BOR_{agd,'row',t}$$

Government's borrowing from domestic agents is a share of total domestic borrowing. As a closure rule, it is assumed that government cannot increase its borrowing from the rest of the world.

$$BOR_{'gvt,agd,t} = \lambda^{BOR}_{agd} \; BOR\_DOM_t$$

Domestic and foreign interests are computed as the product of respective interest rate and debt.

$$INT\_DOM_{,ag,t} = IR\_DOM_{ag,t} \; DEBT\_DOM_{ag,t}$$

$$INT\_ROW_{agd,t} = IR\_ROW_{agd,t} \; DEBT\_ROW_{agd,t}$$

4.5 Results

A key question that needs answering is whether South Africa can achieve the MDGs, considering that 2015 is just a few years away. Some of the MDGs have already been achieved, but attainment of the health-related goals (MDGs 4 and 5) seems unlikely, even infeasible.[63] Therefore, this section looks at how much additional public spending is needed to reach some of the goals. Moreover, some MDGs have a feedback effect on the other MDGs. For instance, the AIDS MDG (MDG6), which will probably be reached, directly affects MDG4 and MDG5. More mothers who are HIV-positive die giving birth than those who are HIV-negative. The same is true for under-five mortality.[64] Thus, investing in this particular MDG will also have positive effects on the other MDGs. The purpose is not to impose any hierarchy on the MDGs, but to try to simulate an improvement in the general situation within the time constraints. Simulations are run based on the following scenarios:

- Scenario 1: how much would it take to reach all the MDGs by 2015? (All means MDG 2, 4, 5 and 6, but does not include 7 and 8 as they are already reached.)
- Scenario 2: how much would it take to reach MDG2 (universal education) in 2015?
- Scenario 3: how much would it take to reach MDG6 (HIV indicator) in 2015?
- Scenario 4: can MDG6 be reached through a fiscal reform (indirect tax)?

4.5.1 Scenario 1: reach all MDGs by 2015

In this scenario, all the MDGs are attained in four years from now (in 2015). Here, the model does not solve, which means that reaching all the MDGs within four years is not feasible. To reach this conclusion, the results of the empirical studies showed that some of the MDGs (MDG4 and MDG5) are unattainable, as the values are too far away from each other to make it feasible to reach the target within four years. For instance, the initial (or current) value for MDG4 is 104,[65] whereas the MDG4 target is 20. The same is observed for MDG5, whose initial value is 625[66] and target value (in 2015) is 38. Basically, the model confirms what is already known: it is not feasible to reach all the MDGs by 2015 because of the short timeframe.

63 See for example the MDG SA report 2010, p.60.

64 See MDG SA report.

65 MDG SA report p.60.

66 MDG SA report p.67.

In this scenario, MDG2 is reached, and Table 4.17 shows how much extra the government has to spend (compared to a situation without policy).

4.5.2 Scenario 2: reach MDG2 in 2015

This scenario consists of reaching MDG2 (universal education) and looking at the cost in terms of primary education public spending. As explained earlier, improving the skills level of the population will have positive spillovers for the other MDGs, by creating more skilled people for the economy in the long run. However, the assumption is that government borrows from domestic agents, and no fiscal policy adjustment is available to finance the policy. In this scenario, MDG2 is reached, and Table 4.17 shows how much extra the government has to spend (compared to a situation without policy).

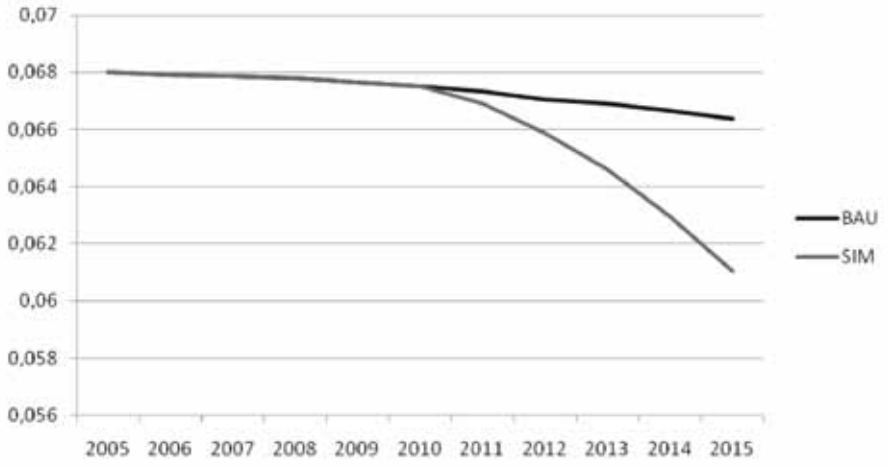
Table 4.17 Impact on government spending (in % compared to BAU)

Years	Government consumption in 'primary'	Years	Government consumption in 'primary'
2011	1.24	2014	10.84
2012	3.38	2015	23.57
2013	6.46		

Source: Simulation results

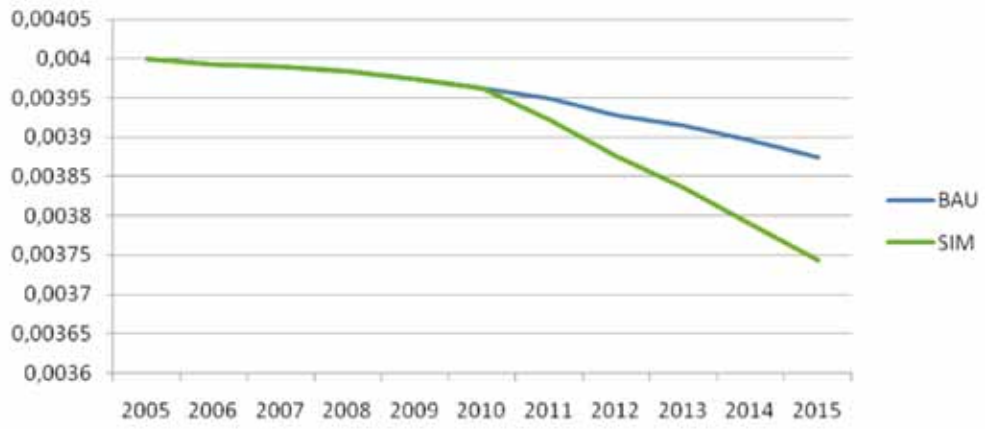
Increasing public spending in education for the primary education sector is not only about increasing teachers' salaries. Increasing the education budget in fact means that government hires more teachers, gives subsidies to children for transport, builds new schools, and so on. This increase in government's spending will have an impact on the rest of the economy as well as on the other MDGs. Figures 4.5, 4.6 and 4.7 show the positive impact the policy has on the other MDGs.

Figure 4.5 Impact on MDG4



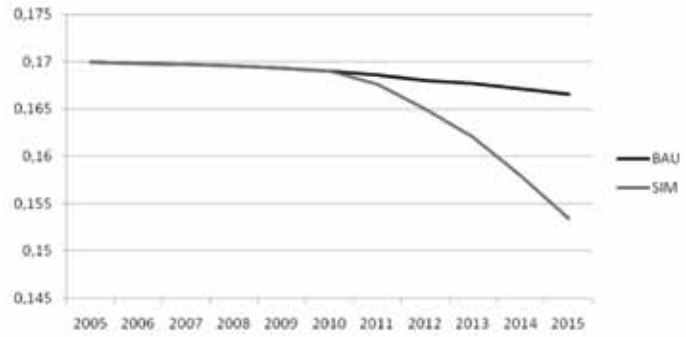
Source: Simulation results

Figure 4.6 Impact on MDG5



Source: Simulation results

Figure 4.7 Impact on MDG6



Source: Simulation results

As previously mentioned, increased public spending also has an impact on the whole economy. As government hires more people (to teach, to build new schools etc.), the effect on labour demand, and therefore on unemployment rates, is positive (Table 4.18). A general equilibrium effect occurs, which means that government carries the other sectors of the economy through backward and forward linkages.

Table 4.18 Impact on unemployment rate in 2015 (in %)

	Highly skilled	Medium Skilled	Low Skilled
2015	-0.27	-0.26	-0.02

Source: Simulation results

The categories that really benefit from the policy are highly and semi-skilled labour, but the effect is negligible for low-skilled workers. The impact on households' income (YH) is also positive, as their spending on consumption (CTH) increases by 1.14%, and direct taxes (TDH) increase by 1.17% (Table 4.19).

Table 4.19 Impact on households (in % compared to BAU)

	YH	CTH	TDH
2015	1.17	1.14	1.17

Source: Simulation results

As Table 4.20 shows, the government's income increases, notably due to the increase in households' direct taxes and indirect taxes (as households consume more commodities). However, not surprisingly, government savings decrease due to the absence of fiscal reform to compensate for the policy. The corresponding value is small, which explains the huge variation.

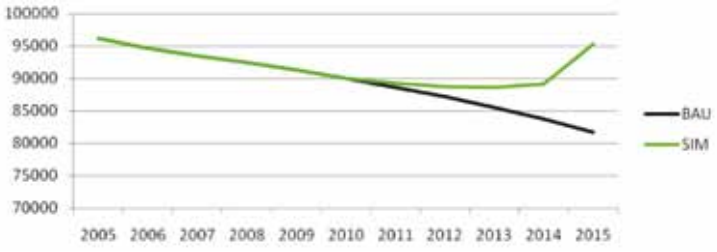
Table 4.20 Impact on government (in % compared to BAU)

	YG	YGTR	SG
2015	0.83	0.72	-23.66

Source: Simulation results

From 2011, as Figure 4.8 shows, government increases its borrowing, notably from domestic firms.

Figure 4.8 Impact on domestic borrowing



Source: Simulation results

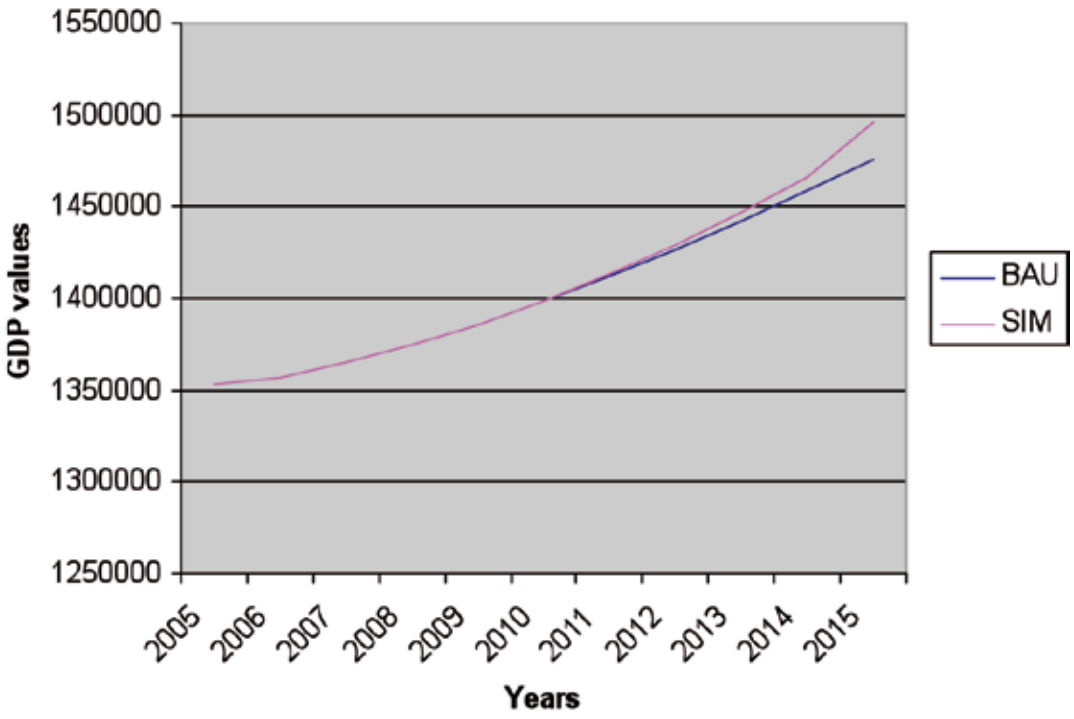
One of the hypotheses in this scenario was that government could not borrow more from the rest of the world. Therefore, domestic investment was affected, as firms are normally the main contributors to total investment. Table 4.21 illustrates the fall in private investment and a typical crowding-out effect. As Figure 4.9 shows, in this scenario, GDP increases slightly.

Table 4.21 Impact on investment (in % compared to BAU)

	IT	IT_PRI	IT_PUB
2015	-2.40	-2.86	0.03

Source: Simulation results

Figure 4.9 Impact on GDP (at basic prices):



Source: Simulation results

4.5.3 Scenario 3: reach MDG6 in 2015

This scenario assumes that MDG6 (HIV indicator) is reached in 2015. According to the report on South Africa's MDGs, this objective is attainable (UNDP, 2007:75). In order to reach the target, government increases its consumption for health services. In other words, it builds extra hospitals, improves the transport system to enable people to reach their health centres, which allows more people access to free treatments and so on. As Table 4.22 shows, by 2015 government's consumption for health services would increase by 17.4%.

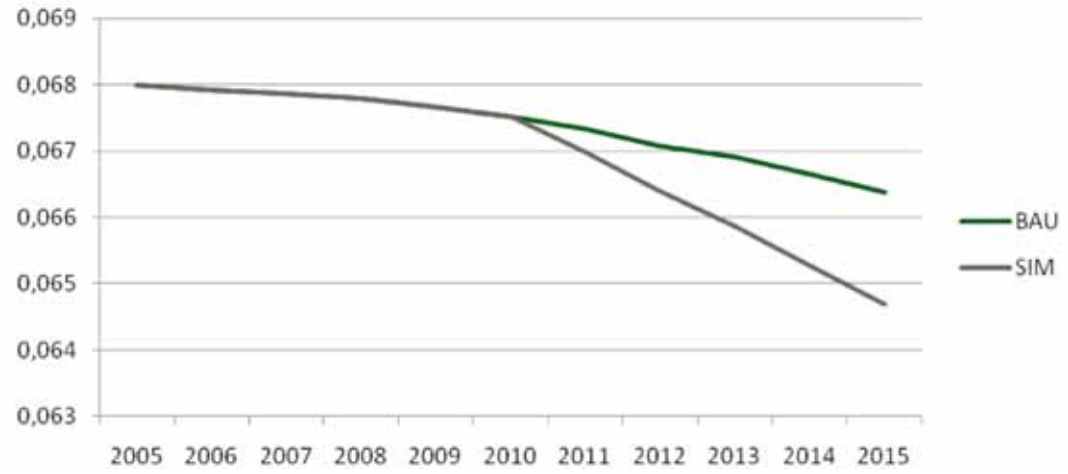
Table 4.22 Impact on government's consumption on health services (in % compared to BAU)

Year	Government's consumption in health services
2011	3.27
2012	6.37
2013	10.09
2014	13.66
2015	17.40

Source: Simulation results

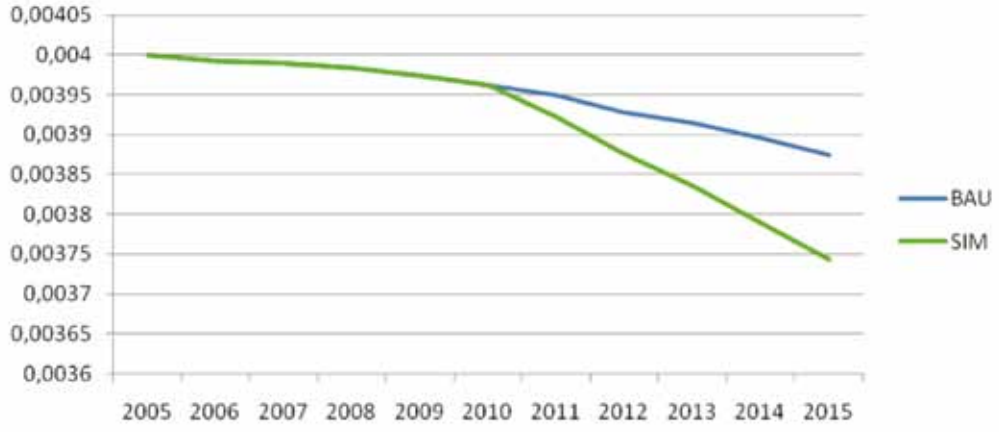
As previously mentioned, targeting MDG6 has positive knock-on effects for other MDGs, especially MDG4 and MDG5. Figures 4.10 and 4.11 show these effects.

Figure 4.10 Impact on MDG4



Source: Simulation results

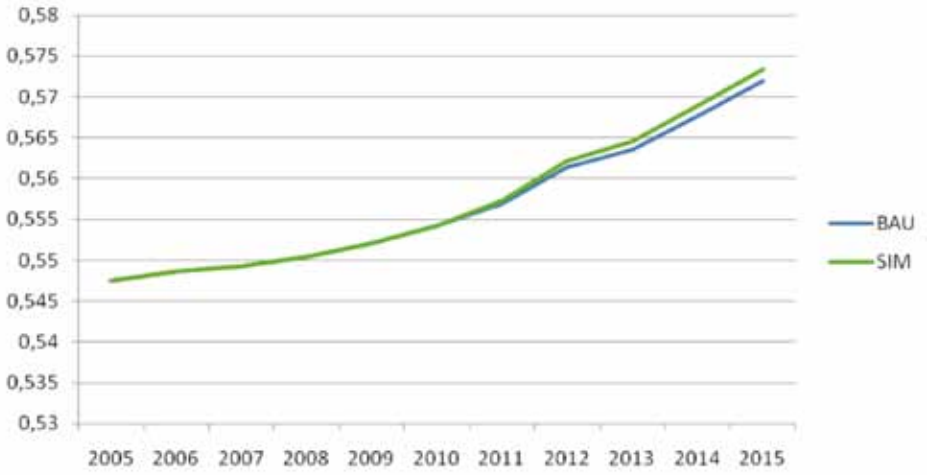
Figure 4.11 Impact on MDG5



Source: Simulation results

The general improvement of health also affects the education indicator (MDG2), as children who are not sick can go to school and follow a normal school life. However, as Figure 4.12 illustrates, the impact is not as strong as for the previous indicators.

Figure 4.12 Impact on MDG2



Source: Simulation results

The implementation of the policy has positive effects on the entire economy. Government needs to hire people in order to build new care centres, as well as hire new doctors and nurses, which has a positive impact on the level of employment. As Table 4.23 clearly shows, unemployment decreases for each type of worker, especially for skilled and highly skilled workers.

Table 4.23 Impact on unemployment rate in 2015 (in %)

	Highly skilled	Medium skilled	Low-skilled
2015	-0.36	-0.13	-0.01

Source: Simulation results

The impact on households is also positive, as their income increases by 0.63% in 2015, and their dissaving decreases (Table 4.24).

Table 4.24 Impact on households (in % compared to BAU)

	YH	SH	TDH
2015	0.63	-0.13	0.63

Source: Simulation results

The level of direct taxes collected by government also increases, which leads to government's income increasing by 0.34% in 2015 (Table 4.25). Again in this scenario government's savings decrease by just over 14% in 2015.

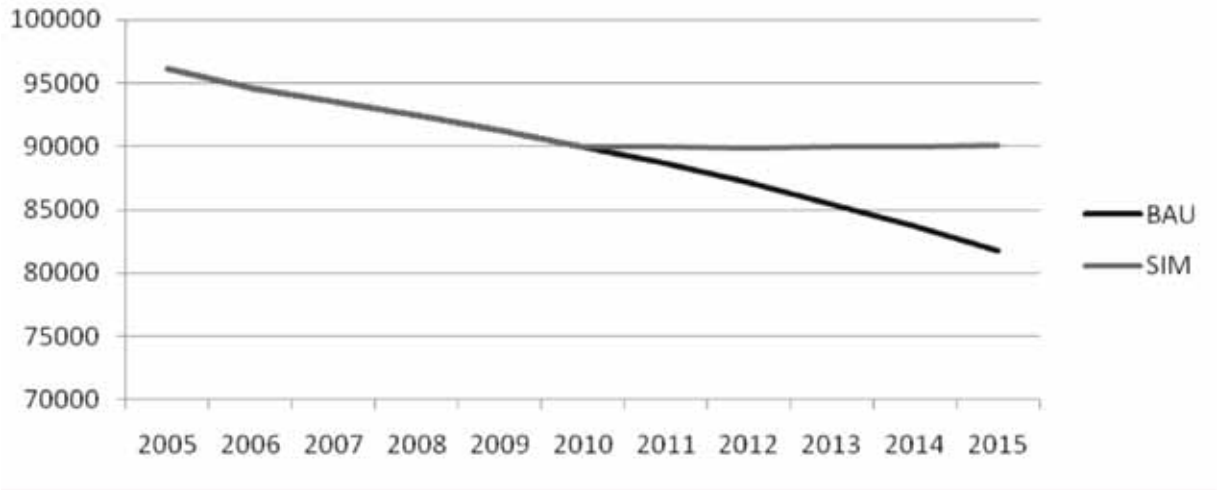
Table 4.25 Impact on government (in %, compared to BAU)

	YG	YGTR	SG
2015	0.34	0.16	-14.5

Source: Simulation results

In order to finance its policy, government borrows from the domestic market. Figure 4.13 shows that government increases its borrowing from 2011. (The BAU would be a constant decrease of the borrowing.)

Figure 4.13 Impact on the domestic borrowing



Source: Simulation results

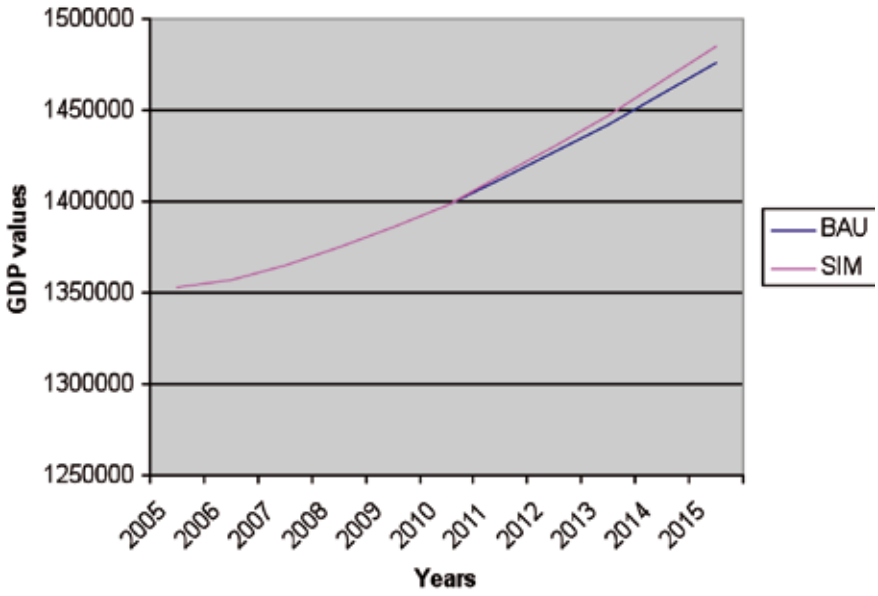
This increase in public borrowing, mainly from the domestic firms, has an impact on total investment. The same phenomenon occurs as in the previous scenario, with public investment having a crowding-out effect (Table 4.26).

Table 4.26 Impact on investment: (in % compared to BAU)

	IT	IT_PRI	IT_PUB
2015	-1.98	-2.38	0.07

Source: Simulation results

Figure 4.14 Impact on GDP (at basic prices)



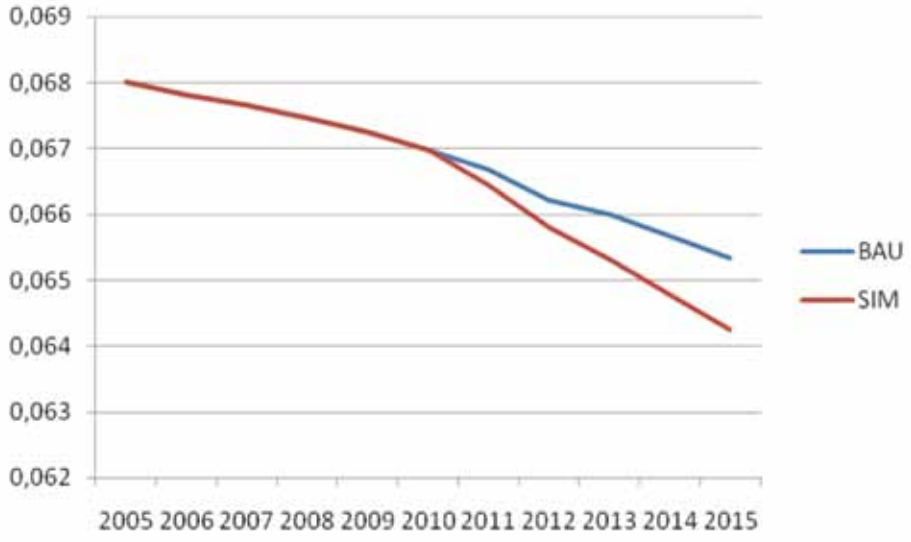
Source: Simulation results

To avoid this crowding-out effect and the bad consequences of a negative impact on total investment in the long run, the same simulation was run (reaching the MDG6). This time a fiscal reform was added, so that government will not have to borrow from the domestic economy (Scenario 4).

4.5.4 Scenario 4: reach MDG6 in 2015 through fiscal reform

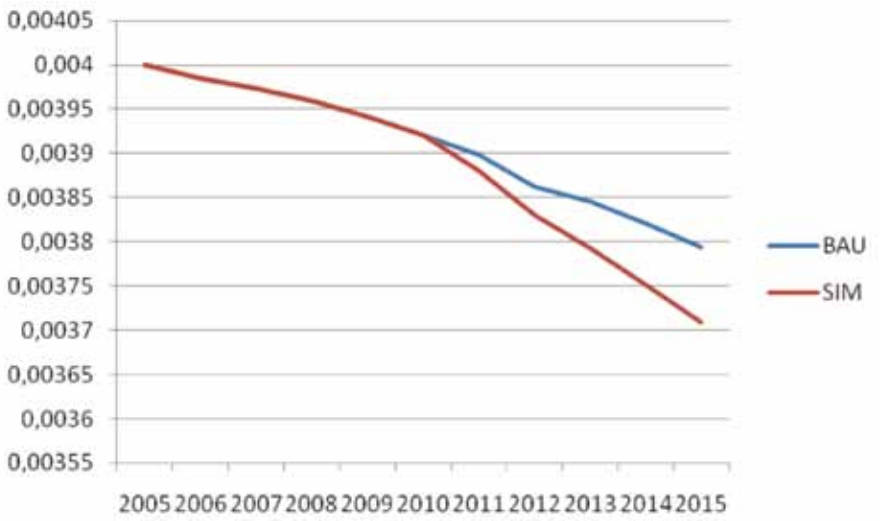
In this scenario, MDG6 is attained by increasing government's consumption in health services, but adding a uniform tax on commodities to keep government's deficit constant. As in the previous scenario, the health-related MDGs (4 and 5) improve as child mortality and mother mortality decrease. However, a slight decrease is observed in the MDG2 (Figure 4.15), as this indicator depends on the graduation rate, which relies on several proxies. Among them, households' per capita consumption decreases sharply, due to the fiscal policy. However, the decrease is almost imperceptible, dropping from 0.588 to 0.584.

Figure 4.15 Impact on MDG4



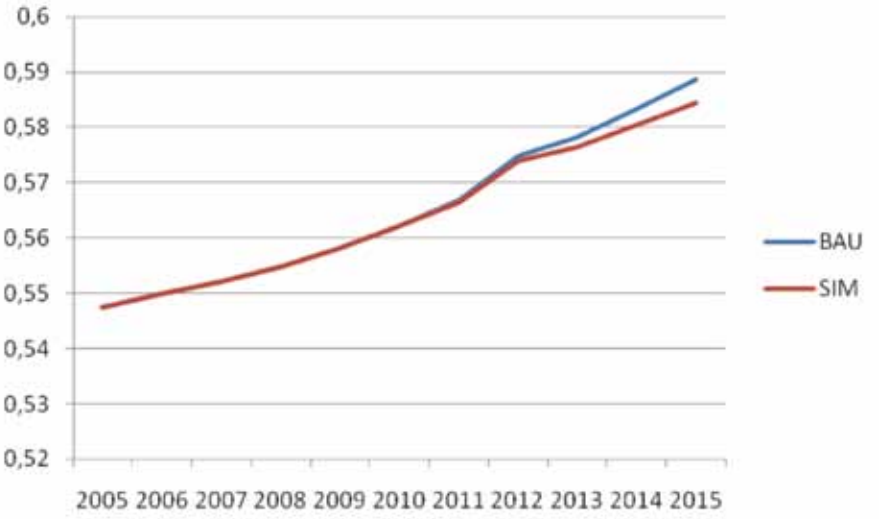
Source: Simulation results

Figure 4.16 Impact on MDG5



Source: Simulation results

Figure 4.17 Impact on MDG2



Source: Simulation results

As in the previous simulation, government's increased consumption of health services stimulates activity in the whole economy and leads to an increase in labour demand, which results in an increase in households' income. However, due to the indirect tax, real consumption per capita decreases by 0.4% in 2015.

Table 4.27 Impact on households (in % compared to BAU)

	YH	YHTR	SH
2015	0.08	-0.09	-0.04

Source: Simulation results

The impact on government's income is positive, as an indirect tax finances the policy. All commodities are concerned and so not only households pay for this, but firms also have to pay more for their intermediate consumptions. Thus, government's income increases by 1.88% in 2015. The drop in households' consumption has a sharp impact on total production, which decreases. The wage rate and the rate of return on capital decreases until reaching the corresponding minimal wage in the case for wage rates. The decrease in the rate of return affects firms' income and, consequently, their transfers[67] and savings.

67 This explains why households' transfer income and government's transfer income decrease.

Table 4.28 Impact on government (in % compared to BAU)

	YG	YGTR
2015	1.88	-0.11

Source: Simulation results

Here investment is affected by the decrease of firms' savings, whereas in the previous simulations it was affected by the decrease in government's savings.

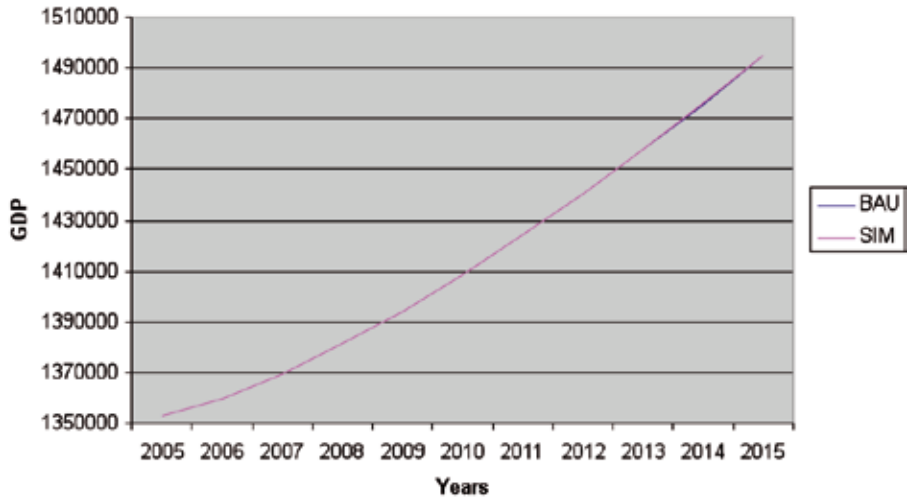
Table 4.29 Impact on investment (in %, compared to BAU)

	IT	IT_PRI	IT_PUB
2015	-0.18	-0.29	0.34

Source: Simulation results

The impact on GDP (at basic prices) is not noticeable, as Figure 4.18 illustrates.

Figure 4.18 Impact on GDP



Source: Simulation results

4.6 Conclusion and Ongoing Work

Reaching all the MDGs within four years seems unlikely, even impossible, especially MDG4 and MDG5 (maternal mortality and under-five mortality rates), as the actual values are too far away from the target values. This chapter looked at the effects on the economy if the country is on track to reach several MDGs. As mentioned, two of the MDGs are unlikely, but South Africa is on track to attain the education and HIV/AIDS goals. Four scenarios were analysed. The first scenario tested the feasibility of reaching all the MDGs in 2015, which was found not to be probable given the time constraint. The second and third scenarios assessed the attainment of MDG2 and MDG6 respectively, and the results were quite promising. However, in both of these simulations, it was assumed that government does not set up a fiscal reform, meaning that government has to borrow (from the domestic firms) to finance the policy, which is not sustainable in the long run. Therefore, the last scenario analysed the impact of a combined policy: reaching the MDG target and increasing indirect taxes to finance the policy. The indirect tax was found to have a harmful impact on households' consumption and on the economy, and eventually reduced the benefits of the policy. An interesting way to extend this work would be to lengthen the timeframe of the MDGs, to give more time for the economy to adjust, and then some of the MDGs could be reachable. Within the current timeframe, and without suggesting any hierarchy within the MDGs, it seems that focusing on MDG2 and MDG6 could be achievable, and also have benefits on the health-related ones (MDG4 and MDG5). Another interesting way to extend the work further would be to integrate the gender dimension (MDG3) into the modelling.

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CHAPTER 5: A MULTI-REGION GENERAL EQUILIBRIUM ANALYSIS OF FISCAL CONSOLIDATION

Ramos Mabugu,[68] Margaret Chitiga[69] and Ismael Fofana[70]

5.1 Introduction

The global economic crisis in 2008 and 2009 has brought to the fore a mismatch between South Africa's revenues and expenditures. General government expenditure constitutes roughly 33% of gross domestic product (GDP), of which approximately 29% is raised nationally and 4% locally. Provincially raised revenue is insignificant and rarely constitutes more than 2% of provincial revenue.

The slowdown in economic activity has reduced tax revenues, while government expenditures have risen as a counter measure to the recession, as well as for the capitalisation of public enterprises. Consequently, the government budget balance has deteriorated, from a surplus of 0.9% of GDP in 2008/09 to a projected deficit of 7.3% in 2010/11. Gross loan debt is projected to reach 43.1% of GDP in 2013/14, which is a significant rise from its level of 27% in 2009/10 (National Treasury, 2010). The situation becomes even more pessimistic if sustainability indicators incorporate projected events such as changes in the age structure of the population and the burden of HIV/AIDS. Unless modified, current fiscal policy is likely to pass huge tax bills onto future generations.

Government has already started fiscal consolidation efforts, realising that deficits of this magnitude not only lead to large public debts that may become unsustainable, but also destabilise the economy through rising inflation and interest rates. As a first direct signal of government's intent in this regard, the 2010/2011 Budget provides for a one percentage point reduction in the expenditure-to-GDP ratio from 2011/12 to 2013/14. With fiscal consolidation a high-priority policy issue in South Africa today, it is important to understand how the gains and losses from deficit reduction are distributed. The cut in grants can be viewed as a series of events, rather than fiscal consolidation, and allows us to assess the extent to which sub-national governments adjust expenditures and use their own fiscal powers (where these are significant) to offset the cuts in their grant allocations.

Applied General Equilibrium (AGE) models are among the methods and tools used to better understand the interactions between national and sub-national government spheres. They are able to shed light on the extent to which sub-national government participates in fiscal consolidation and hence macroeconomic adjustment. They are also able to trace the changes in property prices and in opportunities for households, and the migration between regions following reforms to existing revenue-distributing arrangements.

In countries with multiple government spheres, financial interactions between spheres of government and fiscal consolidation take on an added dimension of complexity. Most of the literature on the financial relationship among government spheres has focused on how to allocate optimally and to finance public service provision across the different levels of government.[71] Although less well developed, the literature on macroeconomic management in multi-tiered governments emphasises the tendency towards decentralisation and fiscal federalism, which raises the concern of maintaining sustainable public finances. A key issue is the incentives that multi-tiered fiscal authorities face. For example, tasked with providing an essential service such as health, sub-national governments face the problem of 'soft budget con-

68 Financial and Fiscal Commission, South Africa.

69 Human Sciences Research Council, Economic Performance and Development, South Africa.

70 International Food Policy Research Institute, West and Central Africa, Dakar, Senegal.

71 This is the classical fiscal federalism literature. Studies have looked at how different levels of government react to changes in the balance between central government grants and local revenues, for example, the 'flypaper effect'. See Oates (1999) for an extensive review of this literature.

straints'. To address this concern, many countries adopt fiscal coordination mechanisms.[72] In this chapter, a multi-region AGE model is used to analysis the effects of government expenditures, taxation and intergovernmental grants on equity and efficiency goals when used as an instrument of fiscal consolidation in a unitary-state country with three spheres of government (local, provincial and national) such as South Africa. An explanation of the structure and specificities of the multi-region AGE model is followed by a discussion of the data requirements, simulation and results.

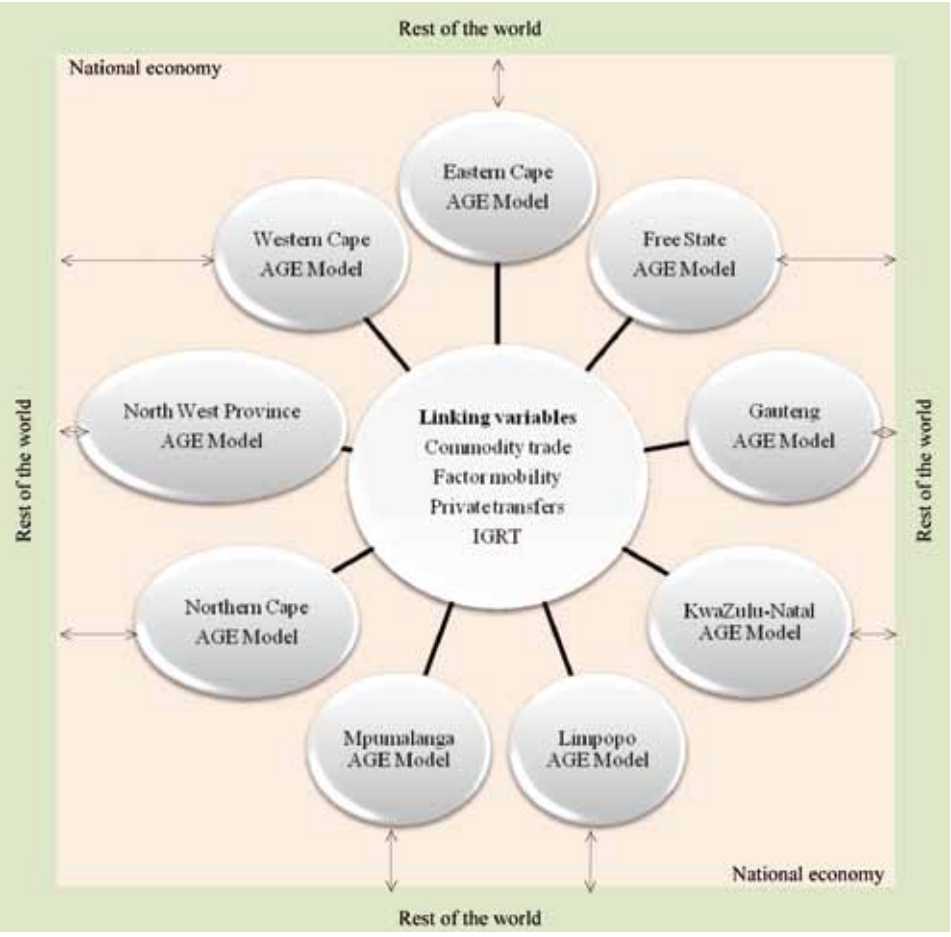
5.2 The AGE Model

The Integrated Multi-region Applied General Equilibrium (IMAGE) model is built for South Africa and used to assess the equity and efficiency of the current South African Intergovernmental Revenue Transfers (IGRT). It combines nine sub-models (Figure 5.1) which replicate the economies of the nine regions that constitute South Africa using an AGE framework.[73]

An AGE model is a multi-market and multi-agent system of equations, which uses real-world data to simulate the workings of a market economy. In policy analysis, using AGE models allows the integration of both direct and indirect interactions throughout the economy. In other words, if government policy causes something to change in one part of the economy, the model automatically computes the effects in the other parts.

At the core of the IMAGE model is the neoclassic general equilibrium theory, which seeks to explain production, consumption and prices in the economy, in which producers and consumers respond to relative prices as a result of profit and utility-maximising behaviours, respectively. Markets simultaneously adjust relative prices in order to reconcile supply and demand decisions and, thus, determine production and consumption levels.

Figure 5.1 Schematic representation of the IMAGE model



Source: Authors

72 These range from formal subnational fiscal rules (e.g., expenditure and borrowing ceilings) to informal coordination mechanisms.

73 Regions are synonymous with provinces in South Africa.

Partridge and Rickman (2010) note that, although regional AGE models follow country model archetypes, they present some additional complexities, which include:

- Regions trade not only with foreign countries, but also with other regions; therefore, the openness of the regional economy is greater than that of the country's economy.
- Labour mobility is greater among regions of a country than among countries; furthermore, there is a mismatch between the place of factor employment and the place of expenditure of factor income.
- Regional saving is less likely to influence regional investment.
- The intergovernmental fiscal transfers play an important role in reducing the gap in the living standards among regions.

The IMAGE model establishes the relationships among regions at four levels: i) commodity trade; ii) factors mobility; iii) intergovernmental revenue transfers; and iv) interregional private transfers and other specificities.

5.2.1 Commodity trade

The model presented here is shaped according to the information on interregional trade provided by the regional Social Accounting Matrices (SAMs). Data on imported and exported commodities (and other interregional linking variables) is available in one aggregate account: the Rest of South Africa (RSA). The nine regional SAMs do not give information on the region of origin and the region of destination for the traded products. The number of trading partners is the first difference between a standard country model and a regional model. Specifically, the IMAGE model features three trading partners instead of the two usually found in standard AGE models. The availability of a given product in one region or absorption is met by an aggregation of products from three regions: the region, other South African regions and the rest of the world. A nested constant elasticity of substitution (CES) specifies an imperfect substitution relationship among demands from the three regions. The derivative demands of the product from the region r, the RSA, and the rest of the world are closely related to the price of the product in the region, the average price of the product from the RSA, and the converted world price of the imported product.

As in the standard AGE models, the region r prices of goods and services are determined through the neoclassical market-clearing price system (perfect competition hypothesis). That is, producers and consumers take as given the relative prices that equalise the quantities demanded and produced for each commodity. Therefore, simultaneously determined producer and consumer prices vary only by given tax or subsidy and margins rates.

The treatment of the world prices is also similar to the standard AGE framework. Fixed international prices of imported commodities are assumed; in other words, there is no constraint on the availability or the supply of foreign goods (small country hypothesis). However, the converted prices of foreign goods, which are defined by international fixed prices, the exchange rate, and government fiscal interventions, determine the allocation of demand between national and international products.

The second feature of the IMAGE model is the interregional trade of goods and services and the treatment of the export demand. Standard AGE models usually assume a fixed export demand for the internationally traded commodities. However, an increasing number of models integrate a downward-sloping, export-demand system that links the export demand to the ratio of fixed world price and to the free on board (FOB) price. In the IMAGE model, the export demand of a region is determined by the demand for imports from other regions of the country.

The interregional trade is governed by the following rule: for a given commodity, the nationwide export demand is equal to the aggregation of the nine regions' imports (Figure 5.2). Then, the export demand of a specific region follows a cost minimisation rule. A constant elasticity of substitution is used to determine the export demand for the region from the nationwide export demand. Regional export prices determine the allocation of demand for exports among regions. Thus, the average price of imported commodities from the RSA is the average price of exported commodities by the RSA. The latter is the weighted average export prices in all regions in South Africa.

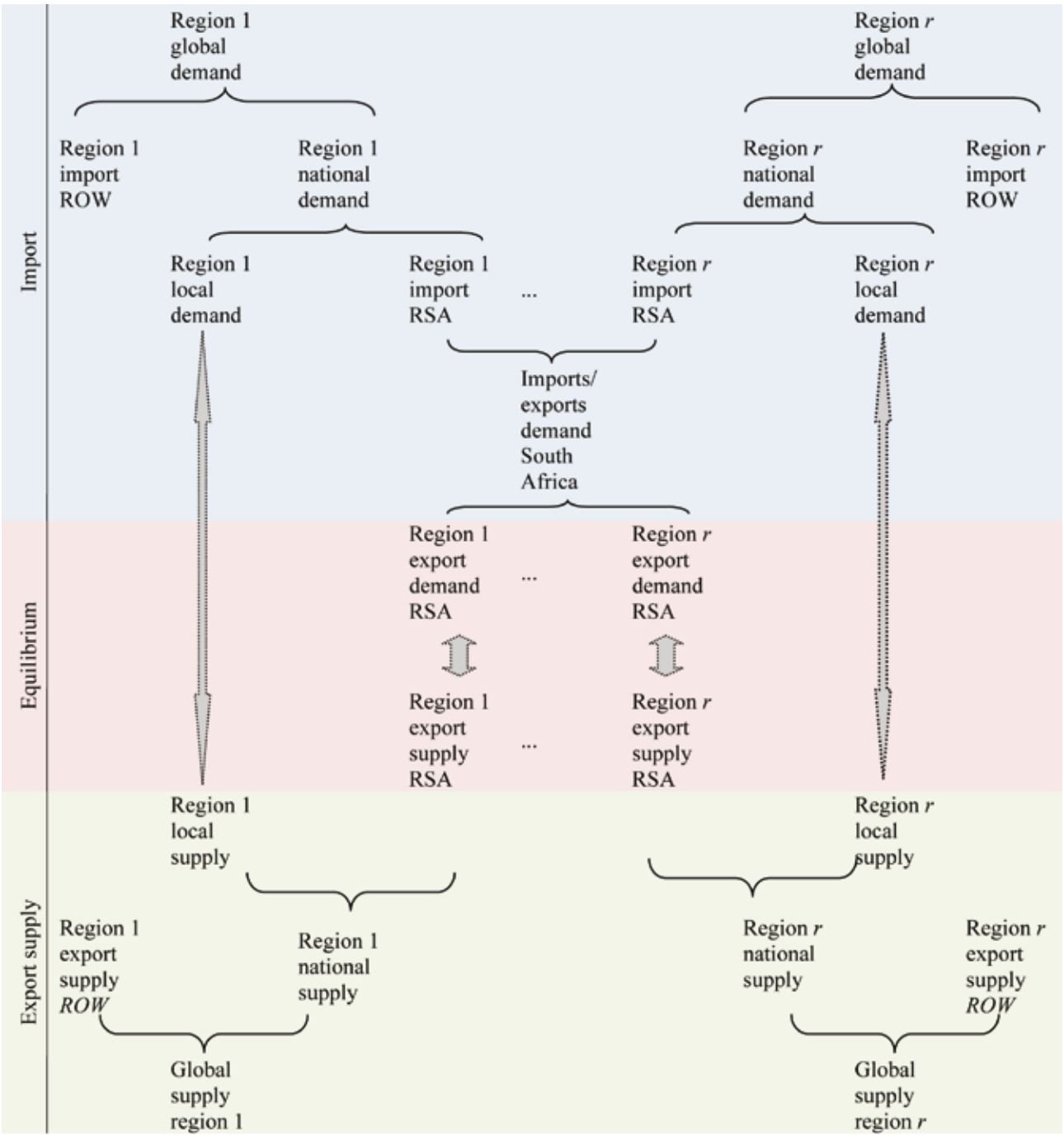
An imperfect transformation among the regional market, the RSA market, and the international market is specified for the regional production. Therefore, export supplies of a product to the region, the RSA, and the rest of the world are closely linked to the price of the product in the region, the average price of the product from the RSA, and the FOB price of the internationally exported product. Adjustments in the export FOB prices balance export demand from and export supply to the rest of the world. Export demand from the rest of the world follows the standard specification, i.e. downward sloping. Consequently, export demand depends on world prices and domestic FOB prices.

5.2.2 Factor mobility

An adaption of the Harris and Todaro (1970) model of migration is used to explain the interregional mobility of factors, i.e. labour and capital. The model assumes that the migration decision is based on the differentials between the expected wage in the urban sector and the wage rate in the rural sector. This implies that rural–urban migration occurs as long as the expected wage from migrating to the urban area is greater than the wage in the rural area.

The IMAGE model considers a natural interregional flow of labour and capital explained by many reasons, including the price differentials between regions. The relative changes in the labour or capital flows (compared to their initial levels given by the regional SAMs) are assumed to be closely linked to the changes in the ratio of national to regional prices. When the ratio is greater than one, there is an increase in the flow of labour or capital from the region toward the rest of the country.

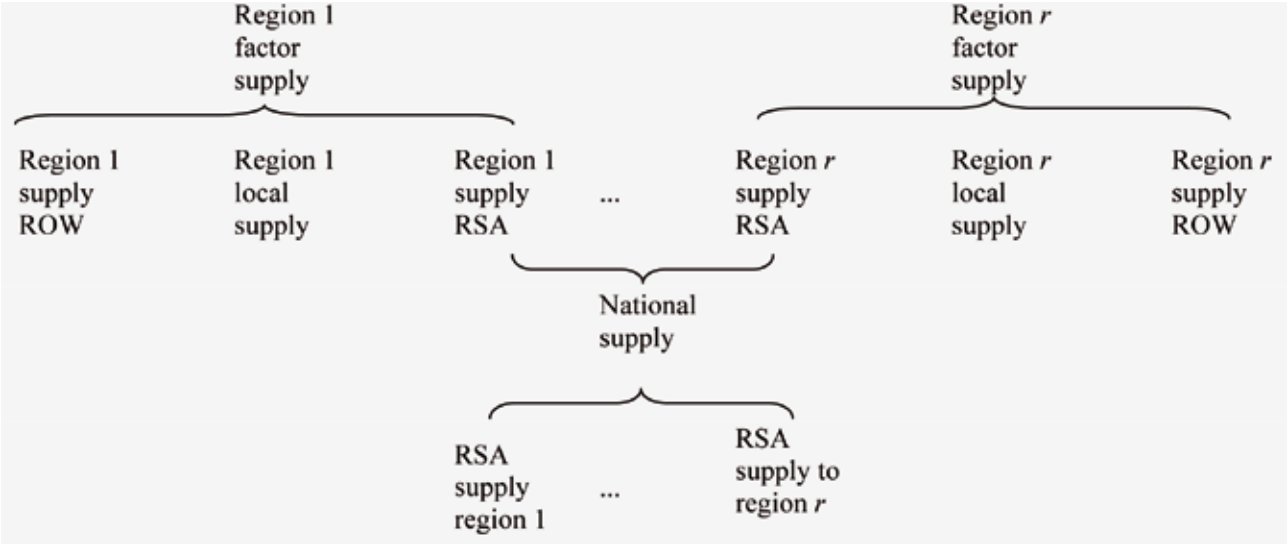
Figure 5.2 Structure of the interregional trade in goods and services



Source: Authors

Figure 5.3 shows the interregional reallocation of factors, which is in two steps: first, the decision to move, then the choice about the destination is made. In this relationship, potential migrants or capital holders are assumed to be risk averse. The assumption is expressed by an inelastic relationship between the changes in interregional labour or capital flows with respect to changes in expected wage or return-to-capital ratio. In other words, the migrant labourers spend their entire revenue in the region of origin.[74]

Figure 5.3 Interregional mobility of factors



Source: Authors

Labour

The change in labour supply to the RSA, compared to its initial level, depends on the ratio of the expected wage rate in the region and the nationwide average expected wage rate. The expected wage rates are equal to the gross wage rates adjusted by the unemployment rates. The nationwide average wage and unemployment rates are equal to the regional wage rates weighted by the regional supply and demand of labour respectively.

The total supply of labour to the RSA is an aggregate of the regional supplies (See Figure 5.3). It is then distributed among regions according to an imperfect transformation relationship. The supply of labour from the RSA to one region is closely related to the ratio of its expected wage rates in the region and the nationwide average wage rate.

Capital

The change in the supply of capital to the RSA compared to its initial level also depends on the return-to-capital ratio in the region and the RSA. The nationwide return to capital is an average of the region's returns weighted by their demand for capital.

The aggregate supply of capital is distributed among regions through a constant elasticity of transformation. The supply of capital from the rest of South Africa to the region is also related to the region's return to capital and the nationwide average return to capital.

5.2.3 Intergovernmental fiscal transfers

The IMAGE model accounts for three spheres of government: national, regional and local. Each sphere is assigned certain powers, functions and financial resources, which may be exclusive, concurrent or shared. While national government raises the bulk of aggregate revenues, its expenditure responsibilities are much lower. There is thus a mismatch between revenues

74 Alternatively, the assumption could be that the migrant revenue is shared between the region of origin and the region of destination by defining a sharing.

raised and expenditure responsibilities. A converse mismatch exists at the provincial level. This vertical mismatch is known as vertical fiscal imbalance. Horizontal fiscal imbalance exists among regions, and also among localities within regions where different regions have different abilities to raise funds. Thus, regions have massively different expenditure responsibilities and existing (as well as potential) revenue sources.

Each government sphere spends on providing public services, subsidising the national economy (activities and products), and transferring revenues to other governments and institutions. The IGRT are modelled in a standard fashion, i.e. they are assumed to be fixed in real terms. Government fiscal policies also follow the standard specification, namely that the national government expenses in a given region is exogenous. While the national government's fiscal balance is endogenously determined in all regions, its overall balance is exogenous. Therefore, a revenue-neutral hypothesis is assumed for national government and its revenue loss, if any, is compensated by an endogenous uniform tax on household gross incomes across all regions. Rigidity in expenses and revenue-neutral assumptions are also made for regional and local governments. Compensatory taxes at endogenous uniform rates are applied to households' gross incomes.

5.2.4 Interregional private transfers and other specificities

A standard formulation is used to model the private transfers, i.e. they are fixed among regions, as well as between a given region and the rest of the world. The assumptions associated to the rest of the model are discussed below.

Regional supplies and demands

As producers maximise their profit under a given technology and prices, industry-specific producers are modelled as representative producers who are assumed to have a CES production technology. In addition, production activities and commodities are separated. A fixed proportional relationship, between activity output and domestic supply of commodity, permits any activity to produce one or multiple commodities and any commodity to be produced by one or multiple activities.

Consumers' behaviour is rational, which implies that their production and consumption decisions are separated in the presence of complete markets. With the fixed factor endowments assumption, their incomes are closely related to the return to these factors. Consumers maximise their utility under limited budgets and given market prices, while households are also modelled as representative agents that are assumed to have Stone-Geary type of preferences.

Institutional constraints

AGE models differ primarily in the choices of closure rules that equilibrate commodity, factor and foreign exchange markets. These models also differ in rules specified to reconcile the government budget constraint and in the mechanism used to equilibrate savings and investment levels in the economy.

The labour market is assumed to be fully segmented. Each category of labour is assumed to be perfectly mobile across industries. Skilled workers are fully employed in the economy, although low rates of frictional unemployment[75] are observed. The skilled labour market is assumed to be perfectly competitive so that the prevailing wage rates equalise exogenous supplies and endogenous demands for high-skilled workers. In contrast, the competition is imperfect in the unskilled labour markets, where the total demand does not equal the total supply, and an excess supply of labour remains unemployed. The wage rate paid to unskilled workers is closely related to the unemployment rates through a wage-curve specification.

Institutional units are endowed with one type of capital, which is mobile among industries with one return to capital in the economy. The static comparative analysis does not imply capital accumulation and investment rules. As a consequence, exogenous investment and capital supply are assumed. Therefore, saving is driven by investment. Savings are generated by exogenous constant rates for households and by residual savings for firms. Savings of the national, provincial, and local governments are exogenous, as are savings of the RSA and the rest of the world.

Although every region exchanges directly with the rest of the world through trade of goods and services and other transfers, the external current account balance is specified at the national level. The nationwide balance of external current account is

75 Frictional unemployment exists because both jobs and workers are heterogeneous. A mismatch in skills, payment, working time, location, attitude and tastes can result between the supply and the demand of labour.

exogenous. Therefore, an endogenous exchange rate or the relative price of goods and services traded with the rest of the world clears the external current account.

On the other hand, regional sub-models also feature external current accounts with the RSA. To avoid free lunches among regions, the balances of the external current accounts with the RSA are fixed. They are balanced through adjustments in region-specific exchange rates, which are defined as the relative price of goods and services traded with the RSA and are set as 'numeraires'.

5.3 The Data

The IMAGE model is operationalised through the calibration procedure, which consists of finding parameters that permit equations to reproduce exactly the benchmark situation given by nine region-level SAMs.[76]

5.3.1 Regional SAMs

Regional SAMs are available for the nine regions that constitute South Africa. All SAMs are for the year 2006 and are structured as follows (see Table 5.5 in Annexure 5A):

- 35 to 47 accounts for activities/commodities;
- 44 accounts for labour payments divided into four population groups and 11 occupations;
- Four accounts for capital payments or the gross operating surplus (GOS);
- Four accounts for enterprises;
- 48 accounts for households, disaggregated into four population groups and 12 consumption deciles;
- Seven accounts for government income sources and six accounts for its expenditures items;
- Two accounts for government, and corporations and households capital accumulation;
- Four accounts for the RSA;
- Five accounts for the rest of the world; and
- One account for residuals and discrepancies.

The adjustment procedure aims both to set up a common framework for the nine regional SAMs and to be consistent with the standard structure of AGE models.

Activities and products are aggregated into a suitable number of accounts according to the mapping made among the nine regional SAMs in order to generate a uniform framework with 35 industries/commodities: one agriculture, one mining, four food, one beverage, 19 manufacturing and nine services.

The 44 accounts for labour payments are aggregated into the 11 occupational groups.

The four accounts for enterprises are grouped into two categories: Public Enterprise and Private Business Enterprise (which includes Combi-Taxi Enterprise and Informal Enterprise).

The 48 accounts for households are aggregated according to the 12 consumption deciles.

Income and expense accounts of the three levels of government – national, provincial, and local – are adjusted to match receipts (row) and spending (column). The four accounts of the RSA are aggregated into one account. The five accounts of the

76 The SAMs provided by the Department of Trade and Industry and constructed by Coningharth Economists in 2008.

rest of the world are also aggregated into one account. Institutional accumulation account is aggregated into a one account. The allowance for depreciation, or payments of capital recorded directly in the capital account, is first transferred to institutional units and then channelled to the capital account; the model follows the principle that savings are made by institutional units (either resident or non resident). Residual accounts are cancelled out by combining them to the change in inventories featured in the accumulation account.

5.3.2 Other data

Alongside the SAM data, the calibration procedure of the IMAGE model requires additional information, essentially the elasticities, the Frisch parameter, and the unemployment rates. With the exception of unemployment rates, which are different from one region to another (see Figure 5.8 in Annexure 5A), the value of parameters chosen for regional sub-models are identical.

The values of the income elasticity of demand are drawn from the work done by the Economic Research Service of the US Department of Agriculture for 114 countries (see Table 5.6 in Annexure 5A).[77] The elasticity of the wage rates with respect to the unemployment rate is set at -0.1 according to estimates by Kingdon and Knight (2005). The value of -3.34 is chosen for the Frisch parameter, an estimate for middle-income countries by Hertel *et al*. (1997). The elasticity of substitution between capital and labour is fixed at 2.5, the highest value surveyed by Annabi *et al*. (2006). The trade elasticities are estimated by Gibson (2003) for the Armington elasticities (see Table 5.7 in Annexure 5A), and by Behar and Edwards (2004) for the export elasticities. The latter take the values of 1.3 for the transformation elasticity and 6.0 for the export demand elasticity.

The next set of parameters related to the interregional relationship is i) the import and export elasticities; ii) the elasticity of factor mobility among regions with respect to prices; iii) the transformation elasticity of factors among regions. Since estimates are not available for these parameters and the results of this analysis are likely to be influenced by their values, the main simulation is carried out under two scenarios: low and high interregional relationships.

5.3.3 Simulation scenarios

The IMAGE model developed for South Africa is used to assess the effectiveness of the current IGRT. The degree to which the national government equity goal is achieved through the current IGRT is quantified. The simulation is based on the vertical imbalance of national government revenues and expenses among regions.

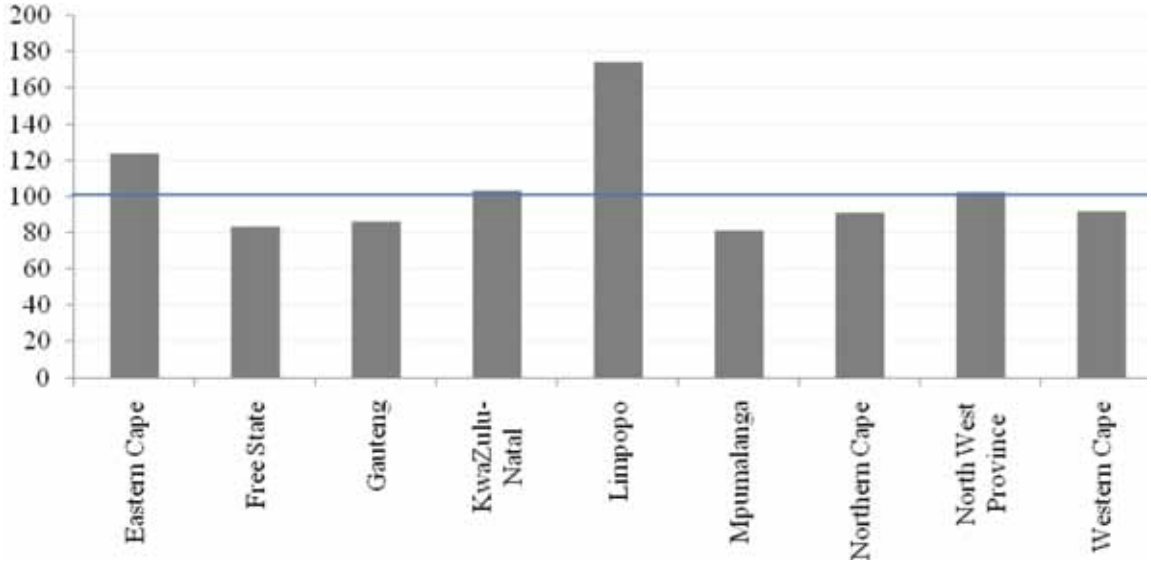
First the revenues and expenses of the national government in each region are presented in order to understand better the simulation performed later. Figure 5.4 shows disparities between collected revenues and expenses by the national government in all regions.

The regions that receive by far the most transfers from national government are Limpopo and Eastern Cape, where R174 and R124 respectively are spent for every R100 collected in the region. The two other regions that receive net transfers from the national government, but to a lesser extent, are KwaZulu-Natal and North West Province: R103 and R102 for every R100 collected respectively.

On the other hand, national government spending is less than the collected revenues in Mpumalanga, the Free State and Gauteng: for every R100 collected, it spends R81, R83, and R86 respectively. The Northern Cape and Western Cape also received R91 and R92 for every R100 collected in these regions.

77 The data is available at www.ers.usda.gov/data/internationalfooddemand. The values estimated for Botswana are used for South Africa, which is not covered by this database. South Africa and Botswana have similar Human Development Indexes, as computed annually by the United Nations Development Programme (UNDP).

Figure 5.4 National government spending-to-income ratio by region (%)



Source: Regional SAMs for 2006

To analyse the effectiveness of the IGRT in South Africa, the current system of fiscal transfer was arbitrarily reduced by 50%. The effectiveness of the policy is captured through welfare effects, as measured by the changes in equivalent variation.[78]

National government's primary saving rate is assumed to be identical for all regions, in order to avoid simulating the issue of the national government fiscal balance alongside the main simulation scenario – the IGRT. Once national government fiscal balances are determined for all regions, the spending excess/deficit of all revenues collected by national government in the region is estimated. The spending excess/deficit is then calculated in proportion to the initial national government spending in terms of transferred revenues to the region. In the baseline scenario, this spending excess/deficit is nil. In the simulation scenario, it is assumed that 50% of the spending excess is cancelled out for some regions and 50% of the spending deficit is transferred back to other regions.

When 50% of the IGRT is cancelled out, regions such as Limpopo, Eastern Cape, KwaZulu-Natal and North West Province receive less transfer revenues, and consequently national government spending falls. On the other hand, Northern Cape, Western Cape, Free State, Mpumalanga, and Gauteng have additional fiscal spare capacity; that is, national government spending increases in these regions.

Changes in transfer revenues do not have an impact on national government fiscal policy, as it is re-transferring revenues among regions. However, regional government fiscal policy is directly affected by the changes in transfer revenues. A revenue-neutral hypothesis is adopted for regional governments so that, with fixed regional expenses and savings, their budgets are balanced through a compensatory tax or subsidy on households' gross income.

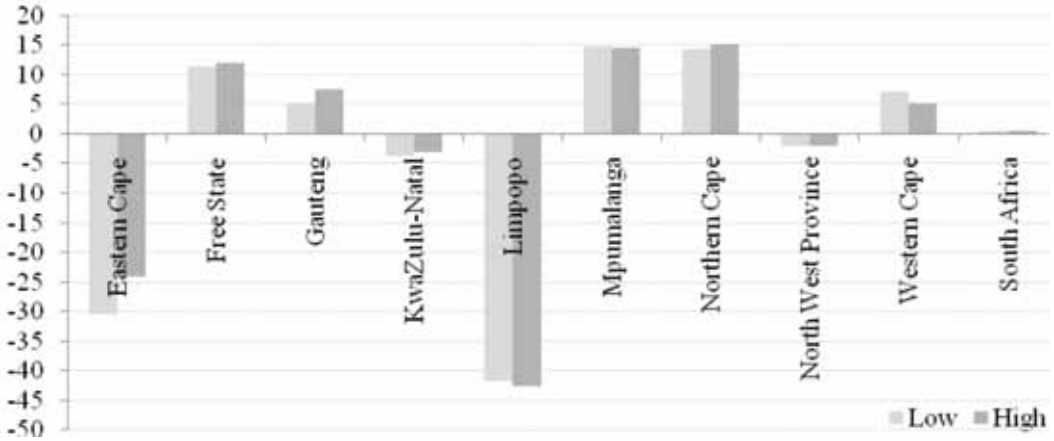
The 50% cut of grants is performed under two scenarios: *low* and *high* interregional trade and factor mobility. The *low* interregional relationship scenario assumes that the interregional trade elasticities are identical to the international trade elasticities. Assuming no changes in regions' ownership of factors and consequently temporary mobility of labour, an inelastic interregional supply of labour and capital is assumed with respect to the changes in their relative regional prices. While the elasticity value of 0.1 is set for labour, a relatively more flexible value of 0.3 is chosen for capital. An identical elasticity value for labour mobility and the transformation elasticity is assumed, i.e. after making the decision to supply more or less labour to the other regions, the choice of the destination is still limited because of the temporary mobility of labour hypothesis. However, it is assumed that the choice of the destination (the transformation elasticity) of the capital is twice as flexible as the supply elasticity. So long as the openness of the regional economy is greater than that of the country's economy, results drawn from the *low* scenario should be interpreted as lower bound results. Therefore, the *high* interregional relationship scenario measures the sensibility of the results to higher economic interaction amongst regions. In this regard, the elasticities are set at values three times higher than their counterpart in the *low* scenario.

78 The experiment is limited to 50% reduction of the IGRT for the reason that higher shocks, in particular a full cancelling out (100%), are too big for many regions (e.g. Limpopo) and technically impossible to perform using the model. A progressive reduction of the IGRT simulated through a dynamic framework would be more appropriate in this case.

5.3.4 Simulation results

The simulation demonstrates that reducing the current IGRT has significant interregional equity effects, although the overall impact is less important. Nationwide welfare falls by 0.6% when the IGRT are cut by 50% (Figure 5.5). However, its distributional effect among regions is important. Changes in welfare are negative in four regions: Limpopo (42–43%), Eastern Cape (24–30%), KwaZulu-Natal (3–4%), and the North West Province (2%). As net receivers of IGTR, these regions witness a loss of revenues after a 50% cut of the transfer.

Figure 5.5 Equivalent variation of initial consumption expenses (%)

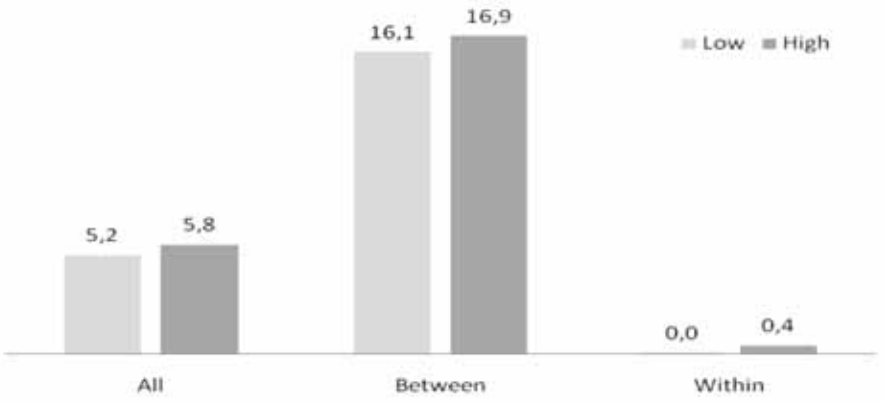


Source: Simulation results

As depicted in Figure 5.6, changes in welfare are positive in five regions: Mpumalanga (15%), the Northern Cape (14–15%), Free State (11–12%), Gauteng (5–8%), and the Western Cape (5–7%). These positive changes in welfare are attributed to the additional revenues spent in these regions following the partial cancelling of revenues that were initially transferred to other regions.

Theil indices are used to measure the regional disparities. The overall regional disparity increases by 5–6% (Figure 5.6). This is essentially imputed to the increase in disparities between regions by 16 to 17%.

Figure 5.6 Variation in Theil indices (%)



Source: Simulation results

Although the overall within-region disparities remain unchanged (Figure 5.6), the intraregional disparities are important and vary from region to region. Disparities between top and bottom income categories increase in Limpopo and the Eastern Cape, regions that were initially receiving net positive IGRT (Tables 5.1 and 5.2). The reduction of revenue transferred to others regions – consequently, an increase of national government spending in the region – benefits more the bottom income groups in the Northern Cape, Mpumalanga, and Free State.

Table 5.1 Percent change in EV of initial consumption expenses, low scenario

Household category	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpuma-langa	Northern Cape	North West Province	Western Cape
P1	-27.2	9.8	5.9	-3.4	-39.8	14.4	10.8	-2.3	6.3
P2	-26.0	9.8	5.6	-3.8	-36.6	12.5	8.7	-2.5	6.0
P3	-26.6	9.9	5.2	-3.7	-37.3	12.9	8.4	-2.2	6.3
P4	-26.3	9.9	4.8	-3.6	-37.8	13.1	9.3	-2.2	6.6
P5	-26.5	9.8	5.1	-3.7	-36.8	12.9	9.0	-2.3	6.4
P6	-26.7	10.0	4.8	-3.6	-38.2	13.4	9.9	-2.2	6.3
P7	-27.8	10.0	5.3	-3.4	-39.4	12.7	10.9	-2.3	6.2
P8	-27.9	10.1	4.8	-3.5	-40.0	13.1	16.2	-2.3	6.5
P9	-28.1	10.4	4.4	-3.4	-41.6	14.2	15.1	-1.9	6.9
P10	-35.4	11.6	4.5	-3.7	-51.7	17.9	13.8	-1.8	7.0
P11	-41.9	12.4	6.9	-3.9	-49.8	17.3	18.5	-2.5	7.2
P12	-31.5	13.9	5.2	-3.7	-42.2	15.4	54.8	-1.9	7.4
ALL	-30.4	11.3	5.1	-3.7	-41.7	14.8	14.3	-2.1	7.0

Source: Simulation results. Note: EV: Equivalent Variation

Table 5.2 Percent change in EV of initial consumption expenses, high scenario

Household category	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpuma-langa	Northern Cape	North West Province	Western Cape
P1	-22.1	10.4	8.0	-2.7	-40.8	15.0	13.2	-1.9	5.0
P2	-20.3	10.4	7.0	-2.9	-37.9	12.4	11.4	-2.2	4.4
P3	-20.8	10.5	6.8	-2.9	-38.4	12.4	11.3	-2.0	4.6
P4	-20.7	10.5	6.6	-2.9	-38.8	12.7	10.2	-2.0	4.7
P5	-20.9	10.5	6.8	-3.0	-38.3	12.7	9.8	-2.1	4.6
P6	-21.4	10.7	6.7	-3.0	-39.3	13.1	9.2	-2.0	4.6
P7	-22.3	10.7	6.9	-3.0	-40.6	12.6	9.5	-2.2	4.6
P8	-22.8	10.8	6.8	-3.1	-41.0	13.1	15.8	-2.1	4.7
P9	-23.0	11.0	6.7	-3.0	-42.6	13.8	15.1	-2.0	4.9
P10	-28.9	12.3	7.6	-3.3	-52.1	17.5	13.2	-1.9	5.1
P11	-33.7	13.1	9.3	-3.3	-50.1	17.4	17.7	-2.3	5.3
P12	-25.0	14.4	8.1	-3.1	-43.0	15.0	58.7	-2.0	5.5
ALL	-24.2	11.9	7.6	-3.1	-42.6	14.5	15.1	-2.1	5.2

Source: Simulation results. Note: EV: Equivalent Variation

Therefore, halving the IGRT in South Africa leads to increased regional disparities. Compared to other regions, Limpopo and the Eastern Cape witness significant welfare losses. In the same vein, low-income households are heavily hit compared to the middle and high-income households within these regions. Regions that were initially transferring revenue see welfare gains and a fall in income disparities.

The overall effect on GDP is small. Reducing the IGRT by 50% leads to a fall of 0.2% in GDP in the low scenario and of 0.1% in the high scenario. Although higher regional integration lowers the adverse effect of reducing the IGRT, its regional disparities are more important (Figure 5.7).

The group of regions receiving revenues within the IGRT system see a fall in GDP, which is particularly significant in Limpopo and the Eastern Cape. GDP falls slightly in KwaZulu-Natal and the North West Province. Regions transferring revenues (Northern Cape, Mpumalanga, Free State, Gauteng and Western Cape) see their GDPs increase.

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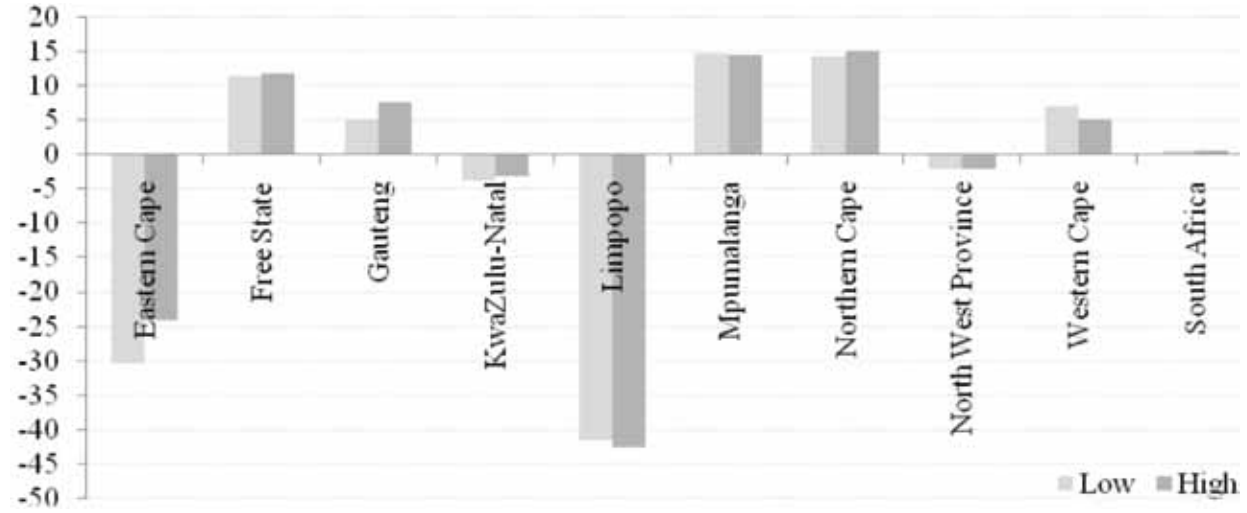
Figure 5.7 Change in GDP (%)



Source: Simulation results

The IGRT have income and price effects in all regions. Reducing the national government transfer payments leads to a fall of income in regions receiving IGRT revenue and has negative effects on households' well-being. Regions initially transferring revenues see their income and welfare increase. However, higher income increases the demand for goods and services and puts pressure on prices, which reduces the purchasing power and households' well-being.

The income and price effects are explored in order to understand better the inter- and intra- regional disparities. Assuming a revenue-neutral hypothesis for all governments (i.e. fixed spending and savings), revenue changes are captured through a compensatory tax or subsidy on households' gross incomes and, consequently, their consumption.

The reduction of IGRT by 50% creates a revenue deficit for regional governments in Limpopo, Eastern Cape, KwaZulu-Natal, and the North West Province. Therefore, these governments can either reduce their expenses and/or increase their income. Assuming that expenditures are fixed, the alternative is that government increases taxes, which is done through the introduction of a uniform compensatory tax on households' gross income. The additional tax rates required to fully compensate the loss of regional government revenue is: 12.4% in Limpopo, 6.8% in the Eastern Cape, 0.9% in KwaZulu-Natal, and 0.5% in the Northern Province.

In contrast, regions that are initially transferring revenues show compensatory subsidy rates of 4.1% in the Northern Cape, 3.7% in Mpumalanga, 3.2% in Free State, 2.5% in Gauteng, and 1.7% in the Western Cape.

In the low and high trade and factor mobility scenarios, households' gross incomes fall (Tables 5.3 and 5.4): in the initially net receiver regions because of the transfer cut and the ensuing positive compensatory tax rates; and in the initially net payer regions because of the inflationary and depreciatory effects. As a result, domestic factors and commodities prices fall relative to external prices. Consumer price indices also fall and, consequently, real consumptions increase for the net payers and fall for the net receivers.

Because of the regressive nature of the compensatory tax, and eventually public expenses when government has to cut on its expenses instead of increasing taxes, poor households are hardest hit in regions where the rate increases. In contrast, poor households benefit more in regions where the compensatory tax rate falls.

Table 5.3 Percent change in revenues, low scenario

	Eastern Cape	Free State	Gauteng	KwaZulu Natal	Limpopo	Mpuma-langa	Northern Cape	North West Province	Western Cape
Gross income	-4.3	-3.6	-2.9	-3.7	-3.2	-3.7	-3.1	-3.6	-3.5
Compensatory tax rate	6.8	-3.2	-2.5	0.9	12.4	-3.7	-4.1	0.5	-1.7
Disposable income	-12.3	-0.2	-0.2	-4.8	-16.6	0.3	2.5	-4.4	-1.6
Consumer price index	-4.5	-3.3	-1.6	-3.7	-3.9	-3.8	-1.7	-3.6	-3.5
Real consumption	-8.3	4.0	1.4	-1.1	-13.2	4.4	16.0	-0.8	2.1

Source: Simulation results

Table 5.4 Percent change in revenues, high scenario

	Eastern Cape	Free State	Gauteng	KwaZulu Natal	Limpopo	Mpuma-langa	Northern Cape	North West Province	Western Cape
Gross income	-1.3	-0.8	-0.6	-1.0	-0.7	-1.3	-1.2	-1.2	-0.9
Compensatory tax rate	6.2	-3.2	-2.4	0.8	11.9	-4.0	-4.4	0.4	-1.3
Disposal income	-8.6	2.8	2.1	-1.9	-13.8	3.2	5.2	-1.7	0.6
Consumer price index	-1.4	-0.8	-0.2	-1.0	-1.2	-1.1	0.6	-1.0	-0.9
Real consumption	-7.5	4.3	2.4	-0.9	-12.9	4.5	17.8	-0.6	1.6

Source: Simulation results

5.4 Conclusion

While previous studies of fiscal consolidation attempts have tended to focus solely on general government, this research has established an important role for sub-national government in fiscal consolidation. A multi-region computable applied general equilibrium model was used to show how efficiency and equity goals are affected. Although the results that emerge from the empirical analysis are varied, two general points are worth highlighting.

First, cuts in grants have significant interregional equity effects, although the overall impact is less important. In regions that were initially receiving revenues, i.e. Limpopo, Eastern Cape, KwaZulu-Natal, and the North West Province, reducing the current IGRT leads to a fall in welfare. However, welfare increases in regions that were initially transferring revenues, i.e. Northern Cape, Mpumalanga, Free State, Gauteng and the Western Cape. In addition, the change in GDP is negative for the former group of regions, while positive for the latter group.

Second, cuts in grants also have significant intra-regional equity effects, although the economy-wide impact is small. When transfer revenues – and consequently regional and local governments' revenues – fall, poor households are the most affected because they depend more on public services, which are essentially financed by governments. When the government fiscal position improves, poor households also benefit more from additional government expenses. Cuts in grants can be compensated by increases in taxation. However, the increase in sub-national taxation means that households' incomes fall and income disparity widens. Poor households are hardest hit in regions where the rate increases because of the regressive nature of the integrated compensatory tax – eventually government has to cut its expenses instead of increasing taxes. In contrast, poor households benefit more in regions where the compensatory tax rate falls.

The current IGRT is therefore effective and contributes to realising the national government equity goal. It would seem difficult to agree on painful measures to keep the budget balanced, if fiscal restraint is widely perceived to be associated with not only a higher net tax burden on current generations, but also a more unequal distribution of their after-tax incomes. Such concerns about intra-generational equity appear to be justified if cuts in social assistance or less regressive taxes are used to reduce the deficit. Not least from a South African welfare state perspective, a programme of fiscal consolidation could easily conflict with ambitious (re)distributive objectives.

The analysis represents a modest first step towards a more complete empirical assessment of fiscal consolidation in economies with multi-spherical governments. A number of extensions can be done with the current model. Intergovernmental fiscal transfers may also have dynamic efficiency gains in the sense that, if higher spending on services such as education, health, transportation, water, sanitation and public housing increase the stock of human capital, then this might increase the rate of economic growth and per capita incomes.

The next phase will be to explore efficiency and equity issues for having uniform minimum standards of public services in South Africa. It is essential to extend the model to capture these dynamic interactions so that the relative sizes of fiscal resources, which have to flow between and among governments and tiers, are determined equitably and in a transparent manner.

The work can also be extended to explore many other issues, such as the impact of the equitable formula on national and sub-national performances; the effects of varying the equitable formula to regions, i.e. a move from population-based to needs-based formula using poverty status of regions; the effect of matching grants versus block grants; the effect of conditional grants, considering the conditional grants by sector or by classification; the effects of targeted use of transfers versus non-targeted use; the effect of revenue raising at the provincial level, e.g. reducing national income tax, creating a fiscal space that can be used for provincial personal income taxes; the effect of changing the component shares of conditional grants per province; and the effects of various funding possibilities for raising revenue of regional

public goods, revenue-neutral financing, redistributive taxes, and uniform tax deductions. Despite the limitations mentioned, the results are quite thought provoking, showing that the design of fiscal consolidation programmes clearly requires a careful balance between intergovernmental and intra-generational fairness.

Annexure 5A Graphs and tables

Table 5.5 Dimension of the regional SAMs

SAMs accounts	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Lim-popo	Mpuma-langa	Northern Cape	North West	Western Cape
Activity	42	36	37	45	46	47	37	35	47
Commodity	42	36	37	45	46	47	37	35	47
Labour	44	44	44	44	44	44	44	44	44
Capital	4	4	4	4	4	4	4	4	4
Enterprise	4	4	4	4	4	4	4	4	4
Household	48	48	48	48	48	48	48	48	48
Govt income (expenses)	7 (6)	7 (6)	7 (6)	7 (6)	7 (6)	7 (6)	7 (6)	7 (6)	7 (6)
Capital account	2	2	2	2	2	2	2	2	2
Rest of South Africa	4	4	4	4	4	4	4	4	4
Rest of the world	5	5	5	5	5	5	5	5	5
Discre-pancy	1	1	-	1	1	1	1	1	-

Source: Regional SAMs for 2006

Table 5.6 Income elasticity of consumption products

Products	Value	Products	Value
Agriculture	0.655	Other Fabricated Metal Products	1.367
Mining	1.367	Machinery & Equipment	1.367
Meat, Fish, Fruit, Vegetables, Oils and Fat Products	0.697	Electrical Machinery & Apparatus	1.367
Dairy products	0.764	Communication, Medical and other Electronic Equipment	1.367
Grain Mill, Bakery and Animal Feed Products	0.458	Manufacturing of Transport Equipment	1.367
Other food products	0.697	Other Manufacturing & Recycling	1.367
Beverages and tobacco products	0.989	Electricity	1.208
Textiles, Clothing, Leather Products and Footwear	0.917	Water	1.208
Wood and Wood Products	1.367	Building and Construction	1.367
Furniture	1.204	Trade	1.367
Paper and Paper Products	1.367	Accommodation	1.208
Publishing and Printing	1.367	Transport	1.221
Chemicals & Chemical Products (incl Plastic Products)	1.208	Communication	1.221
Rubber Products	1.367	Insurance	1.367
Non-Metallic Mineral Products	1.367	Real Estate	1.208
Basic Metal Products	1.367	Business Services	1.514
Structural Metal Products	1.367	Community, Social and Personal Services	1.367

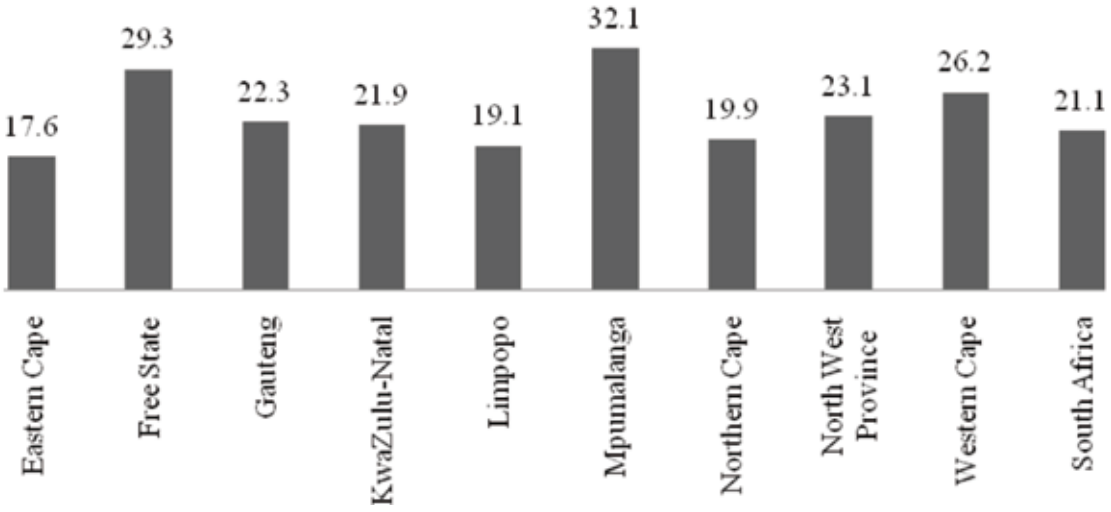
Source: USDA, Economic Research Service, using the 1996 ICP data. From the ERS report Cross-Price Elasticities of Demand Across 114 Countries (TB-1925); Botswana data

Table 5.7 Armington elasticities

Products	Value	Products	Value
Agriculture	1.273	Other Fabricated Metal Products	0.747
Mining	2.771	Machinery & Equipment	0.490
Meat, Fish, Fruit, Vegetables, Oils and Fat Products	0.937	Electrical Machinery & Apparatus	0.944
Dairy products	0.937	Communication, Medical and other Electronic Equipment	0.505
Grain Mill, Bakery and Animal Feed Products	0.937	Manufacturing of Transport Equipment	0.786
Other food products	0.937	Other Manufacturing & Recycling	0.417
Beverages and tobacco products	1.570	Electricity	1.437
Textiles, Clothing, Leather Products and Footwear	2.040	Water	1.437
Wood and Wood Products	1.205	Building and Construction	1.280
Furniture	1.075	Trade	0.603
Paper and Paper Products	0.789	Accommodation	0.420
Publishing and Printing	0.200	Transport	0.861
Chemicals & Chemical Products (incl Plastic Products)	0.730	Communication	0.568
Rubber Products	1.135	Insurance	0.616
Non-Metallic Mineral Products	0.942	Real Estate	1.066
Basic Metal Products	0.447	Business Services	1.066
Structural Metal Products	0.747	Community, Social and Personal Services	1.065

Source: Gibson (2003)

Figure 5.8 Unemployment rates by province (%)



Source: Statistics South Africa (2010)

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PART 2: VIBRANT URBAN ECONOMIES

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CHAPTER 6: HOW EFFECTIVE, CREDIBLE AND SUSTAINABLE ARE LOCAL GOVERNMENT BUDGETS?

Mkhululi Ncube,[79] Sasha Peters[80] and Jugal Mahabir[81]

6.1 Introduction

An integral part of South Africa's governance system, the local government sector is diverse and consists of 283 municipalities.[82] There are six metros, which contain 35% of the population, while secondary cities and local municipalities account for 38% and 26.8% of the population, respectively (StatsSA, 2007). Some municipalities have populations as small as 5,000 (e.g. Laingsburg) while at the other extreme, the City of Johannesburg is home to four million people. Over 80% of South Africa's gross domestic product (GDP) is generated in urban areas and, in 2002, the nine largest cities in South Africa contributed 63% to gross value added (GVA) and employed 51% of the country's total working population (SACN, 2004). Municipalities are also in control of infrastructural assets with a replacement value of over R720 billion (Boshoff, 2009). In 2008/9 the six metros accounted for 60.6% and 56% of total local government capital and operating expenditure respectively.

The local government sphere faces a myriad of challenges, including widespread poverty, unemployment (which in cities and towns ranges from 26% to 50%), and overstretched, sometimes inadequate infrastructure which affects service delivery negatively.

The local government sphere is at the coal face of service delivery, and is constitutionally assigned the responsibility of providing basic services to communities. However, many municipalities are failing to provide adequate basic services. Table 6.1 shows that, although the backlogs have improved, the number of households without access to refuse removal, sewage disposal, electricity and water remains high.

Table 6.1 Access to basic services

Basic Service	1996	2001	2007
Households with refuse removal by a local authority at least once a week	51.2%	55.4%	60.1%
Households with access to a flush toilet connected to a sewage disposal	n/a	49.1%	55.1%
Households using electricity as the main source of lighting	57.6%	69.7%	80.0%
Households with access to piped water	n/a	84.5%	88.6%

Source: StatsSA, 2007

In 2007, 40% and 45% of households had no access to adequate refuse removal and sewage disposal facilities. Of the four million households that received irregular or highly inadequate services, an estimated 2.2 million households had no access to any solid waste collection services at all (Savage, 2009). In 2007 the backlogs for electricity and water stood at 20% and 11% respectively.

The reasons for poor service delivery and other municipal failures are many and include:

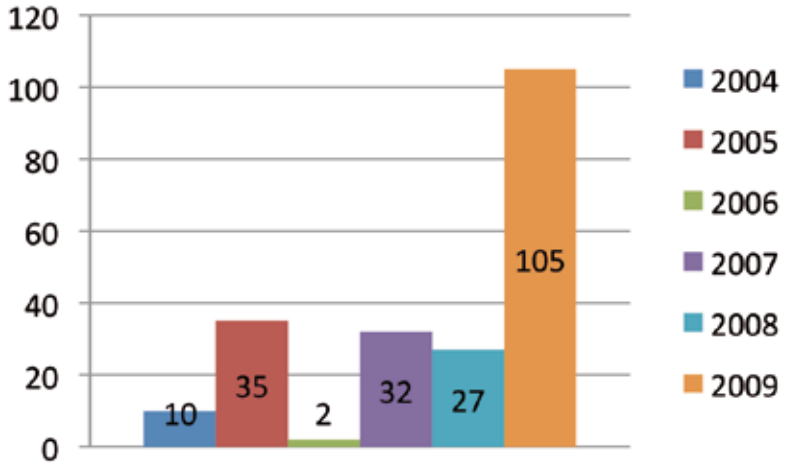
- Inadequate and overstretched infrastructure.

79 Financial and Fiscal Commission.
80 Financial and Fiscal Commission.
81 Financial and Fiscal Commission.
82 The re-demarcation process in 2011 reduced this number to 276 municipalities.

- Inadequate revenues versus unlimited expenditure needs.
- Limited opportunities to raise own revenues.
- Limited administrative, technical and managerial capacity and skills within the municipal workforce.
- Poor governance systems and structures, corruption and political meddling.

In recent years, poor service delivery has led to protests by residents across the country. These protests, by residents clamouring for improved service delivery, have emerged as one of the major threats to development and stability in the local government sphere. Service delivery protests have destabilised many municipalities and increased sharply around 2009 and 2010. Figure 6.1 shows the trends in service delivery protests.

Figure 6.1 Number of Service Delivery Protests in South Africa



Source: Karamoko (2011)

Reasons behind the protests include dissatisfaction with service delivery (such as water, electricity, toilets), unemployment, poverty, allegations of rampant corruption in local governments, and rising costs of utilities. The local government sphere is in difficulty, as the large numbers of qualified audit reports in municipalities proclaim (see Table 6.2). Municipalities submit their audit reports to National Treasury every year.

The table below shows audit reports between 2004/05 and 2008/09. Although the table below indicates some improvement in 2007/08 and 2008/09, the many incidences of audits with disclaimers, qualifications and adverse reports point to the challenges that municipalities face in meeting the grade. Reasons for the high incidence of these negative reports include capacity constraints and poor support infrastructure.

Table 6.2. Audit opinions

Audit opinions	2004/05	2005/06	2006/07	2007/08	2008/09
Unqualified	23%	18%	19%	33%	39%
Disclaimer	41%	45%	39%	33%	25%
Qualified	27%	22%	25%	19%	14%
Adverse	6%	9%	9%	3%	2%
Non-reported case	4%	6%	8%	13%	19%
Total	100%	100%	100%	100%	100%

Source: Author

To address poor service delivery in the local government sphere, the government has come up with the Local Government Turnaround Strategy (LGTAS), a comprehensive turnaround strategy (CoGTA, 2009a). LGTAS acknowledges the many challenges facing the sector and spells out a number of strategies to deal with them.

6.1.1 Problem statement

The performance of the economy is affected by many economic policies, for example monetary, trade, labour or industrial policies. Similarly, the government budget is one instrument or policy that has a significant impact on economic performance and can be used to influence the behaviour of economic agents and the economy at large. It spells out how the government mobilises, allocates and spends public resources, and how priorities are set and managed. It not only articulates the micro and macroeconomic policies of the government, but also fulfils the obligations and roles of the government to the population. Therefore, the effectiveness and efficacy of budgets in addressing national priorities needs to be constantly reviewed and evaluated in order to assess whether budgets continue to fulfil their main functions or whether they are deviating from national and local priorities.

Budget analysis is critical for local government, as municipalities can respond to local needs and priorities in a way that no other sphere of government can. By virtue of their proximity to the people, local governments are better placed and informed to understand the socioeconomic dynamics that exist within their communities.

In South Africa, municipalities are constitutionally mandated to ensure that their constituents have constant and high quality access to basic services such as water, sanitation and refuse removal. The local government sector is increasingly called upon to play a pivotal role in service delivery. Both the 2009 State of Local Government (CoGTA, 2009b) and 2009 LGTAS highlight the central role of local governments in changing the fortunes of the country, yet service delivery failures and community protests have increased in number and frequency (see Figure 6.1). For municipalities to maximise service delivery, sound financial practices are the key (Schoeman, 2011), as financial resources need to be used efficiently and effectively in order to maximise service delivery. For municipal budgets, this means fiscal credibility and sustainability, the main pillars of sound financial practices.

6.1.2 Rationale

This research will assist policy-makers, society and Parliament. It will help policy-makers to evaluate or formulate their budgets and related policy, contribute to the debate about how to turn around the fortunes of poorly performing municipalities and help assess whether more or less decentralisation is desirable to address service delivery challenges. As local governments are the custodians of public funds, analysing their budgets will benefit society, which needs to understand how its resources are utilised and which deep-seated budgetary challenges require urgent intervention. Parliament will also benefit, as the analysis will shed light on the allocation of scarce fiscal resources within the different spheres of government.

The Financial and Fiscal Commission (the Commission) is mandated with ensuring equitable sharing of fiscal resources and accountability of government agents. A systematic analysis of municipal budgets lays the foundation for building accountable local government institutions, which is one of the broad themes of the Commission's research strategy.

6.1.3 Methodology

Municipalities in South Africa are socially, demographically and economically diverse. Each municipality faces unique circumstances that either assist or hinder its ability to perform optimally. For instance, local governments in metros operate very differently from local governments in rural communities. Therefore, given these differences across municipalities, it is implausible to analyse local government in aggregate terms and infeasible to analyse every municipality in the country. Instead, municipalities will be categorised into relevant groupings as far as possible.

Section 155(1) of the Constitution recognises three categories of municipalities: A, B and C municipalities. However, the differences among municipalities within each category, particularly categories B and C, makes such grouping less attractive. For example, local (C) municipalities range from highly populated secondary cities such as Msunduzi (Pietermaritzburg) to sparsely populated rural municipalities such as Mbizana (Bizana). The asymmetric division of powers and functions between district and local municipalities also makes it difficult to compare category C municipalities in aggregate, as the nature of their budgets and expenditures differ.

Therefore, where possible, the budget outcomes will be evaluated using the categories in Table 6.3 and, if this categorisation is not possible, recourse will be made to the A, B and C groupings.

Table 6.3 Categorisation of municipalities

Category	No	Description
Metropolitan municipalities	6	As per the constitutional definition of category A municipalities
Secondary cities	21	Local municipalities with the highest operating budgets and a large urban spatial pattern
Large towns	29	Local municipalities that consist of a large town
Medium to smaller towns	111	Local municipalities that consist of several smaller urban settlements
Rural municipalities	70	Local municipalities that are largely rural with large sprawling settlements
District municipalities without major service powers and functions[83]	25	Category C municipalities without water and sanitation service powers and functions
District municipalities with major service powers and functions[84]	21	Category C municipalities with water and sanitation service powers and functions
Total	283	Local government sector

Source: CoGTA, 2009

Local government data has many gaps and deficiencies, which can hamper meaningful interrogation of budgets, and much of the information (such as the GVA or population of municipalities) is not up to date. Therefore, the data is sourced mainly from National Treasury databases (Local Government Budgets and Expenditure Review, various issues) up to 2008/09 which have been audited (National Treasury, 2010).

The objective of this chapter is to evaluate the performance of local government budgets, with particular emphasis on the implications of different spending patterns and revenue sources on service delivery challenges. The main issue is to evaluate the effectiveness of municipal budgets in fulfilling the main mandate of local governments, which is to maximise service delivery. In assessing the soundness of budget practices in the local sphere, the focus is on the fiscal credibility and sustainability of the sector's budgets.

A review of the macroeconomic environment and economic outlook for municipalities is followed by an analysis of spending, revenue trends and outcomes. After examining whether municipal budgets are sustainable and credible, recommendations are made to ensure a stronger and sustainable local government sphere.

6.2 Macroeconomic Environment and Economic Outlook

The macroeconomic environment in which municipalities operate affects their performance, especially their budgeting and spending processes. Like the rest of the world, South Africa's economy is slowly coming out of a financial and economic crisis. During the recession, South Africa's economy slowed, from a peak real GDP growth rate of 6% in 2006/07, to a negative real GDP growth rate in 2009/10.

The crisis was characterised by huge inflationary pressures, subdued domestic demand, weak export and tourism revenues, rising unemployment and poverty. As the engines of growth and development in many countries, urban centres found themselves in the deep end of this economic meltdown and were hit hard by unemployment, de-industrialisation, poverty and many other ills.

To reverse the downward spiral in economic activity, many economies introduced various stimulus packages, which in South Africa took the form of infrastructure investment, largely for the 2010 FIFA World Cup™.

83 Hereafter referred to as district municipalities without powers.

84 Hereafter referred to as district municipalities with powers.

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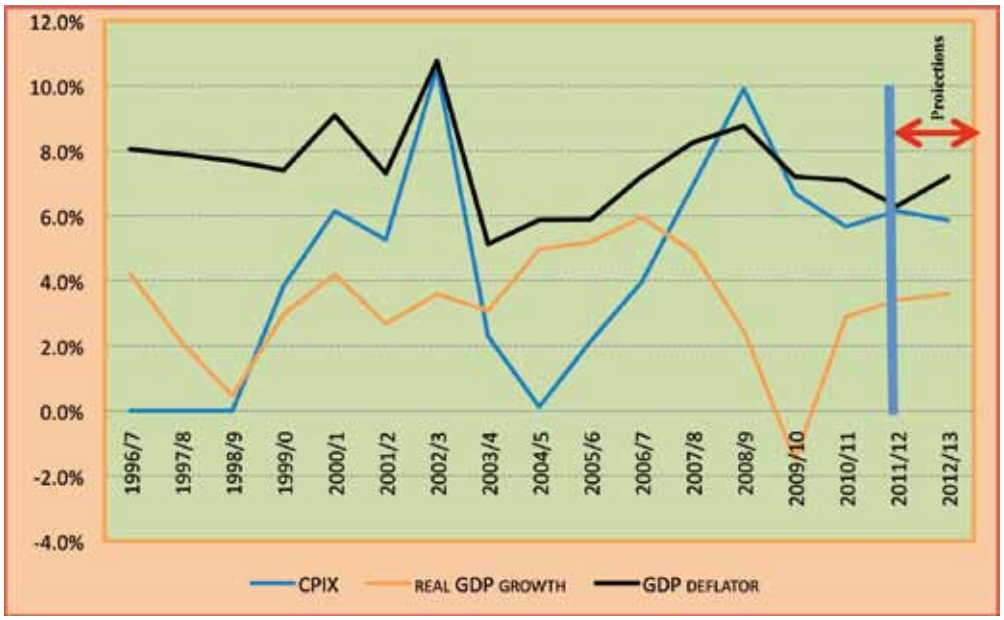
Figure 6.2 Macroeconomic indicators



Source: South African Reserve Bank (various)

Infrastructure investment helped to diminish what would have been deeper impacts of the recession. As Figure 6.2 shows, by the end of 2009 the economy was slowly rebounding and the outlook was promising. The rebound was spearheaded by manufacturing, mining, finance, wholesale and retail, and government sectors (see Table 6.4). In the manufacturing sector, the main growth impetus came from export-oriented sectors. Platinum prices drove spectacular growth in the mining sector of 4.6% in the last quarter of 2009 and 15.4% in the first quarter of 2010. Improvements in consumer confidence (attributable to the decline in inflation) and interest rates led to improved domestic demand and a boost in the retail sector. Spending associated with the 2010 FIFA World Cup™ also resulted in additional retail sales growth. The upswing was strongly correlated with the resurgence in capital inflows and recovery in global demand, particularly in East Asia, South Asia and sub-Saharan Africa (SSA), regions that account for the bulk of South African exports. The World Bank estimates that in 2011 and 2012, East Asian economies will grow by 7.8% and 7.7%, South Asian by 8.7% and 8.2%, and SSA by 5.1% and 5.4%. The euro area, which accounts for 35% of South African exports, is expected to grow by 1.3% and 1.8% in 2011 and 2012.

Table 6.4 Performance of key sectors of the economy

	2009Q1	2009Q2	2009Q3	2009Q4	2010Q1
Agriculture	-5.6	-15.8	-11.8	-7.6	3.0
Mining	-30.7	15.8	-5.8	4.6	15.4
Manufacturing	-25.5	-11.1	7.6	10.1	8.4
Electricity	-8.1	1.9	4.2	0.9	4.9
Construction	10.7	8.7	6.1	3.6	2.1
Wholesale & retail	-2.4	-5.9	-1.1	-0.7	3.3
Transport	-2.1	-1.0	1.2	1.9	2.4
Finance	-2.3	-4.3	-1.0	2.1	2.5
General government	2.1	4.1	4.4	5.1	2.8
Personnel services	2.7	3.3	3.5	3.1	2.0

Source: National Treasury, 2010

Although recovery prospects for the South African economy are strong, risks of all sorts may diminish the rate of economic expansion. On the domestic front, threats to sustained recovery will come from increases in electricity prices, strong currency, post-World Cup lull in economic activity, and strike activities in many sectors of the economy. On the external front the biggest threat to recovery comes from the sovereign debt crisis in the euro zone.

6.3 Local Government Budgetary Trends and Outcomes

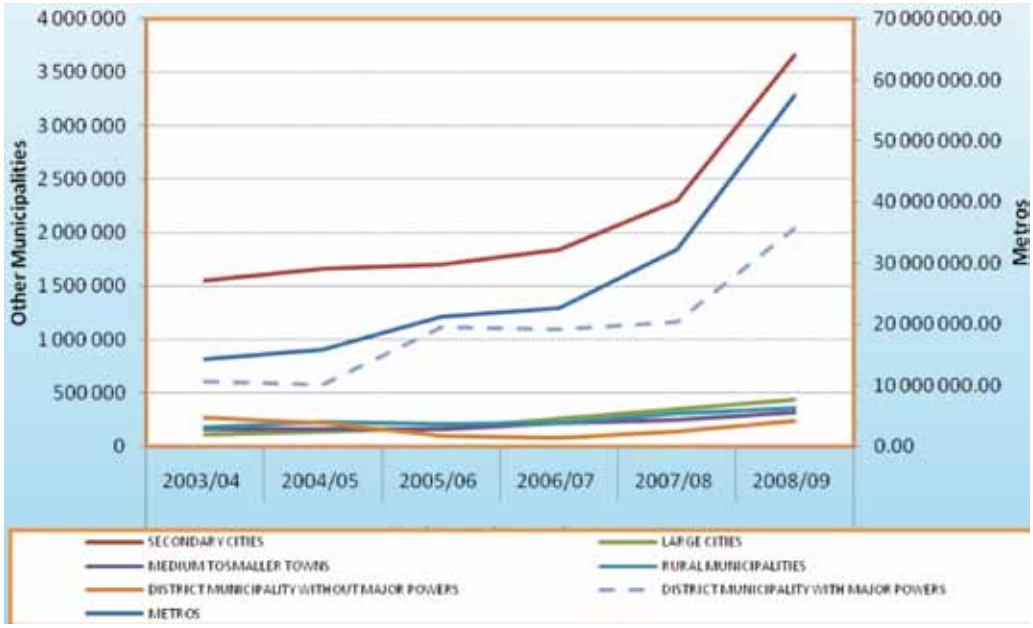
The two sides of the budget – expenditure and revenue – play equally important roles in the economy and social well-being, influencing the behaviour of many socioeconomic aggregates.

In the local government sphere, expenditure is broadly divided into capital and operating expenditures. Capital expenditure consists of long-term economic and social infrastructural investment, while operating expenditures constitute costs associated with the actual provision of services, e.g. input, capital and material costs. Across all municipal categories, municipalities generally devote at least 80% of their actual budgets to operational issues and 20% to capital expenditure.

6.3.1 Capital spending in the local government sphere

Figure 6.3 shows the real actual capital expenditures for the seven municipal categories for the period 2003/04 to 2008/09 (the series for metros is plotted on the 'secondary axis'). After 2007, capital spending increases sharply in metros, secondary cities and district municipalities with major powers and functions, but remains modest in the other municipality categories.

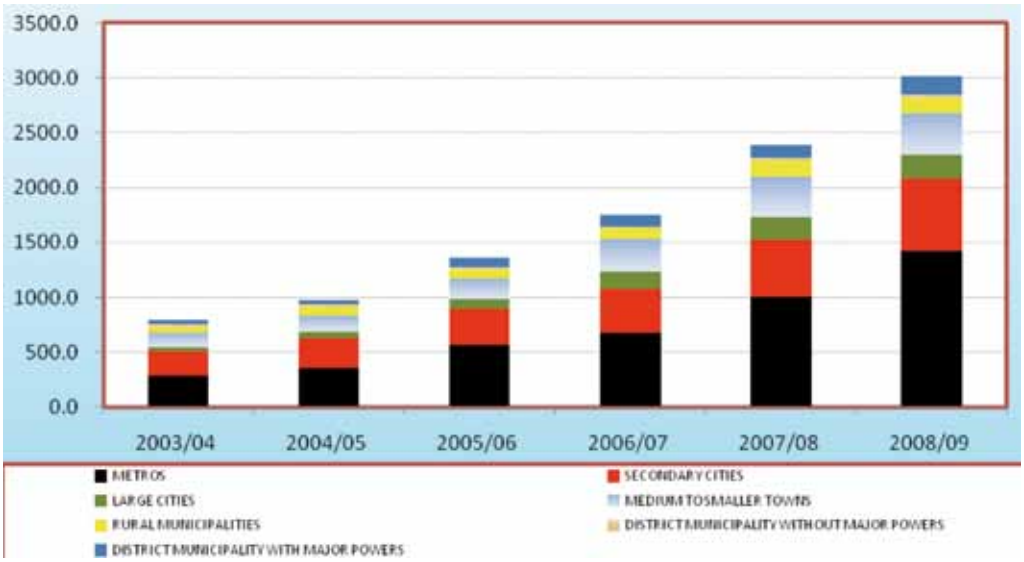
Figure 6.3 Real municipal capital expenditure (R'000)



Source: National Treasury, 2010

In Figure 6.4 the per capita capital expenditure trends are presented with the per capita spend in parenthesis.

Figure 6.4 Real per capita capital expenditure (rands)



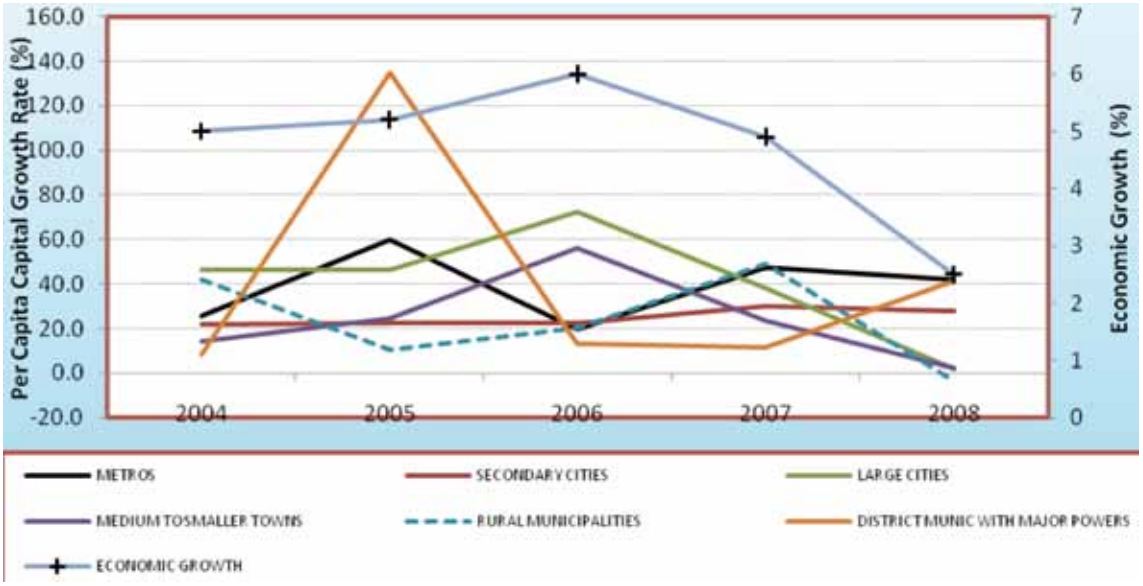
Source: National Treasury, 2010

Metros and secondary cities have the highest per capita spending, but all other municipalities show a modest increase in spending, which suggests that all municipalities are investing larger amounts in capital infrastructure.[85] Small investments by district municipalities are expected, as these municipalities have no powers to invest in infrastructure such as water and sanitation.

Although not shown here, when municipalities were grouped by province, per capita capital spend shows wide variation. The highest average per capita spending is in Western Cape municipalities (R6,235 per annum), followed by Gauteng (R6,029). At the lower end are municipalities in the Limpopo region (R1,492), Mpumalanga (R1,980) and the Eastern Cape (R2,204). Reasons for this variation are historical, demographical and economical.

Comparing per capita capital expenditure to economic growth rates (Figure 6.5)[86] reveals that the growth in per capita spend is inconsistent (districts with major powers are a good example) and exceeded the rate of inflation during the review period (except for district municipalities without major powers and functions). For most municipalities, there seems to be a close association between per capita spending and economic growth, implying that municipality spending is vulnerable to economic changes.

Figure 6.5 Per capita capital expenditure and economic growth rates (%)



Source: Own calculations from National Treasury Data (various years)

When evaluating public finances, it is critical to know where the money is spent (i.e. what are the budgetary outcomes). The Constitution mandates the local government sphere to provide basic services, while the LGTAS is clear that government's priority is to eradicate backlogs and ensure that the entire population has access to basic services such as water, sanitation and refuse removal. In order to assess whether sub-national spending is assisting national government to realise its goal of providing basic services to all, capital spending is examined by function.

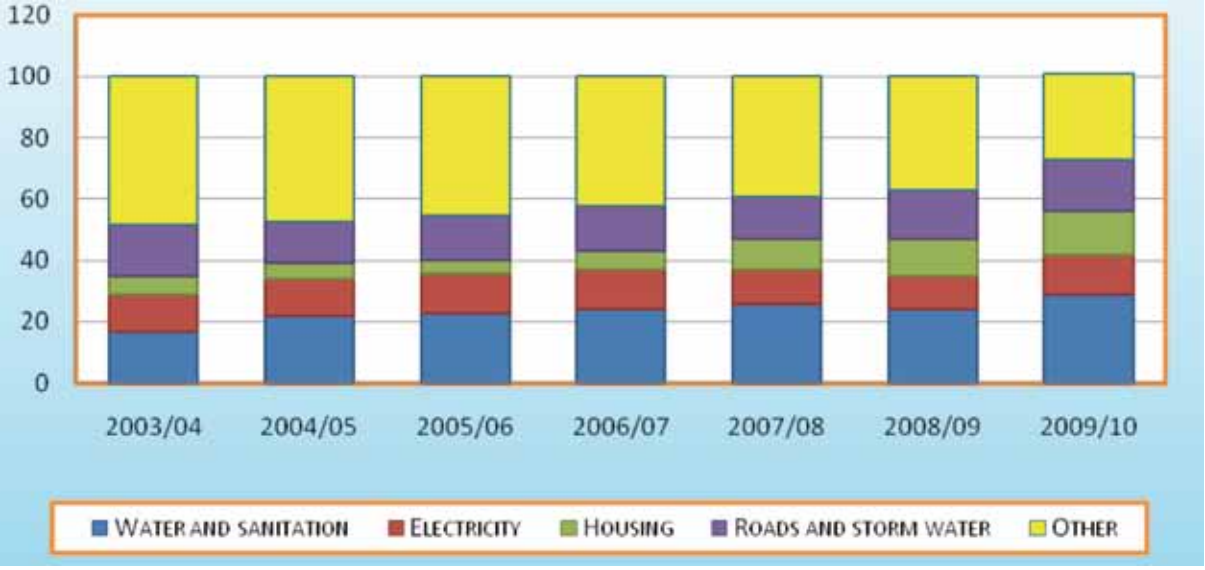
Water and sanitation, roads and storm water and 'Other' (see Figure 6.6) dominate local government capital expenditure. The 'Other' component refers to expenditures on land, buildings, vehicle fleets, and so on. However, caution must be exercised when interpreting information for district municipalities, which do not have water and sanitation service powers and functions. Interestingly, Figure 6.6 shows that water, sanitation and housing[87] have increased their share of the budget, which augurs well for the aim of providing all South Africans with basic services and is also in line with government's goal of achieving the Millennium Development Goals (MDGs) by 2014.

85 This point will be interrogated further in subsequent sections.

86 Municipalities without water and sanitation powers and functions are excluded from Figure 6.4.

87 Housing is mainly provided by metros, as housing is a provincial competency with implementation usually at the local level.

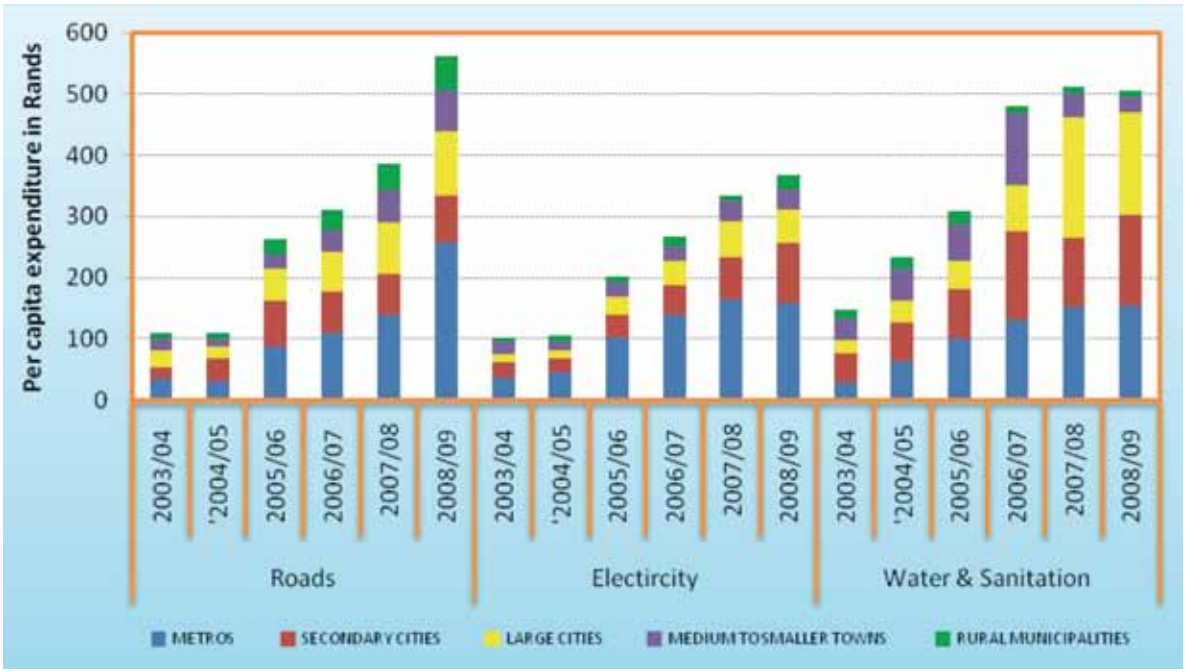
Figure 6.6 Capital expenditure shares for all municipalities (%)



Note: 'Other' refers to expenditure on land, buildings, fleet vehicles, etc.
Source: National Treasury, 2010

When the per capita capital expenditure is examined by function (Figure 6.7), large disparities appear for basic services by municipal type.[88] In general, metros spend the most per capita on infrastructure for all basic services and have increased their per capita expenditure. Large cities are also high per capita capital spenders on basic services, whereas rural municipalities and medium to smaller towns spend the least on road infrastructure. Of concern is the small and declining per capita capital spending by rural municipalities on water and sanitation. This implies that water and sanitation backlogs will persist in rural communities for the foreseeable future.

Figure 6.7 Per capita capital expenditure by function



Source: Own calculations from National Treasury Data (various years)

88 Note that all district municipalities have been left out because some do not have certain functions, such as water. It should be noted that some local municipalities do not spend on road infrastructure, as these functions are shared.

When examining spending patterns, the other issue is whether allocated resources are actually being spent. The expenditure analysis suggests extensive under-spending in capital budgets, which is of concern for service delivery. Under-spent capital budgets mean forgone infrastructural development, which translates into forgone jobs and economic development. Table 6.5 examines spending patterns of the conditional grants for infrastructure and capacity building, as capital spending largely comes from conditional grant revenues. The four major municipal, Schedule 6 grants are: Municipal Infrastructure Grant, Local Government Financial Management Grant, Municipal Systems Improvement Grant and the National Electrification Programme (Municipal) Grant. As Table 6.5 shows, these grants are widely under-spent.

Table 6.5 Spending on conditional grants

Conditional grant	2006/07	2008/09	2009/10
	Expenditure as % of allocation	Expenditure as % of allocation	Expenditure as % of allocation
Municipal Infrastructure Grant	90%	43.4%	78.9%
Local Government Financial Management Grant	34%	36%	110.9%
Municipal Systems Improvement Grant	67%	34.4%	94.3%
National Electrification Programme (Municipal Grant)	79%	53.4%	86.4%

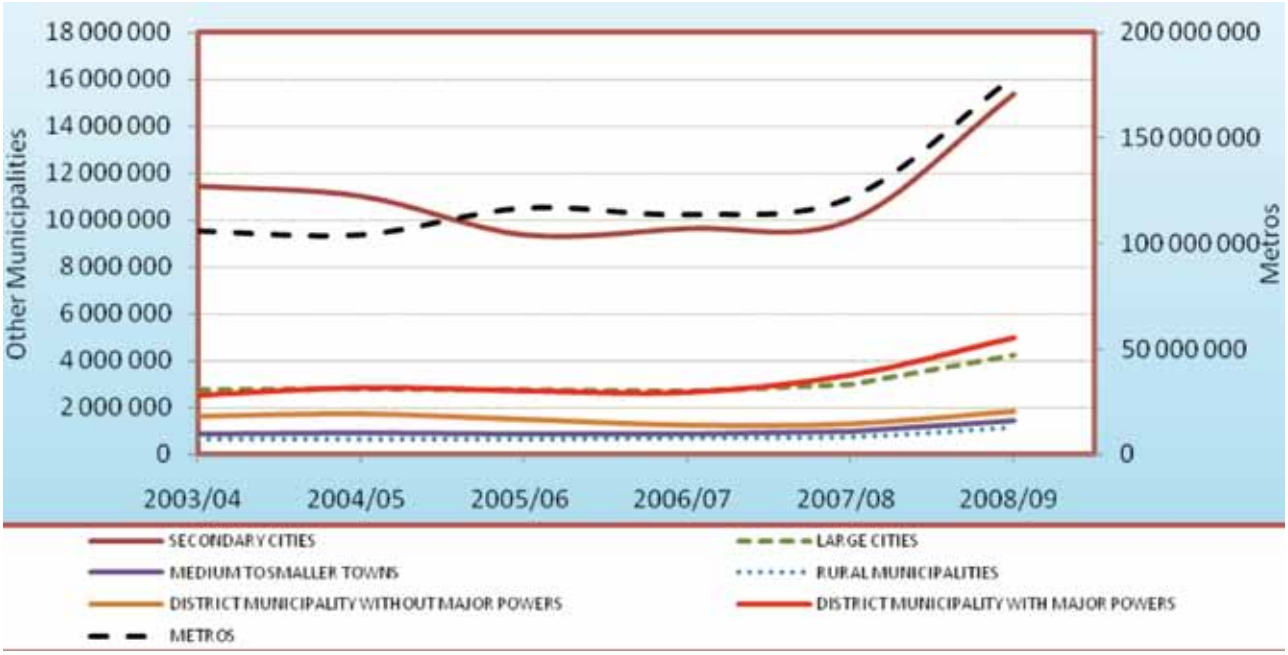
Source: Authors

Although the figures for 2009/10 show some improvement compared to 2008/09, the under-spending problem is widespread in capital budgets in general and in grants in particular. In 2009/10, all grants were under-spent, apart from the Local Government Financial Management Grant, which was overspent by 11%. Under-spending on the Municipal Infrastructure, Municipal Systems Improvement and National Electrification Programme (Municipal) Grants was 21%, 6% and 14% respectively. Consequences of under-spending fall disproportionately on the poorer communities and result in backlogs that are costly to eradicate. Under-spending on infrastructure not only affects employment, but also perpetuates poverty and hampers efficient and sustainable service delivery. Causes of under-spending include poor planning, poor infrastructure costing and lack of technical, project management and procurement capacity.

6.3.2 Operating expenditure

The bulk of local government expenditure goes on operating costs, which are associated with service provision. Figure 6.8 presents the operating expenditure trends (operating expenditures for metros were plotted on the secondary axis because of the large differences between the metros and other municipalities).

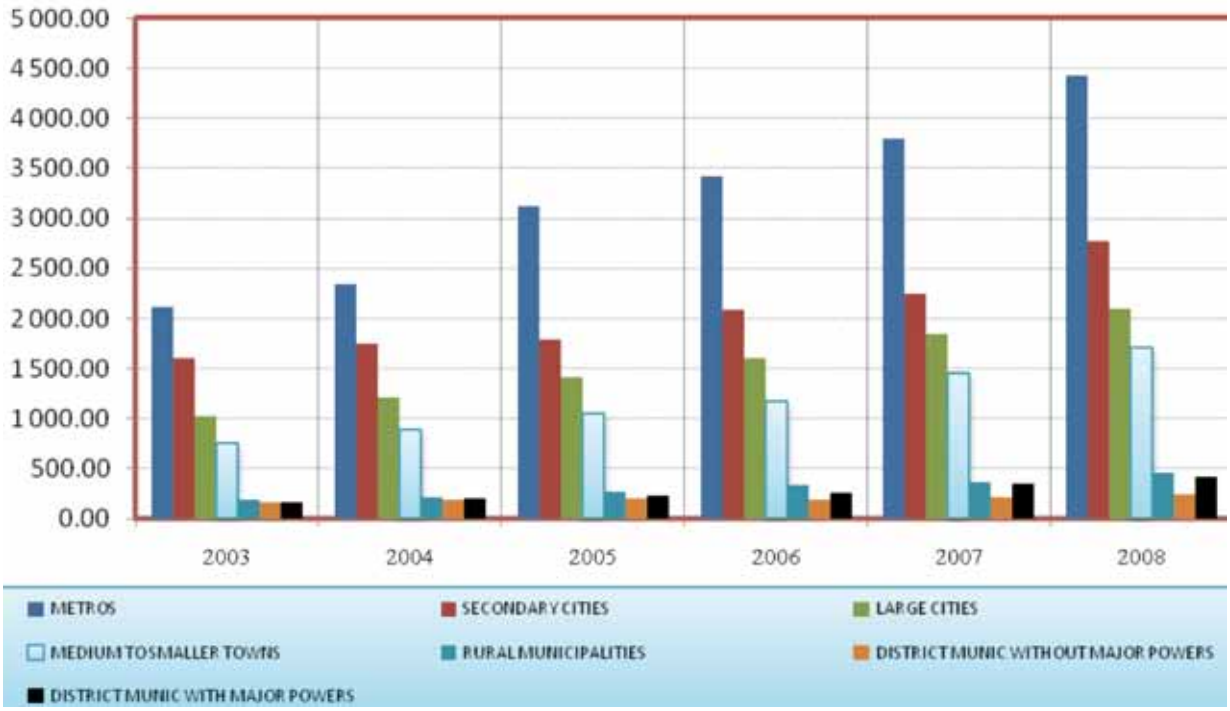
Figure 6.8 Real operating expenditure (R'000)



Source: National Treasury, 2010

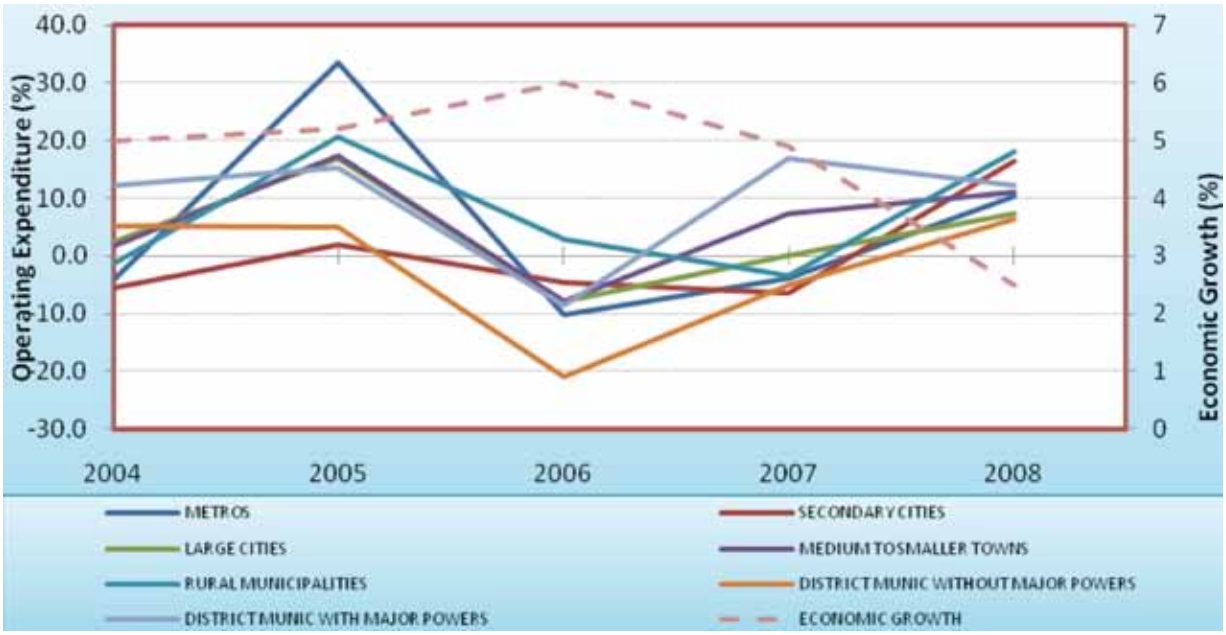
Operating expenditures in all municipalities decelerated between 2005/06 and 2007/08, but picked up in 2008/09. In per capita terms, operating expenditures increased steadily (Figure 6.9). However, when the growth in real per capita operating expenditures is plotted against economic growth (Figure 6.10), there appears to be no association.

Figure 6.9 Per capita operating expenditure (rands)



Source: FCC Calculations from National Treasury Data (various years)

Figure 6.10 Per capita operating expenditure and economic growth rates (%)



Source: FCC Calculations from National Treasury Data (various years)

Table 6.6 shows actual operating expenditures separated by functions. The main drivers, accounting for over 80% of total operating expenditures, are employee costs, material and bulk purchases and 'Other', which account for over 80% of total operating expenditures.

Table 6.6 Actual operating expenditure by function

Category		Actual Operating Expenditure							
		Employee costs	Depreciation & amortisation	Material & bulk purchases	Remuneration of councillors	Repairs & maintenance	Finance charges	Other	Total
2003	Metros	29%	4%	26%	0%	7%	6%	28%	100%
	Secondary cities	28%	5%	25%	1%	6%	4%	31%	100%
	Large cities	40%	1%	23%	1%	6%	6%	24%	100%
	Medium to smaller towns	40%	0%	19%	1%	6%	4%	29%	100%
	Rural municipalities	35%	0%	5%	6%	5%	2%	46%	100%
	District municipalities without major powers	43%	2%	5%	3%	2%	5%	41%	100%
	District municipalities with major powers	25%	1%	2%	3%	3%	3%	62%	100%
2004	Metros	28%	6%	24%	0%	7%	4%	31%	100%
	Secondary cities	30%	5%	23%	1%	6%	3%	31%	100%
	Large cities	35%	2%	22%	1%	5%	4%	28%	96%
	Medium to smaller towns	39%	1%	17%	1%	6%	4%	32%	100%
	Rural municipalities	36%	1%	5%	6%	4%	2%	46%	100%
	District municipalities without major powers	40%	3%	0%	4%	3%	4%	46%	100%
	District municipalities with major powers	27%	0%	2%	2%	4%	2%	63%	100%
2005	Metros	28%	6%	25%	1%	7%	4%	29%	100%
	Secondary cities	29%	6%	23%	4%	6%	4%	28%	100%
	Large cities	34%	4%	21%	2%	7%	3%	30%	100%
	Medium to smaller towns	37%	1%	17%	2%	6%	3%	33%	100%
	Rural municipalities	34%	1%	5%	8%	5%	2%	46%	100%
	District municipalities without major powers	40%	2%	1%	6%	4%	3%	45%	100%
	District municipalities with major powers	28%	1%	3%	2%	6%	1%	59%	100%

2006	Metros	31%	7%	25%	1%	7%	4%	25%	100%
	Secondary cities	29%	5%	23%	5%	6%	3%	29%	100%
	Large cities	35%	5%	19%	3%	6%	3%	30%	100%
	Medium to smaller towns	37%	2%	16%	4%	5%	2%	34%	100%
	Rural municipalities	31%	2%	2%	11%	5%	2%	47%	100%
	District municipalities without major powers	42%	2%	0%	6%	5%	3%	42%	100%
	District municipalities with major powers	29%	3%	7%	3%	5%	1%	52%	100%
2007	Metros	30%	6%	24%	1%	8%	3%	28%	100%
	Secondary cities	28%	8%	23%	4%	6%	3%	27%	100%
	Large cities	34%	5%	18%	3%	6%	2%	31%	100%
	Medium to smaller towns	35%	4%	14%	3%	5%	2%	37%	100%
	Rural municipalities	33%	3%	3%	11%	4%	1%	46%	100%
	District municipalities without major powers	41%	3%	0%	5%	5%	2%	44%	100%
	District municipalities with major powers	28%	4%	5%	2%	5%	1%	54%	100%
2008	Metros	28%	8%	25%	1%	7%	4%	28%	100%
	Secondary cities	26%	8%	23%	4%	6%	4%	28%	100%
	Large cities	33%	6%	19%	2%	6%	2%	31%	100%
	Medium to smaller towns	33%	4%	16%	4%	5%	2%	37%	100%
	Rural municipalities	32%	4%	3%	10%	5%	1%	44%	100%
	District municipalities without major powers	40%	4%	0%	6%	4%	2%	44%	100%
	District municipalities with major powers	26%	6%	6%	2%	5%	1%	54%	100%

Source: National Treasury, 2010

Two components described in Table 6.6 that warrant further analysis are employee costs and repairs and maintenance.

Employee/Personnel Costs

Expenditure on salaries is driven by the need for labour, as an input to provide services and run the municipal administration efficiently and effectively. Municipalities also maintain the political structures in terms of remunerating councillors. A disaggregated analysis of personnel expenditure by municipal category reveals that spending on personnel tends to be larger in municipalities with less service-level responsibilities. This means that rural and district municipalities have (1) the largest shares of personnel expenditure to total operating expenditure, and (2) relatively larger real growth rates for personnel costs.[89]

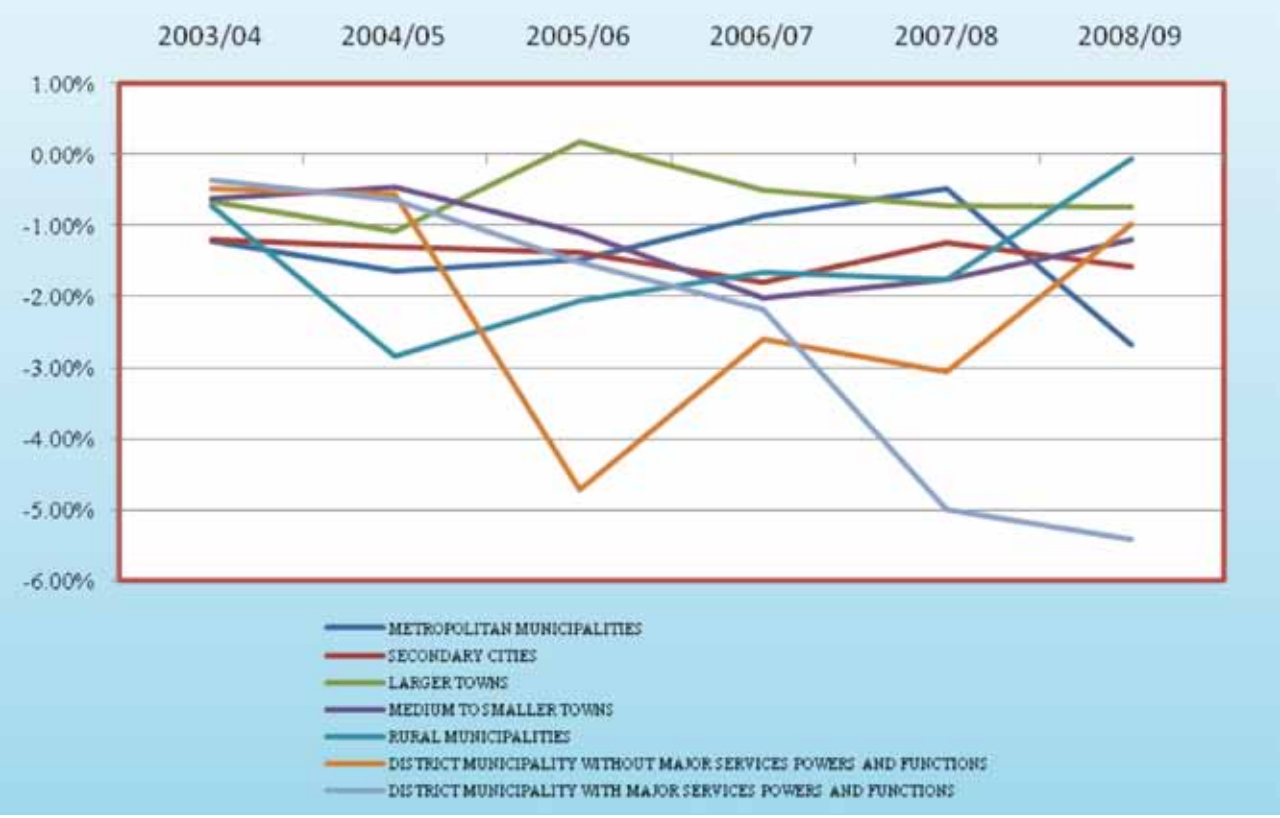
89 For example, expenditure on personnel increased on average by 16% in districts with major powers, compared to just 3% and 4% in metros and secondary cities respectively. In rural municipalities, real personnel expenditure increased, on average, by 16% over the period under review.

Furthermore, compared to other types of municipalities, rural municipalities spend the highest proportion of operating budgets on councillor remuneration. This trend is surprising because the salaries of councillors are governed by the Independent Commission for the Remuneration of Public Office Bearers,[90] and higher numbers of councillors are found in larger municipalities, which receive more funds via the local equitable share (LES) for remuneration of councillors. However, most of the municipalities in question have no, or limited service powers and functions (relative to metros), which means that more labour-intense service delivery processes are not a possible explanation for the trend. One possible reason is that these municipalities are simply paying excessive salaries. Another is their location in poorer, rural areas of the country, which means that they are obliged to pay excessive salaries in order to attract appropriate skills. If either of these two reasons explains the trend, the implication is that service delivery is being compromised in the municipalities, as resources required for the delivery of services are being diverted to pay large salaries.

Repairs and Maintenance

To ensure sustainable delivery of quality services, it is crucial that new and existing municipal infrastructure is adequately maintained. Although National Treasury recommends that 8%–10% of municipal operating budgets be allocated to this line item, ideally repairs and maintenance should be planned and executed relative to the existing municipal asset base. However, Figure 6.11 shows that performance on repairs and maintenance is extremely poor, regardless of the size, capacity or characteristics of the municipality. In fact, over the period under review, none of the municipalities fully spent their budgeted amounts for repairs and maintenance (with the exception of large towns in 2005/06).

Figure 6.11 Actual expenditure on repairs and maintenance relative to budgeted amounts 2003/04–2008/09



Source: Own calculations based on National Treasury Local Government Database, 2010

As poor spending on repairs and maintenance is found in all municipal categories, the underlying reasons must go beyond fiscal, planning and budgeting capacity. One possible reason could be that municipal services are not cost reflective, which means that tariffs do not reflect the cost (incorporating a reasonable return on investment) of providing the services. Repairs and maintenance of infrastructure should be funded via the tariff charged for a service, as required

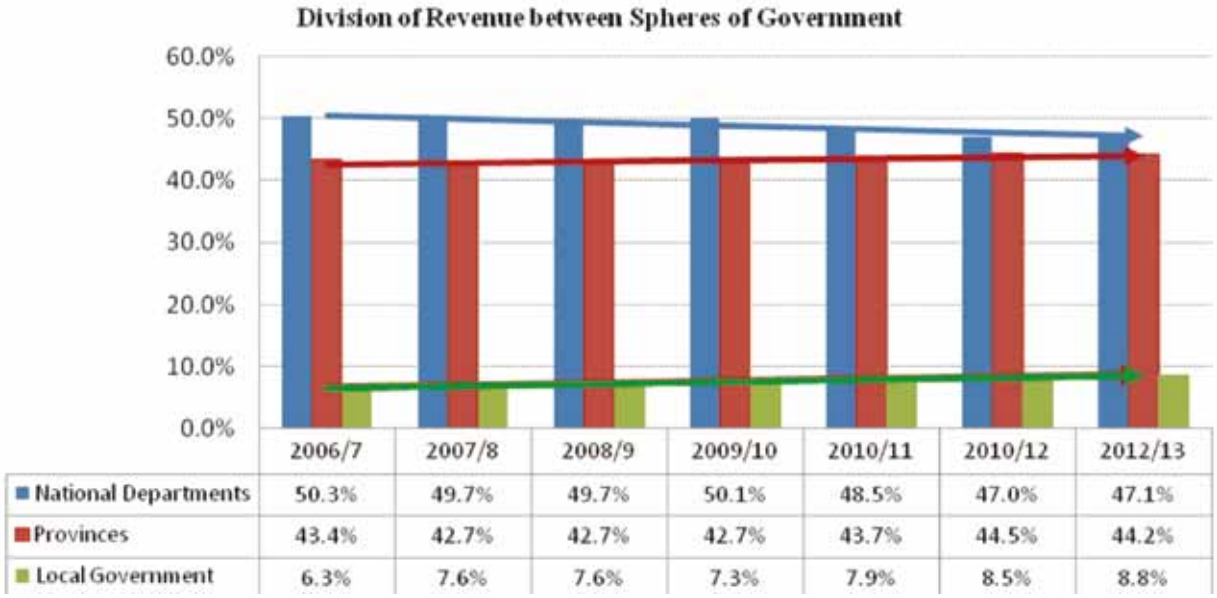
90 See the Independent Commission for the Remuneration of Public Office Bearers Act of 1997.

under Section 74(2) of the Municipal Systems Act, No. 32 of 2000. However, municipal tariffs have a long history of not being cost reflective, and government is considering a review of municipal tariff structures. When assessing the funding requirements of repairs and maintenance, it is important to distinguish between social and economic infrastructure. Consumers can be charged a tariff for the use of economic infrastructure, but social infrastructure is the infrastructure required to deliver a basic service to a household, specifically poor households, and a return on investment is unlikely. Therefore, to lessen the strain on municipal resources, the maintenance of social infrastructure should be supported via an operating subsidy from national government, such as the LES.

6.3.3 Local government revenues

An analysis of the performance of revenues begins with an overview of the division of revenue between the three spheres of government. Figure 6.12 shows that the share of local government has remained at less than 10%. The trade-off between the local government share and the national share is clear: as the former increases gradually, the latter shows a steady decrease. The provincial share has remained somewhat constant at between 43% and 44%. One plausible reason for the increase in the local government share is the realisation that local government is closer to the community and the best channel for dealing with local socioeconomic deficits.

Figure 6.12 Division of revenue between spheres of government



	2006/7	2007/8	2008/9	2009/10	2010/11	2010/12	2012/13
National Departments	50.3%	49.7%	49.7%	50.1%	48.5%	47.0%	47.1%
Provinces	43.4%	42.7%	42.7%	42.7%	43.7%	44.5%	44.2%
Local Government	6.3%	7.6%	7.6%	7.3%	7.9%	8.5%	8.8%

Source: National Treasury, 2010

Capital revenues

Like expenditures, revenues are divided into capital and operational revenues. Table 6.7 shows actual capital revenue shares for the seven municipality categories between 2003/04 and 2008/09. As the table shows, grants and subsidies and 'Other' revenues drive capital revenues, while external loans feature quite strongly for metros and secondary cities.

Conditional grants and subsidies dominate capital revenues of all municipalities, but especially rural municipalities and district municipalities with major powers. In 2008/09 these two categories of municipalities received grants and subsidies representing 73% and 74% respectively of their capital revenues. The overwhelming dependence on grants and subsidies for infrastructural funding takes away the autonomy of municipalities to choose their own capital projects, as the grants are mainly conditional.

Metros are increasingly becoming major players in the credit markets. As Table 6.7 shows, between 2003/04 and 2008/09, external loans as a proportion of capital revenues of the six metros increased from 28% to 38%. Secondary cities are also major players, although the share of external loans in total revenues is declining. There is some evidence of a trade-off between grants and external loan revenues in rural municipalities and medium to smaller towns, which suggests that national transfers may be crowding out own-revenue efforts such as borrowing. The 'Other' component is

the internal, own income of municipalities and represents a significant portion of total capital revenues for all municipalities. This is a positive development, as own revenues gives municipalities the autonomy and leeway to decide on where and how to spend their capital revenues. However, for district municipalities with major powers, the share of the 'Other' component has declined sharply since 2004/5. It seems the decline was being compensated by an increase in grants.

Table 6.7 Actual capital revenue

Actual capital revenue						
	Category	Grants & subsidies	External loans	Public contributions & donations	Other	Total
2003	Metros	29%	28%	8%	34%	100%
	Secondary cities	47%	15%	0%	38%	100%
	Large cities	52%	7%	0%	40%	100%
	Medium to smaller towns	51%	10%	1%	38%	100%
	Rural municipalities	55%	2%	0%	43%	100%
	District municipalities without major powers	36%	9%	0%	55%	100%
	District municipalities with major powers	31%	0%	0%	64%	95%
2004	Metros	45%	29%	1%	24%	100%
	Secondary cities	51%	17%	5%	27%	100%
	Large cities	59%	14%	1%	27%	100%
	Medium to smaller towns	50%	9%	2%	38%	100%
	Rural municipalities	41%	2%	0%	57%	100%
	District municipalities without major powers	31%	6%	3%	61%	100%
	District municipalities with major powers	26%	7%	0%	67%	100%
2005	Metros	43%	31%	1%	26%	100%
	Secondary cities	46%	22%	6%	27%	100%
	Large cities	50%	17%	5%	28%	100%
	Medium to smaller towns	58%	7%	1%	34%	100%
	Rural municipalities	50%	1%	0%	49%	100%
	District municipalities without major powers	19%	5%	5%	71%	100%
	District municipalities with major powers	55%	2%	0%	43%	100%
2006	Metros	35%	36%	0%	29%	100%
	Secondary cities	49%	13%	2%	36%	100%
	Large cities	46%	11%	0%	43%	100%
	Medium to smaller towns	62%	8%	1%	28%	100%
	Rural municipalities	58%	0%	0%	42%	100%
	District municipalities without major powers	17%	6%	0%	77%	100%
	District municipalities with major powers	68%	2%	0%	30%	100%
2007	Metros	35%	40%	0%	24%	100%
	Secondary cities	43%	14%	1%	41%	100%
	Large cities	45%	10%	3%	42%	100%
	Medium to smaller towns	66%	8%	1%	25%	100%
	Rural municipalities	65%	1%	2%	32%	100%
	District municipalities without major powers	21%	4%	0%	76%	100%
	District municipalities with major powers	81%	1%	0%	18%	100%
2008	Metros	41%	38%	1%	20%	100%
	Secondary cities	42%	12%	2%	45%	100%
	Large cities	42%	6%	1%	50%	100%
	Medium to smaller towns	66%	3%	2%	29%	100%
	Rural municipalities	73%	2%	2%	24%	100%
	District municipalities without major powers	29%	5%	0%	66%	100%
	District municipalities with major powers	74%	2%	0%	24%	100%

Source: FCC Calculations from National Treasury Data (various years)

Operating revenues

Table 6.8 shows the sources of local government operating revenues, which are dominated by service charges, property taxes, grants and other incomes. These four revenue sources account for over 80% of total municipal operating revenues.

Table 6.8 Actual operating revenues shares

	Category	Service charges	Gov grants	Invest-ments	Property rates	Donations	RSL	Other Income	Total
2003/4	Metros	54%	6%	3%	22%	0%	7%	8%	100%
	Secondary cities	51%	10%	1%	16%	0%	0%	22%	100%
	Large cities	54%	13%	1%	22%	0%	0%	10%	100%
	Medium to smaller towns	45%	26%	1%	12%	0%	0%	15%	100%
	Rural municipalities	10%	68%	2%	7%	1%	0%	12%	100%
	District municipalities with major powers	6%	23%	6%	0%	0%	46%	19%	100%
	District municipalities without major powers	13%	51%	4%	0%	0%	18%	15%	100%
2004/5	Metros	49%	9%	3%	22%	0%	9%	8%	100%
	Secondary cities	51%	15%	2%	17%	1%	0%	14%	100%
	Large cities	51%	14%	1%	23%	0%	0%	11%	100%
	Medium to smaller towns	44%	27%	1%	12%	0%	0%	15%	100%
	Rural municipalities	10%	72%	2%	6%	1%	0%	10%	100%
	District municipalities with major powers	2%	29%	4%	0%	1%	48%	15%	100%
	District municipalities without major powers	10%	58%	2%	0%	0%	20%	10%	100%
2005/6	Metros	47%	9%	3%	22%	1%	9%	9%	100%
	Secondary cities	46%	17%	2%	17%	1%	0%	17%	100%
	Large cities	47%	19%	1%	22%	1%	0%	11%	100%
	Medium to smaller towns	42%	30%	1%	12%	0%	0%	14%	100%
	Rural municipalities	8%	76%	2%	5%	2%	0%	7%	100%
	District municipalities with major powers	1%	33%	4%	0%	0%	51%	10%	100%
	District municipalities without major powers	10%	64%	2%	0%	0%	15%	9%	100%
2006/7	Metros	47%	19%	3%	20%	1%	0%	10%	100%
	Secondary cities	48%	21%	2%	15%	0%	0%	13%	100%
	Large cities	40%	23%	2%	22%	1%	0%	12%	100%
	Medium to smaller towns	40%	33%	2%	13%	0%	0%	13%	100%
	Rural municipalities	8%	76%	2%	6%	1%	0%	8%	100%
	District municipalities with major powers	2%	71%	5%	1%	0%	4%	17%	100%
	District municipalities without major powers	11%	78%	2%	0%	0%	1%	8%	100%
2007/8	Metros	44%	24%	3%	20%	1%	0%	8%	100%
	Secondary cities	47%	23%	3%	16%	0%	0%	10%	100%
	Large cities	39%	24%	2%	23%	1%	0%	12%	100%
	Medium to smaller towns	35%	39%	2%	12%	0%	0%	13%	100%
	Rural municipalities	6%	78%	2%	5%	0%	0%	8%	100%
	District municipalities with major powers	2%	80%	6%	0%	0%	0%	12%	100%
	District municipalities without major powers	11%	78%	4%	0%	0%	0%	8%	100%
2008/9	Metros	45%	26%	3%	18%	0%	0%	9%	100%
	Secondary cities	48%	24%	3%	15%	1%	0%	10%	100%
	Large cities	39%	28%	2%	21%	0%	0%	11%	100%
	Medium to smaller towns	34%	40%	2%	11%	0%	0%	13%	100%
	Rural municipalities	7%	79%	3%	5%	0%	0%	7%	100%
	District municipalities with major powers	2%	80%	7%	0%	0%	0%	10%	100%
	District municipalities without major powers	9%	77%	4%	0%	0%	0%	10%	100%

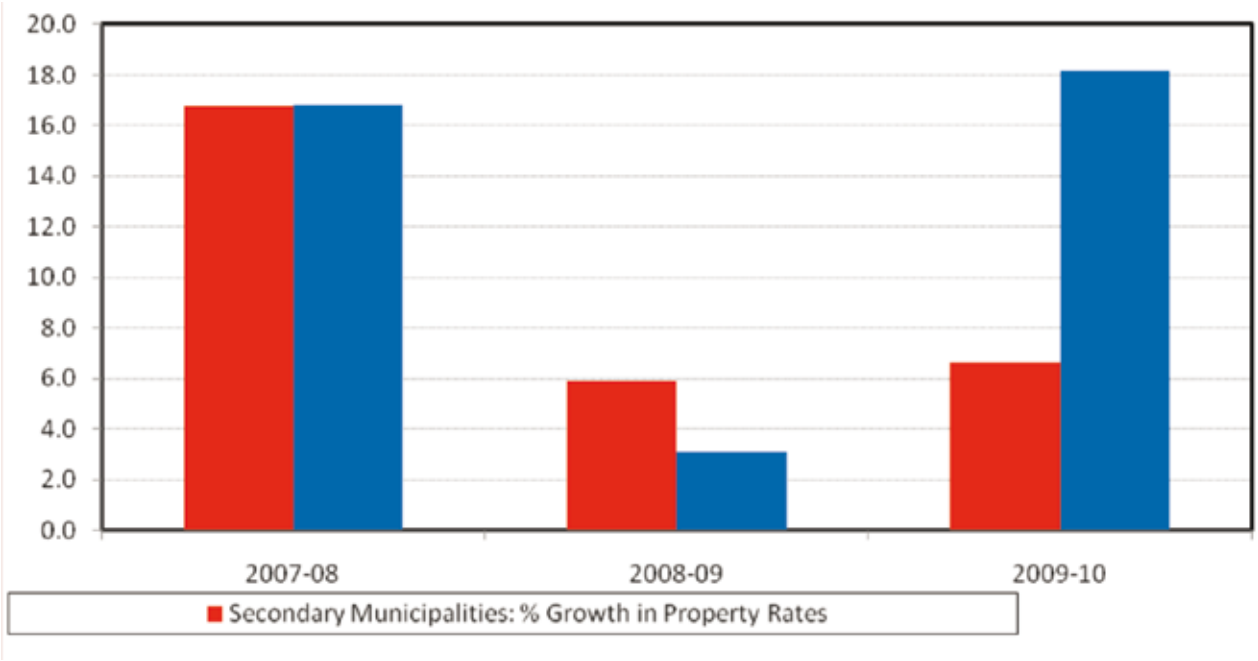
Source: Own calculations from National Treasury Data (various years)

Service charges are the main source of operating revenue for metros, secondary cities, large cities and medium to smaller towns. However, as rural and district municipalities have limited services to levy, most of their operating revenue comes from government grants, which may lead to grant dependency. As noted earlier, employee and councillor remuneration represents a significant share of operating expenditure, which implies that grant revenues are being channelled into personnel-related costs instead of services that will improve the livelihoods of the population. Over-dependency on

grants could also take away the accountability of local government officials and councillors to their communities. Grant dependency can give rise to the soft budget problem, where municipalities overspend because even if their budgets do not balance up, the bail outs will flow from the upper spheres of government (Schoeman, 2011). Lastly, transfer dependency may actually stifle the efforts and creativity of municipalities to raise their own revenues.

Between 2003/04 and 2008/09 metros' revenues from service charges declined from 54% to 45%, but the grant component of operating revenues increased from 6% to 26%. Large cities exhibited a similar pattern, which may be due to pressures from the economic crisis. The trade-offs between grants and service charges are cause for concern, suggesting that these two municipality categories are becoming more dependent on transfers, at the expense of own-revenue sources.

Figure 6.13 Growth in property rates



Source: National Treasury, 2010

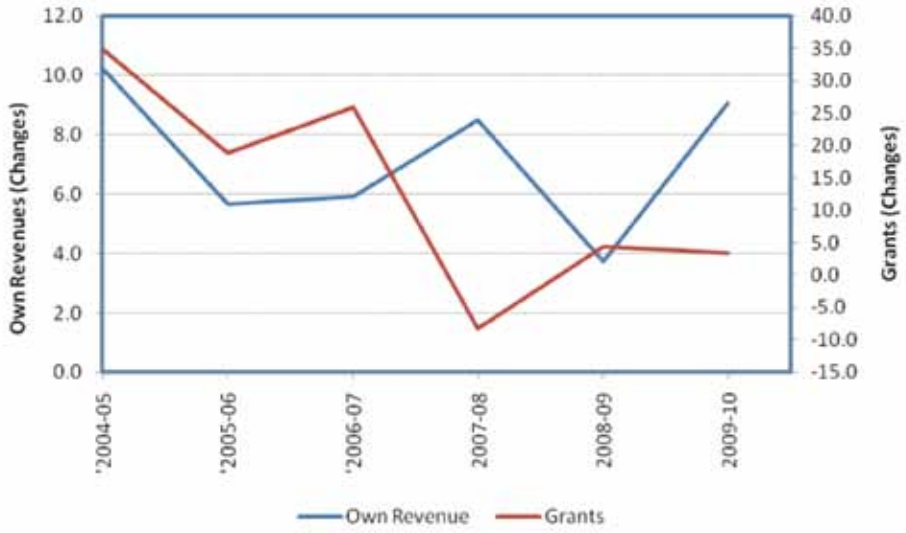
In 2008/09 the proportion of property rates declined slightly for some municipality categories (e.g. metros, secondary cities, large cities and medium to smaller towns). This decline in rates can partially be explained by the financial crisis of 2008, which affected the property market. Figure 6.13 shows that the growth in revenues from property rates for both metros and secondary municipalities was subdued during the recession period.[91] The decline in revenues from service charges and property rates suggest that municipal own revenues are vulnerable to economic shocks.

As noted above, grants are a significant component of municipality revenues. Grants are divided into conditional and non-conditional components: conditional grants are mainly for capital expenditure, while unconditional grants are part of operating expenditures. The possible trade-off between grants (both conditional and unconditional) and own revenues has been observed in some municipality categories.

In order to assess whether the increase in grants is crowding out municipal own revenues, the growth rate in total municipal own revenues is plotted in Figure 6.14. The discord in the trends of the two series suggests some trade-off between own revenues and grants.

91 Please note that the 2009/10 data is unaudited and so caution must be exercised in interpreting this result.

Figure 6.14 Growth rate of grants and own revenue (%)



Source: Own calculations from National Treasury Data (various years)

Grants play a significant role in financing the activities of municipalities and may have detrimental effects on a municipality's efforts to raise its own revenues (the 'crowding-out' effect). On the other hand, grants may have a 'crowding-in' effect whereby they help stimulate efforts by municipalities to raise their own revenues.

The hypothesis that grants crowd out own revenue has been tested in developed countries using local government data (Zhuravskaya, 2000; Dahlberg *et al*., 2007). In the developing world, Mogues *et al*. (2009) tested this hypothesis on Ghanaian local government data, using an econometric model, and found that external transfers to the local government sector tend to crowd out local government's own revenues.

They concluded that crowding out results in the loss of equity and efficiency gains associated with decentralisation. Using a discontinuous grant rule model to identify the effect of grants on local taxes and spending in Sweden, Dahlberg *et al*. (2007), found strong evidence of crowding in, where federal grants are shifted to more local spending, but not reduced local tax rates. In the South African context, Amusa *et al*. (2008) tested this hypothesis, which is also known as the 'flypaper effect' and did not find any crowding out.

For the purpose of this research, the following model[92] is used to test the hypothesis that grants are crowding out the own-revenue raising efforts of municipalities, using a panel data set:

$$lnOR_{it} = \beta_1 lnGR_{it} + \beta_2 lnEXP_{it} + \beta_3 X_i + \beta_4 LG_i + \varepsilon_{it}$$

Where, OR_{it} denotes own revenues for municipality i during period t, $GRit\text{-}1$ is grant revenues, $EXP_{it\text{-}1}$ are past expenditures, X_i is a vector of economic and demographic municipality variables, and LG_i are the dummies to control for municipality-specific effects. The relationship between OR and GR is of particular interest, as it sheds light on the crowding-out effects of transfers from upper tiers of government on local government's efforts to raise own revenues.[93] The crowding-out phenomenon is tested on a sample of 176 municipalities that had complete data for the above own-revenue drivers (municipalities with inadequate data were eliminated). The exogenous variables for the above model are:

Expenditure requirements. Expenditure requirements are another key driver of own revenues in municipalities, as an increase in spending requirements will encourage municipalities to find other sources of revenues.

Access variables. Access variables imply that residents of a municipality are more likely to pay their dues when they have access to basic services, which are water and electricity in this model.

Socio-demographic variables. The variables used are population size in a municipality and number of councillors, which

92 This model is a modified version of that used in Mogues et al. (2009).

93 RSL will be omitted in the estimation, as it has the potential to distort or bias the results.

are simple proxies for the size of a municipality. An increase in population size or number of councillors is expected to boost a municipality's own revenues.

Four panel data modelling techniques are used: the generalised least squares random effects model, maximum likelihood fixed effects model, and the ordinary least squares (OLS) fixed effects model with time and group-specific effects. Table 6.9 presents the estimates of the above equation. The random effects and the maximum likelihood models give more robust results than the other two. In a nutshell, the results indicate that the key drivers of own revenue are population size and access to water and electricity. In addition, the last model indicates the importance of time and group effects. These effects simply control for effects that are specific to each municipality group or specific to a time period.

Three of the four models suggest that national government transfers are instrumental in explaining municipality own-revenue raising efforts. In all four models, the relationship between grants and own revenues is positive, although insignificant in the fourth model. This finding (of a positive relationship between transfers and own revenues) refutes the hypothesis that in South Africa, national government transfers crowd out efforts by municipalities to raise own revenues. The result underscores the importance of the transfer system in stimulating economic development in sub-national governments. In other words, grants provide additional opportunities and are enabling mechanisms for municipalities to generate extra revenues. The implication is that the government should always strive for a stable and predictable transfer system to avoid the undesirable consequences of crowding out.[94]

Table 6.9 Testing for crowding-out effects (independent variable: municipal own revenue)

Variable	Coefficient (T-value)	Coefficient (T-value)	Coefficient (T-value)	Coefficient (T-value)
Constant	4.1862 (4.38)	4.0480 (4.08)	-7.9619 (-4.69)	8.3220 (2.09)
No of councillors	0.0003 (0.01)	0.0018 (0.01)	-0.0003 (-0.01)	0.0251 (1.25)
Access electricity	0.0564 (2.73)	0.0539 (2.65)	0.0251 (1.22)	0.3549 (4.77)
Grant	0.3170 (4.62)	0.3301 (4.82)	0.0748 (2.73)	0.0121 (0.39)
Population size	0.6494 (7.68)	0.6453 (7.34)	8.5023 (5.25)	0.3824 (3.21)
Access to water	0.0522 (2.17)	0.0508 (2.15)	0.0426 (1.91)	0.1536 (7.42)
	Wald X^2 (5)=319.6 (0.000)	R^2 Within = 19%, Between = 51%, Overall = 50% LR X^2=(5) =234.8(0.000)	R^2 Within = 23%, Between = 48%, Overall = 47% F(5,523)30.7 (0.0000)	**Time-specific effects** *Yr* 2006 0.0671 (5.75) *Yr* 2007 -0.6468 (-16.0) *Yr* 2008 -1.1536 (-15.2) **Municipality specific effects** District 0.315(5.62) Rural 0.402(6.87) Med-small 0.988(18.2) Largetowns 1.02(12.9) Secondary cities 1.68(20.1) R^2 56%

Source: Own estimates

6.4 Budget Analysis

To fulfil the main mandate of local governments, which is to maximise service delivery, municipalities are required to have budgets that are fiscally credible and sustainable. The credibility of budgets and spending plans are especially important, as infrastructure investment stimulates local economic development.

6.4.1 Budget credibility

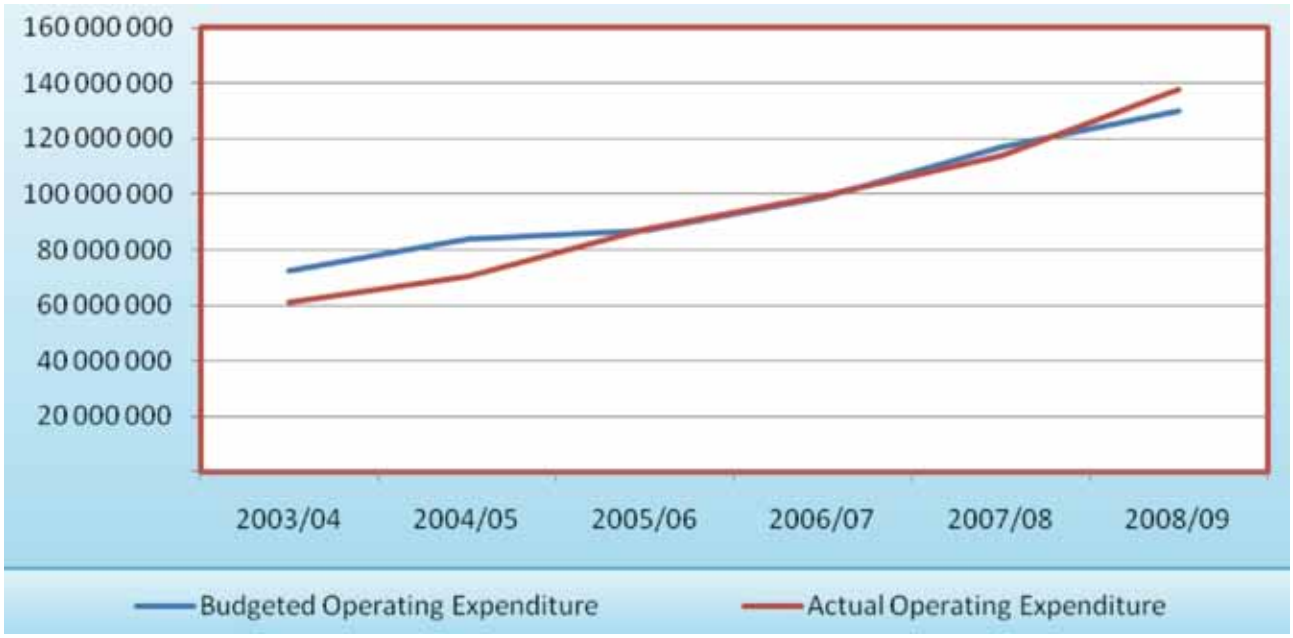
A credible budget ensures the funding of all approved items, not unapproved items. In other words, a credible budget ensures that "the budget out-turns regularly and, with little deviation, matches the budget approved" (Fölscher, 2006). A credible budget is implemented as planned, accurately reflects a country's priorities and must be an effective financial management instru-

94 Please note that this analysis will be improved once data has been updated to take care of lagged effects.

ment (Schiavo-Campo, 2008). A credible budget is anchored in sound, timely and reliable information on spending and service delivery, diligent and robust macro and fiscal revenue projections, realistic costing of government activities and a feasible and transparent planning process. Without these elements, budget out-turns are likely to deviate from approved budgets.

For the purpose of this research, budget credibility is represented by the extent to which budgeted and actual expenditures coincide. If the resulting credibility measurement is less than 100%, the actual amount (or outcome) is smaller than the budgeted amount, meaning that the budget is under-spent. The reverse is also true: if the measurement is greater than 100%, the budget was exceeded. Ideally, the deviation between budgeted and actual amounts should be minimal or zero, which is rarely the case. The Department of Co-operative Governance and Traditional Affairs (CoGTA) has defined a credible budget as "one with a variance of less than 20 per cent" (CoGTA, 2009:62). Variations between budgeted and actual amounts can occur for many reasons, including increases in unemployment, poverty and/or general economic downturns. Nevertheless, while municipalities may not have control over these factors, in their planning processes they are expected to be sensitive to extenuating factors and revise budget/spending projections appropriately.

Figure 6.15 Aggregate operating expenditure, budgeted versus outcomes, 2003/04–2008/09 (R'000)



Source: National Treasury Data, 2010

In Figure 6.15, the budgeted operating expenditure and actual expenditure seem to be moving together, with very little variability. Operating expenditure is much less flexible than capital expenditure, as it includes employee remuneration, a budgetary item that allows for very little or no variation at all. As a result, municipalities find it easier to cut back/under-spend on items such as capital or maintenance than personnel.

Whereas Figure 6.15 provides an aggregate picture of budgeted versus actual operating expenditure, Table 6.10 disaggregates municipalities according to the seven categories and provides a credibility ratio for each from 2003/04 until 2008/09.

Table 6.10 Credibility of operating expenditure disaggregated by municipal category, 2003/04–2008/09

Category	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Metros	75.6%	75.3%	94.8%	94.0%	90.4%	100.3%
Secondary cities	103.7%	99.3%	97.0%	104.1%	99.1%	109.8%
Large towns	96.9%	103.2%	107.3%	106.2%	105.3%	103.9%
Medium to smaller towns	92.2%	96.5%	108.6%	105.6%	115.6%	110.7%
Rural municipalities	98.4%	96.7%	112.2%	111.5%	105.7%	119.6%
District municipalities without powers	76.5%	78.1%	155.4%	136.6%	114.9%	109.9%
District municipalities with powers	96.0%	90.1%	157.6%	147.7%	136.2%	160.8%
TOTAL	84.3%	83.9%	100.7%	100.5%	97.4%	106.1%

Source: National Treasury, 2010

Table 6.10 shows that operating budgets and spending can be described as credible for metros, secondary cities, large towns, medium to smaller towns, and district municipalities without powers, as the variation between what was originally budgeted for and the actual operational expenditure differs by less than 20%.

Metros in particular show marginal differences between budgeted and actual operating expenditure in 2008/09, which underlines the fact that these municipalities are employing good planning techniques, and that other municipalities have much to learn from these types of municipalities.

Rural municipalities, and to a greater extent district municipalities with powers, display large variances between amounts budgeted and actual operating expenditure. District municipalities seem to have become progressively worse relative to 2003/04, which indicates poor planning processes, as these municipalities appear to be significantly under-budgeting their expenditure and risk overspending.

The credibility of budgeted versus actual revenue from service charges (including payment for services such as electricity, water, sanitation, refuse removal) is assessed in Table 6.11.

Table 6.11 Budgeted versus actual revenue derived from service charges, 2003/04–2008/09 (in %)

Category	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Metros	77.2%	75.7%	97.9%	102.2%	102.9%	102.4%
Secondary cities	93.5%	94.0%	89.7%	101.4%	103.8%	106.9%
Large towns	103.4%	103.3%	108.4%	101.6%	97.7%	97.4%
Medium to smaller towns	92.3%	101.2%	98.4%	98.4%	97.8%	99.6%
Rural municipalities	67.6%	85.9%	101.3%	101.1%	75.3%	100.0%
District municipalities without powers	261.9%	95.1%	119.7%	134.8%	119.1%	43.5%
District municipalities with powers	89.7%	70.1%	86.4%	97.8%	82.6%	75.7%
TOTAL	83.5%	83.2%	96.9%	101.7%	101.5%	102.1%

Source: National Treasury, 2010

On aggregate, the local government sphere appears to be performing relatively well with regard to credibility of budgeted revenue relative to actual revenue from service charges. Since 2003/04 progress has been made, with budgeted versus actual amounts mimicking each other very well.

However, district municipalities with, and to a greater degree those without, powers are displaying particularly poor performance. In 2008/09 district municipalities without powers[95] over-budgeted expected revenue from service charges by more than 50% (R194 billion was originally budgeted, but only R84 billion was collected in service charges).

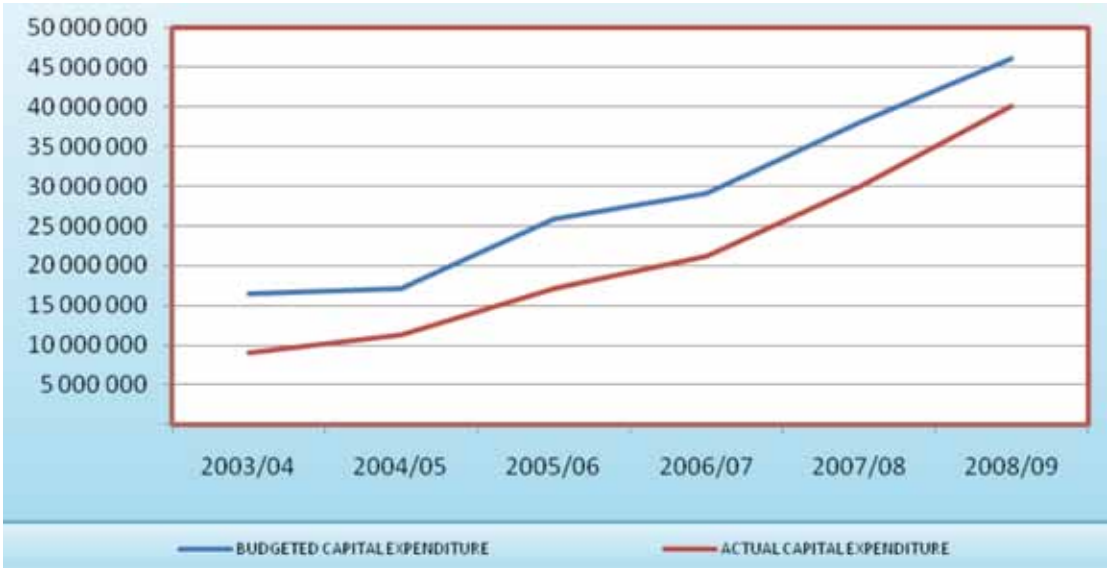
As they have no water or sanitation powers and functions, these municipalities are expected to collect less revenue. Yet they continue to table unrealistic plans, going from gross under-budgeting in 2003/04 (when actual service-charge revenues were more than the budgeted amount) to a situation in 2008/09 where revenue budgeted for from service charges far exceeded actual service charges collected.

Capital expenditure is the final aspect of credibility to be assessed. Figure 6.16 shows that municipalities struggle to align budgeted and actual capital expenditure. Over the entire period reviewed, actual capital expenditure is less than anticipated. One reason for this variation is that budgeting and spending on capital projects differ from operational items. In many cases the municipality's budget is based on simply dividing the projected cost of a capital project by the estimated number of years to completion.

The reality is that capital projects are multi-year undertakings and often show increases or spikes in spending towards the end of the project life cycle. To ensure that under/over-spending does not occur, municipalities need to have sound project and financial management in place, but instead suffer from capacity constraints. In South Africa, under-spending of capital budgets is pervasive, particularly in municipalities, which Figure 6.16 confirms.

95 While district municipalities without the water and sanitation function do not provide services to their local municipalities, they do provide all municipal services to District Management Areas (DMAS). DMAs are not part of a local municipality, but are areas that the district municipality directly controls and are usually national parks or areas with low population density.

Figure 6.16 Credibility of budgeted versus actual capital expenditure, 2003/04–2008/09 (in R'000)



Source: National Treasury, 2010

Decomposing the aggregate picture according to the seven municipal categories highlights the challenge with respect to the credibility of capital spending, as Table 6.12 illustrates.

Table 6.12 Budgeted versus actual capital expenditure by municipal category, 2003/04–2008/09

Category	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Metros	55.4%	64.8%	70.8%	85.1%	96.9%	110.5%
Secondary cities	70.0%	78.2%	66.1%	65.4%	69.3%	72.1%
Large towns	48.6%	54.7%	78.8%	69.3%	72.3%	65.7%
Medium to smaller towns	57.0%	72.8%	56.1%	64.7%	59.1%	66.4%
Rural municipalities	52.6%	63.1%	48.6%	51.1%	75.9%	67.2%
District municipalities without powers	63.7%	104.4%	43.0%	24.2%	58.7%	43.1%
District municipalities with powers	35.7%	51.0%	66.5%	68.2%	47.3%	55.1%
TOTAL	55.1%	66.3%	66.6%	72.7%	78.7%	87.0%

Source: National Treasury, 2010

Table 6.12 shows that all categories of municipalities, except for metros, have problems with capital spending, deviating by more than the 20% benchmark/acceptable variance set by CoGTA. Under-spending on capital projects is particularly dire in district municipalities without powers and rural municipalities.

Based on this brief analysis of budget credibility, better-resourced municipalities, such as the metros and large towns, tend to show greater alignment between budgeted and actual revenue/expenditure. In all probability, this is because better-skilled human capital is available to these municipalities, which means that they are able to plan and project spending/revenue trends more accurately. This suggests that there is room for skills transfer from well performing to poorly performing municipalities. The challenge of credible capital spending requires urgent attention.

6.4.2 Budget sustainability

Sustainability is about financial efficiency, but the concept of sustainability is fluid and not easily operationalised (Dollery *et al*., 2007: 119–120). No generalised measure of sustainability exists, although the National Treasury often measures sustainability by computing the ratio of personnel costs to operational costs. The measure may be a rather simplistic way of analysing sustainability, but it captures the notion that budgets cannot sustain their basic functions if personnel costs are substantial relative to operational expenditure.

The Australian Local Government Association (ALGA), through the Productivity Commission of Australia, has come up with a number of possible measures of sustainability (ALGA, 2007), including:

- Minimal (or negative) growth in revenue.
- Cost growth which exceed revenue growth.
- Tendency to operate deficits.
- Limited access to rate revenues due to small or declining population bases.

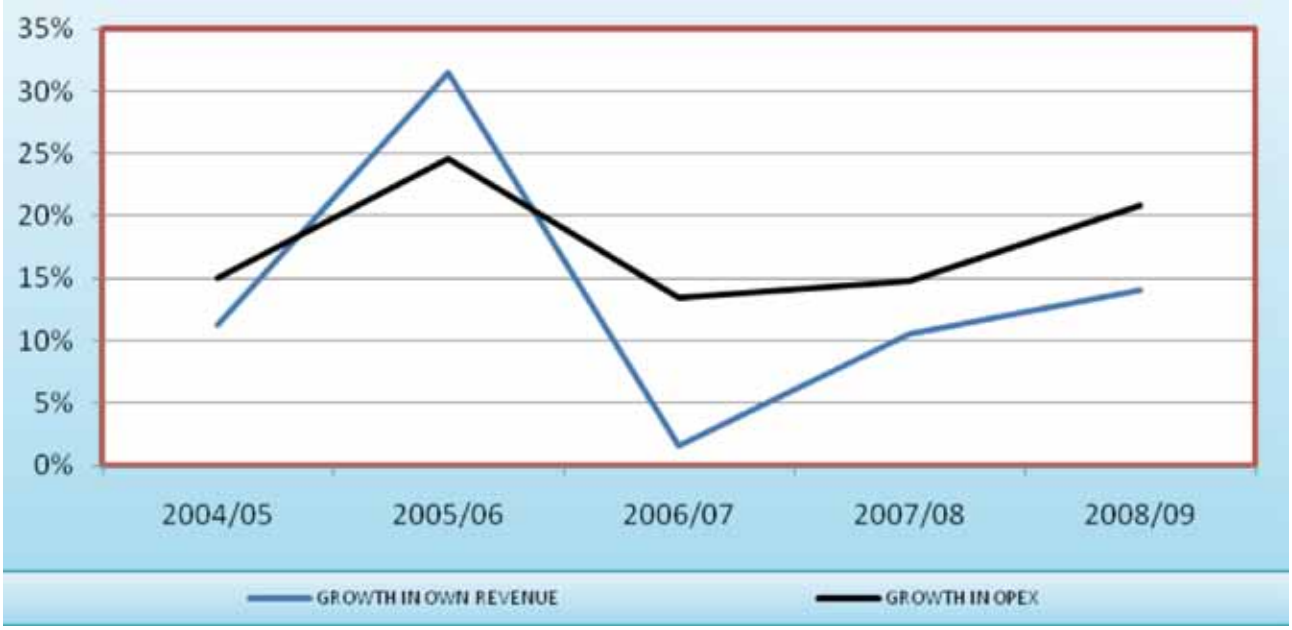
In 2006, an enquiry into the issue of sustainability in North South Wales identified various conditions that municipalities have to meet in order to be declared financially healthy (Dollery *et al*., 2007:119–120). These include:

- Borrowing or debt should make up a small proportion of the total capital invested in infrastructure/capital assets.
- The council (municipality) should be running an operating surplus, not a deficit.
- The municipality should exhibit a small infrastructural renewal backlog, and spending on infrastructure renewal/replacement should be approximately at the same level as depreciation expenses.

An important conclusion from the Dollery study is that flexibility is needed when devising sustainability indicators to measure municipal performance. A one-size-fits-all approach may be too inflexible to capture the diverse contexts experienced by different types of local government authorities (Dollery *et al*. 2007).

Several indicators can be used to measure sustainability, and for the purpose of this exercise, operating expenditure and own-revenue growth rates are used. The long-term financial sustainability of the municipality may be threatened if municipal input costs are increasing at a higher rate than own revenue. In such a case, greater intergovernmental fiscal transfers would be needed to sustain the demand for services from communities. Figure 6.17 gives the aggregate picture for local government in South Africa.

Figure 6.17 Expenditure and own-revenue growth rates



Source: National Treasury, 2010

In general, expenditure responsibilities appear to be increasing faster than own revenues. However, the drivers of the increase in expenditure need to be factored in. If the increase in expenditure is larger than the increase in input costs or demand for services, then the financial sustainability of municipal own revenues would be of concern.

However, intergovernmental fiscal transfers are likely to have grown substantially, which would in turn allow municipalities to increase their non-discretionary or non-essential expenditures. Table 6.13 disaggregates this analysis per category of municipality.

Table 6.13 Sustainability ratio per municipal category

Municipality	2004/05	2005/06	2006/07	2007/08	2008/09
Metros	-2%	10%	-12%	-2%	-8%
Secondary cities	-3%	10%	-10%	-1%	-9%
Large towns	-8%	-2%	-3%	-5%	-3%
Smaller towns	-3%	-7%	-4%	-9%	-1%
Rural municipalities	-3%	-19%	-2%	-10%	0%
District municipalities without powers	-15%	3%	-52%	-30%	-5%
District municipalities with powers	-12%	-17%	-17%	-37%	-7%
Grand Total	-4%	7%	-12%	-4%	-7%

Source: Own calculations

Table 6.14 calculates a sustainability ratio, which is the difference between the growth in municipal own revenues and expenditure responsibilities. This ratio is shown per financial year but can be aggregated per period (for example five years). A negative ratio indicates that expenditure responsibilities are increasing at a higher rate than own revenues, suggesting that these municipalities are financially unsustainable in the long run. Most of the categories of municipalities have negative sustainability ratios, which is of concern for the long-term financial sustainability of these municipalities. One explanation may be that municipalities are not maximising own revenues. For instance, revenue collection is poor, the local tax base is eroding, changes in local economic environment mean that potential revenue sources are not being maximised, or intergovernmental fiscal transfers are crowding out own revenues.

To further examine the sustainability of budgets, the ratio of personnel expenditure to total operational expenditure is computed. However, as there is no benchmark ratio, any ratio above the average will indicate an unsustainable budget. As Table 6.14 shows, the average sustainability ratio for all municipalities was 28% in 2008/09. The smaller and rural municipalities have ratios above the average of 28%, which suggests that these municipalities have, to some extent, unsustainable budgets and therefore need interventions (e.g. building capacity and monitoring of budgetary processes).

Table 6.14 Sustainability ratio per type of municipality

Municipality	2004/05	2005/06	2006/07	2007/08	2008/09
Metros	30%	28%	28%	29%	28%
Secondary cities	28%	28%	28%	28%	28%
Large towns	37%	34%	33%	34%	32%
Smaller towns	37%	36%	35%	34%	31%
Rural municipalities	31%	32%	31%	29%	30%
District municipalities without powers	23%	24%	24%	29%	29%
District municipalities with powers	20%	20%	21%	22%	22%
Average ratio for all municipalities	30%	29%	28%	29%	28%

Source: National Treasury, 2010

6.5 Conclusion and Recommendations

In evaluating the performance of local government budgets, the emphasis was on the effectiveness of budgets in dealing with challenges facing municipalities, in particular service delivery. The chapter assessed the soundness of budget practices in the local government sphere, focusing on fiscal credibility and sustainability of budgets.

Analysis of the expenditure and revenue suggests that:

- Budgets for municipalities are vulnerable to external economic shocks.
- Spending on personnel costs, including the remuneration of councillors, is excessive, especially for smaller municipalities. Such expenditure takes resources away from much needed service delivery needs.
- Repairs and maintenance spending is generally low in local government, which gives rise to backlogs, unemployment, retarded economic growth, poverty and other service delivery challenges.
- Some municipalities depend heavily on transfer revenues, which could have negative effects. Although the modelling re-

sults suggest that grants have no negative effects on own-revenue raising efforts, the negative effects on accountability and lack of enthusiasm to balance budgets cannot be discounted. Municipalities should be incentivised to find creative ways of raising their own revenues. The model estimates suggest that grants have some crowd-in effects, which means that grants spur economic activity in municipalities which translate into improved revenue bases. In this regard a predictable transfer system is important.

- Under-spending, of capital budgets in general and grants in particular, is very widespread. Such under-spending implies forgone jobs and economic growth and increases in backlogs and service delivery challenges. The underlying causes of this under-spending are capacity and skills constraints, poor planning and costing of infrastructural projects.

When assessing budget credibility from an aggregate viewpoint, municipalities appear to be performing well, particularly with respect to operational expenditures and service charges. However a disaggregation of credibility ratios by category of municipality presents a different picture. Medium to smaller towns and district municipalities, with and without powers, register poor credibility scores over the period reviewed. The lack of alignment between capital budgets and actual expenditure is glaring and is a challenge faced by all categories of municipalities, albeit to a lesser extent for metros.

Many municipalities are clearly not financially sustainable. In all categories, municipalities are increasing their expenditure at a higher pace than their own revenues. These expenditures are driven mostly by higher input costs and demand for services by communities.

6.5.1 Recommendations

The above analysis yields the following recommendations:

- Municipalities should be encouraged and assisted to find new revenue sources. Government should explore building incentives into the distribution of intergovernmental transfers to promote own-revenue maximisation and punish poor revenue performance.

- Municipalities need to budget adequately for repair and maintenance.

- Spending almost half of operational expenditure on salaries and wages should be discouraged. A thorough analysis of the reasons for this needs to be done, and proper mechanisms put in place to get such expenditures to reasonable and acceptable levels. Costs related to councillor remuneration in smaller municipalities also need to be examined.

- Robust monitoring of municipality budgets is necessary, to ensure that municipality budgets pay attention to service delivery challenges and backlogs.

- Municipalities should prioritise essential expenditures and cut back on 'nice to haves'. Municipalities should also strive for technical and distributive efficiency in order to maximise their service-level outputs with low average input costs and to optimise the welfare of their communities.

- Poorly performing municipalities need to leverage the experience and best practice methods of municipalities that have budget credibility, particularly with respect to capital budgeting and spending.

- Appropriate disincentives should be attached to municipalities that do not plan adequately (especially for capital and grant spending), so that actual figures are not significantly over or underestimated.

- In cases where municipalities lack technical expertise to plan and budget adequately, provincial and national treasuries should provide technical support. For smaller municipalities, sharing technical expertise may be considered as well. Capacity-building efforts need to be strengthened, while fragmented interventions need to be minimised.

- Increases in municipal funding should be based strictly on past spending performance and available human-capital capacity so that additional resources are absorbed and effectively spent.

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CHAPTER 7: ESTIMATING THE FACTORS THAT INFLUENCE MUNICIPAL EXPENDITURE

Jugal Mahabir[96]

7.1 Introduction

Local government is constitutionally mandated to provide basic services to communities within a three-sphere decentralised system of governance. Schedules 4B and 5B of the Constitution of South Africa (Act No. 106 of 1996) assign an array of expenditure responsibilities to the country's 283 municipalities.[97] The most essential of these is the provision of water, sanitation and electricity services. In addition to their service delivery mandate, municipalities continue to invest significantly in social and economic infrastructure in the country. Urban municipalities play a central role in local economic development through their planning and managing of the urban built environment, while rural municipalities continue to roll out basic social infrastructure to eradicate the massive service backlogs in these areas.

Municipalities are empowered with an array of revenue instruments that equip them to deliver on their mandates. To fund their expenditure, municipalities are largely reliant on their own revenues, which include property tax, user fees, surcharges on services and a wide range of other local taxes. Municipal own revenues are supplemented by intergovernmental transfers, predominantly from national government, in the form of unconditional and conditional grants.

However, it is important to recognise the discernible differences in revenue capacity and expenditure responsibilities of the various municipalities. The legacy of apartheid policies perverted the efficient and equitable distribution of wealth and resources in South Africa. As a result, several, mainly rural, municipalities have inadequate own-revenue capacity, extreme poverty and high service backlogs. Urban municipalities were also affected. Metropolitan municipalities and secondary cities operate within a spatial design that is characterised by large communities facing difficulties in accessing economic opportunities, and large-scale urbanisation, as rural inhabitants migrate to seek better economic prospects. These factors contribute to difficulties in planning spatial settlements and managing the urban built environment. Conversely, rural areas are characterised by sparsely populated settlements, scattered across terrain that ranges from relatively flat, such as in the Free State, to mountainous and hilly, such as in the Eastern Cape and KwaZulu-Natal.

Regardless of the nature of the circumstances, all municipalities are faced with the challenge of improving and extending service delivery and supporting the poor. The role of national government support, and intergovernmental fiscal transfers in particular, is pivotal in ensuring a competent, well-resourced and well-capacitated local government sphere. As Yinger (1986) notes, "tax base disparities [among others] influence local spending and [intergovernmental grant design should] offset these disparities".

7.1.1 Problem statement

In the Financial and Fiscal Commission's Annual Submission on the 2011/12 Division of Revenue (DOR),[98] several studies identified concerns over the application of several formula-based grant mechanisms, as the subsidy levels do not reflect the different expenditure pressures faced by municipalities. The mechanisms include the Local Government Equitable Share (LES)[99] and Municipal Infrastructure Grant (MIG),[100] which simply allocate funds to all municipalities based on uniform costs for services and backlogs respectively. These formulas do not factor in the different expenditure pressures faced by municipalities, which raises concerns over the efficacy of the distribution of resources. Reschovsky (2003, cited in Mahabir, 2010) notes

96 Financial and Fiscal Commission (FFC).

97 The number of municipalities changed to 278 after demarcation for 2011 municipal elections.

98 The Annual Submission and accompanying Technical Report are available at www.ffc.co.za.

99 The LES is an unconditional grant that largely finances the operating expenditure of municipalities.

100 The MIG is a conditional grant afforded to municipalities to assist in the eradication of service backlogs, including water, sanitation, municipal roads and refuse removal.

that "general literature confirms that regardless of the type of service, other factors such as topography, population size, population density and other geological characteristics influence costs of services". Yinger (1986) points out that "there exists no general analysis of the impact of cost factors on local public service delivery, and cost factors invariably enter empirical studies and grant formulae in an ad hoc manner".

Therefore, it is important to understand the different expenditure pressures faced by municipalities and to quantify the primary drivers of this expenditure. This chapter will theoretically identify and subsequently estimate the factors that influence municipal operating expenditure. The research highlights factors that national governments should consider when designing accurate, differentiated, cost-based local government grant formulas, in particular that of the LES, which is the primary transfer supporting municipal operating expenditure. This includes exogenous factors, such as population density, migration, and topography and their effects on municipal operating expenditure.

7.1.2 Background to the research

In 2009 the Commission adopted a five-year research strategy to help attain its vision of "enhancing the developmental impact of public resources through the financial and fiscal system in South Africa". Four thematic areas were identified to serve as fundamental principles and goals within the research strategy to direct the institution in attaining its vision:

- policy outcomes;
- accountable institutions;
- equitable growth and distribution of resources; and
- flexible responses.

This chapter contributes to the thematic areas of policy outcomes and, in particular, equitable growth and distribution of resources. It highlights the current economic and fiscal differences between municipalities and the contributing factors. Understanding and quantifying such differences will assist in developing appropriate long-term policies to ensure an equitable distribution of resources.

The primary aim of this chapter is to identify and estimate the factors that influence municipal operating expenditure by estimating a fully specified function, based on first principles. Estimations per type of operating expenditure, i.e. personnel expenditure, bulk costs and service-specific expenditure, go beyond the scope of this exercise.

Intergovernmental fiscal transfers, in the form of conditional and unconditional grants from higher spheres of government to sub-national governments, are a significant feature of any intergovernmental fiscal relations system. Criteria for the allocations of such grants need to be robust enough to ensure that sub-national governments are appropriately funded to fulfil their service delivery and economic development mandates. This is a vital component of the South African intergovernmental system, where local government is mandated to provide important basic services, such as water and sanitation.

Understanding the factors that influence municipal expenditure allows for proper planning of, for example, high levels of inward migration. As municipalities are required to ensure that all their citizens have access to quality basic services, understanding and tracking such movements ensures effective planning of service delivery. The impacts of population density in spatial settlements can also have important implications for built-environment planning, as municipalities should adopt the most cost-effective settlement form.

The outcomes of this chapter will contribute to improving general knowledge of the different factors that influence expenditure of municipalities, and to developing cost-reflective formula-based grants to ensure that diverse municipalities are well financed.

It is important to note that the chapter explores operating expenditure, not capital expenditure (i.e. municipal investments in new infrastructure). Capital expenditures are largely based on longer-term planning decisions around large projects or the coherent development of infrastructure in the built environment. Cross-sectional studies will not capture such dynamic effects. Capital expenditure can appear lumpy, i.e. depending on the scope of the project being funded, and can be undertaken over a certain period for the project with different levels of expenditure. For example, the bulk of the payment for the project can occur in the first year with subsequent smaller payments. This will result in a potential spike in the first year for the given municipality, and therefore a single year interpretation and analysis of capital expenditure can be highly skewed and inaccurate.

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7.2 Defining and Understanding Municipal Expenditure

Ladd (1992) defines per capita spending as "the product of the quantity or quality of public sector outputs and the costs of providing those outputs". Municipal expenditure results in outputs, in the form of public goods, to the constituents of the municipality. Embedded in the expenditure is the cost of producing such output.

These costs include the various input costs such as labour (municipal personnel expenditure), capital and intermediate costs (such as bulk purchases). Expenditure and costs are not interchangeable, as expenditure would capture additional demand-side factors, intergovernmental factors and institutional factors. These factors will form part of the expenditure specification later in the chapter. Another important consideration is the efficiency of municipal expenditure. Therefore, municipal operating expenditure illustrates not only the costs of providing public municipal goods and services, but also the quantity and quality of such services.

This can include technical efficiencies, i.e. the efficient use of given resources to produce an output or, in the case of municipalities, the delivery of a service. Certain municipalities might spend more to produce the same amount of service relative to another municipality because they are technically inefficient. In terms of this exercise, municipal efficiencies cannot be explicitly measured but will be captured in the error term in a well-specified expenditure function.

7.2.1 Composition and trends in municipal expenditure

Total municipal expenditure can be divided into two components - operating expenditure and capital expenditure. Table 7.1 illustrates the actual total municipal expenditure by operating and capital expenditure, in nominal and real terms and in percentages, for the period 2003/04–2008/09.

Table 7.1 Municipal operating and capital expenditure 2003/04–2008/09

Actual Expenditure R'000	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Municipal operating expenditure (nominal terms)	72,024,008	82,051,746	87,505,621	99,264,088	113,957,271	137,674,688
Municipal capital expenditure (nominal terms)	10, 241, 452	13,371,328	17,182,496	21,180,036	29,906,909	40,138,468
Total municipal expenditure (nominal terms)	**82,265,460**	**95,423,074**	**104,688,117**	**120,444,124**	**143,864,180**	**177,813,156**
Municipal operating expenditure (real terms)	79,548,028	85,614,862	86,236,825	91,261,370	96,763,870	07,399,040
Municipal capital expenditure (real terms)	11,311,330	13,951,981	16,933,356	19,472,491	25,394,678	31,311,732
Total municipal expenditure (real terms)	**90,859,358**	**99,566,843**	**103,170,181**	**110,733,861**	**122,158,549**	**138,710,771**
Yearly growth rates	**Average growth**	**2004/05**	**2005/06**	**2006/07**	**2007/08**	**2008/09**
Municipal operating expenditure (nominal terms)	14%	14%	7%	13%	15%	21%
Municipal capital expenditure (nominal terms)	32%	31%	29%	23%	41%	34%
Total municipal expenditure (nominal terms)	**17%**	**16%**	**10%**	**15%**	**19%**	**24%**
Municipal operating expenditure (real terms)	6%	8%	1%	6%	6%	11%
Municipal capital expenditure (real terms)	23%	23%	21%	15%	30%	23%
Total municipal expenditure (real terms)	**9%**	**10%**	**4%**	**7%**	**10%**	**14%**

Source: National Treasury Local Government Database

In 2003/04 municipalities spent a total of R82 billion, of which 88% was operating expenditure (R72 billion) and the remaining 12% capital expenditure (R10 billion). Total municipal expenditure increased by an average of 9% in real terms over the period under review.

Much of this was driven by large increases in capital expenditure, which grew by a massive 23% in real terms. Such increases were probably the result of government's drive to eradicate service backlogs (2004/05–2005/06) and substantial investment in infrastructure related to the 2010 FIFA World Cup™ (around 2007/08–2008/09). The large increases in capital expenditure have resulted in infrastructure investments that now comprise 23% of total municipal expenditure (R40 billion in 2008/09).

Operating expenditure has increased quite modestly over the period, at 6% in real terms. Higher growth rates in operating expenditure would have been expected, given the increasing demand for services from communities and new households connected to services. Table 7.2 disaggregates the components of municipal operating expenditure over the same period.

Table 7.2 Operating expenditure per line item

Operating Expenditure	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
R'000						
Depreciation and amortisation	2,806,485	3,825,558	4,223,682	5,384,398	6,191,747	9,131,850
Employee costs	21,433,904	23,294,193	24,854,981	28,885,956	32,442,931	37,851,310
Finance charges	3,889,716	3,319,929	3,162,729	3,489,910	3,484,676	4,359,467
Grants and subsidies	1,249,062	1,838,078	2,526,063	2,934,465	4,224,310	3,749,971
Material and bulk costs	17,420,995	18,186,568	19,112,565	21,736,718	23,508,846	29,862,340
Other	20,448,367	26,282,843	27,294,585	29,177,488	35,151,669	42,830,229
Remuneration of councillors	504,252	705,999	1,096,343	1,707,719	1,878,965	2,091,520
Repairs and maintenance	4,271,227	4,598,578	5,234,674	5,947,434	7,074,127	7,798,001
Total	**72,024,008**	**82,051,746**	**87,505,622**	**99,264,088**	**113,957,271**	**137,674,688**
Percentage breakdown						
Depreciation and amortisation	3.9%	4.7%	4.8%	5.4%	5.4%	6.6%
Employee costs	29.8%	28.4%	28.4%	29.1%	28.5%	27.5%
Finance charges	5.4%	4.0%	3.6%	3.5%	3.1%	3.2%
Grants and subsidies	1.7%	2.2%	2.9%	3.0%	3.7%	2.7%
Material and bulk costs	24.2%	22.2%	21.8%	21.9%	20.6%	21.7%
Other	28.4%	32.0%	31.2%	29.4%	30.8%	31.1%
Remuneration of councillors	0.7%	0.9%	1.3%	1.7%	1.6%	1.5%
Repairs and maintenance	5.9%	5.6%	6.0%	6.0%	6.2%	5.7%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**99.9%**	**100.0%**

Source: National Treasury Local Government Database

The largest expenditure item in local government is employee-related costs, which means that, when remuneration of councillors is included, over 30% of municipal expenditures are geared towards maintaining the administrative and political structure.

The second-largest expenditure item is material and bulk costs, which include the necessary bulk purchases required to provide (for example) water and electricity services. Over half of municipal operating expenditure is necessary for the delivery of services. Table 7.2 also shows that approximately 6% of the operating budget is spent on repairs and maintenance of existing infrastructure, which is far below the National Treasury guidelines of 8–12%. It confirms the concern over poor maintenance of infrastructure, which is widespread in local government.

7.2.2 Differences in expenditure across municipalities

It is important to clarify the differences in municipal expenditure across the various municipalities,[101] and the factors that drive these differences. This will provide a conceptual framework for determining expenditure and lay the foundations for identifying variables that can test and quantify this model. Table 7.3 outlines the differences in expenditure and other factors for the 2007/08 financial year.

101 The Constitution defines three types of municipalities. These are the six metropolitan (category A) municipalities, 231 local (category B) municipalities and 46 district (category C) municipalities, as of January 2011. This chapter only considers categories A and B. It is important to note that local municipalities share their service and expenditure responsibilities with their respective district municipalities.

Table 7.3 Expenditure, demographic, social and economic profiles of municipalities, 2007/08

Type of Municipality	Total population	Total households	Total gross value add per capita	% of people employed	% of households earning below R3200pm	% of households without access to water	% of households without access to electricity	Average population density	Operating expenditure per capita	Personnel expenditure per capita	Bulk costs per capita	Revenue from local taxes per capita
Metropolitan municipalities	16,974,424	4,714,021	75,67	34%	46%	1%	14%	1388	3,789.48	1,075.29	920.02	3,279.51
Secondary cities	8,233,208	2,207,004	50,80	29%	59%	3%	16%	221	2,242.55	618.00	543.32	1,940.00
Larger towns	3,985,216	1,074,513	40,83	27%	62%	7%	18%	87	1,843.08	593.19	336.67	1,513.82
Smaller towns	6,906,926	1,808,666	29,16	22%	69%	7%	20%	19	1,466.46	459.74	234.53	988.70
Rural municipalities	12,331,695	2,673,914	9,44	13%	80%	28%	35%	81	370.49	111.70	20.15	120.77
Total/average	48,431,469	12,478,118	41,18	25%	63%	9%	20%	359	1,942.41	571.59	410.94	1,568.56

Source: National Treasury Local Government Database; 2007 Community Survey, CSIR

Table 7.3 distinguishes municipalities based on their spatial design (i.e. relatively urban or rural) to highlight the social, economic and demographic differences within local government, and their impact on total operating expenditure, personnel expenditure and bulk costs. Looking at the expenditure, the more urban form a municipality takes, the higher its per capita expenditure. In 2007/08 a metropolitan municipality spent an average of R3,789.48 per capita on operating costs, which included the highest personnel expenditure (R1,075.29) and highest bulk costs (R920.02) per capita of all types of municipalities.

This higher expenditure is probably the result of greater demand for services in metropolitan areas. Metropolitan and other urban municipalities have higher numbers of people, households and businesses, which is confirmed by the higher economic activity. Therefore, urban municipalities are required to provide a greater quantity of services. The profiles of the population and households also determine the quantity and quality of services. Firstly, urban municipalities have the highest numbers of households connected to services (water and electricity), which have higher operating costs. This suggests the provision of higher-quality services, which would increase expenditure in these municipalities relative to those in rural areas.

Secondly, rural areas have the highest levels of poverty and unemployment, which implies less demand for services than in urban municipalities, where people demand greater quantity and quality of services, in terms of sophisticated technologies, and are able to pay more for these services. In urban areas individuals and communities tend to have higher political bargaining powers, which further influence the provision of services. Conversely, rural areas are likely to accept lower and less sophisticated levels of services, as the communities' needs are different, for example their focus is on subsistence farming. Urban agglomerates also have higher infrastructure requirements, such as traffic lights, street lighting and greater security. Lastly, urban municipalities have more fiscal capacity to generate local taxes that can support a greater quantity and quality of service delivery.

Institutional arrangements and intergovernmental factors play an important role in determining the levels of expenditure across local government. Most metropolitan and secondary cities are authorised to provide all major basic services. However, most of the other local municipalities (i.e. larger to smaller towns and rural municipalities) share these services with the respective district municipalities. This institutional arrangement is probably captured in the differences in expenditure across the municipalities. Larger to smaller towns and rural municipalities are likely to have lower per capita operating expenditure and lower bulk costs because the district municipality provides the services.

Per capita expenditure also differs due to supply-side considerations, which include the costs of labour, materials and capital to provide services. In urban areas, wage rates are likely to be higher and more competitive because of the competition for skilled labour. Alternatively, rural areas might offer higher wages to attract the appropriate skills. Costs are also affected by the physical, geographic and topographic nature of municipalities and are thus an important consideration in an expenditure function. Municipalities characterised by hilly terrain or ones that have many natural barriers are likely to incur higher operating costs, given the strain on existing infrastructure to deliver services.

7.3 Literature Review

There are several international studies that estimate the factors that affect local government expenditure. Many studies attempt to answer various research questions that result in specifying a municipal expenditure function. The most common research

question relates to the impacts of spatial patterns in terms of population density on municipal expenditure. These studies pertain to the smart cities debates, which promote a compact city urban plan.

In their assessment of the smart cities assumptions, Cox and Utt (2004) estimate an expenditure function looking at factors such as migration, community age and population density. They conclude that variations in personnel expenditure are more correlated with variations in municipal expenditure. Furthermore, the impacts of population density on municipal costs are statistically significant, but their quantifiable impacts are minimal, whereas migration is insignificant. The latter suggests that municipalities do not account for population growth in their expenditure plans, at least in the short term. They also conclude that political factors – more than economic factors – play an important role in explaining the variations in municipal expenditure.

Ladd (1992) estimates a fully specified expenditure function to test the impacts of population densities and population growth on municipal expenditure. A piecewise linear regression model is estimated to account for segments of data that appear to have different slopes. Analysis is undertaken for operating and capital expenditure. The model specification includes demand-side and supply-side variables as control variables. The demand side looks at the tastes and preferences of communities and includes income variables, education levels and municipal fiscal capacity. Supply-side factors include the average wage rate faced by local authorities compared with the private sector. Most of the control variables are significant. On the tested variables, Ladd finds a nonlinear, J-shaped relationship between density and per capita municipal expenditure, which suggests that municipal expenditure is higher at very low levels of population density, but gradually increases with higher density. Ladd also concludes that rapid population growth puts a tremendous fiscal strain on communities and existing infrastructure, and can result in lower levels of services for existing and new households. This conclusion is based on the inverse relationship between population growth and municipal expenditure.

In their analysis of German states, Buttner et al. [sa] find that, although municipal costs are in general directly proportional to total population, the relationship between municipal expenditure and population density is not significant. However, they also conclude that the results are service specific and vary depending on the nature of the service provided by the municipality. Subnational government expenditure on more social services, such as education and policing, tends to increase with denser settlement patterns, while services such as housing can be "provided at lower per capita costs in more densely populated areas" (ibid.). This is an important finding, as it suggests trade-offs in expenditure among the different services provided by municipalities. The Buttner et al. study confirms the cost benefits of compact settlements for services such as transport and housing, but other costs such as security may increase. They also find that the current design of German intergovernmental transfer systems, which favours highly urbanised settlements, is not justifiable. This finding can also be linked to the current LES and MIG formulas, which allocate larger funds to urban areas.

Kushner et al. (1996) assess the determinant of municipal expenditure in the Ontario region of Canada. As with other studies, a piecewise linear regression model is estimated. The functional form of the expenditure model includes local government fiscal capacity, age of the community to capture demand for services, population density, regional and institutional variables. The existence of economies of scale in the provision of services is also tested. In this instance, population density has positive impacts on per capita expenditure, while expenditure increases with the size of the municipality, i.e. economies of scale do not exist in the provision of services. Institutional or organisational forms of local government have no impact on municipal expenditure.

7.4 Data Sources and Methodology

A fully specified expenditure function is estimated using a cross-sectional dataset from the 2007/08 municipal financial year for a sample of 237 municipalities. The municipalities in the sample include metropolitan and local municipalities.

7.4.1 Data sources

The latest and most-comprehensive data available at the municipal level can be obtained from Statistics South Africa's 2007 Community Survey, which restricted the analysis of municipal expenditure to the 2007/08 financial year. The 2007 Community Survey provided the economic, social and demographic data, while municipal budgeted data was sourced from the National Treasury local government budget database.

Poor reporting on financial statistics (and statistics in general) is widespread in municipalities. This is due primarily to the poor administrative capacity of certain municipalities. Consequently, it is highly unlikely that a full set of accurate budget outcomes data for all 237 municipalities can be obtained. In cases where figures for the 2007/08 financial year were missing, the 2006/07 reported outcomes were inflation-adjusted in order to have a comprehensive set of data for the exercise.

The migration variable was computed using the 2007 Community Survey, Census 1996 and Census 2001. To account for the numerous re-demarcations of municipal boundaries, the data from Census 1996 and Census 2001 has been converted to current municipal boundaries as of 2005 (the latest municipal re-demarcation available).

7.4.2 Model specification

Based on conceptual discussions, municipal expenditure can be expressed as the following expenditure function:

Municipal expenditure per capita = ∫ (household demand, taste and preference variables, intergovernmental relations variables, spatial form, migration, input costs, environmental variables).

Hence the specification of the equation will be:

$$EXPi = \beta 0 + \beta 1DCTi + \beta_2 IGRi + \beta_3 SPFi + \beta_4 PDNi + \beta_5 PDi + \beta_6 INCi + \beta_7 GEi + \acute{e}$$

Where:

EXP	= per capita municipal expenditure
DCT	= a vector of demand, tastes and preferences variables
IGR	= a vector of intergovernmental relations variables
SPF	= spatial nature of the municipality
PDN	= population density variable
PD	= migration variable
INC	= a vector of variables capturing input costs
GE	= a vector of geographic variables
$\acute{e}$	= a random error term

The ordinary least squares (OLS) method is used to estimate the factors that influence municipal operating expenditure. The dataset was tested for violations of the general OLS assumptions, such as heteroskedasticity and multicollinearity that are prevalent in cross-sectional datasets. The data appeared to be heteroskedastic, with various tests undertaken to test for heteroskadasticity.

A Breusch-Pagan/Cook-Weisberg test for heteroskedasticity was carried out on the dependent variable. A chi-squared statistic of 175.46 was computed. This was significant at all conventional statistical levels and thus rejected the null hypothesis of homoscedasticity. Therefore, to correct for this violation, White (robust) standard errors were used to estimate the model. This ensured corrected standard errors and reliable statistics.

7.4.3 Description of variables and a priori expectations[102]

In this exercise, total municipal operating expenditure per capita is used as the dependant variable.

Demand, tastes and preferences variable

Municipal expenditure is likely to be strongly correlated with the local demand from communities. The following variables measure community demand, tastes and preferences for municipal services:

Community demand and preferences – measured by average household income

A household's income can be a proxy for taste and preferences for the type and level of service demanded by individuals. The higher the income per capita for a given municipality, the higher the costs of provision, since these people will probably require and be able to pay for a higher level of service. Likewise, demand for services will be lower if poverty levels are higher and households are not able to pay for these services.

102 Please refer to Annexure7 A for the details and descriptive statistics for the variables used in the model.

Economic activity – measured by percentage of population employed

The effects of unemployment will be similar to those of the income variable. People who are employed are likely to have a higher income. They would thus demand more and be able to pay for a higher level of service. Conversely, the unemployed will find it difficult to pay for services, thus indicating a lower demand.

Access to water, electricity and refuse – measured as percentage of households with access to the basic services[103]

Although these variables are stated separately in the model specification, the impact of each should be similar. A positive relationship would be expected on the operating side – as the more households that are connected to services, the greater the expenditure required to service these households. In addition, operating costs to households not connected to basic infrastructure can include alternative sources of services, such as boreholes for water and paraffin for energy, which cost less to provide.

Authorised municipality for service provision

The local government system gives all metropolitan municipalities full executive and legislative authority within their jurisdiction, and full responsibility for the services provided as assigned by the constitution. However, local and district municipalities share these powers, as either a local or a district municipality is authorised to provide a function, which is usually the case for the water and sanitation service. This asymmetric division of service powers and functions influences municipal expenditure. As an initial proposal, municipal powers and functions will be interpreted as a dummy variable, where 1 indicates the provision of a service. Municipalities with authorisation for services are expected to have greater per capita expenditures.

Spatial nature of municipality

The spatial nature of a municipality, i.e. whether it is relatively urban or rural, has a significant impact on its per capita operating expenditure. An urban jurisdiction would be expected to have more per capita operating expenditure than a rural area because of several factors, including the greater need for additional infrastructural requirements such as traffic lights. The urban/rural effect is captured by a dummy variable that is 1 if the municipality is a metro or secondary city and 0 otherwise.

Population density

As previous empirical research is divided on the impact of population density on expenditure, the impact of this variable can assumed to be relative to the specific characteristics of the country in question. Hence no expectation is placed on this variable. A negative relationship will suggest that denser settlements result in less strain on the infrastructure networks, as they are spread over shorter distances, which reduces the maintenance costs and degree of water and electricity losses. However, there is still much debate about the actual relationship between municipal expenditure and population density. It is possible that the provision of certain services, such as water and electricity, might have lower costs associated with density. However, overall expenditure in high-density populations is likely to be higher because of the greater need for more services, such as traffic lights, transport and roads. The externalities associated with increased strain on the environment caused by higher populations and increased social costs that result in higher crime levels can also influence costs and expenditure in higher-density areas.

Migration

A larger growth in population, be it internal population growth or migration from other municipalities, would be expected to have a positive impact on municipal expenditure, as municipalities will be required to spend more in servicing these households. The migration variable is measured as the annual percentage increase/decrease in population of a municipality from 1996–2007.

103 Minimum access levels as per RDP standards.

Input costs

On the supply side, the costs of inputs in terms of labour, capital and materials also have an impact on municipal expenditure. Higher input costs result in higher expenditure to deliver a service. Significant and positive impacts on these variables on municipal operating expenditure would therefore be expected. Data on average wage rates, average costs of materials and capital costs is not readily available for municipalities. Therefore, a set of appropriate proxies was required for these costs. To capture the cost of labour, average personnel expenditure per municipal employee was used, as this would capture average differences in personnel costs per municipal employee across the various municipalities. For material and capital costs, bulk purchases and expenditure on maintenance and depreciation were calculated per consumer unit[104] receiving the services, in an attempt to capture cost variations across the municipalities.

Geographic variables

The South African geographic landscape is diverse. Municipalities located mainly in the heart of the country lie on a flat plateau and are characterised by a generally flat gradient. Municipalities on the coasts, particularly those in the Eastern Cape and KwaZulu-Natal, are characterised by steep gradients and precipitous settlements. It is argued that there are increased costs in providing services to settlements across hilly terrain. Unfortunately, no geographic and topographic variables or proxies were available at a municipal level to assess the impacts of these factors on municipal expenditure. However, in theory these factors are likely to have a significant impact on municipal expenditure and so cannot be ignored. These variables need to be quantified for each municipality and, ideally, factored into the local government fiscal framework.

7.5 Model Estimations and Results

The model has overall significance and an R-squared value of over 80%. This means that the model explains 80% of the variation in per capita operating expenditure. Given the nature of the model, a degree of multicollinearity can be expected and was confirmed by a correlation matrix. However, most of the variables remained as long as it was supported by theoretical demand and supply-side considerations that impact municipal expenditures.

Table 7.4 Estimation results – robust standard errors estimation, 2007/08

Dependent variable: Total municipal operating expenditure per capita 2007/08			
Independent variables:	Coefficient	t Statistic	P Value
Avg hhincome	0.017***	4.37	0.000
Percentemployed	1277.60**	2.12	0.035
Percentwateraccess	35.71	0.71	0.481
Percentrefuseaccess	1230.30***	7.25	0.000
Percentelectricityaccess	-31.21	-0.16	0.870
Watersp	259.18***	2.77	0.006
Urban	126.04	1.05	0.296
Pop dens	0.399***	3.30	0.001
Migration	-4502.99***	-3.25	0.001
Wagerate	0.000	-0.07	0.942
Kapitalcosts	0.143	1.47	0.144
Materialcosts	0.113	1.08	0.280
Constant	-444.06***	-3.60	0.000
*** significant at 1% level	**significant at 5% level		*significant at 10% level

Source: Author

104 A consumer unit is defined in the Non-financial census of municipalities undertaken annually by Statistics South Africa. It is the point to which a specific service is billed.

Of the variables that capture the demand, tastes and preferences of the communities, both the average household income and employment variables meet expectations and are significant. Firstly, the results confirm the a priori expectations as the more affluent households demand higher levels and quality of services. Therefore, expenditure is less in poorer areas. Although municipalities offer social support to poor households via free basic services policies, this support is relatively less in rand value compared to the expenditure requirements for richer households. The results also confirm that municipalities with higher levels of economic activity have higher expenditures, which is due to the greater demand for services from businesses and other commercial entities. Although employment was used here to measure economic activity, higher levels of employment also impact positively on demand for services in the sense that employed people have greater disposable income to demand higher levels and quantities of services.

In terms of access to services, only the percentage of households with access to refuse variable is significant and positively impacts on expenditures. Both the access to water and electricity variables are insignificant. This could be due to the fact that higher numbers of households have access to these services relative to the refuse service, thus variations in both access levels and expenditure is more evident in the refuse service.

The population density variable is significant and has positive impacts on expenditures. This confirms that denser settlements in general require greater levels of expenditures due to the greater demands for services from compact communities. This includes demand for additional infrastructure in terms of traffic lights, street lighting etc as well as possibly higher costs for social amenities due to, for example, higher levels of crime. Although the urban dummy variable is insignificant, it captures any spatial effects that can distinguish different levels of expenditures.

A municipality authorised to provide the water and sanitation service has on average higher expenses than a municipality that is not a water service authority. This coincides well with the water and sanitation expenditure comprising on average one-quarter of a municipality's budget. Therefore, institutional arrangements within local government impacts on expenditures.

Lastly, the migration variable is significant in explaining the variation in operating expenditure but has a negative effect on such expenditure. This suggests that municipalities are finding it difficult to cope with the increased pressures of migration, which has a negative impact on the quality of service provision. Such a finding supports the conclusion made by Ladd (1992).

7.6 Conclusion

The chapter raises some important points for debate, and an interesting result is that denser settlements require higher levels of expenditures from municipalities. This suggests that denser settlements do not result in any net cost savings because of a greater demand for additional services that require higher expenditures from local government. This contradicts the smart cities urban planning assumptions. There might be cost savings on certain services, such as housing and transportation, but in general denser settlements seem to be more costly. Municipalities appear to be finding it difficult to cope with the expenditure pressures of migration, resulting in lower expenditures as resources are stretched. Service quality is decreasing as a result.

In terms of the design of intergovernmental transfers, the LES is the primary operating grant for municipalities. This grant adopts a formula-driven equalisation framework. Therefore, the formula needs to accurately estimate the expenditure pressures faced by municipalities relative to their fiscal capacity to determine allocations. Based on the analysis and results described above, several factors clearly have an impact on municipal operating expenditures. Therefore, the assumptions that inform the expenditure estimations in the model must reflect the different factors that have an impact on the costs of providing services.

Furthermore, the current LES formula is based on 2001 census data, and so migration patterns, population movements and service-related dynamics over the past ten years are not accounted for. Thus, it is possible that funds from this grant are not being appropriately distributed relative to the demand for services and concentration of poor within local government. Such considerations should be factored into the review of the LES formula, which the government is currently undertaking.

Annexure 7A

Variables	Description	Mean	Max	Min	St Dev
Totopexpc	Total municipal operating expenditure per capita in 2007/08 in rands	1495.76	4528.28	138.92	1072.77
Avghhincome	Average household income in 2007 rands	39627.6	103338.77	13485.35	19163.3
percentemployed	% of people employed, 2007	0.22	0.48	0.04	0.10
Percentwateraccess	% of households with access to basic water	0.87	0.99	0.05	0.18
Percentrefuseaccess	% of households with access to basic refuse removal	0.48	0.97	0.001	0.33
Percentelectricityaccess	% of households with access to basic electricity	0.76	0.98	0.12	0.18
Watersp	Dummy variable =1 if municipality provides the water and sanitation service and 0 otherwise				
Urban	Dummy variable = 1 if municipality is a metro or secondary city				
Popdens	People per kilometre squared 2007	97.10	2363.72	0.35	245.64
Migration	Annualised growth in population 1996 – 2007	0.0016	0.09	-0.1	0.029
Wagerate	Personnel costs per total municipal employees in 2007 rands	246213	n/a	0	880881
Kapitalcosts	Total repairs and maintenance per consumer unit receiving a service in 2007 rands	299.069	5574	0	352.04
Materialcosts	Municipal bulk purchases per consumer unit receiving services in 2007 rands	360.732	2674.33	0	413122

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CHAPTER 8: MEASURING THE EFFICIENCY OF LOCAL GOVERNMENT EXPENDITURE: AN FDH ANALYSIS OF A SAMPLE OF SOUTH AFRICAN MUNICIPALITIES

Jugal Mahabir[105]

8.1 Introduction

Local government is part of a three-sphere system of government. The Constitution mandates municipalities to provide several important services, including the four basic services of water, sanitation, refuse and electricity. These services are enshrined in the country's Bill of Rights and are a social and legal right of all citizens. To fulfil their obligations, municipalities need to be well funded and spend efficiently to provide high-quality services to their communities.

National government has injected considerable funds into the local government sphere through the local government equitable share (LES) and conditional grants. However, despite these resources, municipalities continue to perform poorly in the delivery of basic services to their communities, as the frequent service delivery protests in recent years attest.

The social contract theory validates government to collect taxes from constituents to finance the delivery of public goods, and tax payers and citizens have the political and democratic right to know if these resources are used efficiently. Funds used inefficiently will have negative effects on the quantity and quality of public goods and service delivery to communities. It is thus vital to evaluate the spending efficiency of municipalities to provide "citizens with the necessary information to monitor their political representatives and get good value for their money" (Afonso and Fernandes, 2003).

The recent global financial crisis and recession in the South African economy has affected municipalities' own-revenue sources, which are generally cyclical in nature. In addition, the recession has had an impact on national tax revenues, resulting in potentially lower growth rates in intergovernmental transfers, while some municipalities are already fiscally stressed due to increased demand for services and other economic and socio-demographic circumstances. Therefore, the current resources available to the municipal sphere, no matter how limited, must be spent efficiently to ensure the optimum outcomes as prescribed by policy and the demand of communities.

8.1.1 Problem statement

Ultimately, local government and the services mandated to them exist because of the perceived efficiency of a decentralised system of government to improve and enhance service delivery. The argument for fiscal decentralisation is the perceived efficiency gain from delegating certain services and taxation powers to lower levels of government, which are seen as being better placed to deliver such services. While theoretically justified, such an argument needs to be validated through empirical research.

8.1.2 Background to the research

In 2009 the Financial and Fiscal Commission (the Commission) adopted a five-year research strategy to help attain its vision of enhancing the developmental impact of public resources through the financial and fiscal system in South Africa.

105 Financial and Fiscal Commission (FFC).

The four thematic areas identified to serve as fundamental principles and goals within the research strategy, which would direct the institution in attaining this vision, are:

- policy outcomes
- accountable institutions
- equitable growth and distribution of resources
- flexible responses.

This research is particularly aligned to the Commission's accountable institutions principle, as it evaluates the efficiency of municipalities in their use of public funds and will assist local constituents and national government to assess the performance of municipalities and to hold them accountable.

Each year, the Commission adopts a research theme that informs the submission on the Division of Revenue (DOR) for the given year. The focus for the 2012/13 DOR centred on three key themes of contemporary policy and debate: payback time, progressive realisation and developmental state. This research forms part of the payback time theme. It quantifies the current wastage of resources in the local government system, particularly at a time when austerity measures need to be balanced with optimal service delivery. National debt can be reduced by cutting expenditures or increasing taxes, and government has propagated the former as its policy to consolidate its fiscal position. Therefore, to fulfil the goals of government, local government needs to use resources optimally.

This chapter aims to measure the efficiency of municipalities in South Africa and to estimate the factors that affect this efficiency. The chapter will also assess the changes in efficiency over a four-year period (from the 2005/06 to the 2008/09 financial years); provide a method to benchmark municipal performance in terms of the efficient use of resources; and assess the most efficient methods of providing municipal services, specifically free basic services (FBS).

South Africa is now in its twelfth year of a fully functioning local government. Yet, the literature review found no research that has applied efficiency measurement techniques to analyse the spending performance of South African municipalities, while the analysis of efficiency over a given period is also relatively thin. Ranking municipal performance – by identifying the country's efficient municipalities and understanding the dynamics and fundamentals that inform municipal performance – will assist policy-makers to allocate scarce resources optimally to ensure sustained and adequate quality of services to communities. The research also hopes to be a springboard for more comprehensive research on the efficiency of local government, which will ultimately improve the overall performance of a very significant sphere in South Africa.

After a brief description of local government's legal functions and revenue powers and the spending patterns of municipalities, economic efficiency is defined and the methodology used is described. The free disposable hull (FDH) estimation technique and the tobit regression analysis are then outlined and their results analysed. Lastly, the conclusion includes recommendations and identifies areas for further research.

8.2 Structure and Expenditure Performance of Local Government

8.2.1 The constitutional and legal framework of local government

The Constitution

South Africa is a constitutional democratic state established as a unified country following the first democratic elections in 1994. The country operates in a unitary and decentralised system of government that constitutes three "distinctive, interdependent and interrelated" spheres: the national, provincial (made up of nine provinces) and the local (made up of 283 municipalities[106]) spheres (The Constitution of South Africa Act, No. 106 of 1996). The constitution establishes and sets the guiding principles for the cooperative governance system in South Africa. Chapter 7 of the Constitution recognises and outlines the role of local government in the country. Section 155(1) establishes three broad categories of municipalities: Category A (met-

106 This is valid as of 2010.

ropolitan) municipalities, category B (local) municipalities and category C (district) municipalities. Following an initial period of development and consolidation, in 1998 local government was officially established, consisting of a total of 853 municipalities with several transitional councils in former homeland areas. Since then several demarcation processes have resulted in the current local government configuration of 283 municipalities, including six metropolitan municipalities (usually abbreviated to metros) and 231 local municipalities that fall under 46 district municipalities.[107] The Constitution assigns metros exclusive executive and legislative powers within their area of jurisdiction, while these are shared between the local and district municipalities

Service delivery mandates and the division of powers and functions of municipalities

In accordance with the country's decentralised system of governance, social and basic services are provided either concurrently or exclusively by the three spheres of government. Generally, policy norms and standards are devised at national level and then implemented at sub-national level. While provinces implement most social services, such as education and health, local government is mandated to provide basic services of water, sanitation, electricity and refuse removal. In terms of community demand and expenditure patterns, these are arguably the most important of all the various powers and functions assigned to local government under Schedules 4B and 5B of the Constitution.

Service provision within local government is undertaken in an asymmetrical manner. The metros are responsible for all four major services, whereas either local municipalities or their district municipalities undertake or share these services. These provisions are set out in Chapter 5 of the Municipal Structures Act, No. 117 of 1998 as amended. In general, all local and metropolitan municipalities are authorised to provide electricity and, in most cases, refuse removal services. In terms of the water and sanitation function, either the district municipality or the local municipality is authorised to provide these services. This service delivery arrangement results in differences in the nature and level of municipal expenditures. Municipalities responsible for all major basic services produce a higher level of service output than those with less service delivery responsibilities; by theoretically using more inputs i.e. resources. This arrangement makes it difficult to measure the efficiency of all municipalities in the country equally and is discussed in more detail in the methodology and FDH analysis sections.

Revenue powers of local government

To fund these expenditure responsibilities, local government commands an array of fiscal instruments devolved to them in terms of Section 229 of the Constitution. These include property rates, user charges for municipal services rendered, surcharges on user charges and other local taxes. On average, local government in South Africa is largely self-financing: in the 2008/09 financial year, 77% of their total operating revenues was derived from own-revenue collection (75% on average from the 2005/06 to 2008/09 financial years). However, because horizontal fiscal and economic inequities exist across municipalities, intergovernmental fiscal transfers play a significant role in ensuring that all municipalities are well funded to fulfil their service delivery mandates. Intergovernmental transfers take the form of unconditional and conditional grants, with unconditional grants usually funding operating expenditure. The LES is the largest unconditional grant to local government and is pivotal for the operating expenses of municipalities: most rural or poorer municipalities are almost fully funded by this grant.

8.2.2 Analysis of municipal expenditure

Municipalities are responsible for providing the basic services of water, sanitation, electricity and refuse removal. Given their importance, it is not surprising that these services dominate local government expenditures. Municipal budgets are comprised of two types of expenditure: operating or current expenditure and capital expenditure. Table 8.1 shows the respective size of the operating and capital budget and outcomes for each type of municipality for the 2008/09 financial year.

107 This is valid as of 2010. The latest re-demarcation process by the Municipal Demarcation Board (the institution established to authorise the boundaries of municipalities) decreased the number of municipalities to 278 and established two additional metropolitan municipalities after the 2011 local government elections (8 metros and 226 local municipalities that fall under 44 district municipalities).

Table 8.1 Budgeted and actual expenditure per municipality type, 2008/09

Municipality category	Total budgeted operating expenditure (revised)	Total actual operating expenditure	Variation	Expenditure shares across categories	Total budgeted capital expenditure (revised)	Total actual capital expenditure	Variation	Expenditure shares across categories	Actual opex	Actual capex
Metropolitan Municipalities (6)	77,352,465	77,326,714	100%	56%	24,989,691	24,837,450	99%	62%	76%	24%
Local Municipalities (237)	46,107,580	49,444,327	107%	36%	17,282,041	11,799,552	68%	29%	81%	19%
District Municipalities (46)	7,520,330	10,903,647	145%	8%	6,623,650	3,501,466	53%	9%	76%	24%
Total	**130,980,375**	**137,674,688**	**105%**	**100%**	**48,895,382**	**40,138,468**	**82%**	**100%**	**77%**	**23%**
Sampled Municipalities (129)	114,422,768	117,150,075	102%	85%	38,265,536	34,577,670	90%	86%	77%	23%

Note: Figures in R'000.
Source: National Treasury Local Government Budget Database

Municipalities spent most of their funds (77% on average) on operating expenditures in 2008/09. The largest expenditure occurs in the six metros, which account for over 56% total operating expenditure and over 60% of total capital expenditure by local government. This is attributed to the greater demand for services in these areas due to the higher numbers of people, households and businesses.

The asymmetrical service delivery arrangements complicate analysis of local and district municipalities' expenditure patterns. On average, district municipalities spend 24% of their budgets on capital expenditure, which is higher than the national average. This trend is probably due to the role of service-authorised district municipalities, where the general practice is for the district municipality to invest in infrastructure while delegating the operational provision of the service to the local municipality through service delivery agreements. Table 8.1 also illustrates the variations in planned (budgeted)[108] and actual expenditure patterns, which differ for each type of municipality and show that metros are better able to plan and budget. The lack of planning and spending capacity for district municipalities is evident, as in 2008/09 they overspent on their operating budget (by 45%) and underspent by almost 50% on the capital budgets.

Composition of operating and capital budgets

Operating expenditure consists largely of the current costs, such as labour and other input costs, necessary for the delivery of services. Figure 8.1 shows the general composition of operating expenditure of all municipalities for 2008/09. The three largest components of municipal operating budgets are 'Other'[109] operating expenditure (31%), employee costs (27%) and material and bulk costs (22%).

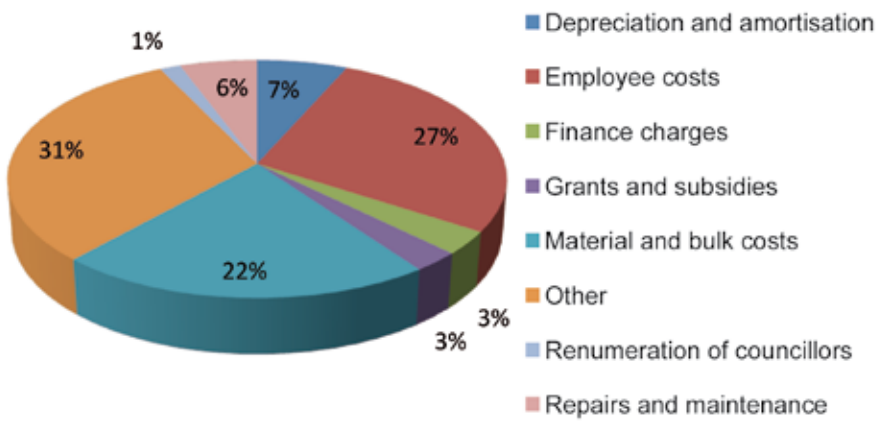
The largest portion of operating expenditure is for input costs (labour, material and capital costs) that are necessary to provide services. Figure 8.1 includes expenditure of municipalities that do not provide all four major services, which means that related input costs (personnel and bulk purchases) would probably be higher for municipalities that provide all four services.

The line item 'Other' is likely to include municipal administration costs, which are also important for providing services. The level of expenditure on repairs and maintenance is significant, as it is related to maintaining the infrastructure that provides services to communities. However, the 6% shown in Figure 8.1 is below the best practice figure of 8–12%, as recommended by the National Treasury. Lastly, the grants and subsidies category depicts transfers from district municipalities to local municipalities, which provide services on their behalf in areas that have service delivery agreements in place.

108 Mid-year revised budgets.

109 The new municipal reporting requirements will ensure that municipalities disaggregate all types of expenditure ensuring the removal of the 'Other' expenditure line item.

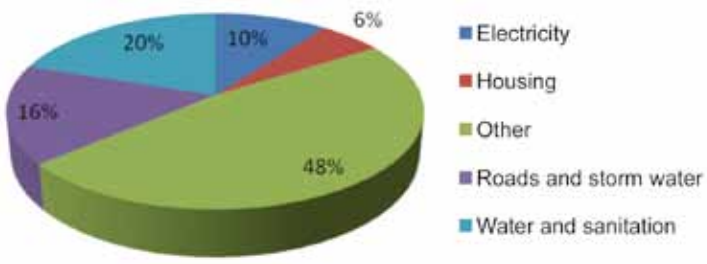
Figure 8.1 Composition of municipal operating expenditure (%), 2008/09



Source: National Treasury Local Government Database

Figure 8.2 gives a breakdown of municipal capital expenditure in 2008/09. Capital expenditure usually entails longer-term investments in social and economic infrastructure. This is necessary to eradicate service delivery backlogs that exist in a developing country such as South Africa (social infrastructure), and provide additional economic infrastructure to promote local economic development.

Figure 8.2 Composition of municipal capital expenditure (%), 2008/09



Source: National Treasury Local Government Database

The bulk (48%) of capital expenditure of municipalities falls under the category 'Other'. Unfortunately, this category is not disaggregated further but would include expenditure on infrastructure projects, such as street lighting and community halls. Expenditure on roads and storm water constitutes 16% of total capital expenditure, while investments in water and sanitation (20%) and electricity (10%) infrastructure are also significant.

Housing is the lowest of the total capital expenditure, at 6%. The lower share for housing expenditure, and to a certain extent electricity infrastructure, is because the housing function is a provincial competency, while the capital roll-out of infrastructure for electricity is shared between local government and Eskom.[110] Investment in housing infrastructure is usually undertaken by metros, on the authority of the respective provinces.

The focus here is on municipal operating expenditure because operating expenditure results in the immediate delivery of a service or output of municipality for public consumption. Therefore, operating expenditure can serve as a good proxy for a municipality's input costs, as it captures items such as personnel, bulk charges and other administrative costs. In contrast, capital expenditure looks at longer-term infrastructure projects and, although these projects are an output of municipalities, they are not linked to the immediate provision of a service but rather extend the level of a service at a later stage. Municipal operating expenditure is therefore a better proxy to link with immediate municipal outputs.

110 Eskom is a state-owned entity responsible for the generation and transmission of electricity. It also plays a large part in the distribution industry, although this is legally a local government competency.

8.3 Defining Economic Efficiency

Economics deals with the economic problem of the unlimited wants of human nature and limited available resources. Economic efficiency can be defined as how consumers, firms and society choose to use and allocate these scarce resources optimally. Table 8.2 offers a list of the different types of economic efficiency.

Table 8.2 Types of economic efficiency

Type of efficiency	Definition
Productive efficiency	All resources are used efficiently, so that the maximum output can be produced with the minimum level of input.
Technical efficiency	This is similar to productive efficiency.
X inefficiency	This occurs when certain decision-making units (DMUs) willingly use more inputs than required, which results in higher average costs than necessary. This usually occurs in a monopoly where the company has no incentive to cut unnecessary costs because it is already making supernormal profits.
Allocation/distribution efficiency	Distributive efficiency ensures that goods and services are allocated to individuals or communities where the need is greatest or where the utility (advantage or fulfillment from using a good or service) is maximised. DMUs can be productively efficient but might not be distributive efficient.
Dynamic efficiency	This is the ability to adapt new technologies, to maintain an optimum level of production that the latest available technology enables. For example, a DMU might be efficient using an available technology, but could become dynamically inefficient if it does not upgrade to a new innovation that might increase output with the same amount of inputs.
Efficiencies of scale	This is a DMU's long-term incentive of developing economies of scale by producing on the lowest point of the long-run average cost curve.
Social efficiency	This concerns limiting the negative externalities that the production of a good or service might have on society, i.e. social marginal benefits are equal to social marginal costs.

Source: http://www.economicshelp.org/microessays/costs/efficiency.html - Assessed July 2010

Most of the different types of efficiencies would apply to, and should be measured for, municipal performance. When producing an output or service, municipalities should be socially efficient in limiting pollution and other negative externalities in their communities. They should also try to cut input costs by developing economies of scale. Municipalities should be dynamically efficient in keeping up with the latest technologies. This can also apply to human capital, where in some municipalities, officials are not appropriately qualified to perform optimally. Therefore, municipalities need to actively train and develop staff and invest in research and development.[111]

However, this chapter focuses on the technical efficiency of municipalities, and whether they use their inputs (expenditure) effectively to produce the optimal level of outputs (service delivery). A municipality is considered technically inefficient if (1) it produces the same or fewer outputs than another municipality with a higher amount of inputs or (2) a municipality produces fewer outputs relative to another municipality using the same level of inputs.

8.4 Overview of Methodology and Data Sources

The non-parametric FDH technique is used to compute input efficiency scores for a sample of 129 South African municipalities in terms of the technical efficiency (i.e. the optimal use of resources/inputs to maximise services/outputs) of operating expenditure from 2005/06 to 2008/09. Techniques such as FDH rank municipalities relative to the most-efficient municipalities within the sample that fall on the production possibility frontier (PPF). Then, using a cross-sectional tobit regression model, the factors that have an impact on the computed efficiency scores for 2008/09 are identified and quantified in the context of local government in South Africa.

8.4.1 Methods of estimating technical efficiency and relation to local government

The three most-popular methods used to measure technical efficiency are stochastic frontier analysis (SFA), a parametric technique, and two non-parametric techniques, data envelopment analysis (DEA) and FDH. Deprins *et al*. (1984) provide a comprehensive mathematical depiction and practical application of the three methods. The following section gives a simple

111 It is sometimes argued that there is no incentive for government agents and government in general to invest in research and development and to be dynamically efficient, as they are not profit-driven economic actors.

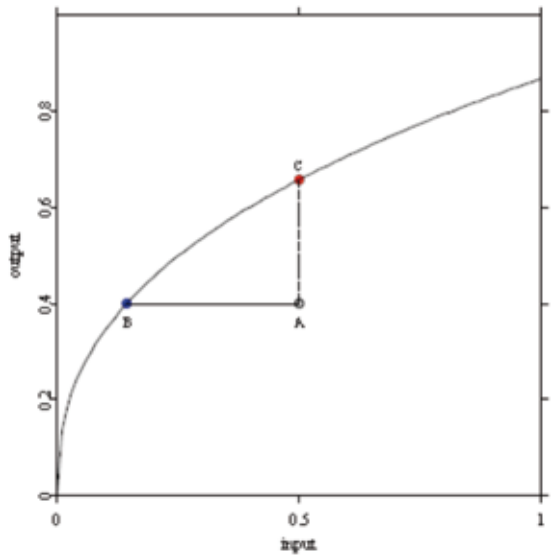
description of one interpretation of these methods. Efficiency analysis is closely related to productivity analysis "In conformity with microeconomic theory, production processes are technical relations of employed inputs to maximum attainable outputs" (Behr and Tente, 2008). This relationship can be viewed in terms of a production set, Ψ, i.e. the combination of a set of inputs that are used to produce a set of outputs. This relationship can be depicted as:

$$\Psi = \{(x,y)|\, x \in \mathbb{R}_+^p, y \in \mathbb{R}_+^q, (x,y) is\ feasible$$

Where Ψ = production set
x = vector of inputs
y = vector of outputs

With p>0 and q>0, using $x_i, \ldots, x_p$ input quantities, it is feasible to produce $y_i, \ldots y_q$ outputs. The SFA, DEA and FDH are methods used to estimate the production set or Ψ. As Park *et al*. (2000) note, "estimators for the production set also induce estimators for the [production] frontier and for the efficiencies". The PPF can be defined as the boundary of a production set where output is maximised and is illustrated in Figure 8.3.

Figure 8.3 Production possibility frontier and technical efficiency



Source: Adapted from Hardle and Jeong, 2005

Each of these methods differs mainly by the assumed functional form of the PPF. With SFA, the functional form needs to be specified, usually in the form of a production function (such as Cobb-Douglas). DEA and FDH analysis simply envelop a given dataset forming the frontier. However, DEA assumes convexity in the form of the PPF, whereas FDH analysis assumes that the inputs and outputs are freely disposable.

These approaches are methods used to evaluate how well a decision-making unit transforms spending inputs into outputs (Afonso and Fernandes, 2003) relative to the PPF. Therefore, "technical efficiency is measured as the distance between an observed production unit and the postulated boundary", as determined by the choice of technique (De Borger *et al*., 1994). Observations or DMUs below the PPF are considered inefficient relative to the PPF.

In Figure 8.3, DMUs B and C lie on the specified PPF, which means that these DMUs are maximising their outputs with their given inputs. DMU A is considered inefficient, as it is producing below the PPF. Relative to point B, A is using more inputs to produce the same level of outputs. The distance BA is therefore the computed input-orientated efficiency measure i.e. A is inefficient as it can produce the same amount of outputs as B with less input. The distance AC depicts the computed output-orientated efficiency measure. Relative to DMU C, A is inefficient because it produces less outputs using the same amount of inputs.

Input-orientated efficiency will be measured over a four-year period for the 129 municipalities. While profit-maximising agents tend to have control over both input and output decisions, municipalities tend to have more control over their inputs than their outputs because of the social nature of services provided by local government in South Africa. Crawford *et al*. (2003) point out that, although outputs and inputs are generally easy to define and measure for a private firm or institution, the

measurement of publicly provided goods, such as education and health care, are complicated. Appropriate proxies to capture such measurements can be developed for local government. For example, municipal services can be equated to outputs from the production processes, i.e. the transformation of inputs (labour and capital) into outputs, with municipal recurrent expenditures as the given input. In the context of South Africa, this would include personnel costs (labour inputs), bulk purchases (material inputs) and other operating expenditure, such as repairs, maintenance and depreciation of existing assets (proxy for capital inputs). Afonso and Fernandes (2003) note that "outcomes may not necessarily reflect the service desired by local residents". The "ultimate outcome [level demanded by communities] of these services is measured by effect indicators, which reflect the degree to which direct outputs of municipal activities translate into welfare improvements" (De Borger and Kerstens, 2000 cited in Afonso and Fernandes, 2003). Approximate proxies for the demand for services by communities are needed, as individual and community utilities or welfare are difficult to measure.

8.4.2 Overview of the FDH efficiency estimation technique

The FDH technique will be used to estimate efficiency scores. This technique was first explored by Deprins *et al*. (1984)[112] in their estimation of labour efficiency in post offices and was developed "on the sole assumption of input and output disposability" (Deprins *et al*., 1984), i.e. the inputs and outputs are freely disposable. This section briefly describes the mechanics, advantages and disadvantages of using the FDH technique compared with the alternatives in the context of local government. Deprins *et al*. (1984), De Borger *et al*. (1994), Park *et al*. (2000), Leleu (2006) and Hardle and Jeong (2005) provide a comprehensive overview of the FDH efficiency estimation technique and non-parametric productivity analysis, in terms of its mathematical fundamentals and related technicalities.

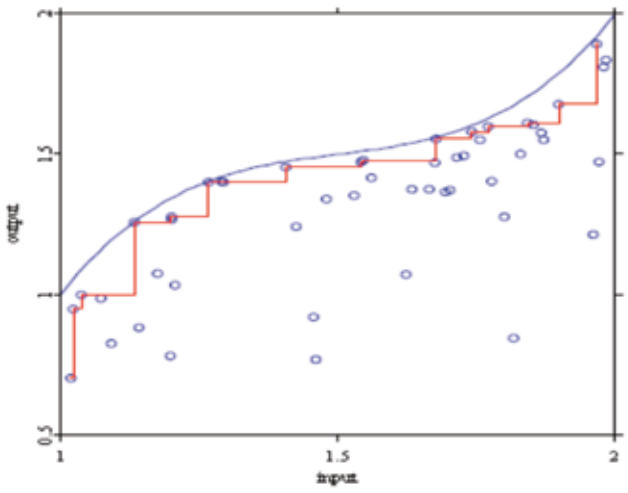
Brief description

The FDH approach is one method of computing a production set, PPF, and the distance between the PPF and an inefficient observation. FDH can be defined as "the smallest free disposable set containing all observations in a sample of production units" (Park *et al*., 2000). Building on the description of the production set (Ψ) above, the FDH production set estimator can be depicted as:

$$\theta^{OUT}(x_1, y_1) = \max_{i|x \geq x_i} \quad \min_{1 \leq k \leq q} \quad y_i^k / y_1^k$$

Here $X\{(x_i, y_i), i = 1, \ldots n)$ is a given sample of observations or, in this case, a sample of municipalities. The FDH technique relies on the free disposable assumption that $x \geq x_i$ and $y \leq y_i$ belong to the production set, Ψ, and is defined as the FDH of the sample X. This is illustrated, as an example, in Figure 8.4.

Figure 8.4 FDH of a given sample



Source: Adapted from Hardel and Jeong, 2005

Given a specific municipality with a point on the Euclidean space, i.e. $\{x_1, y_1\} \in \Psi$ the FDH efficiency score, θ, is the distance

112 Confirmed in Park et al. (2000) and Leleu (2006).

between this point and the disposable hull of the Ψ as estimated. As mentioned, this distance can be output orientated or input orientated. The output efficiency estimate θ^{OUT} can be calculated by:

$$\theta^{OUT}(x_1, y_1) = \max_{i|x \geq x_i} \quad \min_{1 \leq k \leq q} \quad y_i^k / y_1^k$$

As explained above, only the input-orientated efficiency scores will be estimated for the sample of municipalities. The input efficiency estimate θ^{IN} can be calculated by:

$$\theta^{IN}(x_1, y_1) = \min_{i|y \leq y_i} \quad \max_{1 \leq j \leq p} \quad x_i^j / x_1^j$$

The FDH efficiency score for a given municipality is a measure relative to a best-practising or most-efficient municipality that lies on the PPF. Therefore, in an FDH analysis, it is more appropriate to refer to the PPF as the best practising frontier (BPF), as the PPF is determined by the 'efficient' municipalities relative to the given sample and not to a hypothetical DMU, as with SFA and DEA. The technique simply identifies the best practising DMU within the given sample based on the efficiency in transforming inputs into outputs. It is entirely possible that a DMU considered efficient in one sample might not be efficient in another sample.

Advantages of FDH

In general, the FDH technique makes fewer assumptions relative to other techniques. Unlike the SFA technique, the production function of a production set does not need to be specified, as FDH is a non-parametric technique. Compared to other non-parametric techniques such as DEA, FDH does not have many assumptions on the form or structure of the production set, especially for the assumption of convexity, which is paramount in DEA. The removal of these assumptions makes it possible to estimate efficiency relative to the performance of other DMUs within a sample, rather than a hypothetical DMU generated by the production function (in SFA) or a fitted value of the convex production (DEA). Therefore, the FDH approach appears the most practical for the purposes of policy analysis. This is supported by Deprins *et al*. (1984), who conclude that the FDH analysis is the most robust in terms of practical application, as efficiency is measured relative to other productivity units (such as provinces, or post offices in their case). This enables managers and policy-makers to compare performance and to share and learn from best practising entities. Well-performing municipalities can be identified, and less-efficient municipalities can improve performance by mirroring these best practices. Deprins *et al*. (1984) also affirm the relative simplicity of the FHD approach as "simple comparisons of the input and output components of the vectors in a data set" as opposed to a "single large linear programme" for parametric techniques and "many linear programmes" for the DEA technique.

Not requiring the convexity assumption can prove advantageous when analysing production efficiency for municipalities. Generally, the convexity assumptions refer to the theory of firms and the production function of firms, but public agents have no incentive to maximise profit or minimise costs. As noted by De Borger *et al*. (1994), since there is "no generally accepted model of governmental behaviour, the minimal technical and behavioural assumptions underlying the FDH make it a particular useful tool for analysing public sector efficiency".

Disadvantages of FDH

Like other non-parametric approaches to productivity efficiency analysis, FDH is determined by the quality and distribution of the data used and is influenced significantly by the number of observations and number of outliers in the dataset. In the case of outliers, the FDH technique will consider these DMUs efficient and envelop the FDH production curve along them. Several endogenous factors, which have an impact on the quantity of inputs or outputs, may result in possible outliers that can be more frequent in cross-sectional studies. It is therefore not possible to view this outlier as fully efficient, which means that the FDH approach is biased with regards to the nature of the dataset. De Borger *et al*. (1994) confirm that "increasing the sample size increases the possibility of dominance for any given observation, and therefore the probability of being denoted inefficient". Although referring specifically to the DEA technique, Crawford *et al*. (2003) point out that it is possible for a production unit to be deemed efficient simply because it produces more output than any other unit in the sample. They explain that "in (a) single-output example the organisation that produces the most will find itself on the efficiency frontier simply because there is no larger organisation with which to compare it" (Crawford *et al*., 2003). Furthermore, the efficiency scores are highly dependent on the number of inputs and outputs used in the analysis (Crawford *et al*., 2003). The basic fundamentals of FDH are to identify the most-efficient DMUs within a sample, based on using fewer inputs to produce an amount of output (in

terms of input efficiency). The FDH efficiency score is the distance between the efficient DMU and the dominated DMU (the one considered inefficient relative to the same). However, the nature of the method can result in the possibility of undominated DMUs, which Afonso and Fernandes (2003) define as "weak vector dominance limitation". These DMUs are efficient by default, as they have the lowest levels of inputs and outputs and are neither dominated by, or are dominating another DMU. De Borger *et al*. (1994) point out that the FDH techniques cannot be used to determine factor productivity and economies of scale and scope owing to their characteristic of being a multidimensional step function. Da Conceicao Sampaio de Sousa and Battaglin Schwengher [sa] estimate the technical efficiency for courts in the Rio Grande do Sul Province in Brazil using FDH and order-m techniques. In terms of the methodology, they conclude that the efficiency scores computed using the order-m technique appears more reliable than scores computed using the FDH technique.

8.4.3 Overview of the regression model

A tobit regression model is used to estimate the factors that influence the efficiency scores generated by the FDH analysis primarily because of the nature of the distribution of the FDH efficiency variable (Boetti *et al*., 2009). Several municipalities from the sample are likely to be deemed efficient, i.e. situated on the PPF, and will therefore have an efficiency score of 100% or 1. As the distribution of the variable will probably be clustered at the upper level, ordinary least squares (OLS) estimates will probably be biased.

8.4.4 Data sources and rationale for sample

The primary data used for estimating efficiency is budget data, which is sourced from the National Treasury Local Government Database for 2005/06 to 2008/09. Service-level data for water, sanitation, electricity and refuse removal is sourced from the Non-financial census (NFC) of municipalities, an annual survey undertaken by Statistics South Africa (StatsSA), over the same period. To estimate the population per municipality over this period, the most comprehensive available population data was used, which was from the 2001 Census and the 2007 Community Survey.

The asymmetrical approach to service delivery (whereby a municipality is either authorised to provide a service or not) makes it difficult to compare the spending patterns across all municipalities. Municipalities that are authorised to provide services would have higher levels of expenditure and so it is inappropriate to assess the expenditure levels of each and every municipality. Therefore, in order to have a level playing field, the analysis only considered municipalities authorised to provide the four major services of water, sanitation, electricity and refuse removal. This narrowed the sample size to 129 municipalities, including all the metros and 'urban' local municipalities.[113] It excluded all district municipalities, as they are generally only authorised to provide water and sanitation services. As Table 8.1 shows, the sample of 129 municipalities constitutes 85% and 86% of total operating and capital expenditure respectively. Their expenditure patterns mirror their provision of the four basic services and the higher demand for services; thus this sample captures the bulk of total local government operating expenditure for 2008/09.

The data used in the regression model is mainly sourced from the 2009 NFC of municipalities. This data includes information on service delivery arrangements (i.e. whether services are outsourced), management and general vacancy rates and the arrangement with regards to the provision of FBS within each municipality. Information on the qualification and experience of the municipal manager and chief financial officer (CFO) of each municipality was sourced from the Municipal Demarcation Board capacity assessment database. The Independent Electoral Commission provided detailed information on the 2006 municipal election results per municipality to obtain the political composition of local government.

8.5 Review of Previous Empirical Studies

Literature widely uses frontier production techniques to calculate efficiency scores for a range of DMUs, with studies including efficiency analysis of firms, banks, post offices, social services and countries. Such analysis can be applied to any context where the calculation of a productivity set is possible. The literature surveyed applies parametric and various non-parametric techniques to measure the efficiency of local government expenditure. Afonso and Fernandes (2003) use the non-parametric FDH technique to measure the efficiency of a sample of Portuguese municipalities, estimating both input and output-oriented efficiency scores using a one input/one output FDH model. The research finds that, on average, municipalities in the sample can produce the same amount of outputs with 39% less inputs. The method they use to measure outputs is an index of services, which is followed in this study to simplify the analysis. Previous studies that identify and estimate the efficiency of municipal expenditure first use one of the methods available to compute efficiency scores for each municipality. These scores are then regressed against various factors

113 Termed as the secondary cities or top 21 local municipalities with the largest budgets.

that would theoretically have an impact on the efficiency of local government. To compute efficiency scores, most studies use the parametric SFA method (rather than non-parametric techniques) because of its statistic fundamentals. Da Motta and Moreira (2009) include a range of political, economic and institutional variables in their SFA estimation of efficiency scores for municipal expenditure in Brazil. The results show that large costs incurred in computerising or improving the administrative technology actually have a negative impact on efficiency. Outsourcing a service produces the same result, which led to Da Motta and Moreira (2009) concluding that these practices do not necessarily improve transparency levels. The results also show that a re-elected mayor correlates with greater expenditure efficiency of municipalities, which indicates that political stability is important to maintain efficient local governments.

De Borger and Kerstens (1996) apply radial and non-radial FDH techniques to estimate the efficiency for Belgian municipalities. The study assesses the impacts and quality of FDH efficiency scores dependent on whether radial or non-radial distance measures were used. Firstly, they conclude that, when calculating efficiency scores, the non-radial methods are more robust than radial distance measures, and that individual municipality scores were very sensitive to the method used, more so for the radial distance measures. While acknowledging this finding, the radial distance measure will be used in this research for the FDH analysis. Secondly, using a tobit regression model, De Borger and Kerstens (1996) conclude that fiscal revenue capacity and block grants positively influence municipal efficiencies; whereas the nature of how services are financed (own revenue or grants) and municipal political dynamics negatively influence efficiency.

Boetti *et al*., (2009) assess the impacts of increased fiscal decentralisation policies on the expenditure efficiency of a sample of Italian municipalities, using both SFA and DEA techniques to calculate the efficiency scores. Commenting on the De Borger and Kerstens (1996) study, Boetti *et al*., (2009) note "the use of more than one methodology to measure efficiency stems from the attempt to check the robustness of the results obtained through different measurement techniques". They conclude that more autonomous local jurisdictions (in terms of fiscal powers and expenditure decisions) are more efficient in their expenditure. They also find a link between expenditure patterns and the electoral cycle. This suggests that expenditure increases closer to election periods, as politicians attempt to carry favour with the electorate. One is also encouraged to refer to the Boetti *et al*., (2009) study for a comprehensive list of previous studies that estimate expenditure efficiency scores for municipalities and the specific technique used in computing the scores (found in annexure A of their paper) and thereafter a list of studies that identified and quantified the determinants of the efficiency of local government expenditure (found in annexure B of their paper). De Borger and Kerstens (1996) and Boetti *et al*., (2009) use a methodology similar to the one proposed here to estimate the factors influencing the efficiency scores generated. Both use the tobit regression method because of the distribution of the efficiency score variable.

8.6 Research Limitations

Local government data, when available, is plagued with problems and inconsistencies. Firstly, for a project of this nature, one would have preferred a more robust measure of municipal outputs as it relates to service delivery and related administrative outputs. Instead, output proxies are used, in the form of population and access to services of consumer unit indices. However, the problem with such proxies is that they do not measure the quantum of services consumed by households and businesses. In other words, the implicit assumption is that consumer units consume the same amount of a given service. This is a very strong assumption, as a large business consumer unit is likely to consume more services (such as water and electricity) than a household consumer unit. Yet, the output measure used loses these dynamics, which are likely to have an impact on the level of services for certain municipalities. It is also highly likely that poor reporting, especially by the poorer and less-capacitated, municipalities have affected the results of the efficiency scores. Under-reporting on expenditure indicates lower usage of input costs, which incorrectly suggests that these municipalities are relatively efficient.

8.7 FDH Analysis

8.7.1 Data compilation and calculations

Inputs x (factors of productions) and outputs y (goods and services consumed) need to be defined in order to assess the input-orientated efficiency of the sample of municipalities. To simplify the analysis into a single dimensional analysis of the input-output production set, various inputs and outputs were computed into single input and output indices.[114]

114 Future work will explore multivariate inputs and outputs.

The first step was to use municipal operating expenditure per capita as the input variable in an attempt to estimate the efficiency of these recurrent expenditures. Municipal operating expenditure includes personnel costs (labour inputs), bulk charges (materials) and other necessary expenditure (capital related) required in the delivery of a service and proved to be the most feasible proxy for municipal inputs. This variable was produced by dividing the operating expenditure from 2005/06 to 2008/09 by the total population (as generated) within each sampled municipality for the period under review.

The second step required an appropriate measure of municipal outputs. As water, sanitation, electricity and refuse removal are the primary service mandates of local government, and hence the largest composition of their budgets, these are the 'outputs' local government produces using its inputs. A measure of the level of services (outputs) provided by a municipality, or alternatively the demand for such services, was obtained from the NFC of municipalities as the number of consumer units with access to these services. These service levels are defined as:

- access to piped water (for water provision);
- grid electricity (for electricity);
- a ventilated pit latrine and a flushable toilet (for sanitation); and
- removal of solid waste at least one a week (for refuse).

The primary reason for using access to services at a consumer unit level from the NFC, rather than only household data, was because municipalities provide these services to businesses and other sectors of their communities, not just households. Furthermore, the use of consumer units also captures the service to the point of delivery and billing, which makes it an accurate indication of demand for such services.

Municipal outputs are not only dependent on the four basic services they provide. Municipalities also provide a host of other smaller services and administrative outputs to their communities. To measure the level of these 'other' and administrative services, the total population of each municipality was used as an indicator for the demand for these services.

Each output indicator was converted to a ratio of the sample mean for each of the four years. A municipality with a ratio higher than the sample mean indicated a higher demand for these services in the specific municipality relative to other municipalities, and hence a higher required output level. Each ratio was then equally weighted[115] and used to quantify a single output index (i.e. the average of all five service ratios) for each financial year.

8.7.2 Results

Over the period, four municipalities remained constantly efficient: Thembisile in Mpumalanga, Polokwane in Limpopo, Mangaung in the Free State and eThekwini in Kwazulu-Natal. The average efficiency score was 0.30 in 2005/06, peaking at 0.39 in 2007/08, and declining to 0.35 in 2008/09. This suggests that, on average, municipalities in the sample can obtain the same level of output with at least 60–70% less inputs (resources).

Average efficiency increased gradually until 2007/08 and declined in 2008/09. This is possibly due to the initial impacts of the global financial crisis and economic recession, which could have resulted in a decline in resources available to municipalities (driven by a decline in local taxes and slower growth rates in intergovernmental transfers). As the demand for services remained stable, municipalities probably had to become more efficient in using scarcer resources during the recession and were perhaps not successful.

115 There are two reasons behind this relatively strong assumption. Firstly, it was convenient not to complicate the analysis with different weights per service. Secondly, the composition of municipal budgets varies across municipalities depending on the nature of their customer base. Equal weights were used to average out these effects.

Table 8.3 lists the municipalities with 100% input-orientated efficiency scores over the period.

Table 8.3 Efficient municipalities (%), 2005/06–2008/09

Municipality	2005/06 Score	Municipality	2006/07 Score	Municipality	2007/08 Score	Municipality	2008/09 Score
Bushbuckridge	100	City of Cape Town	100	Bushbuckridge	100	Bushbuckridge	100
City of Cape Town	100	City of Johannesburg	100	Dr JS Moroka	100	City of Cape Town	100
City of Johannesburg	100	Emfuleni	100	eThekwini	100	eThekwini	100
Dr JS Moroka	100	eThekwini	100	Mangaung	100	Mangaung	100
Emfuleni	100	Mangaung	100	Mbombela	100	Mbombela	100
eThekwini	100	Msunduzi	100	Nkomazi	100	Polokwane	100
Maluti-a-Phofung	100	Polokwane	100	Polokwane	100	Thembisile	100
Mangaung	100	Rustenburg	100	Thembisile	100		
Moses Kotane	100	Thembisile	100				
Polokwane	100						
Thembisile	100						
Number of efficient municipalities	**11**		**9**		**8**		**7**

Source: Author's calculations

In the 2005/06 financial year, 11 municipalities were computed as efficient, but the number decreased to just seven in 2008/09. Four municipalities (eThekwini, Mangaung, Polokwane and Thembisile) were constantly efficient over the period, while two municipalities (the City of Cape Town and Bushbuckridge in Mpumalanga) were efficient in three of the four years.

Table 8.4 lists the ten municipalities with the highest input-orientated efficiency scores relative to the efficient municipalities depicted in Table 8.3.

Table 8.4 Top ten efficiency scores (%), 2005/06–2008/09

Municipality	2005/06	Municipality	2006/07	Municipality	2007/08	Municipality	2008/09
Ekurhuleni	96.63	Buffalo City	97.04	Nelson Mandela	95.64	Emfuleni	97.68
Madibeng	94.88	Maluti-a-Phofung	95.42	City of Cape Town	94.58	Nelson Mandela	94.60
Rustenburg	94.56	Dr JS Moroka	87.69	Emfuleni	91.06	!Kheis	87.63
Nelson Mandela	93.73	Ekurhuleni	85.01	Buffalo City	90.8	City of Johannesburg	84.22
Mbombela	92.10	Nelson Mandela	84.94	Ekurhuleni	86.03	Rustenburg	84.13
Newcastle	80.29	City of Tshwane	81.17	!Kheis	85.98	City of Tshwane	82.92
City of Tshwane	79.23	Mbombela	66.00	Msunduzi	82.32	Nkomazi	82.00
City of Matlosana	76.57	Nkomazi	65.67	Albert Luthuli	78.09	Msunduzi	81.36
Buffalo City	70.67	Albert Luthuli	64.25	City of Tshwane	75.33	Dr JS Moroka	80.07
Matjhabeng	66.72	City of Matlosana	57.36	City of Johannesburg	74.91	Ekurhuleni	79.01

Source: Author's calculations

The range of the ten most-efficient municipalities differed across the period. In 2008/09, efficiency scores for the ten municipalities ranged from 79.01% to 97.68%, a smaller range than in 2006/07 (57.36% to 97.04%). The municipalities highlighted in red were efficient in the preceding year, but their performance declined in the following year. For example, as Table 8.3 shows, Dr JS Moroka used its resources efficiently in 2005/06, with a 100% efficiency score, only to see its performance drop to 87.69% in 2006/07 (see Table 8.4). In other words, this municipality used 12.21% more resources in 2006/07 than was required based on the demand for services from its communities.

Twice, Dr JS Moroka appeared efficient in one year (2005/06 and 2007/08), only to become relatively inefficient the next year. The City of Cape Town was efficient in three of the four years; in 2007/08 it was inefficient with a score of 94.58%. Table 8.5 lists the ten least-efficient municipalities.

Table 8.5 Ten least-efficient municipalities (%), 2005/06–2008/09

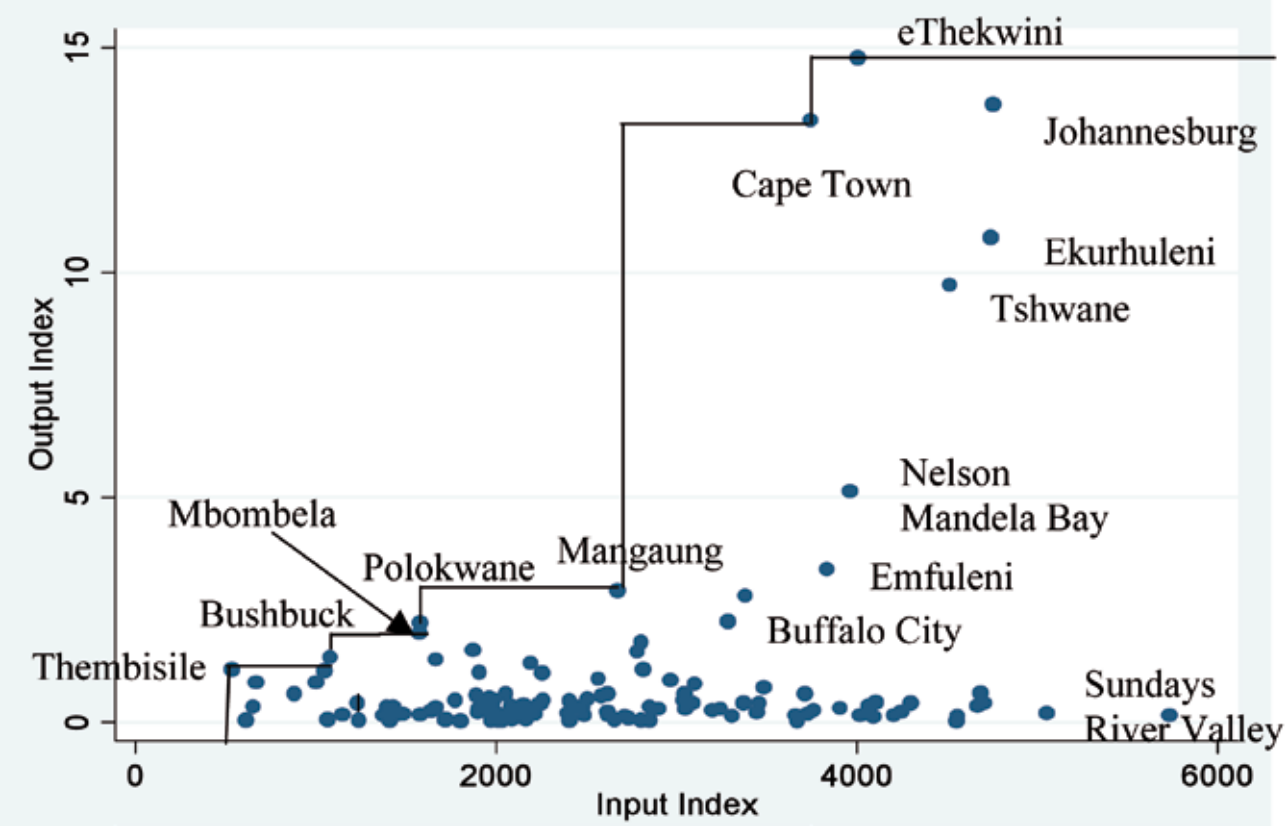
Municipality	2005/06	Municipality	2006/07	Municipality	2007/08	Municipality	2008/09
Mookgopong	8.17	Hessequa	9.51	Hessequa	16.07	Mookgopong	R 12,74
Tlokwe	8.02	Gammagara	9.15	Kungwini	15.33	Hessequa	R 12,63
Oudtshoorn	7.88	Laingsburg	9.04	Midvaal	15.15	Kouga	R 12,47
Laingsburg	7.76	Lesedi	9.03	Kareeberg	14.41	Laingsburg	R 11,77
Saldanha Bay	7.56	Saldanha Bay	8.81	Saldanha Bay	14.13	Blue Crane Route	R 11,75
Hessequa	7.46	Bitou	8.50	George	14.03	Knysna	R 11,48
Knysna	7.05	George	8.39	Overstrand	14.00	George	R 11,44
Bitou	6.38	Midvaal	8.36	Kouga	13.20	Overstrand	R 11,40
Overstrand	6.03	Overstrand	8.18	Bitou	12.52	Bitou	R 10,61
George	5.91	Knysna	6.94	Knysna	12.52	Sundays River Valley	R 9,35

Source: Author's calculations

The efficiency scores of the municipalities in Table 8.5 are extremely low and of concern. They suggest that most of these municipalities are inefficiently spending on average over 90% of their resources. Most of these municipalities are found in the Western Cape. The municipalities highlighted in red are among the ten least efficient municipalities across the four financial years while the municipalities in yellow are among the 10 least efficient municipalities in at least three years.

Figure 8.5 depicts the BPF and the seven municipalities computed as efficient for the 2008/09 municipal financial year (Bushbuckridge, City of Cape Town, eThekwini, Mangaung, Mbombela, Polokwane and Thembisile).

Figure 8.5 Best practice frontier, 2008/09



Source: Author's calculations

The seven efficient municipalities all lie on the BPF, while inefficient municipalities are below the curve. The further away from the curve and along the x-axis (input index), the more inefficient the municipality in terms of input-orientated efficiency. The most inefficient municipality is Sundays River Valley, which is found furthest away from the BPF and the furthest along

the x-axis. Interestingly, Mbombela municipality in the Mpumalanga Province improved its efficiency late in 2008/09, which was around the same time that it received assistance from the Mpumalanga Provincial Government, in terms of Section 139 of the Constitution.[116] The improvement in efficiency is probably related to the intervention.

8.7.3 Analysis of results

The FDH efficiency analysis for input-orientated efficiency identifies the municipality that uses the least inputs to produce the most outputs relative to other municipalities in the sample. The analysis therefore compares similar types of municipalities and identifies the most efficient. Although Bushbuckridge is notorious for poor performance and related problems, it is more efficient in using resources than similar municipalities, such as Moretele. In identifying good performance, the FDH allows similar municipalities to benchmark themselves against better-performing municipalities of a similar nature.

A shortcoming of the analysis is that the output measure is consumer units with access to services, which means that the quantum of service delivery cannot be assessed; the implicit assumption is that all consumer units consume the same levels of outputs. Furthermore, differences in the quality of the services cannot be assessed. Therefore, municipalities, which have relatively few consumer units with access to services but provide a higher quantity and quality of the service, would be unfairly assessed. The quantity of resources used can be impacted by the quality and quantity of services provided. However, it could also indicate that there are differences between the distributions of resources across the various types of municipalities. For example, there is a widely accepted perception that Western Cape municipalities are relatively well resourced in the maximisation of own revenues. Furthermore, Western Cape municipalities have greater fiscal capacity due to their favourable economic and demographic characteristics relative to other parts of the country. The analysis suggests that it is possible that these municipalities are overly endowed with financial resources relative to the demand for their services as many of these municipalities are inefficient. In other words, their resource capacity exceeds their outputs generated, resulting in a relatively inefficient use of given resources.

Alternatively, relatively more efficient municipalities could either be providing a lower level and quality of services, or have fewer resources available to them relative to the demand for services from their communities. These reasons could be related to lower per capita expenditure levels.

Assuming that quantity and quality of services influences the efficiency scores, these results are likely to be influenced by income and economic disparities that exist across municipalities. Municipalities in richer areas of the country have more scope for own revenue collections while other municipalities are more dependent on grants. Therefore, certain municipalities being over endowed with resources results in an inefficient use of these resources relative to other less-resourced municipalities and the demand for services in these jurisdictions.

However, the analysis also suggests that the equalisation nature of intergovernmental transfers, in particular the LES, has been rather unsuccessful. Equalisation grants are meant to address the mismatch between resource distribution and demand for services. Yet, certain municipalities appear to be overly endowed with resources resulting in an inefficient use of resources, while others are resource constrained. Therefore, the distributive nature of thse transfer systems could be improved.

Nevertheless, it is important to reiterate that municipalities are deemed efficient relative to the sample. If a different sample were used, many efficient municipalities identified would probably no longer be efficient. Therefore, these municipalities cannot be declared fully efficient, but merely more efficient than other municipalities in the sample.

Another shortcoming of FDH analysis is the ‘efficiency by default’ nature of observations, where they do not dominate nor are they dominated by other observations. It is possible that a municipality such as Thembisile could be efficient by default across the years.

116 Section 139 of the Constitution mandates the provincial executive to intervene in the affairs of a municipality in cases where the municipality cannot or does not fulfil its constitutional obligations.

8.8 Tobit Regression Analysis

8.8.1 Description

The next step of the analysis is to identify and estimate the specific factors that influence the efficiency scores. Although the analysis calculated FDH scores over a four-year period, this section will only estimate the factors impacting efficiency scores for the 2008/09 financial year because of a lack of frequent data available at local government level. A cross-sectional model will be used for the 129 municipalities. A major disadvantage of using this model for such analysis is that dynamic variables cannot be ideally captured.

8.8.2 Description of variables used and a priori expectations

Models of efficiency for South African municipalities should primarily focus on internal governance and capacity issues, which can include financial management, administrative and political capacity. To assess the ability to hold local government institutions accountable, control variables that capture the nature of the communities served in terms of levels of education and social and economic participation can also be added. In other words, the primary drivers of such efficiency are both municipal internal capacity and administrative arrangements and the general ability of communities to hold local government accountable and monitor performance. For example, fiscal capacity can assess both institutional arrangements, in terms of level of fiscal decentralisation, and the ability of communities to monitor municipal performance. The latter is justified by the assumption that communities are more alert to the spending of monies generated directly from their taxes. Generally, data constraints prevented a more robust look at the profile of communities.

Based on the argument above, four models were used that gradually increased the scope of factors that theoretically or practically had an impact on municipal efficiency levels. The first model considered intergovernmental factors and internal municipal capacity. These variables include the fiscal capacity (measured as local taxes as a percentage of total revenue), institutional capacity (total vacancies) and financial capacity (financial reporting capacity).[117]

For fiscal capacity, a positive effect on efficiency would be expected the more a municipality is funded by local taxes, as municipalities are likely to be more accountable to local constituents paying their taxes. However, the efficiency scores suggest that better-resourced municipalities use these funds inefficiently, which could be because of an over endowment of resources, higher quality of services or a larger community with poor information in how taxes are spent. In this respect, greater fiscal capacity can have a negative effect, which implies that the more resources a municipality has from constituents, the more likely it will spend it inefficiently.

The higher number of vacancies a municipality has implies administrative capacity constraints that are likely to make the municipality inefficient in its utilisation of resources in the delivery of services. One would expect a negative relationship in this regard. On financial capacity, a high capacity municipality in terms of its financial management[118] would likely have a positive effect on efficiency. It must also be pointed out that the use of this categorisation correlates well with financial planning, audit outcomes and the general capacity (in terms of quality and quantity of skills) of the finance department within the municipality. This variable captures most of these dynamics.[119]

The second model included political factors: the percentage of the council controlled by the majority party and the employment status of the councillors. The first variable can be interpreted in two ways. Firstly, a healthy political opposition improves the accountability and monitoring of the municipality's performance. Secondly, a municipality with a considerable majority may experience less friction or arguments in implementing policies and procedures, which could mean greater efficiency. It is also likely that a non-linear relationship exists here, with positive effects as the dominant party obtains more seats at a diminishing, and thereafter negative, rate. The nature of councillors within a municipality can also have an impact on municipal efficiency. The municipal council monitors and oversees the performance of the municipality and ensures accountability to its constituents. Full-time councillors are probably more effective in this role, which in turn ensures that the municipality is more efficient.

The model was extended to include variables of the municipal manager's profile; the municipal manager is the chief account-

117 As part of the Municipal Finance Management Act, No. 56 of 2003, municipalities are categorised based on their capacity to meet reporting requirements in terms of high, medium and low capacity. In this exercise, a dummy variable is used to capture high capacity municipalities in terms of their financial reporting with the low capacity as the reference variable.

118 See footnote 117.

119 Several indicators of financial capacity were used to derive the relevant categorisations. This included audit outcomes and capacity of the CFO.

ing officer of a municipality. The variables, which include experience, time in the post and educational qualifications, should have a positive impact on municipal efficiencies. A competent person leading a municipality improves performance. It is assumed that financial and other administrative capacity (for example the profiles of the CFO or other managers) are captured in the high and total vacancy variables described above.

The fully specified model included all the above variables and introduced service-specific variables, such as whether services were outsourced and the municipality's approach to the provision of FBS. The latter variable is unique to South Africa, as municipalities give a certain portion of free services to indigent households per month. It is important to assess the impacts of these different approaches on the provision of these services. These factors were included in the model as dummy variables. A municipality was given 1 if a specific service was outsourced and 0 if not. In terms of the different methods used to provide FBS, the technical approach was used as the reference base in determining the dummy variable relative to the other approaches.

8.8.3 Results

Table 8.6 illustrates the results of the four regressions while Annexure 8A provides the details and descriptive statistics of the variables used.

Table 8.6 Tobit regression results

Dependent variable: Municipal efficiency scores 2008/09				
Independent variables	Model 1	Model 2	Model 3	Model 4
Decentralisation	-0.752***	-0.600***	-0.642***	-0.600***
	(-6.61)	(-4.80)	(-5.22)	(-5.13)
High	0.310***	0.305***	0.292***	0.292***
	(6.80)	(6.88)	(6.68)	(6.85)
Vacantpostsgeneral	0.150	0.158	0.165	0.167
	(1.09)	(1.17)	(1.25)	(1.34)
constant	0.729***	0.363**	0.238	0.046
	(9.81)	(2.26)	(1.44)	(0.23)
Majority		0.379**	0.450***	0.462***
		(2.55)	(3.06)	(3.19)
Partimecouncil		0.015	0.031	0.043
		(0.24)	(0.50)	(0.71)
Mmexperience			0.005**	0.004**
			(2.38)	(2.12)
Mmtimeinpost			0.005	0.005
			(0.62)	(0.64)
Mmdiplomamore			0.035	0.014
			(0.87)	(0.36)
Wateroutsourced				-0.057
				(-0.86)
Electricityoutsourced				-0.001
				(-0.02)
Refuseoutsourced				0.278***
				(3.77)
Waterbroad				0.245*
				(1.71)
Watertarget				0.321**
				(2.18)

Source: Authors analysis

Table 8.6 Tobit regression results (continued)

Dependent variable: Municipal efficiency scores 2008/09				
Independent variables	Model 1	Model 2	Model 3	Model 4
Watergeographic				0.069 (0.25)
Electricitybroad				-0.219* (-1.77)
Electricitytarget				-0.241** (-2.02)
Electricitygeographic				0.680 (0.29)
Refusebroad				0.141 (1.06)
Refusetarget				0.095 (0.75)
Refusegeographic				-0.323 (-1.07)

Note: Absolute value of statistic in parentheses.
**Significant at 10% level*
*** Significant at 5% level*
**** Significant at 1% level*
Source: Authors analysis

The fiscal capacity variable is significant in all four models and has a negative impact on efficiency. In other words, the more fiscally capacitated a municipality, the more inefficient its use of resources. This goes against general theory, which expects that the larger the local taxes generated, the more local authorities are accountable to their communities. However, it confirms the analysis and distribution of inefficiencies across the municipalities. In the efficiency analysis, the inefficient use of resources increases the more resources a municipality generates in general. This could indicate the large economic disparities across the country, as certain municipalities generate more resources relative to the demand for services in their areas. This view suggests that the equalisation grants system could be improved to appropriately match the demand for services in municipalities relative to their fiscal capacities. Vacancy rates have no significant impact on efficiency.

Other important factors that have a positive impact on efficiency are the financial capacity and management within the municipality and the experience of the municipal manager. The financial capacity measure is statistically significant in all estimations and confirms that financial and administrative ability does have an impact on municipal performance. The time in the post and educational qualification of the municipal manager are statistically insignificant, whereas experience has a significant and positive effect on efficiency. This may be largely because of historical reasons and the general skills shortages in the country. Municipalities find it difficult to attract the appropriate skills and level of education, and so have to rely on the employee's experience. Historically, people with limited educational levels were given senior positions in municipalities and, with experience, ultimately improved their performance. The analysis confirms that municipalities should adhere to the minimum skills requirements for the employment of senior officials in municipalities, as stipulated in the Municipal Regulations on Minimum Competency Levels.

The employment status of the councillors (i.e. whether they are employed on a part-time or full-time basis) has no significant effect on efficiency. However, efficiency increases with the more seats the majority party has in the council. This suggests that a fragmented council made up of several parties can hinder the implementation of policies and procedures. A nonlinear relationship between the composition of the council and efficiency is possible, but this was not assessed.

Outsourcing or commercialising services can lead to efficiency gains. The analysis finds that efficiency is improved when refuse removal services are outsourced, but when water and electricity are outsourced, the impact on efficiencies is not significant. This suggests that municipalities tend to provide the refuse service inefficiently through overusing resources.

In 2002 government announced the FBS policies, as part of the national social security network. Local government provides a portion of services free every month to indigent households and municipalities have discretion over the methods they use to implement such policies. These methods were assessed against the efficiency scores generated to identify which method was the most efficient relative to the service provided.

It was found that the nature of the service informs the best practice mechanism used to provide FBS. For example, municipalities that used the technical approach for the provision of free basic electricity are the most efficient. The technical approach to free basic electricity includes the use of prepaid meters whereby a portion of the service is provided free of charge and thereafter the household has to buy if it wants to use extra. This proves more efficient as all other dummies have a negative effect on efficiencies or are insignificant. In terms of the targeted approach, the municipality needs to identify a household as indigent and then supply this household with a portion of electricity for free. In the broad based approach, all households receive a portion of electricity free, with households that use more than the stipulated free amount paying more to cross-subsidise poorer households. The geographic approach entails the identification of an area or community as poor and simply providing the entire community with free services. It is practical that the use of the technical approach in providing specifically, free basic electricity, gives the municipality more control and minimises losses in terms of households using the service and not paying for it. In the other methods, households can continue to use the service until it is disconnected, with the amount used being unpaid and thus a 'loss' in electricity and revenues. This analysis supports the use of the technical method in providing free basic electricity.

The targeted approach was identified as the most efficient in terms of providing water and sanitation functions. Unlike electricity, a municipality is legally not allowed to cut water to households, as it is a basic right. Therefore, the technical approach is inefficient in this case. The targeted approach ensures that households qualified to receive free services will receive these. The broad-based approach would result in a greater degree of inefficiency in all households receiving the services, because of a high possibility that richer households will receive free services if they use below the stipulated amounts i.e. there is an implicit and untested assumption that richer households consume more of a service.

The methods used to implement free basic refuse were all statistically insignificant. This suggests that there is little difference between them in terms of efficiency gains.

8.9 Conclusion and Recommendations

8.9.1 Conclusion

The chapter examined the technical efficiency of a sample of South African municipalities, based on their operating expenditure over a four-year period. It assessed how well municipalities transformed their inputs relative to the demand for services from their communities. Efficiency scores increased over the years but decreased in 2008/09, possibly due to the impacts of the recession. In general, the sample of municipalities could use 60–70% less resources and still maintain the current quantum of services provided. The following observations were made:

- Resources across the country are inequitably distributed, which results in certain municipalities having more resources relative to their service output requirements.
- Better-resourced municipalities use these resources inefficiently.
- This suggests that the distributive performance of equalisation grants, specifically the LES, can be improved.
- Quantity and quality of services can also have an impact on municipal inputs and outputs.
- The FDH technique can be used as a powerful tool to benchmark municipal performance relative to a set of similar municipalities. This identification process allows less efficient municipalities to learn from the experience and best practice methods employed by more efficient municipalities.

The chapter also used a tobit regression model to quantify the impacts of several factors on municipal efficiency, using the efficiency scores generated for 2008/09 as the dependent variable. This estimation produced the following results:

- The more resources a municipality generates from local taxes, the more inefficiently it uses its resources. This result highlights the skewed distribution of economic activity and resources across the country.
- The financial capacity of the municipality has a significant and positive impact on efficiency. This suggests that municipalities with the capacity to plan and monitor their finances better are more efficient at using resources.
- The capacity and skills of the municipal manager are also important in improving efficiency in municipalities. The experience of the municipal manager has a significant impact on efficiencies, which is probably due to historical reasons.

- The methods used in providing services and FBS also have a significant impact on municipal efficiency. Outsourcing the refuse function has positive effects on efficiency, while the technical approach for the provision of free basic electricity and the targeted approach for the provision of free basic water and sanitation were the most efficient.

8.9.2 Recommendations

Based on the key findings, the following recommendations are made:

- Municipalities should strive for technical and distributive efficiency to maximise their service level outputs with low average input costs, and to optimise the welfare of their communities.
- Municipalities should ensure that appropriately skilled and experienced people are assigned to senior administrative roles in municipalities. This is particularly important for the municipal manager and chief financial officer posts. The minimum requirements prescribed in Municipal Regulations on Minimum Competency Levels should be fully adhered to.
- Municipalities should consider outsourcing municipal services where efficiency gains are apparent, prioritising the refuse removal function.
- Municipalities should use the most efficient method relative to the nature of the service when providing FBS to households. This would mean using the technical approach for free basic electricity and the targeted approach for free basic water and sanitation.
- Poorly performing municipalities need to learn from the experience and best practice methods employed by municipalities that are able to ensure good performance in spending, efficiency in using resources and maximising outcomes.

Annexure 8A

Variables	Description	Mean	Max	Min	Stan Deviation
Efficiency	FDH efficiency scores generated for the 2008/09 financial year (%)	0.35	1.00	0.09	0.25
Decentralisation	Municipal fiscal capacity measured % of total revenues generated from local taxes	0.65	0.96	0.11	0.18
High	Dummy variable = 1 if municipality classified as HIGH capacity in terms of the MFMA financial capacity classification. Reference category: MED and LOW Categories				
Vacantpostsgeneral	% of vacant posts of total posts in organogram	0.14	0.58	0.00	0.14
Majority	% of council seats held by majority party	0.67	0.92	0.34	0.14
Partimecouncil	% of councillors that are part time	0.77	1.00	0.00	0.29
Mmexperience	The experience of the municipal manager in years	12.35	46.00	0.00	9.70
Mmtimeinpost	Number of years the municipal manager has been in the current post	2.09	10.00	0.00	2.19
Mmdiplomamore	A dummy variable = 1 if the municipal manager has a diploma, degree or post graduate degree with matric education or lower as the reference category				
Wateroutsourced	A dummy variable = 1 if the water and sanitation service is outsourced or commercialised with not outsourced being the reference category				
Electricityoutsourced	A dummy variable = 1 if the electricity service is outsourced or commercialised with not outsourced being the reference category				
Refuseoutsourced	A dummy variable = 1 if the refuse service is outsourced or commercialised with not outsourced being the reference category				
Waterbroad	A dummy variable = 1 if the municipality is using the broad based approach in the provision of free basic water and sanitation with the technical approach the reference category				

Watertarget	A dummy variable = 1 if the municipality is using the targeted approach in the provision of free basic water and sanitation with the technical approach the reference category				
Watergeographic	A dummy variable = 1 if the municipality is using the geographic approach in the provision of free basic water and sanitation with the technical approach the reference category				
Electricitybroad	A dummy variable = 1 if the municipality is using the broad based approach in the provision of free basic electricity with the technical approach the reference category				
Electricitytarget	A dummy variable = 1 if the municipality is using the targeted approach in the provision of free basic electricity with the technical approach the reference category				
Electricitygeographic	A dummy variable = 1 if the municipality is using the geographic approach in the provision of free basic electricity with the technical approach the reference category				
Refusebroad	A dummy variable = 1 if the municipality is using the broad based approach in the provision of free basic refuse with the technical approach the reference category				
Refusetarget	A dummy variable = 1 if the municipality is using the targeted approach in the provision of free basic refuse with the technical approach the reference category				
Refusegeographic	A dummy variable = 1 if the municipality is using the geographic approach in the provision of free basic refuse with the technical approach the reference category				

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CHAPTER 9: MUNICIPAL CONSUMER DEBT IN SOUTH AFRICA

Sasha Peters[120]

9.1 Introduction

Municipalities make an important contribution to poverty alleviation and economic development, through providing free basic services (FBS) to poor households and investing in infrastructure and associated services that are critical for economic activity (National Treasury, 2008). To deliver these services effectively, municipalities rely on two important sources of revenue. One is from the national sphere (local government equitable share allocation (LES) and conditional grants), while the other is the municipality's own revenue, which is composed mainly of property rate taxes and charges for providing water, electricity, refuse removal, sanitation and other services. However, one critical question is what happens when the ability of municipalities to generate adequate levels of own revenue is constrained. To this end, the issue of non-payment, also referred to as municipal consumer debt, poses a serious threat to the financial health of municipalities in South Africa.

9.1.1 Problem statement

In South Africa, municipal consumer debt refers to the non-payment of property rates, fees/charges for services provided by municipalities (for example water, sanitation, electricity and refuse removal) and various other financial obligations to municipalities (which include for example, traffic fines and rental housing payments). Municipal consumer debt encompasses late payments for property rates, service and other municipal charges, as well as amounts that are deemed irrecoverable.

Municipal consumer debt has a number of potential impacts. It can cripple the cash position of municipalities and, therefore, their ability to fulfill constitutionally mandated responsibilities. Municipal consumer debt can also reduce the finance available for the delivery of basic services, infrastructure, maintenance and upgrading. In addition, it can prompt the need for greater cross-subsidisation from richer households/businesses, potentially overburdening the existing tax base.Outstanding payments also represent foregone resources that could be used to improve the living conditions of the poor. Possible reasons as to why this type of debt arises are various. Poor performance by municipalities, such as inaccurate billing, weak credit control measures and customer service mechanisms may serve to reinforce non-payment, as those consumers able to pay become unwilling to pay. On the other hand, consumers may be unable to pay as a result of unemployment and poverty. The causes of non-payment in South African municipalities have been the focus of various studies, including Booysen (2001), Botes and Pelser (2001), Burger (2001) and Fjeldstad (2004). However, as most of the studies were carried out in the early to mid-2000s, changes in the local government sphere warrant a thorough and updated investigation of the factors that drive this kind of debt.

9.1.2 Background to the research

The multiple impacts of municipal consumer debt are a public finance and intergovernmental fiscal concern. Municipalities and local government policy-makers need to understand the extent of this debt and how to manage the related challenges and risks better. This research comes at an opportune time, as the key priorities of the Local Government Turnaround Strategy (LGTAS) and Outcome 9 (the delivery agreement for the local government sphere) centre on optimising revenue collection and halving municipal consumer debt by 2014 (CGTA, 2009a; The Presidency, 2010).

In its Submission on the Division of Revenue 2011/12, the Financial and Fiscal Commission (the Commission) carried out research into the role of local government revenue enhancement strategies in addressing municipal revenue challenges. A number of recommendations were made on ways in which municipalities could improve their revenue enhancement and collection strategies. As part of the broader project, this particular project will delve deeper into the issue of municipal consumer

120 Financial and Fiscal Commission.

debt by understanding who the debtors are and the underlying causes of this debt. This research falls under the theme of accountable institutions, one of the five thematic areas identified in the Commission's five-year research strategy adopted in 2009 (FFC, 2008). Financial viability is a critical ingredient in the legislative-prescribed roles and responsibilities for all three spheres of government aimed at ensuring a viable and sustainable local government sphere. Financial accountability is also about municipalities ensuring that their planning and budgeting processes are based on realistic expectations of revenue collection.

9.1.3 Methodology

To contextualise municipal consumer debt across South African municipalities, secondary data was collected from the National Treasury and analysed at both an aggregate and municipal-specific level. The dataset from the National Treasury covers a six-year period (2004/05 to 2009/10) and reflects the slowly improving data collection and reporting by municipalities. The number and category of municipalities reporting in each year is contained in Table 9.1.

Table 9.1 Municipal reporting on consumer debt, 2004/05 to 2009/10

Municipal category	Count of total					
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Metropolitan municipalities	6	5	6	6	6	6
Secondary cities	10	11	18	19	19	21
Larger towns	2	9	20	21	25	28
Medium to smaller towns		28	50	73	100	103
Rural municipalities	2	23	15	32	47	58
Districts without major powers	2	5	10	17	20	20
Districts with major powers	1	6	8	13	14	18
Grand Total	23	87	127	181	231	254

National Treasury, 2010

As the reporting is uneven across municipalities, an annual average debt calculation was used to assess the aggregate debt and debt by municipal category. This approach differs from the way that data on consumer debt is usually presented and analysed. In most instances, data is presented in nominal terms and does not factor in differences in reporting, which may unnecessarily inflate the figures so that the consumer debt challenge appears to be growing. As will become evident, the approach taken in this chapter provides a different view.

The purpose of this chapter is to examine changes in, and causes of, consumer debt in the South African local government sphere. Where the majority of research carried out previously focused solely on households, this research also looks at municipal consumer debt emanating from businesses and government departments.

To isolate the factors that drive municipal consumer debt, data from the annually published General Household Survey (GHS) for the period 2004–2008 is used for households. The GHS includes questions about why households do not pay, and places a particular emphasis on non-payment for water services. As no survey data is available regarding reasons for non-payment by government and business, a short questionnaire was developed and sent to provincial treasuries and Business Unity South Africa (BUSA).[121] Finally, regarding legislative provisions to manage debt, various Acts were analysed and, where possible, information on compliance with certain provisions was sourced from the National Treasury.

The overall objective of the chapter is to investigate the characteristics and causes of municipal consumer debt in South Africa, in particular:

- Profile municipal consumer debt by (a) type of municipality, (b) source of the debt (households, government, businesses etc.) and (c) nature of the debt (for example the proportion of the debt that is historical).
- Investigate what drives non-payment.
- Evaluate legislative provisions relating to municipal consumer debt to determine whether or not weaknesses exist.

121 BUSA is an umbrella body for businesses in South Africa.

- Recommend policy options to assist municipalities in overcoming the challenge of municipal consumer debt.

After a brief literature review on the issue of non-payment, an overview of consumer debt in South Africa is given. The reasons for non-payment by households, government, and businesses are examined, and the government's response to non-payment is reviewed. Five critical aspects that need to be addressed in order to mitigate the challenges caused by municipal consumer debt are discussed, and recommendations are made for specific intergovernmental measures that can be implemented to minimise, and deal with consumer debt.

9.2 Literature Review

At the centre of the municipal consumer debt debate is whether non-payment results from the inability to pay, unwillingness to pay or some other reason. The literature reviewed is aimed at understanding why people do not pay for services and looking at some of the methods employed by governments and other agencies to motivate compliance.

9.2.1 Reasons for non-payment

Inability to pay

The most common reason used to explain non-payment appears to be the inability to pay, as a result of poverty (Booysen, 2001; Botes and Pelser, 2001; Burger, 2001). The term 'inability to pay' indicates that there is an income level above which people are unable to pay for the delivery of services. This raises the central question of affordability. Milne (2004) suggests using "core affordability indicators", which, if properly monitored, can warn policy-makers of early indications of changes in the affordability of services. A range of possible indicators is proposed (Milne, 2004:5):

- Consumption-related indicators, such as percentage of total household expenditure devoted to a commodity or per capita consumption/expenditure on a commodity.
- Price-related indicators, for example unit prices paid for a commodity.
- Payment-related indicators, which would include the use of arrears statistics, alternative payment schemes and disconnections owing to debt.

The value of using the indicators mentioned above is heightened when they are assessed relative to equivalents for other income groups, the median or some national norm/benchmark. Monitoring trends in affordability indicators represents what can be termed a more ex-post approach. McPhail (1993) suggests incorporating assessments of affordability and willingness to pay at the planning stage of a public good such as water or electricity, especially if the intention is to recover costs. The information from an affordability assessment can provide insight into potential service usage patterns and, therefore, the tariff to be charged in order to maximise cost recovery.

Despite the obvious importance of having an indication of willingness to pay, policy-makers continue to make general assumptions about the population to be served and per capita consumption rates (McPhail, 1993). The end result is that tariff-setting is based on covering operating, maintenance and capital costs, without considering what people are willing to spend, which could even be higher than the rate set. McPhail (1993) conducted a study[122] of five Moroccan states in a bid to determine whether the price charged for water was correctly set, or whether there was an opportunity to make individual house connections available to some of the indigent households at retail level. The study found that many low-income households, even those with access to free stand-post water service, are willing to pay in excess of 5% of total household expenditures for individual water services (McPhail, 1993:969). The implication of these findings is that South Africa needs to re-examine indigent policies that determine which portions of the population cannot afford to pay for services.

122 McPhail's study used the contingent valuation method whereby an interviewer poses questions within the context of a hypothetical market. The study was undertaken on behalf of Morocco's national water company.

Willingness to pay

Non-payment is not a given for those residing in poor areas, as significant variations in payment and non-payment exist across both poor and non-poor areas (Fjeldstad, 2004). These findings are confirmed by Booysen (2001) who analysed the income and expenditure of 1,600 households to determine the root cause of non-payment. The analysis found that not only higher-income households, but also households experiencing relatively high levels of poverty paid for services (Booysen, 2001). A second reason for non-payment is therefore the willingness (or not) to pay.

In general, willingness or unwillingness to pay can stem from dissatisfaction with services delivered by government, which can lead to a cycle of non-payment. As a result, municipal authorities are unable to leverage financial and other resources in order to improve service delivery adequately, or perhaps certain efficiency aspects that may improve the affordability of services. In South Africa, the phenomenon of being unwilling to pay, or the 'culture of non-payment' refers to people having the same mindset as during apartheid rates boycotts, when rate-payers refused to pay as a protest against the discriminatory policies of the government of the day. The rationale is that people became accustomed to not paying under the apartheid government and have not changed despite the transition to democracy.

Glaser and Hildreth (1999) propose that perceptions of government and willingness to pay are directly linked. In a survey of mid-western United States cities with a population of approximately 300,000, they found that half of the respondents were willing to pay more for improved local government performance (Glaser and Hildreth, 1999). Fjeldstad (2004) concurs with the power of citizen perception, which is implicitly linked to the extent of trust that community members have in local government leadership. He suggests that three dimensions of trust affect citizen compliance. First, trust in local government to act in their (citizens) interest, which refers to whether people believe that government will spend money on the required services, and whether the services provided are of an acceptable quality.

The second dimension relates to whether citizens believe that authorities will establish fair procedures for collecting revenue and distributing services. Effective enforcement to ensure payment is critical, as citizens should believe that non-payment carries a penalty, for example cutting off of services. However, whereas compliance is expected to be positively related to the severity of sanction applied for non-payment, the opposite is true for South Africa (Fjeldstad, 2004). The reason for this perverse relationship could lie within the principle of reciprocity: giving back what you get. In this case, treatment perceived to be unfair or extreme is met with a strong refusal to pay. Finally, the third dimension concerns trust in other citizens to pay their share. Here, the belief about the honesty of others comes into play, which is related to the role of social influences. For example, behaviour may be motivated to change if non-payment is met with certain negative social connotations or stigma. The reverse is also true: if non-payment is considered the norm, people may not consider non-compliance a big issue (Fjeldstad, 2004).

9.2.2 Measures to enforce payment or recover costs

Various attempts have been made to enforce payment for services delivered. For example, in the United States, non-payment of parking tickets, library fines etc. have prompted various local authorities in New York, Miami and Chicago to hand over collection of debts to private collection agencies, which can result in consumers being black-listed. The effects can be far-reaching and even affect the interest rate a consumer can demand when applying for a home-loan or vehicle financing (Spencer, 2006). As the cost of these effects may outweigh non-payment for services, compliance is greater.

Another tool that can be used to encourage payment is the cutting off/disconnecting of services. However, the use of this measure is politically contentious. In addition, total cut-offs are not possible for certain services such as water, which is considered a basic human right (MacDonald, 2002). Responses to service cut-offs also need to be managed, as existing social conditions (including high levels of unemployment and poverty) can lead to, or exacerbate, negative reactions and/or resistance from communities. In 2001, the community responded to Eskom's 'massive' electricity cut-offs by resorting to illegal connections, some of which were effected by former Eskom employees who were unemployed at the time (Khunou, 2002). There were also incidences of violence as a result of the cut-offs (Ibid.). Four types of permanent cut-offs of basic services have been identified: shutting off services through removal of cables and pipes; increasing reconnection fees, which are usually so severe that they effectively limit who can afford to reconnect; requiring residents to pay off outstanding payments before being able to reconnect; self-disconnecting by prepaid meter (Ruiters, 2002:52–53).

One method of cost recovery is to apply the principle of cross-subsidisation, where wealthier households are charged higher tariffs to subsidise services to poorer households. In the solid waste sector, the cost-subsidisation option works

relatively well (Cointreau, 2005), as, for example, access for collection vehicles is better in wealthier areas, and collecting waste from a big commercial establishment is easier than from less affluent areas where settlement patterns and road conditions make collection more difficult. A commonly used strategy for facilitating delivery of services to poorer households is cross-subsidisation using block tariffs. However, policy-makers need to ensure that the extent of cross-subsidisation does not lead to unduly extreme prices for households that pay more. Cost recovery can also come through voluntarism, where consumers who cannot afford the cost of a service, contribute their labour. This approach can bring unforeseen health/social costs and also add gender, race and class dimensions to cost recovery (McDonald, 2002).

Prepaid meters present the ultimate cost-recovery mechanism, as the service is paid for prior to using it; in essence prepaid meters represent an effective means of preventing defaulting on payments (MacDonald, 2002). The use of prepaid meters, which does not require billing or meter reading, can avoid the pitfalls of non-payment due to poor administrative/financial management practices on the part of municipalities.

However, in developing countries where access to basic services for all remains a challenge, the use of prepaid meters may hinder progress, as "whereas municipal disconnection is a visible (and sometimes violent) physical process, self-disconnection is invisible and masks the extent to which people go without water supply" (Ruiters, 2002:53). A case study in Makhaza Section, Khayelitsha, concluded that cost recovery is unsustainable and leads to excessive spending in an attempt to recover costs from low-income households who, because of unemployment and a range of challenges, will not be able to pay (Xali, 2002). A number of impacts can arise from cost recovery (Xali, 2002:114-115):

- Limited access to social services. The consequence of cost recovery implies that those with money will have access to services, thereby limiting or denying access to low-income households/individuals and exacerbating inequalities.
- Increased burden on working class women. Cost recovery programmes increase the weight of social responsibility on working class women, as in most households women have to find access to alternative sources of water, energy etc.
- Health implications. These arise from the lack of access to clean water and exposure to fumes and fires from using alternative forms of energy.
- Undermining constitutional gains. While the Constitution contains clauses (for example the use of the phrase "within available resources"), which aim to exempt government from liability in cases where access to basic services is not realised, this aspect needs to be contested, especially in view of how the state allocates national resources (for example large allocations to defence).

Pape (2002) suggests the prepaid system could be modified by extending the use of pre-paid technology to businesses/bulk consumers. These users would be required to pre-pay for their consumption, generating significant income that could be used for cross-subsidisation. In addition, using this system for bulk users would be more manageable than attempting to extract money which low-income households do not have.

Prior to determining the sanctions to be applied, the root cause of non-payment must be identified. For example, billing and payment methods are important to low-income households. Decision-makers need to ensure that services of a high quality are being delivered, and that proper billing processes and suitable payment options are available.

9.3 Overview of Municipal Consumer Debt in South Africa

This section focuses on who is responsible for the debt and which sectors represent the bulk of the debt. As mentioned in Section 9.1.3 (Methodology), the figures used have been averaged according to the number and category of municipalities reporting in each year as depicted in Table 9.1.

9.3.1 Aggregate municipal consumer debt

An analysis of municipal consumer debt over the period 2004/05–2009/10 reveals that municipalities are making inroads with respect to the challenge of municipal consumer debt. As Table 9.2 shows, consumer debt is generally declining across the majority of municipal categories, with secondary cities and districts with major powers recording real increases between 2008/09 and 2009/10. Real growth was, however, significantly slower in 2009/10 in districts with major powers.

Table 9.2 Real average municipal consumer debt per municipal category, 2004/05– 2009/10 (R'000)

Municipal category	2004/05	2005/06	2006/07	20007/08	2008/09	2009/10
Metropolitan municipalities	4,423,227	3,431,117	4,187,235	3,772,118	3,826,697	3,715,678
Secondary cities	268,341	499,077	287,915	306,376	352,376	404,590
Larger towns	56,083	1,368,247	106,613	124,428	127,428	111,551
Medium to smaller towns		173,515	38,081	39,739	51,598	42,265
Rural municipalities	10,710	116,798	49,176	21,146	27,023	25,447
Districts without major powers	7,613	37,542	7,502	5,217	17,258	4,306
Districts with major powers	11,164	41,750	63,074	43,228	61,225	70,498
Real year-on-year growth						
Metropolitan municipalities		-22.4%	22.0%	-9.9%	104.0%	-2.9%
Secondary cities		74.3%	-42.3%	6.5%	14.9%	14.8%
Larger towns		2339.7%	-92.2%	16.8%	2.4%	-12.5%
Medium to smaller towns			-78.1%	4.4%	29.8%	-18.1%
Rural municipalities		990.5%	-57.9%	-57.0%	27.8%	-5.8%
Districts without major powers		393.1%	-80.0%	-30.5%	230.8%	-75.0%
Districts with major powers		274.0%	51.1%	-31.5%	41.6%	15.1%

Source: Own calculations based on National Treasury data 2010

This improvement is confirmed when consumer debt is assessed relative to municipal operating revenue. As Table 9.3 shows, consumer debt, as a proportion of municipal operating revenue, is on a downward trend. Districts with major powers show marginal increases from 2007/08 onwards. This issue may be something to monitor, as districts with major powers are one of the two categories that exhibit real increases in municipal consumer debt.

Between 2006/07 and 2009/10, the proportion of consumer debt to operating revenue within secondary cities has remained generally constant. As consumer debt in secondary cities has shown a real increase of about 15% in two consecutive years (2007/08–2008/09 and 2008/09–2009/10), this municipal category should be closely monitored to ensure that consumer debt does not start to affect the financial health of these municipalities.

Table 9.3 Real average municipal consumer debt as a proportion of real average operating revenue, 2004/05–2009/10 (%)

Municipal category	2004/05	2005/06	2006/07	20007/08	2008/09	2009/10
Metropolitan municipalities	10.9%	26.6%	7.5%	6.1%	5.9%	4.7%
Secondary cities	4.1%	8.1%	1.9%	1.9%	2.0%	1.9%
Larger towns	15.9%	283.3%	2.4%	2.6%	2.0%	1.4%
Medium to smaller towns		6.0%	1.1%	0.7%	0.6%	0.5%
Rural municipalities	12.2%	3.8%	5.5%	1.1%	0.8%	0.6%
Districts without major powers	3.5%	5.6%	0.7%	0.3%	0.7%	0.2%
Districts with major powers	5.7%	40.2%	3.0%	1.1%	1.3%	1.6%

Source: Own calculations based on National Treasury data, 2010 and 2011

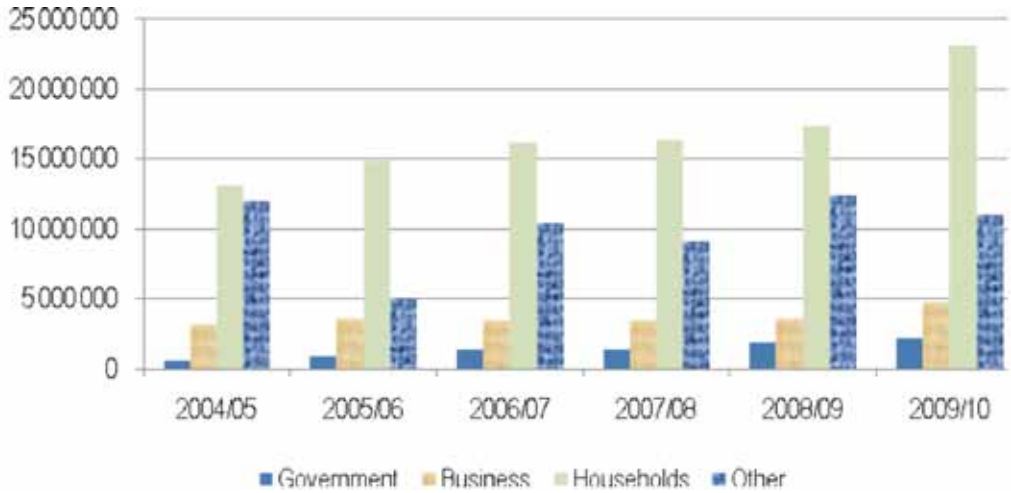
Despite the progress made, consumer debt remains a challenge. For example, metros are still faced with, on average, just under R4 billion worth of consumer debt. However, this analysis indicates that the severity of this challenge is weakening. Policy-makers therefore need to reflect accurately on the consumer debt challenge and acknowledge the progress that has been made.

9.3.2 Disaggregation of municipal consumer debt by customer grouping

Non-payment emanates mainly from households, government, businesses and a category referred to as 'Other'. The manner in which debtor data is reported means that it is not possible to factor out the effects of reporting variances by averaging the amounts recorded across the different types of municipalities. As a result, the data on customer groupings responsible for debt is reported at a real aggregate level. The data shows that households are responsible for the largest share of municipal consumer debt, while non-payment by government departments has grown significantly between 2004 and 2009 (Figure 9.1). Non-payment by the category 'Other' is significant and represents a challenge in terms of transparency. While municipalities may be clear about what this category includes, the use of this term clouds transparency of the municipal budget and spend-

ing plans.[123] National Treasury has indicated that the term 'Other' is in the process of being phased out and that municipalities will be required to be explicit about items within this category.

Figure 9.1 Disaggregation of municipal consumer debt by customer grouping (R'000)

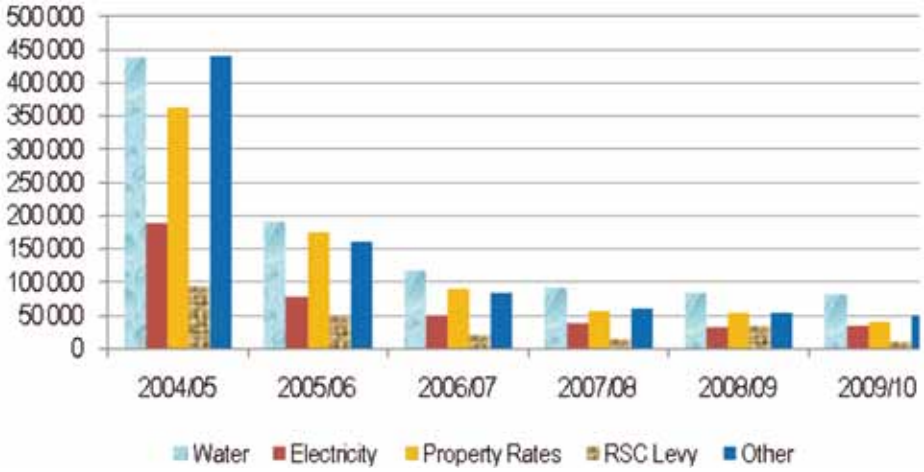


Source: Own calculations based on data from National Treasury 2010

9.3.3 Disaggregation of total municipal consumer debt by income source

Municipal own revenue sources include property rates, service charges (derived largely from electricity, water, sanitation) and various other, smaller sources such as fines. Before being phased out in July 2006, the Regional Services Council (RSC) levies represented a source of income for metropolitan and district municipalities. According to National Treasury, the RSC levy debt represents outstanding amounts payable mostly to district municipalities. As Figure 9.2 shows, outstanding amounts in respect of water, the category 'Other' and property rates dominate over the period.

Figure 9.2 Average municipal consumer debt according to income source (R'000)



Source: Own calculations based on data from National Treasury 2010

Water represents a particular challenge, as it is considered an essential basic service and so cannot be totally cut. This means that non-paying households cannot be completely disconnected from water. The non-payment of electricity may reflect an affordability issue, especially considering recent large increases in electricity prices. Most of the debt arising from non-payment of property rates emanates from government departments, which is the result of government devolving the payment of

123 The contents of this category vary from municipality to municipality. One example of what might be listed in this category is debt emanating from insolvent estates. The practice of using 'Other' is contrary to the reporting format prescribed by National Treasury, whose aims include improving the clarity and accessibility of information.

property rates from the Department of Public Works to provinces. This shift has created a bottleneck in payments, as well as disputes over who is responsible for historical amounts owing to municipalities. Once municipalities start reporting on what 'Other' contains, it will be possible to comment more substantively on this category.

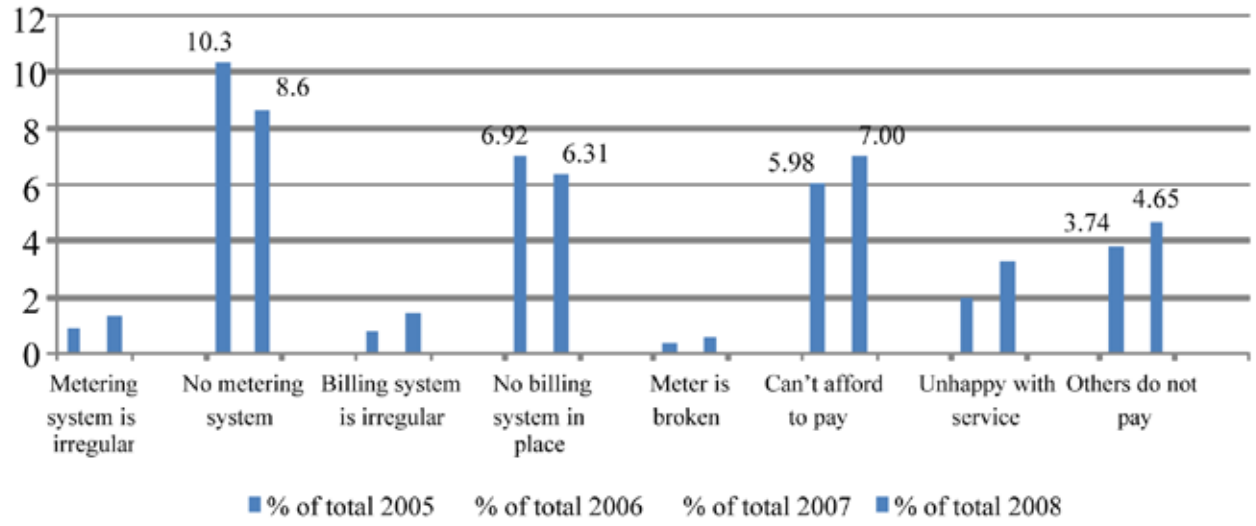
9.4 Reasons for Non-Payment

Households, government and businesses are the main defaulters. This section looks at the possible reasons why these three categories do not pay for services.

9.4.1 Reasons for non-payment by households

Information for this section is sourced from the GHS for the period 2004–2009. The GHS poses specific questions about the non-payment of water and reasons driving defaulters. The GHS was chosen because most non-payment occurs in the water sector. Between 2004 and 2008, eleven reasons were given in the surveys to explain household non-payment. The statistical significance of the reasons was assessed using two F-tests (one to test the equality of the means, and the other to test the equality of the variance). In both instances, the p-value was smaller than 0.05, implying that the reasons provided are different and that some reasons are more dominant than others. Figure 9.3 shows the percentage of households that gave various reasons for non-payment. The absence of a metering system seems to be a strong motivator driving non-payment. The lack of billing systems also features prominently, although appears to be improving. In 2008, the affordability issue emerges strongly, which is probably a result of the slowdown in the economy. In addition, non-payment because other people do not pay seems to be on the increase. However, in general, the reasons driving non-payment tend to stem from municipal performance issues (no metering/billing systems).

Figure 9.3 Reasons for non-payment of water, 2004–2008



Source: StatsSA, 2004–2008

9.4.2 Reasons for non-payment by government

Available data indicates that non-payment by government departments to municipalities has grown rapidly. The information used in this section was sourced from provincial and national treasuries, and data was requested specifically for the six metropolitan municipalities, as municipal consumer debt is concentrated in these six municipalities. As a result, the Gauteng, Western Cape, Eastern Cape and KwaZulu-Natal provincial treasuries were approached for information.

Across the various metropolitan municipalities, the provincial departments of Public Works, Education and Health are responsible for the highest levels of non-payment. The very specific underlying reasons that have led to high levels of non-payment from these particular government departments are:

- Public Works. The devolution of assets and payment of property rates from the national Department of Public Works to its provincial counterparts, has created many bottlenecks in payments to municipalities. A conditional grant, the Devolution of the Property Rates Grant to Provinces, was established to assist provinces to pay for this newly acquired function. However, the extent to which this will translate into relief for municipalities is based on the efficacy with which provincial departments transfer funds to municipalities.

- Education. The concern here is with Section 21 schools, i.e. schools that have been granted the right to manage their own budgets/financial affairs through their respective governing bodies. In some instances basic services such as water are 'stolen' from these schools by residents, which further results in high bills. These schools have indicated that their budget is insufficient and does not allow them to pay for municipal services. In a bid to address this issue, the City of Cape Town, for example, intends to instal prepaid water and electricity meters at all schools over the next two years.

- Health. In this instance, debt is as a result of clinics and hospitals not paying utilities. In addition, in some cases a service level agreement (SLA) exists between provinces and municipalities covering the delivery of certain aspects of primary health care, but either payment is not forthcoming or municipalities have spent more than what was agreed to in the SLA.

In addition to the above, government departments also note the following reasons that contribute to high levels of non-payment: slowness in generating invoices or property rates schedules, inaccurate verification and reconciliation from other municipalities, inappropriate billing systems and unreasonable interest rate charges. Furthermore, the government needs to ensure that reforms, and resulting progress in a particular sector/sphere, do not negatively affect another sphere. To this end, the national departments of Education and Public Works should make a concerted effort to find a speedy solution to these bottlenecks, to ensure that the financial health of municipalities is not unnecessarily jeopardised. While in some instances departments are disputing amounts owed, the increase in government departments owing money to municipalities appears to be partly due to the systemic issues and reforms described above. In view of this situation, calling for punitive action against non-paying departments would not be prudent.

9.4.3 Reasons for non-payment by business

Financial data on non-payment by business is available, but information on the reasons for non-payment is not available. Therefore, BUSA, an umbrella body for business in South Africa was approached to give its views, which are summarised below: (BUSA, 2011)

Reasons for non-payment/late payment

BUSA listed the following factors, in order of importance, as the main reasons driving non-payment/late payment of property rates and/or utility bills:

- Irregular billing

- Incorrect billing

- Unhappiness with service/economic slow-down

- High tariffs

- Others do not pay (this was specifically noted as the most unlikely motive for business non-payment because it would undermine the sustainability of enterprises).

Ways to ensure delivery of high-quality services

The suggestions made by BUSA for ensuring the delivery of high quality services were:

- Increased efficiency (as opposed to increased regulation)

- Qualified people filling key positions/jobs, particularly in the areas of finance, technical and human resources

- Adherence to good governance.

Use of pre-paid meters

The use of pre-paid meters can assist in ensuring that municipalities have access to money, which can be used to cross-subsidise service delivery to poor households. It can also assist in bypassing some of the administrative inefficiencies that numerous municipalities struggle with. The view of BUSA is that, while the use of this type of technology can assist in overcoming certain inefficiencies, it is more suited to private households than to businesses. It was noted that shifting to pre-paid meters was a way to avoid solving the underlying causes of inefficiencies by bypassing them.

Outsourcing municipal billing function

In severe cases, BUSA's view is that this may be a valid option, but in other instances, training and better management may suffice. It was also specifically noted that the effectiveness of outsourcing the billing function would depend on addressing the weaknesses in the current tender system.Based on the reasons driving household, government and business debt, municipalities have much to do in order to convince consumers of the benefit of the services they deliver. Therefore, it may be premature to grant all municipalities punitive collection powers.

9.5 Government's Response to Municipal Consumer Debt

9.5.1 Key legislative provisions

Numerous legislative provisions are intended to guide municipalities in managing their revenue. The Constitution provides broad principles that focus on the role that national and provincial spheres of government should play in municipalities, while the Municipal Finance Management Act (MFMA) and Municipal Systems Act (MSA) provide much more explicit direction on revenue and debt management, including possible recourse mechanisms. Section 64 of the MFMA clearly attributes full responsibility for revenue management to the accounting officer. The accounting officer is expected to ensure that the municipality has an effective revenue-collection system in place, that revenue due to the municipality is calculated on a monthly basis, that interest on arrears are charged and that National Treasury is informed of any cases of non-payment by other organs of state. The MSA dedicates an entire chapter to credit control and debt collection. This chapter details the need for municipalities to set up a customer care management system and provides guidance on the contents of a municipal credit control and debt collection policy, as well as methods that municipalities may employ in trying to recover amounts owed to it (for example, termination/restriction of services, seizure of property or attachment of rent payable on a property).

9.5.2 Other state interventions

In addition to legislative provisions, government has implemented four key interventions in an attempt to motivate greater levels of payment for municipal services by consumers and greater recovery of consumer debt by municipalities (Table 9.4).

Table 9.4 Summary of government-led policy interventions

Intervention	Description
1. Masakhane Campaign	The Masakhane Campaign represents the democratic government's first attempt at implementing a cost-recovery programme. Some commentators indicate that Masakhane was not very successful as a result of slow progress in the delivery of quality services.
2.Project Viability	The initial objective of Project Viability was to monitor the short-term liquidity of municipalities. This encompassed payment levels, arrears and the effectiveness of the credit control or collection function of municipalities. Later, the objective of the intervention was broadened to include support to municipalities experiencing financial problems (DPLG, 1998). According to McDonald (2002:33), the number of municipalities that actually fed the required information to the then Department of Provincial and Local Government (DPLG) was approximately 30%.
3.Project Consolidate	In 2004, the then DPLG launched Project Consolidate, yet another intervention aimed at revitalising the local government sphere. Municipal debt and billing systems were among the specific areas targeted. Relative to previous interventions, Project Consolidate represented a more hands-on approach to addressing municipal challenges, through the deployment of experts and professionals to municipalities. This intervention has shown limited success in the 139 municipalities where experts were deployed.
4.Local Government Turnaround Strategy	The most recent, national attempt to improve the performance of municipalities is the LGTAS, formulated in 2009. In order to achieve its objective of 'turning around' local government, the strategy allocates different roles and responsibilities to the three spheres. The strategy is meant to be holistic and aims to tackle a variety of challenges at the local level, ranging from systemic issues to political and accountability systems, capacity constraints and intergovernmental fiscal issues (CoGTA, 2009:3). Optimising municipal own-revenue collection is a clear goal of this strategy. The performance of this strategy cannot be judged, as it has only been implemented for a short while.

Source: Author

The Commission's Submission for the Division of Revenue 2011/12 included an assessment of fiscal stress and various local government revenue improvement programmes, which were found to be restricted to revenue management and administration issues. Furthermore while these aspects form part of the broader revenue collection value chain, they do not necessarily improve revenue collection (FFC, 2010). Based on available data on municipal consumer debt, these projects do not appear to have had significant impact. Yet, despite the limited impact, new programmes continue to be established.

In 2009 the LGTAS was introduced with the aim of optimising revenue and reducing debt, among other things. In 2010, before the LGTAS has had time to show results, Outcome 9, whose aim is a responsive, accountable, effective and efficient local government system, has also turned the spotlight on the need to reduce municipal consumer debt (among other things). However, government does not appear to evaluate what went wrong with failed reform attempts before implementing new programmes. In essence, a more holistic approach should be adopted; one that gives attention to the interplay of the various aspects of revenue collection. This would mean that processes, such as ensuring information on indigents is updated, and would run parallel to service delivery and revenue management.

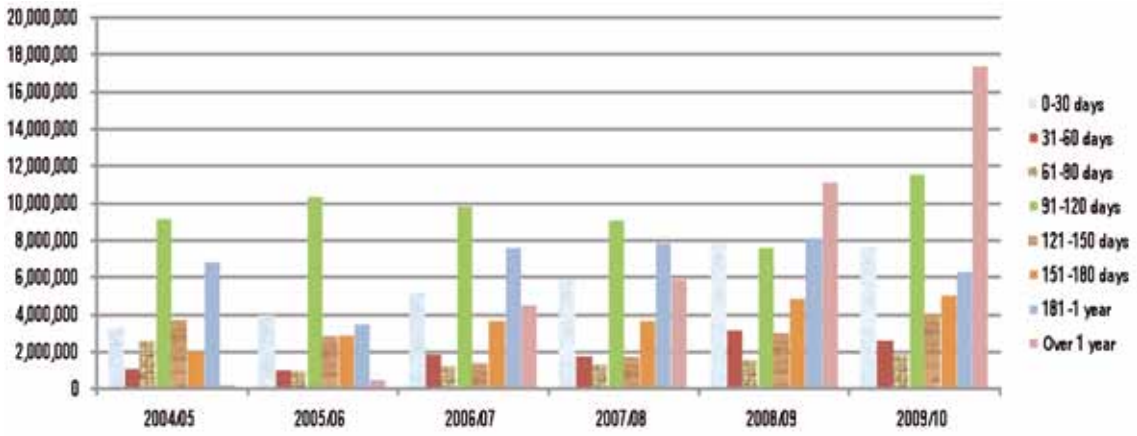
9.6 Key Issues Requiring Attention

The following key issues are considered critical, foundational issues that need to be addressed if the challenge of non-payment is to be further minimised.

9.6.1 Management of debtors

The accounting treatment of debtors varies across municipalities. Issues range from the recognition of revenue[124] to the inadequate writing-off of irrecoverable debt (this artificially inflates amounts outstanding) and inadequate provision for bad debt. There is also little uniformity on the level of interest charged on outstanding amounts. Figure 9.4 disaggregates total consumer debt in each year by the period for which it was outstanding and provides an indication of just one aspect of poor debt management. Over the six-year period, debt outstanding for 91–120 days is significant, but debt outstanding for over one year has started to dominate in the last two years.

Figure 9.4 Period for which municipal consumer debt was outstanding, 2004/05–2009/10



Source: Own calculations based on data from National Treasury, 2010

With respect to the level of interest charged on outstanding amounts, some municipalities peg the rate to the prevailing prime rate, whereas others charge a rate set at the discretion of the chief financial officer. Although these aspects are at the discretion of municipalities and their councils and should be based on location-specific conditions, formal debt management guidelines for different categories of municipalities could assist government to deal with this challenge. These guidelines could be provided in terms of Section 168 of the MFMA, which allows the minister to establish national regulations or guidelines applicable to municipalities.

124 This refers to some municipalities adhering to Generally Recognized Accounting Practice (GRAP) 9 versus others that comply with International Accounting Standards (IAS) 36 and IAS 39. With GRAP 9 the rendering of a service to an indigent does not increase debtors. The opposite is true for municipalities who adhere to IAS 36 and IAS 39: these municipalities recognise services delivered to indigents, which are then reflected as debtors and provision for bad debts need to be made (see SALGA Input to Budget Forum, 2010 for more information).

When municipalities do not accurately reflect the debtor information and overstate the expected income, they not only provide an unrealistic picture of their financial health, but also place the municipality's financial viability at serious risk. In its submission at Budget Forum in October 2010, the South African Local Government Association (SALGA) raised similar concerns around insufficient and insignificant bad debt write-offs.

9.6.2 Accurate accounting for indigents

Due to unemployment and poverty, certain households/citizens are unable to access or pay for basic services – this grouping is referred to as indigent (DPLG, 2005a). According to the FBS policy of South Africa, indigents are exempt from having to pay for basic services below a certain threshold.[125] The roll-out of FBS within municipalities is funded via the LES allocation and municipal own-revenue. As a result, the issue of indigents is intricately related to non-payment, as such non-payment constrains the amount of own-revenue at a municipality's disposal and therefore its ability to extend access and deliver FBS to the poorest of the poor.

Municipalities use a variety of ways to target indigents. In the case of water, which is the service where most non-payment accrues, the majority of municipalities use the targeted approach and the indigent register[126] tool. The problem is that municipalities do not regularly update this information, which means that indigents may be counted as (illegal) defaulters and so falsely inflate the extent of consumer debt. Accurate information, on who is eligible for FBS versus who should pay for services, is essential when devising credible revenue and expenditure estimates. Therefore, regular updating/maintenance of indigent information should be recognised as an integral component of revenue management and be included in Section 64 of the MFMA. More weight should be attached to the quality and accuracy of data and information about indigents, as such information can help to address a range of challenges, from better targeting of the poorest of the poor, to better quantifying of consumer debt and more credible revenue and expenditure estimates.

9.6.3 Monitoring affordability[127] of basic municipal services

Related to the issue of indigents is the need to monitor the affordability of basic services (water, electricity, sanitation, refuse removal). Although there is a national benchmark for who is eligible for FBS,[128] municipalities are at liberty to increase this threshold. In times of economic recessions or excessive tariff escalations,[129] municipalities need to be sensitive to the impact on vulnerable households on the margins that may be become eligible for FBS. Affordability indicators need not be complicated. For example, municipal policy-makers can monitor affordability (Milne, 2004:5) through consumption-related indicators (such as percentage of total household expenditure devoted to a commodity or per capita consumption/expenditure on a commodity), price-related indicators (for example unit prices paid for a commodity) or payment-related indicators (such as the use of arrears statistics, use of alternative payment schemes and disconnections owing to debt). These can assist municipalities in becoming more sensitive to potential increases in consumer debt and/or the need to adjust municipal indigent thresholds.

9.6.4 Poor billing and collection activities

Poor billing/collection is not specific to smaller, less resourced municipalities, as recent reports of public discontent with the poor billing practices of the City of Johannesburg prove.[130] Yet, improvements in billing and collection activities have the potential to bring about immediate enhancements to the revenue bases of municipalities. Instead, as households, business and government confirm, incorrect billing issues continue to negatively affect the integrity of local authorities. Poor performance

125 For example, in the case of electricity the FBS threshold is 50 kilowatt hours per household per month. For water, the FBS amount is 6,000 litres per formal connection per month.

126 See Non-Financial Census, 2008/09.

127 In its October 2011 submission to the Budget Forum, SALGA raised serious concerns around the affordability of municipal services to the average household and in particular the poor.

128 According to the 2005 Guidelines for the Implementation of the National Indigent Policy, R1,600 is cited as the monthly household income threshold for determining indigent status (See DPLG, 2005b).

129 For example according to Eskom's multi-year price determination for the period 2010/11–2012/12, the cost of electricity will increase by just under 26% annually. Municipalities often have little choice but to pass these increases on to consumers.

130 The City of Johannesburg recently spent R580 million on Project Phakama, an upgraded system described on the municipality's website as a system that will, "ensure greater functionality in the areas of metered services, billing, collections, customers' service options and payment process" (Mungoshi, 2010).

can result in paying customers being categorised as defaulters and, in certain instances, can exacerbate an unwillingness to pay. Achieving and maintaining accurate and efficient billing and collection processes depends on a number of factors, including accurate customer databases, effective and regular metering of service consumption, adequate staff capacity and convenient facilities for customer payments (World Bank, 2008). With respect to reasons driving household non-payment, poor/irregular metering systems were particularly emphasised (StatsSA, 2005, 2006, 2007, 2008). In this instance, wider use of prepaid meters may be a possible solution.[131]

Nevertheless, some municipalities successfully implement creative measures to improve billing and collection. For example, eThekwini Municipality has developed a geographic information system to facilitate enhanced management of water and sanitation services. The system uses aerial photographic surveys carried out annually to produce maps that indicate (for example) recently constructed properties and can show the precise location of all connected and unconnected properties (World Bank, 2008). The municipality also employs dedicated staff to focus on the recovery of government and top debtors. The City of Cape Town employs a similar strategy, with a dedicated section that focuses on the top 1,000 debtors in the City. Theewaterskloof places particular emphasis on the use of customer profiling and regular updating of its indigent register.

In addressing the billing and collection challenge, municipalities need to determine the root cause of poor performance. In instances where municipalities do not have the financial and human capital resources to upgrade and employ more sophisticated administrative and billing systems, consideration should be given to either outsourcing the function (permissible in terms of Section 76(b) of the Municipal Systems Act) or establishing an internal municipal service district to facilitate improved performance (permissible in terms of Section 85 of the Municipal Systems Act). In less severe cases, municipalities should explore the relatively less complicated solution of leveraging the experience of their counterparts who are capably managing their billing and collection functions. Finally, appropriate weight should be attached to the role of sound and efficient billing and collection processes in municipalities, as part of the specific key performance indicators (KPIs) included in the performance contracts of municipal managers. These KPIs should include, for example, reductions in the average time between meter reading and invoicing, increases in metered consumption (if metering is chosen over the use of prepaid systems) and improvements in the average time between complaints being lodged and (partially or fully) addressed.

9.6.5 Municipal powers to recover unpaid amounts

The government needs to take a differential approach when expanding the powers of municipalities to exercise more punitive recovery measures. This differentiated approach should not be based on municipal category but rather on individual municipal performance with respect to consumer debt, and should consider a range of factors, from general management of debt to regular updates of indigent information.

9.7 Conclusion and Recommendations

Municipal consumer debt is a complex challenge that requires multi-faceted solutions. Addressing the challenge requires not only interventions aimed at promoting greater levels of payment by consumers but also, perhaps more importantly, improvements to municipal service delivery and administrative processes. Based on the key issues discussed, the following recommendations are proposed.

- National guidelines/norms should be established for the management of municipal consumer debt. Such guidelines should cover aspects such as interest charges on outstanding amounts, debt impairment and writing-off of bad debts. The imposition of these guidelines could be an interim measure that can be relaxed once the management of debt improves in the local government sphere.

- Municipalities should continuously track the affordability of basic services, with indigent thresholds being accordingly updated.

- The regular updating and maintenance of data and information on indigents should be included as an integral component of municipal revenue management as specified in Section 64 of the MFMA.

131 The use of prepaid meters brings certain disadvantages, most notably by providing a false sense of progress with respect to access to basic services as a result of self-disconnection. However, if indigent thresholds are sensitive to changes in affordability and are appropriately adjusted, the advantages of using prepaid meters may outweigh the disadvantages.

- In addressing the billing and collection challenge, municipalities should determine the root cause of poor performance. In instances where municipalities do not have the financial and human capital resources to upgrade and employ more sophisticated administrative and billing systems, consideration should be given to either outsourcing the function (permissible in terms of Section 76(b) of the Municipal Systems Act) or establishing an internal municipal service district to facilitate improved performance (permissible in terms of Section 85 of the Municipal Systems Act). In less severe cases, municipalities should explore the relatively less complicated solution of leveraging the experience of their counterparts who are capably managing their billing and collection functions.

- Specific key performance indicators should be included in the performance contracts of municipal managers. These could include, for example, reductions in the average time between meter reading and invoicing, increases in metered consumption (if metering is chosen over the use of prepaid systems) and improvements in the average time between complaints being lodged and (partially or fully) addressed.

- In terms of expanding the powers of municipalities to exercise more punitive recovery measures, it is recommended that government take a differentiated approach that is not based on municipal category but rather on individual municipal performance with respect to consumer debt, and should consider a range of factors, from general management of debt to regular updates of indigent information.

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CHAPTER 10: ECONOMIC AND FISCAL COSTS OF INEFFICIENT LAND-USE PATTERNS

PDG, Stephen Berrisford Consulting and the African Centre for Cities

10.1 Introduction

In comparison with other similar international cities. South African cities are characterised by low densities, highly inequitable land distribution patterns and relatively high carbon emissions. The urban poor are typically located on the urban periphery; they face high transport costs, have little access to housing and services and are marginalised from the formal city economy. This inefficient land use not only exacerbates inequalities but is also costly to society in terms of lost gross domestic product (GDP), wasted physical resources and marginalisation of vulnerable population groups. An alternative, optimum land-use pattern is needed that will improve the social, economic and environmental effectiveness of South African cities. Post-1994 government interventions have aimed to address the spatial inequalities of the apartheid city. Although certain interventions, such as subsidised housing and transport have improved apartheid's effects, others have perpetuated its spatial layout through the poor location of housing and services.

However, what is not known is the long-term cost of these spatial decisions, which are driven by short-term capital constraints, and who will bear the cost of current land-use patterns. It is unclear whether the current financial frameworks will aid or impair efficient land use, or whether there is a financial argument that can justify altering these frameworks to enable short-term capital investment in spatial interventions in return for long-term economic gain.

In order to establish the size and scale of fiscal and economic costs that the current land-use patterns have on the South African economy, and on urban centres in particular, the objectives of the chapter are:

- To describe the current land-use patterns in South Africa and highlight their associated weaknesses or strengths.
- To establish and quantify the financial and fiscal costs (or opportunity costs) of current land-use patterns in South Africa.
- To establish the financial and fiscal costs of current land-use patterns on the transport, infrastructure, land and housing sectors.
- To make policy recommendations on fiscal policy alternatives required to restructure urban land-use patterns in the transport, infrastructure, land and housing sectors.

Two research methods are used to confirm or refute the proposition that an alternative land-use pattern is more efficient. The first method compares the South African spatial model with similar international cities using a number of efficiency criteria, and includes a literature review to understand the drivers behind the existing land-use patterns in South Africa. The problem statement that arises from this comparison and analysis relates to the current state of South African cities and is discussed in the section "The problem now".

The second method is a more dynamic approach that uses a financial model to measure city efficiency under a number of alternative spatial arrangements. The methodology was developed after consulting relevant literature and engaging with a wide range of professionals working in the field.

Following the international comparison and modelling, the chapter draws conclusions from the study, provides provisional policy recommendations and identifies areas for further research.

10.2 Method 1: Current State of South African Cities

10.2.1 South African cities are exceptionally inefficient

In an attempt to determine the degree of inefficiency, Table 10.1 compares South African cities with similar cities in other developing countries in terms of population density, average trip times and carbon footprint.

Table 10.1 Comparing efficiency of South African and international cities

	Joburg	Cape Town	eThekwini	Tshwane	Curitiba	Ahmedabad	Bangalore	Addis Ababa
Population density (people/hectare)	20.9	12	14	9.5	57	134	207	560.8
Average commuting time (minutes/capita/commuter trip)	52	50	45	60	-	20	-	62
Average trip length (km/person trip)	-	15.9 km	-	-	7.5 km	5.5 km	9 km	10 km
Productivity (GVA/capita)	R51,000	R41,000	R30,000	R42,000	-	-	-	700 euros
Carbon footprint (tons CO^2/capita/year)	7 tons	8 tons	6 tons	9 tons	4.2 tons per light vehicle	0.05 tons	0.12 tons	-

Source: Authors

The population density (measured in people per hectare) is much lower in South African cities than in the cities of Curitiba, Ahmedabad, Bangalore and Addis Ababa. However, the rate of carbon-dioxide emissions in South African cities is much higher, which indicates the need for urban restructuring to improve the urban form. Curitiba, a city hailed as one of the most sustainable cities in the world, has taken decisive and innovative action to integrate land use and transport. The city encourages higher-density and mixed-use developments along its famous bus rapid transit (BRT) routes (Magâlhaes, 2009). As Acioly (2004) shows, the local state in Curitiba plays an active role in facilitating sustainable development, promoting density and intense land use though innovative land-use planning and regulatory measures. These include transferring development rights, which allows developers to swap buildings of historical or architectural significance for land parcels in other parts of the city, increasing the allowable floor area ratios and relaxing zoning restrictions. Similarly, the Indian government is making considerable investments in transport infrastructure through its National Urban Transport Policy (2006), which aims to "ensure safe, affordable, quick, comfortable, reliable and sustainable access" to urban residents to employment and other services (CST – India, [Sa]).

10.2.2 Why are South African cities inefficient?

South African cities are characterised by low-density sprawl and highly unequal land distribution patterns, which are largely a result of apartheid policies. However, post-1994 inappropriate regulation, confusing and often conflicting policy priorities, and an unequal land market have contributed to and entrenched apartheid spatial patterns. Apartheid spatial planning has had a profound impact on the urban landscape. The 2004 State of the Cities report (SACN, 2004) argues that "the 'Apartheid City was a political economy of space' which was based on two policies, i.e. racially-based spatial planning and development for some at the expense of others".

Through legislation, such as the Group Areas Act, No. 36 of 1966, apartheid urban planning reserved specific areas according to race and class. Residential location ultimately determined the level of access to resources, infrastructure, other services and economic opportunity. Dewar (2004:211) argues that the interaction between apartheid spatial planning and the 'modernism' urban planning ideology – with its emphasis on suburban development, separation of urban activities of work and leisure, and the prioritisation of technical efficiency over social and environmental imperatives – have had a profound impact on the spatial urban form. The result is low-density, fragmented and separated cities.

Post-1994, the delivery of housing and other services has entrenched the apartheid spatial form, despite national policy imperatives that argue for sustainable human settlements with an emphasis on higher density developments on well-located land, and better integration between land use, transportation and the provision of infrastructure and services. Yet, the delivery of subsidised housing has not been in line with these policy prescriptions, primarily because of the "greater affordability and availability of land on the periphery of cities as opposed to expensive land in the more central

areas, coupled with insufficient subsidy amounts to build at higher densities to offset higher land costs" (Venter *et al*., 2004:563). Low-density developments on the urban periphery have serious implications for the delivery of transport infrastructure and mobility, with the result that transport subsidies often match or exceed housing subsidies in South Africa. In Cape Town, public transport subsidies for rail and bus transport increased from R415 million in 1998/1999 to R430 million in 2001/2002. In comparison, the money spent on subsidised housing was R206 million in 2001/2002 and R231 million in 2002/2003. In other words, the amount spent on the transport subsidy was more than double that spent on the housing subsidy.[132]

Location also affects the economic efficiency of cities, and a lack of interaction between employment and residential location results in unacceptably high commuting times and high carbon-dioxide emissions. The average carbon dioxide emissions in South Africa's six big cities are 6.5 tons per person, which exceeds the global average (Sustainable Energy Africa, 2006). The mismatch between location of housing and employment opportunities also contributes to income inequality between rich and poor. Unlike poor households, middle- and high-income groups can rely on private motorcars to access economic opportunities (Bertaud, 2009), as "where a city has high levels of private motoring convenience and poor public transport, car owners are able to access the agglomeration opportunities but public transport users are not" (Van Ryneveld, 2010).

Fifty-seven percent of South Africa's population currently live in urban areas, and between 2001 and 2006, the populations of the country's nine major cities increased by an average annual rate of 1.92% (SACN, 2006:6–3). Data from Statistics South Africa (SACN, 2006) shows that between 2001 and 2006, three million South Africans migrated from one district or municipality to another. Most migration was to the more economically prosperous provinces of Gauteng and the Western Cape (SACN, 2006). In addition, out-migration is growing from the economically declining Northern Cape and Eastern Cape to the Western Cape (Tomlinson *et al*., 2003 in Todes *et al*., 2010). Significantly, most of the growth in urban areas has occurred on the periphery of cities (Pillay *et al*., 2006).

Another important trend is the growth in the number of households, which has important implications for backlogs and the provision of housing and other services. In the nine major cities in South Africa, the average number of households grew by 27.5% (2.13 million households) between 1996 and 2001, which is more than double the growth rate of their population (Pillay *et al*., 2006). This has largely been attributed to declining household sizes – the average household size in South Africa decreased from 4.47 people in 1996 to 4 in 2001 (Pillay *et al*., 2006). Despite this, in most cities, economic growth outstrips population growth, demonstrating that people attracted to urban areas correctly assess that their prospects of employment are higher than in smaller towns or in the countryside.

Economic activity is highly concentrated in South African cities, with the nine major cities accounting for 62.5% of gross value added (GVA). These cities experience annual economic growth rates higher than 2.8% and economic growth rates that increased from 3.2% over the 1996–2001 period to 3.8% over the 2001–2004 period (SACN, 2006:3–8). Approximately 80% of South Africa's economic growth is generated in the Gauteng Province and in the cities of Cape Town, Durban, Pietermaritzburg and Port Elizabeth (Nel and Rogerson, 2009). In 2001 the five[133] biggest city economies provided 44.1% of the national number of jobs (4,223,449 jobs out of a total 9,583,770). The National Spatial Development Perspective (NSDP)[134] released in late 2006 found that, of people living under the minimum living level,[135] 77.31% are located within 60 km of areas that generate at least R1 billion of geographic value added.[136] Although the levels of inequality in the nine SACN cities decreased slightly between 2001 and 2005, as indicated by their Gini coefficients,[137] inequality in South African cities remains high. Since 1994, urban interracial inequality has decreased slightly, but overall inequality has increased since 1994 (Crankshaw and Parnell, 2004 cited in Boraine *et al*., 2006), and South African cities have inequality measures similar to some of the world's most unequal societies (SACN, 2006).

The form of South African cities has huge implications for mobility patterns and the provision of sustainable transport infrastructure, and "the state of public transport in a city, in terms of its accessibility, affordability, acceptability and availability, is a good indicator of the commitment of the city towards sustainable development" (SACN, 2009). Two-thirds of South Africans rely on public transport (DBSA, 2008), but public transport still imposes huge social and economic

132 Western Cape Strategy for the Development of Sustainable Human Settlements, June 2006.

133 Johannesburg, Cape Town, Tshwane, eThekwini and Ekurhuleni.

134 National Spatial Development Perspective released in late 2006.

135 The minimum living level is a poverty line used by the Bureau for Economic Research (BER) at UNISA. It refers to "the minimum necessary for an average family if its members are to maintain their health and have acceptable standards of hygiene and sufficient clothing for their needs" (Dasnois, 2005). The level is currently set at R1,950 a month.

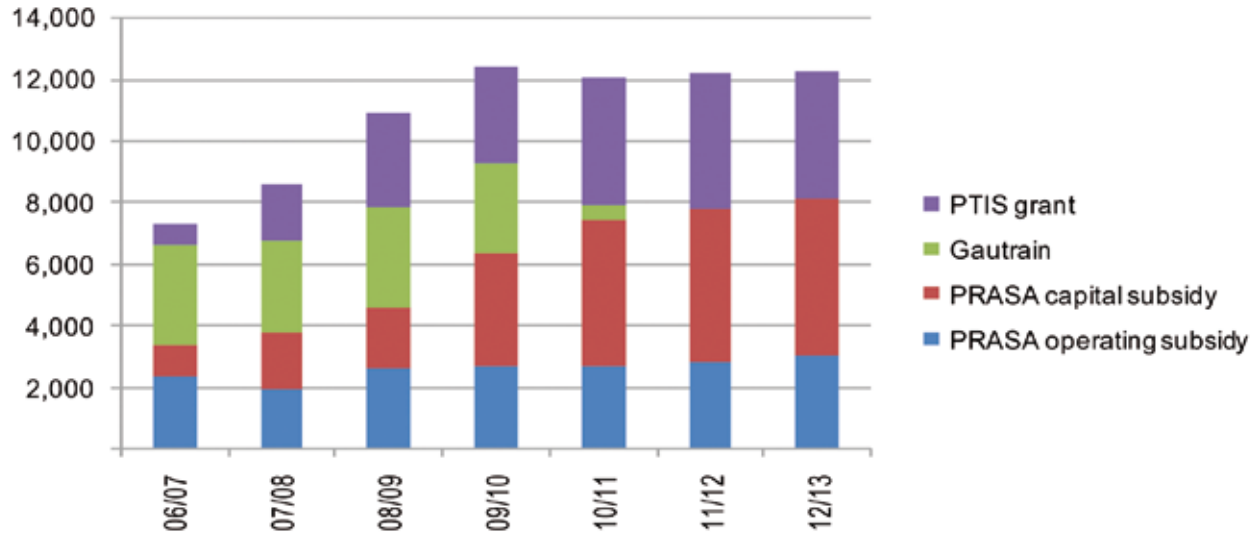
136 Geographic value added is a measure of economic performance and reflects the level of output in the economy and excludes taxes and subsidies.

137 Measure of inequality in income.

costs on poor households, as commuting times are unacceptably high (SACN, 2009). Public transport commuter trips in South Africa are longer than global averages: in Tokyo trip lengths are 8 km compared to more than 25 km in the City of Tshwane (SACN, 2009:6). Moreover, for 20% of households in the lowest income band, transport expenditure, as a percentage of household expenditure, increased from 4% in 1995/96 to 10.6% in 2005/2006 (SACN, 2009:6).

In an attempt to correct this unsustainable situation, the South African government is investing massively in transport infrastructure. Over a five-year period, R44.5 billion has been budgeted for improving the national road system, although the bulk of this expenditure is destined for national roads linking cities rather than for roads within cities. In addition, R61 billion has been set aside over a five-year period for investment in rail infrastructure (DBSA, 2008). Figure 10.1 provides an overview of the huge amounts of capital that have been, and will be invested by the South African government in maintaining and improving the country's public transport system.

Figure 10.1 Historical, current and future transport expenditure (R million), 2006–2013



Note: PTIS = Public Transport Infrastructure and Systems. PRASA = Passenger Rail Agency of South Africa.
Source: Van Ryneveld (2010) (modified to assume that 85% of the PRASA subsidy goes to commuter rail)

The South African government has recently embarked on a major infrastructure drive, which is motivated largely by economic growth imperatives and broader social concerns. Having set a target to halve poverty and unemployment by 2014, the government's triple infrastructure challenge is to: (SACN, 2007:40)

- provide infrastructure that will stimulate economic growth;
- maintain existing infrastructure; and
- provide infrastructure and services to the poor to eradicate poverty.

Among the number of factors that account for South Africa's infrastructure challenges is the country's historically low investment in infrastructure. Between 1976 and 2002 per capita investment declined from R1,268 to R356, while infrastructure investment declined from 8.1% to 2.6% of GDP, which is significantly lower than the international benchmark of between 3% and 6% (Fedderke *et al*., 2006:1041). Since 1975 investment in transport infrastructure has fallen by 1% per year (DBSA, 2008). In the late 1990s this low level of infrastructure investment was due largely to South Africa's macroeconomic policy, the Growth Employment and Reconstruction (GEAR) Programme, which focused on fiscal discipline and constrained public expenditure (Kirsten and Davies, 2008:8, 9).

Summing up South Africa's infrastructure challenges, the Development Bank of Southern Africa (DBSA) stresses that "government must ensure sufficient services to the core economy whilst extending them to historically marginalised groups" (DBSA, 2008:19). The current emphasis on infrastructure investment is a conscious effort by the government to break out of the pattern of underinvestment in infrastructure. It has set specific targets for the eradication of municipal service backlogs, which include those listed in Table 10.2 (DBSA, 2008:125).

Table 10.2 Service backlogs and deadlines for eradication

Backlog	Deadline
Eradication of sanitation bucket system	2007
Infrastructure for FIFA 2010 World Cup™	2010
Access to potable water	2011
Access to sanitation	2011
Universal access to electricity	2013
Solid waste	2014
Other municipal services	2014
Housing	2014

Source: DBSA (2008)

The eradication of service backlogs will require considerable infrastructure investment. According to the DBSA, the capital required to eradicate service backlogs ranges from R36 billion in 2007, increasing to R50 billion in 2011 and declining to R35 billion in 2015, assuming that infrastructure targets are met by 2014. Municipal infrastructure expenditure, which constitutes more than half of capital expenditure, has increased substantially from 13% in 2004 to 17% in 2006 (SACN, 2007:33).

10.2.3 Efforts to address efficiency: 1994–2010

In 1994 "South African cities were characterised by dire housing and service backlogs, inequalities in municipal expenditure, the spatial anomalies associated with the 'apartheid city', profound struggles against local government structures, high unemployment and many poverty-stricken households" (Pillay *et al*., 2006:2). The new government made a concerted effort to address the effects of apartheid spatial planning through a myriad of new policies and strategies post-1994. These include the:

- Reconstruction and Development Programme (1994);
- Urban Development Strategy, which was subsequently published as the Urban Development Framework (1997);
- Rural Development Framework (1997);
- Green Paper on Development and Planning (1999), which was the first official recognition of urbanisation trends;
- Development Facilitation Act (DFA), No. 67 of 1995;
- Breaking New Ground (2004) housing policy; and the
- Integrated Development Plans at local level.

The most prominent example of the government's efforts to introduce a more efficient urban development pattern is in the General Principles for Land Development contained in Chapter 1 of the DFA:[138]

> (c) Policy, administrative practice and laws should promote efficient and integrated land development in that they –
>
> i. promote the integration of the social, economic, institutional and physical aspects of land development;
>
> ii. promote integrated land development in rural and urban areas in support of each other;
>
> iii. promote the availability of residential and employment opportunities in close proximity to or integrated with each other;
>
> iv. optimise the use of existing resources including such resources relating to agriculture, land, minerals, bulk infrastructure, roads, transportation and social facilities;
>
> v. promote a diverse combination of land uses, also at the level of individual erven or subdivisions of land;

138 Section 3(1)(c) of the DFA.

vi. discourage the phenomenon of 'urban sprawl' in urban areas and contribute to the development of more compact towns and cities;

vii. contribute to the correction of the historically distorted spatial patterns of settlement in the Republic and to the optimum use of existing infrastructure in excess of current needs; and

viii. encourage environmentally sustainable land development practices and processes.

In their analysis of the evolution of urban spatial policy in post-apartheid South Africa, Atkinson and Marais (2006) argue that "a lack of clear urbanisation and spatial direction" from the South African Government has had the following unintended consequences:

- Contradictory and confusing messages about the relationship between rural and urban development.
- Uncoordinated spending patterns and the allocation of resources without an appreciation and understanding of settlement patterns. This is the result of narrow sectoral thinking, which has failed to recognise the dynamic interaction between rural and urban areas.
- Conflicting spatial settlement policies.

Similarly, Turok and Parnell (2009) argue that the South African Government's ambiguous stance on rural–urban migration and the lack of a clear national urban development policy to guide and complement local urban development initiatives have constrained efforts for efficient, sustainable and integrated urban development. However, recent trends in urban development policy, specifically the NSDP of 2006, reflect the growing realisation in government of the impact of urbanisation and the importance of the spatial dimension of economic growth and development.

Undoing something as complex as the South African urban spatial pattern can only succeed if it is supported by demonstrable economic/fiscal logic. When confronted by land market forces and government imperatives to address service delivery and housing backlogs in the shortest possible time, good intentions, however well supported by the policy thrusts of international agencies and academic experts, are simply unable to gain traction. Even when these intentions are translated into legislation, as was the case with the General Principles for Land Development in Chapter 1 of the DFA, limited discernible change followed.

10.2.4 The problem now

The failure of policy and legislative measures to change the inefficient, inequitable and unsustainable patterns of urban development in South Africa is widely accepted. The urgency of addressing the issue can also be attributed to global concern about lowering the carbon footprint of cities. A number of attempts have been made recently to quantify the cost implications of current patterns.[139] The argument for more efficient cities has to be premised on a methodology that measures economic and fiscal costs of current patterns. Such a methodology will enable policy-makers to see these costs, as well as the opportunity costs of not developing more efficient cities, and will provide an instrument to test the impact of new policy proposals on urban efficiency.

A credible methodology is needed for measuring the costs of urban spatial patterns, for if cities continue to develop inefficiently, they will impose greater costs on the economy and weaken the economy's capacity to generate more jobs and wealth. In addition, unless the causes and drivers of these costs are understood before embarking on new initiatives to address the widely acknowledged, but still unproven, effects of inefficient patterns of development, government will fail to achieve these new initiatives and generate a new set of unanticipated costs.

Although inefficient cities are recognised as bad, the problem is that there is no shared understanding of what constitutes inefficiency. Urban efficiency consists of a number of interdependent dimensions, which include economic, social and environmental aspects. The debate about urban efficiency is centred on the sustainable use of particular, finite resources, with land and energy being the most important. According to Buxton (2006), urban efficiency is defined in terms of travel patterns, infrastructure and energy use, social and environmental costs, congestion costs and the cost of sprawl. Inefficiencies emerge from the way the land market operates and the way the government invests in infrastructure and subsidised housing and

139 Biermann and van Ryneveld (2007); Venter *et al*. (2006); Social Housing Foundation (2009).

transport. However, there is no basis upon which to identify the specific drivers of spatial patterns. It is recognised that high costs are incurred as a result of the country's patterns of urban growth, but it is uncertain who will bear these costs, especially over time. These are problems that the methodology will help to resolve. This methodology is constrained by time and budget and cannot be expected to resolve all the problems conclusively, but it is an essential first step.

10.3 Method 2: Methodology to Measure City Efficiency

10.3.1 Methodological approach

The purpose is to develop a methodology that quantifies the greater costs of inefficient land use (and related aspects such as public transport) in a transparent, robust and comprehensive way, which includes identifying the costs and who incurs these costs. Four financial 'actors' are defined: households, businesses, the city and the state.[140] The methodology must be able to produce consistent and defensible results in particular cities, and the numbers generated should be able to be used to test scenarios. These will inform macro-economic debates around urban development options and government policy interventions.

The sectors identified as affected financially by location are housing, land, transport and infrastructure[141] (engineering infrastructure for water supply, sanitation, electricity, solid waste disposal and roads). Although other sectors, such as education, health facilities and other regional-scale public services, have efficiency implications related to location, existing travel patterns already reflect these implications.[142] For example, if an area does not have adequate access to schools, the cost implication is that people will have to travel further to get to schools. Their daily travel patterns capture the cost, which is reflected in the household expenditure on transport for that zone.[143]

Location affects the costs of the four identified sectors in two ways. Firstly, low-density, dispersed settlements mean increased recurrent costs, such as transport costs due to greater distances and increased maintenance costs on longer pipe networks. Secondly, the spatial arrangement of a city has an impact on the capital cost of new infrastructure and on the rehabilitation of existing infrastructure. The relationship to increasing density may be positive or negative, as although low densities mean that rail lines, roads and pipe networks may be longer, higher density buildings cost more than low density dwellings and so unit land costs in dense settlements will be higher.

The first task is to assess the current operating costs within a typical South African city and to see how these would differ under an alternative spatial arrangement. The second is to assess the different capital cost needs. Although it may be possible to cost alternative spatial arrangements of a South African city from 'scratch', the exercise would be highly theoretical and have little practical application, as the urban fabric is already established. Instead, to calculate the capital cost of alternative land-use patterns, it is more useful to cost alternative growth trajectories: one that extends the existing layout of South African cities through existing development principles (an urban sprawl scenario), and one that looks at an alternative compact city development model.

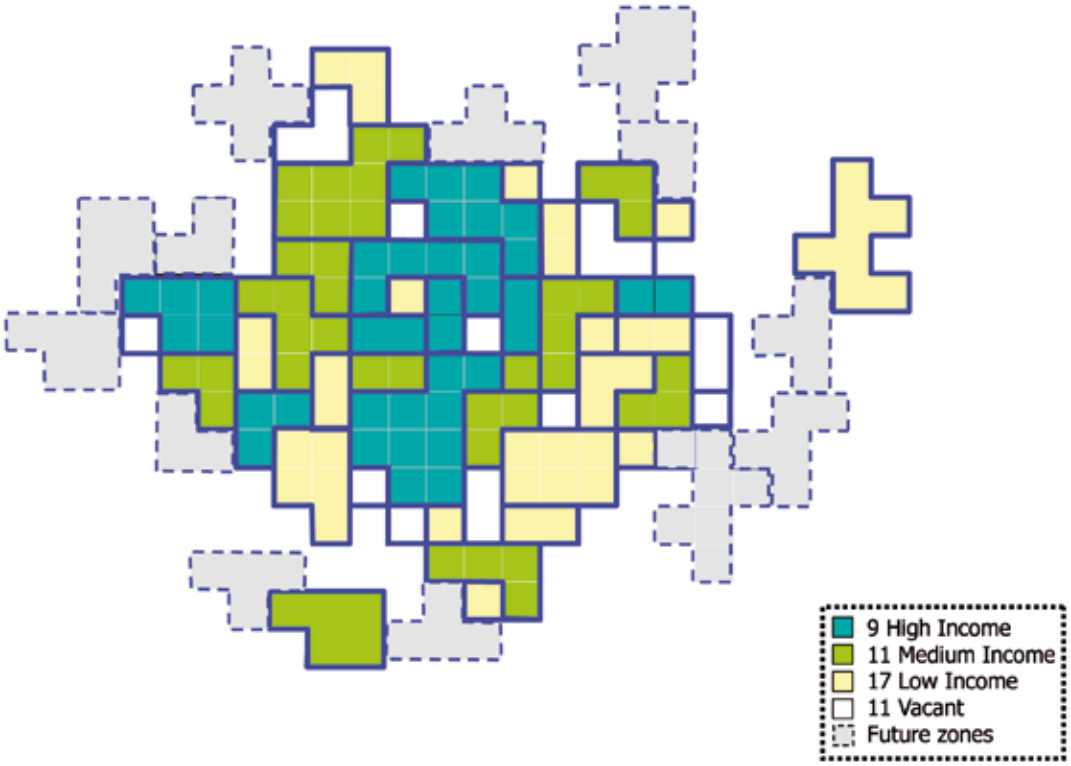
10.3.2 The hypothetical city and the city efficiency costing model

A 'hypothetical' South African city is developed based on the following assumptions: that South African cities share common characteristics (e.g. low-cost housing on the periphery, informal settlements on small parcels around the city, racially segregated communities); that spatial growth is informed by similar drivers (e.g. apartheid planning policies, housing subsidy structure); and that the country's three largest cities have similar populations, areas and socio-economic profiles. The risk of using a hypothetical city, instead of a real case study of a particular city, is that the costs cannot be definitive, and the results cannot be directly applied for making planning decisions at a city level. However, the benefits of using a hypothetical city include the development of a generic structure that can be applied to any real city in future, and producing findings that are relevant to all South African cities. Despite being hypothetical, the city model will be developed using real data from all of the three largest metropolitan municipalities (metros), Johannesburg, Cape Town and eThekwini. Using a hypothetical model also avoids the need to achieve high degrees of accuracy to justify conclusions drawn from one particular city.

140 Provincial government is excluded in this analysis, as it functions largely as a conduit through which national funds flow to the city or to households.
141 Physical engineering infrastructure associated with municipal services.
142 The future location of these services will have an impact on city efficiency, but is beyond the scope of this study.
143 Conversely, if the state invested in more schools, the benefit would be reflected in the reduction in travel time and cost to the household. However, the capital cost to the state would be outside the scope of this methodology.

The tool developed for this project is the Microsoft Excel-based city efficiency costing model (CECM). For the purpose of this costing exercise, a hypothetical city was created with 37[144] indicative zones of homogenous housing typologies (Figure 10.2). In addition, 11 vacant zones were added to simulate vacant parcels of land within the urban edge of the city. Each zone (indicative and vacant) has a number of attributes that define the zone in terms of land use, intensity of use, housing typology, commercial and industrial activity, location, transport characteristics, and infrastructure requirements.

Figure 10.2 Example of a hypothetical city with sample development zones



Source: Authors

In theory, any number of zones can be defined, and the attributes or 'fields' can be unique for each zone. However, to simplify the modelling of residential areas and to reduce data requirements, thirteen standard housing types were defined. These housing types have their own set of attributes, including income profile, building typology, rental characteristics and levels of service. A full list of the housing typologies and attributes is given in Table 10.7. The sums of the values entered for each zone were checked against the real conditions in the South African metros (e.g. population, transport usage, water consumption). Variables within the model were then adjusted to calibrate the assumptions until a 'realistic' scenario was achieved.

10.3.3 Calculating cost

Recurrent costs

The model calculates the monthly recurrent cost for housing, transport and infrastructure in each zone as a whole, by applying unit costs to the amount and type of housing and non-residential portion, travel patterns and infrastructure service level. However, an important consideration is that costs[145] are incurred at three primary 'levels': consumer level (households and businesses), city level and state level (the national fiscus, including flows from the fiscus through provinces). To understand these costs and the relationship between the three tiers of costs, the state subsidies and city rates and tariff policies are superimposed on the total operating costs to determine who actually pays for the services; in other words how the costs accrue to the different financial 'actors', as illustrated in Figure 10.3.

144 The number of zones is fairly arbitrary, but was selected to match the transport data used in the model.

145 It could be argued that costs can be seen as being independent of the body that incurs them. However, this argument will not assist in providing an understanding of how to improve the spatial efficiency of cities through economic and fiscal measures, as these measures are in the realm of public finance policy that is controlled largely by the city and state.

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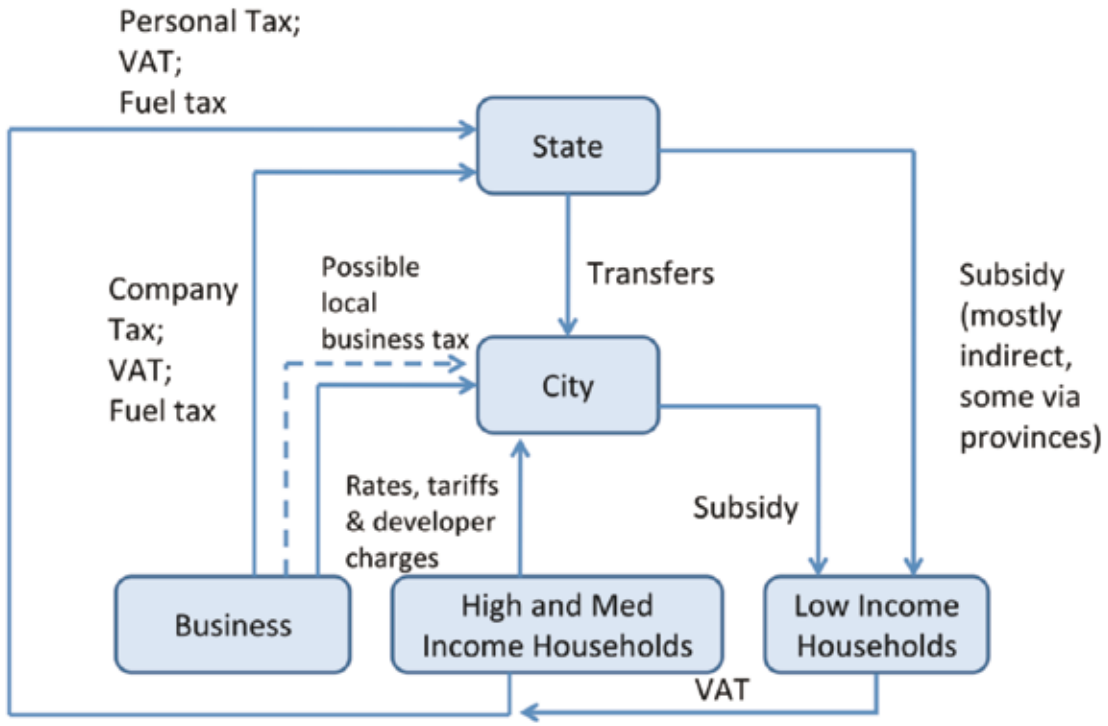
Figure 10.3 Framework for financial flows in South African cities



Source: Authors

A further 'level' of costs is defined as costs to the environment, measured through a combination of direct and indirect measures. Although the scope of this study does not allow for the costing of climate change impact, the energy balance of a city is recognised as an important economic parameter. Therefore, high-level numbers on electricity and fuel use by households within the hypothetical city have been included to assess the 'first order' costs to the environment. Further, in considering costs associated with water, energy, waste and wastewater treatment and disposal, the cost of these bulk services can be increased over time to allow for real cost trends in these sectors.

In this methodology, costing at the household or business tier is most important, in particular, the costs of providing households with services, transport, land and housing, and how much households pay for these services. The inclusion of only three household groups – high-income (typically earning above R12,800 per month), middle-income (typically earning R3,500 to R12,800 per month) and low-income (typically earning below R3,500 per month) – is an obvious simplification, but allows some key concepts to be shown.

Capital costs and the city growth model

When calculating the capital cost, the first step is to value the total existing assets in the city, by applying unit capital replacement costs to the amount and type of infrastructure. This enables a high-level 'asset register' to be constructed for the city. The figures were calibrated against similar figures from the Municipal Services Finance Model (MSFM)[146] used in previous work done for the metros.

Two key growth parameters were used for city expansion: natural household growth through population increase and household fragmentation; and economic growth. The household growth parameter was used to model the growth in housing and service demand, while the economic growth parameter was used to determine the movement of households between income brackets and the rate of commercial and industrial expansion. Within the model, the housing module allocates households to primary and secondary dwellings (backyard shacks, formal rental rooms and granny flats), including 'downward-

146 A model developed by PDG for the DBSA, the Department of Cooperative Governance and Traditional Affairs and the National Treasury. For more information, see DBSA (2010).

raiding'[147] of low-income housing stock by middle-income households, with the households remaining, after the allocation of all the housing stock, being accommodated in informal settlements. The result of applying these two parameters was the number of new consumer units and the associated land demand over a ten-year period.

Spatially, this residential growth was accommodated in the hypothetical city using the following logic:

- Existing areas were densified using a densification factor,[148] which was varied according to the scenario being modelled.
- Vacant stands within existing residential zones were populated with the same housing typology as for the zone as a whole, provided the demand for that housing typology existed.
- Vacant zones within the urban edge were populated with housing typologies according to a pre-determined priority ranking and according to demand.
- Vacant areas were ranked by their 'location factor'[149] and the best-located sites were allocated the highest priority land use. For the urban sprawl scenario, priority was given to high-income, high-density housing, followed by high-income, low-density housing, and so on; low-income, low-density development was the penultimate priority, before low-income informal settlement. For the compact city scenario, development was prioritised by density (high to low) and then by income (low to high), with low-income informal settlements again being the lowest priority land use.
- An assumption was made about how much of the total portion of vacant land within the city was actually available for development.
- Once all available vacant zones within the urban edge were occupied, the remaining residential and non-residential demand was accommodated in new zones outside the urban edge. These new zones were all assumed to have the same transport characteristics and a 'location factor' worse than any existing zone within the urban edge.
- New, non-residential development was accommodated according to the same logic as residential areas, with the same proportions of residential to non-residential land use by housing typology.
- Growth was assumed to be linear and thus the total city situation in year ten was calculated and intermediate years were interpolated.

Once this process was complete, the result was a new zonal definition for the land use and characteristics of the 48 existing zones and 13 new zones. These zones were then allocated new transport characteristics based on a number of assumptions regarding public transport mode shifts and travel time increases or decreases:

- A decrease in the percentage of commuters using private cars over ten years was assumed (10% for the urban sprawl scenario and 20% for the compact city scenario).
- A percentage reduction in non-motorised transport was assumed (50% for both scenarios).
- Public transport commuters were ascribed to mass transit (rail and BRT) according to zone density (higher density = higher mass transit).
- The BRT:rail split for mass transit was assumed to be 35:65 for both scenarios.
- The remainder of public transport users were split between taxi and bus in the same ratio as for year one.
- For existing zones, travel patterns remained the same and would not be influenced by new development nodes.

The last point is not a realistic scenario. However, such a hypothetical exercise is not capable of predicting how travel pat-

147 In expanding cities with sufficient housing stock, 'downward raiding' occurs when middle-income groups buy housing intended for low-income residents.

148 A factor that represents the degree to which the density of an existing zone will increase over the existing density, i.e. a factor of 1.5 will mean that density has increased by 50%, while a factor of 1.0 means that the density remains constant.

149 See the section on Data Sources for a description of the 'location factor'.

terns would alter. The more sophisticated transport models do project travel patterns, and this future pattern could be used as a model input for the final model year. The unit operating costs in year ten were also assumed to have varied in real terms. These assumptions were used to inflate the unit operating cost and a calculation of the total recurrent costs in year ten were then made for both scenarios.

The capital costs for city growth were calculated based on the number of new units constructed, the land utilised and the service levels provided. Transport expenditure was calculated on the capital investment required to generate the assumed change in passengers for the various public transport modes. The recent expenditure on BRT in Cape Town and Johannesburg, and the Cape Town Rail Plan guided these capital investment figures. In addition to the capital costs for new infrastructure, rehabilitation expenditure was included for engineering services and transport infrastructure.[150] A value of 2% of the total current replacement cost of the assets was assumed (correlating to an average useful life of 50 years for these assets). Thus, a total capital sum was calculated for each of the two growth scenarios. As with the recurrent costs, these capital costs were ascribed to each of the financial 'actors' through an analysis of the current subsidy structure. For the modelled scenarios, the current subsidy regime was assumed to continue unchanged. However, for future application of the methodology, the subsidy policy can be altered and the impacts on city efficiency assessed.

10.3.4 Data sources

Key data required for the CECM is transport data, i.e. travel time and distance by mode. This data is available in city transport models but, up until now, has been applied specifically for modelling transport route capacities at peak periods. Transport model data typically also has demographic, socio-economic and density attributes. When linked to land use and financial data, this data becomes very useful for determining the efficiency of a city, as a good measure of city efficiency is how people travel, over what distances, and how long it takes them. It can be assumed that zones with short travel times and distances are 'well located'. The transport data also shows which zones have access to which type of public transport infrastructure.

The use of real transport data enables the modelling of a polycentric city, which shows how people actually move in a city (in as generalised a way as can be captured in a transport model), instead of having to make assumptions about who is moving to where. From this transport data, a 'location factor' is derived, which is a function of the time and the distance travelled. The location factor was calculated as the simple sum of travel time (in minutes) and travel distance (in kilometres), but each of these terms can be weighted if necessary. This location factor is used to prioritise zones for development and densification, but also to apply a cost premium to connector infrastructure. This 'connector infrastructure premium' is based on the assumption that 'poorly located' zones within the city also cost more to service (longer pipe lengths, roads, etc.).[151] The model is therefore able to calculate the cost differential between servicing central and peripheral locations. The connector infrastructure premium was calibrated to achieve a factor of three between the least and most costly zones.[152]

Another key set of data required for the CECM is unit costs for housing, land infrastructure and transport. Land and housing unit costs were obtained from private sector property developers, as well as from previous financial modelling exercises undertaken by PDG for South African municipalities. As land prices are highly variable and poorly researched, broad assumptions had to be made, and so the sensitivity of the model results to land price has been tested. Infrastructure unit costs were obtained from case studies of metros using the MSFM, in which the actual expenditure and revenue of cities for each of the services was calculated. Transport unit costs were obtained from previous studies by PDG to populate Public Transport Models for the country, and for the City of Cape Town and then checked against current public transport projects. Data regarding rates and tariffs was taken from the existing rates and tariffs of the three metros, and an average value was assumed.

10.3.5 Key assumptions

Two key drivers in the model are the economic growth rate and the household growth rate. These have been set to the defaults in the MSFM, as shown in Tables 10.3 and 10.4.

150 Rehabilitation expenditure on private housing or business property was incorporated into the capital appreciation values included in the recurrent cost calculation and thus was not considered in the capital cost calculation.

151 Some complexity is introduced if one considers the premium paid for upgrading existing infrastructure in dense inner-city areas, but this has not been directly considered in the model structure.

152 A factor of three was taken as a 'reasonable' cost premium for servicing peripheral areas. More accurate estimates of this figure have been made by the eThekwini Metro in their Cost Surface Model, which calculates the premium paid for providing bulk and connector infrastructure in specific zones within the city.

Table 10.3 Economic growth rate used in CECM model (%)

2011	2012	2013	2015	2020
1.0	2.0	3.0	4.0	6.0

Source: Authors

Table 10.4 Household growth rates used in CECM model[153] (%)

	2010	2015	2020
High income	0.5	0.5	0.5
Middle income	1.0	0.9	0.8
Low income	3.5	3.0	2.5

Source: Authors

As the subsidised housing delivery programme is an additional key driver of growth and the form of cities, both the quantity and type of housing products delivered by the state need to be projected over the model period. Given that housing delivery is strongly supply-driven at present, a figure was assumed for the quantities of full state subsidies used for low-income units and Finance-Linked Individual Subsidy Programmes (FLISPs) for middle-income units. While this figure can be varied by setting the delivery rate at year one and year ten, the delivery rate was assumed to be constant for these model runs. The percentage of units for ownership (as opposed to rental) was also assumed. These assumptions are shown in Table 10.5.

Table 10.5 Subsidised housing delivery assumptions

	No. of dwelling units (DU) delivered each year
Fully subsidised housing: year 1	10,000
Fully subsidised housing: year 10	10,000
FLISP subsidised housing: year 1	2,000
FLISP subsidised housing: year 10	2,000
	% owned
Fully subsidised housing:	80
FLISP subsidised housing: year 1	80

Source: Authors

The housing typology associated with these subsidies (e.g. high-density units, single formal units or incrementally upgraded sites) depends on which of the various housing programmes the national Department of Human Settlements and the metros prioritise over the next ten years. The assumed housing mix (including both subsidised and unsubsidised housing) varied for each of the scenarios, as Table 10.6 shows.

Table 10.6 Assumed type of housing delivery for each scenario (%)

Housing type	Urban sprawl	Compact city
LI flat	5	20
LI 3 storey	5	30
LI semi	10	30
LI single formal	80	20
MI flat	10	20
MI 3 storey	15	20
MI semi	15	20
MI single formal	60	40
HI flat	10	20
HI 3 storey	15	20
HI semi	15	20
HI single formal	60	40

Note: LI = low income; MI = middle income; HI = high income.
Source: Authors

153 Note that households also shift between income brackets owing to economic growth assumptions. Accordingly, the high-income growth will be higher than natural growth and low-income growth will be lower than natural growth.

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The assumptions regarding the demographics and service levels for each of the 13 housing typologies are shown in Table 10.7.

Table 10.7 Default characteristics of housing typologies

Housing types	Dwelling units per consumer unit	Households per dwelling unit	People per household	Water	Sanitation	Electricity	Solid waste	Road length (metres per consumer unit)	Type of secondary dwelling	Net density (consumer units per hectare)	Average % rental of primary dwelling [154]
LI informal	1.00	1.00	3.49	Inadequate	Inadequate	None	Community contractor	0.2	None	150	40
LI flat	1.00	1.10	3.49	In-house	W/borne	Serviced	Municipal kerbside	2	None	200	80
LI 3 storey	1.00	1.20	3.49	In-house	W/borne	Serviced	Municipal kerbside	4	None	100	60
LI semi	1.40	1.20	3.49	Yard tap	W/borne	Serviced	Municipal kerbside	5	Backyard shack	80	20
LI single formal	1.40	1.20	3.49	Yard tap	W/borne	Serviced	Municipal kerbside	6	Backyard shack	67	20
MI flat	1.00	1.05	3.49	In-house	W/borne	Serviced	Municipal kerbside	2	None	100	80
MI 3 storey	1.00	1.05	3.49	In-house	W/borne	Serviced	Municipal kerbside	4	None	80	50
MI semi	1.40	1.05	3.49	In-house	W/borne	Serviced	Municipal kerbside	6	Backyard shack	50	30
MI single formal	1.40	1.05	3.49	In-house	W/borne	Serviced	Municipal kerbside	9	Formal room	40	30
HI flat	1.00	1.00	3.49	In-house	W/borne	Serviced	Municipal kerbside	4	None	100	60
HI 3 storey	1.00	1.00	3.49	In-house	W/borne	Serviced	Municipal kerbside	6	None	50	50
HI semi	1.00	1.00	3.49	In-house	W/borne	Serviced	Municipal kerbside	10	None	25	40
HI single formal	1.00	1.00	3.49	In-house	W/borne	Serviced	Municipal kerbside	15	Granny flat	20	40
Vacant	-	-	-	Inadequate	Inadequate	None	None	0	None		
Commercial and industrial	-	-	In-house	W/borne	Serviced	Municipal kerbside	15	-	20		

Note: LI = low income; MI = middle income; HI = high income.
Source: Authors

Tables 10.8 and 10.9 outline the assumptions used for changes in the real cost of municipal property rates, building materials, infrastructure construction costs and transport (fuel) costs.

Table 10.8 Real increase municipal property rates over ten years (%)

Residential	Commercial and industrial	Vacant land
10	12	10

Source: Authors

Table 10.9 Real cost increases over ten years (%)

Real building cost increase	30
Infrastructure capital cost increase	20
Infrastructure operating cost increase	10
Transport operating cost increase	50

Source: Authors

In addition to the above parameters, which were kept constant for both the scenarios, there were a number of scenario-dependent variables relating to:

- densification factors for existing zones;
- percentage of total existing land assumed to be available for development;

154 It is assumed that all secondary dwellings are rented.

- maximum increase in land value due to scarcity;
- reduction in private car use;
- increase in travel time; and
- mass transit usage and split between BRT and rail.

Annexure 10A provides a full list of the values assumed in each scenario for these variables.

Links to the financial system at city and state level

The division of costs between the four simplified financial 'actors' in the city (households, businesses, the city and the state) is defined by the level of and the qualification criteria for these subsidies. The model does not consider all the fiscal flows illustrated in Figure 10.3, as it excludes VAT, social grants, payments by households to private entities (except for private transport companies) and financial flows to and from public entities, such as Eskom. The main subsidy flows considered are:

Housing subsidies

As described above, the assumption is that a full subsidy amount of R77,868 is granted to low-income households to cover top structure costs, then infrastructure costs and then land costs. The city pays for any shortfall between the subsidy and actual cost, up to a maximum of R40,000 per unit. A state electricity subsidy of R7,000 per low-income household is added to the housing subsidy for internal services. For the middle-income FLISP subsidy, an amount of R5,136 (the subsidy amount for a household earning R7,000 per month) goes towards top structure and service costs, and the household pays the shortfall.

Infrastructure operating subsidies

These were based on the assumption that the equitable share grant from the state covers most, but not all of the operating costs for low-income households. The city can make a surplus or a deficit on providing services to middle- and high-income households, depending on whether the tariff is set above or below cost. The city assumes the full cost of providing roads, as there is no state subsidy for this, and this cost is assumed to be recovered through municipal rates. These assumptions are presented in Table 10.10.

Table 10.10 Basis for infrastructure operating subsidy assumptions

Service	Income	% State subsidy	% City subsidy	% Household charge	Subsidy mechanism
Water, sanitation, electricity and solid waste	Low	80	20	0	Equitable share grant
	Middle	0	Tariff minus cost	Tariff	City tariff policy
	High	0	Tariff minus cost	Tariff	City tariff policy
Roads	Low	0	100	0	City rates account
	Middle	0	100	0	
	High	0	100	0	

Source: Authors

Infrastructure capital subsidies

These subsidies are for internal infrastructure to low-income households and vary depending on the housing typology. This is because the levels of service (and therefore the total costs) vary, while the infrastructure portion of the housing subsidy remains constant. Middle- and high-income households are assumed to pay the full capital cost of infrastructure. For new bulk and connector infrastructure, the Municipal Infrastructure Grant (MIG) is assumed to cover most, but not all, of the costs of providing infrastructure to low-income households, while for middle and high income households, some of the capital costs are recovered from households through developer charges. The remainder of the cost is borne by the city. Rehabilitation costs are covered by MIG and by the city (Table 10.11).

Table 10.11 Basis for infrastructure capital subsidy assumptions

Service	Income	% State	% City	% Household	Mechanism
New internal infrastructure	Low	76–95	5–24	Only informal households	Housing subsidy and city top-up to make up difference, depending on the housing type and level of service
	Middle	0	0	100	Developer costs passed on to household in purchase price
	High	0	0	100	
New bulk and connector infrastructure	Low	80	20	0	MIG and city top-up
	Middle	0	80	20	Developer charges, passed on to the household in purchase price
	High	0	50	50	
Rehabilitation of existing infrastructure	Low	100	0	0	MIG funding for rehabilitation of state-funded assets
	Middle	0	100	0	Capital reserves and borrowing
	High	0	100	0	

Source: Authors

Transport subsidies

These subsidies are not currently transparent and are difficult to determine accurately. However, the assumptions made for public transport capital and operating subsidies are shown in Tables 10.12 and 10.13. The model can accommodate a shift in the focus of transport operating grants over time, by entering different subsidy percentages for year one and year ten.

Table 10.12 Transport operating subsidy assumptions (%)

Year	Funder	Car	Rail	Taxi	Bus	BRT
2010	State	0	63	0	45	20
	City	0	0	0	5	5
2020	State	0	63	0	45	20
	City	0	0	0	5	5

Source: Authors

Table 10.13 Transport capital subsidy assumptions (%)

Funder	Car	Rail	Taxi	Bus	BRT
State	0	100	0	0	80
City	0	0	0	0	20

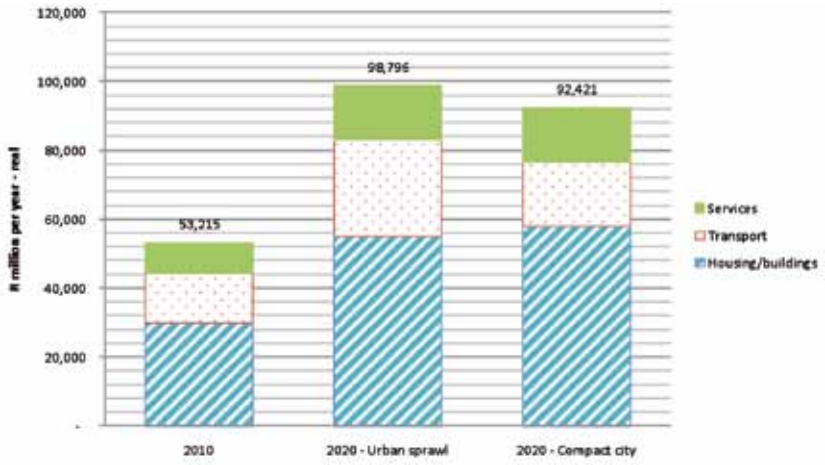
Source: Authors

10.3.6 Results

Recurrent costs

Figure 10.4 illustrates the total recurrent cost for the hypothetical city.

Figure 10.4 Total recurrent cost for the hypothetical city (R million)

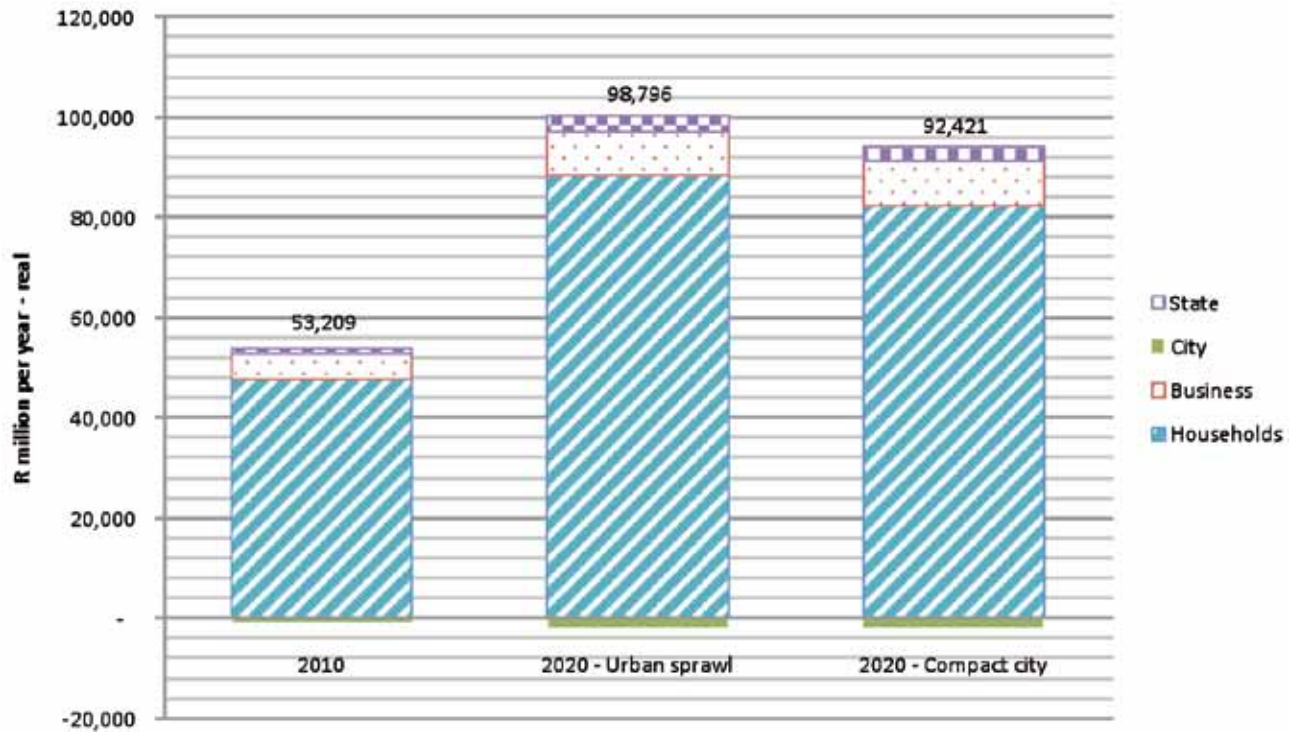


Source: Authors

To run housing, infrastructure and transport in the hypothetical city in the base year requires total recurrent costs of R53 billion per year. Over half of this cost is made up of housing costs. When these costs are escalated to 2020, the operating costs of the city escalate to R99 billion in the urban sprawl scenario and R92 billion in the compact city scenario – a difference of 7% in year ten.

As would be expected, the largest difference between the recurrent costs of the two scenarios is in the transport cost. The increases from year one to year ten are due to city growth and the assumed real cost increases of the various services. In examining who incurs these costs, households clearly carry most of the financial burden, as Figure 10.5 shows.

Figure 10.5 Recurrent costs broken down by financial 'actor' (R million)



Source: Authors

The cost increases from year one to year ten are largely absorbed by households, particularly in the urban sprawl scenario. In this analysis, the recurrent costs incurred by business were limited to rates and infrastructure costs, which increased by 85% and 72% in the urban sprawl and compact city scenarios respectively. Preliminary results show that the city makes a small surplus in the provision of these services, with water and electricity typically providing surpluses that municipalities can use to cross-subsidise other municipal functions.

An assumption has been made that 10% of rates income is used to fund roads. As other non-income-generating municipal functions have not been included in the analysis, the services considered would realistically show the city making a small surplus. Changing the rate tariff and subsidy levels can cause this figure to be slightly positive (i.e. city makes a net loss). The recurrent costs incurred by the state (through the Equitable Share subsidy for free basic services and public transport operating grants) increase by 179% over ten years in the urban sprawl scenario (R3.3 billion per year) and 140% in the compact city scenario (R2.8 billion per year). Figure 10.6 illustrates the patterns that emerge when the recurrent expenditure is analysed by income group.

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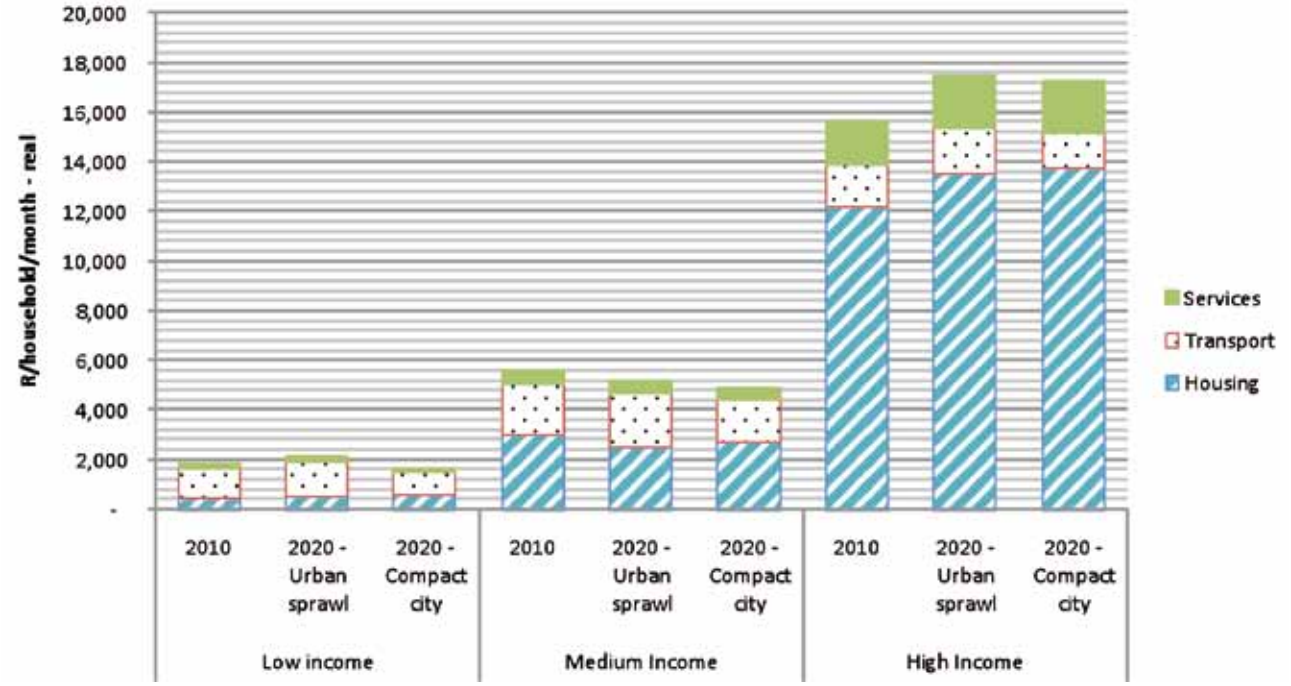
Figure 10.6 Average recurrent household expenditure by income category (R)

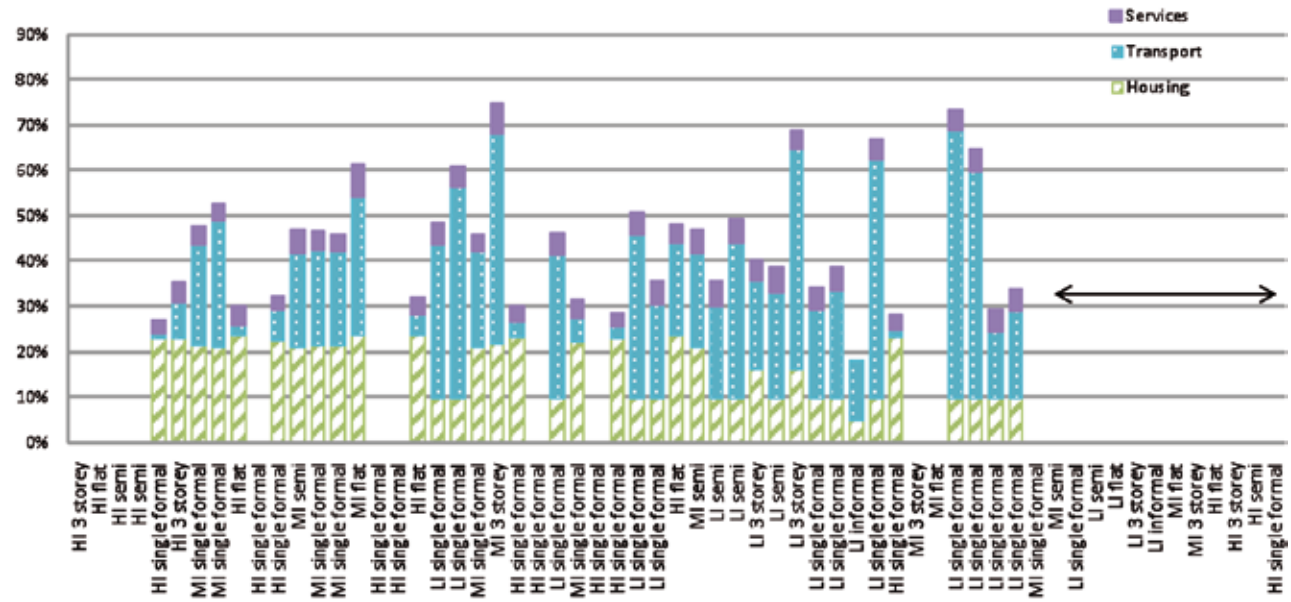


Source: Authors

Low-income households spend 14% more in the urban sprawl scenario, but 10% less per household per month on these services in the compact city scenario than in the base year. Middle-income households spend 8% less in the urban sprawl scenario and 13% less in the compact city scenario. High-income households incur a higher level of monthly expenditure in the urban sprawl scenario (12% increase), whereas for the compact city scenario the increase in monthly expenditure is less (10% increase). Thus, although all households benefit from the compact city scenario, middle and low-income households benefit the most. Low-income households are affected most negatively from the urban sprawl scenario.

Figure 10.7 shows household expenditure on housing, transport and infrastructure broken down by zone. The most 'well-located' zones are shown on the left of the graph and the 'worst-located' zones on the right.

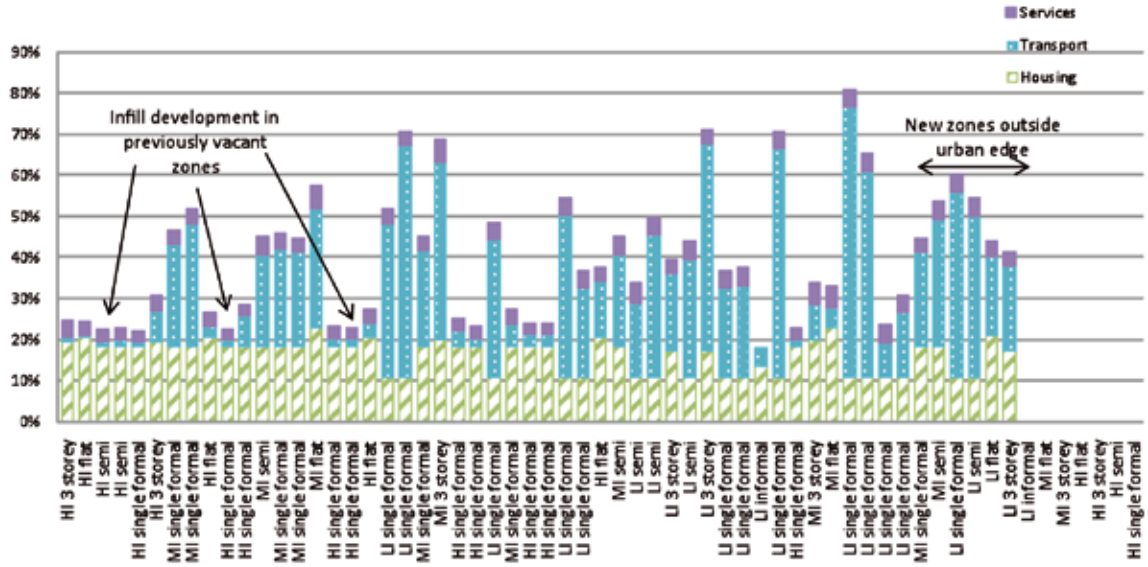
Figure 10.7 Household expenditure breakdown by zone – year 1 (%)



Source: Authors

Housing expenditure, as a percentage of household income, remains fairly constant across the income groups, while infrastructure spending remains constant across all zones. The greatest variation is in transport costs, which in some cases amount to 66% of household income. Transport expenditure is a function of modal split and distance travelled, and the high level of data aggregation used in this model can cause inaccuracies (e.g. assuming a whole zone to be low-income, but including private-car usage of some high-income households).For the urban sprawl scenario, the number of occupied zones increases from 37 to 54 because the vacant land available for development is insufficient to fulfill the housing demand at the densities assumed. Therefore, development spills over the theoretical 'urban edge' into new zones established on the periphery. Figure 10.8 shows household expenditure breakdown by zone for year ten.

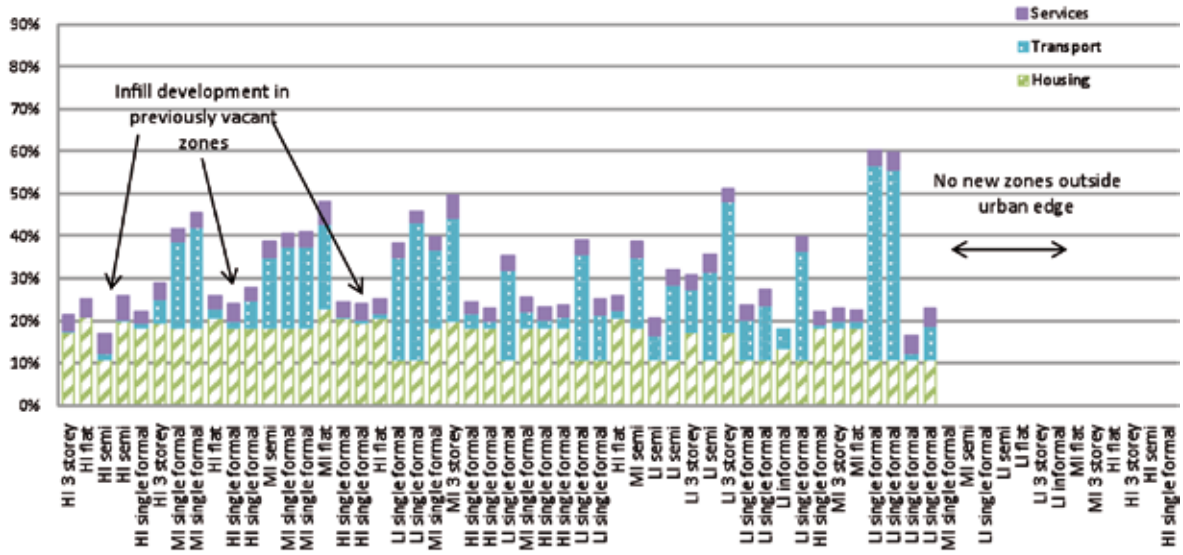
Figure 10.8 Household expenditure breakdown by zone – year 10 urban sprawl scenario (%)



Source: Authors

Transport costs have increased in general and more rapidly for poorer-located zones. The transport costs are low for new development on vacant zones within the city, but relatively high for new zones outside the urban edge. Interestingly, these costs are not as high as for some of the existing zones. This anomaly is due to differences in public transport access: existing zones with the highest transport costs have the lowest access to mass transit (rail). Figure 10.9 shows the transport cost benefit of the compact city model for year ten.

Figure 10.9 Household expenditure breakdown by zone – year 10 compact city scenario (%)



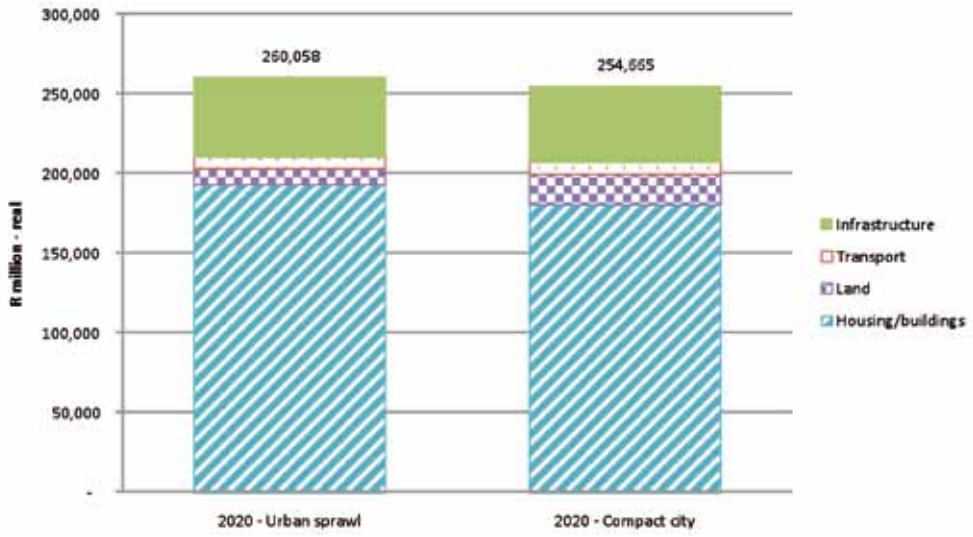
Source: Authors

In general, transport costs are lower due to higher mass transit usage. Infill development has taken place, and no new development is required outside the urban edge because of higher densities.

Capital costs

When the total capital investment is calculated over ten years for the growth of the hypothetical city, the capital costs for the urban sprawl scenario is found to be 2.1% higher, at R261 billion (see Figure 10.10).

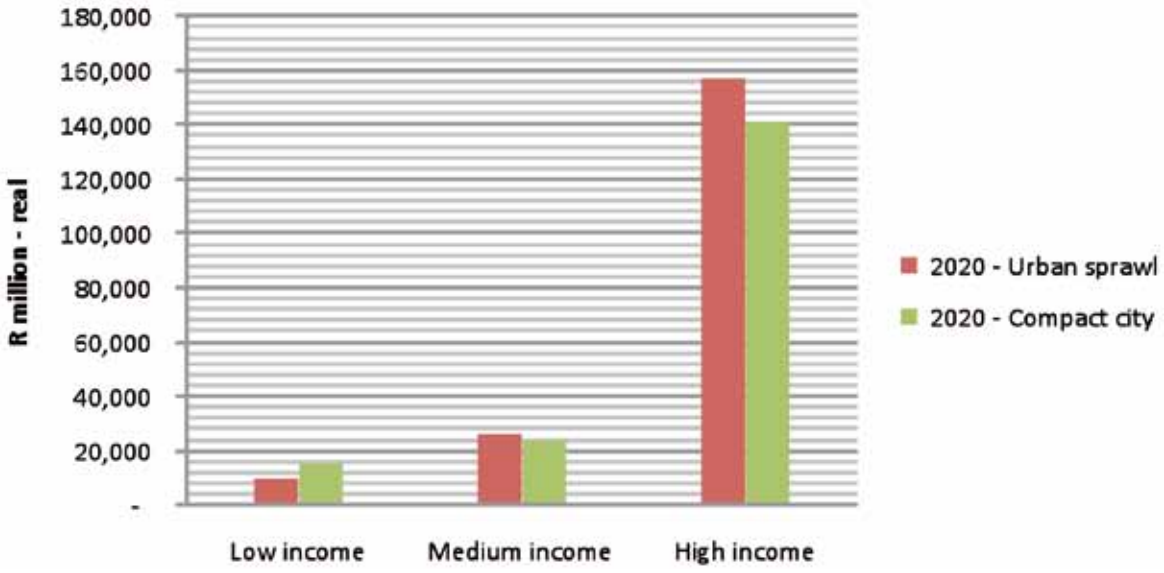
Figure 10.10 Total capital investment over ten years for the two growth scenarios (R million)



Source: Authors

The overall infrastructure and transport costs for the two scenarios are almost identical. However, although the same capital is required for transport, public transport usage is lower in the urban sprawl scenario, i.e. there is more investment per passenger. The main difference in the capital costs is for the land and housing costs. In the urban sprawl scenario, housing and building costs are greater because of the assumed values of high-income units. For example, the average value of a high-income, single residential property is less that an average high-income flat. Thus, with increased density, the total capital required is less. With low-income households, the relationship is reversed, but the high-income trend dominates because the value of low-income housing is much less than that of high-income housing. Figure 10.11 explains this graphically.

Figure 10.11 Total capital investment in housing/buildings over ten years, by income group (R million)



Source: Authors

To balance this trend, the land values in the compact city scenario are higher because of the assumed land price increases. The urban sprawl scenario assumes that the best located land would double in value over ten years (100% real increase), but the worst located land would not increase in value.

In the compact city scenario, the best located land is assumed to increase by a factor of five. A sensitivity analysis on the land price increase is shown in Table 10.14.

Table 10.14 Sensitivity analysis on total capital cost versus land cost increases

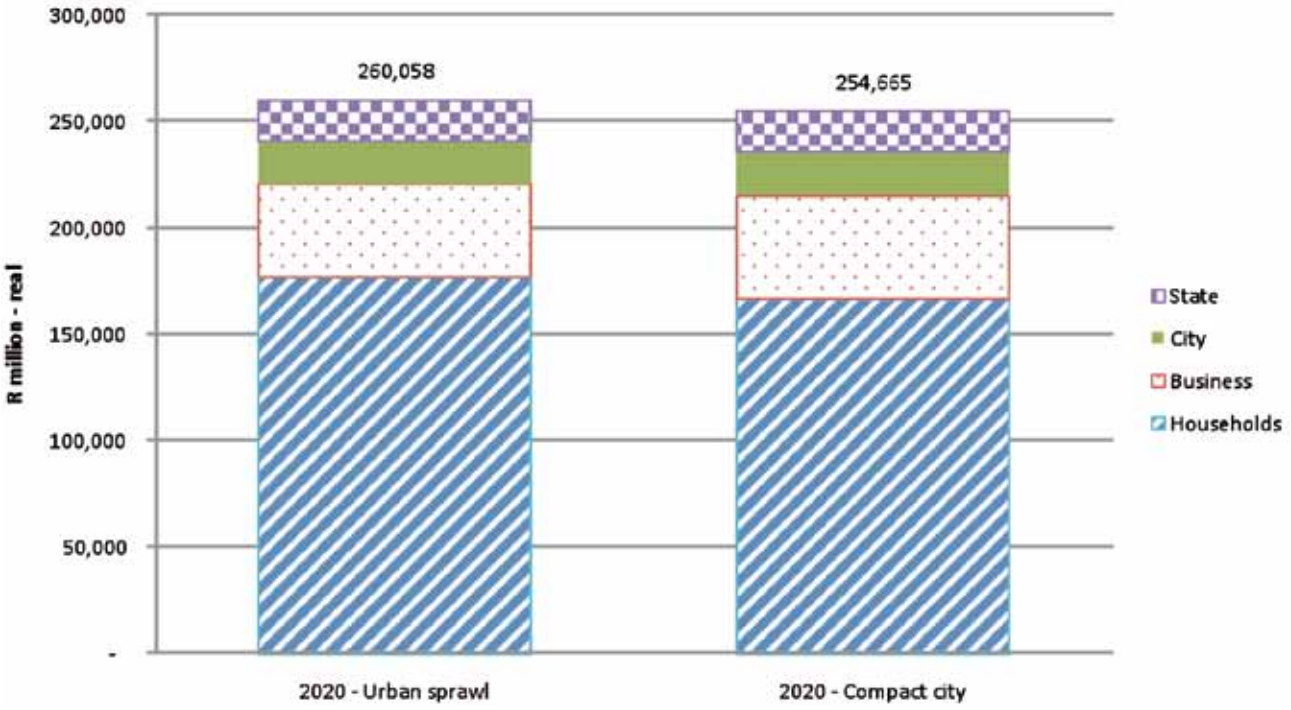
Variable	Urban sprawl			Compact city		
% change in land price increase	% maximum land price increase	Total capital (R billion)	% change in total capital	% maximum land price increase	Total capital (R billion)	% change in total capital
0	100	202,821	0	500	210,246	0
-200	-100	197,735	-1	300	205,829	-2
-100	0	200,278	0	400	208,037	-1
+100	200	205,364	1	600	212,455	1
+200	300	207,907	3	700	214,663	2
+300	400	210,450	4	800	216,872	3

Source: Authors

If the premium on land in the two scenarios were equal (e.g. 300% increase in both), the compact city scenario would be cheaper than the urban sprawl scenario. Alternatively, if the land price increases were more divergent (e.g. 0% increase for urban sprawl and 500% for the compact city), the compact city model would be approximately 5% more expensive.

Figure 10.12 illustrates the total capital investment over ten years by financial 'actor'.

Figure 10.12 Total capital investment over ten years by financial 'actor' (R million)



Source: Authors

The two scenarios show little difference in who incurs this capital cost, but the bulk of the cost falls to households to fund themselves. The capital costs incurred by businesses include investment in land, new buildings (rough approximation), internal infrastructure, and developer contributions for bulk and connector infrastructure. Figure 10.13 shows the capital costs broken down by service and financial 'actor'.

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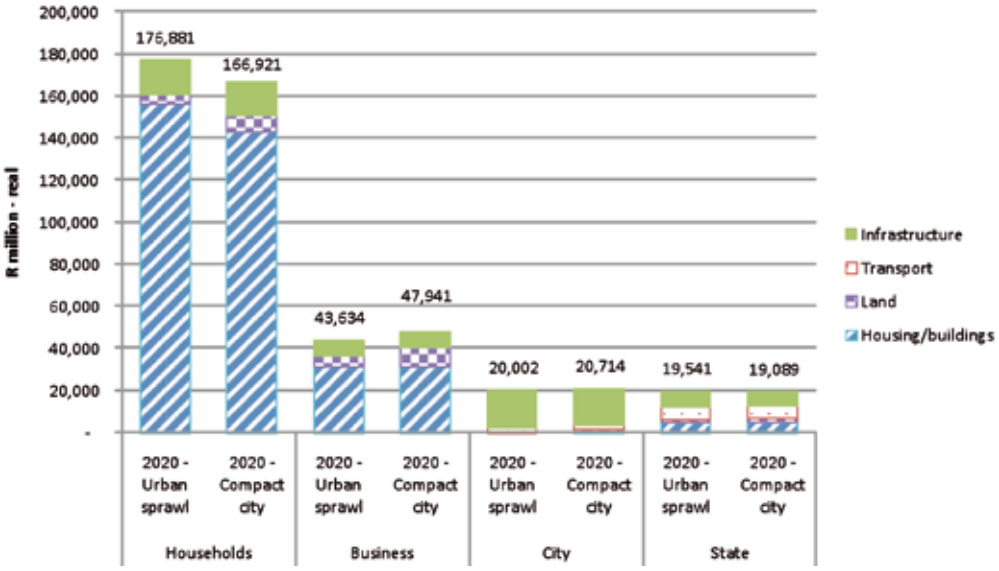
Figure 10.13 Total capital investment over ten years by service and financial 'actor' (R million)



Source: Authors

For the reasons explained above, in the compact city scenario households will pay less for housing, more for land and only slightly less for infrastructure. This reduction is due to the assumption that water consumption reduces with densification. The difference in capital costs for businesses is entirely due to increased land costs in the compact city scenario. Investment by the city and the state is roughly equal in both scenarios, with government paying more for housing and land, but less for transport and infrastructure.

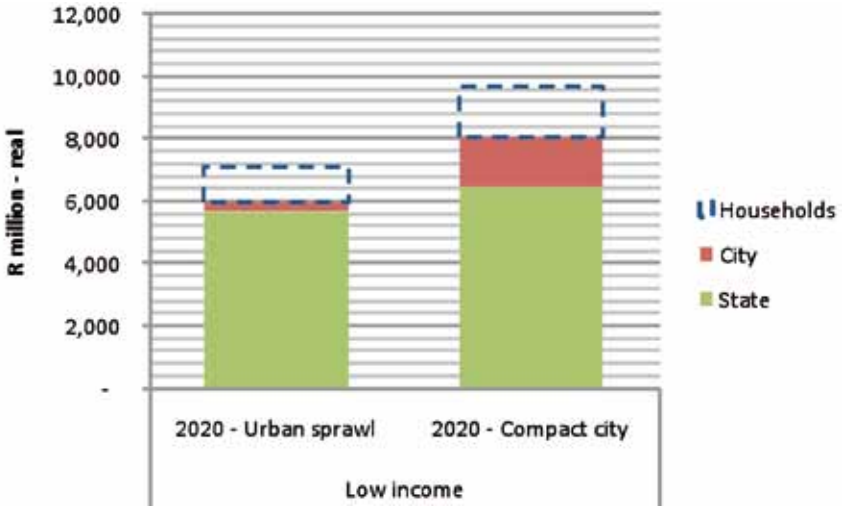
Capital subsidies

It is important to note that the capital costs presented above are calculated based on the assumption that the subsidy regime remains constant.

Low-income housing and housing subsidies

For the housing subsidy, the state contribution is assumed to be fixed, and the remaining cost of the units is attributed to either the city or to the households. Figure 10.14 shows the level of housing subsidies for low-income households.

Figure 10.14 Housing subsidies for low-income households over ten years (R million)



Source: Authors

In the urban sprawl scenario, the state subsidy for housing is calculated at R5.6 billion, with a city top-up of R322 million. In addition, it is assumed that R1.1 billion will be contributed by the households themselves, which includes informal housing, non-subsidised self-build housing, and owner contributions for higher-density housing. Whether this level of capital input is affordable to low-income household requires further investigation.

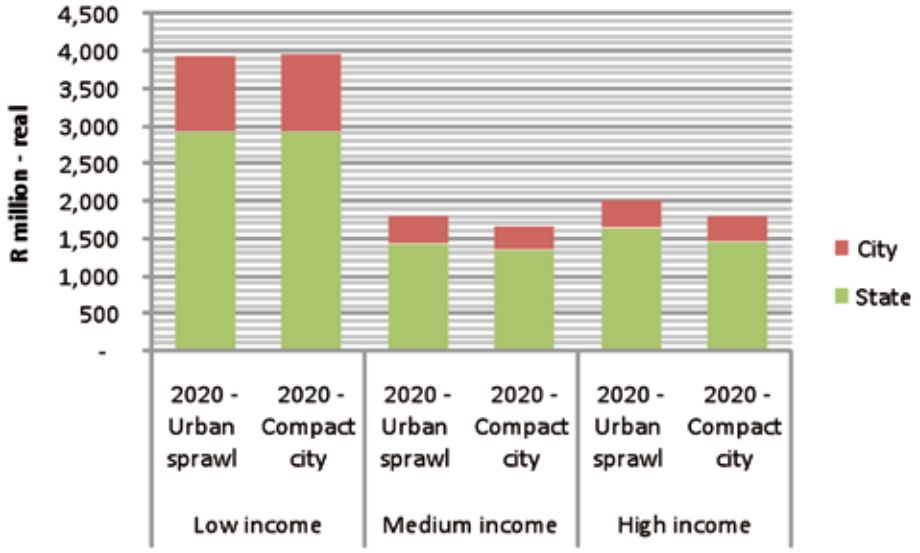
In the compact city scenario, the state subsidy has increased to R6.5 billion (owing to more higher-density units using the full subsidy and an increase in land cost covered by the state). The city top-up has ballooned to R1.6 billion because of the more expensive higher-density units, and the household contributions have also increased to R1.6 billion. The distribution of the government subsidy between the state and the city is a matter of fiscal policy and is likely to vary. However, in the urban sprawl scenario, over ten years the total government contribution increases from R6 billion to R8 billion, which amounts to on average an extra R200 million per year for this hypothetical city. Extrapolating this amount to cover the six metros in South Africa (based on the ratio between the hypothetical city population and the total metro population) would mean approximately R1 billion additional funding per year for housing.

While the state could feasibly provide an additional R1 billion per year towards housing, the extent to which cities can afford the 'top-up' amount of R1.6 billion is very uncertain, as is whether low-income households can afford the additional capital payment for housing. Yet, if cities are to develop along a more compact trajectory, a fundamental requirement is the ability of all actors to finance higher-cost housing in good locations.

Transport subsidies

The assumptions are that transport capital subsidies only to cover rail and BRT systems, and all capital is funded by either the city or the state in a fixed ratio by mode. In addition to capital grants for new infrastructure, rehabilitation expenditure on existing and new assets are assumed to make up 45% of the city costs and only 14% of state costs. Therefore, in the urban sprawl scenario, the total state contribution is R6 billion over ten years compared to the city's contribution of R1.7 billion. In the compact city scenario, the subsidy required is 4% less, but for fewer passengers. The total subsidy amounts to R7.7 billion (over ten years) or R897 per passenger per year in the urban sprawl scenario, and R7.4 billion or R677 per passenger per year in the compact city scenario. It is interesting to note the degree to which middle and high-income households are subsidised by the transport capital subsidy, which is due to the subsidy structure based on mode choice. Figure 10.15 shows the transport capital subsidies over ten years for the two growth scenarios.

Figure 10.15 Transport capital subsidies over ten years (R million)



Source: Authors

Once again, the extent to which cities will develop in a more compact form is strongly dependent on the level of public transport infrastructure funding, primarily in the form of transfers from the national fiscus. The numbers used for these scenarios are based on a limited understanding of what will be required, and higher levels of subsidy may well be necessary. However, the transformative impact of these capital flows cannot be ignored.

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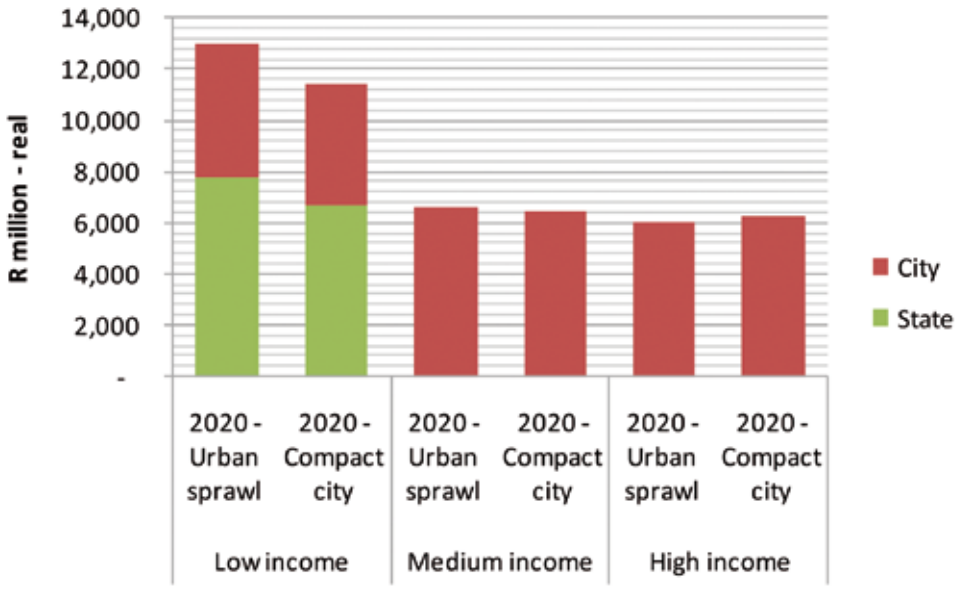
Infrastructure finance and associated subsidies

Infrastructure subsidies from the state include the portion of the housing subsidy that is used for internal services, the MIG subsidy for bulk infrastructure (assumes 80% of capital is required for low-income households), and the rehabilitation of state-funded assets (either through the MIG subsidy or some other mechanism).

The model assumes that the city covers 20% of the bulk infrastructure costs for low-income households, 80% of the costs for middle-income households and 50% of the costs for high-income households (with developer charges covering the remainder). The city also contributes a top-up on internal services for low-income households, as well as provision for the rehabilitation of all non-grant funded assets. The infrastructure subsidies over ten years are shown in Figure 10.16.

Figure 10.16 Infrastructure subsidies over ten years (R million)



Source: Authors

In the urban sprawl scenario, the state subsidy amounts to R7.7 billion, compared to the city's contribution of R17.9 billion, over ten years. In addition, households are assumed to contribute R16.4 billion and business R7.4 billion, matching the government contribution. For the compact city scenario the state subsidy is reduced by 14% to R6.5 billion, and the city contribution is reduced by 3% to R17.4 billion.

As compact cities use infrastructure more efficiently, infrastructure finance arrangements could drive changes in city structure, in particular those related to developer charges. Assuming that infrastructure on the periphery of cities is more expensive, if developers were faced with the full cost of property developments, they would seek lower cost, better located land for development.

Public transport operating subsidies

Assuming no change in subsidy policy, the compact city scenario would result in a reduction of 33% in the public transport operating subsidies required, due to shorter aggregate travel distances on currently subsidised modes of rail and bus. This is a substantial saving and shows how the compact city improves the efficiency of passenger transport overall.

However, this conclusion masks some serious shortcomings in the public transport subsidy system, that emerge when looking at individual zones. For communities living in zones with access to subsidised modes, the public transport costs borne by households are low in relative terms, compared with zones that do not have access to rail and subsidised bus services. Yet most of the poorest people in cities rely on unsubsidised taxis and, as a result, spend a high proportion of their household incomes on transport.

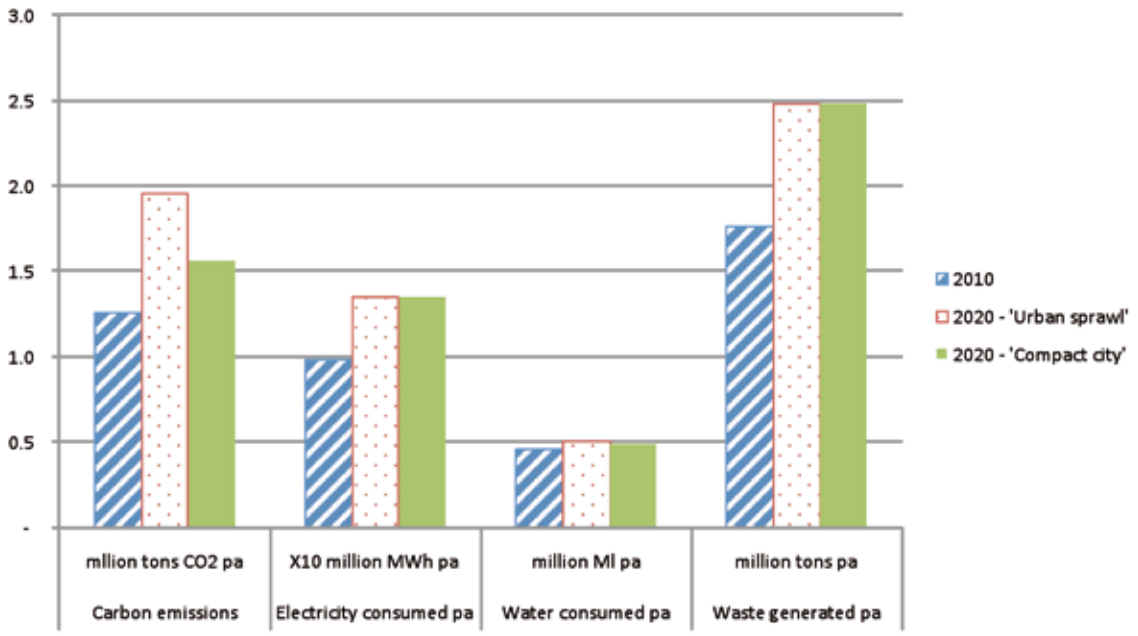
The complex issues associated with transport operating subsidies are beyond the scope of this analysis, but this work needs to be done, and the CECM model provides a tool for testing these policy options.

Environmental Costs

The environmental costs were assessed in terms of carbon emissions (measured as tons of CO2 emitted by all transport modes per year), total electricity and water consumption by households and businesses per year, and total volume of solid waste (refuse) generated by households and business per year. These costs were calculated for the base year and for year ten under both of the growth scenarios.

Figure 10.17 illustrates the environmental impacts of the urban sprawl and compact city scenarios.

Figure 10.17 Environmental impacts



Source: Authors

The two scenarios show little difference in the volumes of electricity and water consumed and waste generated, but a major difference in the volume of carbon emissions, with the compact city scenario emitting 22% less than the urban sprawl scenario. This is due to more efficient public transport and shorter travel distances. Although the compact city scenario includes an increase in travel time of 15%, which would have an impact on the carbon emissions, it is not included in this round of modelling, as figures quoted in the literature for carbon emissions are typically given per vehicle km, and not by time spent travelling. Such an increase in travel time means an average difference of six minutes per commuter per day (34 minutes in the urban sprawl versus 40 minutes in the compact city scenario) and increases the total travel time (for all commuters) by 357,477 hours per day, which is significant when looking at the qualitative benefits of the compact city.

Economic estimates for the monetary value of travel time could be applied to this figure to quantify the benefits of reduced travel time in money terms. However, this would have to be the focus of further research, as it is beyond the scope of this study.

10.4 Summary of Findings

By international standards, South African cities are inefficient. Their low densities and fragmented and inequitable land distribution patterns lead to high social, financial and environmental costs. An alternative, optimum land-use pattern is needed that will improve the social, economic and environmental effectiveness of South African cities. After describing the current land-use patterns in South Africa, and the associated financial and fiscal costs, two alternative spatial arrangements were compared: the compact city and the urban sprawl scenarios.

10.4.1 Overall finding on recurrent cost

The compact city scenario showed a 7% saving in recurrent costs per year after ten years of development. Although at first glance this saving may not seem substantial, it applies to the city as a whole and includes all households and businesses

present in the base year. This also has a cumulative impact, with the benefit carrying over to all future years. Households and the state benefit from most of this saving, while lesser levels of expenditure are required by businesses and the city.

In the compact city scenario, all households are, on average, likely to be better off. However, the benefits are greatest for middle-income households, largely owing to savings on transport. In contrast, if the urban sprawl scenario applies, low-income households are exposed to the biggest negative impact on their household budgets. Low-income households have the most to benefit from a compact city growth scenario, with a 24% difference in recurrent household expenditure between the two scenarios after ten years.

The ratio between housing costs and transport and infrastructure costs for low-income households is particularly relevant in the debate around informal settlements. Households in informal settlements spend the least amount on housing, but a considerable portion of their monthly income on transport. The argument for providing subsidised housing in well-located areas is made on the basis that transport costs will be reduced.

For households living in informal settlements, this argument only holds if the transport cost reduction is equal to, or greater than, the increase in housing and infrastructure costs that will occur as a result of accessing formal housing. If not, then the household is likely not to be able to afford the cost of the formal housing and to be driven back to informality.

10.4.2 Overall finding on capital cost

One of the most interesting findings of the hypothetical city model is that the capital investment required for the two scenarios is almost equal. Considered from the perspective of individual capital components:

- Infrastructure costs are almost the same. The additional length of connector infrastructure required in an urban sprawl scenario is insignificant compared with the costs of internal and bulk infrastructure required in both scenarios.

- For housing and buildings, the capital cost is slightly lower (6%) in the compact city, driven primarily by the assumed lower cost per unit for high-income residential units. In contrast, the cost per unit in the compact city is higher for low-income units. However, the capital cost of land in the compact city was assumed to be significantly more, resulting in a 91% cost difference. As land is a relatively small portion of the total capital cost, the impact on the total capital cost of the urban sprawl scenario is insignificant for land and housing combined. Further work with better data will allow this relative scale of investment in housing to be better understood.

- Public transport infrastructure investment is marginally lower in the case of the compact city scenario. This preliminary result assumes investment in mass transit systems in both scenarios and the overall difference in levels of investment between the scenarios is driven by the level of investment per zone, with lower density zones requiring greater lengths of mass transit routes, but with lower capacity. Thus the cost per commuter in the urban sprawl scenario is 33% higher than for the compact city scenario. This illustrates the relative decrease in benefit for the same amount of investment. Further work on this, with an improved understanding of actual transport systems, will allow for better analysis and explanation. However, an important conclusion remains; that investment in public transport infrastructure is relatively small in relation to the impact it has on reducing the overall recurrent cost of cities, particularly costs incurred by the poor, and making cities more environmentally sustainable.

10.4.3 Observations relating to housing and land

In much of the literature, a key driver of the current urban form is assumed to be the greater affordability and availability of land on the periphery, combined with a housing subsidy structure that promotes the lowest capital cost of the product (Biermann and van Ryneveld, 2007). However, the land cost is a small portion of the total cost of the housing product and the capital cost per unit is further reduced with higher density units.

The impact of the subsidy framework needs to be considered in relation to the total cost of housing, including land. In the model, the capital subsidy amount has been assumed to be constant for all housing products. Therefore, the city and the household are assumed to bear the difference (additional cost) for higher–cost, high-density products, which may not be viable in reality. Low-income households may not be able to afford the difference in cost of acquiring a better located – and more expensive – housing unit in a more compact city. With this in mind, some further thoughts on the

housing subsidy are included below. As the results suggest, the capital costs of the two development scenarios are almost identical. This raises the question of why the compact city has not developed as a rational response to market forces. Part of the reason lies with incentives for low-income housing development. The subsidy mechanism is primarily a fixed amount per housing unit, which does not favour the development of better-located areas of land where costs are higher. Property developers have other considerations about middle and high-income property development, including the technical, political and bureaucratic difficulties of infill development and the economies of scale achievable on large tracts of greenfield[155] land on the periphery. Experience of urban growth patterns in post-apartheid South Africa show that the urban form is driven largely by capital investment decisions associated with housing developments. Unless this changes, no shift is likely.

10.4.4 Subsidy conclusions

The subsidies that the CECM has taken into account comprise a:

- recurrent grant for free basic services (Equitable Share Grant);
- recurrent grant for public transport (Public Transport Operating Grant);
- capital grant for housing and land (Integrated Housing and Human Settlements Development Grant – top structure portion only);
- capital grant for public transport (Public Transport Infrastructure and Systems Grant); and a
- capital grant for infrastructure to low-income households (MIG (Cities), an internal infrastructure portion of the Housing Grant, and the Integrated National Electrification Programme Grant).

The current application of these subsidies is assumed to be constant for the ten-year model period, and Table 10.15 shows the implications for these grants in the two scenarios.

Table 10.15 Summary of state contributions (subsidies) in year

	Recurrent (R million per year – real)		Capital (R million per year – real)		
	Public transport	Infrastructure	Housing and land	Public transport	Infrastructure
2020 – Urban sprawl	1,527	1,773	580	600	774
2020 – Compact city	1,039	1,795	670	572	668
Difference	-32%	1%	15%	-5%	-14%

Source: Authors

In addition, the city is assumed to provide the following contributions, comprising:

- transport operating subsidies;
- a housing and land capital subsidy top-up on national subsidy;
- a public transport capital contribution; and
- capital investment in infrastructure, including rehabilitation of assets.

Although the city is shown to make a surplus on infrastructure, this depends on the level of cross-subsidy in the particular city. The impact of the different growth scenarios on these contributions is shown in Table 10.16.

155 Undeveloped land, which has no existing infrastructure, and is easy to develop.

Table 10.16 Summary of city contributions in year 10

	Recurrent (R million per year – real)		Capital (R million per year – real)		
	Public transport	Infrastructure	Housing and land	Public transport	Infrastructure
2020 – Urban sprawl	141	-1,843	32	175	1,793
2020 – Compact city	85	-1,916	157	170	1,745
Difference	-40%	4%	387%	-3%	-3%

Source: Authors

The assumed static subsidy regime is not realistic, and as the fiscal responsibility for the different cost components can be shifted between state and city (and households) by changes in policy, it is informative to combine Tables 10.15 and 10.16 to illustrate overall government contributions for the two scenarios, which is reflected in Table 10.17.

Table 10.17 Summary of total government contributions in year 10

	Recurrent (R million per year – real)		Capital (R million per year – real)		
	Public transport	Infrastructure	Housing and land	Public transport	Infrastructure
2020 – Urban sprawl	1,668	-69	612	775	2,566
2020 – Compact city	1,124	-122	826	742	2,412
Difference	-33%	75%	35%	-4%	-6%

Source: Authors

Assuming no change in subsidy policy, the compact city scenario requires less transport operating grant for an equivalent capital expenditure on public transport. Recurrent costs are largely covered by households, and the government contribution is insignificant compared with the level of capital investment that will continue to be required. As discussed, the compact city would require a 35% increase in contributions from both tiers of government for housing and land to affect a more compact city structure, notwithstanding the additional capital contribution that would be required from low-income households.

The saving of 33% for public transport operating subsidies is substantial, but does not suggest that the level of subsidy should be reduced. As mentioned earlier, the public transport operating subsidy arrangements applied currently are highly inequitable and, most importantly, do not serve to compensate the poorest people who do not benefit from gaining access to well-located properties within cities.

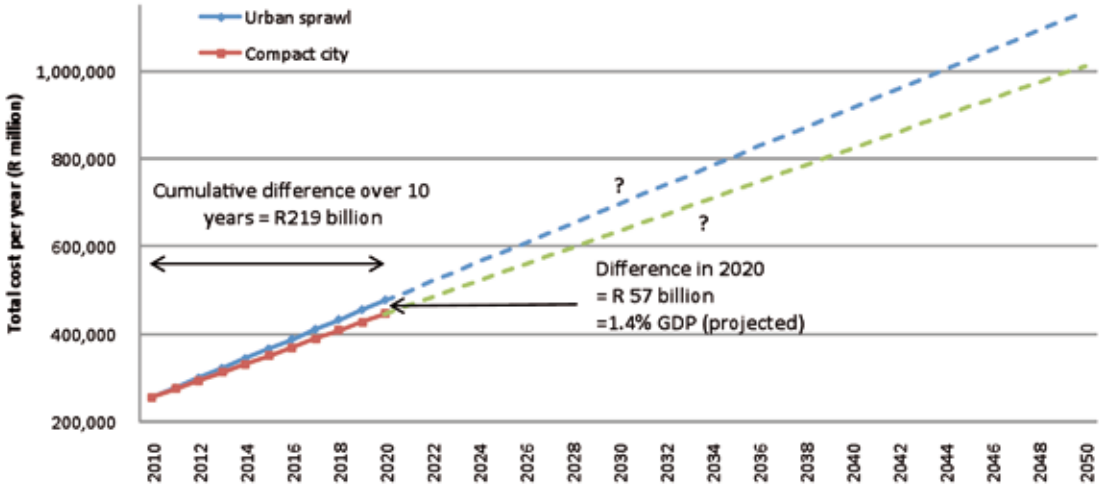
10.4.5 Environmental considerations

The financial benefits of a compact city versus urban sprawl are not extreme. The most significant difference appears to be the environmental impact, with a 22% saving on carbon emissions from transport. In addition, based on other environmental measures, such as loss of agricultural land and biodiversity, a more compact city will show even greater environmental benefits.

10.4.6 Implications of inefficient cities

The CECM indicates that in ten years' time a theoretical South African metro developed in a sprawling spatial form will be marginally more expensive in recurrent and capital cost terms compared with a compact growth pattern. The total cost implication is a 7% difference in recurrent costs and a 2.1% difference in capital costs. Extrapolating these conclusions to all six South African metros allows some conclusions on the national implications for South African cities to be drawn. A ratio of the base year population of the hypothetical city to the total population of all six metros was used for this calculation, as depicted in Figure 10.18.

Figure 10.18 Projected total capital and recurrent costs for six South African metros under two growth scenarios (R million), 2010–2050



Source: Authors

The total cost difference in year ten is R57 billion, or 1.4% of projected GDP.[156] The total difference (capital and recurrent) over ten years amounts to R219 billion. While this gap is likely to widen over time, the shape of the projected cost curves shown in Figure 10.18 are uncertain. It is also uncertain whether a sprawling city becomes increasingly inefficient, or whether dense, compact cities become more efficient up to a point and then less efficient due to congestion and a lack of land availability. Further research is needed to address these uncertainties.

A further implication of an inefficient city is inequality, as the results of this study show that the heaviest impact of urban sprawl will be on low-income households. This impact is expressed in financial cost terms and does not take into account the continued spatial, social and economic segregation and marginalisation that is characteristic of South African cities. The compact city model used incorporates the economic and spatial integration of the poor through the prioritisation of low-income high-density housing on well-located land.

The most significant implication of pursuing an inefficient spatial growth path is a 55% increase in carbon emissions from transport in ten years. This increase can be reduced by approximately 22% in a more efficient, compact city. With states, and even cities, now committing to carbon reduction targets, these targets are likely to be difficult and costly to achieve. However, it raises the question of whether cities can afford to follow a growth path that results in 22% higher emissions.

10.4.7 Fiscal/financial measures for a more efficient urban spatial form

A primary mechanism for altering the efficiency of spatial form through public investment is to invest in public transport infrastructure. This investment not only has an impact on the spatial layout of the city, by creating movement spines and stimulating development, but also significantly affects the cost of cities. The preliminary results, which are based on actual data, show the scale of saving that can be realised with a more compact city. For a single, large city, a 33% reduction in recurrent expenditure on transport infrastructure is possible after ten years – about R9 billion per year. The greatest benefit will be for the poor, as the proportion of their household budgets spent on transport will decrease in a compact city scenario, whereas if urban sprawl continues the proportion will increase. To realise these benefits, the public transport subsidy system requires urgent attention. On the capital subsidy side, the introduction of the Public Transport Infrastructure and Systems grant has been very important, and can, if properly scaled, promote compact cities. However, the current public transport operating grant system does little to provide incentives for improvements in city structure. An investigation into ways of improving this system is important, but beyond the scope of this study, although the model does provide a basis for testing options.

A second way of effecting positive spatial change is through public intervention in the housing market. The findings of this research point to two possible financial instruments that could be used: higher housing subsidies for higher-density

156 GDP for 2010 of R2.7 trillion was projected forward to 2020 using the Bureau of Economic Research (BER) long-term economic growth forecast.

developments in specific locations, and incentives for developers to undertake the type of development that generates a compact urban form. The modelling can help determine what sort of incentives, including subsidy, the state can offer, but is not dealt with in this preliminary application of the model.

A further mechanism that can affect capital investment decisions, but has not succeeded to date, is tighter regulation of urban development. However, this debate falls outside the scope of this study.

10.4.8 Further developments and application of the methodology

The hypothetical city is only a test case for the developed methodology. Two sets of variables were selected for the scenarios, but any number of these variables can be altered to create alternative scenarios. However, the methodology has produced consistent results and explained the drivers behind the cost of urban development under alternative spatial patterns. The results produce much needed empirical evidence to anchor the debates around city efficiency, including the impact of financial frameworks on spatial form and vice versa.

Ideally, the CECM should be applied in the contexts of real cities to help inform state and city strategies for making South African cities more efficient and sustainable. Where urban theory has failed to elicit a shift in the inefficient urban form in South Africa, the financial and environmental arguments presented by this methodology may provide a new impetus for change.

Annexure 10A Scenario Assumptions

	Scenario 1 Urban sprawl	Scenario 2 Compact city
Densification factors:		
LI informal	1.10	1.20
LI flat	1.05	1.50
LI 3 storey	1.05	1.20
LI semi	1.05	1.20
LI single formal	1.00	1.05
MI flat	1.00	1.50
MI 3 storey	1.00	1.10
MI semi	1.00	1.10
MI single formal	1.00	1.10
HI flat	1.10	1.20
HI 3 storey	1.05	1.20
HI semi	1.05	1.20
HI single formal	1.00	1.10
Vacant	1.00	1.00
% vacant land to use	50%	80%
Order of housing allocation		
1	HI flat	LI flat
2	HI 3 storey	LI 3 storey
3	HI semi	LI semi
4	HI single formal	LI single formal
5	MI flat	MI flat
6	MI 3 storey	MI 3 storey
7	MI semi	MI semi
8	MI single formal	MI single formal

	Scenario 1 Urban sprawl	Scenario 2 Compact city
9	LI flat	HI flat
10	LI 3 storey	HI 3 storey
11	LI semi	HI semi
12	LI single formal	HI single formal
Land cost premium (%)	100	500
Housing mix (%)		
LI flat	5	20
LI 3 storey	5	30
LI semi	10	30
LI single formal	80	20
MI flat	10	20
MI 3 storey	15	20
MI semi	15	20
MI single formal	60	40
HI flat	10	20
HI 3 storey	15	20
HI semi	15	20
HI single formal	60	40
Reduction in car use	10	20
Travel time increase factor	0	15
% potential passengers taking mass transit	60	75
Split passengers to BRT (versus rail)	35	35

Note: LI = low income; MI = middle income; HI = high income.

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CHAPTER 11: IMPACT OF CURRENT LAND-USE PATTERNS ON PUBLIC TRANSPORT AND HUMAN SETTLEMENTS

Sabelo Mtantato[157]

11.1 Introduction

South Africa is still trapped in the legacy of racially segregated human-settlement policies. The apartheid government introduced legislation that preserved white supremacy, such as the Group Area Acts (No. 41 of 1950 and No. 36 of 1966), which directed population groups into specific urban spaces separated by buffer zones of open land. Whites were allocated large central areas, while blacks were displaced to townships on the periphery of cities. The apartheid system not only segregated races, but also entrenched inequality in the different forms of housing, geographical location, environmental landscape and in the distribution of facilities (Spinks, 2001). Post-1994 low-cost housing projects continue to be provided on the outskirts of cities, where land is cheaper and more accessible. Although locating human settlements on the edge of cities is a cheaper option, it is costly in the long run. The government has to provide public transport operating subsidies, and poor households spend high proportions of their disposable income on public transport.

Major cities in South Africa face a number of challenges, as urbanisation and the fragmentation of households (resulting in more, smaller households) increase pressure on urban services and infrastructure. In order to meet the enormous service-delivery demands, cities need to make efficient use of scarce resources. Land and land-use planning are key factors in effectively managing the inevitable progress of urbanisation. The future of cities and their sustainability depend on decisions that are taken now in preparation for this growth. As a result of urban growth, service delivery pressure affects different sectors within cities, especially transportation and human settlements.

The demand for transport is driven by the need for people to reach locations where activities take place, including the workplace, schools, hospitals and clinics. Therefore, effective land-use planning is vital, as it determines where major facilities and human settlements are located, how far people have to travel to access such facilities, and what households and government spend on transport.

Currently in South Africa, these two sectors (public transport and housing) and land-use patterns face various challenges. The current public transport system is expensive, inefficient, ineffective and inaccessible, while coordination is lacking between land-use patterns and transport planning. Rising urbanisation and poverty levels, which increase demand for housing, especially in the cities, are affecting human settlements. Other challenges are related to the shaping of South African urban settlements by the apartheid regime, which resulted in spatial separation of residential areas according to class and race and promoted social isolation (DoHS, 1997). In urban areas, the demand for houses and for suitable land on which to build housing is increasing, but well-located land is scarce, costly and in some cases not owned by the government. As a consequence, most low-cost housing projects tend to be developed in peri-urban areas, where land is cheaper, readily available and can be accessed with relative ease. Given the relative scarcity and cost of land in urban areas, cities need to make the most efficient use of this resource once it becomes available.

This chapter examines the impact of the current land-use patterns and other major challenges particularly on public transportation and human settlements in South Africa. The specific objectives are:

- To examine the current policy and legislative framework on land-use planning related to public transport and human settlements;

157 Financial and Fiscal Commission.

- To evaluate the effect of current land-use patterns on public transport and the transaction cost for poor households;
- To evaluate the challenges in the current urban-housing delivery system; and
- To review the current funding and institutional arrangements and provide alternative models.

11.2 Literature Review

11.2.1 The concept of human settlements and poverty

Poverty is characterised by a lack of income, which results in multiple forms of deprivation and an inability to afford basic goods and necessities. As a consequence, people may be excluded and marginalised from participating in activities that are considered the norm within societies. Housing has been identified as an important element and tool in developing policies and programmes to alleviate poverty (Pomeroy and Evans, 2008). Housing is just one of people's different needs in life, but also the largest expenditure in a basket of necessities. Therefore, analysts have developed the concept of housing-induced poverty,[158] which can intensify due to a number of factors, such as an increase in housing costs and interest rates. Most countries focus their attention on the immediate concerns of urbanisation, which include accommodating the poor and improving living conditions, creating employment, and improving governance and administration of increasingly complex systems (UNPF, 2007). These issues are important but shrink in comparison with the problems related to the growing urban population. Therefore, instead of simply responding, cities need to plan in advance for urban growth and its challenges. Tackling the highly contentious issue of human settlements requires an understanding that delivering housing is more than just providing a shelter. Housing includes infrastructure and services[159] that are necessary for housing or human settlements to be habitable (Charlton, 2004). The living experience of a residential environment is dependent upon the availability and accessibility of facilities and amenities, such as schools, clinics, police stations and sporting facilities, while central to human settlements is convenient, safe and affordable public transport to move from home to work or to other facilities (ibid.).

11.2.2 Importance of land-use planning

Transport enables people to participate in various activities, such as working, shopping and recreation (Van Wee, 2002). The demand for transport and travel patterns is determined by the nature and location of human settlements in relation to major amenities and areas with economic opportunities. Hence, human settlements and transport investment planning decisions should be undertaken within the broader framework of land-use patterns. Table 11.1 shows land-use categories.

Table 11.1 Land-use categories

Built environment	Open space
Residential (family housing)	Agriculture
Commercial (stores)	Forest
Institutional (schools)	Underdeveloped lands
Industrial	
Brownfields	
Transport facilities (roads and parking lots)	

Source: Litman (2010)

Land-use patterns can be evaluated based on a number of attributes (Litman, 2010):

- Density level: the number of people or the number of housing units within an area.
- Mix of land-use types: such as the location of commercial, residential and other important amenities together or close to each other, which is also related to clustering.
- Accessibility: the ability of people to be able to reach their desired activities and destinations.

158 The situation occurs when housing costs are so high that households cannot afford other non-housing necessities.

159 Such infrastructure and services include water, sanitation, energy, and access roads and footpaths.

- Green space: the portion of land used for parks, gardens, etc.
- Non-motorised accessibility: the availability and quality of walking and cycling conditions.

A city that uses land efficiently experiences compact and smart urban development, while a city with inefficient land use becomes a network city or urban sprawl. Table 11.2 summarises the characteristics of these two urban forms of development.

Table 11.2 Indicators and urban development models

Indicator	Network city/urban sprawl	Compact city
Residential density	Dispersed population in low-density developments	High-density use and residential developments
Neighbourhood mix	Separated (home, shops, workplaces)	Mixed: communities benefit from education, health, commercial facilities that are conveniently located closer to residential areas
Activity centre centeredness	Lack of well-defined activity centres	Concentration of settlements and well-defined activity centres
Transportation choice	Poor access to public transport choices, higher commuter rates and car ownership	Environmentally friendly, with public transport choices, suitable for walking and cycling
Recycling of land	New developments mainly on greenfields	Redevelopment of brownfield sites

Source: Compiled from Storch (2007)

Urban sprawl does not provide for a functional mixed use of land and is characterised by unplanned, uncoordinated, separated or single-use development, low-population density and automobile dependency. Such development is usually viewed negatively because of the excessive land consumption, increased commuting and socioeconomic segregation due to its exclusionary housing markets. It is also perceived as contributing to high fiscal costs for the provision of infrastructure and services. However, some researchers (for example Holcombe and Blast, 1999) defend urban sprawl based on a number of justifications, such as low density providing more room space and a higher standard of living.

In contrast, smart or compact cities encourage relatively high population density and mixed use of land. These features often promote an efficient public transport system and encourage walking and cycling, which in turn reduces the use of private cars (Litman, 2010). Benefits of compact cities include less car dependency, less emissions, reduced energy consumption, better public transport services, increased accessibility and re-use of previously developed land.

11.2.3 Human settlements and efficient urban land use

Efficient land use is important, especially when cities experience a high level of urbanisation and pressure to accelerate housing delivery against a finite land resource. A key tool that has been identified for housing development is densification, which refers to increasing the number of units of housing per square foot of land. This requires cities to plan for housing typologies that will promote efficient land use. In general, housing types range from a single detached house, duplex, triplex, multiplex, side-attached house, stacked-row house, small apartment, low-rise apartment, mid-rise apartment, to a high-rise apartment (Litman, 2010).

The Social Housing Foundation (SHF, 2010) categorises housing typologies according to descending density:

- High-rise apartments: apartments with over four storeys;
- Medium-rise apartments: two, three and four-storey walk-ups;
- Attached permanent/town/row houses: single or double storey, which are semi-detached;
- Single rooms; and
- Detached low-rise houses: freestanding houses generally in townships and suburbs.

High-rise buildings are an efficient use of land (Sev and Özygen, 2009), and high-rise and low-rise apartments are also im-

portant to achieve densification, creating the highest level of activity for public transport (for example). However, the costs of constructing high-rise buildings are believed to escalate with the number of storeys built.

11.2.4 Importance of infill development for efficient land use

Infill and brownfield developments can increase the efficient use of scarce urban land and help reverse urban sprawl and its associated problems. Infill development generally refers to prioritising the development of parcels of vacant, underdeveloped or underused sites within an urban area over undeveloped land outside the city. Brownfield development refers to development within an area or on land that was previously used but has become vacant or derelict. The main principle behind infill and brownfield developments is to use existing resources and services before considering extensions to outlying areas.

11.2.5 Constraints and incentives of infill development

Despite their benefits, infill developments are not a developer's first choice because they are associated with a number of constraints, including size, lack of basic infrastructure and environmental issues (MRSC of Washington, 1997). The Truckee Meadows Regional Planning Agency (TMRPA, 2005) classifies barriers to infill developments as financial, infrastructure, regulatory policies, land assembly and its cost, local residents' resistance, political leadership, public perceptions of increased density and unwillingness to condemn targeted sites. These challenges increase the cost of infill and brownfield developments and result in delays in developing human settlements in these areas.

In an attempt to direct how cities grow, some countries have developed and implemented tools (such as incentives and disincentives) to promote the development of infill, including (MRSC, 1997):

- Implementing a parcel assembly programme and strategic land banking;
- Considering tax incentives and disincentives to promote infill housing;
- Adopting infrastructure strategies that support development in infill areas;
- Limiting the supply of land available for development in non-target areas;
- Permitting densities to ensure that infill development is feasible; and
- Assisting infill developers to obtain favourable financing terms.

For the purpose of this discussion, only the first four tools need further explanation.

Implementing a parcel assembly programme and strategic land banking

A city with a current and accessible vacant land inventory can achieve infill development (Tarnay, 2004), but some cities are stifling such developments by failing to maintain inventories of vacant properties (TMRPA, 2005). Cities have to audit the land and identify land ownership and property zoning in order to compile accurate vacant property inventories. These provide developers interested in infill development with the necessary information to be able to purchase the land. Thus, potential developers do not need to initiate the process themselves. Furthermore, land for infill development generally comprises small parcels of land under different ownership. Local authorities can assist infill development by assembling these small, individual parcels of land into larger blocks under common ownership, which can be used immediately or for future use.

Considering tax incentives and disincentives to promote infill housing

Other countries have implemented financial incentives to promote infill developments. An example of this is a property tax exemption for a given number of years as an incentive to construct on vacant and city-designated target areas within urban centres. Portland, Oregon offers a ten-year tax abatement for housing of a particular price in designated infill development areas, which has contributed to the affordability and expansion of infill housing (MRSC, 1997). San Jose gives exemptions on construction tax for infill housing within the city's Central Incentive Zone and other development areas (Wheeler, 2002). Another way to encourage infill development is by raising the tax on vacant land, while reducing tax on buildings. Unimproved

land thus becomes more expensive and infill developments more attractive. Pittsburgh, Pennsylvania has restructured its tax policy and increased tax on unimproved land by more than five times, which has resulted in a significant increase in the level of urban building activity. Although tax exemption may reduce revenue collections in the short run, it also helps to shape urban growth and increase the tax base in the long run, after the exemption period has elapsed.

Adopting infrastructure strategies that support development in infill areas

Some cities have used public infrastructure investment strategies to direct their future growth by filling basic infrastructure gaps or by upgrading infrastructure where necessary. Examples include investing in basic infrastructure and amenities, such as parks, roads and libraries. This boosts investors' confidence in the potential market and stimulates infill development in the surrounding areas.

Limiting the supply of land available for development in non-target areas

Other cities, such as Washington, have set boundaries for where urban development can take place. The aim is to ensure that land within the developed areas is considered before using outlying areas.

11.3 Research Methodology

A qualitative approach (secondary information) is used to evaluate the impact of the current land use and other challenges in the public transport and human settlements sectors. Legislative and policy framework on land-use planning, and challenges posed by various legislations, are reviewed. Since density is one of the key factors when determining efficient land use, density levels in South African major cities are considered and compared with those in cities of other developing countries. After analysing the institutional arrangements and challenges relating to housing and transport sectors, the current funding framework for the delivery of housing within the context of human settlements is discussed, including selected grants and their ability to promote densification and efficient land use.

11.4 Current Challenges in Land Use and the Built Environment

11.4.1 Legislative and policy framework analysis on land use

Various legislation and policies in South Africa acknowledge the importance of land-use planning, its relationship with transportation planning and housing, and the need for densification. These include the Constitution of South Africa, Act No. 108 of 1996, the Development Facilitation Act (DFA), No. 67 of 1995, the Land Use Management Bill (LUMB) of 2008 later revised to be the Spatial Planning and Land Use Management Bill (SPLUMB) of 2011, and a White Paper on Spatial Planning and Land Use Management of 2001. Land-use management pre-1994 was used primarily to achieve the aims of the apartheid system.[160] Post-1995 pieces of legislation aim to create integrated urban areas that will transform the segregated construction of the apartheid era.

While the DFA has attempted to accelerate land development by introducing principles of equity and efficiency in spatial management, a significant obstacle is the spatial planning system, which consists of an overlay of inherited provincial legislation from the 1980s and national legislation governing informal township establishments from the early 1990s. The problem is further compounded by some provinces and municipalities not adopting the mechanisms available under the DFA and continuing development without adequate land development frameworks, which essentially implies that adherence to national norms and standards is nonexistent. LUMB[161] seeks to rectify this situation, but its enactment has been delayed, which further exacerbates inappropriate land use and development by these provinces and municipalities. However, the Commission notes the recent development on land-use management with the Department of Rural

160 This was to maintain spatial segregation by reserving the provision of rights and services for the white minority.

161 The Bill covers the roles and functions of different spheres of government. The national sphere is mainly responsible for establishing norms and standards, enforcing compliance and for capacitating other levels. Through land-use tribunals, the provincial sphere of government considers and decides on all applications and appeals lodged and redirected to it in accordance with this Bill. Through municipal land-use committees, municipalities consider and decide on all applications lodged or redirected to them in terms of this Bill.

and Land Reform's publication of a draft SPLUMB for comments (in May 2011). This Bill is intended to replace all pre-1994 legislation on land-use management and development, including the DFA.

The described legislation and policies emphasise the need to improve land-use patterns and integrated planning between land use and transport. The principle of densification and the need to improve planning and coordination are key factors identified to achieve efficiency. The problem remains the effective implementation of the policies and legislation in order to ensure that objectives are met.

11.4.2 Public transport and spatial form of South African cities

Transport demand and usage in South Africa

The demand for transport is driven by the need for people to reach locations where activities take place, including the workplace, schools, hospitals and clinics. Table 11.3 provides a breakdown of the main reasons for transport use, by settlement type.

Table 11.3 Purpose for weekday trips, by settlement type (%) in 2003

Settlement type	Percentage of household members naming the trip purpose			
	Education	Shopping	Visiting	Work
Metro	32.8	35.8	28.3	36.6
Urban	37.1	31.5	31.0	31.0
Rural	51.0	23.4	27.0	15.9
South Africa	40.9	29.9	28.6	27.2

Source: Department of Transport, 2003

The main purpose for undertaking trips on weekdays in South Africa is to attend educational institutions (40.9%). Shopping is the second main reason, particularly for metros (35.8%), as a result of the traditional land-use patterns where commercial centres were separated from the areas where people are housed. However, this is changing in bigger townships, as shopping centres are being built within walking distance of housing.

Table 11.4 illustrates the reasons for transport use by gender.

Table 11.4 Trip purpose by gender (%) in 2003

Trip purpose	Male	Female	Difference
Church	43%	57%	14
Education	51%	49%	2
Looking for work	51%	49%	2
Medical services	42%	58%	16
Other	17%	83%	66
Shops	50%	50%	0
Sport, recreation and entertainment	62%	38%	24
Visiting	50%	50%	0
Welfare offices	50%	50%	0
Work	58%	42%	16

Source: Department of Transport, 2003

Generally, the use of public transport in South Africa differs little between genders, with some exceptions as shown in Table 11.4. Male trips dominate for work and sport, recreation and entertainment, which could be due to the traditional practice of females remaining at home and may particularly be the case in communities with low education levels. Female trips dominate for church and medical services, which could be explained by the fact that females take responsibility for children's health care. Therefore, part of female trips for medical services can be attributed to children.

Density and transport costs in South Africa

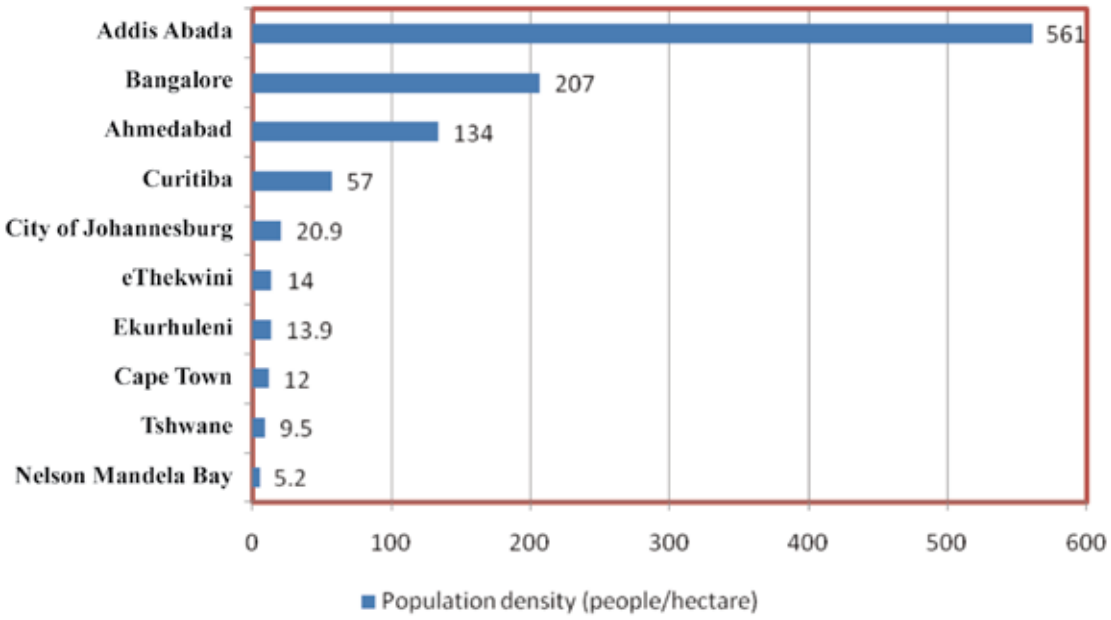
Density level in South African major cities

In general, South African cities have comparatively low settlement densities,[162] and relatively low density levels when measured in terms of the number of people per hectare. The densest city in South Africa is Johannesburg, which has a population density of 20.9 people per hectare, followed by eThekwini, with 14.0 people per hectare. As Figure 11.1 shows, these levels of density are relatively low when compared with other cities in the developing world, such as Addis Ababa, Bangalore, Ahmedabad and Curitiba that have density levels of 560, 207, 134 and 57 people per hectare respectively.

Low population density has, among other things, two disadvantages. The first one is the high consumption of land, as low density levels increase the per capita cost of land infrastructure and services and, to some extent, also limits social interaction. The second is the high demand for movement across the city and long trips undertaken by people to access important amenities, which results in loss of time and higher spending on public transport, especially for the poor.

Densification in South Africa has tended to drift towards peripheral areas of the urban core and has taken place without the consideration of public transport (SPDD, 2008). However, a densification strategy should be aligned with public transport plans. For example, the city Curitiba in Brazil encourages higher densification and mixed-use developments along its bus rapid transit (BRT) routes (Magalhâes, 2009). Similarly, the Indian government is making considerable investments in transport infrastructure through its National Urban Transport Policy (2006), to ensure safe, affordable, reliable and sustainable access for urban residents to their workplace and other services.

Figure 11.1 Population density in South African major cities and other cities in developing countries



Source: Palmer Development Group, 2011; Development Bank of Southern Africa, 2007

Apart from the legacy of apartheid and its policies and objectives, other reasons for the low density in cities include a lack of emphasis on redevelopment and regeneration, the continued location of low-cost housing in outlying areas, a lack of incentives for infill developments, uncoordinated development and funding instruments that promote single-house developments.

The legislative and policy framework is clear about the direction that South African major cities need to take for efficient land use and densification. However, the current low-cost housing delivery system in South Africa reinforces the delivery of single-house and greenfield developments, which is contrary to the principle of densification. This is mainly because of the high costs associated with infill and brownfield developments (as international experience shows) and because land parcels

162 Density can be measured in a variety of ways, including population density (number of people per hectare), dwelling unit density (number of dwelling units per hectare) and building density (ratio of total floor area of building to the corresponding site). In this chapter people per hectare is used.

tend not to be owned by the government. For example, although Tshwane has identified land for infill and brownfield developments in its 2010 and Beyond Spatial Development Strategy (CRMM, 2007), the land is owned mostly by the private sector and Transnet. Other cities in South Africa, such as Ekurhuleni, have also identified areas for infill and brownfield development purposes.[163] To help accelerate the development of these parcels of land, cities need to provide incentives, such as developmental charges and the Neighbourhood Development Partnership Grant.

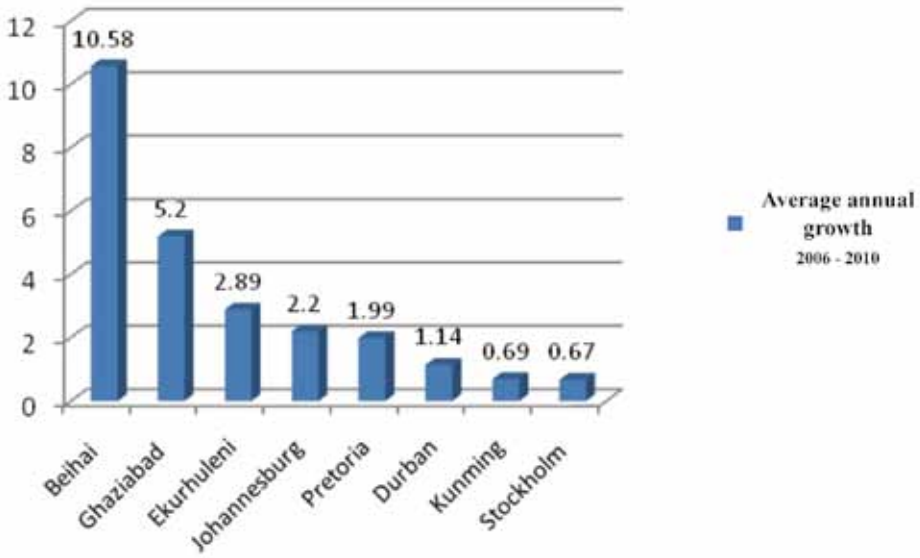
Housing typology plays a key role in efficient land use and improving density level. However, instead of considering high-rise and low-rise apartments, the government has focused on the delivery of low-cost housing, mainly in the form of single, detached housing systems, with most low-cost housing projects being delivered on the outskirts of cities. To encourage infill and brownfield developments, the subsidy funding model needs to recognise that two and three-storey buildings are relatively expensive compared to normal low-cost housing and so provide incentives for developers who are prepared to consider low-cost high-rise developments.

Furthermore, the manner in which infrastructure decisions, planning and investment have been undertaken by various departments and sectors (see Box 11.1) has contributed to low density levels. Infrastructure investment plans and decisions have been taken by different sectors aiming to achieve their own objectives, without taking into account how such decisions affect or reinforce other sectors' plans and projects.

Urban growth in South Africa

The low density level in South African cities should be understood and analysed within the context of urban growth and within the different areas of cities where this growth occurs. Urban growth remains a challenge in major South African cities. Municipalities have to position themselves to face this challenge and develop strategies to overcome it. If the current land-use pattern challenges are not addressed effectively, the trend will continue. This will result in further unfavourable spatial patterns and economic marginalisation of a larger part of the urban population. Figure 11.2 shows that South African cities are among the world cities that are experiencing high population growth, which is expected to continue until 2020 (City Mayors Foundation, 2006). Beihai (China) and Ghaziabad (India) are expected to be the world's fastest-growing cities in terms of population, with average annual growths of 10.58% and 5.20% respectively between 2006 and 2020. Although not at the top of the list, South African cities are also expected to experience population growth. Ekurhuleni is ranked the 57th fastest-growing city, with an average annual growth of 2.89%, while Johannesburg, Pretoria and Durban are expected to experience population growth of 2.20%, 1.99% and 1.14% respectively. Cities expected to experience lower population growth during this period are Kunming (China) and Stockholm (Sweden), with an average growth of less than 1%.

Figure 11.2 Comparison of cities' annual growth, 2006–2020 (%)



Source: The City Mayor Foundation, 2006

163 For example Germiston, Boksburg, Benoni and Springs CBD, as contained in Ekurhuleni 2010 Spatial Development Framework.

Population growth in South African major cities is driven mainly by rural–urban migration, which occurs within and between provinces, and natural population growth. Table 11.5 shows migration patterns in South Africa.

Table 11.5 Urbanisation in South African major cities

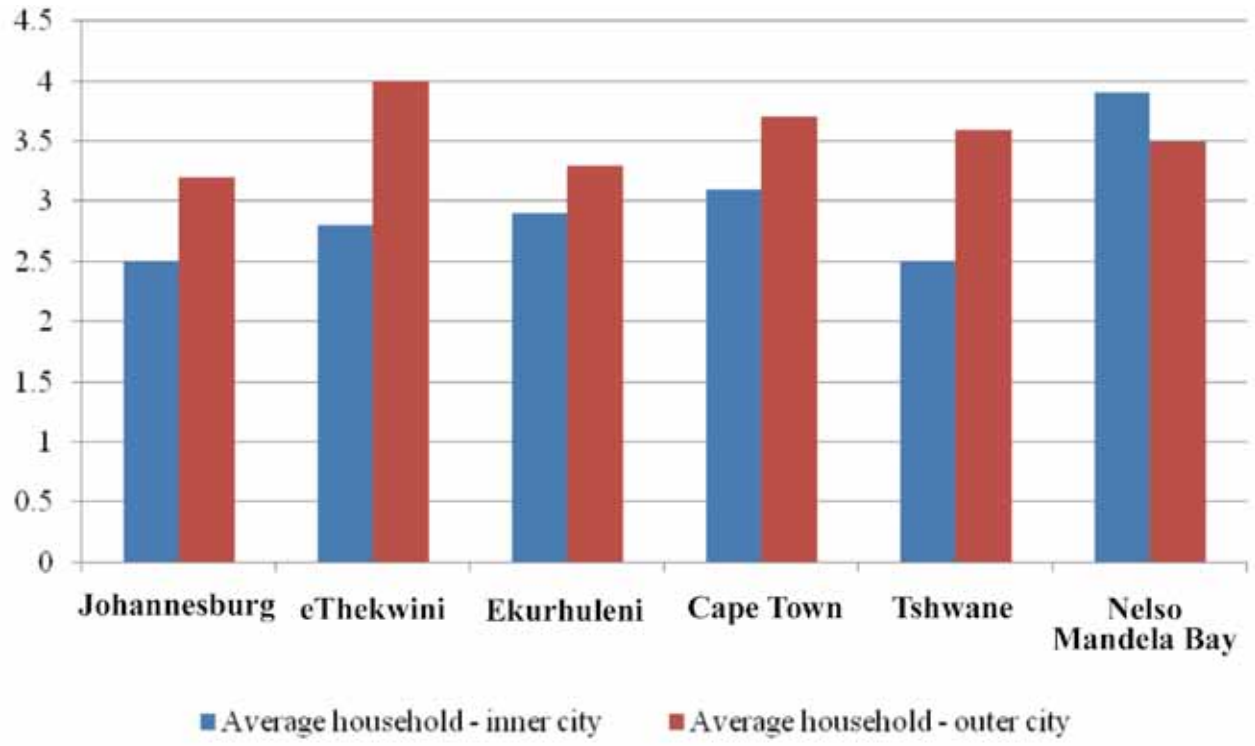
Municipality	Born within the province	From other provinces	From outside SA	Total population	Percentage from outside SA
Buffalo City	664,425	37,504	7,916	713,502	1.1
Nelson Mandela Bay	946,283	68,779	15,947	1,033,211	1.5
Mangaung	634,631	85,758	16,705	737,937	2.3
Ekurhuleni	1,584,379	974,466	136,479	2,702,149	5.1
Johannesburg	2,263,117	1,262,616	304,353	3,842,383	8.0
Tshwane	1,035,860	1,171,132	79,031	2,301,294	3.4
eThekwini	3,095,817	272,320	58,577	3,433,271	1.7
Polokwane	508,086	32,465	5,762	547,200	1.1
Cape Town	2,357,758	937,457	139,392	3,445,105	4.1

Source: StatSA, Community Survey, 2007

The contribution to urbanisation of people coming from outside South Africa is relatively low compared with rural–urban migration within and between provinces. However, it is unclear whether the leading driver is rural–urban migration or natural population growth.

Despite the level of urbanisation, densities are surprisingly low in South African major cities. An explanation is that people migrating to urban areas in South Africa are mostly poor, and are pushed away from the city centres to the city peripheries. As a result, population densities are typically low within the central business districts (CBDs) but increase on the city outskirts, as illustrated in Figure 11.3. Generally, the inner-city average household size is far lower than the outer parts of the cities (the only exception is Nelson Mandela Bay municipality). This means that more people reside in the outer parts of cities, which affects the level of commuting and spending by both households and the government. However, the decreasing densities from the centre are not a true reflection of consumers' choice, but rather the result of other factors, including regulation practices and the low-cost housing delivery model. The informal settlements sector has demonstrated that densities decrease with distance, as households prefer to reside closer to the areas where they work, to reduce the burden of public transport costs. Lower densities closer to the CBDs and higher densities on the city peripheries represent the formal housing sector.

Figure 11.3 Variations in household size between inner and outer cities



Source: Development Bank of Southern Africa (2007)

In South African cities, low densities have been shown to affect the viability and sustainability of public transport. However, the government has invested in BRT as a way of improving public transport in cities, which provides an opportunity to improve land-use patterns. Cities therefore need to plan efficiently how to use the land around these routes more intensively for developments of higher densities. For this, coordination between public transport and human settlements is crucial.

Household and government spending on transport

The current urban form in South Africa directly affects the costs of transportation and accessibility, especially for the poor. Over recent years, spending by households on transport has more than doubled, from 4% in 1995/96 to 10.6% in 2005/06 (StatsSA, 2008). The cost of public transport and the distances involved prevent the poor from taking full advantage of opportunities offered by cities, and such exclusion contributes to high unemployment rates. For those who are employed, the result is both a loss of productivity and low saving rates, as the cost of transport constitutes a form of regressive tax on earnings. The inability of low-income group households to access cities means that the current land-use pattern is partly responsible for the income gaps that exist between the poor and the middle and higher classes. If not addressed, these gaps will continue to widen. Spending on public transport is currently above the national objective, exceeding 10% of households' disposable income. Table 11.6 shows the percentage of household income spent on public transport in relation to monthly household income.[164]

Approximately half of the lowest income band and over 18% of the second-lowest band spend in excess of 20% of their disposable income on public transport.

Table 11.6 Percentage of monthly household income spent on public transport, 2001

Monthly household income	Percentage of households				
	0%	1–5%	6–10%	11–20%	>20%
< R500	20.8	0.0	24.5	5.8	49.0
R501–R1,000	14.1	33.5	20.9	13.2	18.3
R1,001–R3,000	15.1	28.8	24.0	22.0	10.1
R3,001–R6,000	32.5	35.4	18.6	10.7	2.8
> R6,000	68.8	23.8	5.4	1.9	0.0

Source: DoT (2003)

The South African urban transport system is performing relatively poorly against the overall national objective that commuting distance should not exceed 40 km and commuting time should not exceed one hour. The reasons for this include:

Long distances that households have to travel

The widely dispersed form and low density of South African cities have resulted in long and expensive trips. People have to commute from their residential areas to work in the cities and access other important amenities. In some cases, people reside as far as 50–100 km from their place of work, for example former KwaNdebele is located 100 km from Pretoria, while Botshabelo is 50 km from Bloemfontein. Reducing travel will save time and money for households and fiscal resources that are currently used for subsidies.

Low density to make mass transportation viable

In South African major cities, low density directly affects the volume of public transport users and the frequency and viability of mass public transport modes. It also contributes to high public transport costs and high household expenditure on public transport. When investing in mass public transport, density needs to be considered. For example, according to the National Rail Plan, passenger numbers of 20,000–30,000 per hour are required for the rail transport system to be viable.

164 The amounts denoting the different bands have increased as a result of inflation. However, the high proportion of household income spent on public transport among lower income households continues.

Lack of choice on the modes of transport

The lack of choice is also related to the issue of viability. Low densities for bus and rail transport modes have resulted in under-served communities, and the taxi transport mode has taken advantage of this opportunity. As taxis are the only means of transportation available to serve some communities, users have no other alternative. Taxis are currently the dominant mode of public transport in South Africa, and fares are high compared with bus and rail.

Current design of the public transport subsidy system

Household spending on public transport is high despite the government's efforts to reduce the burden by providing subsidised bus and passenger rail services, which costs the fiscus over R5 billion per annum. Compounding the current design of these subsidies are the current land-use patterns and the location of low-cost housing on the urban peripheries,[165] and so households continue to spend a high percentage of their disposable income on public transport.

11.4.3 Institutional challenges within transport and housing

The coordination between the spheres of government responsible for different modes of public transport is one of the institutional issues that needs to be addressed. This has given rise to inefficient use of space and resources. For example, a lack of coordination has resulted in some BRT routes (managed by the cities) directly competing with passenger rail routes (managed by the Passenger Rail Agency of South Africa, PRASA), as these routes run parallel to each other.[166] This challenge is associated with uncoordinated investment decisions within the public transport sector and may have negative implications on the long-term sustainability of modes of transport, especially as densities are relatively low to sustain public transport in South African major cities. If not addressed, this low density may be costly and could lead further to under utilisation of services in the bus and rail modes.

According to the Constitution, housing is clearly a concurrent function between the national and provincial governments. The Constitution also provides for the national and provincial governments to assign administration functions to municipalities when:

- The function would be administered more effectively at the municipality level; and
- The municipality has the capacity to administer such a function.

The Housing Act, No. 107 of 1997 also makes provision for municipalities with adequate capacity to be accredited[167] with the housing function. The outcome of all these pieces of legislation is that the housing delivery and development function rests with higher spheres of the government, while municipalities are responsible for the actual delivery of housing and other complementary services, such as water and sanitation. Municipalities are also responsible for the overall Integrated Development Plan. However, government policy has started to recognise the centrality of municipalities in the provision and management of housing. New developments in this regard include the accreditation of cities to manage the overall planning and delivery of public human settlements. Such accreditation will result in a more integrated system of housing delivery.

Recent developments in the transport sector include devolving public transport function to the cities, as provided for by the National Land Transport Act, No. 5 of 2009. Although devolving some functions to the cities is desirable for better coordination and planning, some risks are involved, such as simply transferring existing problems at sectoral level or within a particular sphere of government to the cities. For example, accrediting cities to undertake the overall human settlements function will not result in much improvement unless the present funding and capacity challenges within

165 Public transport subsidies are only available to users who buy weekly and monthly tickets for formal routes on both bus and rail subsidised modes. These two modes of public transport currently subsidised have a combined market share of 37%, whereas the taxi mode has a market share of 63%. The taxi mode does not receive any form of operating subsidies. This issue will be a project on its own in the next research cycle.

166 See a study by the Financial and Fiscal Commission, 2010, where, for example, the proposed PRASA rail project from the Cape Town airport to the CBD runs parallel to the BRT route.

167 Accreditation of a municipality, especially at level 3, is advantageous because it allows a municipality to administer any national housing programme within its jurisdiction. This includes receiving, evaluating and approving or disapproving applications for subsidies. Furthermore, a municipality with level 3 accreditation would be able to receive its transfer directly from national government, effectively removing the provincial sphere from the equation. This improves planning as well as implementation, and eliminates delays in the disbursement of funding.

the current framework and land-issue problems are first resolved. This implies that various issues need to be resolved within the fiscal intergovernmental relations in order to improve the human settlements delivery system.

The challenge of transforming the spatial form of South African cities is greater than the institutional coordination failure and legislative gap and is complicated by an urgent need to address housing and other basic services backlogs. A focus on eradicating backlogs has to some extent entrenched the apartheid city form and reflects path dependency, as the government with limited resources could choose either to channel funding to address historical backlogs or to attempt to change the spatial city form.

11.4.4 Funding issues

Two key challenges are highlighted in this section: the housing subsidy design and the overall funding of the built environment.

The housing subsidy design

One of the major problems is the current public housing subsidy system, which focuses on direct state provision of housing. In so doing, the system fails to leverage private finance and end-user contributions for housing delivery. The focus on the mass provision of fully-subsidised housing units has also constrained consumers' choice and often leads to sub-optimal output. Furthermore, there has been a lack of focus on key issues such as resolving administrative problems associated with land release and tenure security. In most cases the trade-off has been between the larger stands in distant location, where land is cheaper, and smaller lots, which are normally of poor quality and relatively more expensive, but located closer to economic opportunities. The location of human settlements and important amenities determines transport costs and expenditure incurred by households. The fact that poor households choose to live in informal settlements, slums and backyard dwellings is an indication that they are prepared to accept poor quality housing closer to economic opportunities. Therefore, if given a choice, they would choose their houses to be built closer to the jobs.

However, the current system does not allow such choice. The only remedy to the distortion in city shape caused by large subsidised housing programmes is to make subsidies 'portable' and to let low income households make their own trade-offs between land-use standards, transport costs and location. An example of a portable subsidy is creating a 'housing account' at an existing bank institution, to which qualifying households can also contribute, based on income level. The account would be interest-bearing and tax-free and offer the consumer a choice of when and where to use the subsidy.

The current funding for human settlements has also contributed to the peripheral location of low-cost housing and does not promote densification. The funding grant does not incentivise infill and brownfield developments, but is designed to provide a complete housing product on cheaper peripheral locations. It fails to recognise that the biggest challenge is access to well-located land and providing subsidy amounts sufficient to build settlements with optimum densities that will eventually offset higher land costs. Other cities have achieved higher densification through infill and brownfield developments using incentives/disincentives that the South African system lacks.

Funding for the built environment

There are a number of sectoral grants within the built environment that are currently administered by different spheres of government and departments. Examples of these grants are given in Box 11.1.

Box 11.1 Conditional Grants in the Built Environment

Integrated housing and human settlements development grant. Administered by the Department of Human Settlements, its purpose is to provide funding for creating sustainable human settlements, while the urban settlements development grant (USDG) is allocated to metropolitan municipalities to supplement their capital budgets. It is intended to fund the provision of basic municipal services to new housing projects.

Municipal infrastructure grant (MIG cities/urban development grant). Administered by the Department of Cooperative Governance, its purpose is to provide specific capital finance to address basic municipal infrastructure backlogs for poor households, micro enterprises and social institutions serving poor communities.

Integrated national electrification grant. Administered by the Department of Energy, it is aimed at the provision of electrification of residential dwellings, the installation of bulk infrastructure, rehabilitation and refurbishment of electricity infrastructure in order to improve the quality of supply.

Regional bulk infrastructure grant. Administered by the Department of Water Affairs, its purpose is for the development of regional bulk infrastructure for water supply.

Public transport infrastructure and systems grant. Administered by the National Department of Transport, it is intended for accelerated planning, construction and improvement of public and non-motorised transport networks.

Neighbourhood development partnership grant. Administered by the National Treasury, its purpose is to support neighbourhood development projects that provide community infrastructure and create the platform for other public and private partnerships.

The common purpose of these grants is to provide sustainable human settlements with the necessary basic infrastructure. For example, sustainable human settlements should have water and sanitation services, and roads and electricity, among other things. The challenge lies not in the funding itself (as shown by the variety of grants) but in the lack of coordination.

Some recent positive developments within the funding framework include the introduction of an urban settlements development grant (USDG),[168] which supplements metropolitan municipalities' capital budgets for the development of sustainable human settlements, and the shifting of the sanitation function to the Department of Human Settlements (DoHS, 2010). These developments are positive for the alignment of grants and improved coordination in the delivery of human settlements. However, it is only the beginning of the process, as a number of grants still need to be aligned. Currently, there is a lack of strategic or operational relationship between infrastructure transfers, housing subsidies and other grants/subsidies including the one for public transport investment, which is an issue that the Commission highlighted in 2005 (see Box 11.2).

This lack of relationship is reflected in the continued fragmentation of infrastructure-related transfers across different sectors, which leads to delays in infrastructure provision. One practical example of the effect of this lack of coordination is the delay in the provision of human settlements due to unavailability of bulk infrastructure (Sexwale, 2010).

Box 11.2 Lack of Coordination and Alignment in the Funding for the Built Environment

The lack of coordination in funding for the built environment is not a new issue, as it was raised by the Commission in 2005. Subsequently a recommendation relating to this issue was made to consider linking new housing subsidies with the MIG. Government accepted this recommendation, although it was also noted that the MIG does not only target new housing. The FFC, however, is still of the view that this should be done, at least for new human settlements developments.

168 The USDG is the result of merging the MIG cities grant and the internal infrastructure portion of the provincial human settlements development grant.

11.5 Recommendations

The current land-use pattern in South Africa has resulted in a number of challenges for transport and human settlements sectors. These challenges include:

- overcoming the legacy of apartheid and its policies;
- legislative gaps;
- poorly located low-cost housing and low densities, leading to extensive commuting;
- high transport costs; and
- unsustainable and inefficient public transport.

These challenges have in turn resulted in higher government spending in the form of public transport operating subsidies. The current funding framework for the built environment is highly fragmented. This results in uncoordinated infrastructure investment plans that compromise or delay service delivery. The current human settlements funding does not support density or allow beneficiaries to have choices. Although other developing countries have used fiscal and financial incentives to achieve higher levels of density, South Africa lacks such incentives.

From the above analysis, the following recommendations are made:

- The government should actively pursue the development of a more spatially compact urban form for South African cities by adopting appropriate policies and financing instruments. Specific fiscal instruments that can support these objectives include wider use of development charges in financing infrastructure associated with the land development process; public transport subsidies that specifically target high-density low-income areas; and fiscal incentives for urban land development projects that occur within the existing urban form.
- The government should improve the alignment of other funding instruments in the built environment, specifically the Integrated Housing and Human Settlements Grant, with other conditional grants that make human settlements complete.
- To address the problem of uncoordinated planning and decision-making in silos, inter-sectoral infrastructure investments, planning and development projects should be coordinated to ensure an integrated service delivery. This could easily be implemented by designing institutional arrangements that would allow municipalities to fulfill their entire municipal planning and coordinating role.
- Municipalities working with the Housing Development Agency should develop, maintain and update land information systems and databases within their areas of jurisdiction. This information should be publicly available.
- The infrastructure grant should be used as a tool to guide, direct and shape future city and regional development and should prioritise designated areas. The existing Neighbourhood Development and Partnership grant can be linked to targeted infill developments in major cities.
- Underutilisation of land or keeping land undeveloped should be discouraged through levying higher municipal taxes. Developmental charges could be used to enforce this.
- Cities should be more prescriptive on density, which should be included in their spatial development plans. Density is a key issue for efficient land use, yet cities have done little to develop specific guidelines and prescriptions on density, which public transport and various legislation and policies seek to promote.

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CHAPTER 12: ENVIRONMENTAL SUSTAINABILITY AND CLIMATE CHANGE IN THE LOCAL GOVERNMENT SPHERE

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12.1 Introduction

The impact of climate change on world economies is increasingly taking centre stage in global socioeconomic and political debates and policies. The severity and frequency of associated natural disasters have made climate change one of the major threats to global economies in the 21st century. The hazards of climate change have manifested themselves in, among others, wide temperature variations, changes in rainfall patterns, rises in sea levels, unprecedented levels of air pollution, frequent floods and droughts, and increases in water- and vector-borne diseases (World Bank, 2010). Although every economy is vulnerable to the adverse impacts of climate change, this vulnerability is distributed disproportionately across continents and regions.

The developed world generates most of the negative externalities associated with climate change, while the poorest global populations bear the greatest risks. In the USA, per capita emissions of greenhouse gases (GHG) are 19 times greater than in Africa. Yet, although responsible for less than 7% of global GHG and 4% of CO2 emissions, Africa is the most vulnerable to the impact of climate change (Campbell-Lendrum and Corvalan, 2007). Inadequate adaptation and mitigation infrastructure, poorly functioning markets, weak institutions, and limited resources are some of the factors that make low-income countries more vulnerable to climate variability and change.

The government has recognised that climate change is a threat to the socioeconomic fabric of the country and to the environmental sustainability and vibrancy of cities. South Africa is party to many international agreements, including the following: Antarctic–Environmental Protocol, Antarctic Marine Living Resources, Convention for the Conservation of Antarctic Seals, Antarctic Treaty, Biodiversity, Climate Change–Kyoto Protocol, Desertification, Convention on International Trade in Endangered Species (CITES), International Treaty on Hazardous Wastes, Law of the Sea, Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Marine Life Conservation, and Ozone Layer Protection.

Furthermore, the government's 2009–2014 Medium-Term Strategic Framework includes the protection and enhancement of environmental assets and natural resources as one of the strategic priorities that were developed into 12 key outcomes. However, in spite of this recognition, lower tiers of government, especially local government, have not been proactively involved in efforts to adapt to and mitigate climate change. As principal drivers of economic growth, development and innovation, municipalities need to recognise the challenges posed by climate change. Yet, local authorities do not prioritise climate change because its impacts are not immediate; they consider themselves too small to have any influence and are reluctant to spend resources on what is a global problem. The result is inaction and a lack of appreciation that global climate change is a legitimate local (and global) concern (Betsill, 2001). Part of the problem is that municipalities have insufficient knowledge about the possible impacts of climate change at local level.

The Fiscal and Financial Commission (the Commission) is concerned about the effect of climate change because of its potential to strain public finances and so undermine any gains in intergovernmental fiscal relations, which the Commission is constitutionally mandated to promote. Another concern is the potential of climate change to undermine development and growth, imposing costs on society and government through expenditure related to ameliorating climatic

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effects. This chapter seeks to show how climate change is affecting the environmental sustainability and vibrancy of urban economies in South Africa. The primary objectives of this chapter are:

- To examine the impact of climate change on South Africa's municipalities, with a special focus on the water and energy sectors.
- To recommend possible and appropriate financial and fiscal policies and instruments for municipalities to deal proactively with the threats and opportunities that accompany climate variability and change.

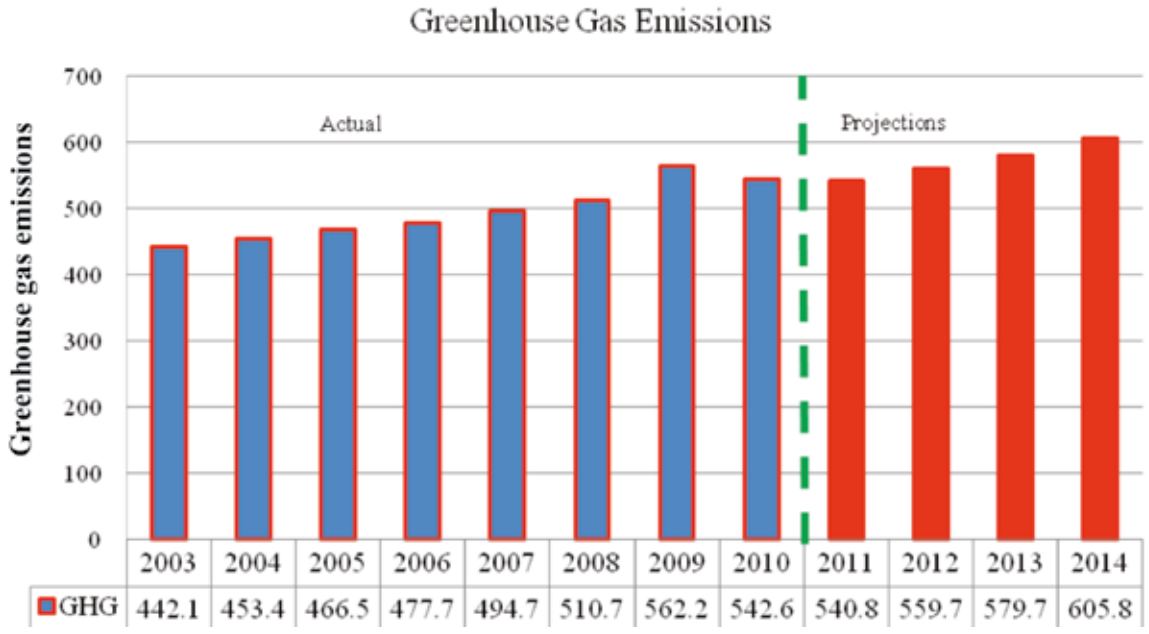
12.2 The State of the South African Environment

Since 1994, environmental sustainability has gradually been placed at the core of South Africa's socioeconomic and political agendas. South Africa has pursued policies that seek to promote the socioeconomic well-being of the population, while at the same time preserve the natural assets of the country. Through various policies, institutional developments and legislative frameworks, the country has integrated environmental sustainability within the broader development agenda.

South Africa's environment is characterised by deep-rooted degradation, which is due to many factors, including high levels of poverty, unemployment, inequality, rapid urbanisation, inefficient land-use patterns, and extensive use of fossil fuels. One of the main indicators of the deteriorating environment is the steady increase in GHG emissions, as shown in Figure 12.1.

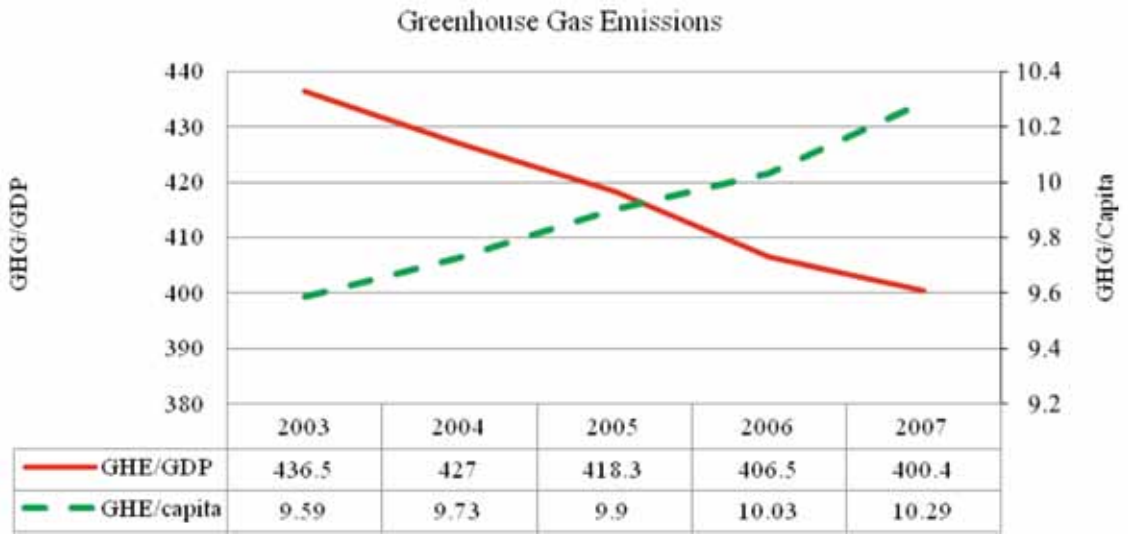
Between 2003 and 2007 GHG emissions increased steadily, from 9.6% to 10.3% per capita. However, as Figure 12.2 shows, the same period saw a steady decline in emissions as a proportion of gross domestic product (GDP), which may suggest the economy is moving to energy-efficient industries.

Figure 12.1 GHG emissions in South Africa



Source: Government of South Africa, 2009

Figure 12.2 GHG emissions as a percentage of GDP in South Africa



	2003	2004	2005	2006	2007
GHE/GDP	436.5	427	418.3	406.5	400.4
GHE/capita	9.59	9.73	9.9	10.03	10.29

Source: Government of South Africa, 2009

As mentioned above, South Africa's commitment to a sustainable environment is reflected in the government's strategic priority areas. Key outcome 12 of these priorities is concerned with "Environmental Assets and Natural Resources that are well protected and continually enhanced", and includes the following outputs: (DEA, 2009)

- Enhanced quality and quantity of water resources;
- Reduced GHG, climate change impacts, and improved air and atmospheric quality;
- Sustainable environmental management; and
- Protected biodiversity.

South Africa has also linked its strategic priority areas to the Millennium Development Goals (MDGs), including MDG 7, which promotes sustainable environmental resource use and management. Progress towards achieving MDG 7 in South Africa is mixed (StatsSA, 2007):

- Targets already achieved: proportion of population using improved drinking water sources and proportion of population using solid fuels as the primary source of energy.
- Targets likely to be achieved by 2014: proportion of protected terrestrial and marine areas; proportion of population using improved sanitation facilities; reduced CO2 emissions and reduced consumption of ozone-depleting substances.
- Targets unlikely to be achieved by 2014: reduction in the number of species threatened with extinction and proportion of urban population living in slums.

12.3 Literature Review

Although the subject of climate change transcends many disciplines, such as ecology, (environmental) economics, geography, climatology and sociology, the focus of this review is on the economic and fiscal perspective. At a theoretical level, climate change is seen as a global externality, which makes solutions difficult to find, as the externality often transcends borders and generations and involves some interactions of the natural, climate and economic systems (Bulkeley, 2002; Cline, 1992; Brown and Jackson, 1986; Forrester, 1961; Forrester, 1968).

The impact of climate change varies by region and level of development and causes severe strain on global economies. Nordhaus (1991) and Tol (1995) estimate that climate change-related hazards will force the GDP of developed countries to contract in future. However, Stern (2007) found that the developing world is likely to lose out in terms of national GDP,

which suggests that developing countries will carry a heavier burden of climate change than the developed world. The lack of adaptation and mitigation capacity and resources are perhaps the most important factors to explain why the economies of developing countries are likely to suffer most.

Many studies have looked specifically at the impact of climate change on water and energy resources. A common finding is that climate change will lead to an increase in the demand for energy (Tol, 2002; Pearce *et al*., 1996; Kurtze and Springer, 1999). Davidson *et al.* (2003) suggest that climate changes will compromise energy security, as supply and demand gaps are likely to widen. The water supply–demand gap will also widen because of climate change: water demand will increase while water supply will diminish (Muller, 2007). An increase in global mean temperature of 1°C will result in water resource losses in Africa worth $2.4 billion (Tol, 2002), while the quality and quantity of water will be compromised.

To ameliorate climate change-related hazards, many alternative policy instruments – fiscal, financial and other – are suggested (EarthLife Africa, 2009; African Development Bank, *et al*., 2003). They can be divided into two categories: regulatory instruments and economic/market-based instruments (Brown and Jackson, 1986). The regulatory instruments include setting up of rules, limits, restrictions, or sanctions that will discourage environmentally harmful behaviours. Economic instruments simply rely on the price mechanism, which will act when behaviours are environmentally harmful, encouraging environment-friendly alternatives. Market-based instruments include taxes, tariffs, subsidies and carbon trading. Another emerging set of policy instruments includes land-use policies, green procurement, green tendering, green budgeting, and other financial incentives (ibid.).

The literature is clear: climate change will have profound effects on water and energy supply and demand. These sectors form the backbone of urban and local government economies, and therefore the local sphere is vulnerable to climate change. Unless action is taken to tackle the consequences of climate variability and change (in particular mitigation and adaptation measures), efforts to build economically strong local economies will be compromised.

12.4 Methodology and Data Analysis

The link between climate change and municipal-level demand for water and electricity is examined using a conceptual framework that is premised on system dynamics modelling and empirical methodology based on econometric modelling.

12.4.1 The conceptual model: system dynamics framework

Climate change presents a number of challenges for sustainability around the globe. South Africa is no exception, as shown by several disasters such as floods, droughts and fires, which have resulted in huge and frequent economic and social damages. What is needed is to improve the representation of climatic and biophysical systems and, in particular, the anthropogenic (human) activities that influence or control the impacts of climate change at national, provincial and local levels.

System dynamics can help decision-makers to understand the structure and characteristics of a complex system. It integrates system-thinking theory, cybernetics and information theory, and is useful when dealing with problems of high-level, non-linear and multiple feedbacks.[172] It is a well-established approach for describing the behaviour of a system (Forrester, 1961, 1968) and uses causal loop diagrams or stock and flow diagrams. A system dynamics model provides a flexible way of understanding the dynamic relationships between the variables and their interactions/linkages. The principles used to develop such a model can be found in a number of studies, including Forrester (1961), Randers (1980), Richardson and Pugh (1981) and Mohapatra (1994).

A causal loop diagram (see Figure 12.3) was developed to illustrate the relationship between climate variability and change, municipal economic development and population, as well as factors associated with climate change and demand for electricity at municipal levels. South African municipalities need to put appropriate strategies in place to ensure sustainable provision of water services. Yet, population and industrial growth increase demand for water significantly, and climate conditions such as rainfall and temperature can affect its supply. The interactions shown in Figure 12.3 guided the selection of variables used to estimate the econometric models.

172 Feedback refers to the situation where X affects Y, and Y in turn affects X, perhaps through a chain of causes and effects (Sterman, 2000).

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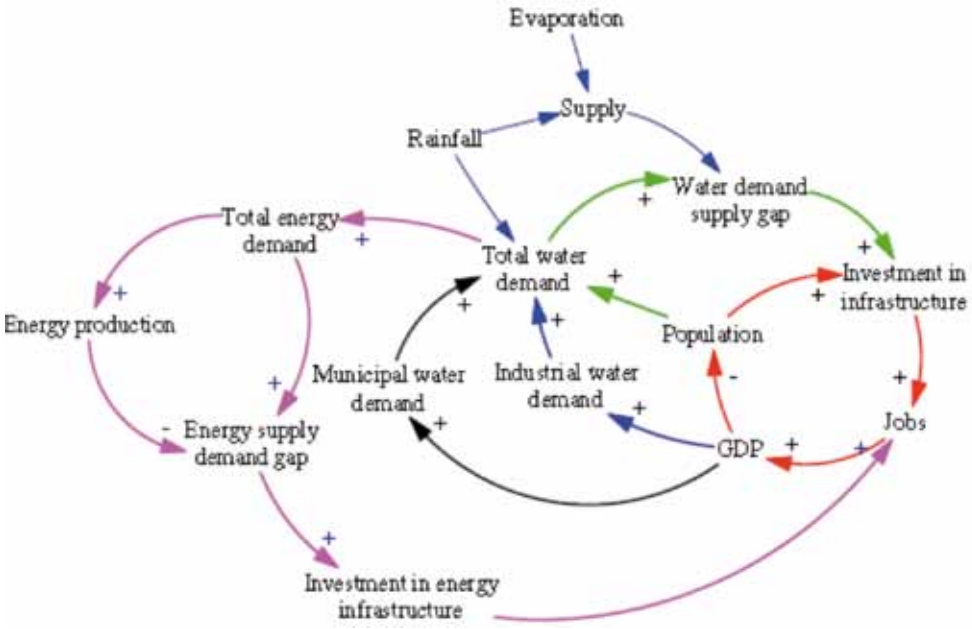
Figure 12.3 Causal-loop diagram



Note: A causal loop diagram explains the impact dynamics and feedback of the system being studied. The term 'causal' refers to a cause-and-effect relationship. '+' on an arrow connecting two variables indicates the variable at the tail of the arrow causes a change in the variable at the head of the arrow in the same direction; '–' indicates a change in the opposite direction.
Source: Authors

Figure 12.3 highlights a number of possible interactions between three systems: water (total water demand and supply); socioeconomic (municipal population, investment in water-related infrastructure and GDP); and climatic (rainfall and evaporation, which is a function of temperature and humidity). GDP growth is expected to lead to reduced population, but GDP and population growth will also raise water demand, which in turn will increase the water demand–supply gap; hence the need for more investment in infrastructure to meet the needs for water provision.The causal loop shown in Figure 12.3 reasonably represents the real-world relationships (water demand/supply, electricity demand/supply and climatic conditions) that empirical models need to consider. For instance, in the real world, water demand for industry, agriculture, and other municipal activities needs to indicate the feedback influences of rainfall, temperature and storage capacities.

12.4.2 The econometric models

The water and energy sectors are central to the welfare of citizens and functioning of municipalities in South Africa and beyond. Figure 12.3 shows how climate conditions (particularly changes in rainfall) affect water demand, which in turn affects the energy supply–demand gap. Using municipal expenditures on water and electricity as proxies for municipal water and electricity demand, the hypothesised link between these indicators and climate variability and/or change for municipality m at time t can be modelled as a system of equations as follows:

$$Water_{mt} = \beta_0 + \beta_1 C_{mt} + \boldsymbol{\beta}_2 \mathbf{W}_{\mathbf{mt}} + \varepsilon_{mt}$$
$$Electricity_{mt} = \alpha_0 + \alpha_1 C_{mt} + \boldsymbol{\alpha}_2 \mathbf{X}_{\mathbf{mt}} + \mu_{mt}$$

for $m = 1,.....N$ municipalities over $t = 1, ...T$ years. (1)

The dependent variable *Water* is the municipal expenditures (in rand) on water-related services and infrastructure, and *Electricity* is municipal expenditures (in rand) on electricity-related services and infrastructure. The climate change variables are represented by C, as the focus is on rainfall variability as a proxy for climate variability and change. In addition to these climate variables, characteristics of municipalities believed to affect municipal water and electricity expenditures are controlled for. They are captured by the vectors W and X for water and electricity expenditures, respectively. The parameters to be estimated are β_0, β_1, $\boldsymbol{\beta}_2$, α_0, α_1, and $\boldsymbol{\alpha}_2$. The error terms for each equation are denoted by ε and μ. These error terms are assumed to be such that $(C, \varepsilon), (\mathbf{W}, \varepsilon), (C, \mu), \text{and } (\mathbf{X}, \mu) \sim i.i.d$ and (X, μ): $i.i.d$ and $N(0, \sigma^2)$.

Time-series data on water and electricity expenditures by municipalities, as well as rainfall variability and other control variables, is combined to form a panel dataset. In estimating the systems of equations in (1), this structure of pooled data can be taken into account in three ways, each introducing the intercept into the model in a different way. Specifically, the estimated model may have a common, fixed or random intercept term. In other words, the three model specifications are the common effects regression, fixed effects and random effects models.

The common effects regression model involves pooling all the data for the municipalities, assuming that the parameters do not vary across sample observations, as done in (1). In this model, the level of demand for water and electricity – proxied by municipal expenditures on water- and electricity-related infrastructure and/or services, respectively – is assumed to be homogeneous across municipalities. These assumptions imply that the equations in (1) can be estimated using panel data ordinary least squares (OLS).

Alternatively, the intercept term could be allowed to vary across municipalities. This is done by introducing dummy variables to take into account the differences in the levels of water and electricity expenditure across the municipalities. Referred to as the fixed effects model, it can be represented as:

$$\begin{aligned} Water_{mt} &= \sum_{i=1}^{N} \beta_i M_{it} + \beta_1 C_{mt} + \boldsymbol{\beta}_2 \mathbf{W}_{\mathbf{mt}} + \varepsilon_{mt} \\ Electricity_{mt} &= \sum_{i=1}^{N} \alpha_i M_{it} + \alpha_1 C_{mt} + \boldsymbol{\alpha}_2 \mathbf{X}_{\mathbf{mt}} + \mu_{mt} \end{aligned} \quad (2)$$

where β_i *and* α_i represent the intercept coefficient for the ith cross-sectional municipality in each respective equation, M_{ii} are dummy variables that take a value of one for observations belonging to the ith municipality and zero otherwise.

This is appropriate when specifying a different intercept coefficient for each cross-sectional unit that adequately captures differences in municipalities.

A random effects model can be used as an alternative to the fixed effects model. It assumes that the coefficients are random variables drawn from a larger population such that:

$$\begin{aligned} Water_{mt} &= \beta_0 + \beta_1 C_{mt} + \boldsymbol{\beta}_2 \mathbf{W}_{\mathbf{mt}} + u_i + \varepsilon_{mt} \\ Electricity_{mt} &= \alpha_0 + \alpha_1 C_{mt} + \boldsymbol{\alpha}_2 \mathbf{X}_{\mathbf{mt}} + \eta_i + \mu_{mt} \end{aligned} \quad (3)$$

where it is assumed that: $E[u_i] = 0, E[u_i^2] = \sigma_u^2, E[u_i u_j] = 0$ for $i \neq j, E[u_i \varepsilon_{it}] = 0$; and

$E[\eta_i] = 0, E[\eta_i^2] = \sigma_\eta^2, E[\eta_i \eta_j] = 0$ for $i \neq j, E[\eta_i \mu_{it}] = 0$

The structure of the model means that, for a given municipality, the correlation between any two disturbances in different time periods is the same. In other words, the correlation is constant over time and identical for all municipalities. Using the random effects estimator means that, in addition to controlling for unobserved effects, the intra-municipality correlation can also be controlled due to unobserved cluster effects (Wooldridge, 2002). The principle is that the results from a random effects model can be generalised to the whole population from which the sample is taken. Thus, while the fixed effects specification assumes municipality-specific effects are fixed parameters, the random effects specification assumes municipalities are made up of a random sample and the municipality-specific effects are assumed to be independently distributed with a mean of zero and a constant variance.

In principle, both the fixed and random effects specifications provide some estimation efficiency gains over the simple common effects regression model when using panel data. However, in deciding which model specification to base the inferences on, several post-estimation statistical tests are performed. An F-test is used to test for the common coefficients specification against the fixed and random effects specifications. In case the specification is rejected, which implies that the common effects estimators are biased and spurious, a Hausman test is used for the fixed versus the random effects specification.

12.4.3 Simulating the impacts of rainfall variability scenarios

Following the estimations of models (1)–(3) and choosing the most appropriate model based on the statistical tests described above, the estimates are used in a simulation exercise. This is meant to project the impact of climate variability and/or change (focusing on rainfall variability) on municipal water and electricity expenditures.

Data

The municipality is the unit of analysis. A municipal-level panel data set is used, containing comprehensive information on the characteristics of the municipalities, as well as the average socioeconomic characteristics of the households or individuals residing in those municipalities. The empirical panel data covers 283 municipalities across South Africa for the period 2005–2009.

The dependent variable, Water, is expenditure (in millions of rand) on water-related services and infrastructure, and Electricity is expenditure (in millions of rand) on electricity-related services and infrastructure. The level of expenditures is used as a proxy for municipal water and electricity demand. The assumption is that, in response to changes in water and electricity demand from their residents, municipalities change the level and composition of water and electricity-related infrastructure and/or service provision, which in turn changes the level of water and electricity-related expenditures.

Rainfall Variability is of primary interest to this study. The coefficient of variation is the indicator used to measure variability or dispersion of rainfall levels at municipal level. This is a normalised measure of dispersion of a variable – rainfall levels – computed as the ratio of standard deviation and average rainfall such that:

$$\text{Coefficient of variation} = \frac{Std.Deviation_m}{\overline{\text{Rainfall}}}$$

$Std.Deviation_m$ is the standard deviation of rainfall for municipality m.

This is computed as the square root of variance, where the sample variance is computed as:

$$Variance_m = \frac{1}{n}\sum_{t=1}^{n}(\text{Rainfall}_{mt} - \overline{\text{Rainfall}})^2$$

where n is the number of years for which rainfall data was recorded within each municipality (five in cases where rainfall data was found for each of the five years covered in the panel). Rainfall is the average level of rainfall within a particular municipality for the five years covered in the panel data.

The main advantage of using the coefficient is that, unlike the variance and standard deviation which need to be understood in the context of the mean of the variable, the coefficient of variation is a dimensionless number. The coefficient of rainfall variation thus illustrates how wide the spread of annual rainfall values is, recorded by municipalities. The larger the coefficient of variation, the more scattered the observed rainfall levels are on average. Specifically, they tend to be further from the average rainfall levels observed in the five years covered in the study. Rainfall variability indicators are computed at municipality level, implying that the values will be the same within municipalities but vary across municipalities.

The other control variables used in the empirical analysis include the value of unconditional grants allocated to municipalities by the national government (in thousands of rand); gross value added (GVA), in thousands of rand, which is an equivalent of GDP at municipal level; the municipality's population; the land area covered by each municipality; population density; the share of population that is less than 19 years old; the share of population that is over 65 years old; and the number of councillors in a municipality, which indicates the size of the local government. The definition and descriptive statistics of these variables are presented in Table 12.1.

Table 12.1: Definition and descriptive statistics of the variables used in the econometric model

Variable name	Variable definition	Mean	Std. Deviation	Obs.
Water	Municipal expenditures on water-related infrastructure and provision (in million rand)	39.92	118.80	678
Electricity	Municipal expenditures on electricity-related infrastructure and provision (in million rand)	24.21	98.72	646
Rainfall	Annual rainfall in millimetres	417.83	1348.86	443
Variance of rainfall	Variance of annual rainfall in millimetres	1.30E+06	1.23E+07	470
Standard deviation of Rainfall	Standard deviation of annual rainfall in millimetres	228.95	1118.26	470
Rainfall variability	Coefficient of variation of annual rainfall	0.44	0.30	470
Population	Number of persons in municipality	167356.50	380108.50	1285
Municipal area	Area covered by the municipality, in square kilometres	4626.27	4423.01	1350
Population density	Population/municipal area, persons per square kilometre	80.12	208.36	1260
Grants	Unconditional grants allocated to the municipality by the national government (in thousand rand)	4.87E+07	9.61E+07	1410
Gross value added	Gross value added (in thousand rand)	5592.33	23047.13	1310
Population under 19	Proportion of population under the age of 19	0.44	0.04	1285
Population over 65	Proportion of population over the age of 65	0.05	0.01	1275
Councillors	Number of councillors	31.41	28.99	1406

Source: Own calculations

Table 12.1 shows that an average municipality spends close to R40 million per year on water-related infrastructure and/or services and about R24 million per year on electricity-related services and infrastructure. The average annual precipitation, for municipalities where rainfall data was recorded, is 418 mm. Indicators reveal huge variability of rainfall across the years within municipalities, with an average coefficient variation of close to 44%. An average municipality covers around 4,626 square kilometres and is home to about 167,357 residents, an average population density of close to 80 persons per square kilometre. The GDP equivalent for each municipality, on average, is around R6 million, while the average unconditional grant received by municipalities from the national government is approximately R49 billion. In an average municipality, 44% of the population is below the age of 19 years old, while 0.5% is over 65 years old.

The variables discussed above are used to estimate equation (1). However, due to missing data for these variables, especially data on annual rainfall in most municipalities (as revealed in Table 12.1 column 5), the effective sample used in the estimations covers 74 municipalities for which comprehensive rainfall data was available.

12.5 Results and Discussion

This section presents and discusses the results from econometric estimation of equations (1) to (3). A smoothing procedure provides an indication of how linear (or non-linear) the relationship is between municipal spend on water and electricity and climate variability as proxied by rainfall variability.

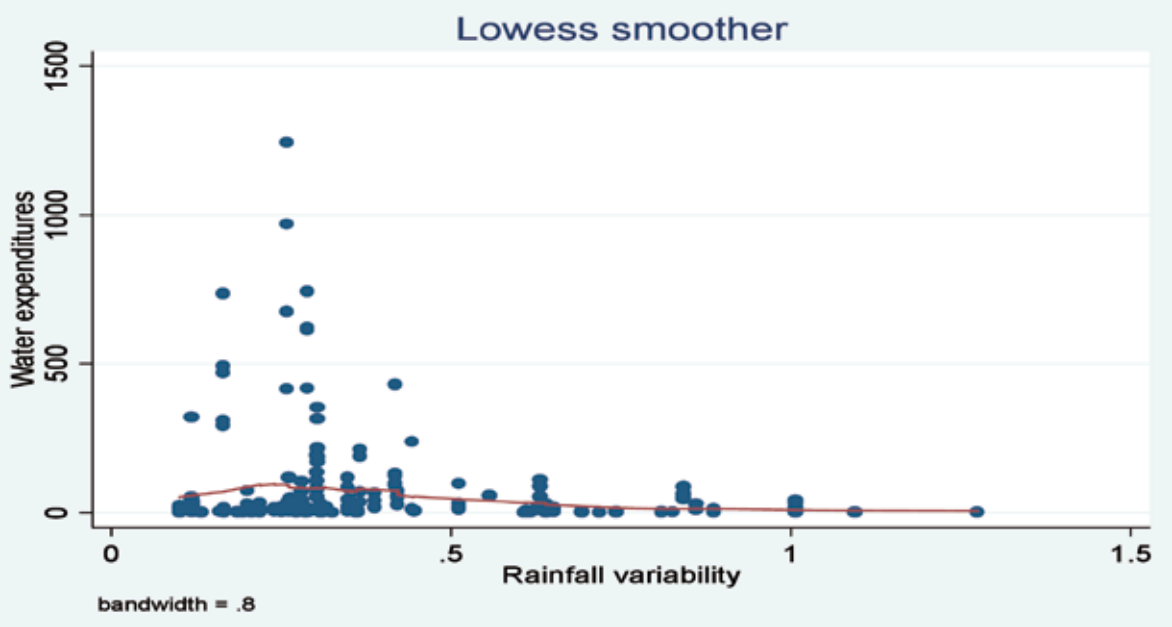
12.5.1 Rainfall variability and municipal expenditures: Lowess estimation

A non-parametric smoothing method, the locally weighted scatterplot smoothing (Lowess) estimation is conducted to examine whether the econometric relationship between municipal expenditures and rainfall variability to be estimated is specified correctly. This is a local linear regression estimator, which calculates a local estimate of the regression curve at each point by using only a neighbourhood of points, then weighting them according to how close they are to the point in question (Cleveland, 1979). Essentially it uses a rolling local average of the dependent variable over a wide window around each value of an independent variable to produce a smoother estimate. The bandwidth – the proportion of the full sample used in each regression – determines the range of the independent variable. Consistent with standard practice, this study uses 80% of the sample to run each regression (i.e. a bandwidth of 0.8).

The advantages of using Lowess include: it imposes minimal structure on the data; it is locally robust, since far away observations in the sample have no influence on the estimated local relationship; it has a variable bandwidth range; and it uses a local polynomial estimator to minimise boundary problems (Cameron and Trivedi, 2005). Its major limitation is that it does not allow controlling for other possible determinants of municipal expenditures. Specific to this study, the Lowess estimator is

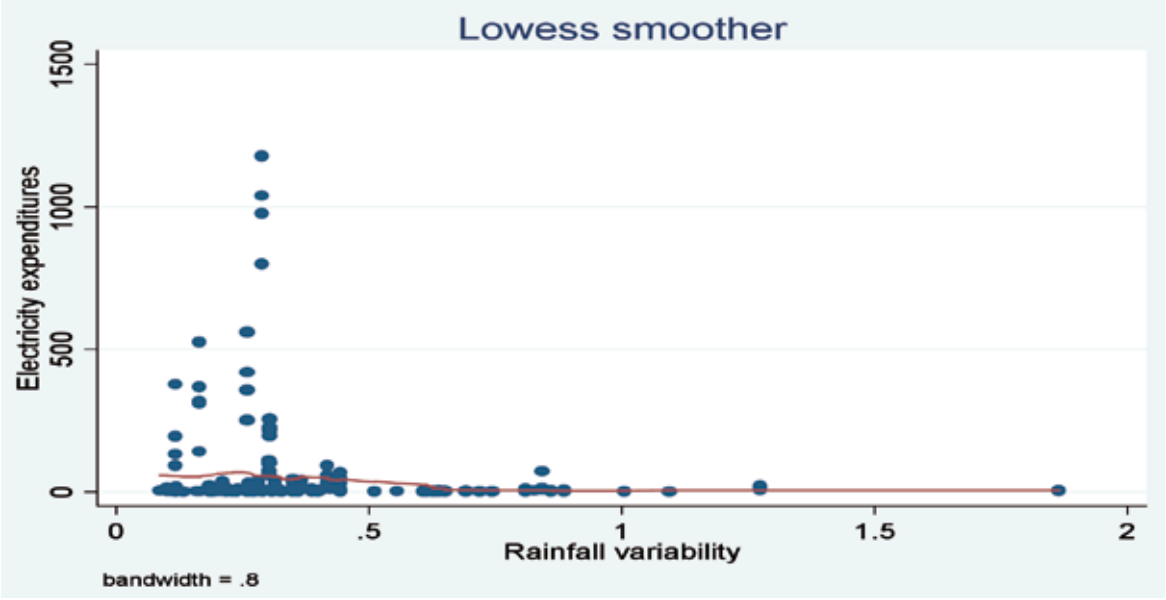
used to give a smoother estimate based on a rolling local average of Water and Electricity over a wide window around each value of Rainfall Variability. The results of the Lowess smoothing procedure are presented in Figures 12.4 and 12.5 with Water and Electricity as dependent variables, respectively.

Figure 12.4 Lowess estimation of Water and Rainfall variability



Source: Own calculations

Figure 12.5 Lowess estimation of Electricity and Rainfall variability



Source: Own calculations

Figures 12.4 and 12.5 suggest a non-linear relationship between municipal expenditures on water and electricity and rainfall variability as proxied by the coefficient of variation of rainfall. An inverted U-shape or quadratic relationship is suggested. Accordingly, the square of Rainfall variability is introduced as an additional explanatory variable in the econometric models used to estimate the system of equations specified in (1). Arguably, the relationship between municipal expenditures and rainfall variability might not be as simple as Figures 12.4 and 12.5 suggest and might include non-climatic factors. Additional factors or variables that might affect municipal expenditures need to be controlled in order to isolate, as far as possible, the impact of rainfall variability on municipal expenditures. Given this, a multivariate econometric framework is used to further explore the relationship between expenditures and rainfall variability.

12.5.2 Rainfall variability and municipal expenditures: econometric evidence

As the discussion of the econometric model indicated, the econometric strategy employed to estimate the impact of rainfall variability on municipal water and electricity expenditures uses three model specifications: (i) common effects (essentially pooled OLS), (ii) fixed effects, and (iii) random effects models. However, as rainfall variability variables are indexed to municipalities, the fixed effects model cannot be estimated. That is, the fact that rainfall variability variables do not vary within municipalities indicates that a fixed effect model would naturally drop them from the estimation. Common and random effects estimations are carried out, using Water and Electricity as dependent variables and controlling for the explanatory variables specified in Table 12.1. The regression results for the common and random effects are provided in Table 12.2. Models (a) and (b) are from pooled OLS estimation of Water and Electricity, respectively, while models (c) and (d) are from random effects estimation of Water and Electricity, respectively. All these models use the coefficient of variation as an indicator of rainfall variability.

Table 12.2 Pooled and random effects regression results for water and electricity models

	Pooled OLS estimations		Random Effects estimations	
Variable	Water (a)	Electricity (b)	Water (c)	Electricity (d)
Rainfall variability variables				
Rainfall variability	237.226***	49.066***	244.541***	85.205**
	(69.064)	(17.508)	(92.446)	(38.415)
Rainfall variability squared	-200.216***	-27.458**	-205.123***	-51.157**
	(57.233)	(10.847)	(77.888)	(22.227)
Other control variables				
Population density	0.209***	0.333***	0.164**	0.213**
	(0.048)	(0.052)	(0.073)	(0.092)
Grants	0.000***	-0.000	0.000**	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Gross value added	0.001	0.001***	0.002**	0.003***
	(0.000)	(0.000)	(0.001)	(0.001)
Population under 19	387.881**	127.980	438.444*	463.566**
	(194.104)	(100.720)	(226.915)	(206.776)
Population over 65	1,426.013**	37.068	1,121.671	70.388
	(684.580)	(354.962)	(1,253.787)	(658.798)
Councillors	-0.202	-0.771***	-0.960	-2.291***
	(0.324)	(0.280)	(0.613)	(0.671)
Dummy for 2006	15.620	11.950	17.120*	9.459**
	(13.473)	(10.317)	(9.685)	(4.611)
Dummy for 2007	24.437*	15.803*	22.845**	10.133**
	(14.121)	(9.439)	(10.206)	(4.325)
Dummy for 2008	31.652**	28.998***	25.381**	16.648***
	(13.747)	(10.751)	(10.671)	(6.237)
Dummy for 2009	10.080	44.673***	-3.058	7.846
	(15.712)	(14.826)	(16.000)	(9.636)
Constant	-303.255***	-72.562	-297.851**	-198.806*
	(114.025)	(55.133)	(140.264)	(103.742)
R-squared	0.737	0.864		
Wald X^2			64.07	210.61
ρ (12)			0.5217	0.864
Breusch and Pagan Lagrangian multiplier test for random effects: X^2 (1)			104.59	154.66
Observations	246	272	246	272
Number of municipalities			74	85

*Notes: Dependent variable for models (a) and (c): municipalities' expenditures on water. Dependent variable for models (b) and (d): municipalities' expenditures on electricity. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.*
Source: Own calculations

Breusch and Pagan Lagrangian multiplier tests for random effects are performed for both random effects specifications. These tests provide the statistical significance of the coefficient ρ which represents the proportion of the observed total vari-

ance of the error term due to random effects. The results of these tests support the hypothesised existence of random effects: the X^2 (1) is equal to 104.59 and 154.66 in the case of models *(c)* and *(d)*, respectively. This justifies the use of a random effects estimator.

The estimated coefficients for both the rainfall variability variables (rainfall variability and rainfall variability squared) for *Water* and *Electricity* models are statistically significant. These results indicate that increased variability of rainfall (a proxy for climate variability) is significantly associated with increases in municipal water and electricity expenditures, which implies that rainfall variability increases water and energy demand by municipalities. Specifically, a concave relationship between rainfall variability and municipal water and electricity expenditures is found. This suggests that after a threshold level of rainfall variability, the marginal impact of rainfall variability on municipal water expenditures and electricity expenditures starts to decline. The result is robust for Water and Electricity random effects model estimates, which show this threshold is around 0.6 for water expenditures and 0.8 for electricity expenditures.

Two interlinked explanations can be used to contextualise this result, particularly the increase in municipal expenditures that is associated with increased rainfall variability. The first explanation, and consistent with Mukheibir (2007), is that variability of rainfall complicates local government planning processes, particularly in relation to water and electricity supply and demand management. Increased rainfall variability introduces an element of uncertainty to municipal water and electricity demand/supply, and it becomes challenging for municipalities to plan for times of severe rainfall variability (e.g. drought and/or floods).

Altered water balance affects water resources, which means that municipal water-related infrastructure and water provision services must adapt to the changes in water demand and supply. In some cases this could involve changing municipal water management strategies.

Rainfall abundance determines the management, distribution and use of electricity by municipalities, suggesting that rainfall variability may require municipalities to adapt to electricity-related services and infrastructure; most particularly when changes in energy resources affect the electricity demand–supply gap.

Adaptive behaviour will result in changes to municipality expenditure on water and energy sectors, suggesting that increased rainfall variability should be treated as an increased risk to residents. Municipalities should respond to this increased risk by investing in water- and electricity-related infrastructure and/or water and electricity provision channels to protect residents. Furthermore, results suggest that local government's response to increased climate variability is non linear, as municipalities will only increase water expenditures up to a certain threshold, after which such investments will decline.

The second explanation relates to the use of water and electricity expenditures as proxies for water and electricity demand by municipalities (water and electricity that is distributed to consumers). As indicated above, increased variability of rainfall reflects increased risks associated with rainfall/water scarcity. This translates into increased risks (fluctuations) in the provision of services that are dependent on rainfall; in this particular case municipal provision of water- and energy-related services and/or infrastructure. Water and electricity demand will rise as municipalities attempt to smooth water and electricity supply or distribution to their residents. The increased water and electricity demand is shown to be non linear: municipalities will only increase water expenditures up to a certain threshold, after which demand declines.

12.5.3 Rainfall variability and municipal expenditures: simulation results

The empirical estimates reported in Table 12.2 were used as inputs to simulate the average level of municipal expenditures on water and electricity for given rainfall variability levels. The rainfall variability values range between zero and two for simulation of municipal expenditures, as the rainfall variability indicator – the coefficient of variation of rainfall – in the data ranges from 0.087 to 1.861. The results obtained from the simulation are reported in Figure 12.6.

Figure 12.6 supports the quadratic relationship between municipal expenditures and rainfall variability revealed in Table 12.2. This result is robust to simulations based on both pooled OLS and random effects estimates. Both Figure 12.6a and Figure 12.6b suggest that low levels of rainfall variability are associated with increased average municipal expenditures on water and electricity. However, for water expenditures, this changes when the coefficient of variation value reaches somewhere between 0.6 and 0.75, when increased variability starts to be associated with reduced average water expenditures. The turning point for electricity expenditures is reached when the coefficient of variation is somewhere between 0.85 and 1.

Figure 12.6 Predicted average expenditures for different levels of rainfall variability

Figure 12.6a Predictions based on pooled OLS estimates

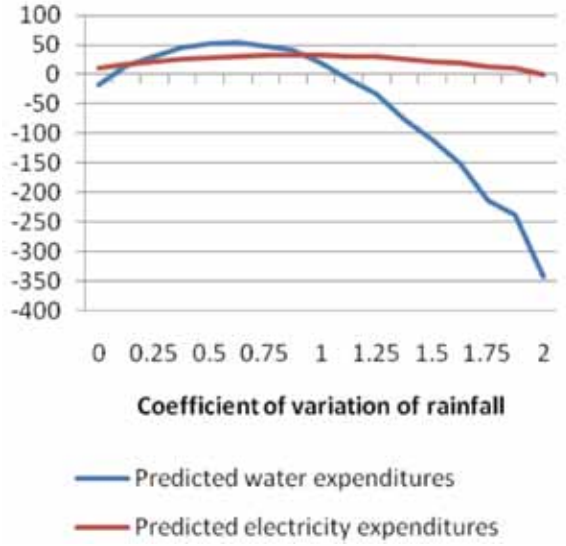
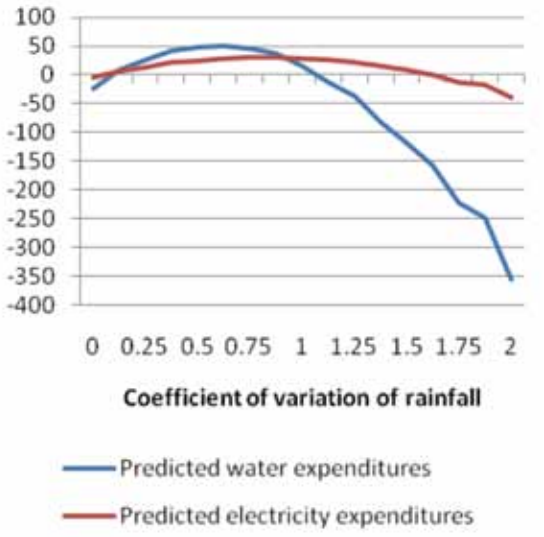


Figure 12.6b Predictions based on random effects estimates



Source: Own calculations

Figure 12.7 complements Figure 12.6 by showing how the predicted municipal expenditures reported in Figure 12.6 change from one level of rainfall variability to another. The results indicate that rainfall variability is expected to influence future municipality expenditure levels strongly. The change in predicted expenditures declines with the level of rainfall variability, for the averages of both water and electricity expenditures. Interestingly, Figure 12.7 suggests that water expenditures change faster than electricity expenditures, which is consistent with the turning point revealed in Figure 12.6: the rainfall variability value where the level of waters expenditures begins to decline is reached faster than that of electricity expenditures. As variability goes beyond a certain threshold, both Figure 12.6 and Figure 12.7 could easily be interpreted as suggesting some form of disinvestment in water and electricity by municipalities. However, in real life, disinvestment might not be seen as a viable strategy, which implies that the high levels of uncertainty associated with high levels of rainfall variability pose a challenge and difficulty for municipal planning processes. Low levels of investment or expenditure in water and electricity may result, but will not necessarily be from a deliberate policy to disinvest in these sectors. Nevertheless, the high decrease in predicted water expenditure attributed to increasing rainfall variability implies that municipalities lack the appropriate adaptation strategies, which makes them vulnerable to the climatic change.

Figure 12.7 Changes in predicted average expenditures for different levels of rainfall variability

Figure 12.7a Changes in predicted expenditures based on pooled OLS estimates

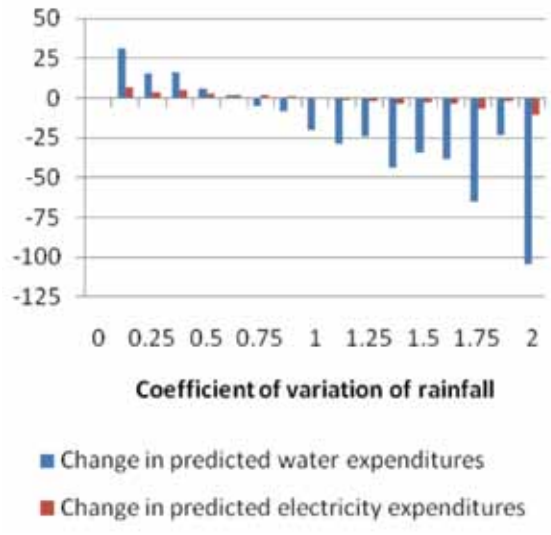
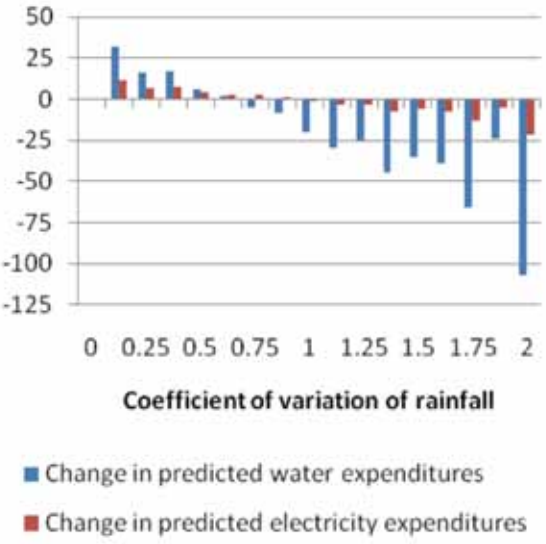


Figure 12.7b Changes in predicted expenditures based on random effects estimates



Source: Own calculations

Overall, these results from the Lowess smoothing, econometric estimation and post-estimation simulation suggest that climate variability and change affect South African municipalities. In particular, South African municipalities must change water resource and electricity management strategies to satisfy changes in water and electricity demand and supply associated with climate change and variability. Climate variability and change will pose challenges for municipalities to reconcile water and electricity supply and demand, in the short and long term. In the short term (for periodic drought or short-term water shortages) municipalities will have to develop coping strategies. Long-term responses will have to involve adaptation strategies to build resilience to the impacts of climate variability and change in municipalities. Either way, climate variability and change has real financial implications on (South African) municipalities. Therefore, municipalities, along with other relevant stakeholders, need to be involved in efforts to mitigate and adapt to climate variability and change. However, it is important to remember that municipalities differ and that they have different development objectives and trajectories, which should be taken into account to promote relatively sustainable and feasible ways to 'green' municipalities.

12.5.4 Other correlates of municipal expenditures

Municipal expenditure on water- and electricity-related infrastructure and services is affected by factors other than the climate (rainfall variability). The results suggest that population densities have a positive and significant impact on water and electricity expenditures. While increased population density can be expected to reduce the per unit cost of water and electricity service delivery, it might increase some costs, especially in very large cities (Kushner *et al*., 1996).

The results also show the importance of GDP on municipality water and electricity-related expenditure. As expected, the higher the income at the municipality's disposal, the higher the expenditure on water and electricity-related infrastructure and/or services. This is because the two variables that are used as proxies for available municipal income – the level of unconditional grants municipalities get from the central government and the GVA or municipal GDP – influence water and electricity expenditures positively and significantly.

The composition of population also affects municipal water and electricity expenditures. Consistent in both models (c) and (d) is the finding that water and electricity-related expenditures increase with the share of population under the age of 19, but are not affected significantly by the share of population over 65. This could suggest that municipalities respond to the differences in the needs of different population groups through changes in expenditure, and the response is primarily driven by the needs of the younger population.

Increasing the number of councillors (model (d)) has a significantly negative impact on electricity expenditures. This result could be pointing at competing use of financial resources: the more money spent on maintaining a local government consisting of many councillors means less is available for other uses, particularly for electricity-related services and/or infrastructure.

The dummy variables for the different years suggest that time-variant factors are not explicitly controlled in the estimations, but they significantly determine the level of monetary resources spent on the water sector. Specifically, models (c) and (d) indicate that, on average, municipalities spent more on the water and energy sector in the years 2006, 2007 and 2008 than in 2005.

12.6 Dealing with Climate Change in the Local Government Sector

South African municipalities already face a number of pervasive problems with water and electricity provision: water and electricity losses as the result of aging infrastructure, illegal connections, inappropriate pricing, and poor water quality. Water and energy resources are central drivers of local government growth and development and must be used efficiently, in order to help minimise costs that municipalities incur as a result of climate variability and change-related impacts on water and energy demand and supply.

Water loss must be minimised, as water loss in South Africa is significant (Table 12.3). Unaccounted-for water represents about 30% of the total water demand in South Africa. Water losses of this magnitude may be a result of aging infrastructure,[173] and so it is vital that mechanisms (and adequate budgets) are put in place to minimise incidences of poor maintenance.

173 A study conducted in parallel with this report indicates that the repair and maintenance of infrastructure by many municipalities is at a low level. In addition, the budget allocated for the repair and maintenance is remarkably low.

Table 12.3 Distribution of water

	Municipality Category				Total
	A	B1	LW	DW	
Water sold	1,299,702	498,567	342,738	499,999	2,641,004
Residential customers	907,989	386,523	299,392	440,156	2,034,060
Non-residential customers	391,713	112,044	43,346	59,842	606,945
Unaccounted-for water	557,015	213,671	146,888	214,285	1,131,859
Bulk water requirement	1,856,716	712,238	489,625	714,284	3,772,863

Notes: A = metropolitan municipalities; B = local municipalities with the highest operating budgets and a large urban spatial pattern; LW = local municipalities with water service powers; DW = district municipalities with water and sanitation service powers and functions.
Source: PDG, 2010

Local authorities need to become champions of energy efficient[174] initiatives, to promote the adoption of renewable energy in their municipalities and to encourage energy efficiency in building and construction, agriculture and forestry, alternative energy efficient transportation, recycling and proper waste management (the 13th Finance Commission, 2009). Municipalities need to deal proactively with the consequences of climate change. The econometric results suggest that rainfall variability increases municipal water and energy-related expenditures. Therefore, to tackle the consequences of climate change on the water and energy sectors, a number of instruments, including the budget, can be applied. For instance, clean environmental objectives could be mainstreamed into the budget ('greening' budgets). In this case, the intergovernmental fiscal relations framework is used to encourage innovative approaches to environmental management, and to reward good environmental performance (ibid.). For example, local authorities can use their budgets (e.g. taxes and subsidies) to influence sustainable energy production and consumption.

12.6.1 Environment-friendly instruments

Subsidies

Subsidies are an important mechanism for achieving environmental goals. Subsidies can be used to encourage the production of eco-friendly goods and services or discourage the production of goods that harm the environment. In South Africa, green initiatives could be encouraged through subsidising, researching and developing eco-friendly technologies. The cost of such subsidies can be recouped by taxing competing, non-environment-friendly technologies.

Transfers

Grants are also a potent mechanism for driving the eco-friendly agenda. Lessons from the 13th Finance Commission (2009) are useful for the South African local government sector. In India, grants have been used to reward good environmental performance and environmentally-sound programmes. In South Africa, the government should consider establishing a separate, special-purpose conditional environmental grant that would seek to achieve the following:

- Reward and encourage environment-friendly actions and performances in the local government sphere.
- Provide for repair and maintenance and rehabilitation of water and energy infrastructure.
- Build capacity to address climate change management in local government.
- Provide minimum environmental protection services.
- Fund research into best adaptation and mitigation practices and new environment-friendly technologies (especially water- and energy-efficient technologies), waste management, green building, etc.

When establishing a separate special purpose environmental grant, attention should be given to its design: the grant should be sensitive to factors such as the municipality's size, topography, vulnerability and risk to climate-related hazards.

174 Energy efficiency means minimising energy wastage, using less energy to perform the same activities and shifting to cleaner energy sources.

Green public procurement

As municipalities are the main buyers of goods and services in their areas, mainstreaming environmental concerns in their procurement policies can promote a clean environment. In green procurement (also known as sustainable procurement or green tendering), public authorities deliberately and strategically procure eco-friendly goods and services from a selection of environmentally conscious suppliers or contractors. Public officials can also set environmental requirements in procurement contracts. Cities can be turned into 'green' zones through easing the development of, and sustaining, environmentally sensitive markets.

Adaptation and mitigation

The burden imposed by climate change means that municipalities need to minimise its impact by putting in place appropriate adaptation and mitigation plans and mechanisms. Some municipalities already have functional climate change adaptation and mitigation strategies in place, for example Cape Town and eThekwini (McKenzie, 2011). In developing adaptation and mitigation mechanisms, municipalities need to take the following into account.

Sound analysis of climate change at municipality level

Rigorous analysis of climate change impacts is required. Municipalities should endeavour to develop their own municipal-level risk analysis, which includes identifying primary and secondary hazards, assessing relative exposure and vulnerability of the population, and analysing institutional capacities. This analysis will then support their adaptation and mitigation plans and strategies. An understanding of the individual impacts is important for crafting municipal-level adaptation and mitigation strategies.

Adequate financing of adaptation and mitigation

Successful and sustainable adaptation and mitigation depend on sustainable financing. Elsewhere in the world, 'climate change' grants have been used to fund adaptation and mitigation strategies and programmes. Climate or environmental grants can also be considered in the case of the South African local government sector. In addition, municipalities themselves need to consider budgeting for adaptation and mitigation programmes, as climate change disasters are becoming more frequent and intense. Collective financing could be considered in cases of budgetary or capacity constraint.[175]

Timely and adequate information, communication and awareness

Both short- and long-term impacts of climate change must be understood and communicated to individuals and organisations that are likely to be affected by climate change. Timely and adequate information will minimise uncertainties that often surround climate change issues.

Community involvement

Local communities should be involved in mitigation and adaptation programmes and projects, so that the sustenance of the projects and programmes will be guaranteed.

12.7 Conclusions and Recommendations

Climate change poses a real threat to municipalities in South Africa, especially to water and energy security at the local government level. Therefore, local governments need to be proactively involved in local, national and global efforts to adapt to and mitigate climate change impacts. Individual municipalities need to understand and establish their climate change impact assessments, taking into account their specific conditions and circumstances. This will give rise to the crafting and implementation of effective, efficient and well-targeted policy measures and programmes.

175 This means pooling resources to finance a common activity.

This chapter makes the following recommendations:

- The government should ensure that municipalities develop their own climate change mitigation and adaptation strategies and plans as part of the Integrated Development Planning process. Government should provide support to municipalities over the next three years, distinguishing between different types of municipality by both location and capacity in terms of the mandatory requirements placed on them.

- The government should consider providing performance-based conditional grants to municipalities. Such grants should reward and encourage environmentally efficient action and response to the adaptation and mitigation challenges of climate change. The design of the proposed grant should pay attention to municipality-specific factors such as area, topography, coastal/or otherwise, and vulnerability to climate change. Specific focus areas for this grant should include:

    i. Efficient water management practices, including the minimisation of water losses (unaccounted-for water), effective asset management or rehabilitation programmes, and demand management;

    ii. Efficient energy management practices, including the minimisation of electricity losses (unaccounted-for electricity), the elimination of illegal connections and energy savings by households and industry; and

    iii. The implementation of green procurement principles.

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PART 3: IMPROVING DEVELOPMENT OUTCOMES OF THE INTERGOVERNMENTAL FISCAL RELATIONS SYSTEM

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CHAPTER 13: BUDGET ANALYSIS AND EXPLORATION OF ISSUES FOR IMPROVED PERFORMANCE IN BASIC EDUCATION

Tebogo Makube[176]

13.1 Introduction and Background

If South Africa is to grow and develop, it must improve the quality and relevance of education. Low achievement rates, measured by various national and international assessments, indicate poor quality education. Supply issues relate to resource availability, schools finance equity, human and physical capital development limitations, teacher training, and quality of teaching. There are also shortcomings, monitoring and evaluation problems at provincial and school administrative and management levels. Demand issues relate to the socioeconomic status of students (including poverty, family background and disability), direct and indirect costs of schooling (e.g. transport), and other factors that keep children away from school (Arunatilake, 2006).

The challenge of access to basic education forms the core of this chapter. Formal access issues include the following:

- Adequacy of basic education funding and the effects on the intergovernmental fiscal relations (IGFR) system (known, unknown and changing costs of basic education).
- Adequacy of the physical teaching and learning environment and its impact on quality teaching and learner performance.
- Learner transport issues relating to long travel times, unsafe modes of travel and exposure to weather- and traffic-related dangers.
- Epistemological (transfer of knowledge) access issues.
- Methods used to distribute knowledge in South African schools (instructional time educators spend with learners, especially in township and rural schools).
- Changing curriculum and the effects on education and learner performance.
- Inclusive education and the challenge of dealing with the continued preference of granting access to able-bodied children over children with disabilities.

Education is regarded as the route to economic prosperity, the key to scientific and technological advancement, the means to combat unemployment and the foundation of social equity (Chimombo, 2005). Quality education is important, especially for a developing country such as South Africa, as it provides the knowledge, values and skills that form the foundation for lifelong learning and professional success. Quality education is based on a curriculum that is relevant to the needs and reality of all learners and is transmitted through professionally trained teachers who are equipped with appropriate learning materials and technologies. The school environment should be child-friendly, safe, clean and conducive to learning and extra mural activities (Hillman and Jenkner, 2004; Chimombo, 2005).

176 Financial and Fiscal Commission.

A high standard of achievement at basic education level creates an enabling foundation for secondary schooling and post-secondary education performance. This in turn facilitates social inclusion and establishes the basis for effective participation in the economy and society.

This chapter presents an analysis of the basic education system in South Africa. After reviewing access to education from formal and epistemological perspectives, the problems examined include the intolerable physical conditions of schools, some of which present safety and health hazards for learners and educators, and the shortage of teaching space, which translates into overcrowding and ineffective teaching and learning environments. Transport is another major issue that links with the adequacy of the South African education infrastructure.

13.2 Methodology

A national analysis views the effects of basic education policy reforms on resource allocations and educational outcomes. The objectives are to trace the changing meanings of 'access to education' in post-apartheid South Africa. Literature from different sources was reviewed to trace the concept across legislation and policies. Empirical analysis is drawn from student assessments (National Senior Certificate, PIRLS, TIMMS and SACMEQII[177]). Several broad basic education policy reforms, undertaken since the dawn of democracy in 1994, are reviewed. In general, these reforms concern legislative and policy changes, a number of professional and management reforms (such as curriculum reforms, learner training and teacher training), and changes in the education expenditure structure.

Epistemological analysis draws on the methods used to distribute knowledge in South African schools. The focus is on the access to, and costs of basic quality education, especially in township and rural schools. This centres on the curriculum, access to quality learning materials, infrastructure and committed, qualified teachers. It also covers the issue of inclusive education. Schools still grant access to able-bodied children more easily than they do to children with disabilities of various kinds (Jansen, 2008). The purpose of this chapter is to critically review the attainment of these multidimensional and complex education policy issues, which involve trade-offs.

13.3 Resource Allocation for Basic Education in South Africa

The right to basic education, including adult basic education, is entrenched in Section 29(1)(a) of the South African Constitution and the South African Schools Act (SASA), No. 84 of 1996. Basic education for school-aged children covers the General Education and Training (GET) band over three phases: foundation phase (Grades 1–3); intermediate phase (Grades 4–6); and senior phase (Grades 7–9). A reception grade, Grade R, became compulsory in 2010.

The Constitution does not indicate how a basic education is defined, leaving those decisions to the South African Parliament and Government (Reschovsky, 2009). The definition and interpretation of 'basic education' continues to evolve in South Africa – it must, by nature, take into account the changing circumstances and requirements of our society. This requires the government to develop policies and programmes and direct resources towards ensuring an individual's full enjoyment of the right to basic education (Taylor and Yu, 2009).

Education is a constitutionally concurrent function between national and provincial governments. National government is responsible for policy making and developing national priorities for achieving an adequate education. Basic education is funded mainly through the provincial equitable share (PES), which is an unconditional fiscal transfer system. Other education policy priorities are funded through conditional fiscal transfers, for example the Dinaledi project schools, HIV/AIDS, life skills education, the national school nutrition programme and technical secondary schools recapitalisation. The provinces are guided by the National Norms and Standards for School Funding policy in terms of the SASA.

On average, provinces spend 42% of their total provincial budgets on education. Public schools are allocated almost 83% of the total education expenditure. Some elements underpinning this large percentage are the expansion of no-fee schools and teacher salaries. However, in their allocations for education budgets, there is no obligation to divide provincial budget according to the components or weights of the PES formula. This is a constant source of tension be-

177 PIRLS: Progress in International Reading Literacy Study; TIMMS: Trends in International Mathematics and Science Study, an international assessment of the mathematics and science knowledge of students around the world) PIRLS and TIMMS were developed by the International Association for the Evaluation of Educational Achievement (IEA) to allow participating nations to compare students' educational achievement across borders. SACMEQII: second Southern Africa Consortium for Monitoring Educational Quality study conducted in 2000.

tween national and provincial education departments as well as the National Treasury. In the Annual Submission for the Division of Revenue for 2010/11, the FFC recommended a review of the PES formula, noting complaints that provinces do not fund education with their equitable share, but use it to fund other provincial priorities instead. The 2011 Division of Revenue Bill reflects the government's intention to implement substantial changes to the PES formula for the 2011 Medium-Term Expenditure Framework (MTEF).

The weights to the education component are reduced from 51% to 48%, while those of health are increased from 26% to 27%). The basic component is increased from 14% to 16%, and the other formula components are unchanged. The occupational specific dispensation (OSD) implementation of equity in the salaries of teachers has resulted in a substantial increase in labour costs, which has created considerable constraints for the public education system.

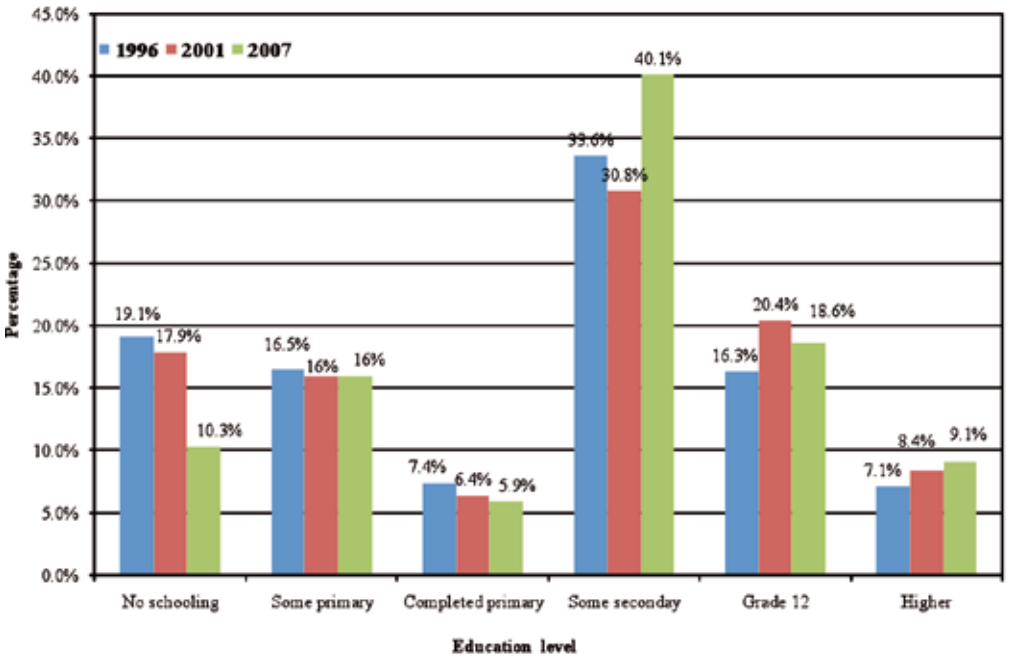
Education performance is not just about provincial funding, but relates to intergovernmental coordination in policy making and budgeting; failures in other areas of governance manifest in education resource allocations. The overall performance of education and health systems must strengthen, and the fiscal responsibility and accountability of provincial governments needs to improve.

13.4 The Performance of Basic Education in South Africa

Education plays a fundamental role in human development. However, the extent to which basic educations reforms have succeeded in terms of Section 29 of the Constitution is the subject of much debate and analysis. The Bradshaw study (2008) shows that in South Africa, less than a third of the adult population have a National Senior Certificate (NSC) or higher qualification.

In 2007, 10% of the population aged 20 years and above had no education, compared with 19% in 1996 (see Figure 13.1). This trend is probably a consequence of changes in access to the education system since 1994. According to the 2003 South African Demographic and Health Survey, about 95% of the younger adult population of South Africa were able to read, but the proportion decreased with age (Bradshaw, 2008).

Figure 13.1 Highest level of education among population aged 20 years and above, 1996, 2001 and 2007



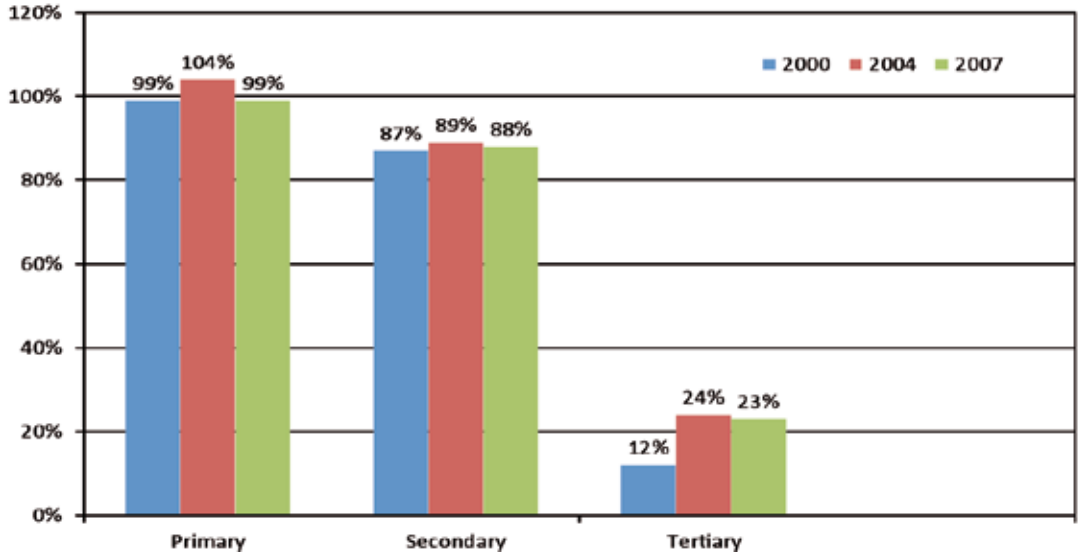
Source: Bradshaw, 2008

The challenge of illiteracy resulted in the launch of a national government programme called Kha ri Gude. The aim of the programme is for 4.7 million adults to become literate between 2008 and 2012 (Gustafsson *et al*, 2010).

Enrolment rates at primary level are high, which shows that South Africa has expanded access and is on track to meet Millennium Development Goal (MDG) 2 of universal primary education. However, completion rates at secondary level

are low, mainly because of grade repetition and high drop-out rates, which reach about 20% by Grade 9, (Gustafsson and Morduchowicz, 2008). Figure 13.2 shows the gross enrolment ratio (GER) in South Africa for primary, secondary and tertiary education in South Africa.

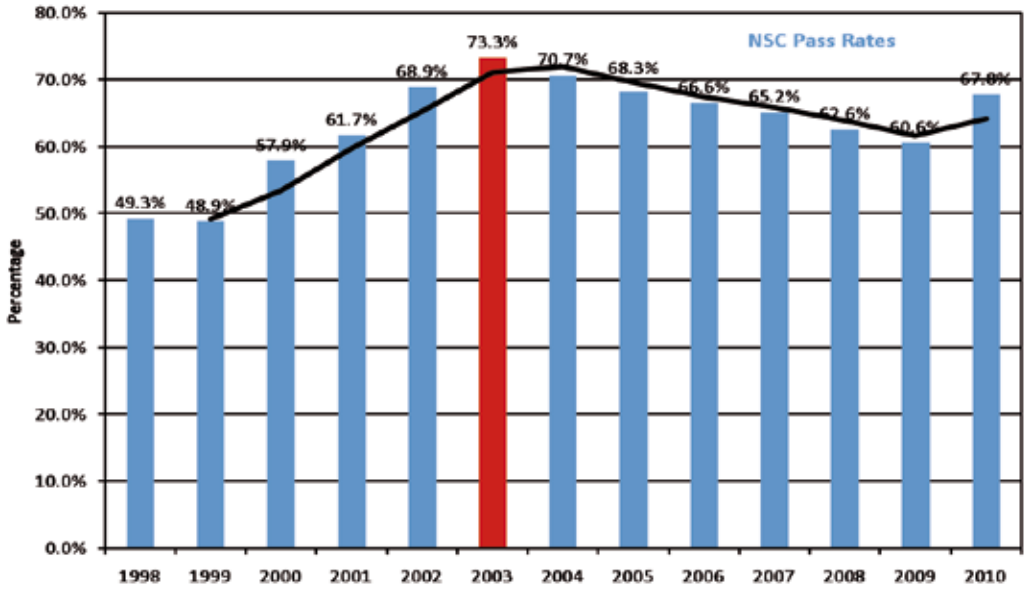
Figure 13.2 Gross enrolment ratio in South Africa



Source: Department of Education

Access to secondary education benefits mainly the better-off urban population and remains largely inaccessible for rural people, with girls at a particular disadvantage. Access to tertiary education is beyond the reach of many South African students, mainly because of entrance requirements, tuition fees and other socioeconomic reasons. Figure 13.3 shows that, of the learners who wrote Grade 12 examinations between 1998 and 2010, only 63.2% passed. Cronje (2010) notes that the university entrance pass rate for 2008 (13.4%) was significantly lower than that of the 1950s, 1960s, and 1970s. The overall pass rate in 2010 was ten percentage points higher than in 1955 but lower than the peak years of the 1960s and early 1970s.

Figure 13.3 Grade 12 pass rates in South Africa



Source: Department of Basic Education

Table 13.1 shows that of the 3,341 learners who wrote the NSC in 2009 in quintile 1 schools, only 265 or 7.6% passed. Quintile 1 schools with fewer than 50 students are not included in the table. Bushbuckridge in Mpumalanga was South Africa's worst-performing region in terms of NSC pass rates.

Table 13.1 Quintile 1 schools with a pass rate of 10% or less in 2009

Province	Region	District	School Name	Wrote	Passed	% pass
Eastern Cape	North Eastern	Mount Fletcher	1. Bethania Senior Secondary	77	1	1.3%
	North Eastern	Mount Fletcher	2. Edward Zibi Senior Secondary	77	8	10.4%
	Eastern	Mthatha	3. Menziwe Senior Secondary	122	11	9.0%
	North Eastern	Lusikisiki	4. Mfazwe Comprehensive Technical High	64	5	7.8%
	North Eastern	Maluti	5. Mnukwa Senior Secondary	86	9	10.5%
	Eastern	Mthatha	6. Sea View Secondary	65	6	9.2%
	Eastern	Qumbu	7. Welsh Senior Secondary	52	5	9.6%
KwaZulu-Natal	Zululand	Empangeni	8. Nqumizwe Secondary	109	8	7.3%
	Pietermaritzburg	Ugu	9. Sizanayo High	53	4	7.5%
	Zululand	Obonjeni	10. Thongwana Junior Secondary	118	9	7.6%
Limpopo	Greater Sekhukhune	Hlogotlou	11. Izikhali Zemfundo Senior Secondary	100	10	10.0%
	Mopani	Mamaila	12. Kheodi High	216	22	10.2%
	Vhembe	Vhumbedzi	13. Limbedzi Secondary	56	4	7.1%
	Greater Sekhukhune	Driekop	14. Mamogege Secondary	90	4	4.4%
	Greater Sekhukhune	Eensaam	15. Mmamokokgolushi Secondary	60	5	8.3%
	Greater Sekhukhune	Seotlong	16. Morokalebole Secondary	87	6	6.9%
Mpumalanga	Bushbuckridge Region	Cottondale	17. Babinatau Senior Secondary	57	6	10.5%
	Bushbuckridge Region	Casteel	18. Ben Matloshe High	86	5	5.8%
	Gert Sibande	Mpuluzi	19. Enkhanini Secondary	75	5	6.7%
	Bushbuckridge Region	Greenvalley	20. Germans Chiloane	136	9	6.6%
	Bushbuckridge Region	Marite	21. Halemela Secondary	58	4	6.9%
	Bushbuckridge Region	Agincourt	22. Langa Seconday	213	21	9.9%
	Bushbuckridge Region	Arthurseat	23. Lethipele Senior Secondary	80	5	6.3%
	Bushbuckridge Region	Arthurseat	24. Maakere High	82	6	7.3%
	Bushbuckridge Region	Agincourt	25. Machaye Senior Secondary	104	10	9.6%
	Bushbuckridge Region	Maviljan	26. Magabotse Secondary	51	2	3.9%
	Bushbuckridge Region	Thulamahashe	27. Magigwana Secondary	77	4	5.2%
	Bushbuckridge Region	Cottondale	28. Mhlangana Secondary	198	20	10.1%
	Bushbuckridge Region	Cottondale	29. Moses Mnisi High	248	25	10.1%
	Bushbuckridge Region	Casteel	30. Moseterata Secondary	58	4	6.9%
	Bushbuckridge Region	Dwarsloop	31. Qokiso Senior Secondary	177	7	4.0%
	Bushbuckridge Region	Cottondale	32. Tladishi High	209	15	7.2%
Total				3341	265	7.6%

PLEASE NOTE: Any school with fewer than 50 pupils has been left out.
Source: Report on National Senior Certificate Results, 2009, Department of Basic Education

Table 13.2 shows that of the 1,096 learners who wrote the NSC in quintile 1 schools in 2010, only 71 or 6.5% passed. If quintile 1 schools with fewer than 50 students are included, of the 1,821 learners who wrote, only 113 or 6.2% passed. In 2010 the NSC pass rate showed no improvement in quintile 1 schools.

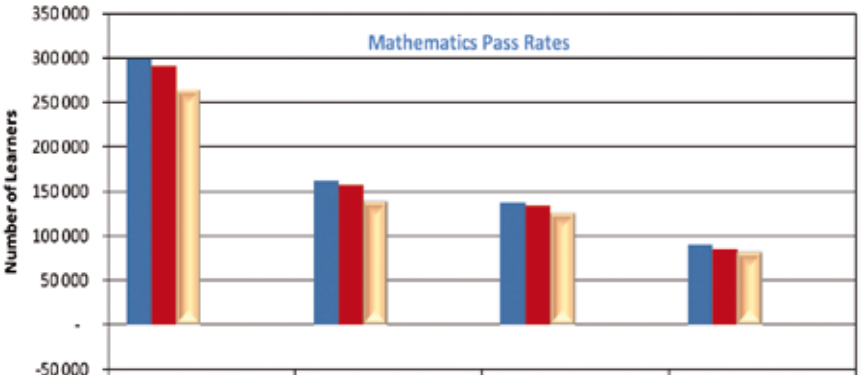
Table 13.2 Quintile 1 schools with a pass rate of 10% or less in 2010

Province	Region	District	School Name	Wrote	Passed	% pass
Eastern Cape	Eastern	Libode	1. Ngqeleni Senior Secondary	172	15	8.7%
	Eastern	Libode	2. Ntshilini Senior Secondary	173	14	8.1%
	Eastern	Qumbu	3. Somagunya Senior Secondary	61	2	3.3%
Free State	Motheo	Region 1	4. Headstart High School	104	0	0.0%
KwaZulu-Natal	Pietermaritzburg	Ugu	5. Sam Mkhize High	71	3	4.2%
	Ukhahlamba	Umzinyathi	6. Esethu High School	52	3	5.8%
	Zululand	Empangeni	7. Velamuva High School	53	5	9.4%
Limpopo	Waterberg	Warmbad	8. Raeleng Secondary	67	3	4.5%
Mpumalanga	Bushbuckridge Region	Cottondale	9. Babinatau Senior Secondary	84	6	7.1%
	Bushbuckridge Region	Marite	10. Lamulelani High	124	7	5.6%
	Bushbuckridge Region	Marite	11. Mathipe High	135	13	9.6%
Total				1096	71	6.5%

PLEASE NOTE: Any school with fewer than 50 pupils has been left out.
Source: Report on National Senior Certificate Results, 2010, Department of Basic Education

Quintile 1 schools face not only financial but complex and varied challenges. Inequities in access to educational resources and knowledge play a significant role in determining performance and outcomes. Schools identified as 'failing' under current methods are in poor rural and township areas and often serve the most disadvantaged students (Thernstrom and Thernstrom, 2003). They have low test scores, struggle to attract and retain better-qualified teachers, have few resources and exhibit poor morale. In these schools, from 2008 to 2010 the pass rate in mathematics and physical science was below 50%, with on average only 30% of learners achieving marks above 40% in mathematics. Moreover, the number of NSC candidates writing the mathematics examination since 2008 has been declining (see Figure 13.4).

Figure 13.4 Mathematics pass rates (2008–2010)

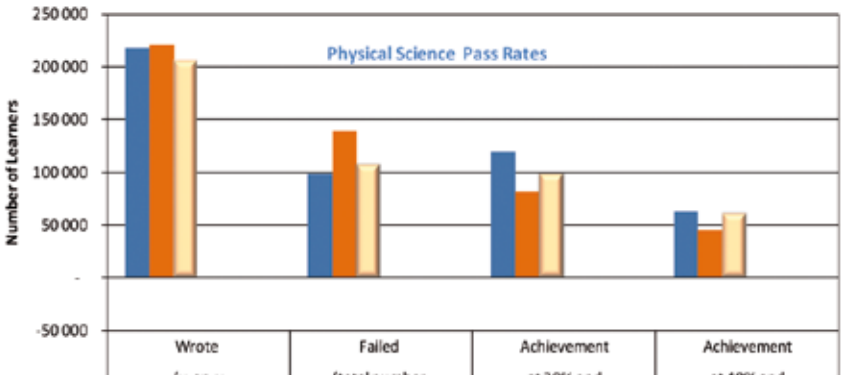


	Wrote (y-on-y growth)	Failed (total number in one year)	Achievement at 30% and above	Achievement at 40% and above
2008 NSC	298 821	162 318	136 503	89 788
2009 NSC	290 407	156 902	133 505	85 356
2010 NSC	263 034	138 356	124 678	81 278
2008 %		54.3%	45.7%	30.0%
2009 %	-2.8%	54.0%	46.0%	29.4%
2010 %	-9.4%	52.6%	47.4%	30.9%

Source: Department of Basic Education

The failure rate in physical science increased sharply between 2008 and 2009, from 45.1% to 63.2%, improving to 52.2% in 2010. Correspondingly, the percentage of candidates achieving marks of 40% and above increased from 20.6% in 2009 to just 29.7% in 2010 (see Figure 13.5).

Figure 13.5 Physical Science pass rates (2008–2010)



	Wrote (y-on-y growth)	Failed (total number in one year)	Achievement at 30% and above	Achievement at 40% and above
2008 NSC	218 156	98 333	119 823	62 530
2009 NSC	220 882	139 526	81 356	45 452
2010 NSC	205 364	107 200	98 164	60 993
2008 %		45.1%	54.9%	28.7%
2009 %	1.2%	63.2%	36.8%	20.6%
2010 %	-7.0%	52.2%	47.8%	29.7%

Source: Department of Basic Education

Continuing low pass rates do not augur well for the future and are cause for considerable concern, as mathematics and physical science have been identified as key subjects for providing the skills needed for growth in South Africa. There are currently more than 500 Dinaledi project schools in South Africa, which are designed to promote meaningful access to mathematics, science and technology, particularly in rural and township areas. In 2008, the Dinaledi schools accounted for over 50,000 of those writing maths and science exams. However, according to its 2008 performance report, 54 of the Dinaledi schools had fewer than 20 maths passes, and science passes fell below 2008 targets.

In addition to the NSC results, international assessments show that South Africa is still not yielding adequate returns in investment in basic education. Schools in South Africa have a long way to go to enable all, or even most, learners to learn to read, write, reason, and work with numbers.

The effect of poor performance in the public education system is migration to independent schools – even by learners from townships. The School Realities data (2009) produced by the Department of Basic Education shows that in 2009 there were 386,098 learners attending 1,174 independent schools (see Table 13.3).

The substantial growth in private schooling in South Africa is accompanied by socioeconomic and demographic diversification. African learners currently constitute more than 70% of all learners in independent schools, mainly in schools with low to average fees (Du Toit, 2004). This is because of the perceived quality in independent schools. However, private or independent schooling is selective, based on the willingness and ability to pay. The government, in partnership with civil society, has a responsibility to provide quality education in public schools in South Africa, as migration to independent schools cannot be a solution.

Table 13.3 Independent school statistics by province, 2009

	Numbers			Ratio	
	Learners	Educators	Schools	Learner: Educator	Learner: School
Eastern Cape	44,202	2,211	140	20	316
Free State	14,520	781	64	19	227
Gauteng	183,595	11,765	420	16	437
KwaZulu-Natal	43,638	3,095	159	14	274
Limpopo	35,608	1,797	117	20	304
Mpumalanga	18,990	1,229	89	15	213
Northern Cape	2,852	227	17	13	168
North West	12,792	935	52	14	246
Western	29,901	2,537	116	12	258
Total	386,098	24,577	1,174	16	329
Percentage of national total					
Eastern Cape	11.4	9.0	11.9		
Free State	3.8	3.2	5.5		
Gauteng	47.6	47.9	35.8		
KwaZulu-Natal	11.3	12.6	13.5		
Limpopo	9.2	7.3	10.0		
Mpumalanga	4.9	5.0	7.6		
Northern Cape	0.7	0.9	1.4		
North West	3.3	3.8	4.4		
Western	7.7	10.3	9.9		
Total	100	100	100		

Source: School Realities in 2009, Department of Basic Education, 2009

The quality of education is a strong predictor of the level of economic growth (Mullis *et al*., 2007; Hanushek and Woessman, 2007). The sustained downward trend reflects significant shortcomings in the country's basic education system, especially primary and secondary levels of schooling, and the continued poor performance poses serious challenges for national development. The economic costs are that the skills demands on school leavers are greater today than they were 30 or 40 years ago. Information technology and a change in South Africa's industrial base mean that employers demand a greater level of skills from their employees. Much still needs to be done to improve epistemological access to education.

Quality education and learner performance are also affected by formal access issues to education, mainly learner transport and inclusive education.

13.5 Learner Transport

The institutional fragmentation is associated with the provision of learner transport at provincial level. While the shortage of schools and classrooms is a recognised problem, the combination of lack of transport, shortages of schools and low-density settlements in many rural areas remains largely unrecognised. According to the General Household Survey (2009), nearly three-quarters (73.6%) of those attending an educational institution walk there. A further 8% travel by private car, and 8% use buses and taxis (Jansen, 2008).

The Department of Basic Education's access norms and standards require learners to be within a three kilometre distance of a school. However, the average walking distance in rural areas is five kilometres. Poor learners should have either transport or hostel facilities if they live more than 1.5 hour's walking distance from the nearest school. Furthermore, learning transport policy is inconsistent across provinces, especially regarding institutional relationships, funding, procurement and coverage.

13.6 Inclusive Education

There is a general lack of knowledge, skills and training for effective implementation of inclusive education in South Africa. The lack of training, time, experience, facilities and learner materials mean that teachers are unprepared and ill-equipped to teach in inclusive classrooms (Cook, 2001). Investments in infrastructure, learner material, capacity and teacher support, as well as a change of attitude from both teachers and learners, are required if inclusive education is to gain momentum.

The 2001 Education White Paper 6 on Special Needs Education underpins the development of an inclusive education and training system in South Africa. In November 2007 the National Department of Education published guidelines to ensure that all special schools become fully functional and contain the preparatory steps for their development as special school resource centres. Such resource centres will have specialist support staff with physical infrastructure for learners with physical disabilities, therapy rooms, incontinence facilities, rooms for orientation and mobility training, and properly fitted assistive devices (Aston, 2008). However, "schools (and universities), as is the case with the broader society, still grant access to able-bodied children more easily than they do to children with disabilities of various kinds. A blind child, or a child in a wheelchair, or a child with diabetes, struggles much more to gain access to schools than children without special needs" (Jansen, 2008:7).

13.7 Observations and Recommendations

13.7.1 Redirect funding to quality improvements in basic education

Total provincial expenditure on education has increased, but providing basic education is labour intensive: on average, 80% of the funding goes to personnel costs. In South Africa teacher salaries are set through a national bargaining process, which restricts provincial discretion in funding, leaving little money for non-personnel expenditure. This can be regarded as a fracture of the IGFR system. Moreover, the dual system of fee paying and no-fee paying schools creates a complex system of education finance that affects the equal provision of basic education and performance.

The Commission submits that the current framework does not guarantee the distribution of funds to schools based on their expenditure needs. In the past, the Commission recommended that increases in education spending should be directed towards investments that will have the biggest impact on quality, including learner and teacher support materials. There should also be input indicators or measures to assure that learners have resources to ensure high-quality basic education (Reschovsky, 2009).

13.7.2 Improve quality and prioritise epistemological access to education

Increased access to education has not resulted in quality output. Even when students enjoy physical access to schools, they have highly uneven, even unequal, access to knowledge within those schools. Lack of access to knowledge has both direct and indirect effects on the economy and society. Moreover, quality education plays a significant part in improving the chances of poor children. As access to knowledge (epistemological access) is strongly dependent on the curriculum, teachers and institutional context of the school, a necessary pre-condition for measuring the epistemological access to schools should be evaluating learner performance throughout their academic careers.

13.7.3 Ensure and implement required amount of time spent on teaching

Educators, especially in townships and rural areas, spend less time actually teaching than is specified in policy (Chisholm and Sujee, 2005). They work an average of 41 hours a week, instead of 43 hours. An average of 16 hours a week is spent teaching out of an expected range of between 22.5–27.5 hours per week, while the remaining 25 hours are spent on administrative and non-administrative activities. Furthermore, as the week progresses, educators spend less and less time teaching and participating in other school-related activities, and in many schools very little teaching occurs on Fridays (ibid.). During the formal school day, taking together all the work of educators, teaching is crowded out by management and supervision, assessment and evaluation and extra-curricular activities. The Department of Basic Education needs to find solutions to relieve teachers of administrative burdens so that they can spend adequate time teaching. An inspection or monitoring and evaluation system should ensure that the required instruction time and assessment take place.

13.7.4 Support the training and development of teachers

Quality teaching is acknowledged to be a critical element of epistemological access to education. Therefore, teachers should be properly qualified to provide high-quality education. Through the Division of Revenue, the government must state clearly the amount spent on training and development of teachers and must regularly report on the outcomes and improvements. This relates to prospective teachers who are still being trained and those who are already in service. To improve teacher education, teacher-training colleges need to be resuscitated and recapitalised. These colleges should focus on teaching methods where teachers can specialise as either primary or secondary teachers.

13.7.5 Improve school accountability for learner performance

The curriculum assumes that parents and school governing bodies play active and supportive roles in their children's education. This is more apparent in middle class and well-to-do schools than in poor schools. The role played by semi-literate and illiterate parents in their children's education falls beyond the ambit of the current education policy, yet affects the performance of learners from poor backgrounds. Poor schools in quintiles 1 to 3 require a differentiated approach that is more than simply a financially based intervention. The intervention should separate school and non-school effects on children's learning. It is likely that a school's test scores are a function of both school practices (e.g. good teaching and efficient administration) and non-school characteristics (e.g. involved parenting and quality neighbourhoods). Therefore, it is important to measure the value that schools add and to acknowledge the widely varying non-school factors and socio-economic environments that affect children's learning. A differentiated approach involves the provision of adequate and relevant learner support materials, coaching, financial support, empowerment of parents, school governance development and extra lessons for learners. This support should be tied to accountability for improved and good performance. Financial incentives should be provided for schools in poor areas that perform well, which should not mean a dramatic increase in the amount of public spending on education.

13.7.6 Finalise the implementation of OSD and formalise teacher performance evaluation

Personnel remuneration accounts for the largest portion of education spending, and provinces regularly overspend, mainly as the result of OSD implementation. Since the 2007/08 financial year, the deficit in education budgets has been funded through provincial budget adjustments. The increased ratio of wage bill to total budgets has led to a reduction in funding of other priority programmes, especially infrastructure. This situation must change. The problem is a clear sign of inadequate costing, lack of norm specification and other challenges to the IGFR system. Personnel costs are centrally determined but funded by provinces through the PES, which does not specify spending norms. What is needed is a different fiscal framework that links performance and accountability to dispensation, cost of living adjustments and rank promotion. A formalised performance evaluation system is also required, which would to boost education performance by emphasising highly competent teachers.

13.7.7 Improve the coordination, financing and provisioning of learner transport

In the past, the Commission has raised inconsistencies about the regulation, coordination, financing and provisioning of learner transport. The provision of transport enhances access to education, promotes safety of learners on the roads and conserves their energy to concentrate (Rogan, 2006). Policies for learner transport include procurement, contract terms and budget allocations, which vary across provinces. Common issues are unsustainable contract rates for transport pro-

viders in most provinces; overloading of vehicles transporting learners, in some instances; and occasional non-payment of contractors. Intervention is needed to improve learner travel times, reduce excessive walking distances and improve the safety of travel to schools. This will help to curb absenteeism and drop-out rates.

Government must address five main areas affecting learners:

- Provide transport to learners from poor communities who live more than five kilometres from their nearest school and who do not have access to public transport.
- Clarify and finalise overall responsibility and accountability for determining a provincial learner transport policy between the Department of Basic Education and the Department of Transport.
- Finalise policy and implementation guidelines on learner transport subsidies (design of the subsidy, allocation criteria, method of payment and transfer mechanism).
- Agree on the manner and cost effectiveness in which learner transport should be provided (buses, taxis, bicycles).
- Address other issues affecting learner transport (e.g. safety, drop-off points, and time spent travelling/impact on learner performance).

Government should also consider building boarding schools, especially for children who do not have access to any form of public transport in rural areas.

13.7.8 Accelerate the implementation of inclusive education by gazetting norms and standards

It is alarming that inclusive education is not mentioned as a priority in the delivery agreement (Outcome One: Improved Quality of Basic Education) between the President and the Minister of Basic Education. For the practical application of inclusive education to be successful and provide meaningful access, substantial changes are needed in learner enrolment practices, attitudes, educational approaches and school facilities.

This will require setting the norms and standards for inclusive education before the fiscal framework can be designed and agreed upon. National government and provincial education departments must take reasonable measures to effect the inclusive education of intellectually disabled children. Input norms should indicate:

- The human, physical, administrative and regulatory resources to be dedicated to achieving targets for inclusive education.
- The resources required for staffing levels and training of special educators, development of adapted materials, and physical improvements to schools to make them accessible to learners with special needs.

Output norms should indicate:

- The curriculum and learner materials adapted for children with special needs and the number of teachers trained in inclusive practices (e.g. training in Braille, Sign Language, disability awareness, the use of appropriate augmentative and alternative modes, means and formats of communication, educational techniques, and materials to support learners with special needs).
- The gross or net enrolment rate (%) of learners with special needs.
- The completion rate (%) of learners with special needs.
- The participation in tertiary education (%) of learners with special needs.

These norms and standards must inform the implementation of the inclusive education plan envisaged in the 2001 Education White Paper 6 on Special Needs, with regular reports on the performance of inclusive education.

13.8 Conclusion

The South African Constitution guarantees that all children, including children from poor households, should have access to basic education. However, this does not ensure the quality of that education. The shortcomings in instruction times spent by teachers in township and rural schools, as well as in the material resourcing of schools, play a significant part in limiting poor children's epistemological access to education and life opportunities comparable to those of other, well-to-do children.

Government has increased its expenditure on education, but returns have been sub-optimal. Education in South Africa is fraught with many challenges related not only to funding, but also to quality education in itself, the role of teachers, parents, structure of facilities, learner performance and the socioeconomic status of students. All these factors require robust intervention mainly by government as well as civil society, research and academic institutions. If these interventions are not made promptly, the school system will constrain South Africa's economic development prospects.

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CHAPTER 14: BURDEN OF DISEASES, HEALTH FINANCING AND FISCAL IMPACTS

Tebogo Makube[178]

14.1 Introduction and Background

The South African public sector health care system is faced with profound challenges, mainly because of a double burden of infectious and chronic[179] diseases. In responding to health sector challenges, the National Department of Health (DoH) in line with the 2009–2014 Medium-Term Strategic Framework (MTEF), released a Health 10 Point Plan for the same period. The Plan's main aim is to pursue a unified health sector, and its fundamental goal is to have equity in the delivery of health services. The priorities of the 10 Point Plan are intended to assist the country to meet the Millennium Development Goals (MDGs) and monitor improvements in the health system (see Table 14.1).

Table 14.1 Health 10 Point Plan

1. Provision of strategic leadership and creation of a social compact for better health outcomes	6. Improved human resources planning, development and management
2. Implementation of a national health insurance for South Africa	7. Accelerated implementation of the HIV/AIDS and sexually transmitted infections National Strategic Plan and the increased focus on tuberculosis (TB) and other communicable diseases
3. Improving the quality of health	8. Mass mobilisation for the better health of the population
4. Overhaul the health-care system and improve its management	9. Review of drug policy
5. Revitalisation of physical infrastructure	10. Strengthening research and development

Source: Department of Health

Substantial increases in mortality and morbidity threaten to overwhelm the health system and undermine attainment of the MDGs. Communicable and non-communicable diseases, injury and trauma continue to prevent faster development. HIV/AIDS, tuberculosis (TB) and malaria pose the greatest challenges. However, health analysts caution that these diseases should not overshadow the severe burden of communicable diseases including pneumonia, diarrhoea and measles in children, and other diseases that severely debilitate communities (McIntyre and Thiede, 2007). Despite good plans and strategies, this ever-increasing disease burden is cause for concern for policy-makers. Despite existing policy and legislation, an assessment of the South African health care system by various analysts brings great concern about the levels of access to health care services and the quality of care provided in the public health care system (Okorafor *et al*., 2005).

Disease-driven health care financing and expenditure is a further challenge. Although government health expenditure grew by an average annual rate of 17.6% between 2006/07 and 2009/10, from R11.3 billion to R18.4 billion, and is projected to amount to R25.8 billion in 2012/13, the public sector health care system remains under severe pressure. This chapter reviews health policy developments in South Africa and provides an overview of health care financing and expenditure, mainly in the public sector health care system. It is proposed that health systems be strengthened through improved policy, resources, and management. The goal of the Health 10 Point Plan is to significantly improve accessibility, the depth and breadth of health care services packages, and the quality of care provided.The burden of disease is putting pressure on provincial health budgets and raises concerns around the financial instability and capacity of provinces to cope. Therefore, this chapter focuses on the successes and challenges of health financing and provisioning from the equity, efficiency and quality dimensions of health services by:

178 Financial and Fiscal Commission.

179 Chronic diseases are often referred to as 'non-communicable diseases' to distinguish them from communicable diseases and as 'diseases of lifestyle' to distinguish them from diseases with environmental causes (Gilson *et al*., 2007).

- Presenting an analysis of the allocation of health care resources in South Africa.
- Analysing the health resources allocation formula (in terms of equity and outcome) in order to address the health care spending inequities between provinces.
- Examining the elements of an equitable and fully functional health system necessary for a country to deliver basic health care to its people.

14.2 Literature Review

Literature on health equity issues in South Africa draws substantially on the work done by researchers and analysts from the University of Cape Town: Health Economics Unit (HEU), the University of the Witwatersrand Centre for Health Policy (CHP), and the Health Systems Trust (HST). The economic statistics and budget trends have been drawn from the National Treasury Budget and Expenditure Reviews, and the health statistics from the DoH, Statistics South Africa (StatsSA) and the World Health Organisation (WHO). International literature on equitable health financing was also reviewed.

The financing of health care is of major concern throughout the world. This includes taxation, social health insurance, private health insurance and out-of-pocket payments (Schoen *et al*., 2000). Financing arrangements are likely to have a substantial impact on equity in terms of access, financing and provisioning. Although equitable financing is a key objective of health care systems, apart from a select few technocrats and policy-makers, there has been little debate on tensions between the principles of equitable financing of health and equal opportunity of access, or to the fact that, in practice, these principles are difficult to reconcile.

Braveman and Gruskin (2003) argue that equity in health is the absence of systematic disparities in health (or in the major social determinants of health) between groups with different levels of underlying social advantage/disadvantage, i.e. wealth, power, or prestige. Schoen *et al*. (2000) also note that concern about equity was a motivating force behind the creation of universal, equal health coverage for all in Australia, Canada, Great Britain, New Zealand and the United States. The intention is to provide treatment to every citizen without exception, without remuneration limit and without economic barrier. Equity is an ethical principle; it is also consonant with and closely related to human rights principles (Braveman and Gruskin, 2003). Assessing health equity requires comparing health and its social determinants between more and less advantaged social groups.

Reliance on the private health market, based on private insurance and patient out-of-pocket costs, incurs social costs and raises access barriers for those with the greatest health care needs, while reform policies divide communities (Chetty, 2007; McIntyre and Thiede, 2007; Harrison, 2009;). As lower and higher income groups have different access experiences, they are likely to view their nation's health system differently (Schoen *et al*., 2000). Inequities in health puts already socially disadvantaged groups at further disadvantage.

Health is essential to well-being and to overcoming other effects of social disadvantage. Poor people are more sickly and die more quickly "from the premature cradle to the early grave" (Everette, 2008:1). The poor have the highest rates of death due to diabetes, heart disease and breast, lung, and colon cancer (Oliver, 2003). While equity on its own will not eliminate health problems, it is the most important step toward eliminating health care disparities and should support the right to the highest attainable standard of health as indicated by the health status of the most socially advantaged groups.

Distribution of limited health care resources is another topical issue. Asthana and Gibson (2008) argue that in order to promote an "equal opportunity to be healthy", funding needs to be targeted to reduce the health gap between the most advantaged and least advantaged groups. This implies that resources should not necessarily be directed at populations with the highest absolute burden of ill-health, but at those with the worst health based on age-standardised measures. "The point is that a population with a high absolute burden of need (perhaps because it comprises a large proportion of older people) may well, in age-standardised terms, be relatively healthy. Thus depending on whether crude or standardised measures are used, the distribution of 'need' is very different." *(ibid.)*.

Literature on equitable financing of health care systems is important to consider when trying to resolve the tension of distributing limited resources for health care in South Africa.

14.3 Performance of the Public Health Care System

South Africa has a dual health care system of public and private health services. The government provides health care services to the nation through public hospitals and health clinics throughout the country. Services range from in- and out-patient care to preventive care and promotion of health. Schedule 4 (A and B) of the Constitution lists health services and municipal health services (MHS) as functional areas of concurrent national and provincial legislative competence. The National Health Act (No. 61 of 2003) gives provinces bulk responsibility for primary health care and defines MHS narrowly to encompass environmental health services only. According to the Municipal Structures Act (No. 117 of 1998), MHS are a function of metro and district municipalities. However, this is historically a local municipality function, with minimal services outside the cities and main towns.

Fiscal transfers are core funding instruments of the South African public sector health system, with the exception of local government which funds this function from its own revenue sources. Fiscal transfers can be either conditional or unconditional and are allocated through the annual Division of Revenue (DOR), within the context of the three-year MTEF (National Treasury, 2009).

They fund expenditure assignments given to provinces and municipalities through the Constitution and take into consideration the capacity of sub-national governments to raise revenue. Health services are funded mainly through the provincial equitable share (PES) formula. However, other national health priorities are funded through conditional grants (e.g. health revitalisation programme, comprehensive HIV/AIDS programme, forensic pathology services, health professions training and development programme, and national tertiary services).

Prior to the 2011 MTEF, the health component of the PES was weighted at 26%, and favoured people without medical aid. In the 2010/11 DOR, the Financial and Fiscal Commission (the Commission) made recommendations for a review of the PES, noting challenges in the funding of education and health by provinces. The 2011 DOR Bill reflects the government's intention to implement substantial changes to the PES. Data in Table 14.2 shows that the weights to the education component are reduced downwards (from 51% to 48%) and increased upwards to health (from 26% to 27%). The basic component was revised upwards (from 14% to 16%). The rest of the seven components in the formula are unchanged.

Table 14.2 The revised provincial equitable share formula for the 2011 MTEF

Equitable share component	Data used	Source
Education (48%)	Total enrolment numbers School-age cohort (6 - 17 years)	National Department of Education: enrolment figure Census 2001
Health (27%)	Risk adjusted capitation (75%) Hospital output (25%)	Risk Equalisation Fund District Health Information System
Basic Share (16%)	Population per province	StatsSA: Mid Year Estimates
Institutional (5%)	Independent of data	
Poverty (3%)	Income Basic component	IES Survey StatsSA
Economic activity (1%)	Gross geographic product	StatsSA: GDP-R : Mid Year

Source: National Treasury, 2011

A step in the right direction is the consideration of utilisation rates and hospital case-mix. However, the data is not always reliable, and data regarding the uptake in health treatment in the public health care system is barely collected. A key question is whether the revised provincial equitable share formula will lead to equity, achieve quality and move to a better provincial health expenditure control and less waste.

Various health and budget analysts in South Africa, including the Commission, criticise the fact that most provincial hospital budgets (and staff establishments) are based on historical allocations and adjusted for inflation. This practice perpetuates previous policies, depriving former homelands and poor rural areas of necessary health services (Chetty, 2007). The majority of provinces overspend on personnel costs, mainly because they implement the occupational specific dispensation (OSD), although vacancy rates remain high in public hospitals (National Treasury, 2010a). Budget, drug and staff shortages are becoming the norm in provincial hospitals. The system of transfers, from national to provincial and from provincial to actual health centres, is not functioning efficiently. Fiscal and health decentralisation needs to

be accompanied by the provision of adequate financial, human and physical resources. Since 1994, one of the greatest challenges facing the government is addressing inequities in the public sector health financing system. The DoH is only responsible for national policy making and determining norms and standards, and much of the operational and financial decision-making in health care delivery is decentralised to provincial level, (Okorafor *et al*., 2005).

Depending on provincial priorities and pressures, Provincial Executive Councils and Legislatures determine how much money goes to each function. The allocation also depends on the capacity of each provincial department to motivate for funding. In essence, fiscal decentralisation or the intergovernmental relations system in South Africa limits the role of national government (i.e. DoH) in determining actual health resource allocations across provinces, except for conditional grants.

14.4 Budget and Economic Analysis of Health Resource Allocations

On average, about 56% of total health financial flows (from 2005/06 to 2010/11) continues to be channelled to the private sector, 41% to the public sector, while non-governmental organisations (NGOs) contribute 2%. A detailed analysis of the private sector health expenditure is made later in this section.

Table 14.3 Consolidated funding flows in the South African health sector

R million	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	Avg. annual nominal growth 2005/06 - 2011/12
Public sector								
National Department of Health (core)	1,030	1,132	1,210	1,460	1,480	1,601	1,691	8.6%
Provincial Departments of Health	47,071	53,649	62,582	75,030	82,359	91,999	99,140	13.2%
Defence	1,557	1,705	1,878	2,128	2,441	2,606	2,792	10.2%
Correctional services	211	234	261	282	300	318	339	8.2%
Local government (own revenue)	1,317	1478	1,316	1,342	1,369	1,396	1,480	2.0%
Workmen's Compensation Fund	1,310	1,415	1,287	1,415	1,529	1,651	1,718	4.6%
Road Accident Fund	356	488	764	797	740	860	980	18.4%
Education	1,565	1,721	1,833	2,134	2,350	2,503	2,653	9.2%
Subtotal	**54,417**	**61,822**	**71,131**	**84,588**	**92,568**	**102,934**	**110,793**	**12.6%**
Private sector								
Medical schemes	54,905	58,349	65,468	74,089	80,320	86,841	9,3441	9.3%
Out of pocket	23,470	26,596	31,997	35,468	37,386	39,300	41,108	9.8%
Medical insurance	1,956	2,056	2,179	2,452	2,660	2,870	3,089	7.9%
Private employer	935	982	1,041	1,172	1,271	1,372	1,476	7.9%
Subtotal	81,266	87,983	100,685	113,181	121,637	130,383	139,114	9.4%
Donors or NGO's	1,944	2,503	3,835	5,212	6,910	6,319	5,787	19.9%
Total	**13,7627**	**152,308**	**175,651**	**202,981**	**221,115**	**239,636**	**255,694**	**10.9%**
Percentage shares								
Public sector	40%	41%	40%	42%	42%	43%	43%	
Private sector	59%	58%	57%	56%	55%	54%	54%	
Donors or NGOs	1%	2%	2%	3%	3%	3%	2%	

Source: Provincial Budgets & Expenditure Review: 2005/06 - 2011/12

The health sector's share of total government expenditure has been increasing since 2004/05 but from a lower base than the allocation for education, social security and built environment (Figure 14.1).

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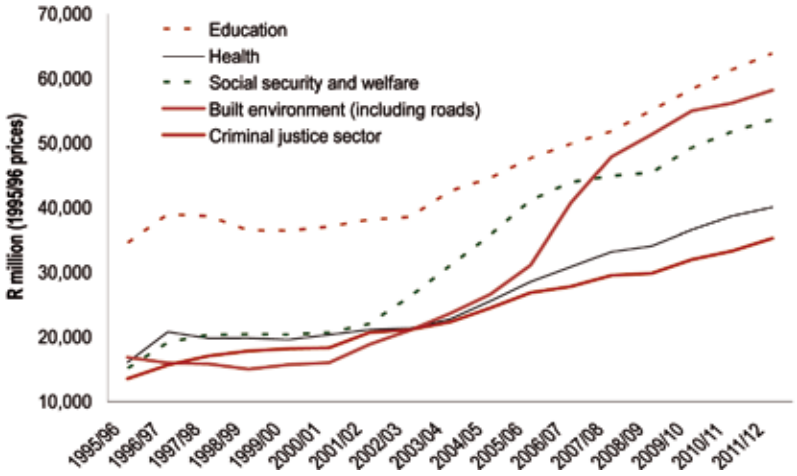
Figure 14.1 Government spending trends on policy priorities, 1995/96–2011/12



Source: National Treasury (2000; 2010b)

The major areas of growth for health budget allocations are in HIV/AIDS, where increasing patient uptake has resulted in greater anti-retroviral treatment costs. Other health cost drivers are hospitals and the health facilities management revitalisation programme, and the provision of OSD for health professionals (National Treasury, 2010b). Within the public health sector system, 88% of government health expenditure is allocated to provinces. On average, provinces spend 40% of their budgets on health services (National Treasury, 2009). Over one-third of provincial health expenditure is at district level i.e. primary care and district hospitals, followed by provincial hospitals at almost a fifth of total expenditure and finally by tertiary and central hospitals (McIntyre and Thiede, 2007; National Treasury, 2009).

Despite real increases averaging around R4 billion annually, correspondingly large improvements in health outputs, outcomes or quality are not in evidence. In South Africa, total health care expenditure (including private health expenditure) was slightly more than R115 billion in 2007 but less than half for public health care. This level of health expenditure was equivalent to 8.6% of gross domestic product. Table 14.4 compares health care expenditure in South Africa and other countries. This expenditure is at similar levels to that of Australia (8.9%), United Kingdom (8.4%), Brazil (8.4%), and above that of China (4.3%), India (4.1%) and Russia (5.4%). However, Russia spends more per capita than South Africa.

Table 14.4 Comparison of health care expenditure and health status indicators in developed and developing countries

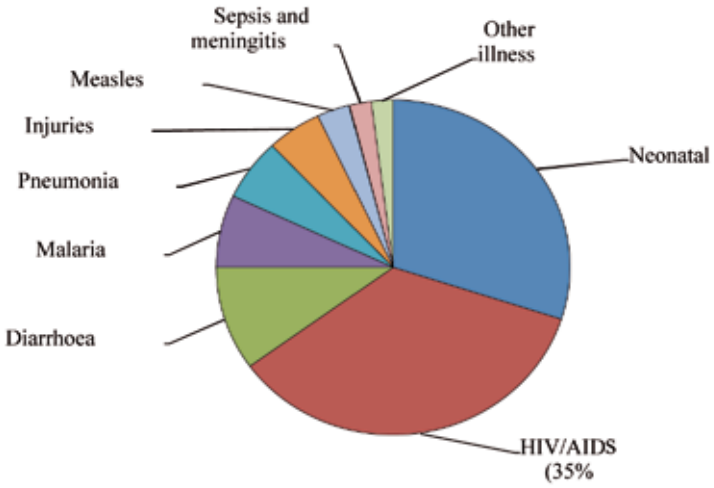
Country	Health care expenditure as % GDP, 2007	Per capita govt expenditure on health (PPP int $)	Life expectancy at birth, 2008	Infant mortality rate per 1000 live births, 2008 (MDG 4)
South Africa	8.6	340	53	48
High income countries				
Australia	8.9	2,266	74	4
Canada	10.1	2,730	73	5
United Kingdom	8.4	2,446	72	5
USA	15.7	3,317	70	7
BRIC member states				
Brazil	8.4	348	64	18
China	4.3	104	66	18
India	4.1	29	56	52
Russia	5.4	512	60	9
Middle income countries				
Chile	6.2	507	70	7
Cuba	10.4	875	69	5
Egypt	6.3	118	60	20
Malaysia	4.4	268	64	6
Thailand	3.7	209	62	13
Average	**7.49**	**1005**	**65**	**16**

Source: World Health Organisation estimates for country Health Account, 2010

Table 14.4 also shows South Africa's challenges of declining life expectancy and high infant mortality rates. This is against the backdrop of globally improved health: people's health has improved more in recent decades than in the whole span of human history. However, life expectancy in South Africa is 53 years (52 for males and 55 for females), the lowest in Table 4.1 Many health analysts and official health reports cite HIV/AIDS as the main reason for South Africans dying younger and in greater numbers.

The causes of infant mortality are listed in Figure 14.2. The under-five infant mortality rate per 1,000 lives (i.e. the probability of dying by age 1 per 1,000 live births) is 48 per 1,000 live births in South Africa compared to India's rate of 52 per 1,000 live births. Children aged less than 12 months are at greater risk of dying than older children (Norman *et al*., 2006).

Figure 14.2 Causes of infant mortality in South Africa, 2000–2005



Source: Norman et al., 2006

Deaths in the neonatal period contribute substantially to under-five deaths, with the majority of these deaths being attributed to pre-term birth, birth asphyxia and infections. Outside the neonatal period, HIV/AIDS and childhood infections (most commonly diarrhoea and lower respiratory infections) are the major causes of death, responsible for the majority of childhood illness in South Africa (Sanders *et al*., 2010).

In trying to understand variations in health expenditures and South Africa's relatively poor health outcomes, Woolard (2002) notes that the poor have particular difficulties in accessing health care because of economic reasons and social standing, and finds strong links between poverty, morbidity and mortality. A study of poverty and chronic diseases in South Africa also reveals complex patterns of mortality, morbidity, risk factors and unhealthy lifestyles among the poor, with the poor areas suffering premature mortality due to chronic disease including HIV/AIDS, stroke, asthma, epilepsy and cervical cancer (Bradshaw and Steyn, 2001). Most health analysts agree that poor maternal and child health, infectious diseases and malnutrition are associated with poverty. Many poor families end up using all their resources, indebting themselves and mortgaging assets to fund health care in catastrophic situations (Bradshaw and Steyn, 2001; MRC, 2008).

This state of affairs is also blamed on inequities in the country's health care system. Resources are allocated inequitably between the private and public sectors as well as within the public sector itself (among provinces and different levels of health care). Since the 1980s, expenditure in the private sector health care system has continued to increase annually, at rates far exceeding the inflation rate. Increases are associated with a concomitant increase in contribution rates or premiums charged by medical schemes. As a result, membership of medical schemes has become increasingly unaffordable for most South Africans. In 2009 a relatively small proportion (16.9%) had medical aid coverage (StatsSA, 2010). Gilson *et al*. (2007) estimate that 21% of the population not covered by health insurance prefer to use private primary care doctors and pharmacies on an out-of-pocket basis. Some of the most important current policy debates on health finance reform in South Africa pertain to the introduction of mandatory national health insurance (NHI), user fee reforms and reforms to the intergovernmental system to better align policy and budgets.

The majority of the population depends on the public sector for conventional health care services. Government alone cannot afford and assure the health of the entire population. With eight physicians, 41 nurses, one dentist and three pharmacists per 10,000 people, South Africa does not perform badly compared to other middle-income countries in terms of medical personnel; only Egypt bypasses South Africa. South Africa has more physicians than Australia, Chile,

Malaysia and Thailand, more nurses than the latter three countries and the United Kingdom, but less dentistry personnel than most countries listed in Table 14.5.

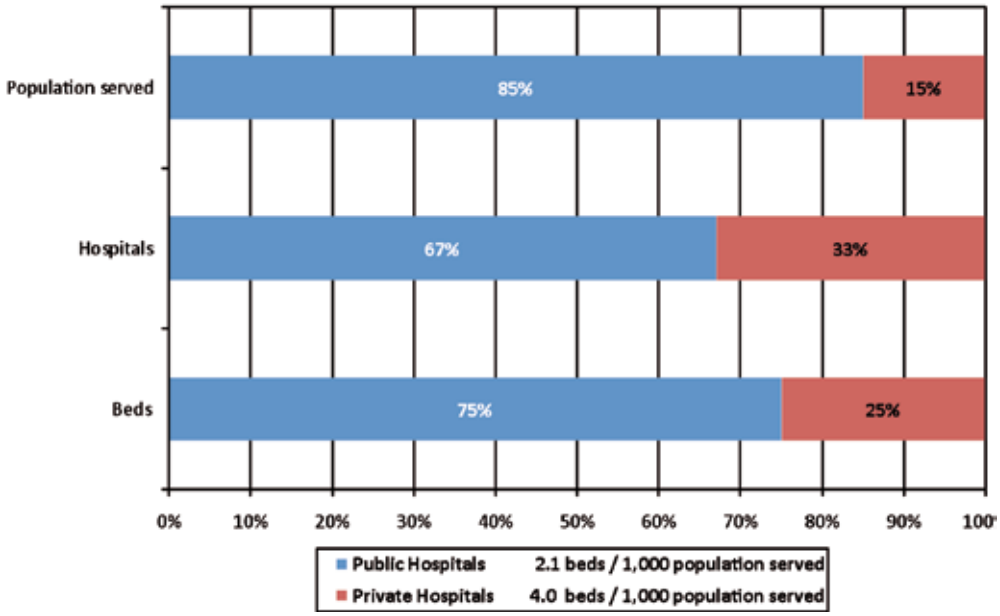
Table 14.5 Medical personnel and hospital facilities utilisation rates in developed and developing countries

	Physicians		Nursing and midwifery personnel		Dentistry personnel		Pharmaceutical personnel		Hospital beds
Countries	Number	Density (per 10 000 population)	Number	Density (per 10 000 population)	Number	Density (per 10 000 population)	Number	Density (per 10 000 population)	(per 10 000 population)
South Africa	34,829	8	184,459	41	5,995	1	12,521	3	28
High income countries									
Australia	19,612	10	222,133	109	29,624	15	15,339	8	39
Canada	62,307	19	327,224	100	38,310	12	27,078	8	34
United Kingdom	126,126	21	37,200	6	25,914	4	...	...	39
USA	793,648	27	2,927,000	98	463,663	16	249,642	9	31
BRIC member states									
Brazil	320,013	17	549,423	29	217,217	12	104,098	6	24
China	1,862,630	14	1,259,240	10	136,520	1	351,620	3	30
India	643,520	6	1,372,059	13	55,344	1	592,577	6	9
Russia	614,183	43	1,214,292	85	45,628	3	11,521	1	97
Middle income countries									
Chile	17,250	11	10,000	6	6,750	4	...	...	23
Cuba	72,416	64	97,800	86	20,158	18	7,047	6	60
Egypt	179,900	24	248,010	34	25,170	3	92,540	12	21
Malaysia	17,020	7	43,380	18	2,160	1	2,880	1	18
Thailand	18,987	3	84,683	14	4,471	1	7,350	1	22
Average	**341,603**	**20**	**612,636**	**46**	**76,923**	**7**	**122,851**	**5**	**34**

Source: World Health Organisation estimates for country Health Accounts, 2010

Health inequities in South Africa are exacerbated by the fact that the private health care system caters for seven million people while the public sector caters for 30.2 million people. The public sector is under pressure and cannot cope with the rising demand, as the premature exhaustion of benefits results in private insurance holders either foregoing private health care or using the public health sector system (Sishana, 2007). Figure 14.3 shows the mean bed/population ratio is 2.1 per 1,000 people in public hospitals and 4 per 1,000 people in private hospitals.

Figure 14.3 Ratios for health services in South Africa



Source: McIntyre and Thiede, 2007

With the over-resourcing of private health insurance and under-resourcing of the public sector, health care practitioners have been attracted to the more lucrative private health system (McIntyre and Thiede, 2007). The migration of doctors and other health professionals from the public to the private sector produces gross inequities in health care provisioning and explains low-density levels of health service provision in South Africa.

Placing health equity as the central goal of health systems requires substantial reforms of policy, institutional arrangements and funding. The adequacy of fiscal transfers is critical if problems of equitable access to the health care system are to be addressed (McIntyre, 2005). Increasing spending inequalities among sub-national governments translates into widening spatial inequalities in access to health care. There are health spending and service-level inequities between rural and urban areas, and people still have to travel long distances for health service delivery, especially for primary health care. Inadequate provincial budgeting for primary health care leads to a shortage of community health centres with access to full-time doctors, radiology, laboratory services, rehabilitation, and obstetric services. Fiscal transfers and adequate health budgets must cater for dynamism and should factor in and attend to such underlying changes that affect the provision of health services.

14.5 Observations and Recommendations

Equitable health reforms take years to implement and unfortunately the task of improving the health service is dogged by what Oliver (2003) calls the "two time-scales problem". One time-scale is that of the five-year parliamentary electoral cycle, expressed in the annual State of the Nation address by the President. The other time-scale is that required to remedy the current gross inequities in health care services (huge shortages of funding, personnel and modern facilities and equipment) and is not tied to the elective cycle; but health reforms can take more than 20 years.

South Africa has limited public sector health resources and faces an enormous burden of disease. Without structural reforms, the system will be inadequate to deal with the competing demands of public health care and more acute and urgent conditions such as trauma or infectious diseases (Sanders *et al*., 2010). Health analysts have urged the South African government to review the current public and private health delivery models and financing frameworks, with the object of increasing the per capita expenditure so that a greater proportion of the population has access to the essential package of health services. In order to achieve this, the following recommendations are made.

14.5.1 Reduce the incidence of high infant mortality rate

Over the past 15 years, the high infant mortality rate in South Africa has shown no signs of improvement, which is cause for concern. The under-five mortality rate is a key indicator of child health, and the MDG 4 commits countries to reduce the under-five mortality rate by two-thirds between 1990 and 2015. Government has a duty to improve the delivery of child health services and to address the underlying social determinants of health, which are the central pillars of the United Nations Convention on the Rights of the Child (Sanders *et al*., 2010). The General Household Survey (2009) found that children are slightly less likely to be covered by a medical aid programme than the population as a whole. Less than 14% of all children had access to medical aid in 2009, compared to about 17% for the total population. The medical fee exemption should be extended to needy children under the age of 18 in line with social security insurance.

14.5.2 Comprehensively review provincial health costing, budgeting and expenditure frameworks and practices

Even though the health component of the PES has been reformed, provincial health budgets are still not based on an estimation of the needs of health service users. Nor do the budgets adequately account for the magnitude of the HIV/AIDS epidemic and South Africa's other growing health challenges. To deal with health inequities and finance challenges, government has proposed the NHI, which will have an impact on the role of provinces in delivering health services. However, with or without the NHI, provinces must still attend to the challenges of delivering health care services by provinces. These challenges centre on funding and also relate to managerial, systematic and process issues concerning resource provisioning (staffing, procurement, information systems and reporting). Institutional arrangements between provincial treasuries, provincial departments of health and service centres (hospitals and clinics) also need attention to improve hospital performance.

Public hospitals consume approximately half the total provincial allocation for health services, but there is very little evidence that these allocations have an impact. Hospital budgets are determined according to different methodologies

across provinces. However, budget allocations for public hospitals need to be set and overseen in a consistent manner. In the past the Commission recommended that minimum norms and standards be set to guide the delivery of hospital services with respect to staffing, facilities, equipment and other aspects that affect the provision of quality care. Norms and standards exist for primary health care (clinics and community services) but not for hospitals offering more specialised levels of care. It is therefore important to design norms and standards that will inform the equitable formulas for budget allocations to hospitals and clinics. The government must institutionalise oversight of the budgeting process of hospitals and clinics, while provincial government must be held accountable for the underfunding of hospitals and clinics. The organisational form of hospitals is also an important determinant of performance. The Commission has made a recommendation that devolving certain functions such as procurement, human resources and financial management may lead to greater efficiency and better performance in public hospitals. It is hoped that the establishment of the Office of Health Standards Compliance will assist with effective interventions that improve service coverage and ensure patient/client access is adequate and of good quality.

14.5.3 Reform fiscal frameworks for public sector health care system

Health budgets are disease driven, and so funding models must take into account the budget pressures resulting from the burden of diseases, including both communicable and non-communicable conditions. Funding HIV/AIDS treatment through conditional grants, in isolation from other infectious and opportunistic diseases, is not the best way to deal with the growing burden of diseases in South Africa. Funding other diseases through the equitable share (and HIV/AIDS through conditional grants) creates two parallel funding systems in the public health care system. The delayed funding of HIV/AIDS in South Africa has confirmed that failure to tackle epidemics results in considerable costs. Therefore, utilisation costs and district-level data need to be reviewed for chronic disease (HIV/AIDS and TB) services and maternal and child health. Such information should be integrated in the funding for health services.

The rapid rise in demand for chronic care for HIV/AIDS and TB, and non-communicable diseases, emphasises the need for a strong and modernised primary and community health care system. The public sector health care expenditure is dominated by tertiary-level hospitals, with 30% of the total public health expenditure being spent on super tertiary hospitals in Johannesburg, Pretoria, Cape Town and Durban. While tertiary hospitals play an important referral and educational role, the same effort needs to be directed towards primary health care facilities. Resource distribution between the different levels of care needs to be re-examined in order to strength primary health care, without weakening the role played by tertiary hospitals. A sound health system can dramatically curb the spread of the burden of the disease, but a health system that is not securely financed or well managed can cripple a nation's health care.

14.5.4 Resolve costly approaches to health personnel funding and management

Health personnel costs are the major cost drivers for the public health care system in South Africa. Provinces habitually overspend their health budgets and build up large debts, and yet there is a chronic shortage of medical staff in both hospitals and clinics. Provinces should not be allowed to overspend on personnel unabatedly while there are acute shortages of medical personnel. National and Provincial Treasuries should ensure proper financial management, which suggests an urgent need to implement and fund the 2004 National DoH Human Resources plan for staffing norms in hospitals and clinics. This will enable provincial health departments to schedule and shift tasks, introduce financial incentives, balance the skill sets of medical personnel and create conducive working conditions. There must also be controlled monitoring within a specific timeframe.

14.6 Conclusion

This chapter has reviewed the key health policy challenges for promoting equity in health services in South Africa. The allocation of health care resources in South Africa was compared to the allocation within other countries. Analysis shows that the South African health system is fraught with gross inequities in the provision of health services. Public sector health challenges are not only financial but also encompass institutional challenges, burden of diseases with growing demand for services, access to quality services and equitable provision of services. The Health 10 Point Plan is necessary but insufficient to deal with health challenges in South Africa. To realise the plan's objectives, the public health sector requires adequate resourcing of the public health sector through the fiscus and other funding mechanisms. The South African government needs to urgently review the current public and private health delivery models and financing frameworks with the aim of increasing the per capita expenditure so that a greater proportion of the population has access to the essential package of health services.

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CHAPTER 15: THE IMPACT OF UNFUNDED MANDATES IN SOUTH AFRICAN INTERGOVERNMENTAL RELATIONS

Lydia Ntenga[180]

15.1 Introduction

This chapter reports on the progress of the first phase of the work, which the Financial and Fiscal Commission (the Commission) began during the second half of 2010, into the impact of unfunded/underfunded mandates on provincial and local government. This phase focused primarily on the six metropolitan areas. Since their inception, some municipalities have raised the issue that they are compelled to perform functions which are not allocated to them in terms of the Constitution and legislation on powers and functions. Some provinces have also pointed out that they face unfunded or underfunded mandates as a result of policy decisions made at a national level. These decisions have financial implications, but come without the necessary funding for their implementation. To deal with unfunded mandates and the constraints they place on other spheres of government, the government has put in place several initiatives. The most notable are the 2003 amendments to the Municipal System Act of 2000, specifically to Sections 9 and 10, which aim to prevent unfunded mandates flowing from legislative assignments; and the 2003 amendments to the Financial and Fiscal Commission Act of 1997, which requires organs of state to assess the financial and fiscal implications (and obtain the Commission's recommendations) before functions that are assigned to other organs of state in another sphere of government become law. In evaluating the impact of unfunded mandates on service delivery at provincial and local government level, this chapter focuses on housing, health care services, roadworks, libraries and museums, as these are commonly cited services when unfunded mandates are discussed.

15.1.1 Methodology

The methodology consists of a review of legislative prescripts and literature relating to unfunded mandates nationally and internationally, an overview of what mandates have been given to provinces and local government, and an analysis of the legal and financial impact of unfunded mandates.

Legislative prescripts are used to define functions, the relationship between spheres of government and procedures for transferring functions to other spheres of government. They include the Constitution, Local Government Municipal Systems Act, No. 32 of 2000, Intergovernmental Fiscal Relations Act, No. 97 of 1997, and the Division of Revenue Act.

Data (budget/expenditure) from provinces and metropolitan municipalities is used to analyse and quantify unfunded mandates at a local and provincial government level. The information was obtained from provinces and through a questionnaire devised for metropolitan municipalities. The analysis distinguishes (a) disbursement metric (measure of government level at which public resources are disbursed); and (b) expenditure metrics (captures which government level public resources are actually spent or used).

The objectives of this chapter are threefold:

- To define and demonstrate the existence of unfunded mandates between the spheres of government.
- If unfunded mandates do exist, to establish their financial and legal impact on housing, health care services, roadworks, libraries and museums.

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- To identify key issues that must be addressed to improve the process of assigning and delegating functions among spheres of government.

15.2 Legislative Framework for Transferring Powers and Functions

Unfunded mandates can only be understood in the context of the constitutional and legislative framework for allocating and transferring powers and functions.

15.2.1 Allocation of powers in the Constitution

Sections 44, 104 and 156 (read with Schedules 4 and 5) of the Constitution allocate powers and functions to the three spheres of government. Provinces have concurrent powers in functional areas listed in Schedule 4 (shared with the national government) and exclusive powers with regard to Schedule 5 matters. Municipalities have powers in respect of the functional areas listed in Schedules 4B and 5B. All residual matters fall under the national government's jurisdiction. This division of powers is not watertight, as defining the cut-off points between the schedules and the two parts of the schedules can be very difficult.

The point of departure is that provinces and municipalities may exercise their powers at their discretion in the listed functional areas. However, the Bill of Rights imposes duties on the various spheres of government in the areas covered by the listed socioeconomic rights.[181] In addition, municipalities are also constitutionally bound to provide basic municipal services.[182] The Constitution links a sub-national government's functions and funding to perform those functions. As Section 227(1) states, "Local government and each province (a) is entitled to an equitable share of revenue raised nationally to enable it to provide basic services and perform functions allocated to it". The entitlement to an equitable share is thus linked to the basic services to be provided.

Local government has a constitutional duty to be self-financing (as far as possible) in order to provide basic services and allocated functions; the equitable share transfers are complementary, rather than the sole source of revenue for such functions. Therefore, when determining the equitable share allocation, a municipality's fiscal capacity must be taken into account.

Table 15.1 provides a summary of the role of each sphere of government in the provision of functions as they relate to housing, health-care services, libraries and museums, and highlights the sector-specific legislation that assign these functions.

Table 15.1 The role of each sphere of government and legislation for the assignment of functions

Functions in constitution				Sector-specific legislation for assigning specific functions
Function	Relationship to Schedule 4B and 5B	Provinces	Municipalities	Legislation
Health care services	A municipal health service is listed as a Schedule 4B function in the Constitution.	Undertake a function of primary health care services. Coordinate municipal health services.	Provide primary health care services as a delegation from provinces. Undertake a function of municipal health services.	The National Health Act, No. 61 of 2003, provides for the primary health care functions to be assigned to local government.
Housing	Housing appears as a competency in Schedule 4A. However, 'Housing' as a competency has not been defined in any statute or court judgment.	Facilitate and promote the provision of adequate housing in the province and within the framework of national policy.	Implement the process of integrated development planning within the framework of national and provincial housing legislation and policy.	The Housing Act, No. 107 of 1997, provides for 'accreditation' of municipalities to undertake housing activities.

181 Ss 26 and 27 Constitution.

182 Joseph v City of Johannesburg 2010 (3) BCLR 212 (CC).

Functions in constitution				Sector-specific legislation for assigning specific functions
Libraries	"Libraries other than national libraries" are a Schedule 5A function that falls within the exclusive legislative competence of a province.	Provincial libraries and archives.	Provide libraries, although this is not a municipal function.	There is no legislation. The function is provided without formal delegations from provinces.
Museums	"Museums other than national museums" are a Schedule 5A functional area that falls within the exclusive legislative competency of a province.	Provincial museums.	Provide museums, although this is not a municipal function.	There is no legislation. The function is provided without formal delegations from provinces.

Source: Author

Although listed as a Schedule 4B function in the Constitution, the National Health Care Act, No. 61 of 2003, defines municipal health services as including "water quality monitoring; food control; waste management; health surveillance of premises; surveillance and prevention of communicable diseases, excluding: immunisations; vector control; environmental pollution control; disposal of the dead; and chemical safety". From this definition, municipal health care appears to exclude the personal health aspects of primary health care. This interpretation is in keeping with the executive policy decisions and frameworks that accompanied the promulgation of the Act.

The above definition has been the subject of a legal challenge: *Independent Municipal and Allied Workers Union and Others versus President of the RSA and Others* 3298/2006 argued that the definition is unconstitutional because it does not include "primary health care services". The Court found that as the definition contains the word "includes", the list of functions in the definition is not a closed list, but includes primary health care services.[183]

Furthermore, housing appears as a competency in Schedule 4A, although it has not been defined as a competency in any statute or court judgement. The Housing Act, No. 107 of 1997, defines "housing development" as: [184]

> the establishment and maintenance of habitable, stable and sustainable public and private residential environments to ensure viable households and communities in areas allowing convenient access to economic opportunities, and to health, educational and social amenities in which all citizens and permanent residents of the Republic will, on a progressive basis, have access to permanent residential structures with secure tenure, ensuring internal and external privacy and providing adequate protection against the elements; and potable water, adequate sanitary facilities and domestic energy supply.

This definition describes integrated human settlements, which point to various public sector responsibilities, administered by different spheres and sectors. Central to the definition is the notion of permanent residential structures with secure tenure, privacy and protection against the elements. Although not defined in any statute, the housing competency in Schedule 4A broadly refers to the regulation, planning, funding and execution of government-subsidised housing schemes. As housing is located in Schedule 4A, both national and provincial government may adopt and administer housing legislation, but municipalities may not make housing legislation or administer the housing subsidy without assignment. However, there are two important legal qualifiers. Firstly, Section 26 of the Constitution instructs the State as a whole to realise the right of access to housing. As a consequence of this intersection between the right of access to housing and the constitutional division of authority, municipalities have been allocated, by statute and by court judgement, responsibilities to realise the right of access to housing. Secondly, under Section 10 of the Housing Act, No. 107 of 1997, municipalities may be accredited to assume a greater role in housing. This provision is given content to in a national framework for accreditation, captured in the National Housing Code, 2000 (revised in 2009).

183 The Court proceeded to arrive at the curious conclusion that municipalities have the authority over primary health care, but that national and provincial health governments have the power to remove that authority from municipalities.

184 Section 1 "housing development" Housing Act.

15.2.2 Transferring powers and functions between spheres of government

The constitutional allocation of powers and functions is not rigid but flexible; powers and functions may be shifted between spheres of government. The following modes of transfers of powers and functions are available:

General delegation and agency shift

According to Section 238(a) of the Constitution, "an executive organ of state in any sphere of government may delegate a power or function … to any other executive organ of state". The section also provides the legal basis for an agency agreement.

Legislative assignment

In terms of Sections 44(1)(a)(iii) and 104(1)(c) of the Constitution, national or provincial legislatures can assign any of their legislative powers to municipal councils. The assignment may grant municipalities the discretionary legislative or executive power to function in an identified functional area. For example, the National Housing Act, No. 107 of 1997, empowers a municipality to apply to a provincial government for accreditation to administer a housing subsidy scheme.

Executive assignment

Sections 99 and 126 of the Constitution allow Cabinet members and provincial MECs (members of the Executive Council) to assign executive powers to specific municipal councils. The assignment must be consistent with the Municipal Systems Act (No. 32 of 2000) in terms of which relevant power or function is exercised or performed. This mode of assignment differs from the previous assignments, as it concerns executive powers only and entails compulsion: the relevant sections speak of the assignment of a matter "that is to be exercised". This executive assignment must be concluded by means of an agreement with a specific municipality. An example is where a provincial executive accredits a municipality to administer a housing subsidy scheme. Section 156(4) of the Constitution indicates under what circumstances such an assignment is compulsory for the provincial or national executive.

15.2.3 Procedures for assignment and delegation of functions

Where powers and functions are assigned, the question is whether any constitutional or statutory provisions require such an assignment to be accompanied by funds from the transferring sphere. The legislative framework comprises of the following:

The Municipal Systems Act (No. 32 of 2000). In terms of Section 9 and 10 of the Municipal Systems Act there are procedural and substantive requirements that must be complied with during the assignment process. A national minister initiating the assignment of a function to municipalities in general (or to any category of municipalities) by means of an Act of Parliament must go through a procedure of consultation with the various stakeholders within a reasonable time before the Bill is introduced in Parliament.

The Intergovernmental Fiscal Relations Act (No. 97 of 1997). The Act provides for consultation with the Financial and Fiscal Commission when any sphere of government intends to shift or delegate a function to another sphere of government.

The Financial and Fiscal Commission Amendment Act (No. 99 of 1997). Section 3 of the Act provides for consultation with the Commission on the financial and fiscal implications before an organ of state in one sphere of government assigns the power or function to an organ of state in another sphere of government.

Division of Revenue Act (DORA). When a function is shifted, the resources employed to render the function shift with the function. This principle arises from section 27(2) of the Annual Division of Revenue Act and requires that the equitable share allocations for the financing of particular functions and conditional grants (both operating and capital) must be paid to the organ of state that will become responsible for the function following an assignment.

The Public Finance Management Act (PFMA). This provides for the calculation of the financial implications for the transfer of function. In terms of Section 35, draft national legislation that assigns an additional function or power to, or imposes any other obligation on, a provincial government, must, in a memorandum that must be introduced in Parliament with that legislation, give a projection of the financial implications of that function, power or obligation to the province.

15.3 Literature Review

The term unfunded mandate is used loosely in the context of South African intergovernmental relations. An unfunded mandate can be viewed broadly as any obligation (mandate) imposed by a hierarchical superior body (the national or provincial government) on an inferior body (a provincial or local government) without matching funds. A narrow view of an unfunded mandate refers only to a mandate that falls outside a provincial or local government's constitutionally allocated functions.

15.3.1 Broad definition of unfunded mandate

Khumalo and Mokate (2007:271) define unfunded mandates as follows:

> Unfunded mandates refer to situations in which subnational governments are legally mandated in terms of the Constitution or by policy pronouncement to undertake specific functions but do not receive funds from nationally raised revenues in order to fulfill these functions. This scenario is highlighted in cases where the framework underlying the provision of particular services require provincial or local governments to implement nationally determined minimum-service standards. However, the funding for the delivery of such services fails to reflect the cost of the service standards, forcing subnational authorities to divert scare own-revenue funds to meet the standard set.

Unfunded mandates include both the assignment of functions and how allocated functions are to be performed. An example of a minimum-service standard is the provision of free basic services. Although the provision of water is a municipal function, a policy directive turns a discretionary function into an obligation. These obligations are also referred to as 'underfunded' mandates, as the national government may set policies that are based on input norms, but costing the service is not sufficiently accurate, which results in inadequate funding (Khumalo and Mokate, 2007:283).

A further instance may be imposing procedural requirements that slow down decision making or require substantial financial input from the municipality. Examples of these requirements include overly onerous reporting, multiple consultations and compulsory investigations.

15.3.2 Narrow definition

A narrower definition confines unfunded mandates to the transfer of new functions (not constitutionally assigned) to provinces and municipalities. The South African Cities Network (SACN, 2007:78) defines an unfunded mandate as when "cities perform the functions of other spheres of government and bear significant costs out of their own revenue sources". For example, at a recent South African Local Government Association (SALGA) meeting, one municipal manager presented the following list of unfunded mandates:[185] libraries, museums, environmental regulation enforcement (Biodiversity Bill), Environmental Protection Areas Bill, regional town planning, passenger transport management, traffic enforcement on provincial/national roads, vehicle licensing, drivers/learners licensing, roadworthy tests, roads, health (primary health), housing and ambulances.

Although the list is restricted to areas not included in Schedules 4B and 5B of the Constitution, some functional areas highlight the definitional ambiguities of the schedules. For instance, the reference to health relates to the definition of municipal health services, yet also included is vehicle licensing, which is a mandate that results from agency agreements and has a funding stream attached.

15.4 International Case Studies on Eliminating Unfunded Mandates

The concern about unfunded mandates is widespread in federal and decentralised systems throughout the world and appears under various names. In Canada it is referred to as 'service responsibility downloading' (MacMillian, 2006) and 'cost shifting' in Australia (Sansom, 2009). The most concerted efforts to address the problem have been made in the United States, although Germany has also taken measures in this regard.

185 Presentation on unfunded mandates to SALGA 28 February 2011.

15.4.1 United States

The concern is long-standing about unfunded mandates imposed by federal legislation and executive acts on state and local governments, and by states on local governments. Following initiatives that sought to curb states from imposing unfunded mandates on municipalities, the US Congress passed the Unfunded Mandates Reform Act of 1995 (UMRA). As this is a complex legislative instrument, the most important aspects are highlighted to illustrate the procedural method of curbing unfunded mandates.[186] Before focusing on the UMRA, the more substantive methods of control followed by state legislatures are reviewed.

State constitutions and statutes

During the 1970s/early 1980s and in the early 1990s, 15 states amended their constitutions to curb unfunded mandates, using the following methods (Zimmerman, 1995):

- Prohibiting the imposition of some or all types of state mandates;
- Requiring reimbursements of all or part of the costs associated with the mandates;
- Delaying the implementation date of a mandate;
- Authorising local governments to ignore an unfunded mandate;
- Requiring a two-thirds vote in each house of the state legislature before imposing a mandate;
- Authorising the governor of a state to suspend a mandate.

The Michigan State Constitution[187] provides one example: "The state is prohibited from requiring any new or expanded activities by local governments without full state financing, from reducing the proportion of state spending in the form of aid to local governments, or from shifting the tax burden to local government" (Williams, 2006).

A further 16 states used ordinary statutes to provide local government relief from mandates, and additional methods used include the following (Zimmerman, 1995):

- Appointment of legislative committees by state legislatures to receive complaints regarding unfunded mandates, determine their merit and then propose amendments to the offending legislation;
- Addition of a sunset provision, which requires a study of the impact of a mandate before the mandate is imposed;
- Pilot testing of new state mandates in selected local authorities, with the state assessing the cost of the mandate;
- Authorisation by state legislature of the governor (or another body with power) to suspend a mandate and refer it to the state legislature with recommendations.

Unfunded Mandates Reform Act of 1995 (UMRA)

The object of the UMRA was not to place a ban on unfunded mandates but to promote decision-making, by compelling Congress and federal agencies to consider the cost of imposing mandates on states, local and tribal governments and the private sector. It was called the "stop, look and listen" approach to mandates (Posner, 1997).

The advocates of the initiative argued that separating regulation (imposition of the mandate) from funding (responsibility of the state for local governments) discouraged accountability because it confused the public over which level of government was responsible. The priorities of sub-national governments also inevitably shift in order to make way for the federally imposed mandates.

186 For detailed discussion on the UMRA, see Posner (1997; 2007) and Gromley (2006).

187 Article 9 Section 25 of the Michigan state constitution (inserted in 1978).

Definition

According to the UMRA, a mandate arises from an enforceable duty imposed on state or local authorities. Importantly, certain mandates are exempted from the UMRA; the exemptions include any provision in legislation or a federal regulation that:

- enforces constitutional rights of individuals;
- establishes or enforces a statutory right that prohibits discrimination on a list of grounds;
- requires compliance with accounting and auditing procedures with respect to grants provided by the federal government;
- provides emergency assistance or relief at the request of a state or local government;
- is necessary for national security or the ratification or implementation of treaty obligations;
- is designated as emergency legislation by the President and the Congress; and
- relates to old-age, survivors and disability insurance.

Furthermore, a mandate does not arise when the duty is a condition of federal assistance or results from participation in a voluntary federal programme. The UMRA covers both federal legislation and regulatory actions of federal agencies (acting in terms of federal legislation).

A mandate may cover a broad spectrum of institutions – states, local authorities, tribal authorities or the private sector – and only direct costs are taken into account. The direct costs refer to the aggregate amounts that all state, local and tribal authorities would spend on implementation (or, in the case of federal legislation, lose because of limitations on revenue-raising powers).

A cost also arises when the federal appropriations are reduced or eliminated for a mandate that was previously imposed and funded. Furthermore, before the UMRA can apply, certain thresholds must be crossed: the costs must exceed $50 million (in 1996 and adjusted annually for inflation) in any of the first five years of its implementation for states or local governments ($100 million for private sector). The threshold for federal regulations is $100 million (in 1996). However, the Act does not apply if the costs' threshold is breached, but the legislation authorises appropriations to cover the mandate.

Method

The principal means of avoiding an unfunded mandate is to provide Congress with information about the cost impact of the federal legislation. The Congressional Budget Office (CBO) must prepare so-called mandate statements, which identify and describe federal mandates in the proposed legislation, and quantify, where possible, the direct cost of such mandates. In addition the CBO must provide an estimate of anticipated indirect costs and secondary effects.

The CBO statement is part of the legislative process, as any bill or joint resolution is out of order without a CBO mandate. The procedural device provided by the UMRA is that a law, which creates an unfunded mandate (as defined in the Act), may be overruled by majority vote. Although any member of Congress may raise a point of order (stopping the bill), it can be overridden by a simple majority in the committee before which the bill is presented. Although weak, this procedural device forces the committee to consider the matter.

The UMRA was not designed to be self-executing, and its effectiveness would "ultimately rest on the commitment of the Congress itself to sustain the Act's objectives of self-restraint because there is very little about the process that is automatic. First, a member of Congress must formally raise a point of order to trigger that covered unfunded mandates are out of order" (Posner, 1997). Posner (2007) thus describes the UMRA not as "an impenetrable barrier, but more of a 'speed bump' that could promote accountability which could embarrass mandate proponents and rally opponents" – the procedure "discourage[s] (but does not prevent) the imposition of unfunded federal mandates".

In the case of mandates imposed by federal agencies, the Congressional Office of Management and Budget's (OMB) Office of Information and Budgetary Affairs monitors compliance. The UMRA also allows limited judicial review of compliance: where federal agencies fail to prepare a written statement on the costs, the UMRA compels the agency to prepare such a statement.

Effectiveness

It has been argued that legislative awareness has reduced the incidence of unfunded mandates, by allowing affected governments to lobby against them, restraining the federal government to some degree (Posner, 2007). When unfunded mandates are imposed, it is either with the consent of the affected governments or as a deliberative choice.[188]

In practice, during the first decade of the UMRA, the CBO reviewed over 5,200 bills, resolutions and legislative proposals, of which 12% contained an intergovernmental mandate. Of those, 9% would have exceeded the threshold, but in the end only five bills were passed where the costs of the unfunded mandates exceeded the statutory threshold. During this period, a point of order was raised 12 times in the House of Representatives but never in the Senate (Anderson and Constantine, 2005). The UMRA has been successful because it has allowed state and local governments to access information that they can use for lobbying (ibid., p.17).

Both proponents and opponents of the UMRA criticise the Act. Proponents argue that the UMRA does not go far enough, as the cost estimates are restricted to direct costs only. Furthermore, the calculation of costs relates only to each individual mandate and not the aggregate impact of a range of mandates (ibid., p.5). The uncertainty of a mandate's scope adds to the difficulty. The CBO mandate report is also on the initial bill and does not cover changes during the legislative process. Lastly, the exceptions to the rule confine the UMRA to a narrow band of mandates (Posner, 2007). However, opponents argue that the UMRA has made it difficult to pass certain bills because the benefits cannot be as easily identifiable as the costs. Forcing the federal government to provide funds is also not conducive to good governance, as the state and local governments are not focused on efficiency savings.

15.4.2 Australia

The issue of unfunded mandates (or cost shifting) was a pertinent issue in Australia for many years. The matter came to a head in a wide-ranging inquiry by the Federal House of Representatives Standing Committee on Economics, Finance and Public Administration that reported in 2003 (Sansom, 2004). The Report, entitled Rates and Taxes: A Fair Share for Local Government, deals with both definitional questions and mechanisms to address the problem.

Definition

The first difficulty the Committee encountered was the definition of cost shifting. Not surprisingly, local governments defined the concept broadly. The Australian Local Government Association (ALGA) identified at least four forms of cost shifting. The first is where local authorities are required to provide services that were previously done by other spheres of government.[189] A variation on this theme is where local governments are "required to be the sole provider of new and innovative services that have no historical funding precedent".[190] The second is where the federal or state governments require local government to provide concessions or rebates on their revenue resources (mainly property rates) without compensation. A variation of this kind of unfunded mandate is where the supervising governments control the fees and charges that local governments are permitted to apply and do not index such fees and charges to increased costs in the provision of the services concerned. The third is where the supervising governments require that local government "undertake costly compliance activity".[191]

Although the Committee acknowledged the need for an agreed definition, supported by a robust methodology,[192] no definition was offered. It seemed, however, that it was sympathetic to ALGA's broad definition by, in addition to shifting of responsibilities and functions, recognising the following five types of cost shifting:[193] The first is when the superior government withdraws or reduces funding once a programme has been established. The local authority can discontinue the programme but then "suffer the political odium of cancelling the service".[194] The second is the transfer of assets without supporting funding. The third is the imposition of concessions and rebates without compensation payments. The fourth is increased regulatory and compliance requirements. The final one is the lack of indexing service fees and charges when the

188 See Posner 2007 on the agreement of states and local governments to the imposition of unfunded mandates.
189 House of Representatives Economics Committee 2003, 25.
190 House of Representatives Economics Committee 2003, 25.
191 House of Representatives Economics Committee 2003, 25.
192 House of Representatives Economics Committee 2003, 27.
193 House of Representatives Economics Committee 2003, 30.
194 House of Representatives Economics Committee 2003, 30.

superior government controls increases. The Committee also defined unfunded mandates negatively; they do not include any activities that local government voluntarily undertakes, including where such services are already provided for by another sphere of government.[195]

Because of the lack of a consensus definition, it was difficult to estimate the extent and cost of unfunded mandates. Moreover, the absence of an agreed allocation of responsibilities between the three spheres, added to this methodological problem.[196] ALGA did however offer an estimate for 2002 of between Aus$500 million and Aus$1.1 billion.[197]

Measures to counter cost shifting

The Committee saw the definition of responsibilities of each sphere of government and then how each should be funded, as part of the solution to cost shifting.[198] Furthermore, local government must be involved in the negotiations before the shifts are made. The main recommendations of the Committee were to resolve the matter along intergovernmental relations route. The first step was a federal/states/local government intergovernmental agreement which identifies the roles and responsibilities of local government in delivering federal and state programmes, and the allocation of federal and state resources to fulfil those responsibilities.[199] It further recommended that in such an intergovernmental agreement, cost shifting should be recognised as a problem, that funds should follow the devolution of responsibilities, that unwarranted financial restrictions on local revenue raising powers be reduced, and that a local government impact statement be developed that identifies the financial impact of federal and state legislation.[200]

Evidence on the success of the intergovernmental relations agreement to curb cost shifting is not readily available. In terms of the Agreement itself, the Agreement had to be evaluated not more than five years after its commencements. This stipulation has not been adhered to as the five year period expired on 12 April 2011.

15.4.3 Germany

Unfunded federal mandates on local government also featured in the recent reform agenda of German federalism. In the major reform initiative of 2006, the Länder[201] asserted their constitutional dominance over local governments to the exclusion of the federal government. Articles 84(1) and 85(1) were thus amended by adding the following sentence to each: "Federal laws may not entrust municipalities and associations of municipalities with any tasks". Therefore, transfers of tasks would come from Länder only (Gunlicks, 2007). Länder constitutions have also contained some provisions to limit unfunded mandates.

The underlying principle is that of 'connectivity', requiring Länder to transfer not only administrative tasks to local governments but also the financial means necessary to execute the tasks. These reform measures are only prospective; they have not affected existing federal mandates on local government which are still causing much of the financial distress among local authorities.

15.4.4 Evaluation

It is apparent that there is no generally applicable definition of an unfunded mandate that is agreed upon by orders of government. The US legislation is the closest in recognising a broader concept of an unfunded mandate which includes limitation on the revenue raising measures. Even this broad definition has been criticised for not being inclusive enough, as monetary limits are placed on financial impact and the cost of regulation is also excluded. Although organised local government in Australia has argued for the recognition of the broad definition, the measures taken to curb unfunded mandate work with a narrow definition, confine the concept to the shift in responsibilities and functions. The methods of curbing or containing unfunded mandates are two-fold. The first, radical, intervention is to impose a clear prohibition on the imposition of unfunded mandates as implemented by some states in the USA and in Germany, on the federal legislature. The more common approach is to admonish the transferring legislature or authority to stop, assess and consider before imposing a mandate. This has been the

195 House of Representatives Economics Committee 2003, 26.
196 House of Representatives Economics Committee 2003, 26.
197 House of Representatives Economics Committee 2003, 29.
198 House of Representatives Economics Committee 2003, 30.
199 Recommendation 1.
200 Recommendation 6.
201 German state.

approach used by the US Congress and also underpins the Australian intergovernmental agreement. The US UMRA further institutionalises and formalises the financial impact assessment on state and local governments, while the Australian intergovernmental agreement has not done so.

15.5 The Existence of Unfunded Mandates

15.5.1 Health service (primary health care)

Municipalities also often cite primary health care as an unfunded mandate.[202] In 2005 the National Health Council resolved that primary health care would be a provincial responsibility, and municipal health services (comprising selected components of the environmental health package of services) would remain a municipal responsibility. In terms of the 2005 resolution, municipal clinics were to be transferred under the provincial health structures, in a process known as "provincialisation". This policy will be reviewed in 2015 and may be amended or reversed if a single public service has been established by then.

Following this resolution, the provincialisation process started, with provinces making different levels of progress. However, in October 2007, the South African Local Government Association (SALGA) advised municipalities to halt all further transfers of primary health care to the provincial government until clarity has been reached on what constitutes primary health care, and research has been done on whether municipalities are best placed to provide effective and efficient primary health care services. According to Versteeg *et al*. (2009), since then, no primary health care services have been provincialised from any metropolitan municipality in the country.

Relation to Schedules 4B and 5B

The Constitution lists "Municipal health services" as a Schedule 4B function. The National Health Care Act, No. 61 of 2003 defines municipal health services as water quality monitoring, food control, waste management, health surveillance of premises, surveillance and prevention of communicable diseases excluding immunisations, vector control, environmental pollution control, disposal of the dead, and chemical safety.

Municipalities that provide primary health services must adhere to national standards, which deal with, among other things, the free provision of health services. In addition, municipalities are under considerable situational pressure to perform the service or to maintain quality standards. These municipalities feel compelled to provide the service and to uphold a legally prescribed standard in doing so – which comes at a cost. Municipalities that perform primary health services do so in terms of agency agreements, which reportedly provide for inadequate funding arrangements.

15.5.2 Libraries

Relationship to Schedules 4B and 5B

"Libraries other than national libraries" are a Schedule 5A functional area that fall within the exclusive legislative competence of a province. Municipalities have no comparable competence. As an exclusive provincial competence, provinces are active in this functional area, but to a limited degree. For example, in the Western Cape, the core functions of the provincial library service are the selection, ordering, professional preparation and processing of library materials, the provision of an information service, the promotion of the use of libraries and library materials, and the maintenance of a computerised library information system. Municipalities perform the bulk of the function, i.e. employing staff, managing the operations of libraries and maintaining library buildings.

Furthermore, municipal libraries also perform a strong supplementary role in primary and secondary education (a Schedule 4A function). They are a reference source for school projects, particularly in light of the poor quality of many school libraries. Many libraries also provide study space for learners.

202 Metropolitan municipalities provide primary health care services in terms of agency agreements with their provincial departments.

Duty or discretion?

There has been no legislative or executive assignment by the provinces of the library function to municipalities. However, until the 1996 Constitution came into operation, libraries were a local government matter, and most public libraries are currently still administered and funded by municipalities.

In the Western Cape, for example, there are 148 library sites in non-metropolitan areas (130 public libraries, three multi-purpose community centres, five mobile libraries and ten satellite libraries) and 105 in the City of Cape Town (98 public libraries, three mobile libraries and four others). The province administers libraries in only three municipalities, which was apparently due to the refusal of the municipalities to continue with the library function in 2000, and the province was willing to take them over. The question is then, why do municipalities continue to perform a function that is not legally theirs. The answer is situational: it is socially and politically unacceptable for municipalities to close their libraries knowing that the provincial governments may not take over or provide adequate compensation for this function.

15.5.3 Museums

Relation to Schedule 4B and 5B

"Museums other than national museums" are a Schedule 5A functional area that falls within the exclusive legislative competence of a province. Provinces have been active in exercising their constitutional powers by administering or supporting museums. Although "museums" are not listed in local government's constitutional functional areas in Schedules 4B or 5B, municipalities are conducting similar activities (a practice that, like libraries, predates the Constitution), ostensibly as part of their local tourism function (a Schedule 4B functional area).

Duty or discretion?

There has been no legislative or executive assignment by the provinces of the museum function to municipalities. As museums were a local government matter until the 1996 Constitution came into operation, most museums are currently still administered and funded by municipalities.

Museums are not a basic service, and no obligation is imposed on municipalities to either establish or support them. Should the province assign the legislative function to municipalities, it would merely be extending a discretionary competence. Thus, there can be no compulsion to establish, run or support a museum. However, should a municipality decide to venture into this functional area, the province could set minimum standards for managing museum collections, visitor services and facilities.

Costs

As suggested above, since the functional area of museums is discretionary power, any costs incurred would be for the account of the municipality concerned.

15.5.4 Housing

Although the precise content of the housing competency in Schedule 4A is not defined in any statute, it broadly refers to the regulation, planning, funding and execution of government-subsidised housing schemes. The location of housing in Schedule 4A means that both national and provincial government may adopt and administer housing legislation. However, without assignment, municipalities may not make legislation with regard to housing or administer the housing subsidy.

There are two important legal qualifiers. Firstly, municipalities may be accredited to assume a greater role in housing, and the process of accreditation does not result in an unfunded mandate as defined in this chapter. Secondly, the Constitution instructs the State, including municipalities, to realise the right of access to housing. Municipalities have been allocated, by statute and by court judgment, responsibilities to realise the right of access to housing. For example, the Prevention of Illegal Evictions from and Unlawful Occupation of Land (PIE) Act instructs municipalities to submit information to the eviction court about alternative accommodation, and courts have instructed municipalities to make alternative land available to evictees whose eviction will result in homelessness. Municipalities have argued that, in practice, these obligations are no longer a small

component, but go to the heart of the housing function. The imposition of the obligations emanates not only from PIE but mostly from the Bill of Rights, which removes the issue from the definition of unfunded mandates adopted here. Duties, arising from the Bill of Rights and imposed on municipalities through court orders, should not be considered unfunded mandates. Furthermore, while the provision of subsidised housing falls outside of the municipality's constitutional mandate, the same cannot be said of the provision of serviced sites or the facilitation of access to unoccupied buildings.

A responsibility would qualify as an unfunded mandate, as defined in this chapter, to the extent that government has transferred responsibility to local government to submit reports to eviction courts. It is a responsibility, imposed by national government through legislation that falls outside Schedule 4B and 5B, and is not accompanied by a dedicated funding stream from national government. The Act predates the assignment framework of the Municipal Systems Act and the FFC Act. However, the courts appear to attenuate this duty by requiring municipalities to act 'reasonably'. Municipalities may therefore limit their involvement to evictions of the desperately poor that will result in homelessness. This involvement is based on the municipality's duty to implement the right of access to housing. Evictions that do not result in homelessness do not fall within that category.

The duty of local government to respect, protect, promote and fulfil the right of access to housing is not an unfunded mandate as defined in this chapter. It forms part of the responsibilities allocated to the municipality by the Constitution and must be catered for in the equitable share. However, it may very well be an underfunded mandate in that the equitable share is not designed to incorporate a municipality's constitutional responsibilities concerning the right of access to housing in the context of evictions.

15.6 The Impact of Unfunded Mandates between Spheres of Government

This section provides an analysis of the financial impact of unfunded mandates as they relate to local government and provinces, looking at the financial impact of unfunded mandates on the metropolitan municipalities of eThekwini, City of Johannesburg, Nelson Mandela Bay, Ekurhuleni, Tshwane and City of Cape Town. A questionnaire was administered to the six metros to assess the financial impact of unfunded mandates. The focus is only on metropolitan municipalities and KwaZulu-Natal, Eastern Cape and Gauteng provinces, and is part of the Commission's first attempt to assess the impact of unfunded mandates in South African intergovernmental relations. The Commission plans to undertake further research into the impact of unfunded mandates on local municipalities, district municipalities and other provinces over the next Medium-Term Expenditure Framework cycle.

15.6.1 The financial impact of unfunded mandates in practice

Metropolitan municipalities

What emerged from the questionnaire was that municipalities perform functions on behalf of provinces. These functions include health care services, libraries, housing services, museums and roadworks.

Table 15.2 Unfunded mandates by Metropolitan Municipality (nominal terms)

Type of unfunded mandate	eThekwini		City of JHB		Nelson Mandela		Ekurhuleni		Tshwane		City of Cape Town Bay	
R million/year	08/09	09/10	08/09	09/10	08/09	09/10	08/09	09/10	08/09	09/10	08/09	09/10
Health care services	115.3	112.4	308.2	330.8	42.4	45.3	90.2	274.8	215.2	277.4	88.9	120.3
Library services	131.4	155.6	121.1	139.9	45.1	42.7	15.3	45.6	54.2	60.1	203.0	274.0
Museums	29.6	35.5	44.4	54.6	8.5	16.8	0.0	0.0	13.1	14.2		
Housing: new develop.	578.6	492.8	446.7	547.4	0.0	0.0	432.7	519.2	318.9	53.5		
Formal housing	89.8	120.6	205.8	130.6	18.7	-53.9	0.0	0.0	197.6	379.0		
Roadworks subsidies	0.0	0.0	0.0	0.0	4.0	5.0	0.0	0.0	0.0	0.0		
Total	**944.7**	**916.9**	**1126.2**	**1203.3**	**118.7**	**55.9**	**538.2**	**839.6**	**799.0**	**784.2**	**291.9**	**394.3**
Total 2008/09	**3818.7**											
Total 2009/10	**4194.2**											

Source: Metropolitan Municipalities: eThekwini, City of Johannesburg, Nelson Mandela Bay, Ekurhuleni, Tshwane and City of Cape Town

Table 15.2 summarises the cost of unfunded mandates by metropolitan municipalities. It reflects that, in addition to the total amount received from provinces and other sources, the six metros have used/spent from their own budget on existing unfunded mandates. They spent an additional amount of R3,819 billion in 2008/09 and R4,194 billion in 2009/10. The City of Johannesburg spent more on unfunded mandates than other metros did for the 2008/09 and 2009/10 financial years, allocating R1,126 billion and R1,203 billion respectively. The eThekwini municipality spent about R945 million in 2008/09 and R917 million in 2009/10.

Based on the figures above, municipalities clearly perform functions on behalf of provinces without assigning full expenditure to the functions. This has implications for the equitable sharing of nationally collected revenue and the delivery of services.

The findings of the research also highlighted the following challenges related to the delivery of these services as a result of unfunded mandates:

Health Care Services	Libraries
Infrastructure is inadequate and does not address the needs of the patients and the health care services. Extensions, upgrading and maintenance of the health care facilities is for the account of the local government. There is a critical shortage of personnel to render the promotive and preventative health care. In some instances non-governmental organisations are used to fund staff and implement certain programmes in primary health care facilities. Once the service is provided, the funding of the non-governmental organisations is stopped or limited, and the staff have to continue rendering services, which creates an even higher workload for the remaining staff. Financial constraints are experienced as stock, equipment and records required for primary health care (e.g. needles, syringes, dressings) have to be funded by the local government budget.	The Library Grant published in the Gazette is inadequate to fund the expenses of the Library service. The Library service has been curtailed in its functionality to save on costs. There is a shortage of staff. Existing buildings need maintenance. There is lack of funding for programmes and projects. Municipal operational and capital budgets allocated internally are not sufficient to maintain/improve/expand services, resources and facilities. The standard of library services and facilities is declining slowly, instead of growing to satisfy the ever-changing and increasing needs of communities.
Housing	**Museums**
The rental collection rates are poor. There is scarcity of suitable land for development. Inherited aging stock leads to high maintenance costs. The subsidy quantum does not relate to the cost of delivery. Additional facilities are needed.	There is a shortage of education and support staff. Most museums have inadequate infrastructure for storage and exhibitions. The space for visiting schools and practical workshops is limited.

Other issues related to the exercise of powers and functions among the three spheres of government include:

- In some instances, the Service Level Agreements (SLAs) for the last three years have not been signed by provincial departments.
- Provincial departments do not adhere to the principles of these agreements with regard to the provision of all resources.
- Some allocations from the province are not transferred on time according to the agreed payment schedule.
- Some services are devolved to municipalities without consultation and additional funding.

Provinces

In addition to a questionnaire devised for metropolitan municipalities, the existence of unfunded mandates between national and provincial government (where metropolitan municipalities are funded through the respective provincial treasuries) was investigated. The findings of the investigation are summarised below. KwaZulu-Natal Provincial Treasury indicated

that unfunded mandates exist between national level and the province. These arise because of policy decisions made at a national level, which have financial implications but come without the necessary funding to the province for implementation. The Treasury further argued that these unfunded mandates place pressure on the provincial fiscus. The total cost of unfunded mandates in the province amounts to R310,888 million, with the bulk emanating from the Departments of Education (R130,000 million) and Agriculture, Environmental Affairs and Development (R85,070 million).

Table 15.3 Unfunded mandates by Province and Department – 2011/12

Department (R'000)	KwaZulu-Natal	Eastern Cape
Provincial legislature	11,445	
Agriculture, Environmental Affairs and Rural Development	85,070	
Rural Development and Agrarian Reforms		1,040,040
Economic Development and Tourism	4,000	1,239,669
Education	130,000	2,514,233
Health		1,242,500
Social Development		38,900
Human Settlements		131,922
Public Works	47,114	155,339
Arts and Culture	33,259	
Total	**310,888**	**6,362,603**

Source: KwaZulu-Natal Provincial Treasury and Eastern Cape Provincial Treasury

The Eastern Cape Provincial Treasury also highlighted that unfunded mandates exist between national level and the province. It indicated that, in the current financial year, the total cost of unfunded mandates amounts to R6,363 billion. Similar to KwaZulu-Natal, the bulk emanates from the Department of Education, followed by the Departments of Health, Economic Development and Rural Development and Agrarian Reforms with estimated costs of R2,514 billion, R1,243 billion, R1,240 billion and R1,040 billion respectively.

According to the above, Section 35 of the Public Finance Management Act (PFMA) is contravened, as it requires the financial implications for the transfer of a function to be calculated, which is not the case. It also states that draft national legislation that assigns an additional function or power to (or imposes any other obligation on) a provincial government, must, in a memorandum that must be introduced in Parliament with that legislation, give a projection of the financial implications to the province of that function, power or obligation.

In the case of Gauteng, the Provincial Treasury's understanding is that an unfunded mandate is a statute or regulation that requires a provincial government or local government to perform certain functions, yet provides no money for fulfilling the requirement. Thus, in the strictest sense of this definition, the province does not have unfunded mandates. However, over the years the province has suffered from the misalignment between policy and the manner in which funds are allocated to the province, which has resulted in partial funding. The Gauteng Provincial Treasury highlighted that:

- There is a gap in the manner in which the province has been compensated for occupation specific dispensation (OSD). This gap will remain in the system for the years to come.

- In the last two years, Human Settlement Departments are now expected to register new houses built with the National Home Builders Registration Council. However, the conditional grant does not make provision for this and the cost of other related professional fees.

- Through a conditional grant called Public Transport Operations, the province has been mandated to provide a bus subsidy on behalf of the National Department of Transport. Being aware that such a grant will not be sufficient to cover everything, national government has classified this grant as Schedule 4, which creates problems for the province at implementation stage.

15.7 Observations

The Commission is of the view that unfunded mandates possibly exist between the spheres of government, as municipalities perform provincial functions without the necessary funding. For instance, what emerged from the metropolitan municipalities questioned was that in total, the six metros spent an additional amount of R3,819 billion in 2008/09 and R4,194 billion in 2009/10 in the provision of existing unfunded mandates. In this case, it was the responsibility of the metros to use/spend their

own budget for these functions. There are examples of unfunded mandates in the fields of libraries, museums, health and, to some extent, housing. However, numerous claims by municipalities may not be sustained, based on the narrow definition of unfunded mandates. It is suggested that they must therefore be addressed through the equitable share. However, determining whether a mandate falls outside Schedules 4B and 5B is not always easy, as the cut-off points between functional areas are not readily ascertained, which becomes apparent in the area of health services.

Essential legal procedures clearly need to be followed when assigning and delegating additional functions or powers to other spheres of government. However, in some instances metros are allocated functions without the SLAs governing such delegations. Where agreements exist, allocations from the provinces are not always transferred on time according to the agreed payment schedule. There are also problems with a shortage of staff to render the services. This raises serious concerns, as Section 27(2) of the Annual Division of Revenue Act (DORA) requires that the resources employed to render a function are shifted with the function. It requires equitable share allocations for the financing of particular functions and conditional grants (both operating and capital) to be paid to the organ of state that will become responsible for that function following an assignment.

The assignment framework that binds national and provincial governments and seeks to prevent unfunded mandates is not effective. Despite the overlapping of the various pieces of legislation dealing with assignments (and which sometimes makes the framework difficult to apply), it is clear that Sections 9 and 10 of the Systems Act are honoured in their breach rather than in their application. This is even more pertinent to Section 3(2D) of the Financial and Fiscal Commission Act. Local government's ability to discharge its mandate effectively is damaged when the lack of compliance results in an unfunded mandate.

In a number of functional areas, there is no legal basis for local government's activities. The clearest example is libraries. A further troublesome example is primary health services. While it is permissible for 'municipal health services' to be defined in national legislation (subject of course to judicial scrutiny), the (informal) administrative reallocation of tasks to metros has no secure legal basis and tends to disadvantage municipalities.

Lastly, prior consultation with the Commission before assignment legislation is introduced in a legislature, can be regarded as a formal validity requirement of such legislation. It may be argued that the provisions of the Systems Act and the FFC Act do not necessarily 'overrule' provisions contained in other statutes. However, the 'manner and form' provisions of the Systems Act and the FFC Act apply before the new legislation becomes a reality. They regulate the actions of the executive in preparing assignment legislation or making assignment decisions. With regard to assignments done by executive act, Section 3(2A)(b) of the FFC Act is clear. It provides that an assignment 'has no force' unless the Commission's recommendation has been considered.[203] In response to the problems identified above, the following advisories are made by the Commission:

- Government should undertake a review of the extent of compliance with legal procedures for the assignment and delegation of functions, as set out in the Intergovernmental Fiscal Relations Act, the Financial and Fiscal Commission Act, the Division of Revenue Act and the Local Government Municipal Systems Act. In particular, it is recommended that compliance with the following legal requirements is assessed:

    i. The financial and fiscal implications of a function shift on the sphere of government or organ of state. The organ of state initiating a general assignment must provide these implications to the Commission for its recommendations to the Minister of Finance in line with Section 3 of the FFC Act 2003 as amended and the Minister of Finance. The Commission tabled a compliance checklist for this specific purpose in 2007.

    ii. All resources associated with delivering a service associated with a function to be shifted are transferred. These should include current assets, budgets and all future resources. There must be evidence of a decision taken by the Executing Authority of the assigning or delegating department or organ of state that this is acknowledged and pledged.

- Government should take steps to ensure that all mandates have a legal basis. The functions performed by each sphere of government must have a secure legal footing. Performing functions falling outside their mandate impinges upon the lawfulness of their budgets (although their expenditure is not necessarily illegal).

- Government should develop a time-bound programme to regularise the functional assignment of libraries and museums.

203 A consultation requirement in the Constitution with regard to legislation dealing with local government's taxing powers (s 229(5) Constitution), was successfully challenged in court. See Robertson v City of Cape Town 2004 (9) BCLR 950 (C). The invalidity of the contested Act was not upheld by the Constitutional Court on a different ground. See Steytler & De Visser 2007, para 1.2.1.

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Annexure 15A Summary Tables

eThekwini Municipality

Type of unfunded mandate	Operational cost to municipality to provide the service	Capital expenditure related to provision of service	Repairs and maintenance cost (if any)	Amount received from province	Amount received from other sources	Amount spent (unfunded mandate)
	R'm	R'm	R'm	R'm	R'm	R'm
Health care services 08/09	147.0	4.7	4.1	36.4	0.0	115.3
Health care services 09/10	150.1	4.9	4.4	42.6	0.0	112.4
Library services 08/09	134.6	4.8	4.9	4.5	3.5	131.4
Library services 09/10	156.9	4.6	5.3	2.2	3.7	155.6
Museums 08/09	29.5	0.5	1.4	0.1	0.3	29.6
Museums 09/10	26.9	8.9	1.3	0.1	0.2	35.5
Housing: new develop. 08/09	310.7	665.0	30.8	345.4	81.7	578.6
Housing: new develop. 09/10	349.8	390.0	10.0	183.8	63.2	492.8
Formal housing 08/09	120.0	7.4	14.0	0.0	37.6	89.8
Formal housing 09/10	124.0	34.7	11.1	0.0	38.1	120.6
Roadworks 08/09 subsidies	0.0					
Roadworks 09/10 subsidies						
Total 2008/09	741.8	682.4	55.2	386.4	93.1	944.7
Total 2009/10	807.7	443.1	32.1	228.7	95.2	916.9

Source: eThekwini Municipality

City of Johannesburg

Type of unfunded mandate	Operational cost to municipality to provide the service	Capital expenditure related to provision of service	Repairs and maintenance cost (if any)	Amount received from province	Amount received from other sources	Amount spent (unfunded mandate)
	R'm	R'm	R'm	R'm	R'm	R'm
Health care services 08/09	380.7	7.0	7.7	75.9	3.6	308.2
Health care services 09/10	405.2	12.0	1.8	80.9	5.5	330.8
Library services 08/09	126.1	10.7	2.2	6.5	9.2	121.1
Library services 09/10	132.2	26.3	0.3	13.2	5.4	139.9
Museums 08/09	55.1	8.5	1.5	7.8	11.4	44.4
Museums 09/10	57.3	0.7	0.3	1.1	2.3	54.6
Housing: new develop. 08/09	735.1	276.5	14.8	448.6	116.3	446.7
Housing: new develop. 09/10	473.3	275.0	6.8	158.9	42.0	547.4
Formal housing 08/09	53.2	205.1	8.3	15.1	37.4	205.8
Formal housing 09/10	64.2	126.5	9.0	11.7	48.4	130.6
Roadworks 08/09- subsidised	0.0	0.0	0.0	0.0	0.0	0.0
Roadworks 09/10- subsidised	0.0	0.0	0.0	0.0	0.0	0.0
Total 2008/09	1,350.2	507.8	34.5	553.9	177.9	1,126.2
Total 2009/10	1,132.2	440.5	18.2	265.8	103.6	1,203.3

Source: City of Johannesburg

Nelson Mandela Bay

Type of unfunded mandate	Operational cost to municipality to provide the service	Capital expenditure related to provision of service	Repairs and maintenance cost (if any)	Amount received from province	Amount received from other sources	Amount spent (unfunded mandate)
	R'm	R'm	R'm	R'm	R'm	R'm
Health care services 08/09	102.1	16.4	2.7	76.1	0.0	42.4
Health care services 09/10	115.7	11.7	2.2	82.1	0.0	45.3
Library services 08/09	45.6	5.0	1.1	3.5	2.0	45.1
Library services 09/10	40.4	6.7	1.5	3.5	0.9	42.7
Museums 08/09	8.8	0.0	0.1	0.0	0.3	8.5
Museums 09/10	9.8	7.0	0.3	0.0	0.0	16.8
Housing: new develop. 08/09	0.0	0.0	0.0	0.0	0.0	0.0
Housing: new develop. 09/10	0.0	0.0	0.0	0.0	0.0	0.0
Formal housing 08/09	190.9	0.0	0.0	172.2	0.0	18.7
Formal housing 09/10	322.7	0.0	0.0	376.6	0.0	-53.9
Roadworks 08/09- subsidised	0.0	4.0	0.0	0.0	0.0	4.0
Roadworks 09/10- subsidised	0.0	5.0	0.0	0.0	0.0	5.0
Total 2008/09	347.4	25.4	3.9	251.8	2.3	118.7
Total 2009/10	488.6	30.4	4.0	462.2	0.9	55.9

Source: Nelson Mandela Bay

Ekurhuleni

Type of unfunded mandate	Operational cost to municipality to provide the service	Capital expenditure related to provision of service	Repairs and maintenance cost (if any)	Amount received from province	Amount received from other sources	Amount spent (unfunded mandate)
	R'm	R'm	R'm	R'm	R'm	R'm
Health care services 08/09	223.0	80.8	8.0	213.6	0.0	90.2
Health care services 09/10	413.7	85.1	7.8	224.0	0.0	274.8
Library services 08/09	16.3	10.6	0.6	11.6	0.0	15.3
Library services 09/10	28.9	17.3	0.6	0.6	0.0	45.6
Museums 08/09	0.0	0.0	0.0	0.0	0.0	0.0
Museums 09/10	0.0	0.0	0.0	0.0	0.0	0.0
Housing: new develop. 08/09	205.0	268.0	19.8	29.9	10.4	432.7
Housing: new develop. 09/10	313.8	284.0	17.4	34.2	44.4	519.2
Formal housing 08/09	0.0	0.0	0.0	0.0	0.0	0.0
Formal housing 09/10	0.0	0.0	0.0	0.0	0.0	0.0
Roadworks 08/09 subsidies	0.0	0.0	0.0	0.0	0.0	0.0
Roadworks 09/10 subsidies	0.0	0.0	0.0	0.0	0.0	0.0
Total 2008/09	444.3	359.4	28.4	255.1	10.4	538.2
Total 2009/10	756.4	386.4	25.8	258.8	44.4	839.6

Source: Ekurhuleni

City of Tshwane

Type of unfunded mandate	Operational cost to municipality to provide the service	Capital expenditure related to provision of service	Repairs and maintenance cost (if any)	Amount received from province	Amount received from other sources	Amount spent (unfunded mandate)
	R'm	R'm	R'm	R'm	R'm	R'm
Health care services 08/09	270.4	8.7	32.4	63.9	0.0	215.2
Health care services 09/10	320.3	11.2	38.4	54.1	0.0	277.4
Library services 08/09	58.2	0.0	7.0	4.0	0.0	54.2
Library services 09/10	66.1	0.14	7.9	6.1	0.0	60.1
Museums 08/09	13.1	0.0	1.6	0.0	0.0	13.1
Museums 09/10	14.2	0.0	1.7	0.0	0.0	14.2
Housing: new develop. 08/09	135.0	211.9	16.2	28.0	0.0	318.9
Housing: new develop. 09/10	0.0	96.7	0.0	27.2	16.0	53.5
Formal housing 08/09	228.5	70.7	27.4	101.6	0.0	197.6
Formal housing 09/10	303.0	94.9	36.4	18.9	0.0	379.0
Total 2008/09	705.3	291.3	84.6	197.5	0.0	799.0
Total 2009/10	703.6	202.9	84.4	106.3	16.0	784.2

Source: City of Tshwane

City of Cape Town

Type of unfunded mandate	Operational cost to municipality to provide the service	Capital expenditure related to provision of service	Repairs and maintenance cost (if any)	Amount received from province	Amount received from other sources	Amount spent (unfunded mandate)
	R'm	R'm	R'm	R'm	R'm	R'm
Health care services 08/09	229.4	17.2	7.2	157.7	0.0	88.9
Health care services 09/10	312.8	22.7	8.0	215.2	0.0	120.3
Library services 08/09	211.8	24.3	9.9	14.6	18.7	203.0
Library services 09/10	294.0	16.6	10.0	18.1	18.5	274.0
Museums 08/09	0.0	0.0	0.0	0.0	0.0	0.0
Museums 09/10	0.0	0.0	0.0	0.0	0.0	0.0
Housing: new develop. 08/09	0.0	0.0	0.0	0.0	0.0	0.0
Housing: new develop. 09/10	0.0	0.0	0.0	0.0		
Formal housing 08/09	0.0	0.0	0.0	0.0	0.0	0.0
Formal housing 09/10	0.0	0.0	0.0	0.0	0.0	0.0
Roadworks 08/09 subsidies	0.0	0.0	0.0	0.0	0.0	0.0
Roadworks 09/10 subsidies	0.0	0.0	0.0	0.0	0.0	0.0
Total 2008/09	441.2	41.5	17.1	172.3	18.7	291.9
Total 2009/10	606.8	39.3	18.0	233.3	18.5	394.3

Source: City of Cape Town

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