An analysis of sub-national economic databases in South Africa

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Abstract

South Africa faces significant challenges such as a low economic growth rate, high unemployment rate, high poverty rate and substantial inequality. These problems and their possible solutions have a spatial dimension that is often neglected. To support local economic development the public and private sectors require access to reliable sub-national data. Statistics South Africa collects and disseminates socio-economic data, but information about local economies is limited to two private sector databases. This dissertation sets out to analyse the validity and reliability of the economic data available at municipal level in South Africa.

A comparison of the sub-national data from these two databases reveals differences in the estimates as a result of the different methodologies applied. Each database seems to be internally consistent. Over the period some places grew faster or slower than the national average in terms of population and value added but there is persistence in relative positions and ranking. This is the outcome that one would expect if local economies conform to the theories of geographical economies: growth occurs in agglomerations, but the process is cumulative and path dependent. The analysis found no evidence of “exploding standard errors”.

Though the comparison of the two databases shows that they are internally consistent, it also shows that rankings between the two differ substantially. Different variables from the two databases should not be used together in analysis.

The key caveat of this study is that the analysis does not extend to the construction of a sub-national database, but it provides the background for such an effort.

Key words:

Geographic concentration, agglomeration, growth determinants, South Africa, spatial economic development, sub-national data

Opsomming

Suid-Afrika staar verskeie uitdagings soos lae ekonomiese groeikoers, hoë werkloosheid, hoë vlak van armoede en ongelykheid in die gesig. Hierdie uitdagings, sowel as die oplossings daarvoor, het gewoonlik ‘n ruimtelike aspek wat nie altyd aangespreek word nie. Die publieke- en privaat sektor benodig data op ‘n sub-nasionale vlak om ekonomiese ontwikkeling op ‘n plaaslike vlak te ondersteun. Statistiek Suid Afrika versamel en versprei sosio-ekonomiese data, maar dit is nie altyd beskikbaar op plaaslike vlak nie. Daar is wel twee privaat sektor databasisse wat inligting van plaaslike ekonomieë beskikbaar het. Die verhandeling ontleed die geldigheid en betroubaarheid van die ekonomiese data wat beskikbaar is op munisipale vlak in Suid-Afrika.

Die vergelyking van die twee sub-nasionale databasisse van die privaat sektor openbaar verskille in die beramings as gevolg van die verskille in die metodologieë wat toegepas word. Dit wil voorkom of beide die databasisse intern konsekwent is. Sekere plekke het oor tyd vinniger of stadiger gegroei as die nationale gemiddeld, ten opsigte van populasie en waarde toegevoeg, maar die relatiewe posisies van plekke, ten opsigte van hul bydrae tot die nasionale totaal, het dieselfde gebly. Dit is die resultaat wat verwag word as daar aangeneem word dat plaaslike ekonomieë voldoen aan die teorieë van geografiese ekonomie: dat groei voorkom in agglomerasies, maar dat hierdie proses kumulatief is en afhang van besluite wat oor tyd geneem word. Die analise vind geen bewys van standaard afwykings wat “ontplof” nie.

Alhoewel die vergelyking van die twee databasisse wys dat die data konsekwent is, wys dit ook dat die posisies van plekke tussen die twee baie verskil. Verskillende veranderlikes van die twee databasisse moet nie saam gebruik word in ‘n ontleding nie.

Die tekortkoming van die studie is dat die ontleding nie fokus op die samestelling van ‘n sub-nasional databasis nie. Agtergrond inligting vir so ‘n poging word wel verskaf.

Sleutelwoorde:
Geografiese konsentrasie, agglomerasie, determinante van groei, Suid-Afrika, ruimtelike ekonomiese ontwikkeling, sub-nasionale data.

Table of Contents

List of Figures

List of Tables

Chapter 1: Introduction

1.1 Background

At its most basic level economics is concerned with the key questions of what, how and for whom to produce. The choice of goods and services to produce, the production methods and how the output is shared and consumed lies at the heart of the challenges of economic growth and development in a globalising world. However, when researchers write about endogenous drivers of economic growth, the importance of trade or macroeconomic stability, it is often with reference to the national economy. In many models, trade occurs between countries, education is a driver of economic growth, and that growth is assumed to happen in every city and town. In the real world, economic activity is characterised by spatial unevenness. People and their production and consumption activities are found in cities and towns. At most places on the map very little happens and researchers and policymakers need to take account of this. Economic growth and development has a unique spatial nature with regional and local dimensions.

In South Africa too, the spatial distribution of economic activity is highly skewed, with around 73 per cent of the country's GDP being produced in only 19 of the urban areas in 2010 (REX, 2011). The South African economy is, however, better known for the challenges it faces in the forms of slow economic growth, high levels of poverty and great income inequality. In the years since democratisation much has been written about the South African economy, and the major themes include economic growth (or the lack thereof), the impact of the opening up of the economy and globalisation, fiscal adjustment, inflation targeting, exchange rate management and the issues of poverty and inequality. With much of this work, though, the focus is at the level of the national economy. The latest National Development Plan (NDP) *Vision 2030*, again focuses mainly on the economy-wide challenges of unemployment, infrastructure, improving the quality of education training and innovation, social protection and health care and the reform of the public service. However, all of the challenges and possible solutions also have a unique spatial nature with regional and local dimensions. The post-democratisation period was marked by a significant decentralisation of economic decision making in an economy characterised by significant spatial inequality. The transformation of the system of local government has resulted in local authorities that are constitutionally responsible for the development of their areas. The National Spatial Development Perspective set spatial priorities for all spheres of government and the recent NDP mentions the need to address the spatial legacy of history.

All around the world increasing emphasis is being placed on local economic development and planning. According to the United Nations Human Settlements Programme (UN-HABITAT), local economic development is defined as follows:

"Local economic development (LED) is a participatory process in which local people from all sectors work together to stimulate local commercial activity, resulting in a resilient and sustainable economy. It is a way to help create decent jobs and improve the quality of life for everyone, including the poor and marginalised." (United Nations Human Settlements Programme, 2005:2)

In South Africa, the primary responsibility of local government is the development of their communities. To be able to formulate and implement LED policies, both national and local government have a need to be able to assess the demographic, economic and socio-economic *status quo*, as well as measure growth and development on a sub-national level. LED initiatives require an understanding of the strengths, weaknesses, opportunities and threats to an area, and knowledge of a local area's regional economic linkages and competitive advantages. Accurate data on growth rates and sectoral shifts in economic activity are required to inform policy and strategy decisions, economic planning, market development, infrastructure planning, development and delivery (Oldham and Hickson, 2003).

Public and private sector decision makers therefore need accurate data about the spatial distribution of economic activity which signifies the need for reliable sub-national economic data. Statistics South Africa has the goal of producing timely, accurate, and official statistics. To this end, Statistics South Africa produces official demographic, economic, and social censuses and surveys. Statistics South Africa has published the results of two censuses (1996 and 2001) and is currently processing the data of the recent 2011 census. Most of the demographic and social data required for LED policies are available on sub-national level and can be obtained from the censuses and surveys such as the Labour Force Survey and Household Survey. However, most of Stats SA's economic data are only available on provincial level for example GVA per region. To meet the need for economic data at local level the private sector has developed sub-national databases. Both Global Insight and Quantec supply databases that attempt to provide accurate and up-to-date economic, socio-economic and development information on a district council level and municipal level within South Africa. However, there has been no academic analysis of the reliability and validity of the economic data available at sub-national level in South Africa. This dissertation sets out to address this gap.

1.2 Problem statement

South Africa faces significant challenges such as a low economic growth rate, high unemployment rate, high poverty rate and significant inequality. These problems and their possible solutions have a spatial dimension that has often been neglected. To support local

economic development the public and private sectors require access to reliable sub-national data. Statistics South Africa collects and disseminates socio-economic data, but information about local economies is limited to two private sector databases. This dissertation sets out to analyse the economic data available at municipal level in South Africa. The analysis should yield insight to the validity and reliability of the available data and the suitability of the data for LED policymaking.

1.3 Motivation

The significance of *where* economic activity takes place is not limited to the South African context. Economists' explanations of economic growth have moved from those of differential allocations of resources, labour and capital, to accounts that emphasise imperfect competition, institutions and geography. The new economic geography, or geographical economics framework, that has been developed argues that the explanation of differences in growth between places lies beyond so-called "first nature geography". Analyses of economic growth should firstly be about explaining the location of production in space – and this is driven by a fundamental trade-off between increasing returns and transport costs (Fujita and Thisse, 2002). This means that for local economic growth, policymakers have to look toward:

- first-nature geography, for example climate, or unevenness in the distribution of natural resources such as arable land or minerals,
- non-market institutions, such as externalities that give rise to endogenous differences between the growth potential of places, and
- an imperfectly competitive paradigm characterised by scale economies (Fujita and Thisse, 2002:45).

In South Africa, little cognisance has been taken of the implications that geographical economics holds for the challenges that face the South African economy. When the NDP mentions the need to address the spatial legacy of Apartheid it cannot only be about urban planning and transport – policy interventions such as infrastructure development, improving the quality of education training and innovation have spatial dimensions that are linked to the local natural geography, externalities and scale economies.

However, as stated in the background section above, limited research has been done on the spatial distribution of economic activity or the determinants of the growth of economic activities across different localities in South Africa. Scope for further research and sensible inputs into policymaking, will depend greatly on the availability of reliable sub-national data. Currently in South Africa only very limited sub-national economic data are available.

In addition, the importance of this study extends beyond that call for more accurate estimations of municipal-level economic activity. The ability to accurately measure local growth would be an important first step, but the private and public sectors would also like to know what explains it. This prompts the link to the geographical economics literature. The literature overview of chapter 2 will show that growth occurs in agglomerations. The endogenous drivers of economic growth, that is, human capital, research and development, learning by doing, infrastructure investment, have particular spatial dimensions in a pooled labour market, specialised suppliers of intermediate inputs and knowledge spillovers.

More knowledge about sub-national economic growth and its drivers will benefit communities. This prompts the analysis of the validity and reliability of the available data.

1.4 Objectives

The general objective of this dissertation is to explore the sources of sub-national economic data in South Africa and assess the validity and reliability of available data.

The specific objectives that have to be achieved to reach this include:

- Writing an overview of the theories that explain the location of economic activity.
- Writing an overview of the history of the location of economic activity in South Africa.
- Compiling a matrix with information about publically available economic data and the corresponding level of spatial disaggregation.
- Analysing sub-national data from the private Global Insight and Quantec databases and relating the information back to the available data from Statistics South Africa.
- Drawing conclusions and making recommendations for future work.

1.5 Method

The methods employed will include a literature review and empirical analysis of data. The literature review will focus on the theories that explain the location of economic activity as well as the literature about the history of the location of economic activity in South Africa. The empirical analysis will include systematically ordering publically available data from Statistics South Africa and determining the level of spatial disaggregation. The validity and reliability of the data will be assessed through comparisons of public data with privately constructed databases and through decomposition of the variation of data (for example of gross value added) across municipalities and over time.

1.6 Delimitation and outline

The key caveat of this study is that the analysis will not extend to the construction of a sub-national database, but it should provide the background for such an effort.

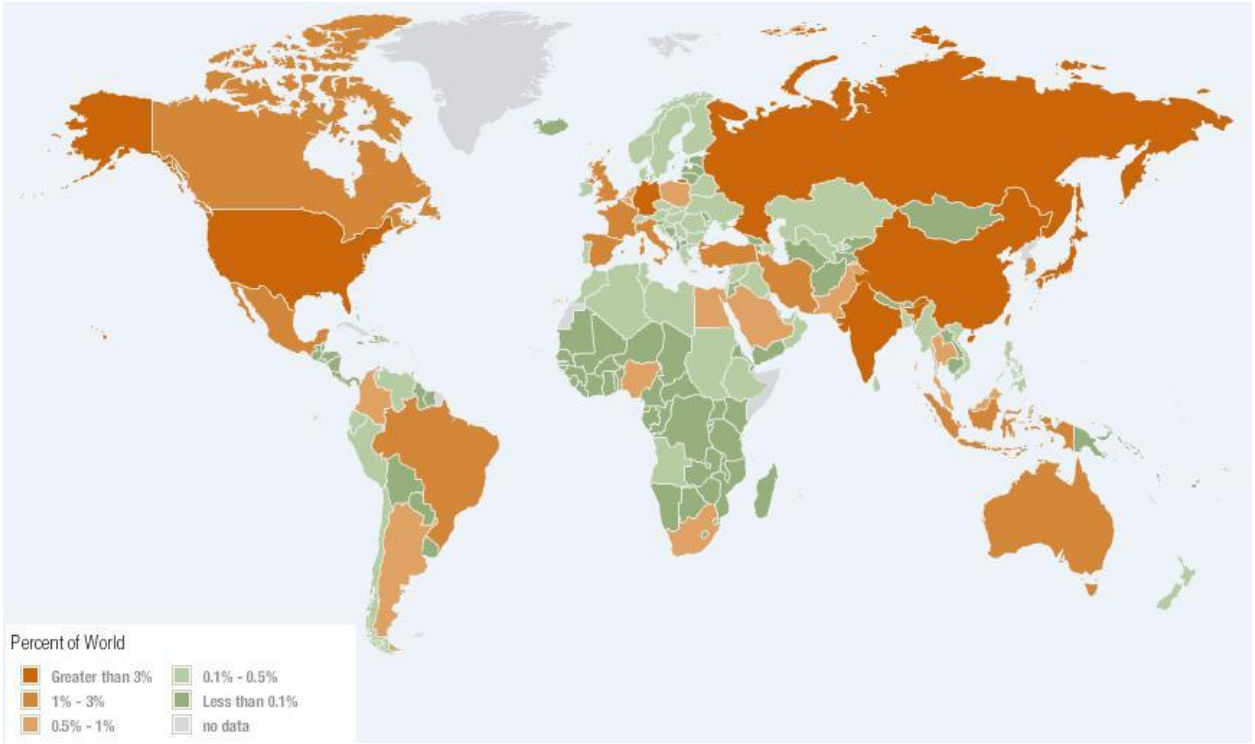
The dissertation is structured as follows: Chapter 1 presents the introduction. Chapter 2 provides an overview of the theory of the location of economic activity. Chapter 3 reviews the spatial economy of South Africa. The history of the location of economic activity in South Africa is discussed and an overview of the literature on the South African space economy is provided. Chapter 4 reports the empirical analysis of the sub-national databases. Conclusions and recommendations are presented in Chapter 5.

Chapter 2: The Literature of the Location of Economic Activity

2.1 Introduction

Chapter 1 highlighted that one of the most remarkable aspects of economic activity is its unequal distribution across the earth. The speed of development and concentration of economic activities varies between countries and regions.

Figure 1: GDP based on PPP share of world, 2010



Source: International Monetary Fund, World Economic Outlook, 2010

Figure 1 illustrates the uneven economic development across the world. According to the International Monetary Fund (IMF, 2010), production is not evenly distributed across the world, but is concentrated in the developed economies (such as the United States, the United Kingdom and Australia) and the emerging and developing economies (such as China, India, Russia, Brazil and Mexico). Distribution of economic activity is also uneven within countries because industrialisation drives specific sectors and places along divergent paths of growth (Walker, 2000). The economic landscape and development is shaped by dimensions of density and distance.

The first of the geographic dimensions of development is density, defined by the World Bank (2009:49) as "*the economic mass or output generated on a unit of land*". The output generated on a unit of land is influenced by agglomeration economies. Economic activity is usually located in dense areas where scale economies exist, where labour and other factors of production are

most mobile, and where the access to markets and suppliers are the greatest (to minimise transport costs). As a region develops, the agglomeration of capital, consumers, and workers brings production advantages. The large local markets enable firms to spread the fixed costs of production across a wider number of consumers, producing cost and productivity advantages. This leads to the concentration of industries and services (Quigley, 1998).

Economies of scale can be internal or external. Internal scale economies occur at firm-level where larger firms have a cost advantage over smaller firms just because the scale of production allows them to produce larger quantities at lower average cost. External scale economies occur at industry level. In this case, an increase in the output of the industry as a whole leads to a decrease in average costs. The sources of these external economies are closely linked to the location of production. Location matters when external economies of scale are the result of local knowledge spillovers, the concentration of specialised inputs or labour market pooling. These generate a supply-side concentration force that causes firms to locate close to one another and the agglomeration reinforces the externalities. Locating in an agglomeration also saves transport costs through the proximity of input suppliers and/or final consumers. More labour and capital is attracted to these areas because of higher wages and greater availability of a more diversified range of goods and services. The increase in population and economic density leads to the formation of towns, cities and metropolises (Quigley, 1998). Firms would locate close to their inputs, close to their customers, or most likely at some point optimally trading off distance between inputs and customers. Economic density can ensure that cities keep on growing, despite negative externalities such as congestion and crime.

The second of the geographic dimensions of development is distance, defined by the World Bank (2009:75) as "*the ease or difficulty for goods, services, labour, capital, information, and ideas to traverse space*". The ease of movement of goods, capital, people and ideas are heavily dependent on proximity to linked activities. Proximity to economically dense areas leads to spillovers, which creates larger agglomerated areas. The reason for this is that the areas closer to economic density have easier access to goods, services, amenities and other opportunities, which attracts more firms and workers will migrate from less dense areas to more economically dense areas (Krugman, 1998). Spatial disparities are likely to increase during development and economic growth may be 'lumpy', with certain locations and sectors expanding fast while others lag behind (Venables, 2005). This fact is apparent when investigating spatial transformation – most countries have booming cities, as well as struggling rural areas.

The purpose of this chapter is to review the theories of the spatial structure of economic activity and the determinants of spatial economic growth and development. This literature underscores the importance of the spatial aspects of economic growth and development and why more knowledge about sub-national economic growth and its drivers will benefit communities. In turn, this motivates the later analysis of the validity and reliability of the available data.

The review explains the theories of the geography of economic activity by examining the role of external economies, factor mobility, distance, and transport costs. It is about how density and distance characterise the geographical economy. Empirical evidence for the relevant models is also reviewed. At the end of this chapter, readers should have a clear understanding of why location matters for economic growth and development, and, by extension, why it is important to have accurate data of where it happens.

The following section discusses the literature of *where* economic activity is located. It is important to understand *why* and *when* economic activities concentrate in certain regions. These questions can be answered by examining market forces such as agglomeration, migration, and specialisation which influence the spatial location of economic activity. This section therefore considers these market forces to elucidate the question of *where* economic activity is located.

2.2 Scale economies and agglomeration

One of the explanations of the location of economic activity in space is that economic activity is driven by economies of scale which in turn promote economic growth. Economies of scale occur when production is more efficient and greater volumes are produced at a lower average cost per unit (Brakman *et al.*, 2006). This fall in the average cost occurs because of externalities – internal or external benefits received for free. To capture agglomeration economies, firms or producers locate together. By locating to specific areas, producers benefit from knowledge spillovers, lower logistics costs, and a bigger potential market (World Bank, 2009). There are also costs involved in locating to agglomerations. Beyond the private costs of the individual firm, there may be negative external effects such as pollution, congestion and crime that spill over to firms. There are multiple explanations of why agglomerations exist:

1. **First-nature geography**: Characteristics linked to the physical landscape, such as temperature, rainfall, access to the sea/harbours, the presence of natural resources, the availability of arable land resource endowments or any other specific features of an area can give a region or area a ‘natural advantage’ (Gallup *et al., 1999;* Ellison and Glaeser, 1999; González-Val and Pueyo, 2009; Greenstone *et al.*, 2010).

2. **Second-nature geography**: Agglomeration economies are another explanation for agglomeration (Anas *et al.*, 1998). This occurs when there is interaction between two or more economic agents, as opposed to interaction between an economic agent and nature (Roos, 2005). These are explained at length below.
3. **Reductions of transport costs**: Krugman (1991b) emphasises the importance of transportation costs in location decisions. When transport costs are very high, producers would try to locate close to consumers in every region. When transport costs are very low, producers will all locate close to one another in one region (for agglomeration benefits) and trade with consumers in other regions. In the intermediate range of transport cost, the trade-off between the external economies of agglomerations and the transport costs of trade influence the location decisions of producers.

To understand *where* economic activity would likely be located, a clear explanation of each of the above factors is needed. A discussion of first- and second-nature geography and empirical evidence is provided in the following sub-sections. The importance of transport costs is discussed in section 2.4.

2.2.1 First-nature geography

First-nature geography refers to the 'natural advantage' of an area or region as a result of characteristics linked to the physical landscape, such as temperature, rainfall, access to the sea/harbours, the presence of natural resources, the availability of arable land resource endowments, or any other specific features (González-Val and Pueyo, 2009). A natural harbour or temperate climate may provide cost advantages to firms at a specific location and this leads to agglomeration. In other words, geography affects the location choice of firms (Greenstone *et al.*, 2010). Krugman (1991, 1998) contended that due to first-nature geography (amongst other things) "history matters". In other words, arbitrary initial conditions and accidental events may set in motion particular patterns of industrial development that are subsequently locked-in via self-reinforcing effects.

This view of the importance of first-nature geography was also at the heart of the early empirical literature that aimed to explain differences in cross-country growth patterns and the lack of convergence of incomes. In the growth regressions the "Africa dummy" was replaced by explanatory variables that measured aspects of first-nature geography. For example, Gallup *et* al. (1999) regressed population density on geography variables such as climate, availability of water, and distances to the coast and found that these factors explain 73 per cent of the observed variability in the population density across countries. A related study by Ellison and Glaeser (1999) examined the relationship between agglomeration and first-nature geography

and it was found that geography is an important determinant of agglomeration and accounted for 50 per cent to 86 per cent of the observed variability.

Gallup *et al.* (1998) investigated the relationship between geography and macroeconomic growth and found that geography matters for economic development along with economic and political institutions[1]. Physical geography is highly differentiated across regions, and these differences have a large effect on economic development. The authors drew several conclusions. Firstly, regions with temperate climates are favoured in development when compared to tropical regions, probably because tropical regions are burdened with higher levels of disease, and limitations on agricultural productivity. Secondly, landlocked countries experience lower growth than countries with access to the coast because international migration and cross-border infrastructure development is difficult. Thirdly, population density in coastal regions is more favourable for development than inland regions. Higher population densities in regions away from the coast is associated with lower output per capita because transport costs are high, and division of labour is low.

2.2.2 Second-nature geography

Second-nature geography refers to the interaction between two or more economic agents, as opposed to the interaction between an economic agent and nature. Krugman's New Economic Geography theory emphasises the role of second-nature geography and shows that the location of economic activity can be explained by agglomeration economies that arise as a result of increasing returns to scale and transportation costs. According to Roos (2005), second-nature forces seem more important for agglomeration than first-nature advantages. Dumais, Ellison and Glaeser (1997) showed that the geographic concentrations of industry are dynamic, which suggests that second-nature characteristics of regions, rather than first-nature characteristics, are an important part of what attracts firms to a particular location.

In the analysis of second-nature geography it is possible to distinguish between internal and external economies of scale (Anas *et al.*, 1998). Internal economies of scale occur at firm level and exist when production processes of firms are more efficient and lead to the production of greater volumes at lower costs. The cost advantages of producing greater volumes at fewer locations lead to agglomeration. External economies of scale occur at industry level when cost

1 Gallup et al. (1998) investigated the geographical characteristics, such as GDP per capita, total population and land area, of several regions together with key variables closely related to economic development. The variables examined include: the extent of land in the geographical tropics, the proportion of the region's population within 100 kilometres of coastline, the percentage of the population that lives in landlocked countries, the average air distance (weighted by country populations) of countries within the region to one of the core economic areas, and the density of human settlement (population per square kilometre) in the coastal region (within 100 kilometres of the coastline) and the interior (further than 100 kilometres from the coastline).

advantages are obtained by locating near other firms. The cost advantages spill over from infrastructure and knowledge sharing (technological externalities) and diversity of intermediate inputs and matching on the labour market (pecuniary externalities) (Anas *et al.,* 1998). Figure 2 illustrates the types of economies of scale that exists.

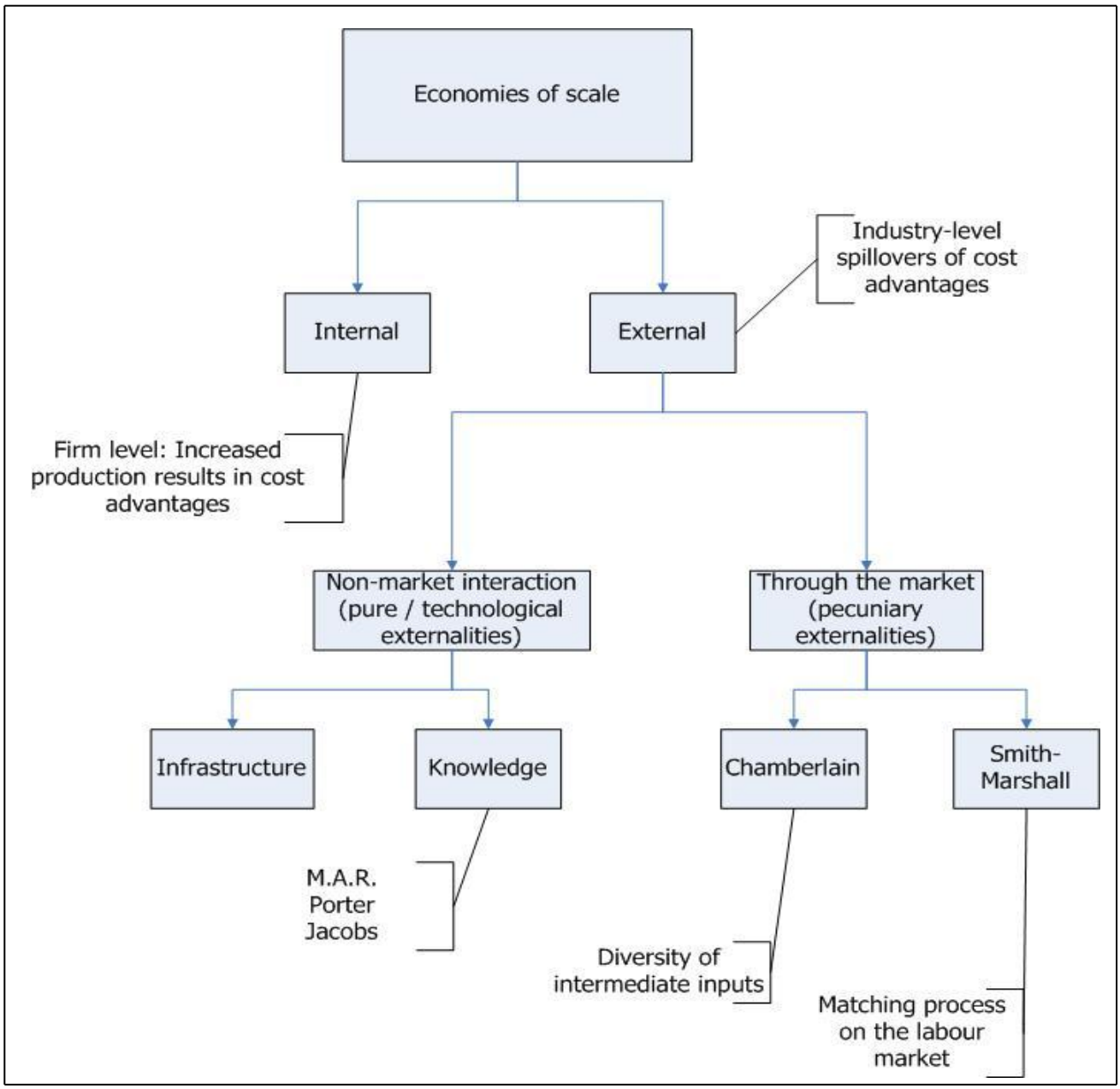
In the case of pure external economies, an increase in industry-wide output causes a change in the technological relationship between inputs and output for each individual firm. There are two examples of this. The first is that of knowledge sharing, learning and innovation: As industry output rises, the stock of knowledge rises and information spills over to firms. This is a positive external benefit that is not paid for, reducing cost and causing an increase in the level of output at the firm level. Glaeser et al. (1992) distinguished between three types of these externalities:

- Marshall-Arrow-Romer externalities that are due to knowledge sharing between firms in the same industry and where local monopoly fosters these spillovers. Firms would want to locate near other firms in the same industry, leading to agglomeration.
- Porter externalities that are industry-specific knowledge spillovers but where local competition fosters the spillovers. Agglomeration will be the result of firms locating near other firms in the same industry.
- Jacobs externalities where knowledge spillovers occur between firms of different industries and where local competition stimulates these spillovers. Firms locate in areas that are highly industrially diversified which result in agglomeration.

The second type of spillover from technological externalities involves public goods. The supply of public goods and services provides benefits to members of a community. There is no competition or exclusivity associated with the consumption of these public goods and services, so the benefits are accessible to all members of a community - even when they are not willing to pay for the benefits. Public goods or services thus have external benefits that lower costs and enhance efficiency, giving rise to increasing returns in the aggregate. People and firms prefer to locate in areas with adequate infrastructure because infrastructure and public goods can accelerate a region's economic growth (World Bank, 2009). Proximity makes it possible to capture the spillovers of knowledge, or from infrastructure, which increase productivity and lower costs (Krugell, 2005).

In contrast to such pure externalities that affect the production function, pecuniary externalities affect a firm's output decisions through price effects that are transmitted via the market. Pecuniary externalities arise between economic agents in close spatial proximity due to access to a common specialised labour pool (Smith-Marshall), or economies of scale in producing intermediate goods (Chamberlain) (Anas *et al.*, 1998).

Figure 2: Types of scale economies



Source: Krugell, 2005

Pecuniary externalities can lead to agglomeration when there is labour mobility and input-output linkages. A large market will create jobs which attract workers to the area, and the expenditure of these workers will lead to the further expansion of the market. Proximity also allows for better matching between workers and jobs. In this approach there are two models. Helsley and Strange (1990) showed that a large city allows for a better average match between heterogeneous workers and firms' job requirements thus enhancing efficiency. On the other hand, Duranton (1998) argued that a large market allows workers to become more specialised and, therefore, more efficient. In both cases, the increased efficiency increases workers' wages. At the same time, workers find it less risky to be in locations with many possible employers. The input-output linkages in an agglomeration work in a similar fashion. The pool of

specialised supplier of inputs means that firms create the market for other firms (Venables, 1996) which improves efficiency, lowers cost and reinforces agglomeration of economic activity.

Finally, in the case of external economies, a further distinction is possible between localisation economies and urbanisation economies (see Table 1). Localisation economies (or MAR economies in a dynamic context) occur between firms in the same industry, while urbanisation economies (or Jacobs economies in a dynamic context) are external economies that apply to firms across industries. Economies of localisation cause cities to be specialised, whereas economies of urbanisation cause them to be diversified (Glaeser et al., 1992).

Table 1: External economies

Localisation economies	Urbanisation economies
Externalities from other plants in the same industry locally (or MAR economies in a dynamic context).	Externalities from the scale or diversity of local economic activity outside the own industry involving some type of cross-fertilisation (or Jacobs economies in a dynamic context).
If an industry is subject to MAR economies, producers are likely to cluster together primarily in a few cities specialised in traded good production in just that activity, or a closely interconnected set of related activities. Specialisation enhances full exploitation of scale externalities, while conserving on local land rent and congestion cost increases.	If an industry is subject to Jacobs economies, to thrive it needs to be in a more diverse and hence usually larger environment.
Activities tend to be found in smaller specialised metro areas.	Activities tend to be found in larger metro areas.
Stronger in high-tech industries and non-existent in machinery, and it is also larger for non-affiliates than for corporate plants.	Weak/non-existent in high-tech industries. No evidence of these economies for any industry.

Source: Compiled based on information from Overman *et al*, 2001

Localisation economies come from geographically concentrated groups of firms, linked by the technology they use, the markets they serve, the products and services they provide, and the skills they require. Firms become more competitive when upstream and downstream firms cluster together. As countries develop, they shift their economies from agriculture-based activities to higher-value manufacturing and services. As the latter becomes more important, firms start to cluster together to exploit the agglomeration economies. Spatial clustering is high in high-skill and high-technology industries, while it is even more pronounced in services because of the greater potential for agglomeration (World Bank, 2009).

There are a number of studies that present evidence that support the existence of external economies of scale. Cikurel (2002) provided evidence that technological externalities involving public goods can lead to the unequal distribution of economic activities by influencing the economic growth rates of regions. Cikurel (2002) investigated the effects of the structural reforms undertaken by Mexico in 1985 on the growth rate in the country, and provides evidence that the growth was not homogenous across Mexico. Results showed that areas with better access to infrastructure experienced higher growth rates. Technological externalities involving public goods can lead to the unequal distribution of economic activities by influencing the economic growth rates of regions. Glaeser *et al.* (1992) empirically tested industry growth in a cross-section of city industries as a function of geographic specialisation and competition to determine if externalities are important for growth. No evidence of MAR and Porter within-industry externalities were found, but results supported the local competition theories of Porter and Jacobs – industries grow faster in cities where firms in those industries are smaller than the national average size of firms in that industry. Results also indicated that knowledge spillovers promote growth, consistent with Jacobs's view. Empirical evidence suggests that pecuniary externalities such as access to markets are a strong driver of agglomeration. Venables (1996) demonstrated that agglomeration could occur as a result of inter-industry linkages. Firms tend to locate in regions or areas where local suppliers are available, in order to reduce transaction costs and therefore increase productivity. Krugman (1991b) shows that large market demand in a region would motivate manufacturing firms to agglomerate to realise scale economies in production.

Empirical literature that support the positive effects of localisation economies include Henderson (1988) and Ciccone and Hall (1995). Henderson *et al.* (1995) estimated scale economies using city level industry data, and found localisation economies of about 6 to 8 per cent. Henderson (2002) estimated production functions at the plant level to determine the effect of agglomeration economies on productivity. Results indicated that high-tech industries experience significant localisation economies, while machinery industries do not. High-tech industries also tend to be more agglomerated than machinery industries, thereby suggesting that agglomeration and economies are related. A study by Black and Henderson (1999b) also found evidence of localisation and MAR economies in high tech industries, while no evidence of externalities were found in capital-goods industries. Results show that industries with the greatest degree of scale externalities are the most agglomerated.

Sveikauskas (1975) and Segal (1976) (as cited by Mukkala, 2004) examined whether larger cities are more efficient in production than smaller cities by using the production function approach. Sveikauskas (1975) found that in the average industry the level of labour productivity is 6 per cent higher where the size of the city is doubled. In the study by Segal (1976), the

agglomeration effects experienced by the largest cities made labour and capital (total factor productivity) 8 per cent more productive. Gopinath *et al.* (2004) investigated the effect of concentration of the U.S manufacturing sector and found that the relationship between productivity growth and concentration is an inverted-U. Growth in the concentration of the manufacturing sector accounted for an average of 10 per cent of the variation in productivity growth. But when the growth rate in concentration exceeded 23 per cent, productivity started to decline. Density is a determinant of spatial transformation. Economic activity tends to agglomerate in denser areas and lead to the formation of cities.

In summary, it is evident that agglomeration of economic activity is driven by economies of scale, but a mechanism is required through which agglomeration can take place. Factor mobility and migration is such a mechanism.

2.3 Factor mobility and migration

The mobility of labour and capital is a mechanism through which agglomeration takes place. Factor mobility facilitates the concentration of economic activity. Factors of production, such as capital and labour, move to places where they will earn the highest returns, in other words, the places where these factors are scarce (World Bank, 2009) and leads to agglomeration. This sub-section considers whether localised externalities contribute to the spatial variability in factor prices and the resulting agglomeration of economic activity in specific locations.

Agglomeration leads to a rise in production and a rise in labour demand. The greater demand for labour leads to higher wages which attract more workers. The relocation of workers to these areas with higher wages leads to increased demand of goods and services, which creates a backward linkage whereby local expenditure is increased. As more workers migrate to agglomerations nominal wages start to fall, reducing costs of production – a positive cost and demand linkage. This leads to an overall increase of local profits and more firms are attracted to the area. Positive demand and cost linkages therefore affect the location of industries (Benabou, 1993; Venables, 1995 & 1996; Ottaviano and Puga, 1997; Krugman, 1998). Labour migration promotes growth by increasing the earnings prospects of people who move, and it drives agglomeration spillovers by clustering skills and talent (World Bank, 2009).

As argued in the previous section, agglomeration also allows for labour market pooling – when firms locate near one another it shields workers from firm-specific shocks (Dumais *et al.,* 1997). Industries locate near other industries that share the same type of labour and workers choose locations where similar firms are standing by, ready to hire them. Proximity therefore allows for better matching between workers and jobs (Dumais *et al.,* 1997; Blaauw and Krugell, 2011).

Helsley and Strange (1990) showed that workers are more efficient in a large city because of better matching between workers and jobs. Duranton (1998) also found that workers become more efficient in larger markets, but because a large market allows workers to become more specialised and, therefore, more efficient. Both sources indicate that increased efficiency leads to increased wages. Empirical evidence suggests that workers find it less risky to locate in more dense areas with many possible employers. A study by Ciccone and Hall (1996) investigated the effect of a larger labour force in a specific sector or region on the labour productivity across the U.S. and found that by doubling the number of employees in a specific sector or region, the average labour productivity in a country increases by 6 per cent. Another study by Ciccone (2002) showed that by doubling employment density, productivity is increased by up to five per cent. Mukkala (2004) also investigated the effects of localisation economies on regional productivity in certain industries in Finland and found that, if the labour force in the food sector is doubled, the productivity in the sector increases by 0.5 per cent. In a recent study, Havemann and Kearney (2010) examined the spatial aspects of the South African labour market. They used 2001 census data to construct an urbanisation index at district council level and used it along with a range of individual-specific predictors of employment from the Labour Force Survey of March 2005. The results showed a positive relationship between urbanisation and employment. For example, someone in Johannesburg is 1.5 times more likely to be employed than a similar individual in a medium-sized town. Labour market pooling is therefore a dominant characteristic of the agglomeration of industry (Dumais *et al.,* 1997).

There is significant empirical evidence that factor mobility is a mechanism through which agglomeration takes place. Localised externalities contribute to the spatial variability in factor prices and the resulting agglomeration of economic activity in specific locations. Much literature exists on the variation in nominal wages across regions. Spatial models based on increasing returns commonly predict that equilibrium wages and land prices will be higher in more densely concentrated regions. Hanson (1997) and Krugman (1991b) found that proximity to large consumer or industrial markets leads to higher wages in the specific region or area because firms in these regions benefit from location-specific externalities. Glaesar and Mare (1994) found that wages are higher in urban areas than in rural areas and Montgomery (1992) shows that wages can vary substantially between areas (as referenced by Hanson, 2000). Hanson (2000) identifies two explanations for long-run fluctuations in wages in his paper on the geographic location of industry – uneven supply of services and location-specific externalities. Kingdon and Knight (2006) estimated a wage curve across space and found a negative relationship. Their local labour markets were defined by the clusters of the South African Labour and Development Research Unit (SALDRU) dataset used. The results showed that male, urban and married workers received significantly higher wages than female, rural, unmarried workers. A clear distinction between rural and urban areas was not found, but

significant province dummies indicated regional variation in wages. Blaauw and Krugell (2011) examined the employment of day labourers across South Africa and found that the thickness of the labour market contributed to higher wages. Puga (1999) found that economic activity agglomerates because of wage variations and the resulting mobility or immobility of labour. Labour mobility (and low transport costs) leads to agglomeration of activity in one location (Alonso-Villar, 2005).

Empirical studies suggest that skilled workers are more mobile than unskilled workers between distant locations (Fujita and Thisse, 2002). One reason for this could be that education generates human capital that is easily transferable to other regions. The larger presence of educated individuals may also be one of the factors explaining the relatively larger increase in wages (Cikurel, 2002). Blaauw and Krugell (2011) examined the employment of day labourers across South Africa to establish whether the thickness of the labour market determines wages. The results from the regression models (that examined location as one of the predictors of earnings while controlling for a range of individual specific characteristics of day labourers) showed that education is positively associated with wages. Black and Henderson (1999a) developed a spatial theory based on human-capital externalities, and predicted that wages and land rents will be higher in regions where there are more people with knowledge. This theory draws on empirical work done by Rauch (1993). Rauch used education data from a cross-section of individual workers and housing units in U.S. metropolitan areas and estimated price equations for wages and housing rents. Results showed that if the average education level in a region increased by one year, an individual worker's wage can increase by 3 per cent and an individual housing unit's rent by 13 per cent. In regions where workers are more educated and knowledge spillovers are large, workers will be more productive and will earn higher wages. This is one explanation for the variation in growth rates across regions. Black and Henderson (1999a) found that U.S. metropolitan areas that have a more educated population also grow faster than other areas. Migration is also a possible explanation for the higher population growth. A highly skilled individual will migrate from a rural area to a larger urban region, if there is opportunity for a higher income in the larger region (Austin and Schmidt, 1998). Krugman (1991b) and Hanson (1997) found that proximity to large consumer or industrial markets leads to higher wages in the specific region or area because firms in these regions benefit from location-specific externalities.

A study by Ciccone and Hall (1996) investigated the effect of a larger labour force in a specific sector or region on labour productivity across the U.S. and found that by doubling the number of employees in a specific sector or region, the average labour productivity in a country increases by 6%. Mukkala (2004) also investigated the effects of localisation economies on regional

productivity in certain industries in Finland and found that if the labour force in the food sector is doubled, the productivity in the sector increases by 0.5%.

In summary, it can be said that location-specific externalities exist and influence the spatial distribution of economic activity through factor mobility and migration. Transport cost is another explanation for the location of economic activity in space, with inter-industry linkages as the mechanism through which agglomeration takes place. This will be discussed in the following sub-section.

2.4 Transport costs

Krugman (1991b) emphasises the importance of transportation costs in location decisions and therefore the spatial distribution of economic activity. As explained earlier in the chapter, transport costs have an effect on the agglomeration or dispersion of economic activities and regional growth (Lopes, 2003 and Gallup *et al.,* 1999). When transport costs are high, industry is scattered across regions to meet final consumer demand. If transport costs fall, costs and demand linkages lead to the agglomeration of economic activities (Alonso-Villar, 2005). Agglomeration saves on transport costs through proximity to input suppliers or final consumers. Marshall (1920) argues that transportation costs should induce plants to locate close to their inputs, close to their customers, or most likely at some point optimally trading off distance between inputs and customers (Dumais *et al.*, 1997). Work done by Paul Krugman, Anthony Venables, and others also show how agglomeration economies and transport costs can lead to a highly differentiated spatial organisation of economic activity (Gallup *et al.*, 1999).

Krugman (1991b) explained that transport costs define the geographic size of markets by influencing the concentration of people and firms. Firms would always attempt to minimise transportation costs. This means that the preferred sites for manufacturing will be those with a relatively large nearby demand, since producing near one's main market minimises transportation costs. A fall in transport costs increases the concentration of people and firms because it allows more efficient sharing of facilities and services. This in turn facilitates economies of scale in production, and higher production and trade produce economies of scale in transport (World Bank, 2009). Krugman (1998:166) explained this circular logic that can produce agglomerations: "Firms want to concentrate production (because of scale economies) near markets and suppliers (because of transport costs); but access to markets and suppliers is best where other firms locate (because of market-size effects)". Venables (1996) suggested that the decision of firms to locate in a certain region would depend on the interaction between production costs and access to markets. If transport costs are low, firms can supply customers from any location and would therefore not be subject to locating in one region. As transport

costs rise, firms would want to agglomerate near the largest market. Empirical evidence that confirms the important link between the spatial distribution of economic activity, economic growth and transport costs, is presented below.

Transport costs influence the location decision making concerning economic activity. Transport costs are influenced by geographical factors such as distance to markets (Radelet and Sachs, 1998) which, in turn, have an effect on long-run economic growth. Radelet and Sachs (1998) empirically found that doubling transport costs is associated with a decrease in gross domestic product (GDP) growth (that is economic growth) of slightly more than one and a half percentage points. Countries that have underlying advantages in transport costs, amongst others, will display permanently higher growth rates and a widening proportionate gap with slower growing countries (Gallup *et al.*, 1999). Limão and Venables (2001) confirmed this with their finding that landlocked countries tend to have approximately 50 per cent higher transport costs and around 60 per cent lower trade volumes than coastal countries. Countries with lower transport costs have experienced more rapid growth in overall economic growth during the past three decades, compared with countries with higher transport costs (Matthee, 2007).

Transport and communication costs influence the speed and efficiency of the spatial transformation of modern cities needed for growth (Anas *et al.,* 1998). Cikurel (2002) investigated the effects of the structural reforms undertaken by Mexico and found that the states in the northern region of the country that had larger endowments of communications and transportation infrastructure and, especially, of human capital before the reforms, also had a relatively larger increase in wages observed after the reforms took place. This could have been because of the greater presence of educated individuals as well as the better supply of public utilities and infrastructure to conduct their operations (Cikurel, 2002). Limão and Venables (2002) found that transport costs increase with distance since lengthy distances imply longer journeys and an increase in accompanying costs. Martínez-Zarzoso *et al* (2003) used distance as a proxy for transport costs and estimate that a 1 per cent increase in distance increases transport costs by approximately 0.25 per cent. Matthee, Naudé and Krugell (2006) used cubic-spline density functions to provide empirical evidence on the impact of domestic transport costs on both manufactured exports and the spatial location of such exporters. They observed that between 70 per cent and 98 per cent of exports from magisterial districts in South Africa is generated within 100 km from the export hub. It is therefore evident that geography and transport costs play an important role in the location of economic activity.

In conclusion, it is clear that the location of economic activity is influenced by agglomeration economies, factor mobility and transport costs. Economic activity would be located in areas with sufficiently strong economies of scale, transport costs in an intermediate range, and

production that is not tied down to other locations either by the need to be very close to the consumer, or by the need to use natural resources very close to their source. When these conditions are met, each manufacturer would want to serve the national market from a single location which would lead to the agglomeration of economic activity. Manufacturers would want to minimise transport costs, so they would choose a location with a large demand. Local demand will be large precisely where the majority of manufacturers choose to locate. It is in this way that agglomeration leads to the growth of a specific location and labour mobility is the mechanism through which agglomeration occurs.

2.5 Summary and Conclusions

The purpose of this chapter was to review the theories of the spatial structure of economic activity and the determinants of spatial economic growth and development. The theories of the geography of economic activity were explained by examining the role of external economies, factor mobility, distance, and transport costs. A number of conclusions can be drawn.

The first is that agglomeration forces are considered by many researchers to be the origin of the uneven distribution and growth of economic activities across regions. Agglomeration is explained by first-nature geography, second-nature geography and proximity. There is a propensity to agglomerate as a result of economies of scale. Internal economies of scale occur on firm level where increased production leads to lower cost. Fragmenting production across locations would therefore be more costly than producing at a single location, therefore internal economies of scale lead to agglomeration. External economies of scale lead to cost advantages at the industry level that could be captured by locating in close proximity to other manufacturers.

The second conclusion that can be drawn is that the mobility of labour and capital is a mechanism through which agglomeration takes place. Factor mobility facilitates agglomeration by influencing the spatial distribution of economic activities.

The third conclusion is that transport costs have an effect on the agglomeration or dispersion of economic activities. A firm chooses a location to minimise transport costs. The intermediate range of transport costs favours location in the larger market. The mechanism through which agglomeration takes place here is inter-industry linkages.

Finally, development has dimensions of density and distance which influence the formation of cities, and the flows of goods, capital, people and ideas and therefore the spatial transformation of a region.

In terms of the objective of this study, this chapter aimed to provide readers with a clear understanding of why location matters for economic growth and development, and by extension, why it is important to have accurate data of where it happens. The complexity of the processes driving local growth shows that the private sector and policymakers need more than just local GDP numbers. Measures of the thickness of the labour market, local wages, linkages between firms and transport costs would all contribute to a greater understanding of local growth.

The following chapter will discuss the South African space economy to determine to what extent economic growth across South Africa is determined by geography. The history of the location of economic activity in South Africa is presented in an attempt to illustrate the complexity of the location of economic activity in South Africa. An overview of the South African literature is also provided to show how researchers have approached the study of the space economy in South Africa in the past.

Chapter 3: The South African Spatial Economy

3.1 Introduction

The South African economy is characterised by significant spatial inequality. However, as stated in Chapter 1, limited research has been done on the spatial distribution of economic activity or the determinants of local economic growth. Scope for further research and sensible inputs into policymaking, will depend greatly on the availability of reliable sub-national data. Before analysing the available data, it is important to understand the processes that determine economic growth at sub-national level. Chapter 2 discussed the link to the geographical economics literature. The literature overview showed that growth occurs in agglomerations. The endogenous drivers of economic growth, that is, human capital, research and development, learning by doing, infrastructure investment, have particular spatial dimensions in a pooled labour market, specialised suppliers of intermediate inputs and knowledge spillovers.

Chapter 2 also showed that "history matters". In other words, arbitrary initial conditions and accidental events may set in motion particular patterns of economic development that are subsequently locked in via self-reinforcing agglomeration effects. Thus, to understand the spatial distribution of economic activity in South Africa one also needs to consider the history of the South African spatial economy. This background will provide a benchmark against which to view more recent data of the spatial patterns of economic activity and economic growth.

The chapter is structured as follows. Section 3.2 outlines the history of South Africa's spatial development before and after democratisation in 1994. In Section 3.3 the latest developments regarding the NDP are discussed. Section 3.4 discusses the academic literature that has focused specifically on the geographical economics of South Africa. The conclusion follows in Section 3.5.

3.2 History of South Africa's spatial development

South Africa is well known for the highly unequal spatial distribution of economic activity that persists in the country. The previous chapter identified the possible causes for this – one being the forces of agglomeration. Over time, different places play different roles in the phases of economic development. This is because each place has its own endowment of natural resources, institutional structures and economic, cultural and political practices that influences how each of these places will develop. It is therefore evident that history is an important factor to take account of when studying the distribution of economic activity in a region or country.

South Africa has six large cities (metropolitan areas) – Johannesburg, the East Rand, Durban, Cape Town, Pretoria and Port Elizabeth. From the history of South Africa it is learned that these cities have played an important role in the South African economy and consequently the spatial inequality in the country.

The following sub-sections outline the history of South Africa, with a focus on the structures, policies and shocks that shaped the spatial economy before and after democratisation in 1994.

3.2.1 History of spatial development pre-democratisation

This sub-section explores the determinants of economic growth and spatial inequality in South Africa before 1994. First-nature geography is one of the key determinants of spatial economic development in South Africa. This is apparent when looking at where economic activity tends to cluster in South Africa. Economic activity is mostly located along the coastline, where there are harbours and favourable climatic conditions (Durban, Cape Town and Port Elizabeth) and also where precious metals and minerals can be found (Johannesburg, the East Rand and Pretoria) (Naude *et al.*, 2009).

The economic development of South Africa can be divided into three periods (Bosman, 1937):

- The Agricultural Period (1652 – 1800)
- The Agricultural – Mineral Period (1800 – 1900)
- The Agricultural – Mineral – Industrial Period (1900 – onwards)

These periods will be explained briefly in the following sub-sections.

3.2.1.1 The Agricultural Period (1652 – 1800)

The first successful settlement in South Africa took place in 1652 when the Dutch East India Company (D.E.I. Company) sent Jan van Riebeeck to take command of the settlement in the Cape. The settlement's purpose was to ensure a sufficient supply of fresh meat, vegetables and water for the Company's passing ships and settlers were encouraged to focus on producing agricultural products (Bosman, 1937). The Company did not want the Cape to become competition for the industries in the Netherlands, and therefore the establishment of industries in the Cape was discouraged. However, as the number of settlements grew, the number of industries also increased. The construction industry was stimulated by the building of the Castle for Simon van der Stel in 1679, copper was discovered in Namaqualand in 1685, and in 1688 the French Huguenots started to cultivate grapes for wine-making (Bosman, 1937). During the

period from 1652 and 1800, home industries such as wine-making, brandy distilling, candle-making, fruit-preserving, soap-making, and tanning started to grow (Bosman, 1937).

Industrial development in the Cape was impeded by the lack of regular trade, trade restrictions, long distances, and lack of transportation and communication. Some of the settlers were dissatisfied with the conditions in the Cape and decided to migrate inland. In 1836 the "Voortrekkers" set out on the "Great Trek" – a movement into the interior of the country in an attempt to escape the restriction of British rule (Bosman, 1937). They set up the republics of the Transvaal and the Orange Free State (Kemp, 1993) and during the second half of the nineteenth century there were favourable developments in these areas (Bosman, 1937). Agriculture was still important, but the "Voortrekkers" started to depend more on their flocks (Kemp, 1993) and wool-growing, and cattle-farming started to increase (Bosman, 1937). Foundations were also laid in Natal which was developed into a British colony (Bosman, 1937). The sugar plantations in Natal ensured economic development in the area. Labourers were imported from India to overcome the shortage of labour in the area – they formed the basis of the Indian community in the Natal region (Kemp, 1993).

3.2.1.2 The Agricultural – Mineral Period (1800 – 1900)

Diamonds were discovered in Kimberley in 1865, followed by the finding of the goldfields in the Witwatersrand in 1886. This led to the establishment of the diamond mining and gold mining industries and brought significant change to the economy of South Africa (Bosman, 1937; Kemp, 1993, Selwyn, 1975). The first major inland agglomeration was formed in the town of Kimberley, a world diamond producing location. This agglomeration later shifted northward to the Witwatersrand area due to the discovery of gold. The exploitation of gold dominated the South African economy and the spatial distribution of economic activity (Selwyn, 1975; Naude *et al.*, 2009). Large numbers of people were attracted to the mining areas, and vast amounts of foreign capital flowed into the country (Bosman, 1937; Selwyn, 1975; Kemp, 1993). For much of the century the fastest growing localities in the country were around the inland agglomeration of Johannesburg and the administrative capital, Pretoria (Naude *et al.*, 2009). The industry had significant backward and forward linkages. There was growing demand for machinery and equipment used in mining which stimulated the manufacturing sector in Johannesburg and Pretoria. Even today, South Africa's manufacturing sector is largely based around the Johannesburg-Pretoria area (Naude *et al.*, 2009). There was also a need for infrastructure, such as electricity and transport infrastructure, and the growing population of the areas increased the demand for agricultural products (especially food and other consumer goods) and other services (Bosman, 1937; Selwyn, 1975; Kemp, 1993; Naudé *et al.*, 2009). It is said that mining was the driving force for industrial development in South Africa (Kemp, 1993).

Transportation and communication started to improve during the period 1800 – 1900. Roads, bridges and mountain passes were being constructed, and the construction of the first railway between Cape Town and Wellington commenced in 1859. The development of the banking sector also increased during this period. This contributed to the development of economic activity in South Africa (Bosman, 1937). People continued to stream to the areas as a result of improved facilities due to railway transport, better roads, telegraphic communication and banking (Bosman, 1937) and the agglomeration of the economy around the Witwatersrand area was self-reinforcing (Selwyn, 1975).

3.2.1.3 The Agricultural – Mineral – Industrial Period (1900 – onwards)

Before 1910, the country was divided into four separate governments: The Cape Colony and Natal (in British possession) and the two independent republics of the Transvaal and the Orange Free State. There was no co-operation between governments which inhibited economic development of the country as a whole. There was limited investment in South Africa because of the economic, social and political instability (Bosman, 1937). The British administration and the Boer republics came into conflict which resulted in the Boer War in 1899. The Boers were subjugated in 1902 and in 1910 the four British colonies, the Cape of Good Hope, Natal, Transvaal and the Orange Free State were united under one central Government. The Act of Union was signed in 1910 and the Union of South Africa was established (Bosman, 1937; Kemp, 1993). Confidence was restored in the country and economic development ensued with the establishment of secondary industries in South Africa (Bosman, s.a.). Economic activity was mainly located in the Western Cape (wine and distilleries), Natal (sugar), and Southern Transvaal including Pretoria and Vereeniging (mining, engineering, and other). In 1915/16, the Western Cape, Port Elizabeth, Durban and Southern Transvaal (including Pretoria and Vereeniging) accounted for about 70 per cent of industrial activity in the country. These areas' contribution increased to 80 per cent in 1936 largely due to the development in the Witwatersrand area. Other places where industrial development took place include: East London, Pietermaritzburg, Witbank, Bloemfontein, Kimberley, Worcester, Newcastle, Stellenbosch, and Ermelo (Bosman, s.a.). The two main factors that influenced the location of industries was proximity to markets and the cost of raw materials.

It was only after the First World War (also known as the Great War) from 1914 – 1918 that industrial development in South Africa really commenced. Until the 1920s there had been little state intervention, but since then South Africa's economy was characterised as an inward-looking economy with tariffs and quotas protecting manufacturing industries. The import substitution strategy was applied to develop the industrial sector (Kemp, 1993; Suleman, 1998). Industries manufacturing final goods had high levels of protection, while industries delivering

intermediary goods and capital goods, received less protection (Suleman, 1998). Under these new tariffs, several new industries were established, such as the manufacturing of cotton blankets, felt hats, car bodies, pumps, chemicals, clothing, and much more (Kemp, 1993). Bosman (1937) identified areas where certain industries located. As previously mentioned, most of the industries were located in the Cape, Transvaal, Natal and Orange Free State. See Annexure A for a detailed list of industry locations.

The state further intervened by setting up the South African Iron and Steel Industrial Corporation, a parastatal, in 1928 with the objective to establish the iron and steel industry in the country. The first iron and steel works was established at Pretoria in 1934 (Bosman, 1937). The Second World War (1939 – 1945) encouraged structural change in the South African economy by promoting the mining industry (especially in fulfilment of military orders). After the war, the National Party came into power in 1948. This led to a fundamental change in policy - in the shape of apartheid (Kemp, 1993).

Between 1948 and 1991 the ruling National Party imposed the policies of apartheid. Although the apartheid policies of the 1950s supported the above spatial patterns of development, it did so by enforcing inequalities between different race groups. Apartheid was a system of segregating races territorially, socially and politically (Christopher, 1997). The bulk of the black population was transferred to 'homelands' - political entities created in lagging rural areas that enforced the spatial inequalities between metropolitan and rural areas (Kemp, 1993; Naude, 2006). One of the first pieces of legislation during apartheid was the Group Areas Act of 1950. The 'Group Areas Act' was legislated to allow for the spatial separation of cities by assigning different areas to different racial groups where they were allowed to reside or do business (Christopher, 1997; Naude *et al.*, 2009). City centres and key inner suburbs were zoned for the dominant white group, leaving only small peripheral areas for the other groups (Christopher, 1997). The townships reserved for non-whites had to be large enough to allow for expansion without spilling over into another racial group area. Townships also needed to be located far enough from white areas, and had to be a considerable distance from main and national roads (Christopher, 1997). Apartheid added to the spatial inequality caused by the country's first-nature geography. The inequality caused by apartheid resulted in the spatial economy of South Africa being characterised by inefficient land use, excessive transport costs (due to non-whites having to travel further to their place of work), and under-investment in infrastructure (such as transport, telecommunications and electricity). It also resulted in segmented labour and consumption markets and created artificial internal barriers to trade (Naudé and Krugell, 2003). The policies enforced during this time caused unequal development of economic activity and led to inefficient land use and high costs of doing business (Naudé and Krugell, 2005). Spatial inequalities were also enforced within towns and cities outside of the homelands. The apartheid

regime was internationally condemned and sanctions were set-up against South Africa (Kemp, 1993).

At the start of the 1970s the South African authorities realised that an outward-looking policy would have more economic benefits for the country. Export-orientated policies have the benefit of an almost unlimited market and cost structures aligned to international prices, while local market demand reaches a ceiling when following an import substitution policy (Kleynhans *et al.*, 2003). But during the apartheid era, South Africa was excluded from the international community due to sanctions and was forced to continue its inward-looking development approach (Naudé and Krugell, 2005). During this time, Johannesburg and the surrounding Pretoria-Witwatersrand-Vaal (PWV) region was the economic core of the country, where most of the economic activities were taking place (Rogerson and Rogerson, 1999). Williams (1966) (as referenced by Bloch, 1999) identified certain reasons for this concentration. He indicated that industrialisation takes place in larger urban areas where there is a large population with a growing market for goods and a growing market of labour to serve this market. This corresponds with the theoretical concept of external economies of scale and agglomeration as discussed in the previous chapter. The tertiary (services) sector mostly concentrated in Johannesburg, but it was starting to become evident that the secondary (manufacturing) sector was beginning to decentralise to other parts of the PWV region (Rogerson and Rogerson, 1999). The government introduced incentives in 1972 that aimed to promote exports. This included a rebate on imported inputs used in the production of export commodities, tax concessions, compensation for financing costs, consumption of electricity and costs of air freight, as well as subsidies for foreign market expenses in the form of tax allowances (Kleynhans *et al.*, 2003).

From 1980, the state started to actively intervene through policies that affected industrial location, a central component of this intervention being via the decentralisation policy (Dewar *et al.*, 1984; Rogerson, 1988). The industrial decentralisation policy aimed to change the spatial pattern of South African industry to establish a more balanced industrial development pattern in accordance with the requirements of apartheid planning and changed the industry in the Witwatersrand area during the period it was pursued (Dewar *et al.*, 1984; Pickles, 1988; Rogerson, 1995). Some authors argue that the main reason for industrial decentralisation was not economic, but political – it was meant to facilitate segregation between black and white by transferring the bulk of the black population to 'homelands' (as previously discussed) (Dewar *et al.*, 1984; Pickles, 1988). The rationale to the policy was to relocate industry to be closer to concentrations of labour in order to avoid large-scale transportation of workers into the main industrial centres (Naude, 2006). During the 1980s and early 1990s all key economic sectors showed signs of decentralisation of employment (Rogerson and Rogerson, 1999). Rogerson

and Rogerson (1999) cite many sources (Turok, 1995; Rogerson, 1996; Rogerson and Rogerson, 1995 & 1997) that identified a strong trend of employment decentralisation in the Witwatersrand area which affected retailing, corporate head office decision-making, financial services, and manufacturing.

Eight development regions were identified by a working group (set up by the government's Department of Economic Affairs) and were announced at the Good Hope Conference in 1981 (Dewar *et al.*, 1984; Pickles, 1988). Within these regions, settlements were classified as follows:

- Metropolitan areas: the major urban centres of the country with the main targets being the PWV region and Durban/Pinetown.
- Deconcentration points: areas near the metropolitan areas with natural advantages, in other words, areas with little disadvantages in terms of industrial location. These included:
    - Tongaat
    - Pietermaritzburg
    - Ekangala
    - Atlantis
- Industrial development points: areas with the greatest probability of attracting growth. These included:
    - Messina
    - Louis Trichardt
    - Muraleni
    - Thohoyandou
    - Giyani
    - Lebowakgomo
    - Seshego
    - Tzaneen
    - Pietersburg
    - Nkowankowa
    - Potgietersrus
    - Nelspruit
    - Kabokweni
    - Mkhulu
    - Mogwasi
    - Mafikeng
    - Taung
    - Kimberley
    - Upington
    - De Aar
    - Bloemfontein
    - Botshabelo
    - Thaba Nchu
    - Phuthaditjaba
    - Harrismith
    - Newcastle
    - Ladismith
    - Madadeni
    - Ezakheni
    - Ulundi
    - Richards Bay
    - Empangeni
    - Lusikisiki
    - Umtata
    - Queenstown
    - Butterworth
    - East London
    - King Williams Town
    - George

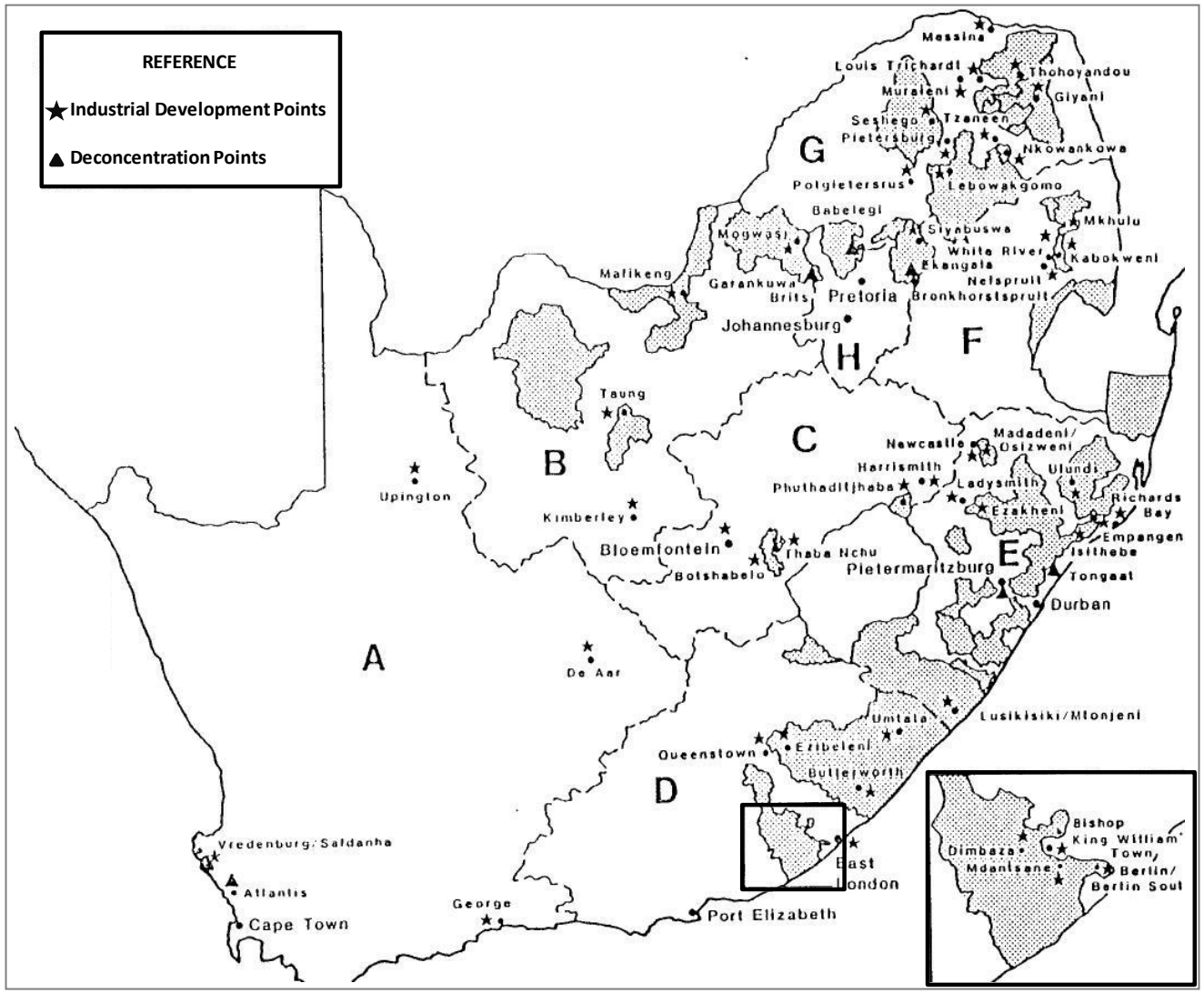
- Other industrial points: all other industrial points not classified as industrial development points.

Industrial development points and deconcentration points are illustrated in Figure 3*.*

Industrial decentralisation is often associated with specific policy interventions which are intended to shift economic activities to areas outside the largest urban centres (Rogerson and Rogerson, 1999). The Regional Industrial Development Plan (RIDP) was introduced in South Africa in 1982 with the intention to promote economic development. It focused on the development of the industrial sector in South Africa and involved the use of various incentives to the manufacturing industry to establish itself in certain areas of the country. These policies and incentives were designed to encourage the relocation of manufacturing activities away from the country's national core region (the Johannesburg and Witwatersrand areas) towards a series of decentralised areas and growth points also known as homelands[2], in an attempt to make non-metropolitan areas more competitive in manufacturing (Bell, 1997; Rogerson and Rogerson, 1999; Hartzenberg, 2001; Rogerson, 2001). The most important short-term incentives to encourage regional industrial development were subsidies for job creation and labour expenses, interest rates, relocation and unforeseen expenses. Long-term incentives included housing subsidies, cash training allowances, subsidies on electricity, transport rebates on all goods leaving the country and tender preferences of up to ten per cent on all tenders to state departments, as well as some public corporations and local authorities (Kleynhans *et al.*, 2003). However, the 1982 RIDP was unable to achieve sustained development and job creation in the decentralised areas in spite of the incentives, and migration to towns, cities and metropolitan areas continued (Kleynhans *et al.*, 2003).

2 The system of homelands included "independent" states such as Transkei, Bophuthatswana, Venda and Ciskei - these states included Gazankulu, Kangwane, Kwandebele, KwaZulu, Lebowa and Qwa Qwa.

Figure 3: Development regions in South Africa associated with decentralisation policy



Source: Pickles, 1988

This led to the acceptance of a new RIDP in 1991. There was an evident shift in development focus. Where in the past development was artificially focused on areas with limited potential, development now shifted towards areas with natural potential and strong market forces. Impractical political choices made place for pure economic criteria when development decisions were made (Hartzenberg, 2001; Kleynhans *et al.*, 2003). According to Le Roux (1996) (as cited by Kleynhans *et al.*, 2003) the new RIDP was focused on the development of all regions and sectors of the country. It aimed to develop an integrated South African spatial economy with a number of broadly defined development areas. Unlike the 1982 RIDP, the new RIDP had a multi-sector development approach that was based on natural competitive and comparative advantages (Hartzenberg, 2001). Instead of being compensated for locational disadvantages, investors now received incentives based on the economic and financial performance of their businesses. The 1991 RIDP prepared the way toward true economic development and served as a building block towards the development of policies stimulating natural development such as the Reconstruction and Development Programme (RDP) of 1995 and the Growth, Employment and Redistribution Strategy (GEAR) of 1996 (Kleynhans *et al.*, 2003).

Since 1994, the new democratic government has been attempting to correct the spatial inequality in South Africa by introducing new spatial policies and transforming local governments. The South African economy started to transition from a closed to an open economy which changed the spatial structure of economic activity again.

3.2.2 Spatial development after democratisation

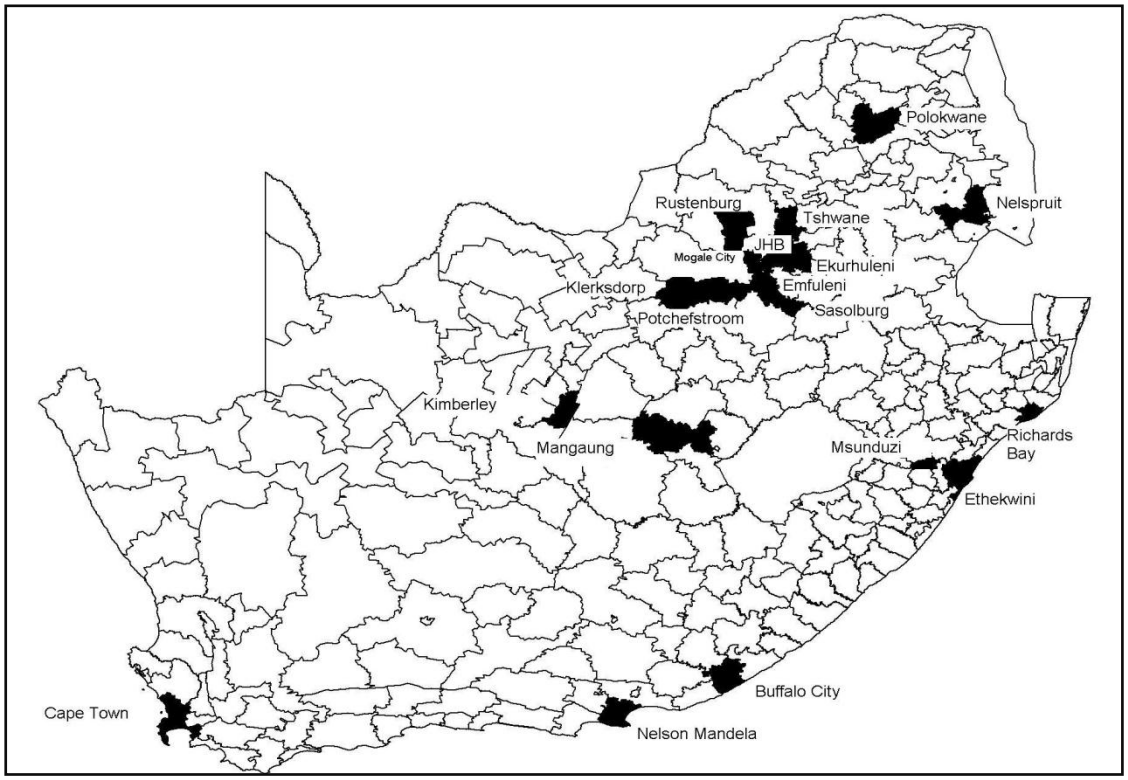
A defining moment in the history of South Africa was the year of 1994 – the year in which the first democratic government was elected. It was also the year marking the end of the country's international isolation, and is the year in which the new government committed itself to globalizing the economy of South Africa through extensive trade liberalisation, conservative fiscal policies, inflation targeting, deregulation of the telecommunications and information technology (IT) sectors and the conclusion of a number of free trade agreements (Naudé *et al.,* 2009).

Since 1994, the country has been divided into nine provinces with a decentralised system of government. The provinces concerned are the Western Cape, Northern Cape, Eastern Cape, Free State, KwaZulu Natal, Gauteng, Mpumalanga, Northern Province, and North West Province. Each of the provinces consists of a number of magisterial districts. The Western Cape has 42 magisterial districts, the Eastern Cape has 78, the Northern Cape 26, the Free State 52, KwaZulu

Natal 51, the North West 19, Gauteng 24, Mpumalanga 31, and the Limpopo Province has 31 magisterial districts. The number of magisterial districts in total is 354 (Matthee and Naudé, 2008) with their own distinct differences in size, levels of income, climate conditions, and even cultural backgrounds (Gries and Naude, 2008).

Figure 4 shows the outline of South Africa and its 354 magisterial districts and indicates the major urban agglomerations.

Figure 4: Basic outline of South Africa and urban agglomerations



Source: Naudé *et al,*, 2009

In an attempt to restructure the South African economy and create a new post-democratisation spatial order, the Government started to implement new policies and strategies aimed at equally distributing economic activity. This section will focus on the programmes and initiatives that have affected the location of economic activity in South Africa post 1994. Firstly, the Reconstruction and Development Programme that was the foundation of the new South African Government's vision for social and economic transformation (African National Congress, 1994) is detailed. The goals of the extension of services and a better life for all would reshape the spatial economy to benefit all South Africans. Secondly, the macroeconomic strategy GEAR that aimed to rebuild and restructure the South African economy is discussed as the backdrop for the transformation of the post-

democratisation economy. Thirdly, the implication of the Spatial Development Initiatives (SDI's) that aimed to fast-track new investment is discussed. Fourthly, how the Manufacturing Development Programme (MDP) affected the spatial structure of the economy is reviewed and lastly, the implications of Local Economic Development (LED) for the location of economic activity are outlined.

3.2.2.1 The Reconstruction and Development Plan (RDP)

In 1994, South Africa still experienced racial division and segregation in education, health, welfare, transport and employment as a result of policies implemented during the apartheid era. The Reconstruction and Development Programme (RDP) aimed to transform the South African economy from a segregated, unequally distributed economy into a sustainable, fast growing, internationally competitive, labour absorbing, and outward-orientated economy (Kleynhans *et al.*, 2003).

The RDP's main objective was to meet the basic needs of people, and promote a people-centred approach to development (CSIR, 2004). The policy was deemed to stimulate natural development (Drewes and Kleynhans, 2011). The basic principles of the RDP were as follows:

- Integration and sustainability.
- People-driven processes.
- Assuring peace and security for all.
- Nation-building.
- Linking reconstruction and development.
- Democratisation.

However, the RDP had a number of shortcomings. Firstly, programmes and projects were not identified based on strategic opportunities or constraints. Secondly, no attempt was made to set priorities or to assign responsibility for the implementation of each programme component. Thirdly, there was no mechanism through which inter-departmental coordination could be obtained. And lastly, the RDP did not have a detailed plan on how to reach its main aims and local governments (who are constitutional responsible for promoting socio-economic development) did not have the necessary capacity to do planning (Visser, 2004).

Even though the 1994 RDP had some shortcomings, it defined the procedure to promote equality and eradicate poverty, and its guidelines have informed all governmental policies post-1994 (Bloch, 1999).

3.2.2.2 South Africa's new macroeconomic strategy

When the apartheid era can to an end in 1994, sanctions against South Africa were lifted and the country was able to again compete in the global market. The import substitution economy was replaced by an outward-orientated economy that focused on stimulating exports. This was done through the establishment of preferential trade agreements (especially with the Southern African Development Community (SADC)) and strategies that control the inflation rate, exchange rate and volatility of the South African Rand (Matthee and Naudé, 2008).

In 1996, the newly elected democratic Government released South Africa's new macroeconomic strategy: the Growth, Employment and Redistribution (GEAR) strategy (Department of Finance, 1996). This outward-orientated macroeconomic strategy was focused on making the South African economy more competitive through the application of tariff liberalisation programmes that aimed to promote investment and enable a stable economic environment (Department of Finance, 1996). The strategy set targets of 6 per cent growth per annum and the generation of 400 000 new formal jobs per annum by 2000 (Department of Finance, 1996).

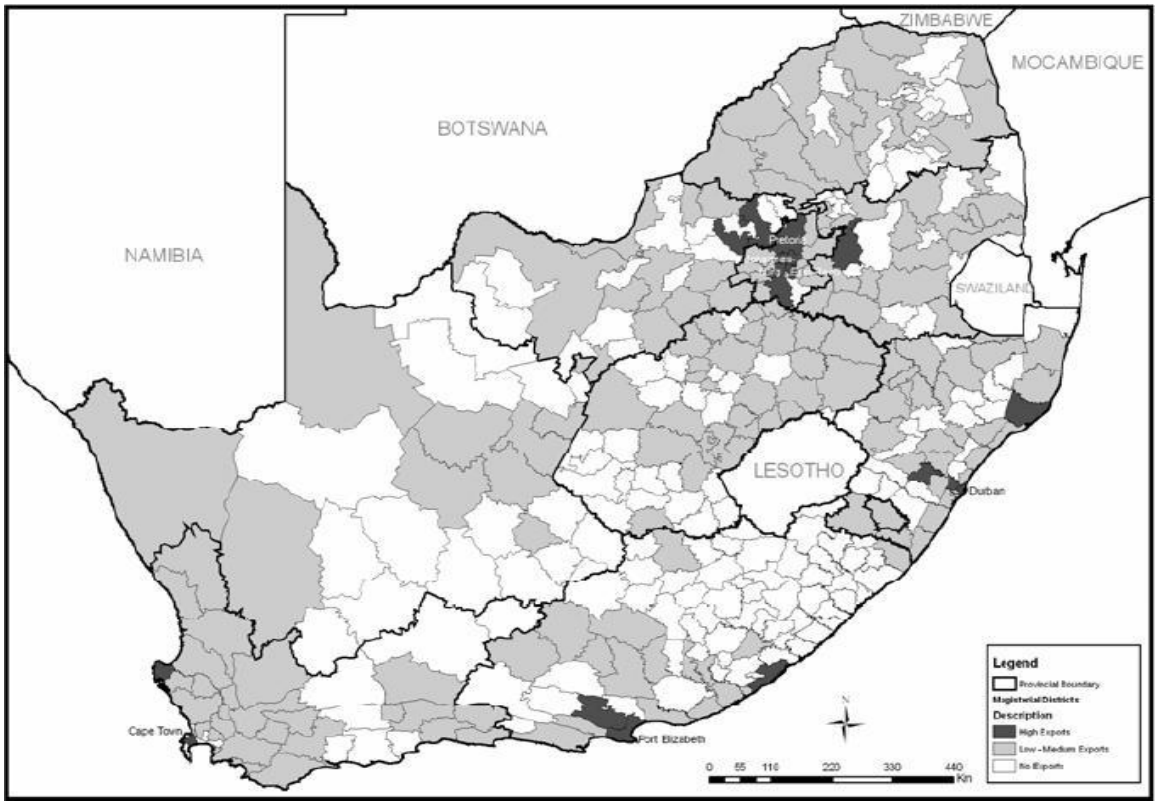
The development of South Africa's manufacturing sector was important to ensure that the growth and employment goals of GEAR were reached. This was done through the establishment of industrial clusters that targeted a specific sector and selected the potential industrial 'winners[3]'. To reach the employment goals, a set of policies were developed to enhance small, medium and micro-enterprises (SMME's). The basic objectives of these policies were to create an enabling environment, facilitate a more equal distribution of income, create wealth and economic opportunities and stimulate economic growth by enhancing the capacity of these SMME's.

Overall, the implementation of GEAR transformed the South African economy from a protected inward-looking to a globally competitive export-oriented economy which had spatial consequences. GEAR was biased towards increased investment at coastal locations and correspondingly towards reducing the advantaged position enjoyed by Gauteng under the former policies of import-substitution (Rogerson, 2002). It is believed that the openness of an economy can lead to changes in the location and geographical concentration of industries. Since the South African economy opened up in 1994 there have been suspicions that the degree of regional specialisation and geographic concentration of industrial activity may have increased, and thus exacerbated spatial

3 Industrial 'winners' are the industries chosen to form the cluster and are usually based on the region's competitive advantage. In other words, the industrial 'winner' will be the industry that will benefit the local economy the most (Shields *et al.*, 2004).

inequality (Rogerson 1998a). Naudé and Matthee (2007) provided empirical evidence regarding this fact. They studied the geographical location of manufacturing exporters in South Africa, and noted changes that have taken place between 1996 and 2004 – the time that South Africa's economy was opened up. They concluded that certain sectors had distinct spatial locations and that industrial clustering was occurring. This was evident from a sectoral analysis of the location of manufacturing exporters, and also supported by literature on the location of foreign direct investment (FDI). The authors found that during the time that South Africa's economy was opened up, clustering was mostly occurring around harbours (Durban, Port Elizabeth, Cape Town, and Richards Bay) and inland ports (such as City Deep situated in Johannesburg) (see Figure 5).

Figure 5: Manufactured export per magisterial district in South Africa, 2004



Source: Naudé and Matthee, 2007

Their results confirmed that when industries become more export-orientated, the decision on where firms locate will depend on factors such as proximity to a port. The implementation of GEAR and the globalisation of the South African economy therefore influenced the location of economic activity in the country. Du Plessis and Smit (2007) found that economic growth accelerated after 1994. They confirmed that since 1994 total factor productivity increased, which they argue was due to the increased openness of the economy.

Overall, the implementation of GEAR transformed the South African economy from a protected inward-looking to a globally competitive export-oriented economy. Within this macroeconomic environment there were specific sets of policy interventions that, together with GEAR, affected the space economy. These interventions will be discussed in the following sub-sections.

3.2.2.3 The Manufacturing Development Programme (MDP)

The Manufacturing Development Programme (MDP) or Tax Holiday Scheme replaced the Regional Industrial Development Programme (RIDP) which was geared towards industrial decentralisation[4] and incorporated a spatial aspect (Lewis and Bloch, 1998; Hartzenberg, 2001; Rogerson, 2001). The provision for tax holidays contained spatial, industry sector and labour components. Regional location, job creation and priority industries determined which projects qualified for tax exemptions (Bell, 1997; Hartzenberg, 2001).

The main objective of the MDP was to promote investment in the South African manufacturing sector. This was achieved by offering tax holidays to larger enterprises for a period up to six years. This scheme applied only to new entities. In order to qualify for the tax holidays the entity had to be operating in one of the identified priority industries, had to be located in one of the qualifying locations, and had to encourage employment and training (Bell, 1997; Hartzenberg, 2001; Rogerson, 2001). The qualifying areas of the MDP programme corresponded to the identified SDIs so that the two programmes complemented each other. The selection of qualifying areas was based on various criteria. The chosen locations needed to reinforce secondary cities and diversify local economies. The programme focused on building upon advantages of existing places and industrial areas instead of establishing new sites (as had been the case during the apartheid period). Places were targeted that had the most potential to attract investors or that seemed likely to be able to attract investors (Hartzenberg, 2001; Rogerson, 2001).

With this programme, the South African government attempted to encourage people from rural areas to move to industrial areas where the opportunities are, instead of taking the employment opportunities to where the unemployed are heavily concentrated.

4 Industrial decentralisation was discussed in Section 3.2.1.

3.2.2.4 Spatial Development Initiatives (SDIs) and Industrial Development Zones (IDZs)

The Spatial Development Initiative (SDI) concept was developed in South Africa by the Department of Transport and Department of Trade and Industry as an integrated planning tool aimed at promoting investment in regions of the country that were underdeveloped but had potential for growth. It was one of the first explicit initiatives of the new government towards addressing spatial inequality (Kleynhans *et al.*, 2003). SDIs were initially conceptualised to address South Africa's transition from an inward-looking import-substitution economy during the apartheid years to an export-oriented economy focusing on industrial development (Rogerson, 2002).

The SDI process began in 1995 and involved a process in which the public sector identified key areas of the country which could be a focus for economic development and promote private sector investment and public-private-community partnerships in these areas. Areas were identified based on the strength of the core economic activities which characterised the area. The public sector then developed strategies for the areas based on these core sectors and identified anchor projects that could initiate and sustain the SDIs into the future (Naudé, 2000). The SDI concept supported the policies of GEAR that aimed to strategically target certain areas in South Africa for development by maximising transport efficiencies and increasing competitiveness in the global market. Spatial levels in South Africa were targeted to ensure the development of previously disadvantaged areas through sustainable employment creation in those regions, by identifying and facilitating new investment opportunities, and at the same time promoting economic growth (Rogerson, 2001).

Initially, the concept only focused on manufacturing but later it was broadened to include a range of other economic activities such as tourism and agriculture (Rogerson, 2001). At least three different types of SDIs were identified and investigated or implemented. An overview of some of the different types of SDIs and their respective sectoral focus is provided in Table 2 below and illustrated in Figure 6.

Numerous authors have investigated the different types of SDIs and their sectoral focus (Jourdan, 1998; Naude, 2000; Rogerson, 2001; De Beer, 2001; Rogerson, 2002). SDIs in the industrial sector included the Fish River Initiative, Richards Bay Initiative, KwaZulu Natal SDI, and Phalaborwa SDI. The Fish River Initiative consisted of areas with economic potential between the coastal cities of Port Elizabeth and East London in the Eastern Cape province. Opportunities in this SDI existed in timber processing, forestry, and the auto -industry. The Richards Bay Initiative was centred in the Richards Bay-Empangeni area in the northern part of KwaZulu-Natal province.

Opportunities identified include potential industrial projects in aluminium, heavy minerals, chemicals, wood and sugar clusters. The KwaZulu-Natal SDI was a provincial SDI located in the south-eastern part of South Africa. Projects in this SDI focused primarily on the ports of Durban and Richards Bay. The Phalaborwa SDI was a main road link that extended from Phalaborwa to Nelspruit in the Mpumalanga province, where the SDI joined the Maputo Development Corridor. The corridor aimed to create better access between the port of Maputo and the mining potential around Phalaborwa in the Limpopo Province and the agricultural projects near Xenon also in Limpopo.

Table 2: Types of SDIs

Sector	Spatial Development Initiative (SDI)
Industrial	• Fish River Initiative • Richards Bay Initiative • KwaZulu Natal SDI (Durban and Pietermaritzburg nodes) • Phalaborwa SDI
Agri-tourism	• Wild Coast Initiative • Lubombo Initiative
Mixed sectors	• Maputo Development Corridor • Platinum Initiative • West Coast Initiative • Coast to Coast Corridor
Second Generation SDI[5]	• Gauteng Special Economic Zones

Source: Jourdan, 1998; Naude, 2000; Rogerson, 2001; De Beer, 2001; Rogerson, 2002.

The Wild Coast Initiative and the Lubombo Initiative were SDIs in the agri-tourism sector. Opportunities in these SDIs were mostly in the agricultural and tourism sectors. The Wild Coast SDI stretched along the coastline of the Indian Ocean in the Eastern Cape province. It extended from outside the city of East London, through to Port Edward bordering the province of KwaZulu-Natal. The Lubombo Initiative extended through an area of South-East Africa that included eastern Swaziland, southern Mozambique and the northern part of the KwaZulu-Natal province in South Africa.

5 The Gauteng Special Economic Zone (SEZ) is a second generation SDI that focuses on high technology manufacturing, information technology, telecommunications, food processing, and cultural activities.

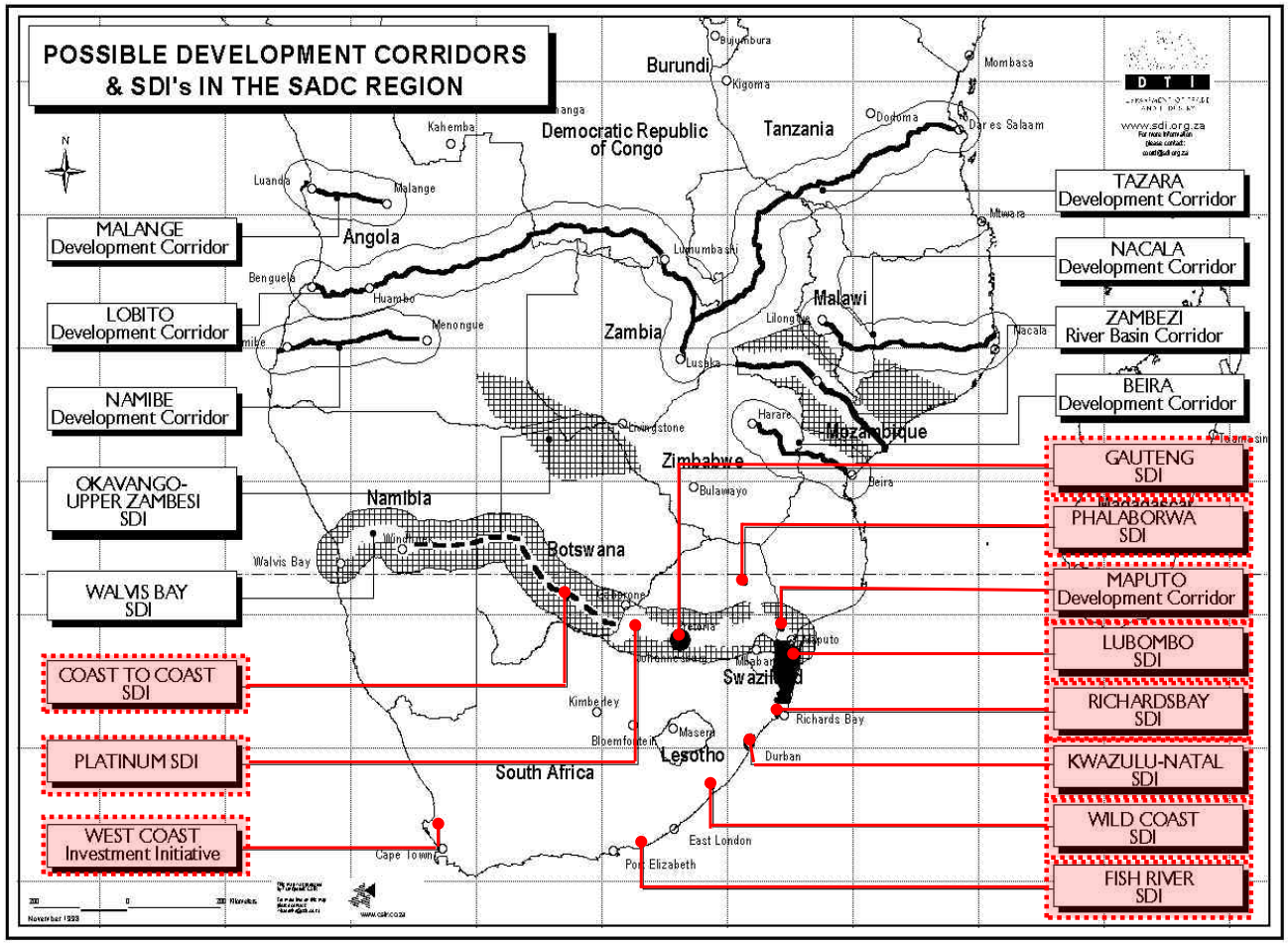
Some SDIs had opportunities in more than one sector. These SDIs included the Maputo Development Corridor, the Platinum Initiative, the West Coast Initiative, and the Coast to Coast Corridor. The Maputo Development Corridor extended from Witbank in Mpumalanga, through Nelspruit, to Maputo the capital of Mozambique. Investment opportunities were identified in the provision of infrastructure and the agriculture, mining, energy, chemicals, tourism and manufacturing sectors. The Platinum SDI was located within the North West Province. The road around which the SDI was based extended from the north of South Africa's capital, Pretoria, in Gauteng, through the North West Province to join the Trans-Kalahari Highway in Lobatse, Botswana. Investment opportunities in the SDI existed in the tourism, manufacturing, agricultural and mining sectors. The West Coast Initiative was located just north of Cape Town on the Cape West Coast. It stretched from the industrial centre of Atlantis in the south past the farming town of Vredendal in the north. The coast had several major fishing and industrial ports, including Saldanha Bay, South Africa's largest natural harbour and biggest port.

Industrial development zones (IDZ) were a special form of SDIs. The Department of Trade and Industry (DTI) defined an IDZ as “a specialised industrial area within an SDI” (as cited by Rogerson, 2002:257) IDZs were planned to stimulate investment in certain areas by providing top-class infrastructure and services which enhanced global competitiveness, access to markets and access to other suppliers and inputs (Rogerson, 2001). Four IDZs were identified in the country between 2001 and 2010 (SA, 2012):

- Port Elizabeth (Coega IDZ)
- East London (ELIDZ)
- Richards Bay (RBIDZ)
- OR Tambo International Airport

Only three of these IDZs are currently operational and located along the eastern coastal belt, while the OR Tambo International Airport is inland and not yet operational. From 2002 to 2010, a total of 40 investors were attracted into the IDZs generating more than R11.8 billion in investments and creating more than 33 thousand jobs (SA, 2012).

Figure 6: SDIs in the SADC region



Source: Hall, 1999

The Coega IDZ was designated in 2001 and is wholly owned by the Eastern Cape Province through the Eastern Cape Development Corporation (ECDC). The IDZ has 12 on-site investors and has created 27 412 direct jobs, the majority of which are in construction. The East London IDZ was designated in 2002 and is operated by the East London IDZ (Pty) Ltd which is co-owned by the Eastern Cape province through the ECDC and the Buffalo City Municipality. The IDZ has 23 on-site investors and has created a total of 5 524 direct jobs. The Richard Bay IDZ was designated in 2002 and is operated by the Richards Bay IDZ (Pty) Ltd. It is co-owned by the uMhlathuze District Municipality and the KwaZulu-Natal government through the Ithala Development Finance Corporation. There is currently one investor on site (SA, 2012).

Other sites identified for the development of IDZs included:

- Saldanha
- Durban
- Mmabatho
- Polokwane
- Upington

3.2.2.5 Local Economic Development (LED)

All around the world increasing emphasis is being placed on local economic development and planning. According to the United Nations Human Settlements Programme (UN-HABITAT), local economic development is defined as follows:

"Local economic development (LED) is a participatory process in which local people from all sectors work together to stimulate local commercial activity, resulting in a resilient and sustainable economy. It is a way to help create decent jobs and improve the quality of life for everyone, including the poor and marginalised." (United Nations Human Settlements Programme, 2005:2)

In South Africa, the primary responsibility of local government is the development of their communities. To be able to formulate and implement LED policies, both national and local government has a need to be able to assess the demographic, economic and socio-economic *status quo*, as well as measure growth and development on a sub-national level. LED initiatives require an understanding of the strengths, weaknesses, opportunities and threats to an area, and knowledge of a local area's regional economic linkages and competitive advantages. Accurate data on growth rates and sectoral shifts in economic activity are required to inform policy and strategy decisions, economic planning, market development, infrastructure planning, development and delivery (Oldham and Hickson, 2003).

The new government presented legislation and policies as guidelines for Local Economic Development (LED). These documents provide a framework influencing the manner in which local authorities should conduct local development. The most relevant national policies and legislation to the LED process are:

- The Constitution
- The White Paper on Local Government
- Local Government Municipal Systems Act
- The National Spatial Development Perspectives

After the 1994 elections, South Africa adopted a new **Constitution**. The Constitution legally compels local governments to promote social and economic development in its area of jurisdiction (Bloch, 1999). In 1998, **The White Paper on Local Government** was published. The White Paper emphasises the need to develop local economies and address poverty alleviation through local economic development (Ministry for Provincial Affairs and Constitutional Development, 1998). Therefore, LED plays a particularly important role in the restructuring and development of the South African economy.

The **Local Government Municipal Systems Act** of 2000 also legislates LED by making Integrated Development Planning (IDP) a compulsory activity for local government. The Act also specifies key LED functions and responsibilities for local government (Rogerson, 2011). The Municipal Systems Act (Act 32 of 2000) lists the duties of a municipal council, within its financial and administrative capacity in Section 4(2). The duties include:

- promoting and undertaking development in the municipality;
- using the resources of the municipality effectively and in the best interest of the local community;
- providing, without favour or prejudice, a democratic and accountable government;
- encouraging the involvement of the local community;
- striving to ensure that municipal services are provided to the local community in a financially and environmentally sustainable manner;
- consulting the local community about the level, quality, range and impact of municipal services provided by the municipality;
- giving members of the local community equitable access to the municipal services to which they are entitled;
- promoting gender equity in the exercise of the municipality's executive and legislative authority;
- promoting a safe and healthy environment in the municipality; and

- contributing to the progressive realization of the fundamental rights contained in Sections 24, 25, 26, 27 and 29 of the Constitution.

In order to address the distortions of the post-apartheid space economy, the **National Spatial Development Programme (NSDP)** was adopted in 2003 and updated in 2006 (Presidency, 2003 & 2006). This perspective programme provides an indication of potential in different geographic spaces across the country and is used as an instrument that informs the respective development plans of national, provincial and local government, which include Integrated Development Plans (IDPs), Provincial Growth and Development Strategies (PGDSs) and the Medium Term Strategic Framework (MTSF). The NSDP is to fundamentally reconfigure apartheid spatial relations and implement spatial priorities that meet the Constitutional imperative of providing basic services and alleviating poverty and inequality. It provides a set of principles and mechanisms for guiding infrastructure investment and development decisions. The NSDP serves as a tool for identifying key areas of tension and/or priority in achieving positive spatial outcomes.

Pakes (1998) investigated industrial development as a strategy for local economic development. An observation made in the study was that by promoting industrialisation at local level, one can stimulate the economy and facilitate growth. The approach to local economic development needs to be market-based, which involves private investors facilitating value-creating processes and local officials creating a favourable environment for investment.

The following key principles for LED that could influence the location of economic activity can therefore be identified:

- LED aims to create favourable locations for investment. This includes obvious elements such as improving the infrastructure and training workers, but also less obvious elements such as the efficiency of local administration.
- LED aims to promote business. This can be existing businesses, start-ups or external companies.
- LED aims to promote access to markets through the identification of opportunities in a locality.
- LED aims to make better use of locally available resources.

It seems however, that spatial inequality in South Africa has not improved since 1994 and the country's globalisation. Naudé (2006) found that over the period of 1996 to 2004 local economic growth between different localities has been quite uneven due to the fact that not all areas were able to benefit from the openness of the economy after 1994. This suggests that local economic development still remains a challenge for local government. He observed that

areas with a large share of exports in the economy tend to grow faster than other areas. The high growth areas are a mix of large, urbanised cities and towns, as well as smaller towns that are less urbanised, but have a significant export share. This will be discussed in more detail in Section 3.4.

In conclusion, this section illustrated how strategies, policies, programmes and initiatives such as RDP, GEAR, MDP, SDI and LED affected the spatial structure of the economy and the location of economic activity. New economic activity tends to be located in areas favoured by the above mentioned programmes, and by contrast, the lagging areas are those areas that formed part of industrial decentralisation programmes of the pre-democratic Government as well as areas that are slow in the development of LED programmes. The following section provides an overview of the new or planned initiatives that are affecting (or will affect) South Africa's spatial economy.

3.3 New or planned initiatives affecting South Africa's spatial economy

The government of South Africa is actively seeking to eliminate poverty and reduce inequality in South Africa. In President Jacob Zuma's State of the Nation Address (2012) delivered on 9 February 2012 in Cape Town, he indicated that the triple challenge of unemployment, poverty and inequality persists. A few initiatives aiming at addressing these challenges are in place. In 2009, the National Planning Commission was established. The Commission was tasked with the development of a national development plan for the country, informed by the Constitution of the Republic and in support of the New Growth Path (NGP) launched in 2010. The NGP identified the job drivers of the economy. The Department of Trade and Industry is in the process of developing a programme that seeks to target Special Economic Zones, in an attempt to accelerate industrial development in the country. The following sub-sections will discuss each of these initiatives.

3.3.1 New Growth Path

The New Growth Path (NGP) for economic development in South Africa was released in December 2010. The NGP laid out strategies to enable South Africa to grow in a more equitable and inclusive manner in the future, fulfilling the promise of our democracy. It has set job creation as a country priority, aimed at reducing unemployment by 10 percentage points by 2020. The NGP has fixed six priority areas to job creation: infrastructure development, agriculture, mining, manufacturing, the "green" economy and tourism.

3.3.2 National Development Plan

President Jacob Zuma appointed the National Planning Commission (NPC) in April 2010. The Commission was mandated to provide a view of what needs to be achieved in 20 years' time and how the proposed objectives would be achieved. The Commission was expected to draft a vision statement for South Africa for 2030 and produce a National Development Plan (NDP) setting out how this vision can be achieved. The Commission needed to identify issues that are affecting long-term development.

The Commission released a vision statement for 2030 and a development plan for Cabinet's consideration on 11 November 2011. The plan aims to eliminate poverty and reduce inequality by 2030. The Diagnostic Report of the National Planning Commission (2011) sets out South Africa's achievements and its shortcomings since 1994. One of the nine main challenges[6] identified in the Diagnostic Report is that spatial challenges continue to marginalize the poor. In the NDP (2011) it is noted that the spatial distribution of economic activity should meet the needs and preferences of the citizens of South Africa. This means that workers should be able to live closer to their places of work, travel distances need to be shorter, and public transport needs to be safe, reliable and affordable. The NDP proposes to reverse the spatial effects of apartheid through the following strategies:

- Increasing urban population density while improving the liveability of cities by providing parks and other open spaces and ensuring safety.
- Providing more reliable and affordable public transport with better coordination across municipalities and between different modes.
- Moving jobs and investment towards dense townships that are on the margins of cities. Building new settlements far from places of work should be discouraged, chiefly through planning and zoning regulations responsive to government policy.

The Commission suggested that a National Spatial Framework (NSF) be developed to implement the above strategies. The NSF will take the place of the National Spatial Development Perspective (NSDP) that currently provides the framework for future development of the national space economy. The NSF will differ from the NSDP in that it will take a broader view of the development potential of different places. The NSF will involve spatial targeting of the certain areas:

6 The nine main challenges identified in the National Development Plan (2011) include: 1)Too few people work; 2) The standard of education for most black learners is of poor quality; 3) Infrastructure is poorly located, under-maintained and insufficient to foster higher growth; 4) Spatial patterns exclude the poor from the fruits of development; 5)The economy is overly and unsustainably resource-intensive; 6) A widespread disease burden is compounded by a failing public health system; 7) Public services are uneven and often of poor quality; 8) Corruption is widespread; 9) South Africa remains a divided society.

- National competitive corridor: corridor of logistics hubs, road, rail, fuel and other infrastructure, including and connecting Gauteng and eThekwini.
- Nodes of competitiveness: include clusters of localities that account for at least 5 per cent of GDP or jobs, which have experienced higher than average growth since 1994, or which have the potential for high growth in future for example Cape Metropolitan region and eThekwini.
- Rural restructuring zones: rural areas with large populations that are experiencing change.
- Resource-critical regions: regions with highly valued natural resources for example the platinum belt for mineral resources, Western Cape for biodiversity and the Eastern Escarpment for water production areas.
- Transnational development corridors: corridors that are critical to creating an integrated southern African economy, which requires specific interventions around economic stimulus and trade and transport networks for example the corridors between Gauteng and Zimbabwe, Botswana and Mozambique.
- Special intervention areas: areas that require particular forms of state support for specified periods:
    - Job intervention zones: areas that have lost more than 20 per cent of their jobs over the past decade for example agricultural districts in the Western Cape, the Free State goldfields, the Newcastle-Dannhauser region in KwaZulu Natal, and the Far West Witwatersrand.
    - Growth management zones: areas of rapid anticipated growth that may require special planning and management for example Waterberg region in Limpopo as a result of new mining development, Saldanha in the Western Cape due to resource-related port and industrial development.
    - Green economy zones: zones with proven potential to create “green jobs” for example areas in the Northern Cape offer potential for solar and wind energy.

3.3.3 Special Economic Zones

A Special Economic Zone (SEZ) is defined by the Department of Trade and Industry as: “a geographically designated area of a country set aside for specifically targeted economic activities, which are then supported through special arrangements (which may include laws) and support systems to promote industrial development” (SA, 2012:11). This programme is a tool that is used to promote trade, economic growth and industrialisation. The main objective of the programme is to support and accelerate industrial development in the targeted regions.

The Industrial Development Zones Programme preceded the SEZ policy, and aimed to support industrial development in the host regions. In 2007, the IDZ programme was reviewed and some challenges were identified (SA, 2012:19):

- The design of the programme favoured only a few regions (a key requirement for designating an IDZ was proximity to either an international sea port or airport)
- Focus was mostly on providing infrastructure, while other critical factors such as logistics, marketing and skills development were ignored
- Inadequate coordination among key government agencies and stakeholders
- Planning was only done on an ad hoc basis making long-term planning difficult
- The programme was dependent on government funding

The specific objectives of the SEZ programme are to (SA, 2012:24):

- Support the development of targeted industrial capabilities and foreign and direct investment in support of the Industrial Development Action Plan (IPAP), regional development strategies, and the new growth path.
- Develop world-class industrial infrastructure in line with the requirements of the targeted industries and investment.
- Promote beneficiation and value addition of the country's mineral and agricultural resources.
- Contribute to the creation of jobs and increase exports of beneficiated commodities in the targeted regions.

The following categories of SEZs have been identified (SA, 2012:12):

- A free port: an area adjacent to a port of entry (sea port or airport)
- Free trade zones: designated areas where goods are not subject to usual customs control
- Industrial parks: facilities that are set aside for production and business services to attract new businesses by providing integrated infrastructure
- Science and technology parks: areas consisting of infrastructure for the establishment and development of knowledge-based companies (usually in close proximity to a centre of technological excellence such as a university)
- Sector development zones: designated areas that focus on the development of specific sectors or industries
- Spatial development corridors: belts of land that connect two or more economic nodes through transportation networks
- Industrial development zone: a purpose-built industrial estate linked to an airport or sea port)

In conclusion, South Africa is still experiencing the triple challenge of unemployment, poverty and inequality. The latest National Development Plan (NDP) Vision 2030, again focuses mainly on the economy-wide challenges of unemployment, infrastructure, improving the quality of education, training and innovation, social protection and health care and the reform of the public service. However, all of the challenges and possible solutions also have a unique spatial nature with regional and local dimensions.

It is therefore evident that the location of economic activity in South Africa is very complex and it is for this reason that different approaches have been used to study the space economy. The following section provides an overview of the South African literature to show how researchers have approached the study of the space economy in South Africa in the past.

3.4 Overview of the literature on the South African spatial economy

Urban and regional planners, economic geographers and economists have all made a contribution to the academic literature on the South African space economy. The research conducted covers a diverse range of topics, but less research has been done in South Africa on the question of the determinants of sub-national growth and the importance of geography for the location of economic activity. This brief overview covers the “other” research that examines topics at sub-national level, the small amount of geographical economics literature and the latest labour market research at sub-national level.

3.4.1 Other research at sub-national level

Studies in the South African literature can be grouped as follows:

- Studies at sub-national level
- Studies of demographics
- Rural studies and studies of the rural-urban divide
- Studies of cities and urban planning
- Studies of local economic development issues
- Studies of Spatial Development Initiatives

These categories are discussed in the following sub-sections.

3.4.1.1 Studies at sub-national level

The first category consists of the studies that examine different topics at sub-national level. This is probably the category in which the most research has been conducted. The studies comprise observations of economic activity on a provincial or local level, but the studies do not always explain why economic activity is located in a specific region or area. This category consists of topics that usually have a strong focus on development and include issues of agriculture, manufacturing, tourism, infrastructure, employment, poverty and inequality at a provincial or local level.

For example, on the topic of agriculture, Hendricks and Lyne (2003) conducted an analysis on expenditure data from two rural areas of KwaZulu Natal and found weak growth linkages. They concluded that agriculture-led growth in South Africa requires public investment in physical and institutional infrastructure to reduce transaction costs and risks in all markets.

Suleman and Naude (2003) examined issues of manufacturing at sub-national level by using export specialisation and output specialisation ratios to identify potential competitive manufacturing clusters at a spatial level in South Africa.

In the area of tourism, a number of authors have made contributions to the sub-national literature. Rogerson (2007) analysed the challenges facing the development of backpacker tourism in South Africa by presenting the findings of a national survey of suppliers of backpacker accommodation. A national database of backpacker accommodation was compiled from different sources such as Backpacking South Africa (and other industry sources), industry publications, the South African Tourism website, and provincial tourism websites. From the database the spatial distribution of backpacker accommodation could be identified. It showed that the largest clusters are found in the Western Cape, Eastern Cape, KwaZulu Natal, Gauteng and Mpumalanga. Free State, Northern Cape, North West and Limpopo only had limited backpacking institutions. Saayman and Saayman (2006) determined the local economic impact of the three leading arts festivals in South Africa through primary data collection from visitor and business surveys at the Klein Karoo Nasionale Kunstefees (Oudtshoorn), the National Arts Festival (Grahamstown) and the Aardklop festival (Potchefstroom). The focus of the study was not on the actual size of the economic impact, but more on the difference between the various contributing factors that determine the economic impact for the different locations. It was found that the location of an arts festival is indeed one of the factors that influence the economic impact of the festival. Cornelissen (2005) used a set of quantitative and qualitative methods to examine the spatial structure and distribution of tourism in the Western Cape province. The quantitative investigation included analyses of the level and location of tourism in

accommodation supply, tourist usage of accommodation and tourism investments. From the study it was evident that tourism activities in the Western Cape are unequally distributed. Tourism activities are mostly concentrated in the Cape Town municipal area, as well as areas adjacent to the area such as the Garden Route and the Winelands. The tourism activities in the rest of the province are much less. It is therefore evident that the demographic and economic characteristics of a province or region determine where tourism activities are located.

Literature that examines issues of infrastructure at sub-national level in South Africa includes a range of issues. Le Roux Booysen (2003) examined provincial disparities in progress on reconstruction and development. He found that the more urbanised a province is, the easier it is for the province to deliver on infrastructure. The more urbanised provinces therefore have an advantage over less urbanised provinces that find it more difficult to improve infrastructure and facilitate demographic transition. Lucas (2011) examines the relationship between transport and social disadvantage in the Tshwane region of South Africa and found that many urban low income residents do not have access to formal public transport and therefore become socially excluded.

In a local study on poverty, Oosthuizen and Nieuwoudt (2003) found that the poor in the Western Cape are most often located in urban areas. They have low levels of education and live in relatively large women-headed households. Serumaga-Zake *et al.* (2005) used data sets from Statistics South Africa to provide statistical estimates of the level of relative poverty over time in the Western Cape province of South Africa and found that large numbers of black and coloured households are chronically poor. Sub-standard education and living conditions were identified as the cause of this situation. Serumaga-Zake and Naudé (2002) identified the determinants of rural and urban poverty in the North West province in South Africa.

On the topic of employment and inequality, Grant (2010) investigated the work activities of residents and workers (residing in low income settlements) in the informal economy through a case study of low-income settlements in Soweto, South Africa's largest township. The author criticised the overemphasis on firms and found that the work activities of poor residents are complex and that workers use networks to connect distant spaces. He reported that every place (home-based enterprises and informal settlements) has an economy and that even residents in poor and marginalised areas are connected to wider space economies.

3.4.1.2 Studies of demographics

The second category of research is focused on demographics, and issues of employment, poverty and inequality in South Africa are addressed. Again, the spatial element of economic activity receives little focus or none at all.

Migration is one of the main issues examined in this literature. For example, Posel (2003) examined the collection of national household survey data in South Africa and found that recent revisions of the surveys do not sufficiently focus on labour migration. Posel (2004) has done work on migration patterns in post-apartheid South Africa, and found an increase in internal labour migration, particularly because of the rise in female migration. Todes *et al.* (2010) examined the urbanisation patterns and trends in South Africa, focusing on the key driving forces underlying migration and urbanisation. They found that the major metropolitan areas have been the main focus of migration, the driving forces being the economic growth within these areas as well as the poor conditions in rural areas.

Many researchers have examined the topic of inequality and poverty within and between income and racial groups. For example, Klasen (1997) analysed poverty and inequality in South Africa by using data from a comprehensive multi-purpose household survey undertaken in 1993 and found that South Africa has among the highest levels of income inequality in the world. He also found that poverty is mostly concentrated among the African population, more specifically black females that are the head of their households, as a direct result of apartheid policies that denied equal access to education, employment and services. Leibbrandt and Woolard (2001) investigated the link between household inequality and income mobility and found that household income inequality is closely linked to labour market access and wage variation in South Africa. The study confirmed that the labour market drives South African inequality and that there is less income mobility at the top and bottom income distributions. Woolard and Klasen (2005) analysed household income mobility among Africans in South Africa during the period 1993 and 1998 and found high mobility. The determinants of mobility were found to be demographic changes and employment changes, which are both related to high unemployment. Martins (2007) examined poverty and income inequality in South Africa and found inequality in the distribution of wealth.

3.4.1.3 Rural studies and studies of the rural-urban divide

The third category of research consists of studies that examine issues in rural areas including issues of the urban-rural divide. To some extent this category is unrelated to the approach to the space economy followed in this study and is therefore only briefly discussed. An example of

one of the studies in this category is Robinson (2003) who examined rural settlement patterns in the Eastern Cape and found that even though households depend on the urban economy for survival and not necessarily on subsistence farming, they keep people on the land to spread the risk of the household and also because of the land tenure system. Moseley and McCusker (2008) examined land redistribution efforts in two of South Africa's provinces, the Western Cape and Limpopo by analyzing a cross-section of projects in these two provinces.

3.4.1.4 Studies of cities and urban planning

This category of research is the urban equivalent of the research in the previous sub-section. It also focuses on issues of households, poverty and inequality, but specifically within the urban context of cities and towns. Again, the approaches in this category of literature are somewhat removed from the approach to geographic economy followed in this study, and are therefore not discussed in detail. The related part of this literature addresses mostly planning and management issues. Nel (2011) examined urbanisation trends from 1911 to 2011 by using 100 years of census data and found that South Africa's population has shifted from being predominantly rural to predominantly urban since 1911. Todes *et al.* (2010) critically assessed an initiative by the Ekurhuleni metropolitan municipality to develop 'local spatial development frameworks[7]' that would guide land use decisions and provide a framework for development.

3.4.1.5 Studies of local economic development issues

This fifth category of literature examines local governments from the perspective of fiscal decentralisation and local economic development initiatives. The fiscal decentralisation literature provides the public economics perspective on the decentralisation of decision-making and the challenges facing provinces and local government in South Africa. Literature on the economic development challenges of local governments specifically focus on Local Economic Development (LED) initiatives and the Integrated Development Planning (IDP) processes currently being undertaken in South Africa. The LED initiative has been discussed in Section 3.2.2.5. Nel made a contribution to this literature with his review and assessment of the status of LED (Nel, 2001); his review of the policy and legal developments (Nel and Binns, 2001) and case studies of the LED and IDP processes (Binns and Nel, 2002). Nel also reviews local economic development in small towns.

7 Local spatial development frameworks are a third layer below the level of its broad indicative metropolitan and regional spatial frameworks.

3.4.1.6 Studies of Spatial Development Initiatives

Section 3.2.2.4 has already introduced the SDI programme and, along with the work done by Rogerson (2001, 2002) and Naudé (2000) mentioned in that section, there are a number of articles that examine issues in this field. For example, Lewis and Bloch (1998) investigated whether SDIs can contribute to regional industrialisation, growth, employment creation and development by examining existing SDIs such as Richards Bay. Koch *et al.* (1998b) identified key lessons for the SDIs in South Africa that aim to promote tourism-led development. These lessons are based on experience from the Malindi-Mombase coastal development corridor[8]. Then there are a number of articles looking at specific SDI programmes:

- Mitchell (1998) examined the lessons learned in implementing the Maputo Development Corridor in the Mpumalanga province.
- Driver (1998) provided an overview of the Fish River SDI in the Eastern Cape province, and also discussed the two industrial development zones (IDZ) which form part of it. She argued that for sustained industrial regeneration in the Eastern Cape a regional industrial strategy is needed. The SDI alone cannot ensure industrial regeneration, but it can be an important element of the strategy.
- Koch *et al.* (1998a) reviewed the models and principles used to achieve development in the tourism sectors of the Lubombo and Wild Coast SDIs and provided guidelines for implementation of an SDI.
- Aniruth and Barnes (1998) examined the rapid industrialisation of Richards Bay and highlighted the factors responsible for the growth in the area. The article provides lessons learnt for the establishment of successful localities through SDIs based on the Richards Bay experience.
- Kleynhans, Naudé and Van der Merwe (2003) provided an overview and evaluation of the Platinum Spatial Development Initiative, putting forward the history of regional industrial policy and the current provincial policy context.

3.4.2 South African geographical economics research

The part of the literature that has focused on the determinants of sub-national growth and the importance of geography for the location of economic activity consists of the contributions of:

- Sub-national growth and convergence

8 The development corridor stretches over Kenya, the Goa Coast of India, the Kulu Valley and Bhutan in the Himalayas, the Gambia, Dominica, Belize and the Maldives.

- The role of cities
- The location of exporters or industries

The above topics will be discussed in the following sub-sections. There are also a few studies that examine the spatial aspects of the labour market (discussed in Section 3.4.3).

3.4.2.1 Sub-national growth and convergence

The extent of spatial inequalities between regions can be determined using various methods to measure whether per capita income between places are converging or diverging. The four most widely used methods include:

- Beta convergence tests
- Sigma convergence tests
- Markov chain analyses
- Kernel density analyses

On the topic of convergence and the determinants of sub-national growth, Naudé and Krugell (2003a, 2006) used panel data regression models and found evidence of slow beta-convergence (β-convergence) across regions in South Africa. Convergence was conditional on initial capital stock, education levels, distance from Johannesburg, and the share of exports in gross value added. Naudé and Krugell (2006) also calculated the coefficient of variation of income per capita across the magisterial districts in South Africa and found some evidence of sigma-convergence (σ-convergence).

There are also some studies that examine distribution of economic activities. Krugell, Koekemoer and Allison (2005) analysed kernels of incomes per magisterial districts in South Africa and confirmed a highly unequal distribution. Over the period 1996 to 2004 more places grew poorer and a few places grew richer. Krugell and Bosker (2008) used Markov chain techniques to describe how South Africa's regional income distribution has changed over time. Empirical evidence of diverging regional income distribution is provided. This means that poor regions are likely to remain poor or become poorer and rich regions will maintain or increase the gap in terms of income levels. The authors also studied the spatial context of the dataset and found that the richer regions absorb economic activity from the surrounding areas and act as local growth points which drive economic growth in South Africa.

3.4.2.2 The role of cities

Cities and urban agglomerations are important for economic development in South Africa. Cities are widely seen as enhancing growth through higher productivity and attainment of better living standards. Naudé and Krugell (2003b) found that cities were growing faster on average than smaller places, and that proximity to South Africa's largest urban agglomeration (Johannesburg) was positively associated with higher economic growth rates.

Naudé and Krugell (2003b) also examined the role of cities in economic development in South Africa and found a highly unequal distribution of economic activity between cities. In 2000, 19 large urban areas produced 70 per cent of South Africa's GDP. The total annual average income in rural areas was also much lower than that of urban areas (R18 506 compared to R51 107 in 2000). It was also found that South Africa's cities tend to be small, with only six large cities. South Africa is experiencing rapid urbanization, but the challenge facing policy makers and city planners is to manage urbanization in such a way that it continues to provide these developmental benefits.

This poses a challenge for the South African government. Although cities are expected to contribute towards inclusive development, the country's cities are characterised by uneven development, inefficient industries and declining quality of life in many instances. These constraints may in effect limit the extent to which the country can benefit from globalization as it would hamper cities' international competitiveness.

The ability of South Africa's cities to meet challenges may depend on the extent to which these cities succeed in generating economic growth through providing static and dynamic economies of scale (urbanisation and localisation economies). Cities are important for economic growth precisely because they provide these dynamic information externalities that are important for innovation (as per Romer, 1986 and Lucas, 1988). Naudé and Krugell (2003b) calculated the Relative Specialisation Index (RZI) and Hirschman-Herfindahl Index (HHI) for six cities. Results showed that Johannesburg and Cape Town have the lowest HHI and highest RZI values which means that they offer primarily localisation economies, while eThekwini (Durban) and the rest of the cities offer urbanisation economies. In particular, Durban is the most diversified of the various cities in South Africa, and Johannesburg the least diversified. Apart from Durban, South Africa's large cities such as Johannesburg and Cape Town are more specialised in services (finance) than manufacturing, a trend consistent with international patterns.

Two major issues which have an impact on urbanisation and localisation economies in South Africa are the sizes of its cities (given their production mix) and the functioning of their labour

markets (discussed in Section 3.4.3). Naudé and Krugell (2003a) investigated the question of whether South African cities are yet of optimal size. They showed that the country's cities tend overall to be "small", with six "large" cities and no "mega" city. The 40 largest cities in South Africa all have populations of 250,000 or more, but apart from Greater Johannesburg (including the 'Ekurhuleni' municipality), less than 5 million. They also showed that about 80 per cent of South African localities have less than 250,000 inhabitants.

3.4.2.3 The location of exporters or industries

Naudé and Matthee (2010) researched the geographical location of manufacturing export industries in South Africa and found that export firms tend to concentrate near export hubs. This was done by obtaining data on manufactured exports from 354 magisterial districts for the period 1996 – 2004, and estimating cubic-spline density functions on the relationship between manufacturing exports and distance. Results showed that manufacturing exports tend to be spatially concentrated. Around 22 of the 354 magisterial districts produced 84 per cent of the total manufacturing exports. Results furthermore showed that distance from an export hub is negatively related to the density of manufactured exports. The largest volumes of manufactured exports are generated within 100 km of an export hub. In a similar study, Naudé and Matthee (2007) provide empirical evidence on the location of export-oriented manufacturing firms in South Africa and found that firms tend to be spatially concentrated. Matthee and Naudé (2008) investigated the determinants of the location of manufacturing firms that export and found that the home-market effect and distance are significant determinants of regional manufacturing exports.

Naudé (2006) examined the level of concentration of the manufacturing industry in South Africa and found a high level of concentration. Fedderke and Wollnick (2008) researched how the manufacturing industry's spatial distribution in South Africa changed over the period 1970 to 1996, and evaluated possible determinants of industry location. They found that industries were more concentrated in the early 1990s than at the beginning of the 1970s and 1980s and identified scale economies as the most important factor pro-concentration force. Linkages were identified as the most important determinant of industry geography.

Several studies have been conducted on export specialisation, export capability and performance, and the relationship with local economic growth. Naudé *et al.* (2010) provides empirical evidence on the relationship between the degree of export diversification and local economic growth by using data from 354 magisterial districts of South Africa for 1996 and 2001 and estimating growth regressions that include measures of export diversification. They found that the faster growing magisterial districts in South Africa between 1996 and 2001 initially did

not have more diversified exports, but became more specialised in their exports as global demand for certain products (especially agricultural and mining products) were growing. Krugell and Matthee (2009) constructed an index to identify the regions in South Africa that can export manufactured goods (location of exporters) and those regions that would benefit most from industrial policy intervention. The principal components analysis (PCA) method was used to construct the index. The results showed a positive relationship between export capability and export performance. The top 40 ranked magisterial districts produced 79 per cent of total manufactured exports in 1996 and 77 per cent in 2001. The exports originate mainly from Gauteng, Durban and Cape Town. Naudé and Gries (2009) investigated the role of geography in explaining trade. They used panel data across 354 South African magisterial districts over the period 1996 to 2000 to estimate the determinants of manufactured exports. They found that only 22 magisterial districts in South Africa were responsible for 85 per cent of the country's manufacturing exports. The empirical evidence supports other findings in the literature that geography matters for export performance. Evidence suggests that regions that are larger in terms of economic size, have good foreign market access and know-how of foreign markets, have competitive transport costs, good local institutions and higher proportions of skilled workers will be more successful in exporting manufactured goods. Gries and Naudé (2008) developed a model to determine how trade and agglomeration affect the development and growth of regions. Results also support findings in the literature that geography influences export performance.

3.4.3 Labour markets and the spatial economy

In the case of South Africa, there are few studies that examine the spatial aspects of the labour market. Kingdon and Knight (2004) found that location matters for black unemployment on a national scale. Rural blacks, specifically those in former homelands, have a 16 percentage point less chance of finding employment than urban inhabitants. In a later contribution, Kingdon and Knight (2006) examined wage responsiveness to local unemployment. At an aggregate level, the difference between the increase in the labour force and the fall in formal sector employment grew rapidly over the period 1990 to 2000, suggesting that there was a positive relationship between wages and unemployment. However, Kingdon and Knight's (2006) estimation of a wage curve across space indicated a negative relationship. Their local labour markets were defined by the clusters of the South African Labour and Development Research Unit (SALDRU) dataset used. The results showed that male, urban and married workers received significantly higher wages than female, rural and unmarried workers. They found that the distinction between rural and urban areas did not capture labour market segmentation well but significant province dummies indicated regional variations in pay levels. It was also found that centralised bargaining insulates workers from local labour market conditions. Recently,

Magruder (2010) examined the last result more closely by looking for spatial discontinuities in the enforcement of centralised bargaining agreements. He used a database of bargaining council agreements along with September Labour Force Survey data for the period 2000 to 2003 with magisterial districts as the spatial level of observation. The results show large spatial discontinuity effects: Having a centralised bargaining agreement in a particular industry in a specific town causes employment to be 8 to 15 per cent lower and wages to be 10 to 21 per cent higher than in the same industry in an uncovered neighbouring town.

Two other researchers who have taken a spatial approach to employment or unemployment are Wittenberg (2001) and Hofmeyr (2010). Wittenberg (2001) examined the spatial dimension of unemployment by examining the role of neighbourhood networks. He used data from the 1995 October Household Survey and distinguished between urban and rural households. He found that some households are more successful at getting their members employed than others and there is a difference in these social effects between urban and rural areas. His spillover variable suggested that rural households have better neighbourhood networks that allow them to access labour market opportunities. The more recent contribution by Hofmeyr (2010) examined the link between social networks and ethnic occupational niches in manufacturing. The study employed data from the 2001 census, which allows for analysis at the level of magisterial districts. Hofmeyr (2010) used individuals' language groups and magisterial districts as a proxy for their social networks and found strong evidence of niche employment. The results showed that English and Afrikaans individuals are clustered in advantageous niches where monthly income and skill levels are relatively high.

In a slightly different approach to the others, recent work by Naudé (2008) examined the possibility of a spatial mismatch in the metropolitan labour market as an explanation of the differences in unemployment rates between the white and black populations. He used data from the 1996 and 2001 censuses and employed various methods to measure the extent of suburbanisation of the population and employment, examine the relationship between residential segregation and unemployment, analyse commuting distances taking into account differences in earnings and education. The results showed a spatial mismatch between jobs and jobseekers and that distance from the city centre plays a significant role as a predictor of black unemployment.

The latest contribution that examines spatial aspects of the South African labour market comes from Havemann and Kearney (2010) who argue that where you live matters. They used 2001 census data to construct an urbanisation index at district council level and used it along with a range of individual-specific predictors of employment from the Labour Force Survey of March 2005. The results show a positive relationship between urbanisation and the probability of

being employed. For example, someone in Johannesburg is 1.5 times more likely to be employed than a similar individual in a medium-sized town.

Finally, there is only one recent study of day labourers. There are of course many contributions to the study of the informal economy, for example Devey *et al*. (2002), but there the focus is on a wider range of informal activities that falls outside the scope of this review. For the case of day labourers specifically, Harmse *et al*. (2009) examined inter-regional differences in the labour market and found clear differences. Day labourers were found to earn higher levels of income in cities and larger towns than in rural areas. Every city or town has sites where a labourer can earn more income than at other sites. Also, some sites draw together labourers with higher levels of skills. However, the focus of the study was only on general levels of development and unemployment at the provincial and local municipality levels.

In conclusion, extensive research has been conducted on economic activity and space, but, as this section shows, few researchers have focused on the spatial distribution of the location of economic activity or the determinants of the growth of economic activity across localities. Academic literature that has focused specifically on the geographical economics of South Africa emphasised the "lumpiness" of economic growth in South Africa, and suggested that spatial inequalities are quite persistent.

3.5 Summary and Conclusions

The purpose of this chapter was to review the spatial economy of South Africa. An overview of the history of the location of economic activity in South Africa was provided to set a benchmark against which to view more recent data of the spatial patterns of economic activity and economic growth. The chapter also considered the different approaches that researchers have taken to study the South African space economy. Examples of the literature were provided in the following categories: development topics at sub-national level, demographics, rural questions, the rural-urban divide, cities and urban planning, local economic development issues and Spatial Development Initiatives. The chapter reviewed a number of recent studies which dealt with the spatial gaps and determinants of growth on a local level, the economics of South Africa's cities and the imperatives of making cities more inclusive engines of growth, and finally on the relationship between spatial inequalities, growth, the labour markets and firms. A number of conclusions can be drawn from the chapter.

Firstly, it is evident that the South African space economy is characterised by significant spatial inequality as a result of its complex history and number of different institutions. South Africa's spatial economic development was mostly determined by the first-nature geography of the

country, but the apartheid policies of the 1950s further added to the spatial inequalities caused by the above. The Group Areas Act and the decentralisation- and homelands policies caused inequality that resulted in inefficient land use, excessive transport costs and under-investment in infrastructure.

Secondly, since 1994 the South African economy has been transformed from a protected inward-looking to an open, globally competitive export-orientated economy which changed the spatial structure of economic activity. Economic growth accelerated as a result of the increased openness. However, not all localities were able to benefit equally from the openness and growth that the economy experienced since 1994 leading to uneven economic growth between regions. Coastal areas benefitted more from the increased openness, and policies (such as GEAR) also seemed to be biased towards these areas and therefore exacerbated spatial inequality. Other programmes (such as the MDP, SDI and IDZ programmes) attempted to promote development in previously disadvantaged areas with potential for growth but have not always been successful.

Thirdly, spatial inequality has not improved since 1994. The President of South Africa, Jacob Zuma, in his State of the Nation Address on 9 February 2012, indicated that the triple challenge of unemployment, poverty and inequality still persists. The latest National Development Plan (NDP) Vision 2030, focuses mainly on the economy-wide challenges of unemployment, infrastructure, improving the quality of education training and innovation, social protection and health care and the reform of the public service. However, all of the challenges and possible solutions also have a unique spatial nature with regional and local dimensions.

In terms of the objective of this study, this chapter aimed to provide an overview of the history of the location of economic activity in South Africa in an attempt to understand the spatial distribution of economic activity. Academic literature that has focused specifically on the geographical economics of South Africa emphasised the “lumpiness” of economic growth in South Africa, and suggested that spatial inequalities are quite persistent. The studies identified ways to ensure that more people (and localities) can benefit from spatial growth points in the country. These include: investment in human capital, investment in physical capital such as transport services and infrastructure, and investments in urban planning. For this, the private sector and policymakers require reliable sub-national data.

The following chapter will report the empirical analysis of the sub-national databases. The empirical analysis will include systematically ordering publically available data from Statistics South Africa and determining the level of spatial disaggregation. The validity and reliability of the data will be assessed through comparisons of public data with privately constructed

databases and through decomposition of the variation of data (for example of gross value added) across municipalities and over time.

Chapter 4: Sub-National Data in South Africa

4.1 Introduction

The previous chapters showed that economic activity is unevenly distributed across places because of forces of agglomeration. The location of production is an important determinant of local economic growth. Growth occurs in places where economic activity is concentrated and therefore influences, and is influenced by, the formation of cities, and the flows of goods, capital, people, and ideas and ultimately the spatial transformation of a region. South Africa has a unique spatial economic history, but analysis of local economies and the agglomeration forces that determine growth at local and regional level has been limited. One reason for this could be the availability of sub-national data in South Africa. There is a need for reliable economic, socio-economic and development data that can be used to inform business and policy decisions.

South Africa has a national statistics agency that is mandated to collect and process data and produce official statistics. However, there has always been a shortage of consistent data at a sub-national level – most economic data are only available at national level and some at provincial level. The process of collecting data is resource-intensive and time-consuming. The private sector in South Africa has taken the initiative to address the need for sub-national data in the country, and two sub-national databases have been constructed so far – IHS Global Insight's Regional Explorer (REX) and Quantec Research (Pty) Ltd's EasyData.

The purpose of this chapter is to explore and assess the sources of sub-national economic data in South Africa to gain insight into the reliability and validity of available data and suitability of the data for LED policymaking. The chapter is structured as follows: Section 4.2 provides background information on South Africa's national statistics agency and systematically orders the economic data that is publically available in South Africa. Section 4.3 provides more insight into the workings of South Africa's two private sector-built sub-national databases. An analysis and a comparison of sub-national data from these databases will be provided in Section 4.4. Section 4.5 concludes the chapter.

4.2 What is available at sub-national level in South Africa

Statistics South Africa (Stats SA) is the national statistics agency in South Africa and is mandated to collect and process data and produce official statistics. Stats SA's mission is to "provide a relevant, timely, reliable and accurate body of statistics to inform users on the dynamics in the economy and society through the application of internationally acclaimed practices" (Stats SA, www.**statssa**.gov.za, 2012).

Stats SA produces a variety of statistics - areas of interest include demography, health and vital statistics, national accounts, labour market, employment, industry and trade, prices, public sector spending, private sector finances and transport. The main sources of data are the population census, household surveys such as the Income and Expenditure Survey and General Household Survey, and Labour Force Surveys (refer to **Annexure B** for a list of the various Stats SA data sources for each of the identified datasets).

Publications containing the statistics produced by Stats SA are listed in a catalogue of publications which is updated bi-monthly and issued six times per year. Many publications are available free of charge or can be downloaded from the Stats SA website. Statistics can be accessed from the homepage of the Stats SA website, and for some data sources it is possible to compile tables according to your own specifications from the website. Stats SA can be contacted directly for publicly available datasets, and once a copy of a dataset has been secured, it is possible to disseminate the data further, providing no change is made and Stats SA is acknowledged as the supplier and owner of the data and copyright.

This section aims to identify publically available data from Stats SA, systematically order the data, determine the level of spatial disaggregation. For the purpose of the study it would be unnecessary to disseminate all the indicators of each of the datasets in the Stats SA database, therefore the following table shows the availability of data for indicators of demographics (population) and economics (employment, unemployment, occupation, and income and expenditure).

Table 3: Availability of sub-national data from Stats SA

Indicator & variables	Source	Level
Population		
Age	• Census 1996 • Census 2001 • Community Survey 2007	Province Magisterial district Municipal
Gender	• Census 1996 • Census 2001 • Community Survey 2007	Province Magisterial district Municipal
Population group	• Census 1996 • Census 2001 • Community Survey 2007	Province Magisterial district Municipal
Language	• Census 1996 • Census 2001	Province Magisterial district Municipal
Disability	• Census 1996 • Census 2001 • Community Survey 2007	Province Magisterial district Municipal
	• Household survey	Province
Marital status	• Census 1996 • Census 2001 • Community Survey 2007	Province Magisterial district Municipal
Mid-year population estimates	• Stats SA estimates	Province
GDP	• Stats SA estimates	Province
Employment		
Per sector	• Census 1996 • Census 2001	Province Magisterial district Municipal
Per industry	• Community Survey	Province Magisterial district Municipal
	• Household Survey • Labour Force Survey	Province
By race	• Community Survey	Province Magisterial district Municipal
Formal and informal economy	• Community Survey	Province Magisterial district Municipal
Occupation	• Census 1996 • Census 2001 • Community Survey 2007	Province Magisterial district Municipal
	• Household Survey • Labour Force Survey	Province
Unemployment	• Census 1996 • Census 2001 • Community Survey 2007	Province Magisterial district Municipal
	• Household Survey • Labour Force Survey	Province

Indicator & variables	Source	Level
Income and expenditure		
Income	• Census 2001 • Community Survey 2007	Province Magisterial district Municipal
	• Household Survey • Labour Force Survey • Income and Expenditure Survey	Province
Expenditure	• Income and Expenditure Survey	Province

Source: Compiled by author based on information from Stats SA, 2011

Table 3 shows that data for population, employment and unemployment variables are available at provincial, magisterial district and municipal level. GDP data from Stats SA is only available at provincial level. From the table it is evident that the Census (1996 and 2001) and Community Survey provide data on all levels of government for most of the indicators, while the Household Survey, Labour Force Survey, and Income and Expenditure Survey only have provincial-level data.

4.3 Commercial/private sector databases in South Africa

There are two private sector databases available in South Africa:

- IHS Global Insight's Regional Economic Explorer (REX)
- Quantec's Standardised Regional Data

Global Insight Southern Africa initiated the private sector effort to provide accurate and up-to-date economic, socio-economic and development information on a sub-national level within South Africa. IHS Global Insight's Regional Economic Explorer (REX) draws together many different sources of sub-national economic information from Stats SA, government departments, development agencies, Regional Services Councils, private research houses and IHS Global Insight's own data.

There are currently 10 focus areas built into the REX database:

- **Demographic**: Information on pure demographic population issues, such as population estimates by race, gender and age, as well as households, growth rates and first language.

- **Development**: Focuses on aspects such as human development, gini coefficients, various poverty indicators, highest education levels and literacy, population density and urbanisation rates.
- **Infrastructure Development:** Contains information on access to household infrastructure such as sanitation, water, electricity, refuse removal, and housing.
- **Labour:** Provides estimates on the economically active population, formal employment, informal employment and unemployment, and where possible to Standard Industrial Classification (SIC)[9] 2-digit level of detail.
- **Income & Expenditure:** Provides estimates of items such as household income levels, personal income, disposable income, expenditure by product type as well as retail sales by product type and a composite index of buying power.
- **Economic:** Provides production-side sectoral estimates on SIC 2-digit level of gross value added by region (GVA-R), gross domestic product by region (GDP-R), labour remuneration, gross operating surplus and various calculated ratios and indices, such as a tress index[10] and location quotients[11].
- **International Trade:** Contains information on international goods trade in South Africa derived from postal code level trade information from the Department of Customs & Excise from the South African Revenue Services (SARS). The information is presented in aggregates based on SIC 2-digit level and harmonised system (HS) 2-digit level of detail. Detail down to HS 8-digit detail is also available on request.
- **Environment:** Contains information on the physical environment, such as size of area and land cover by usage.
- **Weather:** Contains information on temperatures, hours of sunshine and rainfall.
- **Crime:** Estimates based on the official reported crime statistics from the South African Police Service (SAPS). It contains information about violent crimes, and property crimes

Quantec Research (Pty) Ltd is a South African based consultancy that developed a system of integrated databases covering macro and regional socio-economic, industry and international trade data. Quantec's EasyData database is structured as follows:

- **RSA Economic Indicators:** The South African economic indicator time-series database incorporates a set of time-series indicators covering all aspects of the South African economy. The emphasis is on demographics, labour, prices, general economic

9 Standard Industrial Classification of all Economic Activities (SIC), Fifth Edition, published by Statistics South Africa (Stats SA), January 1993.

10 The tress index indicates the level of concentration or diversification in an economy. It is estimated by ranking the sectors according to their contributions to GVA or employment, adding the values cumulatively and indexing them. A tress index of zero represents a totally diversified economy, while a number closer to 100 indicates a high level of concentration.

11 The location quotient is an indication of the comparative advantage of an economy. A provincial or magisterial economy has a location quotient larger (smaller) than one, or a comparative advantage (disadvantage) in a particular sector when the share of that sector in the provincial economy is greater (less) than the share of the same sector in the national economy.

indicators, financial and capital markets, public finance, balance of payments statistics, national accounts and industry data.

- **RSA Standardised Industry:** The South African industry indicator time-series database provides a disaggregated and consistent long-term view of South Africa's economic structure by industry at the 3-digit SIC level. The emphasis of the database is on the input, output, capital employed and labour utilisation structure of each industry.
- **RSA International Trade:** The South African international trade time-series database provides a detailed up-to-date historical overview of South Africa's external goods.
- **RSA Regional Indicators:** Provides data on South Africa's socio-economic structure, market size and potential for key markets in South Africa on a regional and sub-national basis.

Table 4 shows the level at which data is available for some indicators (population, GVA, employment, unemployment, income and expenditure) in both the private sector databases.

Table 4: Availability of sub-national data from private sector databases

Indicator	Level	
	Global Insight	Quantec
Population	Province Magisterial district Municipal	Province Magisterial district Municipal
GVA/GDP (total; per capita; per sector)	Province Magisterial district Municipal	Province Magisterial district Municipal
Employment (total; per sector)	Province Magisterial district Municipal	Province Magisterial district Municipal
Unemployment	Province Magisterial district Municipal	Province Magisterial district Municipal
Income (total; per capita; per household)	Province Magisterial district Municipal	Province Magisterial district Municipal
Expenditure	Province Magisterial district Municipal	Province Magisterial district Municipal

Source: Compiled by author based on information from Global Insight and Quantec, 2011

Table 4 shows that Global Insight and Quantec provide population and economic data at provincial and sub-national level. However, if one looks at the data that is publically available for some of these indicators (such as the GVA as shown in the previous section), it is evident that these two private sector datasets are developed using primary data.

An explanation of the methodology followed by Global Insight to calculate and estimate the numerous indicators in REX are provided in the IHS Global Insight Regional Explorer Encyclopaedia (version 2.04). An extract from the IHS Global Insight Regional Explorer Encyclopaedia is provided in Box 1 to present the methodology followed to calculate and estimate population and GVA[12]. The methodologies followed by Quantec to estimate their data is not publically available, and therefore not discussed in detail.

BOX 1:

1. ESTIMATION OF POPULATION IN REX

National population projections are determined by five primary factors:

- Size of population in the base year, $\mathbf{P_t}$
- Number of deaths occurring between the base and projected years, $\mathbf{D_t}$
- Number of births occurring between the base and projected years, $\mathbf{B_t}$
- Immigrants arriving in the country between the base and projected years, $\mathbf{I_t}$
- Emigrants leaving the country during the base and projected years, $\mathbf{E_t}$

The above variables contribute to the projected population, P_{t+1}, within the following demographic balancing identity:

$$P_{t+1} = P_t + B_t - D_t + I_t - E_t$$

The final population figures are based on a model that computes a separate balancing equation for each race, gender group and province, adding the individual results to arrive at the total national population. This is because fertility, mortality and migration factors vary largely between the different groups. This methodology ensures accurate representation of the grouping breakdowns within the country, as well as an accurate representation of the national population.

12 This drawn directly from the Encyclopedia to serve as a comprehensive example of the methodology and is not presented as original work for this dissertation.

However, each of the separate provincial balancing equations is calibrated to a national population estimate. This national population estimate is computed by running a national population balancing equation for each race group and adding them together to arrive at a total national population estimate.

IHS Global Insight used an external demographic model[13] for the final population output, using internal models or basic assumptions to determine, amongst others, the following variables; the base year population, total fertility rates, age-specific fertility rates, sex ratios at birth, life expectancies and international migration. The following steps were taken for each race and gender group in order to arrive at the final estimates for the population groups.

Step One (Determining P_0)

As can be seen from the demographic balancing equation, the accuracy of P_0 determines the accuracy of population progressions made for all P_{0+x}. Furthermore, the age structure at time t = 0 plays an important role in determining all age structures for P_{0+x}. The progression is further complicated in that age structure by gender distribution (throughout the world) is generally unreliable and that the data for the base year, P_0, is best evaluated, as opposed to simply measured. This is a generally accepted problem by demographers worldwide.

IHS Global Insight surmounted this problem by estimating a national starting population for 1970. This starting population estimate was based on Census data at the time, as well as on backward extrapolation using later census data. It was further broken into race and gender groups, with a special focus on keeping the age, gender and race distributions in line with accepted empirical and theoretical norms. Further adjustments were made to account for the Transkei, Bophuthatswana, Venda and Ciskei (TBVC countries) population data, and assumptions regarding fertility and mortality rates at the time.

Finally, factor based backward extrapolation (using later census data) was carried out to confirm the 1970 base population estimate.

It should be noted that, although the 1996 census survey provided important data, IHS Global Insight was not satisfied that the total population numbers in the 1996 population census were accurate and thus commissioned Prof. Rob Dorrington of the University of Cape Town to re-estimate the 1996 population of South Africa by race, gender and 5-year age category. Dorrington made considerable adjustments to the age distribution within each race group as well as the total white population. His total population estimate is approximately 1.6 million

13 Spectrum, designed by the POLICY project

people higher than that of the 1996 population census.

These results from Prof. Dorrington, along with other adjusted census estimates (including the adjusted Census 2001 and Community Survey 2007 results) were used as benchmark figures when backward extrapolating to arrive at the 1970 base population figure. This was done for each population and gender group to account for the large differences in fertility, mortality and migration rates between the groups. The final 1970 base population figure was concluded by adding the figures from the different race and gender groups, and from the different provinces.

Once the national base population had been estimated, the same exercise was carried out for each province in order to arrive at the provincial base population estimate for each province. Naturally, these were calibrated in order to sum to the national population estimate, with special care being taken to ensure that each provincial age and gender distribution matched theoretical and empirical norms. Municipal populations are estimated by adjusting the provincial factors and assumptions based on underlying provincial evidence.

Step Two (Determining Fertility Rates)

Two different fertility rates were required by IHS Global Insight. The first was the Age Specific Fertility Rate (ASFR) and the second was the Total Fertility Rate (TFR). The ASFR is generally defined as follows:

$$ASF_x = \frac{\text{Births in year t to women aged x last birthday at time of birth}}{\text{Mid year population of women aged x last birthday}}$$

In order to arrive at an accurate assumption regarding Age Specific Fertility Rates, IHS Global Insight used figures from the Bureau of Market Research. This data was adjusted slightly in order to account for the fact that (prior to 1996) the BMR only released ASFR figures once every five years. IHS Global Insight therefore interpolated for the missing values. Furthermore, the BMR did not release ASF rates for the coloured population prior to 1996, and IHS Global Insight was therefore required to assume ASF rates for the coloured population based on combined ASF rates for the African and White populations. The BMR ASF rates after 1996 required simple smoothing to adjust for erratic corrections to the data which appeared once every five years. Provincial and municipal ASF rates are simply determined using the national rates, and adjusting for the percentage share of each population group in that particular province or municipality.

IHS Global Insight considered other sources, including the Standard UN Sub-Sahara profile ASF rates as a comparison. However, these were not used in the final assumption.

The second fertility rate required by IHS Global Insight was the Total Fertility Rate (TFR). This is essentially, the fertility rate for a single average woman over the entire span of possible birth years (in other words, the fertility rate between the ages of 15 and 50 added together) and is therefore defined generally as follows:

$$\text{TFR} = \sum_{x=15}^{49} \text{ASF}_x$$

TF rates were determined per population group to account for the large difference between each group. The national TFR's were adjusted during the calibration of the of the national model such that the population estimate started at the given population in 1970 and passed through each of the population figures from the 1985 census up until the Community Survey 2007, within an adjustment factor that recognised the quality of each individual survey.

Nonetheless, there is broad consensus regarding fertility rates for the **Asian** population. Sadie (1993) projected the fertility rates for this population to be at 1.8% for the period 2006 to 2011 whereas Calitz (1996) projected 1.81% for 2015 to 2020. IHS Global Insight compared the above TFR and adjustments described above, to a number of sources, including the StatsSA 1996 census, 2004, 2005 and 2006 mid-year estimates, the ASSA 2002 and 2003 reports as well as the BMR 270 and 330 reports to arrive at a final adjusted TFR progression for the Asian population as depicted in Table 5 of this section.

There is less consensus regarding the TFR progression for the **African** population. However, demographers do tend to agree that a sharp decline in TFR is expected to continue for this population over the next few years. This is supported by Sadie (1993) and Caldwell and Caldwell (1993). The factors driving the decline in TF rates for this population group are; urbanisation, a greater use of contraceptives, lower fertility preferences among Africans and growing labour force participation rates among women. It is further expected that greater urbanisation will lead to lower fertility rates in this population group, as supported by SADHS (1999) which showed that fertility rates among the urban African population were 40% lower than the average. Again, IHS Global Insight compared these assumptions to a number of sources, including the StatsSA 1996 census, 2004, 2005 and 2006 mid-year estimates, the ASSA 2002 and 2003 reports as well as the BMR 270 and 330 reports to arrive at a final adjusted TFR progression for the African population as depicted in Table 5 of this section.

The **Coloured** population group is expected to experience a similar decrease in TFR as the African population group, although less severe, for similar reasons. Using the same methodology described above, IHS Global Insight arrived at a final adjusted TFR progression for the Coloured population group as depicted in Table 5 of this section.

There is also general consensus in the literature regarding TFR of the **White** population group; specifically that it will remain stable over the period 1996 up to 2020. Sadie (1993) indicates that the White population group will experience a decline of TFR to about 1.66 by 2001 whereas Calitz (1996) indicated a progression from 1.7 to 1.5 from 2000 to 2020. IHS Global Insight used the above studies, as well as Van Aardt and Van Tonder (1999) and the StatsSA 1996 census, 2004, 2005 and 2006 mid-year estimates, the ASSA 2002 and 2003 reports, the BMR 270 and 330 reports and an adjustment using the methodology described above, to arrive at a final adjusted TFR progression for the White population group, also depicted in Table 5 below.

Table 5: IHS Global Insight TFR's 2001 - 2015 as used in the REX demography model

Year	African	Coloured	Asian	White
2001	3.22	2.57	1.61	1.47
2002	3.17	2.55	1.55	1.46
2003	3.12	2.55	1.53	1.45
2004	3.04	2.54	1.50	1.43
2005	2.96	2.53	1.50	1.41
2006	2.89	2.53	1.49	1.39
2007	2.78	2.52	1.49	1.38
2008	2.74	2.50	1.48	1.38
2009	2.67	2.48	1.48	1.37
2010	2.63	2.45	1.48	1.37
2011	2.57	2.42	1.47	1.36
2012	2.53	2.40	1.47	1.35
2013	2.50	2.37	1.47	1.35
2014	2.46	2.35	1.46	1.34

Source: IHS Global Insight, 2011

To calculate Total Fertility Rates (TFR) per province, IHS Global Insight looked at the number of babies born over the period in each province. This data was collected from various sources, including the StatsSA censuses. This is done because, even within the same population group, some provinces have recorded higher fertility rates than other provinces. For example, the African population group in the Eastern Cape has more children compared to the same population group living in the Western Cape. This variable was benchmarked to fit the total

number of babies born for the period 1991 to 2001. It should also be noted that the 0-4 age category is often underreported during population censuses, and therefore this figure was adjusted slightly upwards to correspond with the national TFR rates. Finally, provincial TFR's were adjusted for accuracy in order to calibrate the provincial models to the total national model for each population group.

Step Three (Determining Birth Ratios)

Birth (or sex) ratios measure the number of males in the population per the number of females in the population. Population growth depends largely on the number of females, and this input will therefore determine the overall growth rate of the population. It is possible to measure a Gross Reproduction Rate, which is similar to the TFR, but only measures the number of daughters a woman is likely to have. This is calculated similarly to the TFR, as follows:

$$GRR = \sum_{x=15}^{49} F_X{}^{d}$$

Note that **d** denotes only daughters born to a female over her child bearing years, 15 to 49.

As with TFR's, the GRR's differ from one population group to another, and from one province to another. However, these rates are typically dependant largely on genetics and are therefore very stable over time for a given population group and geographic area.

The birth ratios that IHS Global Insight used as inputs to the external model were derived from a number of empirical sources, including the StatsSA census and community survey data and various other population growth sources. IHS Global Insight calculates birth ratios as the number males per 100 females. Therefore, the following general birth ratios per population group are used on a national level, bearing in mind that these remain fairly stable over a long period of time, although IHS Global Insight does allow for small changes over time where supported by the data.

Table 6: IHS Global Insight birth rations per population group

African	Coloured	Asian	White
101	102.5	104.5	103

Source: IHS Global Insight. 2011

In order to determine birth ratios per province, a methodology similar to that used for Total Fertility Ratios was applied. Birth ratios were measured per province and the percentage

differences in average birth ratios applied to the national total to arrive at a provincial breakdown. It was assumed that **differences** in birth rates across provinces remained stable over time. Note that this does not imply that birth ratios across provinces remain stable, only the percentage difference (for the province) from the national total. This was again benchmarked against the national statistics using the StatsSA Census data and the IHS Global Insight national population estimate.

Step Four (Determining Life Expectancy)

Determining average life expectancy is complicated by a number of factors. Firstly, life expectancy varies across different genders, population groups, age groups and geographic area. Furthermore, the effect of HIV and AIDS on the mortality rates across the various population groups is likely to complicate the estimation. Therefore, IHS Global Insight ignored the effect of HIV and AIDS on mortality rates when calculating initial life expectancies, and opted to use a separate module to calculate the effect of the reduced life expectancies due to HIV and AIDS.

Life expectancies for the **Asian** population were based broadly on those of Calitz (1996), and Van Aardt and Van Tonder (1999). However, most of the life expectancy assumptions for the Asian population were based on figures from the BMR 272 publication for the period 1970 to 1995, with interpolation used for missing data. In 2001, the Asian population life expectancy was based on the ASSA and BMR 330 figures. From 2001 onwards, the BMR 330 figures were used, and checked against StatsSA mid-year estimates. Once again, the effect of HIV and AIDS was ignored on mortality rates.

Regarding life expectancy for the **Coloured** population group, there is little consensus among demographers. However, IHS Global Insight opted again for studies by Calitz (1996), and Van Aardt and Van Tonder (1999). Such studies (and later empirical data) showed a life expectancy about 69.7 years for the female coloured population from the year 2005 to 2010. This was checked against other existing data sources, including BMR 330, BMR 272 and StatsSA mid-year estimates 2004. The final IHS Global Insight results appear in Table 7 below, again ignoring HIV and AIDS impacts.

Regarding life expectancy for the **White** population, there is broad consensus amongst demographers. Sadie (1993) estimated that the life expectancies of White females might be about 77.8 years for the period 2006 to 2011. Regarding White males, he indicated that their life expectancy would be about 71.2 years by 2006 to 2011. Calitz (1996) agrees with these assumptions, namely that the average life expectancies of White males and females will be

about 74.6 years for the period 2005 to 2010 and about 75,3 years for the period 2015 to 2020. These assumptions are correctly captured by the BMR 272 and BMR 330 reports, and it is these figures that are used by IHS Global Insight when calculating life expectancies for the White population group. Similar to the Coloured population group, interpolation is used for years where data is missing. These results appear in Table 7 below, again ignoring HIV and AIDS impacts.

Estimating life expectancy for the **African** population group is slightly more complex. There is currently little consensus on long term changes in this population group's life expectancy. Whereas better healthcare and more urbanisation are likely to lead to increased life expectancy for those over the age of 55, the impact of HIV and AIDS are expected to dramatically decrease the life expectancy of those between the ages of 15 to 55. Again, IHS Global Insight ignored impact of HIV and AIDS on mortality rates, using a separate module for the analysis of this impact. IHS Global Insight applied a simple backward extrapolation technique to the life expectancy for the African population group from 1981 to 1970. Most data sources appear to underestimate the life expectancy for his group prior to 1970. Simple forward extrapolation was then applied for the group from 1981 up to 1995, with adjustment factors applied to bring the growth in this population group to the national estimate, and to other data sources, specifically the StatsSA mid-year estimates and BMR 272 and BMR 330 surveys.

The above life expectancies are used as a starting point for the IHS Global Insight model, but are adjusted in order to balance the national model to other existing data sources. When estimate the population per province, those life expectancies are further adjusted to balance the sum of the provincial population estimates to the existing national model.
Table 7 captures the starting assumptions regarding future life expectancies of the various population groups.

Table 7: IHS Global Insight life expectancy per population group

Year	African male	African female	White male	White female	Coloured male	Coloured female	Asian male	Asian female
2001	58.76	65.35	70.30	77.30	57.19	67.23	64.70	70.71
2002	58.88	65.48	70.40	77.40	57.50	67.57	65.20	70.90
2003	59.00	65.61	70.50	77.50	57.82	67.92	65.80	71.40
2004	59.11	65.74	70.50	77.50	58.13	68.26	66.46	72.00
2005	59.23	65.87	70.60	77.60	58.45	68.61	66.84	72.50
2006	59.35	66.00	70.70	77.70	58.76	68.95	67.23	72.81
2007	59.80	66.30	70.80	77.80	59.07	69.30	67.66	73.20

2008	60.30	66.80	70.80	77.80	59.17	69.40	67.93	73.30
2009	60.70	67.20	70.90	77.90	59.27	69.60	68.00	73.50
2010	61.20	67.70	70.90	77.90	59.72	69.70	68.10	73.60
2011	61.60	68.20	71.00	78.00	60.07	69.80	68.20	73.70
2012	62.00	68.70	71.10	78.10	60.27	69.90	68.30	73.80
2013	62.50	69.20	71.20	78.20	60.37	70.00	68.40	74.00
2014	62.90	69.60	71.20	78.20	60.81	70.20	68.50	74.10
2015	63.21	69.89	71.30	78.30	61.18	70.30	68.60	74.20

Source: IHS Global Insight, 2011

Step Five (Determining Migration)

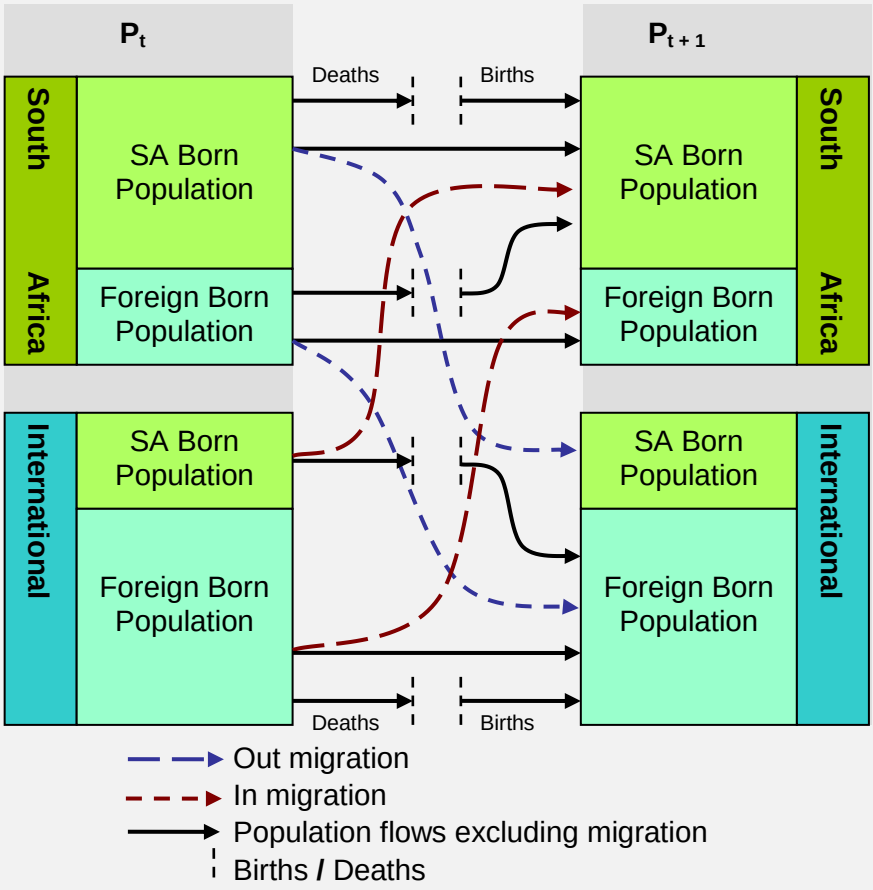
Two types of migration exist, intra provincial migration and international migration, both of which affect either the population within a province, and / or the total national population. However, obtaining a net migration figure (even on a national level) is complicated by a number of factors and has proven elusive in the past. IHS Global Insight therefore developed a specific South African migration model in order to measure the effects of international in and out migration on South Africa, and used the data from Census 1996, Census 2001 and Community Survey 2007 to measure intra provincial migration.

The international migration model was defined by starting with the basic population balancing equation:

$$P_{t+1} = P_t + B_t - D_t + I_t - E_t$$

For the purpose of better understanding migration, this formula was expanded, with the following image used as an illustration for the process that was followed.

Figure 7: IHS Global Insight's illustration of migration



Source: IHS Global Insight, 2011

The above image depicts a growing population as it moves from time **t** to time **t + 1**. The distinction here is between foreign born residents and local born residents. Clearly, there are both South African and foreign born population that reside both inside and outside the country. These populations are free to move as they please, and to come and go from their birth and resident countries at will.

The following migration flows are therefore possible:

- Foreign born population moving into the country.
- Foreign born population moving out of the country (either returning home or moving elsewhere.)
- Local born population moving out of the country.
- Local born population returning to the country after being away[14].

14 By design, a person was considered returning to the country if they had moved back into the country after being away from the country at the previous census. The reader should bear in mind that the censuses used for this measure all had 5-year gaps between them.

The balancing equation is now expanded as follows:

$$P_{t+1} = P_t + B_t - D_t + (I^F_t + I^L_t) - (E^F_t + E^L_t)$$

Where

- The standard variables retain their meaning, with the additional variables representing the following;
- $\mathbf{I^F_t}$ = In migration of foreign born population
- $\mathbf{I^L_t}$ = In migration of local born population
- $\mathbf{E^F_t}$ = Out migration of foreign born population
- $\mathbf{E^L_t}$ = Out migration of local born population

Furthermore, and also demonstrated using the above image, the following equation is defined:

$$P^F_{t+1} = P^F_t - D_t + I^F_t - E^F_t$$

Where

- The standard variables retain their meaning
- $\mathbf{P^F_t}$ = Foreign born population living in South Africa

By measuring the P^F_t and P^F_{t+1} IHS Global Insight was able to derive a net migration figure for the foreign born population of South Africa. This was achieved by measuring the change in size of the foreign born population between Census 1996, Census 2001 and Community Survey 2007. However, these figures were also compared to refugee statistics from the UNHCR, and the foreign born population as measured by the UN. Other, anecdotal sources of information (such as number of refugees housed by South Africa during the xenophobic attacks) were also considered. Final balancing figures were obtained by measuring out migration from the foreign perspective where it was available.

Net migration of the local population ($I^L_t - E^L_t$) was measured largely from the foreign perspective. Anecdotal evidence suggested that most South African out migrants move to the following five countries; England, Australia, New Zealand, America and Canada. IHS Global Insight confirmed this evidence by measuring the number of flights between South Africa and all countries.

IHS Global Insight measured in migration of South Africans to the major five destinations, balancing for variables such as the change in South African born population overseas, long term work permits issued, citizenships issued and number of arrivals declaring their intention to migrate. The accuracy of these figures was confirmed by the proximity of these figures even when using the different measures to arrive at a net migration figure for South Africans.

A final adjustment was made for the remaining countries of the world, with adjustment factors confirmed by other foreign perspective data where available. Age, gender and population group data was also captured using the foreign perspective approach for countries that captured such data for arriving migrants.

Regarding intra-national migration, IHS Global Insight used the 1996, 2001 StatsSA census surveys and the Community Survey 2007 to measure inter-provincial migration. Average annual migration figures are used to determine migration rates using the IHS Global Insight provincial demographic model. Net migration was measured for each gender and population group and for each province.

It should be noted that migration rates are not assumed constant. On the one extreme there may be low inter-provincial migration, while on the other extreme a high inter-provincial migration stream may develop where a high level of urbanisation occurs and vast numbers of people cross the provincial borders in their search for a better future.

The question remains whether such inter-provincial migration streams will be a short term phenomenon or whether it will change the spatial distribution of people in South Africa dramatically over time.

Table 8 captures the importance of measuring population migration, as well as a breakdown net migration for the provinces.

Table 8: Migration between the provinces 2001 - 2005

			Average Annual - 2001-2005			
Province	**2001**	**2005**	**Births**	**Deaths**	**Migration**	**Total**
Eastern Cape	6,333,784	6,374,945	162,296	-87,143	-59,231	15,922
Free State	2,829,872	2,857,286	60,485	-41,004	-10,191	9,291
Gauteng	9,056,417	9,699,849	173,806	-120,233	106,702	160,275
KwaZulu-Natal	9,614,052	9,910,700	257,733	-158,208	-18,263	81,261
Limpopo	4,985,736	5,186,876	152,076	-63,898	-37,011	51,167
Mpumalanga	3,487,707	3,616,467	94,688	-54,145	-6,709	33,835
Northern Cape	1,017,806	1,054,636	23,902	-12,627	-1,862	9,413
Nort West	3,372,563	3,453,925	74,335	-47,487	-4,549	22,299
Western Cape	4,552,715	4,911,076	95,224	-50,124	42,012	87,112
South Africa	**45,250,652**	**47,065,760**	**1,094,546**	**-634,869**	**10,899**	**470,577**

Source: IHS Global Insight, 2011

There is some evidence of conglomeration of populations in South Africa while at the same time a relative de-population of the rural areas and small town areas is visible, that is while the Pretoria-Johannesburg area is experiencing a population explosion; other areas (for example Meyerton and Aliwal-North) are experiencing an out-migration.

Step Six (Adjusting for HIV)

HIV and AIDS will have a large impact on the growth of a given population. However, there are many factors that affect the impact that the virus will have on population progression, namely; adult HIV prevalence rates, speed at which the virus progresses, age distribution of the virus, mother to child transmission and child treatment, adult treatment and finally the percentage by which having the virus will decrease total fertility. IHS Global Insight developed a number of assumptions for each of the above variables, specifically the following.

The **Adult HIV prevalence rates** were obtained from the HIV/AIDS model built by the Actuarial Society of Southern Africa (ASSA-2003). These rates were used as base rates on a provincial level. However, IHS Global Insight slightly adjusted the provincial ASSA-2003 data was to more accurately reflect the national HIV Prevalence rate per population group as used in the national demographic models. The ASSA model in its turn uses the prevalence rates from various primary data sets – in particular the HIV/AIDS surveys conducted by the Department of Health.

The **speed of progression** of the virus (how quickly the HI virus becomes AIDS) is well documented and is fairly stable from one population to the next. IHS Global Insight used the Actuarial Society of Southern Africa (ASSA-2003) progression assumptions, but made slight adjustments. IHS Global Insight increased the speed at which the virus progresses after 19 years.

The **age distribution** of the virus was obtained from the StatsSA 2004 mid-year estimates, with no adjustments. These figures were checked against the default spectrum estimates and were generally comparable. The StatsSA figures has a slightly higher bias toward a higher risk for ages 20 – 24, which fits the South African assumption better.

Finally, the stage of the HIV/AIDS virus differs from province to province, for example KwaZulu-Natal is at a much more advanced stage of the disease and on a higher level than the Western Cape. IHS Global Insight adjusts each province for this difference by using the ratio of the difference between the national and provincial level in the ASSA 2003 model and applying that ratio to the IHS Global Insight national estimates.

It is important to note again that IHS Global Insight runs population progressions per province and sums the results to obtain a national total.

Step Seven (Magisterial districts)

Magisterial district population estimates for 1996 were each projected to year 2012 using magisterial district population growth rates by race published in the BMR reports 274, 282 and 285, and the above discussed model. IHS Global Insight observed that research report 274 and 285 lacked the intra-provincial movements, and combined it with the results from report 282. Global Insight assumes the provincial distribution from report 282, but intra-provincial they used the magisterial distribution from report 274 and 285. These figures were benchmarked and adjusted by using external information obtained from certain municipalities.

The preliminary numbers were then adjusted to ensure that they were consistent with the national totals obtained from the external spectrum model.

2. ESTIMATION OF GROSS VALUE ADDED BY REGION (GVA-R) IN REX

Prior to 2003, the last reliable official estimates of Gross Geographic Product (GGP) were made in 1991, and later updated to 1995 levels. Since there have been substantial shifts in the regional distribution of economic activity it was decided that these figures were not suitable for use in the ReX database.

Between 1995 and 2003 IHS Global Insight filled the information gap by calculating independent GDP-R estimates on a sub-national level. These calculations involve complex models and the process of estimating GDP-R is set out in the HIS encyclopedia. Since 2003, Statistics South Africa (StatsSA) produces estimates for Gross Domestic Product per region (GDP-R) on an annual basis, with the latest available estimates covering the period 1995-2004. However, these estimates are not disaggregated further to a sub-regional level. Prior to the introduction of the 1993 System of National Accounts (SNA) StatsSA compiled estimates at a magisterial district level, with the last official Gross Geographic Product (GGP) estimates being released in November 1995. StatsSA suspended this publication owing to limited resources caused by the implementation of the 93SNA and the benchmarking of South Africa's National Accounts as well as the rebasing of the National Accounts to 1995.

Although there are official statistics available at present for GDP-R, IHS Global Insight does its own estimates of GDP-R. IHS Global Insight's estimates are not necessarily compatible with those published by StatsSA for a number of reasons:

- The information published by StatsSA is only updated once a year, and are only available at a provincial level. IHS Global Insight's estimates are updated continuously as new information becomes available and are broken down to a magisterial district level;
- The methodology used by StatsSA is based on business entity level, whereas IHS Global Insight's information is compiled from an individual perspective. IHS Global Insight is of the view that geographic and sectoral information is more accurately captured on an individual basis, compared with entity level information.

The "-R" extension to the GDP and GVA concepts, simply imply a specific geographic area, called a region. The GDP-R terminology supersedes the old term Gross Geographic Product (GGP), but in essence this is exactly the same.

What are the difference between GVA and GDP at a national level?

GDP(market prices)= GVA (basic prices) (RB6645J)
+ Taxes on products (RB6603J)
– Subsidies on products (RB6604J)

GVA (basic prices) (RB6645J) = GVA (factor cost) (RB6003J)
+ Other Taxes on production (RB6600J)
– Other Subsidies on production (RB6601J)

GVA (factor cost) (RB6003J) = Compensation of employees (RB6000J)
+ Gross operating Surplus

Gross operating Surplus = Net Operating Surplus (RB6001J)
+ Consumption of fixed capital (RB6002J)

Gross Value Added by Region (GVA-R) therefore refers to GVA for a geographic area.

RBXXXXJ - refers to Reserve Bank series (p S-112 National Income & Production Accounts of South Africa June 2006).

Step One

The historical ratio between labour remuneration (LR) and GGP is estimated for each broad sector in each magisterial district from the 1994 Stats SA Statistical Release P0401.

Step Two

By applying the ratio between LR and GGP estimated in step one to the LR estimates for 34 sectors outlined in the previous section, preliminary estimates of GVA were made for 1996.

Step Three

These estimates were benchmarked on national level Reserve Bank estimates of value added by sector to arrive at final estimates for 1996.

Step Four

GVA growth rates for each year for the period 1996-2005 were estimated from various sources:

- **Mining sector**: growth rates were estimated from magisterial district data provided by the **Minerals Bureau**.
- **Construction sector**: growth rates for each magisterial district were estimated from **Regional Service Council** data on company turnover. These estimates were then benchmarked on provincial level estimates of growth in cement sales provided by the Cement and Concrete Institute.
- **Electricity sector**: **Eskom** provided data on electricity production from the 17 major power stations. Growth in electricity production from these stations was used as a proxy for growth in electricity value added for those districts in which the stations are situated. Growth rates for electricity value added in districts without power stations were based on growth rates on the two major electricity consuming sectors that is mining and manufacturing.
- **Retail trade**: growth rates for each magisterial district were estimated from **Regional Service Council** data on company turnover. These estimates were then benchmarked on provincial level estimates of growth in retail trades sales as measured by Stats SA.
- **Other sectors**: Growth rates were estimated from **Regional Service Council** data on company turnover.

Step Five

These growth rates were applied to the 1996 data to arrive at preliminary estimates of GVA for each year from 1997 to 2005. These estimates were benchmarked and adjusted to national level estimates of sectoral GVA (unpublished detailed series obtained from StatsSA as well as South African Reserve Bank published series) to arrive at final estimates.

In conclusion, this section showed that some data are not publically available at sub-national level, but that private sector databases exist (Global Insight and Quantec) that provide population and economic data at provincial and sub-national level. It was confirmed that these datasets are developed using primary data and an explanation of how Global Insight calculate and estimate population and GVA estimates were provided. It can be seen that this is a sophisticated process. Naudé and Krugell (2006) used the Global Insight database in their study of sub-national convergence and divergence in South Africa. Fedderke and Wollnick (2008:2) examined the data and rejected them on quality grounds. Their opinion was that the data is not suitable for dynamic analysis because it is generated from aggregate GDP figures on the basis of a static algorithm. It is therefore necessary to further analyse the data to determine quality and reliability.

4.4 Analysis of data

The previous section showed the necessity to further analyse the data of the two private sector databases. Population and gross value added (GVA) indicators of each private sector database (REX and Quantec) will be analysed for South Africa, the provinces of South Africa, metropolitan municipalities, and the district and local municipalities of the North West Province.

4.4.1 REX

An analysis of population and GVA indicators of the REX database is presented in this section. The growth rates of the indicators per area over time, as well as of each area's share of the national total is presented and analysed. This gives an indication of the variation in the data per place over time and between places over the period. Table 9 shows the growth rate of the population for each of the identified areas. One would anticipate that some areas would experience higher growth rates than others.

Table 9: Growth rate of population – REX data

Area	1996		2001		2010		1996-2010
	Total	GR	Total	GR	Total	GR	Ave
South Africa	41 780 470	1.68	45 145 618	1.41	48 778 754	0.48	1.11
Western Cape	4 053 055	2.54	4 540 831	2.00	5 106 548	0.92	1.67
Eastern Cape	6 187 099	0.58	6 386 107	0.67	6 720 598	0.36	0.59
Northern Cape	981 090	0.99	1 035 204	1.13	1 138 183	0.83	1.07
Free State	2 659 535	1.21	2 790 242	0.74	2 840 974	-0.23	0.47
Kwazulu-Natal	8 847 061	1.77	9 559 759	1.34	10 215 884	0.35	1.03
North West	3 019 084	1.59	3 233 346	1.19	3 464 953	0.37	0.99
Gauteng	8 227 355	2.29	9 187 557	2.04	10 070 497	0.40	1.46
Mpumalanga	3 143 918	2.25	3 442 199	1.49	3 756 236	0.61	1.28
Limpopo	4 662 272	1.22	4 970 373	1.31	5 465 235	0.86	1.14

Area	1996		2001		2010		1996-2010
	Total	GR	Total	GR	Total	GR	Ave
City of Cape Town Metropolitan Municipality	2 616 725	2.39	2 903 193	1.76	3 221 082	0.83	1.50
eThekwini Metropolitan Municipality	2 817 420	2.23	3 114 379	1.81	3 371 729	0.41	1.29
Ekurhuleni Metropolitan Municipality	2 189 148	2.67	2 486 707	2.37	2 758 211	0.41	1.67
City of Johannesburg Metropolitan Municipality	2 821 606	2.68	3 204 711	2.34	3 532 939	0.47	1.62
Nelson Mandela Bay Metropolitan Municipality	974 447	1.13	1 036 818	1.34	1 143 025	0.76	1.15
City of Tshwane Metropolitan Municipality	1 829 350	1.76	1 999 193	1.70	2 164 281	0.34	1.21
Bojanala District Municipality	1 093 464	2.20	1 202 680	1.70	1 314 817	0.52	1.33
Moretele Local Municipality	177 523	0.84	182 432	0.32	185 436	0.20	0.31
Local Municipality of Madibeng	328 673	1.56	350 824	1.11	374 361	0.39	0.93
Rustenburg Local Municipality	319 210	4.72	393 279	3.86	469 175	0.91	2.80
Kgetlengrivier Local Municipality	34 011	2.02	37 145	1.55	39 875	0.31	1.14
Moses Kotane Local Municipality	234 048	0.70	239 000	0.21	245 969	0.23	0.36
Ngaka Modiri Molema District[15]	707 001	1.94	771 162	1.58	843 119	0.54	1.27
Ratlou Local Municipality	100 162	1.26	105 552	0.88	112 513	0.42	0.83
Tswaing Local Municipality	93 269	4.80	115 786	4.06	129 981	0.64	2.41
Mafikeng Local Municipality	246 970	1.35	261 562	0.97	286 872	0.57	1.08
Ditsobotla Local Municipality	134 315	2.33	149 382	1.97	167 055	0.66	1.57
Ramotshere Moiloa Local Municipality	132 285	1.17	138 880	0.82	146 698	0.34	0.74
Bophirima District Municipality	429 875	0.50	436 541	0.13	444 922	0.11	0.25
Kagisano Local Municipality	87 002	0.88	89 924	0.46	93 079	0.17	0.48
Naledi Local Municipality	57 253	0.48	58 421	0.27	59 458	0.07	0.27
Mamusa Local Municipality	43 939	2.36	48 915	1.97	54 614	0.66	1.57
Greater Taung Local Municipality	189 250	-0.28	184 011	-0.80	178 276	-0.17	-0.43
Molopo Local Municipality	13 899	-2.62	11 869	-3.66	9 899	-1.51	-2.39
Lekwa-Teemane Local Municipality	38 532	2.50	43 400	2.28	49 596	0.84	1.82
Dr Kenneth Kaunda District Municipality[16]	788 744	1.05	822 963	0.67	862 096	0.11	0.64
Ventersdorp Local Municipality	32 553	6.66	43 588	5.42	49 425	0.71	3.05
Tlokwe Local Municipality[17]	131 380	-0.17	130 385	-0.19	138 876	0.31	0.40
City of Matlosana[18]	347 000	1.20	364 993	0.84	378 344	0.03	0.62
Maquassi Hills Local Municipality	62 893	2.27	69 775	1.93	77 929	0.66	1.54
Merafong City Local Municipality	214 919	0.33	214 221	-0.40	217 522	-0.22	0.09

Source: IHS Global Insight, 2011

As anticipated, Table 9 shows that the population growth rates across localities differ. The population growth rate also varies over time for each of the areas. Even though the national population growth rate decreased by 1.2% over the period 1996 – 2010, some areas grew faster or slower than the national average. This is explained by the theories of the spatial structure of economic activity (as discussed in Chapter 2). The areas where people tend to locate are shaped by agglomeration forces. People will be drawn to areas where economic activity takes place and where the most opportunities exist. This explains why some areas have

15 Ngaka Modiri Molema District Municipality is also known as Central District Municipality.

16 Dr Kenneth Kaunda District Municipality is also known as Southern District Municipality.

17 Tlokwe Local Municipality is also known as Potchefstroom Local Municipality.

18 City of Matlosana is also known as Klerksdorp.

higher population growth rates than the national average such as the Western Cape, Gauteng, and the metropolitan municipalities in these provinces. As stated in the previous sections, economic activity mostly agglomerates in these areas, therefore it makes sense that more people would tend to locate to these areas to benefit from the opportunities. Then there are areas that have population growth rates lower than the national average and even areas that have a negative population growth rate, which means that people tend to migrate from areas where there might be fewer opportunities to areas where more opportunities exist. Table 10 shows the population of certain areas as a percentage of the national total.

Table 10: Population as percentage of national total - REX data

Area	1996		2001		2010		1996-2010
	Total	Share	Total	Share	Total	Share	Ave
Western Cape	4 053 055	9.70	4 540 831	10.06	5 106 548	10.47	10.13
Eastern Cape	6 187 099	14.81	6 386 107	14.15	6 720 598	13.78	14.11
Northern Cape	981 090	2.35	1 035 204	2.29	1 138 183	2.33	2.31
Free State	2 659 535	6.37	2 790 242	6.18	2 840 974	5.82	6.10
Kwazulu-Natal	8 847 061	21.18	9 559 759	21.18	10 215 884	20.94	21.11
North West	3 019 084	7.23	3 233 346	7.16	3 464 953	7.10	7.16
Gauteng	8 227 355	19.69	9 187 557	20.35	10 070 497	20.65	20.37
Mpumalanga	3 143 918	7.52	3 442 199	7.62	3 756 236	7.70	7.64
Limpopo	4 662 272	11.16	4 970 373	11.01	5 465 235	11.20	11.07
City of Cape Town Metropolitan Municipality	2 616 725	6.26	2 903 193	6.43	3 221 082	6.60	6.46
eThekwini Metropolitan Municipality	2 817 420	6.74	3 114 379	6.90	3 371 729	6.91	6.88
Ekurhuleni Metropolitan Municipality	2 189 148	5.24	2 486 707	5.51	2 758 211	5.65	5.53
City of Johannesburg Metropolitan Municipality	2 821 606	6.75	3 204 711	7.10	3 532 939	7.24	7.10
Nelson Mandela Bay Metropolitan Municipality	974 447	2.33	1 036 818	2.30	1 143 025	2.34	2.31
City of Tshwane Metropolitan Municipality	1 829 350	4.38	1 999 193	4.43	2 164 281	4.44	4.43
Bojanala District Municipality	1 093 464	2.62	1 202 680	2.66	1 314 817	2.70	2.67
Moretele Local Municipality	177 523	0.42	182 432	0.40	185 436	0.38	0.40
Local Municipality of Madibeng	328 673	0.79	350 824	0.78	374 361	0.77	0.78
Rustenburg Local Municipality	319 210	0.76	393 279	0.87	469 175	0.96	0.89
Kgetlengrivier Local Municipality	34 011	0.08	37 145	0.08	39 875	0.08	0.08
Moses Kotane Local Municipality	234 048	0.56	239 000	0.53	245 969	0.50	0.53
Ngaka Modiri Molema District	707 001	1.69	771 162	1.71	843 119	1.73	1.71
Ratlou Local Municipality	100 162	0.24	105 552	0.23	112 513	0.23	0.23
Tswaing Local Municipality	93 269	0.22	115 786	0.26	129 981	0.27	0.25
Mafikeng Local Municipality	246 970	0.59	261 562	0.58	286 872	0.59	0.58
Ditsobotla Local Municipality	134 315	0.32	149 382	0.33	167 055	0.34	0.33
Ramotshere Moiloa Local Municipality	132 285	0.32	138 880	0.31	146 698	0.30	0.31
Bophirima District Municipality	429 875	1.03	436 541	0.97	444 922	0.91	0.96
Kagisano Local Municipality	87 002	0.21	89 924	0.20	93 079	0.19	0.20
Naledi Local Municipality	57 253	0.14	58 421	0.13	59 458	0.12	0.13
Mamusa Local Municipality	43 939	0.11	48 915	0.11	54 614	0.11	0.11
Greater Taung Local Municipality	189 250	0.45	184 011	0.41	178 276	0.37	0.40
Molopo Local Municipality	13 899	0.03	11 869	0.03	9 899	0.02	0.03
Lekwa-Teemane Local Municipality	38 532	0.09	43 400	0.10	49 596	0.10	0.10

Area	1996		2001		2010		
	Total	Share	Total	Share	Total	Share	Ave
Dr Kenneth Kaunda District Municipality	788 744	1.89	822 963	1.82	862 096	1.77	1.82
Ventersdorp Local Municipality	32 553	0.08	43 588	0.10	49 425	0.10	0.09
Tlokwe Local Municipality	131 380	0.31	130 385	0.29	138 876	0.28	0.29
City of Matlosana	347 000	0.83	364 993	0.81	378 344	0.78	0.80
Maquassi Hills Local Municipality	62 893	0.15	69 775	0.15	77 929	0.16	0.16
Merafong City Local Municipality	214 919	0.51	214 221	0.47	217 522	0.45	0.47

Source: IHS Global Insight, 2011

Table 10 shows that Gauteng and KwaZulu Natal have the largest share of South Africa's population, which is anticipated seeing that economic activity in South Africa is mostly concentrated in these areas, as discussed in previous chapters. There is an obvious persistence in the areas' share of the national population. This is also confirmed by the kernel density estimates of population in 1996, 2001 and 2010 (see Figure 8 to Figure 10). The figures show that the distribution of population did not change much over the years. The output is the author's own analysis generated in Stata.

Figure 8: Population '96 kernel density - REX

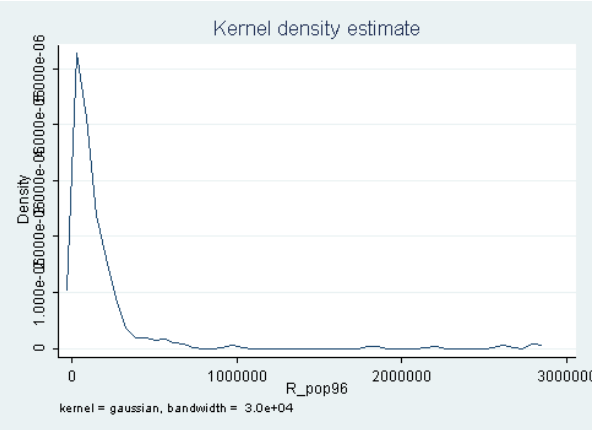


Figure 9: Population '01 kernel density - REX

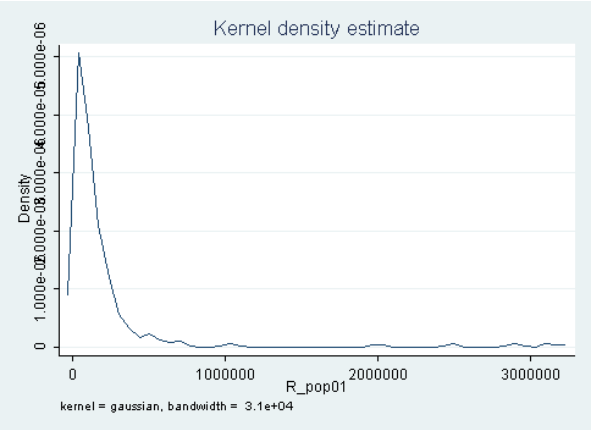


Figure 10: Population '10 kernel density - REX

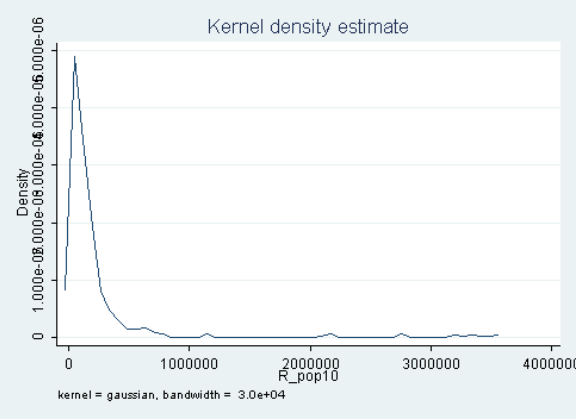


Table 11 shows that the standard deviation of population as a proportion of the national total increased, but not by much, confirming that the data are consistent.

Table 11: Population (REX) Standard deviation

```
. summarize R_pop_prop96 R_pop_prop01 R_pop_prop10
```

Variable	Obs	Mean	Std. Dev.	Min	Max
R_pop_prop96	245	.4081429	.8617338	.004	6.753
R_pop_prop01	245	.4081755	.8858982	.002	7.099
R_pop_prop10	245	.4081592	.8990342	.002	7.243

Even though some areas' populations grew faster or slower than the national population growth rate, it seems that the areas kept their relative position or ranking in terms of their population share. This is anticipated and indicates consistency in data. Table 12 presents the outputs from Spearman's rank correlation test. Municipalities were ranked from largest to smallest per their share of the population and the rank correlation tests for changes in the ranking. The rank correlation coefficient shows a highly positive relationship indicating that the rankings of places over the periods 1996 and 2001 as well as 2001 and 2010 remained more or less consistent.

Table 12: Population (REX) Spearman test

```
. spearman R_pop_rank96 R_pop_rank01 R_pop_rank10, stats(rho obs p)
```

Key
rho *Number of obs* *Sig. level*

	R_po~k96	R_po~k01	R_po~k10
R_pop_rank96	1.0000 245		
R_pop_rank01	0.9947 245 0.0000	1.0000 245	
R_pop_rank10	0.9784 245 0.0000	0.9932 245 0.0000	1.0000 245

Table 13 and Table 14 show the outputs from the variance ratio test for 1996 and 2001, as well as 2001 and 2010. The null hypothesis of the test is that the ratio of the standard deviations is one. The results show a high probability that the ratio of the standard deviations is equal.

Table 13: Population (REX) Variance ratio test: 1996 & 2001

```
. sdtest R_pop_prop96 == R_pop_prop01

Variance ratio test
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
R_pop_..	245	.4081429	.0550542	.8617338	.2997008	.5165849
R_pop_..	245	.4081755	.056598	.8858982	.2966926	.5196584
combined	490	.4081592	.0394384	.8730055	.3306696	.4856488

```
    ratio = sd(R_pop_prop96) / sd(R_pop_prop01)                 f =   0.9462
Ho: ratio = 1                                 degrees of freedom = 244, 244

    Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.3330         2*Pr(F < f) = 0.6661          Pr(F > f) = 0.6670
```

Table 14: Population (REX) Variance ratio test: 2001 & 2010

```
. sdtest R_pop_prop01 == R_pop_prop10

Variance ratio test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
R_pop_.. |     245    .4081755     .056598    .8858982    .2966926    .5196584
R_pop_.. |     245    .4081592    .0574372    .8990342    .2950232    .5212952
---------+--------------------------------------------------------------------
combined |     490    .4081673    .0402774    .8915773    .3290293    .4873054
------------------------------------------------------------------------------
    ratio = sd(R_pop_prop01) / sd(R_pop_prop10)                 f =   0.9710
Ho: ratio = 1                                 degrees of freedom = 244, 244

    Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
 Pr(F < f) = 0.4092         2*Pr(F < f) = 0.8183          Pr(F > f) = 0.5908
```

Table 15 provides the growth rate of gross value added per region or locality.

Table 15: Growth rate of Gross Value Added, R million (GVA) – REX data

Area	1996		2001		2010		1996-2010
	Total	GR	Total	GR	Total	GR	Ave
South Africa	617 957 268	10.97	1 020 007 599	10.61	2 662 757 000	11.13	11.02
Western Cape	88 361 504	11.67	144 585 928	10.39	370 624 418	10.23	10.82
Eastern Cape	50 743 735	10.64	81 895 913	9.30	200 379 828	10.66	10.32
Northern Cape	13 533 414	9.83	24 521 285	9.66	65 152 633	14.06	11.93
Free State	37 101 472	8.48	54 690 219	10.15	142 264 330	8.62	10.17
Kwazulu-Natal	104 403 931	10.15	168 927 040	11.58	425 637 452	10.27	10.58
North West	40 518 006	4.61	64 784 927	12.03	177 201 888	16.62	11.23
Gauteng	206 122 731	12.09	339 216 368	8.33	906 169 890	11.31	11.19
Mpumalanga	43 963 313	10.77	75 606 140	15.68	188 128 437	7.15	11.00
Limpopo	33 209 162	16.49	65 779 779	16.43	187 198 124	14.91	13.22
City of Cape Town Metropolitan Municipality	65 068 671	12.78	108 926 708	10.51	274 403 491	10.79	10.86
eThekwini Metropolitan Municipality	64 643 887	10.11	106 934 660	12.46	275 169 838	10.88	10.92
Ekurhuleni Metropolitan Municipality	43 759 490	7.04	64 782 257	8.00	171 422 489	10.89	10.33
City of Johannesburg Metropolitan Municipality	92 808 387	14.84	160 934 271	8.30	424 033 184	11.02	11.49
Nelson Mandela Bay Metropolitan Municipality	20 661 362	9.29	35 391 729	12.41	84 143 011	11.25	10.60
City of Tshwane Metropolitan Municipality	49 506 397	14.37	88 206 159	8.85	244 304 389	12.45	12.11
Bojanala District Municipality	14 791 108	9.89	32 957 986	15.53	105 550 360	19.83	15.23
Moretele Local Municipality	7 261 906	2.49	9 302 540	9.20	24 037 115	15.41	9.05
Local Municipality of Madibeng	2 682 699	6.03	3 536 075	12.60	8 534 682	13.47	8.92
Rustenburg Local Municipality	15 782 293	0.38	18 988 326	7.61	39 079 731	10.04	6.89
Kgetlengrivier Local Municipality	879 444	12.83	1 494 930	3.02	4 226 054	17.46	11.92
Moses Kotane Local Municipality	4 238 751	7.57	7 558 035	11.00	19 988 694	23.60	12.11
Ngaka Modiri Molema District	7 056 612	13.29	19 241 264	18.66	65 979 797	18.21	17.53
Ratlou Local Municipality	709 341	12.29	1 794 356	18.57	6 180 656	18.20	16.90
Tswaing Local Municipality	1 906 960	0.25	2 869 400	13.07	9 175 159	26.13	12.09
Mafikeng Local Municipality	756 071	2.55	927 009	10.04	2 277 080	14.38	8.44
Ditsobotla Local Municipality	440 788	0.87	499 496	13.12	1 075 845	10.76	7.28
Ramotshere Moiloa Local Municipality	3 880 188	2.48	4 952 514	7.55	13 159 267	16.36	9.20
Bophirima District Municipality	1 379 153	3.32	1 874 245	12.33	4 756 992	13.92	9.43
Kagisano Local Municipality	805 705	1.99	1 049 277	9.11	2 767 931	16.26	9.34
Naledi Local Municipality	398 241	3.36	481 062	12.55	1 119 133	12.63	8.34
Mamusa Local Municipality	780 899	2.81	895 390	10.98	2 136 529	12.13	8.06
Greater Taung Local Municipality	320 664	9.20	457 328	13.17	1 044 567	12.45	9.19
Molopo Local Municipality	601 488	8.76	832 031	8.87	2 161 045	15.90	9.62

Area	1996		2001		2010		1996-2010
	Total	GR	Total	GR	Total	GR	Ave
Lekwa-Teemane Local Municipality	47 549	5.26	63 772	10.99	167 947	14.75	9.76
Dr Kenneth Kaunda District Municipality	533 858	7.81	806 491	18.56	1 905 462	13.23	9.74
Ventersdorp Local Municipality	271 670	4.66	343 726	15.95	815 621	11.67	9.08
Tlokwe Local Municipality	2 353 528	8.80	3 367 340	8.25	8 973 967	15.63	10.10
City of Matlosana	7 778 200	0.96	8 941 529	9.33	16 399 547	11.53	5.60
Maquassi Hills Local Municipality	358 652	8.25	544 432	13.59	1 353 844	14.06	10.21
Merafong City Local Municipality	5 020 243	-5.25	5 791 298	3.78	11 536 752	3.64	6.83

Source: IHS Global Insight, 2011

Table 15 shows that the GVA growth rates across localities differ and also vary across time within localities. This is explained by the theories of the spatial structure of economic activity (as discussed in Chapter 2). The areas where economic activity is located are shaped by agglomeration forces. The concept of convergence of economies is also evident from the table above. Provinces such as Limpopo, the Northern Cape, and the North West (as well as some of the district municipalities and local municipalities in the North West province) experience an average GVA growth rate higher than the national average, while provinces such as the Western Cape, Gauteng, and KwaZulu Natal, where most of the economic activity is located, show a slower average growth rate. This corresponds with so-called convergence theories that predict convergence of per capita income levels between regions. Poorer regions or localities tend to catch up with richer ones, while the richer regions' or localities' economic growth stabilises over time. This does not necessarily mean that the areas with faster growth will have the largest share of national gross value added total. The gross value added as a percentage of national total is presented below.

Table 16: Gross Value Added, R million (GVA) as percentage of national total – REX data

Area	1996		2001		2010		1996-2010
	Total	Share	Total	Share	Total	Share	Ave
Western Cape	88 361 504	14.24	144 585 928	14.17	370 624 418	13.92	14.31
Eastern Cape	50 743 735	8.26	81 895 913	8.03	200 379 828	7.53	7.87
Northern Cape	13 533 414	2.25	24 521 285	2.40	65 152 633	2.45	2.33
Free State	37 101 472	6.12	54 690 219	5.36	142 264 330	5.34	5.49
Kwazulu-Natal	104 403 931	16.33	168 927 040	16.56	425 637 452	15.98	16.39
North West	40 518 006	5.88	64 784 927	6.35	177 201 888	6.65	6.28
Gauteng	206 122 731	34.18	339 216 368	33.26	906 169 890	34.03	33.83
Mpumalanga	43 963 313	7.20	75 606 140	7.41	188 128 437	7.07	7.17
Limpopo	33 209 162	5.54	65 779 779	6.45	187 198 124	7.03	6.34
City of Cape Town Metropolitan Municipality	65 068 671	10.27	108 926 708	10.68	274 403 491	10.31	10.65
eThekwini Metropolitan Municipality	64 643 887	10.17	106 934 660	10.48	275 169 838	10.33	10.40
Ekurhuleni Metropolitan Municipality	43 759 490	8.54	64 782 257	6.35	171 422 489	6.44	6.50
City of Johannesburg Metropolitan Municipality	92 808 387	14.11	160 934 271	15.78	424 033 184	15.92	15.93
Nelson Mandela Bay Metropolitan Municipality	20 661 362	3.62	35 391 729	3.47	84 143 011	3.16	3.31
City of Tshwane Metropolitan Municipality	49 506 397	7.87	88 206 159	8.65	244 304 389	9.17	8.76

Area	1996		2001		2010		
	Total	Share	Total	Share	Total	Share	Ave
Bojanala District Municipality	14 791 108	2.33	32 957 986	3.23	105 550 360	3.96	3.17
Moretele Local Municipality	879 444	0.21	1 494 930	0.15	4 226 054	0.16	0.94
Local Municipality of Madibeng	4 238 751	0.91	7 558 035	0.74	19 988 694	0.75	0.35
Rustenburg Local Municipality	7 056 612	0.85	19 241 264	1.89	65 979 797	2.48	1.82
Kgetlengrivier Local Municipality	709 341	0.07	1 794 356	0.18	6 180 656	0.23	0.15
Moses Kotane Local Municipality	1 906 960	0.30	2 869 400	0.28	9 175 159	0.34	0.68
Ngaka Modiri Molema District	7 261 906	1.25	9 302 540	0.91	24 037 115	0.90	1.88
Ratlou Local Municipality	756 071	0.11	927 009	0.09	2 277 080	0.09	0.18
Tswaing Local Municipality	440 788	0.10	499 496	0.05	1 075 845	0.04	0.28
Mafikeng Local Municipality	3 880 188	0.57	4 952 514	0.49	13 159 267	0.49	0.09
Ditsobotla Local Municipality	1 379 153	0.31	1 874 245	0.18	4 756 992	0.18	0.05
Ramotshere Moiloa Local Municipality	805 705	0.17	1 049 277	0.10	2 767 931	0.10	0.51
Bophirima District Municipality	2 682 699	0.50	3 536 075	0.35	8 534 682	0.32	0.19
Kagisano Local Municipality	398 241	0.07	481 062	0.05	1 119 133	0.04	0.11
Naledi Local Municipality	780 899	0.12	895 390	0.09	2 136 529	0.08	0.05
Mamusa Local Municipality	320 664	0.06	457 328	0.04	1 044 567	0.04	0.09
Greater Taung Local Municipality	601 488	0.14	832 031	0.08	2 161 045	0.08	0.04
Molopo Local Municipality	47 549	0.02	63 772	0.01	167 947	0.01	0.08
Lekwa-Teemane Local Municipality	533 858	0.10	806 491	0.08	1 905 462	0.07	0.01
Dr Kenneth Kaunda District Municipality	15 782 293	1.79	18 988 326	1.86	39 079 731	1.47	0.08
Ventersdorp Local Municipality	271 670	0.05	343 726	0.03	815 621	0.03	0.03
Tlokwe Local Municipality	2 353 528	0.44	3 367 340	0.33	8 973 967	0.34	0.34
City of Matlosana	7 778 200	0.81	8 941 529	0.88	16 399 547	0.62	0.82
Maquassi Hills Local Municipality	358 652	0.09	544 432	0.05	1 353 844	0.05	0.05
Merafong City Local Municipality	5 020 243	0.40	5 791 298	0.57	11 536 752	0.43	0.57

Source: IHS Global Insight, 2011

As anticipated, the regions with the largest share of the national gross value added total are not the areas with the highest GVA growth rates. Gauteng, Western Cape and KwaZulu Natal (the provinces in which most economic activity is located) have the largest share of gross value added, while the provinces and regions that experienced higher growth rates (such as Limpopo, the Northern Cape, the North West and its municipalities) only contribute a small percentage to the national gross value added.

There is persistence in the areas' share of the national GVA. This is confirmed by the kernel density estimates of GVA in 1996, 2001 and 2010 (see Figure 11 to Figure 13). The figures show that the distribution of GVA did not change much over the years. The output is the author's own analysis generated in Stata.

Figure 11: GVA ’96 kernel density - REX

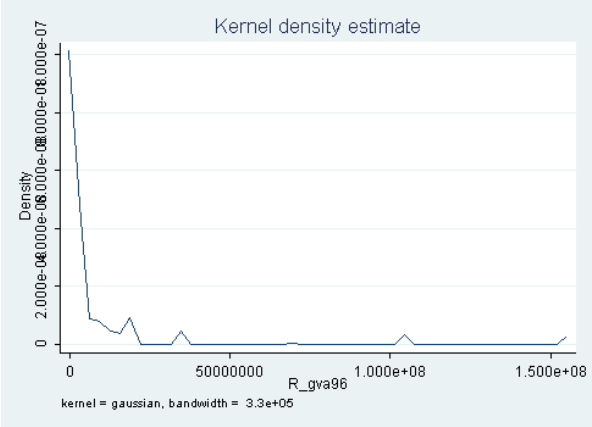


Figure 12: GVA '01 kernel density - REX

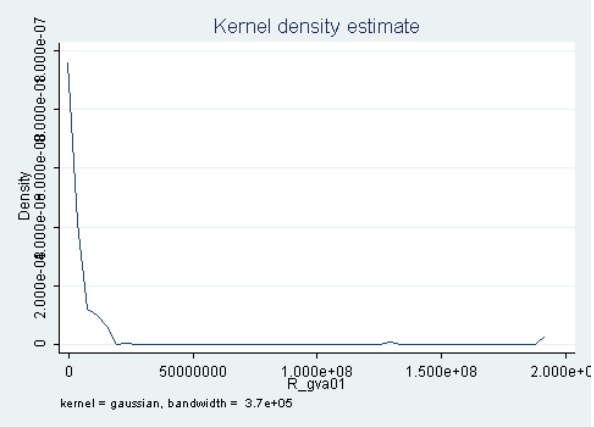


Figure 13: GVA '10 kernel density - REX

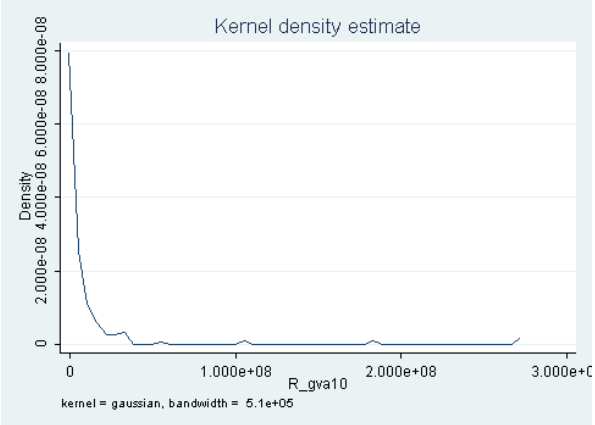


Table 17 shows that the standard deviation of population as a proportion of the national total increased, but not considerably, confirming that the data are consistent.

Table 17: GVA (REX) Standard deviation

```
. summarize R_gva_prop96 R_gva_prop01 R_gva_prop10
```

Variable	Obs	Mean	Std. Dev.	Min	Max
R_gva_prop96	245	.4081633	1.488933	.006	14.807
R_gva_prop01	245	.4081551	1.56957	.005	16.076
R_gva_prop10	245	.4081755	1.628205	.005	16.57

Even though some areas’ GVA grew faster or slower than the national average, it seems that the areas kept their relative position or ranking in terms of their GVA share. This is anticipated and indicates consistency in data. Table 18 presents the outputs from Spearman’s rank correlation test. Municipalities were ranked from largest to smallest per their share of the population and the rank correlation tests for changes in the ranking. The rank correlation coefficient shows a highly positive relationship indicating that the rankings of places over the periods 1996 and 2001, as well as 2001 and 2010 remained more or less consistent.

Table 18: GVA (REX) Spearman test

```
. spearman R_gva_rank96 R_gva_rank01 R_gva_rank10, stats(rho obs p)

        Key
   rho
   Number of obs
   Sig. level

             | R_gv~k96 R_gv~k01 R_gv~k10
-------------+---------------------------
R_gva_rank96 |   1.0000
             |      245
             |
R_gva_rank01 |   0.9909   1.0000
             |      245      245
             |   0.0000
             |
R_gva_rank10 |   0.9807   0.9929   1.0000
             |      245      245      245
             |   0.0000   0.0000
```

Table 19 and Table 20 show the outputs from the variance ratio test for 1996 and 2001, as well as 2001 and 2010. The null hypothesis of the test is that the ratio of the standard deviations is one. The results show a high probability that the ratio of the standard deviations is not equal.

Table 19: GVA (REX) Variance ratio test: 1996 & 2001

```
. sdtest R_gva_prop96 == R_gva_prop01

Variance ratio test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
R_gv~p96 |     245    .4081633    .0951244    1.488933    .2207934    .5955331
R_gv~p01 |     245    .4081551    .1002761     1.56957    .2106378    .6056724
---------+--------------------------------------------------------------------
combined |     490    .4081592    .0690378    1.528218    .2725118    .5438066
------------------------------------------------------------------------------
    ratio = sd(R_gva_prop96) / sd(R_gva_prop01)                 f =   0.8999
Ho: ratio = 1                                 degrees of freedom = 244, 244

   Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
 Pr(F < f) = 0.2053         2*Pr(F < f) = 0.4106          Pr(F > f) = 0.7947
```

Table 20: GVA (REX) Variance ratio test: 2001 & 2010

```
. sdtest R_gva_prop01 == R_gva_prop10

Variance ratio test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
R_gv~p01 |     245    .4081551    .1002761     1.56957    .2106378    .6056724
R_gv~p10 |     245    .4081755    .1040222    1.628205    .2032794    .6130716
---------+--------------------------------------------------------------------
combined |     490    .4081653    .0721686     1.59752    .2663665    .5499641
------------------------------------------------------------------------------
    ratio = sd(R_gva_prop01) / sd(R_gva_prop10)                 f =   0.9293
Ho: ratio = 1                                 degrees of freedom = 244, 244

   Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
 Pr(F < f) = 0.2836         2*Pr(F < f) = 0.5671          Pr(F > f) = 0.7164
```

4.4.2 Quantec's Standardised Regional Data

An analysis of population and GVA indicators in Quantec's database is presented in the following tables. The growth rates of the indicators per area over time, as well as the shares of each area as a proportion of the national totals are presented and analysed. Table 21 shows the population number and the growth rate of the population for each of the identified areas. One would anticipate that some areas would experience higher growth rates than others.

Table 21: Growth rate of population – Quantec data

Area	1996		2001		2010		1996-2010
	Total	GR	Total	GR	Total	GR	Ave
South Africa	52 423 547	2.43	57 760 714	1.65	64 322 536	1.03	1.54
Western Cape	5 034 877	2.89	5 675 490	2.19	6 671 613	1.56	2.09
Eastern Cape	7 926 076	1.98	8 144 476	0.27	8 646 178	0.39	0.71
Northern Cape	1 649 089	3.19	1 713 985	0.59	1 754 656	0.32	0.63
Free State	3 527 689	0.94	3 641 055	0.31	3 771 802	0.41	0.51
Kwazulu-Natal	10 922 831	1.97	11 876 895	1.29	13 233 942	0.91	1.42
North West	3 515 788	3.17	3 855 722	1.52	4 198 129	0.63	1.40
Gauteng	10 228 294	3.52	12 356 448	3.42	14 586 880	1.65	2.64
Mpumalanga	3 865 907	1.45	4 242 546	1.54	4 628 310	0.93	1.31
Limpopo	5 752 994	2.54	6 254 096	1.49	6 831 026	1.04	1.32
City of Cape Town Metropolitan Municipality	3 160 420	3.09	3 571 526	2.33	4 344 561	1.78	2.35
eThekwini Metropolitan Municipality	3 577 919	2.16	3 911 611	1.38	4 594 921	1.29	1.83
Ekurhuleni Metropolitan Municipality	2 733 001	3.74	3 330 249	3.51	3 827 314	1.50	2.53
City of Johannesburg Metropolitan Municipality	3 546 548	3.85	4 367 312	3.78	5 403 335	1.85	3.11
Nelson Mandela Bay Metropolitan Municipality	1 246 167	2.35	1 297 846	0.54	1 408 130	0.56	0.97
City of Tshwane Metropolitan Municipality	2 253 703	2.91	2 675 881	3.22	3 251 675	1.73	2.67
Bojanala District Municipality	1 277 495	3.55	1 428 812	1.83	1 609 036	0.80	1.79
Moretele Local Municipality	203 891	2.72	216 469	1.01	230 315	0.65	1.00
Local Municipality of Madibeng	378 677	3.34	417 934	1.58	460 176	0.49	1.53
Rustenburg Local Municipality	377 742	4.97	457 678	3.12	568 624	1.24	3.10
Kgetlengrivier Local Municipality	42 873	2.95	46 924	1.43	51 030	0.49	1.37
Moses Kotane Local Municipality	274 312	2.66	289 807	0.90	298 891	0.63	0.75
Ngaka Modiri Molema District	842 323	3.14	920 869	1.41	1 007 814	0.56	1.41
Ratlou Local Municipality	118 301	2.69	126 164	1.00	129 986	0.59	0.81
Tswaing Local Municipality	115 608	4.13	133 156	1.86	117 248	0.10	0.40
Mafikeng Local Municipality	291 741	3.04	314 416	1.27	358 129	0.67	1.58
Ditsobotla Local Municipality	160 189	3.36	180 212	2.03	233 215	0.75	2.77
Ramotshere Moiloa Local Municipality	156 485	2.71	166 920	0.98	169 236	0.38	0.71
Bophirima District Municipality	530 707	2.21	548 891	0.48	518 006	0.38	-0.01
Kagisano Local Municipality	110 781	2.46	116 308	0.67	112 124	0.29	0.25
Naledi Local Municipality	70 724	2.44	73 893	0.70	76 696	0.33	0.70
Mamusa Local Municipality	54 176	2.80	58 313	1.01	53 152	0.41	0.07
Greater Taung Local Municipality	219 753	1.83	220 881	0.09	206 373	0.66	-0.29
Molopo Local Municipality	28 487	0.55	27 199	-0.95	22 197	-0.69	-1.61
Lekwa-Teemane Local Municipality	46 786	3.45	52 298	1.64	47 464	-0.08	0.34
Dr Kenneth Kaunda District Municipality	865 263	3.22	957 150	1.76	1 063 272	0.58	1.60
Ventersdorp Local Municipality	41 961	5.38	52 089	3.04	52 137	0.36	1.84
Tlokwe Local Municipality	141 815	2.15	147 791	0.81	153 074	0.42	0.65
City of Matlosana	379 914	3.50	427 896	2.06	483 544	0.57	1.86
Maquassi Hills Local Municipality	76 839	3.17	85 826	1.95	108 165	0.82	2.52
Merafong City Local Municipality	224 734	3.04	243 548	1.50	266 352	0.63	1.34

Source: Quantec, 2011

As anticipated, the above table shows that the population growth rates across localities differ. This is explained by the theories of the spatial structure of economic activity (as discussed in Chapter 2). The areas where people tend to locate are shaped by agglomeration forces.

People will be drawn to areas where economic activity takes place, and where the most opportunities exist. This explains why some areas have higher population growth rates than the national average such as the Western Cape, Gauteng, and the metropolitan municipalities in these provinces. As stated in the previous sections, economic activity mostly agglomerates in these areas, therefore it makes sense that more people would tend to locate to these areas to benefit from the opportunities. Then there are areas that have population growth rates lower than the national average and even areas that have a negative population growth rate, which means that people tend to migrate from areas where there might be fewer opportunities to areas where more opportunities exist. Table 22 shows the population of certain areas as a percentage of the national total.

Table 22: Population as percentage of national total - Quantec data

Area	1996		2001		2010		1996-2010
	Total	Share	Total	Share	Total	Share	Ave
Western Cape	5 034 877	9.60	5 675 490	9.83	6 671 613	10.37	9.94
Eastern Cape	7 926 076	15.12	8 144 476	14.10	8 646 178	13.44	14.14
Northern Cape	1 649 089	3.15	1 713 985	2.97	1 754 656	2.73	2.93
Free State	3 527 689	6.73	3 641 055	6.30	3 771 802	5.86	6.27
Kwazulu-Natal	10 922 831	20.84	11 876 895	20.56	13 233 942	20.57	20.66
North West	3 515 788	6.71	3 855 722	6.68	4 198 129	6.53	6.63
Gauteng	10 228 294	19.51	12 356 448	21.39	14 586 880	22.68	21.33
Mpumalanga	3 865 907	7.37	4 242 546	7.35	4 628 310	7.20	7.31
Limpopo	5 752 994	10.97	6 254 096	10.83	6 831 026	10.62	10.78
City of Cape Town Metropolitan Municipality	3 160 420	6.03	3 571 526	6.18	4 344 561	6.75	6.32
eThekwini Metropolitan Municipality	3 577 919	6.83	3 911 611	6.77	4 594 921	7.14	6.90
Ekurhuleni Metropolitan Municipality	2 733 001	5.21	3 330 249	5.77	3 827 314	5.95	5.69
City of Johannesburg Metropolitan Municipality	3 546 548	6.77	4 367 312	7.56	5 403 335	8.40	7.62
Nelson Mandela Bay Metropolitan Municipality	1 246 167	2.38	1 297 846	2.25	1 408 130	2.19	2.26
City of Tshwane Metropolitan Municipality	2 253 703	4.30	2 675 881	4.63	3 251 675	5.06	4.68
Bojanala District Municipality	1 277 495	2.44	1 428 812	2.47	1 609 036	2.50	2.47
Moretele Local Municipality	203 891	0.39	216 469	0.37	230 315	0.36	0.37
Local Municipality of Madibeng	378 677	0.72	417 934	0.72	460 176	0.72	0.72
Rustenburg Local Municipality	377 742	0.72	457 678	0.79	568 624	0.88	0.80
Kgetlengrivier Local Municipality	42 873	0.08	46 924	0.08	51 030	0.08	0.08
Moses Kotane Local Municipality	274 312	0.52	289 807	0.50	298 891	0.46	0.49
Ngaka Modiri Molema District	842 323	1.61	920 869	1.59	1 007 814	1.57	1.59
Ratlou Local Municipality	118 301	0.23	126 164	0.22	129 986	0.20	0.22
Tswaing Local Municipality	115 608	0.22	133 156	0.23	117 248	0.18	0.21
Mafikeng Local Municipality	291 741	0.56	314 416	0.54	358 129	0.56	0.55
Ditsobotla Local Municipality	160 189	0.31	180 212	0.31	233 215	0.36	0.33
Ramotshere Moiloa Local Municipality	156 485	0.30	166 920	0.29	169 236	0.26	0.28
Bophirima District Municipality	530 707	1.01	548 891	0.95	518 006	0.81	0.92
Kagisano Local Municipality	110 781	0.21	116 308	0.20	112 124	0.17	0.20
Naledi Local Municipality	70 724	0.13	73 893	0.13	76 696	0.12	0.13
Mamusa Local Municipality	54 176	0.10	58 313	0.10	53 152	0.08	0.10
Greater Taung Local Municipality	219 753	0.42	220 881	0.38	206 373	0.32	0.37
Molopo Local Municipality	28 487	0.05	27 199	0.05	22 197	0.03	0.04

Area	1996		2001		2010		1996-2010
	Total	Share	Total	Share	Total	Share	Ave
Lekwa-Teemane Local Municipality	46 786	0.09	52 298	0.09	47 464	0.07	0.09
Dr Kenneth Kaunda District Municipality	865 263	1.65	957 150	1.66	1 063 272	1.65	1.65
Ventersdorp Local Municipality	41 961	0.08	52 089	0.09	52 137	0.08	0.09
Tlokwe Local Municipality	141 815	0.27	147 791	0.26	153 074	0.24	0.25
City of Matlosana	379 914	0.72	427 896	0.74	483 544	0.75	0.74
Maquassi Hills Local Municipality	76 839	0.15	85 826	0.15	108 165	0.17	0.15
Merafong City Local Municipality	224 734	0.43	243 548	0.42	266 352	0.41	0.42

Source: Quantec, 2011

As with Global Insight's data there is an obvious persistence in the areas' share of the national population. This is confirmed by the kernel density estimates of population in 1996, 2001 and 2010 (see Figure 14 to Figure 16). The figures show that the distribution of population did not change much over the years. The output is the author's own analysis generated in Stata.

Figure 14: Population '96 kernel density - Quantec

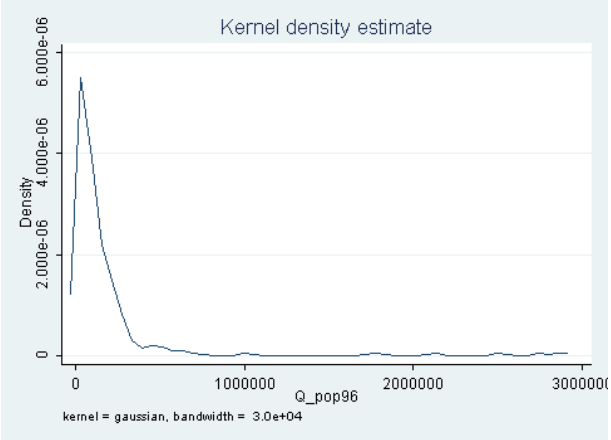


Figure 15: Population '01 kernel density - Quantec

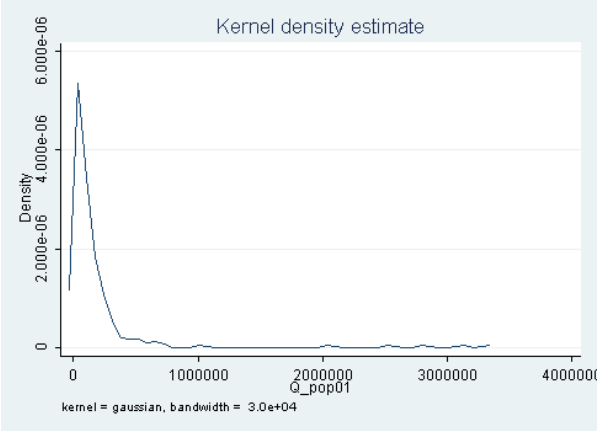


Figure 16: Population '10 kernel density – Quantec

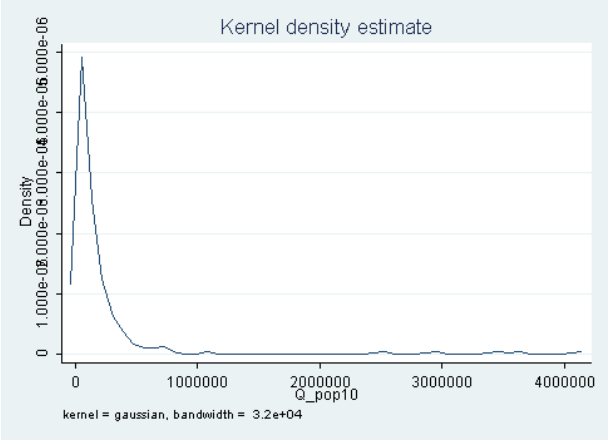


Table 23 shows that the standard deviation of population as a proportion of the national total increased, but not considerably, confirming that the data are consistent.

Table 23: Population (Quantec) Standard deviation

```
. summarize Q_pop_prop96 Q_pop_prop01 Q_pop_prop10
```

Variable	Obs	Mean	Std. Dev.	Min	Max
Q_pop_prop96	257	.3890934	.8382622	0	6.95
Q_pop_prop01	257	.3891128	.8801811	0	7.372
Q_pop_prop10	257	.3890973	.9443685	0	8.226

Even though some areas' population grew faster or slower than the national population growth rate, it seems that the areas kept their position or ranking in terms of their population share. This is anticipated and indicates consistency in data. Table 24 presents the outputs from Spearman's rank correlation test. Municipalities were ranked from largest to smallest per their share of the population and the rank correlation tests for changes in the ranking. The rank correlation coefficient shows a highly positive relationship indicating that the rankings of places over the periods 1996 and 2001, as well as 2001 and 2010 stayed more or less consistent.

Table 24: Population (Quantec) Spearman test

```
. spearman Q_pop_rank96 Q_pop_rank01 Q_pop_rank10
(obs=257)
```

	Q_po~k96	Q_po~k01	Q_po~k10
Q_pop_rank96	1.0000		
Q_pop_rank01	0.9977	1.0000	
Q_pop_rank10	0.9896	0.9932	1.0000

Table 25 and Table 26 shows the outputs from the variance ratio test for 1996 and 2001, as well as 2001 and 2010. The null hypothesis of the test is that the ratio of the standard deviations is one. The result shows a high probability that the ratio of the standard deviations is not equal.

Table 25: Population (Quantec) Variance ratio test: 1996 & 2001

```
. sdtest Q_pop_prop96 == Q_pop_prop01

Variance ratio test
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Q_pop_..	257	.3890934	.0522894	.8382622	.2861213	.4920655
Q_pop_..	257	.3891128	.0549042	.8801811	.2809915	.4972342
combined	514	.3891031	.0378729	.8586391	.314698	.4635083

```
    ratio = sd(Q_pop_prop96) / sd(Q_pop_prop01)                   f =   0.9070
Ho: ratio = 1                                 degrees of freedom = 256, 256

    Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.2177         2*Pr(F < f) = 0.4355           Pr(F > f) = 0.7823
```

Table 26: Population (Quantec) Variance ratio test: 2001 & 2010

```
. sdtest Q_pop_prop01 == Q_pop_prop10

Variance ratio test
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Q_pop_..	257	.3891128	.0549042	.8801811	.2809915	.4972342
Q_pop_..	257	.3890973	.0589081	.9443685	.2730911	.5051034
combined	514	.3891051	.0402243	.911949	.3100803	.4681298

```
    ratio = sd(Q_pop_prop01) / sd(Q_pop_prop10)                   f =   0.8687
Ho: ratio = 1                                 degrees of freedom = 256, 256

    Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.1304         2*Pr(F < f) = 0.2607           Pr(F > f) = 0.8696
```

Table 27 provides the growth rate of gross value added per region or locality.

Table 27: Growth rate of Gross Value Added, R million (GVA) – Quantec data

Area	1996		2001		2010		1996-2010
	Total	GR	Total	GR	Total	GR	Ave
South Africa	565 470	13.01	928 215	10.74	2 181 238	5.99	11.12
Western Cape	79 598	11.87	130 229	10.98	312 942	6.89	11.18
Eastern Cape	47 157	12.03	75 576	9.92	163 818	7.54	10.21
Northern Cape	12 392	7.13	21 269	9.74	49 981	4.55	11.09
Free State	33 341	17.57	48 547	7.12	114 862	8.78	10.59
Kwazulu-Natal	96 373	13.24	152 877	11.67	348 664	6.32	10.63
North West	36 011	17.92	60 432	11.00	148 839	4.02	12.07
Gauteng	189 642	12.00	310 698	9.18	737 779	7.53	11.11
Mpumalanga	39 228	16.14	64 993	13.37	153 833	0.98	11.59
Limpopo	31 729	11.57	63 595	17.37	150 518	0.33	12.76
City of Cape Town Metropolitan Municipality	58 104	12.27	95 599	10.12	225 771	6.65	11.12
eThekwini Metropolitan Municipality	51 832	11.92	84 219	11.29	181 940	5.32	10.29
Ekurhuleni Metropolitan Municipality	48 312	12.29	80 385	9.62	184 563	5.19	11.00
City of Johannesburg Metropolitan Municipality	68 010	13.00	117 218	10.07	285 078	7.15	11.77
Nelson Mandela Bay Metropolitan Municipality	18 765	11.53	28 861	2.84	51 482	2.70	8.38
City of Tshwane Metropolitan Municipality	48 323	11.30	76 033	8.72	187 465	11.39	11.03
Bojanala District Municipality	14 792	15.73	29 878	13.72	78 584	0.32	14.02
Moretele Local Municipality	1 345	11.49	1 895	6.27	4 652	8.33	10.16
Local Municipality of Madibeng	4 346	16.77	7 590	12.22	19 180	1.99	12.53
Rustenburg Local Municipality	6 550	16.42	15 749	15.88	41 945	-1.64	15.71
Kgetlengrivier Local Municipality	434	20.01	601	9.12	1 501	0.23	10.88
Moses Kotane Local Municipality	2 117	13.44	4 044	12.72	11 306	1.91	13.87
Ngaka Modiri Molema District	6 440	18.89	9 310	6.76	22 320	7.70	10.71
Ratlou Local Municipality	285	22.23	422	7.12	863	4.99	9.90
Tswaing Local Municipality	591	44.08	860	6.69	1 843	4.08	11.78
Mafikeng Local Municipality	3 267	15.16	4 823	6.79	11 171	8.05	10.31
Ditsobotla Local Municipality	1 458	18.31	2 034	7.71	5 828	9.02	11.85
Ramotshere Moiloa Local Municipality	840	19.10	1 171	4.91	2 614	6.89	9.89
Bophirima District Municipality	2 792	22.55	3 777	5.54	7 630	4.58	9.14
Kagisano Local Municipality	342	37.12	471	5.04	1 076	5.39	11.37
Naledi Local Municipality	809	20.07	1 013	3.43	2 094	6.22	8.54
Mamusa Local Municipality	365	32.73	494	8.16	1 079	2.82	10.53
Greater Taung Local Municipality	773	12.22	1 077	5.82	2 201	6.75	8.68
Molopo Local Municipality	97	64.41	143	2.51	168	-5.91	8.99
Lekwa-Teemane Local Municipality	405	22.19	579	7.83	1 011	-0.18	8.41
Dr Kenneth Kaunda District Municipality	11 987	19.14	17 467	10.07	40 306	9.73	10.54
Ventersdorp Local Municipality	285	48.59	432	8.29	1 044	4.00	13.44
Tlokwe Local Municipality	1 994	14.52	3 432	5.87	7 936	7.12	11.60
City of Matlosana	5 286	17.37	7 306	9.30	17 466	10.35	10.27
Maquassi Hills Local Municipality	524	33.34	771	12.62	2 193	2.98	13.35
Merafong City Local Municipality	3 899	20.62	5 526	13.73	11 666	12.61	9.87

Source: Quantec, 2011

As with Global Insight data, provinces such as Limpopo and the North West (as well as some of the district municipalities and local municipalities in the North West province) experience a GVA growth rate higher than the national average. While provinces such as KwaZulu Natal, where one expects more economic activity, show a slower growth rate. This can be explained by so-called convergence theories that predict convergence of per capita income levels between regions. Poorer regions or localities tend to catch up with richer ones, while the richer regions' or localities' economic growth stabilises over time. This does not necessarily mean that the areas with faster growth will have the largest share of national gross value added total. The gross value added as a percentage of the national total is presented below in Table 28.

Table 28: Gross Value Added, R million (GVA) as percentage of national total - Quantec data

Area	1996		2001		2010		1996-2010
	Total	Share	Total	Share	Total	Share	Ave
Western Cape	79 598	14.08	130 229	14.03	312 942	14.35	14.25
Eastern Cape	47 157	8.34	75 576	8.14	163 818	7.51	7.96
Northern Cape	12 392	2.19	21 269	2.29	49 981	2.29	2.26
Free State	33 341	5.90	48 547	5.23	114 862	5.27	5.38
Kwazulu-Natal	96 373	17.04	152 877	16.47	348 664	15.98	16.38
North West	36 011	6.37	60 432	6.51	148 839	6.82	6.49
Gauteng	189 642	33.54	310 698	33.47	737 779	33.82	33.80
Mpumalanga	39 228	6.94	64 993	7.00	153 833	7.05	6.88
Limpopo	31 729	5.61	63 595	6.85	150 518	6.90	6.60
City of Cape Town Metropolitan Municipality	58 104	10.28	95 599	10.30	225 771	10.35	10.41
eThekwini Metropolitan Municipality	51 832	9.17	84 219	9.07	181 940	8.34	8.89
Ekurhuleni Metropolitan Municipality	48 312	8.54	80 385	8.66	184 563	8.46	8.68
City of Johannesburg Metropolitan Municipality	68 010	12.03	117 218	12.63	285 078	13.07	12.66
Nelson Mandela Bay Metropolitan Municipality	18 765	3.32	28 861	3.11	51 482	2.36	3.02
City of Tshwane Metropolitan Municipality	48 323	8.55	76 033	8.19	187 465	8.59	8.43
Bojanala District Municipality	14 792	2.62	29 878	3.22	78 584	3.60	3.15
Moretele Local Municipality	1 345	0.24	1 895	0.20	4 652	0.21	0.21
Local Municipality of Madibeng	4 346	0.77	7 590	0.82	19 180	0.88	0.82
Rustenburg Local Municipality	6 550	1.16	15 749	1.70	41 945	1.92	1.61
Kgetlengrivier Local Municipality	434	0.08	601	0.06	1 501	0.07	0.07
Moses Kotane Local Municipality	2 117	0.37	4 044	0.44	11 306	0.52	0.44
Ngaka Modiri Molema District	6 440	1.14	9 310	1.00	22 320	1.02	1.04
Ratlou Local Municipality	285	0.05	422	0.05	863	0.04	0.04
Tswaing Local Municipality	591	0.10	860	0.09	1 843	0.08	0.09
Mafikeng Local Municipality	3 267	0.58	4 823	0.52	11 171	0.51	0.53
Ditsobotla Local Municipality	1 458	0.26	2 034	0.22	5 828	0.27	0.24
Ramotshere Moiloa Local Municipality	840	0.15	1 171	0.13	2 614	0.12	0.13
Bophirima District Municipality	2 792	0.49	3 777	0.41	7 630	0.35	0.41
Kagisano Local Municipality	342	0.06	471	0.05	1 076	0.05	0.05
Naledi Local Municipality	809	0.14	1 013	0.11	2 094	0.10	0.11
Mamusa Local Municipality	365	0.06	494	0.05	1 079	0.05	0.05
Greater Taung Local Municipality	773	0.14	1 077	0.12	2 201	0.10	0.11
Molopo Local Municipality	97	0.02	143	0.02	168	0.01	0.01
Lekwa-Teemane Local Municipality	405	0.07	579	0.06	1 011	0.05	0.06

Area	1996		2001		2010		1996-2010
	Total	Share	Total	Share	Total	Share	Ave
Dr Kenneth Kaunda District Municipality	11 987	2.12	17 467	1.88	40 306	1.85	1.90
Ventersdorp Local Municipality	285	0.05	432	0.05	1 044	0.05	0.05
Tlokwe Local Municipality	1 994	0.35	3 432	0.37	7 936	0.36	0.37
City of Matlosana	5 286	0.93	7 306	0.79	17 466	0.80	0.81
Maquassi Hills Local Municipality	524	0.09	771	0.08	2 193	0.10	0.09
Merafong City Local Municipality	3 899	0.69	5 526	0.60	11 666	0.53	0.58

Source: Quantec, 2011

As anticipated, the regions with the largest share of the national gross value added total are not the areas with the highest GVA growth rates. Gauteng, the Western Cape and KwaZulu Natal (the provinces in which most economic activity is located) have the largest share of gross value added, while the provinces and regions that experienced higher growth rates (such as Limpopo, Mpumalanga, the North West and its municipalities) only contribute a small percentage to the national gross value added.

There is persistence in the areas' share of the national GVA. This is also confirmed by the kernel density estimates of GVA in 1996, 2001 and 2010 (see Figure 17 to Figure 19. The figures show that the distribution of GVA did not change much over the years. The output is the author's own analysis generated in Stata.

Figure 17: GVA '96 kernel density - Quantec

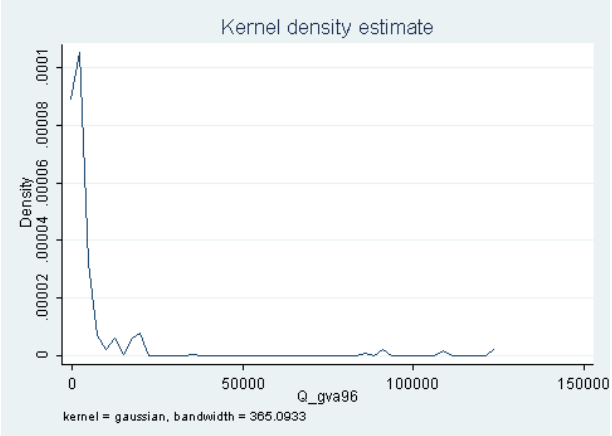


Figure 18: GVA '01 kernel density - Quantec

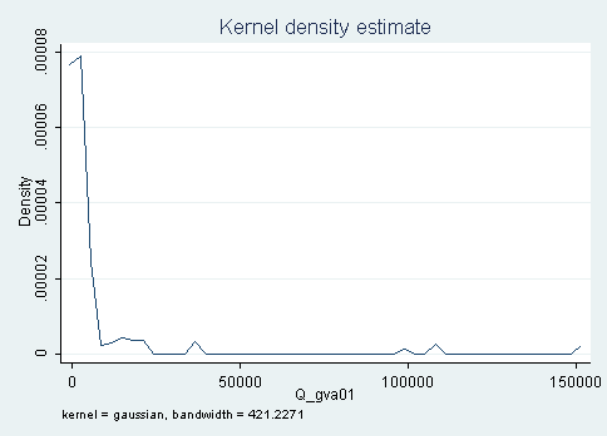


Figure 19: GVA '10 kernel density - Quantec

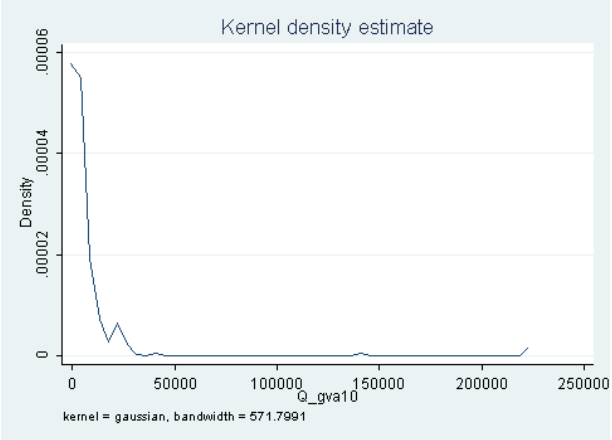


Table 29 shows that the standard deviation of the population as a proportion of the national total increased, but not by much, indicating that the data are consistent.

Table 29: GVA (Quantec) Standard deviation

```
. summarize Q_gva_prop96 Q_gva_prop01 Q_gva_prop10
```

Variable	Obs	Mean	Std. Dev.	Min	Max
Q_gva_prop96	257	.3890778	1.353527	0	11.76
Q_gva_prop01	257	.389144	1.392652	0	12.656
Q_gva_prop10	257	.3891206	1.440657	0	13.568

Even though some areas' GVA grew faster or slower than the national average, it seems that the areas kept their relative position or ranking in terms of their GVA share. This is anticipated and indicates consistency in data. Table 30 presents the outputs from Spearman's rank correlation test. Municipalities were ranked from largest to smallest per their share of the population and the rank correlation tests for changes in the ranking. The rank correlation coefficient shows a highly positive relationship indicating that the rankings of places over the periods 1996 and 2001, as well as 2001 and 2010 remained more or less consistent.

Table 30: GVA (Quantec) Spearman test

```
. spearman Q_gva_rank96 Q_gva_rank01 Q_gva_rank10
(obs=257)
```

	Q_gv~k96	Q_gv~k01	Q_gv~k10
Q_gva_rank96	1.0000		
Q_gva_rank01	0.9877	1.0000	
Q_gva_rank10	0.9688	0.9794	1.0000

Table 31 and Table 32 show the outputs from the variance ratio tests for 1996 and 2001, as well as 2001 and 2010. The null hypothesis of the test is that the ratio of the standard deviations is one. The result shows a high probability that the ratio of the standard deviations in 1996 and 2001 is equal, but not the ratio of the standard deviations in 2001 and 2010.

Table 31: GVA (Quantec) Variance ratio test: 1996 & 2001

```
. sdtest Q_gva_prop96 == Q_gva_prop01

Variance ratio test
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Q_gv~p96	257	.3890778	.0844307	1.353527	.2228106	.555345
Q_gv~p01	257	.389144	.0868713	1.392652	.2180706	.5602173
combined	514	.3891109	.0605115	1.37189	.2702301	.5079917

```
    ratio = sd(Q_gva_prop96) / sd(Q_gva_prop01)                   f =   0.9446
Ho: ratio = 1                                     degrees of freedom = 256, 256

    Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.3244         2*Pr(F < f) = 0.6488          Pr(F > f) = 0.6756
```

Table 32: GVA (Quantec) Variance ratio test: 2001 & 2010

```
. sdtest R_gva_prop01 == Q_gva_prop10

Variance ratio test
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
R_gv~p01	245	.4081551	.1002761	1.56957	.2106378	.6056724
Q_gv~p10	257	.3891206	.0898657	1.440657	.2121504	.5660909
combined	502	.3984104	.0671033	1.503474	.2665717	.530249

```
    ratio = sd(R_gva_prop01) / sd(Q_gva_prop10)                   f =   1.1870
Ho: ratio = 1                                     degrees of freedom = 244, 256

    Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.9122         2*Pr(F > f) = 0.1756          Pr(F > f) = 0.0878
```

In conclusion, it is evident that the data are not generated from aggregate GDP figures on the basis of a static algorithm as suggested by Fedderke and Wollnick (2008:2). There is no evidence of a simple breakdown of the national or provincial breakdown by fixed percentages per municipality. Sound methodologies are applied to estimate the indicators in the databases. The data from the two private sector databases show that growth rates differ between regions, with changes within the regions over time as well. Regions also maintained their shares relative to the national economy even though movement in growth rates are experienced. This is expected and therefore the data can be deemed reliable and of good quality.

4.4.3 Comparison

In this section, a comparison is made of sub-national data from constructed databases in South Africa and publically available data in South Africa. GVA and population indicators in Global Insight's REX and Quantec's Easydata are compared in the tables that follow. Table 33 shows that GVA estimates from Global Insight and Quantec differ from each other. This is expected since the companies would apply different methodologies to produce their estimates. The methodology applied by Quantec is not published, so it is difficult to provide specific reasons for the differences in the estimates.

Table 33: Comparing GVA (R million) in Global Insight's Regional Economic Explorer and Quantec's Easydata

Area	1996		2001		2009	
	REX	Quantec	REX	Quantec	REX	Quantec
Western Cape	88 362	79 598	144 586	130 229	336 234	312 942
Eastern Cape	50 744	47 157	81 896	75 576	181 080	163 818
Northern Cape	13 533	12 392	24 521	21 269	57 123	49 981
Free State	37 101	33 341	54 690	48 547	130 973	114 862
Kwazulu-Natal	104 404	96 373	168 927	152 877	386 004	348 664
North West	40 518	36 011	64 785	60 432	151 950	148 839
Gauteng	206 123	189 642	339 216	310 698	814 124	737 779
Mpumalanga	43 963	39 228	75 606	64 993	175 576	153 833
Limpopo	33 209	31 729	65 780	63 595	162 903	150 518
City of Cape Town Metropolitan Municipality	65 069	58 104	108 927	95 599	247 688	225 771
eThekwini Metropolitan Municipality	64 644	51 832	106 935	84 219	248 167	181 940
Ekurhuleni Metropolitan Municipality	43 759	48 312	64 782	80 385	154 587	184 563
City of Johannesburg Metropolitan Municipality	92 808	68 010	160 934	117 218	381 949	285 078
Nelson Mandela Bay Metropolitan Municipality	20 661	18 765	35 392	28 861	75 636	51 482
City of Tshwane Metropolitan Municipality	49 506	48 323	88 206	76 033	217 249	187 465
Bojanala District Municipality	14 791	14 792	32 958	29 878	88 086	78 584
Moretele Local Municipality	7 262	1 345	9 303	1 895	20 828	4 652
Local Municipality of Madibeng	2 683	4 346	3 536	7 590	7 522	19 180
Rustenburg Local Municipality	15 782	6 550	18 988	15 749	35 514	41 945
Kgetlengrivier Local Municipality	879	434	1 495	601	3 598	1 501
Moses Kotane Local Municipality	4 239	2 117	7 558	4 044	16 172	11 306
Ngaka Modiri Molema District	7 057	6 440	19 241	9 310	55 813	22 320
Ratlou Local Municipality	709	285	1 794	422	5 229	863
Tswaing Local Municipality	1 907	591	2 869	860	7 274	1 843
Mafikeng Local Municipality	756	3 267	927	4 823	1 991	11 171
Ditsobotla Local Municipality	441	1 458	499	2 034	971	5 828
Ramotshere Moiloa Local Municipality	3 880	840	4 953	1 171	11 309	2 614
Bophirima District Municipality	1 379	2 792	1 874	3 777	4 176	7 630
Kagisano Local Municipality	806	342	1 049	471	2 381	1 076
Naledi Local Municipality	398	809	481	1 013	994	2 094
Mamusa Local Municipality	781	365	895	494	1 905	1 079
Greater Taung Local Municipality	321	773	457	1 077	929	2 201
Molopo Local Municipality	601	97	832	143	1 865	168
Lekwa-Teemane Local Municipality	48	405	64	579	146	1 011
Dr Kenneth Kaunda District Municipality	534	11 987	806	17 467	1 683	40 306
Ventersdorp Local Municipality	272	285	344	432	730	1 044
Tlokwe Local Municipality	2 354	1 994	3 367	3 432	7 761	7 936
City of Matlosana	7 778	5 286	8 942	7 306	14 704	17 466
Maquassi Hills Local Municipality	359	524	544	771	1 187	2 193
Merafong City Local Municipality	5 020	3 899	5 791	5 526	11 131	11 666

Source: IHS Global Insight, 2011; Quantec, 2011

An interesting observation is that GVA estimates from Global Insight are generally higher than that of Quantec, while Quantec's population estimates are higher than that of Global Insight (as presented in Table 35).

Table 34 presents the outputs from Spearman's rank correlation test, comparing data from REX with that of Quantec. Municipalities were ranked from largest to smallest per their share of the population and the rank correlation tests for differences in the ranking. The rank correlation coefficient for each database shows internal consistency. There is a highly positive relationship for both datasets indicating that the rankings of places over the periods 1996 and 2001, as well as 2001 and 2010 remained more or less consistent in each of the databases. However, when comparing the two datasets it is obvious that the rankings between the datasets differ significantly as confirmed by the low-rank correlation coefficient.

Table 34: GVA Comparison (Spearman test)

```
. spearman R_gva_rank96 R_gva_rank01 R_gva_rank10 Q_gva_rank96 Q_gva_rank01 Q_gva_rank10
(obs=245)
```

	R_gv~k96	R_gv~k01	R_gv~k10	Q_gv~k96	Q_gv~k01	Q_gv~k10
R_gva_rank96	1.0000					
R_gva_rank01	0.9909	1.0000				
R_gva_rank10	0.9807	0.9929	1.0000			
Q_gva_rank96	0.2947	0.2966	0.3004	1.0000		
Q_gva_rank01	0.2977	0.3006	0.3053	0.9877	1.0000	
Q_gva_rank10	0.2918	0.2956	0.3034	0.9687	0.9796	1.0000

Table 35 shows population estimates from Global Insight and Quantec.

Table 35: Comparing population in Global Insight's Regional Economic Explorer and Quantec's Easydata

Area	1996		2001		2010	
	REX	Quantec	REX	Quantec	REX	Quantec
Western Cape	4 053 055	5 034 877	4 540 831	5 675 490	5 106 548	6 671 613
Eastern Cape	6 187 099	7 926 076	6 386 107	8 144 476	6 720 598	8 646 178
Northern Cape	981 090	1 649 089	1 035 204	1 713 985	1 138 183	1 754 656
Free State	2 659 535	3 527 689	2 790 242	3 641 055	2 840 974	3 771 802
Kwazulu-Natal	8 847 061	10 922 831	9 559 759	11 876 895	10 215 884	13 233 942
North West	3 019 084	3 515 788	3 233 346	3 855 722	3 464 953	4 198 129
Gauteng	8 227 355	10 228 294	9 187 557	12 356 448	10 070 497	14 586 880
Mpumalanga	3 143 918	3 865 907	3 442 199	4 242 546	3 756 236	4 628 310
Limpopo	4 662 272	5 752 994	4 970 373	6 254 096	5 465 235	6 831 026
City of Cape Town Metropolitan Municipality	2 616 725	3 160 420	2 903 193	3 571 526	3 221 082	4 344 561
eThekwini Metropolitan Municipality	2 817 420	3 577 919	3 114 379	3 911 611	3 371 729	4 594 921
Ekurhuleni Metropolitan Municipality	2 189 148	2 733 001	2 486 707	3 330 249	2 758 211	3 827 314
City of Johannesburg Metropolitan Municipality	2 821 606	3 546 548	3 204 711	4 367 312	3 532 939	5 403 335
Nelson Mandela Bay Metropolitan Municipality	974 447	1 246 167	1 036 818	1 297 846	1 143 025	1 408 130
City of Tshwane Metropolitan Municipality	1 829 350	2 253 703	1 999 193	2 675 881	2 164 281	3 251 675
Bojanala District Municipality	1 093 464	1 277 495	1 202 680	1 428 812	1 314 817	1 609 036
Moretele Local Municipality	177 523	203 891	182 432	216 469	185 436	230 315
Local Municipality of Madibeng	328 673	378 677	350 824	417 934	374 361	460 176
Rustenburg Local Municipality	319 210	377 742	393 279	457 678	469 175	568 624
Kgetlengrivier Local Municipality	34 011	42 873	37 145	46 924	39 875	51 030
Moses Kotane Local Municipality	234 048	274 312	239 000	289 807	245 969	298 891
Ngaka Modiri Molema District	707 001	842 323	771 162	920 869	843 119	1 007 814
Ratlou Local Municipality	100 162	118 301	105 552	126 164	112 513	129 986
Tswaing Local Municipality	93 269	115 608	115 786	133 156	129 981	117 248
Mafikeng Local Municipality	246 970	291 741	261 562	314 416	286 872	358 129

Area	1996		2001		2010	
	REX	Quantec	REX	Quantec	REX	Quantec
Ditsobotla Local Municipality	134 315	160 189	149 382	180 212	167 055	233 215
Ramotshere Moiloa Local Municipality	132 285	156 485	138 880	166 920	146 698	169 236
Bophirima District Municipality	429 875	530 707	436 541	548 891	444 922	518 006
Kagisano Local Municipality	87 002	110 781	89 924	116 308	93 079	112 124
Naledi Local Municipality	57 253	70 724	58 421	73 893	59 458	76 696
Mamusa Local Municipality	43 939	54 176	48 915	58 313	54 614	53 152
Greater Taung Local Municipality	189 250	219 753	184 011	220 881	178 276	206 373
Molopo Local Municipality	13 899	28 487	11 869	27 199	9 899	22 197
Lekwa-Teemane Local Municipality	38 532	46 786	43 400	52 298	49 596	47 464
Dr Kenneth Kaunda District Municipality	788 744	865 263	822 963	957 150	862 096	1 063 272
Ventersdorp Local Municipality	32 553	41 961	43 588	52 089	49 425	52 137
Tlokwe Local Municipality	131 380	141 815	130 385	147 791	138 876	153 074
City of Matlosana	347 000	379 914	364 993	427 896	378 344	483 544
Maquassi Hills Local Municipality	62 893	76 839	69 775	85 826	77 929	108 165
Merafong City Local Municipality	214 919	224 734	214 221	243 548	217 522	266 352

Source: IHS Global Insight, 2011; Quantec, 2011

Table 36 presents the outputs from Spearman's rank correlation test, comparing data from REX with that of Quantec. Municipalities were ranked from largest to smallest per their share of the population and the rank correlation tests for changes in the ranking. The rank correlation coefficient shows a highly positive relationship within both datasets indicating that the rankings of places over the periods 1996 and 2001, as well as 2001 and 2010 stayed more or less consistent. However, when comparing the two datasets it is obvious that the rankings between the datasets differ significantly as confirmed by the low-rank correlation coefficient.

Table 36: Population comparison (Spearman test)

```
. spearman R_pop_rank96 R_pop_rank01 R_pop_rank10 Q_pop_rank96 Q_pop_rank01 Q_pop_rank10
(obs=245)

             | R_po~k96 R_po~k01 R_po~k10 Q_po~k96 Q_po~k01 Q_po~k10
-------------+------------------------------------------------------
R_pop_rank96 |   1.0000
R_pop_rank01 |   0.9947   1.0000
R_pop_rank10 |   0.9784   0.9932   1.0000
Q_pop_rank96 |   0.3341   0.3324   0.3259   1.0000
Q_pop_rank01 |   0.3327   0.3323   0.3274   0.9979   1.0000
Q_pop_rank10 |   0.3316   0.3325   0.3284   0.9895   0.9929   1.0000
```

An attempt was made to compare data from the two private sector databases with data publically available from Stats SA. It should be noted however that data from Census 2001, Community Survey 2007 and the private sector databases are not fully comparable due to the boundary differences in each year. The purpose of the comparison is not to discredit any estimate, but rather to illustrate that there are differences in the three sets of estimates. The comparison is provided in Table 37.

Table 37: Comparing population in Global Insight's Regional Economic Explorer and Quantec's Easydata with Census 2001 and Community Survey 2007 data

Area	2001			2007		
	REX	Quantec	Census	REX	Quantec	Community Survey
City of Cape Town Metropolitan Municipality	2 903 193	3 571 526	2 893 251	3 135 386	4 100 594	3 497 101
eThekwini Metropolitan Municipality	3 114 379	3 911 611	3 090 117	3 320 108	4 382 800	3 468 087
Ekurhuleni Metropolitan Municipality	2 486 707	3 330 249	2 480 282	2 712 337	3 678 577	2 724 227
City of Johannesburg Metropolitan Municipality	3 204 711	4 367 312	3 225 810	3 471 993	5 075 798	3 888 182
Nelson Mandela Bay Metropolitan Municipality	1 036 818	1 297 846	1 005 776	1 114 171	1 377 652	1 050 934
City of Tshwane Metropolitan Municipality	1 999 193	2 675 881	1 985 984	2 134 692	3 072 022	2 345 909
Bojanala District Municipality	1 202 680	1 428 812	1 185 030	1 290 560	1 556 983	1 268 586
Moretele Local Municipality	182 432	216 469	177 907	184 314	225 984	182 414
Local Municipality of Madibeng	350 824	417 934	338 266	369 141	449 076	371 183
Rustenburg Local Municipality	393 279	457 678	395 539	453 590	536 394	449 771
Kgetlengrivier Local Municipality	37 145	46 924	36 476	39 390	49 915	37 791
Moses Kotane Local Municipality	239 000	289 807	236 842	244 126	295 614	227 427
Ngaka Modiri Molema District	771 162	920 869	762 988	827 117	984 671	798 783
Ratlou Local Municipality[19]	105 552	126 164	104 326	110 888	128 940	98 102
Tswaing Local Municipality	115 786	133 156	114 143	126 966	122 564	81 004
Mafikeng Local Municipality	261 562	314 416	259 478	281 164	345 672	290 226
Ditsobotla Local Municipality	149 382	180 212	147 602	163 157	218 737	200 150
Ramotshere Moiloa Local Municipality[20]	138 880	166 920	137 439	144 942	168 758	129 301
Bophirima District Municipality	436 541	548 891	439 681	443 040	526 220	354 557
Kagisano Local Municipality	89 924	116 308	96 387	92 464	113 434	75 946
Naledi Local Municipality	58 421	73 893	58 100	59 261	75 879	57 931
Mamusa Local Municipality	48 915	58 313	48 364	53 352	54 641	36 539
Greater Taung Local Municipality	184 011	220 881	182 167	179 399	209 410	144 820
Molopo Local Municipality	11 869	27 199	11 690	10 398	23 600	6508
Lekwa-Teemane Local Municipality	43 400	52 298	42 973	48 166	49 256	32813
Dr Kenneth Kaunda District Municipality	822 963	957 150	810 157	856 819	1 035 226	849985
Ventersdorp Local Municipality	43 588	52 089	43 082	48 166	52 537	36531
Tlokwe Local Municipality	130 385	147 791	128 357	137 199	151 517	124349
City of Matlosana	364 993	427 896	359 206	376 937	469 378	385780
Maquassi Hills Local Municipality	69 775	85 826	69 034	76 120	102 035	87465
Merafong City Local Municipality	214 221	243 548	210 478	218 398	259 760	215860

Source: IHS Global Insight, 2011; Quantec, 2011, StatsSA, 2011

A comparison of Global Insight, Quantec and Census data in 2001 shows that all three sets of estimates differ from one another for both years. Global Insight's estimates are closer to that of Stats SA's, while Quantec's estimates are generally higher than the other two estimates. One reason why these estimates are so different is the methodologies used to produce them. Stats

19 Ratlou Local Municipality was formerly known as Setla-Kgobi.

20 Ramotshere Moiloa Local Municipality was formerly known as Zeerust.

SA uses results from (infrequent) surveys and statistical methodologies, while Global Insight and Quantec can fill in the gaps by integrating different data sources and modelling the real world in combination with statistical information to produce estimates which may or may not be closer to the reality of the real economy than that of pure statistical estimates. Another reason is the underlying information that was used in the estimations. The private sector databases are constrained by confidentiality of information and have to rely on information that is available in the public domain only, while Stats SA has confidential and unpublished information available that could be used to produce estimates. The methodology used by Stats SA includes information from business entity level, whereas IHS Global Insight's information is compiled from an individual or household perspective. IHS Global Insight is of the view that geographic and sectoral information is more accurately captured on an individual basis, compared with entity-level information.

4.5 Summary and Conclusions

The purpose of this chapter was to explore and assess the sources of sub-national economic data in South Africa to gain insight into the reliability and validity of available data and suitability of the data for LED policymaking.

In terms of the objective of this study, this chapter aimed to provide information about publicly available economic data in South Africa, and the corresponding level of spatial disaggregation. Background information of South Africa's national statistics agency was provided and publicly available data in South Africa was systematically ordered. It was shown that some data from Stats SA is only available at provincial level. As a result of a lack of sub-national data, the private sector took the initiative and developed private sector databases (Global Insight and Quantec) using primary data to provide data at this level. However, some researchers have shared their concerns about the quality and reliability of the data provided by the private sector databases.

This chapter aimed to address these concerns by providing an analysis of the data from the Global Insight and Quantec databases. Population and GVA indicators of the two databases were analysed. The growth rates of the indicators per area over time, as well as of each area's share of the national total were presented and analysed to give an indication of the variation in the data per place over time and between places over the period. The following conclusions can be drawn from the analysis.

Firstly, it was found that per municipality or region there are changes in the indicators (GVA and population) over time that differs from the national growth rate. However, localities' share

relative to the national economy was persistent. Even though some areas' population or GVA grew faster or slower than the national average, it seems that the areas kept their relative position or ranking in terms of their relative share. The outcomes are as expected and based on geographical economic literature according to which localities will react differently to changes in the economy. Some localities will experience contraction of their economy while others will experience expansion. At the same time however there is persistence in the share of each locality relative to the national economy with little change in the rankings of places taking place over a 16-year period. The persistence of localities' share relative to the national economy was confirmed by kernel density estimates of GVA and population in 1996, 2001 and 2010. The distribution of GVA and population did not change much over the years. The Spearman test confirmed that the rankings of places stayed more or less consistent over the period 1996 to 2010.

Secondly, Global Insight and Quantec apply different methodologies to produce their estimates. A comparison of the sub-national data from the two databases revealed that the GVA estimates from Global Insight were generally higher than that of Quantec, while Quantec's population estimates were higher than that of Global Insight. An explanation of how Global Insight estimates their population and GVA figures was provided, but the methodology applied by Quantec is not published, so it is difficult to provide specific reasons for the differences in the estimates.

Thirdly, a comparison of the databases showed that even though rankings stayed consistent within each database, the rankings between the two databases differ significantly. It would therefore not be recommended to use a combination of data from the two databases when doing research or conducting an analysis with sub-national data.

Therefore, the results from the data analysis do not support the view that private sector databases are generated from aggregate GDP figures on the basis of a static algorithm' It seems that sound methodologies were applied in the estimation of indicators in the databases and that data is consistent and reliable. However, more research would be required into the determinants of change.

Chapter 5 concludes this study and offers recommendations for future research.

Chapter 5: Summary, Conclusions and Recommendations

This dissertation began with the observation that the challenges facing South Africa (such as low economic growth rate, high unemployment rate, high poverty rate and significant inequality) have a spatial dimension that has often been neglected. It was noted that the public and private sector require access to reliable sub-national data to support local economic development. Statistics South Africa collects and disseminates socio-economic data, but information about local economies is limited to two private sector databases. This dissertation set out to analyse the economic data available at municipal level in South Africa to yield insight to the validity and reliability of the available data and the suitability of the data for LED policymaking.

Chapter 2 reviewed the theories of the spatial structure of economic activities and the determinants of spatial economic growth and development to provide readers with an understanding of why location matters for economic growth and development, and by extension, why it is important to have accurate data of where it happens. This showed that the uneven spatial structure of economic activity is shaped by agglomeration forces. Agglomeration is explained by first-nature geography, second-nature geography and proximity. The propensity to agglomerate is a result of internal and external economies of scale generated by the joint action of increasing returns to scale internal to the firm, imperfect competition and transport costs. The chapter also showed that the mobility of labour and capital, and inter-industry linkages are the mechanisms through which agglomeration takes place. Another conclusion of the chapter was that transport costs have an effect on the agglomeration or dispersion of economic activities. Finally, it was observed that development has dimensions of density and distance which influence the formation of cities, and the flows of goods, capital, people, and ideas and therefore the spatial transformation of a region. The chapter showed the complexity of the processes driving local growth indicating that the private sector and policymakers need more than just local GDP numbers. Measures of the thickness of the labour market, local wages, linkages between firms and transport costs would all contribute to a greater understanding of local growth.

Chapter 3 focused on the South African space economy to determine to what extent economic growth across South Africa is determined by geography. The history of the location of economic activity in South Africa was presented in an attempt to illustrate the complexity of the location of economic activity in South Africa. An overview of the South African literature was also provided to show how researchers have approached the study of the space economy in South Africa in the past. The chapter showed that the South African space economy is characterised by significant

spatial inequality as a result of first-nature geography, complex history and different institutions. Apartheid policies caused inequality that resulted in inefficient land use, excessive transport costs and under-investment in infrastructure. It was also found that even though the country has been transformed from a protected inward-looking system to an open, globally competitive export-orientated economy, not all localities were able to benefit equally from the openness and growth that the economy experienced since 1994, leading to uneven economic growth between regions. In fact, spatial inequality has not improved since 1994. The National Development Plan identified strategies to mitigate the spatial effects of apartheid. Academic literature that has focused specifically on the geographical economics of South Africa emphasised the "lumpiness" of economic growth in South Africa, and suggested that spatial inequalities are quite persistent. Studies identified ways to ensure that more people (and localities) can benefit from spatial growth points in the country. These include: investment in human capital, investment in physical capital such as transport services and infrastructure, and investments in urban planning.

Chapter 4 reported the empirical analysis of the sub-national databases. The chapter aimed to provide information about publically available economic data in South Africa, and also to assess the validity and reliability of the data from privately constructed databases through comparisons of public data and through decomposition of the variation of data across municipalities and over time. It was found that, per municipality or region, there are changes in the indicators (GVA and population) over time that differs from the national growth rate. However, localities' share relative to the national economy was persistent. Even though some areas' population or GVA grew faster or slower than the national average, it seems that the areas kept their relative position or ranking in terms of their relative share. The outcomes are as expected and based on geographical economic literature according to which localities will react differently to changes in the economy. Some localities will experience contraction of their economy while others will experience expansion. At the same time however there is persistence in the share of each locality relative to the national economy with little change in the rankings of places taking place over a 16-year period. A comparison of the sub-national data from the two databases revealed differences in the estimates as a result of different methodologies applied. The comparison also showed that within each database rankings of places stayed consistent, but the rankings between the two databases differ significantly.

Therefore, the results from the data analysis suggest that researchers should not use a combination of data from the two databases when doing research or conducting an analysis with sub-national data. This dissertation also does not support the view that private sector databases

are generated from aggregate GDP figures on the basis of a static algorithm. It seems that sound methodologies were applied in the estimation of indicators in the databases but more research would be required into the determinants of change.

Scope for further research is two-fold. Firstly, there is a need for more reliable sub-national data. Public and private sector decision-makers need information and accurate data at sub-national level for planning and policy making purposes. Statistics South Africa has the responsibility of producing timely, accurate, and official statistics. As discussed in Chapter 4, most of Stats SA's demographic and social data is available at the sub-national level, but most of the economic data is only available at the sub-national level. The need therefore exists for Stats SA to produce official estimations of municipal-level economic activity. Secondly, further research is required into the construction of a sub-national database by utilising existing datasets such as the Labour Force Survey and Household Surveys. It is possible to have a closer look at the different drivers of agglomeration (innovation, suppliers of intermediate inputs, a thick labour market and infrastructure), specifically the local labour market and local infrastructure. An academic, open source dataset is required to produce such a database that can be vetted, applied and improved by all users.

Annexure A: Location of industries in South Africa (1900s)

This Annexure provides a detailed list of the location of industries in South Africa in the 1900s.

Table 38: Location of industries in South Africa in the 1900s

Sector/Industry	Activities	Location
Raw material	• Wattle bark grinding • Wool sourcing • Cotton ginning • Chaff cutting • Fellmongering	• Natal • Cape • Southern Transvaal

Stone, clay, cement, glass and lime	• Production of bricks and lime
	• Glass and glassware
	• Clay ware
		• Transvaal:
		  ○ Vereeniging
		  ○ Boksburg
		  ○ Olifantsfontein
		  ○ Pretoria
		  ○ Heidelberg
		• Cape:
		  ○ Port Elizabeth
		  ○ Piquetberg
		• Orange Free State:
		  ○ Bloemfontein
		• Natal:
		  ○ Durban
		  ○ Pietermaritzburg
		  ○ Talanca

Wood	• Saw mills
	• Carpentry works
	• Joinery works
	• Factories making baskets, brushes and brooms
		• Western Cape
		• Southern Transvaal
		• Natal:
		  ○ Durban
		  ○ Pinetown

Iron and steel	• Engineering
	• Machinery
	• Cutlery works
		• Transvaal
		  ○ Pretoria
		  ○ Vereeniging
		  ○ Benoni
		  ○ Johannesburg (ancillary industries)
		  ○ Rand (ancillary industries)
		  ○ Germiston (ancillary industries)
		• Natal
		  ○ Newcastle
		  ○ Durban (ancillary industries)
		  ○ Pinetown (ancillary industries)

Sector/Industry	Activities	Location
		• Cape ○ Port Elizabeth (ancillary industries)

Food and beverages	• Sugar milling and refining
	• Tobacco
	• Bread-, biscuit-, and cake making
	• Wheat and maize milling
	• Butter production
	• Sweet manufacturing
	• Canning and preserving of fruit, fish, meat and vegetables
		• Natal
		  ○ Woodstock
		  ○ Durban
		  ○ Pietermaritzburg
		• Cape
		  ○ Cape Town
		  ○ Port Elizabeth
		  ○ Malmesbury
		  ○ Darling
		  ○ Piquetberg
		  ○ Paarl
		  ○ Stellenbosch
		  ○ Wellington
		  ○ Worcester
		  ○ East London
		  ○ Luderitz Bay
		  ○ Lamberts Bay
		  ○ Steenberg's Cove
		  ○ Paternoster
		  ○ Saldanha Bay
		  ○ Table Bay
		  ○ Hout Bay
		• Southern Transvaal
		  ○ Johannesburg
		  ○ Germiston
		  ○ Pretoria
		• Orange Free State

Clothing and textiles	• Dress making and millinery
	• Clothing and tailoring
	• Dyeing and cleaning
	• Matting
	• Knitting
	• Bags, sacks, rope, cordage, twine
	• Blankets, rugs
		• Southern Transvaal
		  ○ Johannesburg
		• Western Cape
		  ○ East London
		  ○ Paarl
		  ○ Mowbray
		  ○ Wynberg
		• Natal
		  ○ Woodstock
		  ○ Durban

Books, paper and printing	• Book-, newspaper-, and job-printing
	• Stationary and stationers' goods
		• Western Cape
		  ○ Cape Town
		• Transvaal
		  ○ Johannesburg
		• Natal
		  ○ Durban

Sector/Industry	Activities	Location
Vehicles	• Automobile assembly factories • Repair work • Manufacturing of vehicle bodies	• Cape ○ Port Elizabeth
Ship- and boat building	• Construction of yachts, fishing boats, barges, vessels for harbour works • Repairs	• Cape town • Durban

Furniture	• Cabinets
	• Picture frames
	• Mattresses
		• Southern Transvaal
		  ○ Johannesburg
		• Cape
		  ○ Port Elizabeth

Chemicals, drug and paint	• Explosives
	• Fertilizers
	• Matches
	• Oil and grease
	• Candles and soap
	• Polish, paints and varnishes
	• Ink
	• Perfumery
		• Transvaal
		  ○ Modderfontein
		  ○ Witbank
		• Cape
		  ○ Somerset West
		  ○ Cape Town
		  ○ Observatory
		• Natal
		  ○ Umbogintwini
		  ○ Durban

Jewellery	• Diamond cutting • Diamond polishing	• Johannesburg

Power supply (Electricity)	• Electrification of mines
	• Railway electrification
		• Transvaal
		  ○ Vereeniging
		  ○ Witbank
		  ○ Brakpan
		  ○ Rosherville
		  ○ Pretoria
		  ○ Rand
		• Natal
		  ○ Durban
		  ○ Colenso
		• Cape
		  ○ Cape Town

Leather and leatherware	• Boots
	• Shoes
	• Tanned leather
		• Cape
		  ○ Port Elizabeth
		  ○ Rondebosch
		• Transvaal
		  ○ Pretoria

Building and contracting	• Painting and decorating • Signwriting • Waterworks • Sewage construction	• Johannesburg • Rand

Sector/Industry	Activities	Location

Diverse industries	• Rubber goods
	• Musical instruments
	• Whale oil
	• Toys
	• Starch
		• Transvaal
		  ○ Johannesburg
		  ○ Germiston
		• Natal
		  ○ Durban
		• Cape
		  ○ Cape Town
		  ○ Port Elizabeth
		  ○ Grahamstown

Source: Bosman (1937)

Annexure B: Key Statistics South Africa Data Sources

Stats SA produces a variety of statistics that can be grouped into datasets (Demography, Housing, Social welfare, Economy, Labour market, Education, Transport, Crime, and Health). Table 39 shows the various Stats SA data sources for each of the datasets.

Table 39: StatsSA Data Sources

Key dataset	StatsSA Data source	Relevant variables	Year
Demography	Census	• Age • Gender • Marital status • Population group • Language • Religion • Citizenship • Migration • Income • Household size	1996, 2001
	General Household Survey	• Age • Gender • Population group	2002 – 2009
	Mid-year population estimates	• Age • Gender • Population group	1995 - 2010
	Community Survey	• Age • Gender • Population group • Households	2007
	Labour Force Surveys	• Age • Gender • Population group • Marital status • Language • Migration	2000 – 2007 (6- monthly publications)

Key dataset	StatsSA Data source	Relevant variables	Year
	Quarterly Labour Force Surveys	• Age • Gender • Population group • Marital status • Language • Migration	Q1 2008 – Q4 2011
Housing	Census	• Household size • Dwelling type • Number of rooms • Access to piped water • Toilet facility • Energy source for cooking, lighting, heating • Ownership of household goods • Access to telephone • Refuse or rubbish disposal	1996, 2001
	General Household Survey	• Type of dwelling • Ownership of the dwelling and other assets • Electricity • Water • Sanitation • Environmental issues • Services	2002 – 2009
	Community Survey	• Access to service delivery	2007
	Labour Force Surveys	• Type of dwelling • Ownership of the dwelling and other assets • Services	2000 – 2007 (6- monthly publications)
	Quarterly Labour Force Surveys	• Type of dwelling • Ownership of the dwelling and other assets • Services	Q1 2008 – Q4 2011

Key dataset	StatsSA Data source	Relevant variables	Year
Social welfare	General Household Survey	• Welfare	2002 – 2009
	Community Survey	• Welfare	2007
	Labour Force Surveys	• Social grants	2000 – 2007 (6- monthly publications)
	Quarterly Labour Force Surveys	• Social grants	Q1 2008 – Q4 2011
Economy	Census	• Annual household income	1996, 2001
	Income & Expenditure Survey	• Age • Gender • Population group • Employment • Are of purchase of goods and services • Information regarding dwellings • Cost of housing • Cost of domestic workers • Food • Alcoholic and non-alcoholic beverages • Cigarettes • Personal care • Other household goods • Household services • Household fuel • Clothing and footwear • Furniture and appliances • Health services and medical requisites • Transport • Computing and telecom equipment	1995, 2000, 2005/06

Key dataset	StatsSA Data source	Relevant variables	Year
		• Cost of communication • Cost of education, reading matter and stationery • Cost of recreation, entertainment, sport • Cost of household production and consumption of home produce • Debts • Income from all sources	
	General Household Survey	• Expenditure	2002 – 2009
	Community Survey	• Economic activity	2007
	Labour Force Surveys	• Expenditure	2000 – 2007 (6- monthly publications)
	Quarterly Labour Force Surveys	• Expenditure	Q1 2008 – Q4 2011
Labour market	Census	• Employment status • Occupation	1996, 2001
	General Household Survey	• Activities related to work and unemployment • Trips taken in the 12 months prior to the survey interview	2002 – 2009
	Labour Force Surveys	• Activities related to work in the past seven days • Unemployment and non-economic activities • Main work activities in the past seven days • Agricultural activities • Uncompensated activities in the past seven days	2000 – 2007 (6- monthly publications)

Key dataset	StatsSA Data source	Relevant variables	Year
		• Migrant workers	
	Quarterly Labour Force Surveys	• Activities related to work in the past seven days • Unemployment and non-economic activities • Main work activities in the past seven days • Agricultural activities • Uncompensated activities in the past seven days • Migrant workers	Q1 2008 – Q4 2011
	Community Survey	• Labour force	2007
Education	Census	• School attendance • Level of education	1996, 2001
	General Household Survey	• Education	2002 – 2009
	Community Survey	• Education	2007
	Labour Force Surveys	• Education • Training • Literacy	2000 – 2007 (6- monthly publications)
	Quarterly Labour Force Surveys	• Education • Training • Literacy	Q1 2008 – Q4 2011
Transport	Census	• Travel to school or work	1996, 2001
	General Household Survey	• Transport	2002 – 2009
	Labour Force Surveys	• Transport	2000 – 2007 (6- monthly publications)
	Quarterly Labour Force Surveys	• Transport	Q1 2008 – Q4 2011

Key dataset	StatsSA Data source	Relevant variables	Year
Crime	National Victims of Crime Survey	• Experiences of crime • Patterns and extent of crime • Types of crime • Reporting of crime • Perceptions of police and police services	1998
Health	Census	• Births • Deaths • Disability	1996, 2001
	General Household Survey	• Health • Disability	2002 – 2009
	Community Survey	• Mortality • Disability	2007

Source: Compiled by author based on information from StatsSA, 2011

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