AN ANALYSIS OF REGIONAL EMPLOYMENT DYNAMICS IN SOUTH AFRICA

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ABSTRACT

This paper analyses the change in regional employment in South Africa, a country with high regional employment disparity. It identifies factors contributing to the employment change and studies heterogeneous trends by gender and industry. The paper uses a shift-share decomposition approach to analyse 354 magisterial districts using the 1996 and 2001 population census data. The census data shows that magisterial districts vary considerably in terms of employment change over the period. The main finding of the study is employment change depends largely on the region's competitiveness for the majority of magisterial districts. Furthermore, the results show that the services sector, specifically the wholesale and retail industry, was the main driver of national and regional employment change.

Based on the results, this paper recommends that industrial policy redirect towards regional development and the expansion of growth-enhancing and labour-absorbing industries to depressed regions to bring about convergence. In addition, improvement of regional factors specifically physical and social infrastructure is required to attract industries to regions with low employment growth.

Keywords: Regional employment; Shift-Share; South Africa
JEL: R15; J21

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1. Introduction

International interest in the growth of regional economies within countries and their contribution to the national economy fuelled largely by persistent regional disparity has grown in the past 25 years. Researchers and policy makers are concerned about the regional distribution of economic activity and labour outcomes. The objective to achieve balanced growth across regions requires an understanding of the sources of this regional variation. The paper is concerned about regional employment disparities within countries. OECD (2005) found that regional employment disparities within is often greater than across countries particularly in Europe and North America. While a considerable body of international literature has provided empirical evidence showing large and persistent within country regional employment variation as well as the drivers of regional employment change (Mitchell & Carlson, 2003; Cheng, 2011 and Matlaba et al., 2012), this area of research in the context of Sub-Saharan African countries is limited.

Although there is substantial literature on regional economies and the distribution of economic activity in South Africa, few studies have investigated sources of regional employment change. South Africa is characterised by chronic unemployment. Almost a third of the economically active population is unemployed, the official unemployment rate is 29.8% (Census, 2011). This high unemployment rate puts South Africa as one of the countries with the highest unemployment rates in the world. To address this issue of unemployment, it is important to examine regional employment dynamics. Therefore this study aims to decompose the source of regional employment change into national growth effects, industry-mix effects and regional competitive effects to analyse their influence on evolving patterns of employment change across regions. The objective of the study is to profile regional employment change in South Africa between 1996 and 2001 and the key drivers thereof. The main research question of the study is: how has regional employment changed in South Africa between 1996 and 2001 and what are the main contributing factors to the change? To address the main research question, the study will answer the following sub-questions:

(a) What are the main sources of the regional employment change in South Africa between 1996 and 2001?

(c) Do the main drivers of the change differ by gender?

(d) Which industries are driving regional employment change?

The study extends existing literature in the three ways. First provides insight into the main drivers of regional employment change in South Africa. This is achieved by applying the classic shift-share and Population Census data and decomposing the change in regional employment between 1996 and 2001 to decompose regional employment change into national effects, industry-mix effects and regional competitive effects. Second the study will be applied to magisterial districts across nine industries as classified by the one-digit SIC code. Third, decomposes the sources of regional employment change by gender. The results obtained from the analysis reveal that industry composition and region-specific factors play are more significant role in job creation at the magisterial district level. Policy implication of the study is the promotion targeted regional and industry development towards regions with slow employment growth.

The choice of period is based on three factors. Firstly, the Population Census data provides employment and industry variables at a disaggregated level only in 1996 and 2001. Secondly, the time period is crucial in the South African history as it covers the period shortly after independence. As a result the study is able to analyse and understand what the newly democratically elected government was able to accomplish at the onset of democracy in terms of employment creation and regional development. Thirdly, this period allows for the analysis of the effect of South Africa's entry into the World Trade Organisation (WTO) and the effect of the subsequent tariff reduction on national and regional employment. South African industries were heavily protected pre-1994, and the reduction of tariffs exposed local producers to strong competition from international producers. Using data from this time period allows an investigation into how employment demand was affected by this increased competition. The study will also be extended to 2011[4], by analysis the change between 2001 and 2011. This will provide a deeper understanding on the change in regional employment over two time periods.

The paper is structured as follows: section two provides the background and overview on industries and regional economies. Section three presents the theoretical framework and section four discusses the empirical literature. The data is discussed in section five and section six presents the shift-share decomposition method. Section seven provides the empirical results and section eight provides the conclusion.

[4] Industry variable for 2011 has not yet been released by StatsSA.

2. Background and Overview

Political stability, relatively more inclusive economy, and the lifting of sanctions are some of the benefits of democracy since 1994. However this progress was met with subdued economic growth and low employment growth rate. Du Plessis and Smit (2006) argue that unfavourable initial conditions (pre-1994), restricted the anticipated rapid growth in the post-Apartheid era. These conditions include, among others, international financial crises, low levels of international trade, moderate consumer demand, poor education, lack of skills and unemployment. Bhorat and Cassim (2004) attribute the modest growth improvements to the decline in gross capital formation, slow growth in aggregate demand, poor international competitiveness, and declining productivity growth.

Empirical research attributes the slow employment growth to some supply side factors including poor education, a skills shortage and the lack of experience (Leibbrandt et al., 2010 and Pauw et al., 2006). Other studies have emphasised regulatory impediments to employment creation. Following the end of Apartheid, South Africa implemented new labour policies and legislation including: the Labour Relations Act of 1995, the Basic Conditions of Employment Act of 1997, the Employment Equity Act of 1998, the Skills Development Act of 1998 and the Skills Development Levies Act of 1999 (Leibbrandt et al., 2010). In addition, wage bargaining councils were introduced whereby trade unions negotiate with employers on matters related to wages, working conditions and employee benefits on behalf of workers (Bhorat et al., 2007). These labour regulations increased the administrative burden on firms particularly Small, Medium and Micro Enterprises (SMMEs) causing them to substitute labour with capital (Kingdon & Knight, 2005 and Nattrass & Seekings, 2012). Nattrass and Seekings (2012) also argue that the extension of the wage bargaining agreements to all firms in an industry has prevented the emergence of low-wage labour-intensive firms.

Demand side factors include international trade and technological progress. International trade has increased competition for local firms while technological progress has resulted in skills-upgrading. These two demand factors have also contributed to the reduced demand of low and semi-skilled labour.

2.1 South African Spatial Economy

There is huge disparity in terms of economic activity, growth and employment across provinces, metropolitans, municipalities, magisterial districts, cities and towns. The issues of

unequal spatial growth post-independence has gained considerable focus by policy makers and researchers over the years. This is largely due to the Apartheid policies such as the homeland policies and Group Areas Act which restricted the movement of labour and unequal development of areas. Apartheid reinforced the spatial imbalance by developing major cities at the expense of the homelands and other remote areas. According to Bosker and Krugell (2006) the Apartheid system encouraged the development of inefficient industries coupled with inefficient land use, excessive transport costs, and under-investment in transport infrastructure, telecommunications and electric power in homelands.

Naudé and Krugell (2003) show that around 82% of GDP is produced by only 20% of the areas in the country, the more developed parts of the country. Moreover, the richest 20% of areas had an average per capita income of R25 277 compared to R5 452 in the poorest 20% of areas in 2000 (Naudé and Krugell, 2003).

The spatial economy is also characterised by increased urbanisation. The United Nations (2001) reported the level of urbanisation in South Africa to be around 58% in 2001. Population in the largest 21 urban areas grew by about 14% per annum (from approximately 18.4 million to 21.1 million) between 1996 and 2001 (SACN, 2004). Urban areas have been found to have high economic growth, lower unemployment but high inequality relative to the national average (SACN, 2004).

South Africa's six largest cities include Johannesburg, Ekurhuleni metropolitan, Durban, Cape Town, Pretoria (known as Tshwane metropole) and Port Elizabeth (known as Nelson Mandela metropole)[5] (Naudé, 2010 and Naudé & Krugell, 2003). These cities gained their prominence through trade, mining, favourable climate as well as Apartheid's policies which promoted development of these area (Lipton, 1989 and Feinstein, 2005).

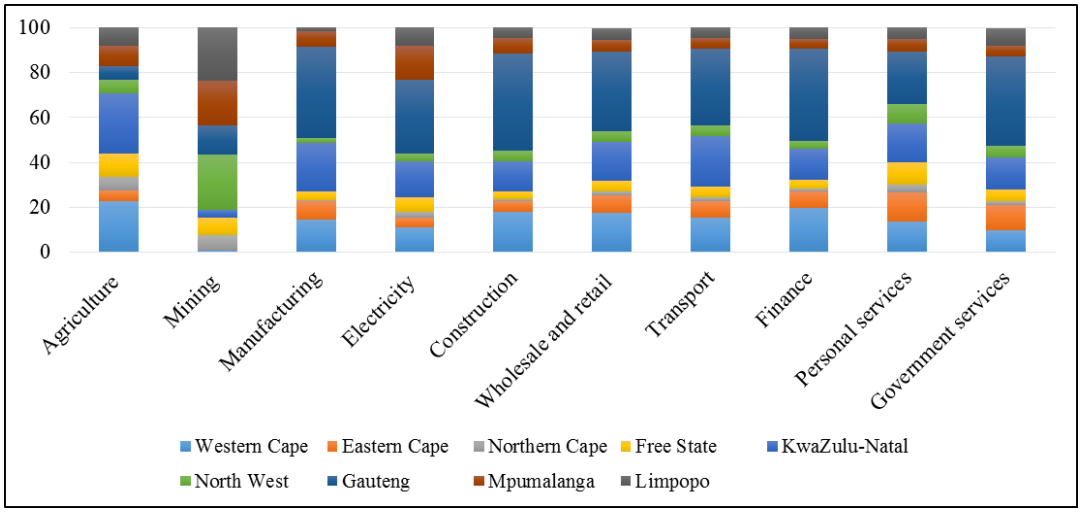
Figure 1 presents the provincial industry[6] distribution as of 2011. The figure shows that Gauteng has the largest share the most of the industries with the exception of mining and

[5] The study will refer to the cities by their previous names because it is focusing on the period between 1996 and 2001. The new names came into effect in the past decade.

[6] StatsSA classified industries as follows: 1. Agriculture: Agriculture; hunting; forestry and fishing. 2. Mining: Mining and quarrying. 3. Manufacturing. 4. Electricity: Electricity; gas and water supply. 5. Construction: Construction. 6. Wholesale and retail: Wholesale and retail trade. 7. Transport: Transport; storage and communication. 8. Finance: Financial; insurance; real estate and business services. 9. Personal services. 10. General government services.

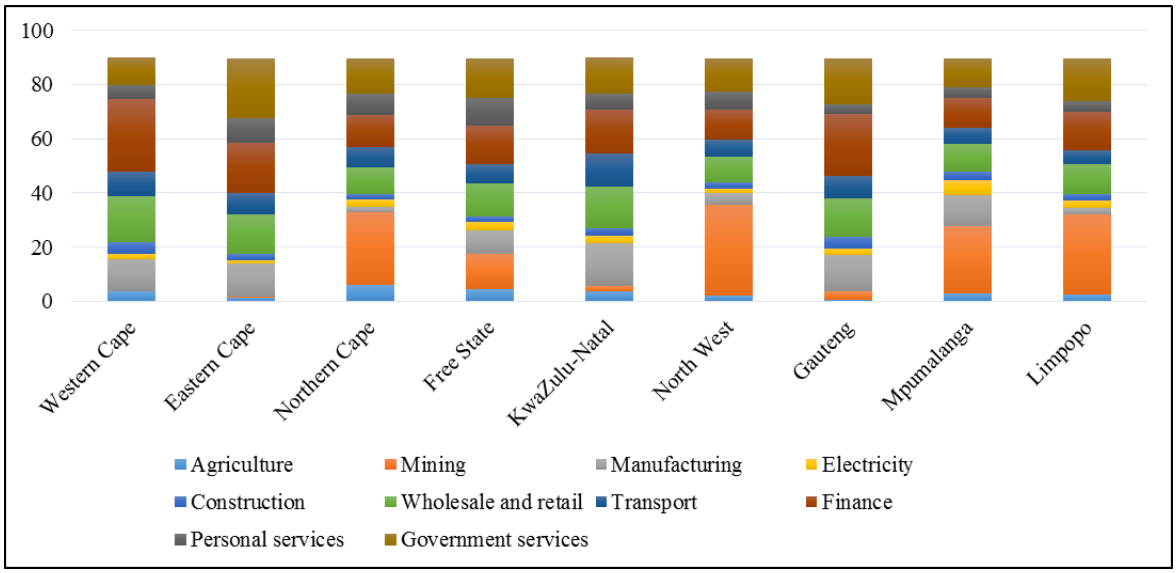
agriculture. The North West has the largest mining activity (24.8%) and Kwa-Zulu Natal has the largest share of agriculture activity (26.8%). Economic activity is restricted mainly in the Northern Cape and Eastern Cape Provinces. These province have the lowest share of economic activity across all the ten industries.

Figure 1: Provincial distribution of economic activity (%): 2011



Source: StatsSA

Figure 2: Provincial economy by industry: 2011



Source: StatsSA

An overview of the within province industry composition as of 2011 is presented in Figure 2. Finance accounts for the largest share in the Western Cape, KwaZulu-Natal and Gauteng. While the Northern Cape, North West, Mpumalanga and Limpopo are dominated by the mining

industry. The general government services constitute the largest share of industries in the Eastern Cape and Free State. The mining industry is almost negligible in the Western Cape (0.3% of total activity in the province) and Eastern Cape (0.2%). With the wide industry variation across provinces, it is plausible that there is also within province variation.

2.2 Employment trends

One of the major socio-economic challenges facing South African is high and persistent unemployment and slow rate of employment creation. Table 1 presents the employment evolution between 1996 and 2001. The table shows that national employment declined by 5.3%. While female employment grew by a modest 0.8%, male employment fell by 9.4% over the same period. National industry[7] employment growth was largely driven by wholesale and retail industry with a growth of around 20.6%, followed by the finance industry growing at a rate of about 17.9% and the manufacturing industry which grew by around 7.7%. The remaining seven industries experienced a decline in employment growth. Industries with the largest decline include mining which contracted by around 34.7%, electricity had a negative growth of about 38.5% and agriculture decreased by around 60.1%. This provides evidence of employment growth disparities across gender and across industries.

Table 1: Employment Growth: 1996 – 2001

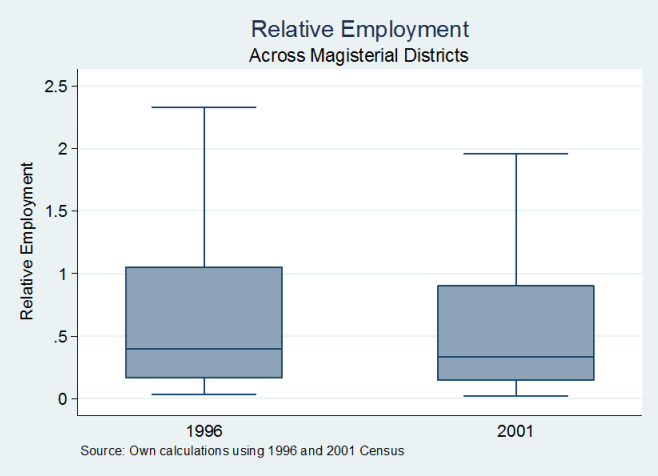
	1996	2001	Growth
National	810 092	697 368	-13.9%
Male	484 932	399 621	-17.6%
Female	325 160	297 747	-8.4%
Agriculture	163 386	65 171	-60.1%
Mining	46 943	30 664	-34.7%
Manufacturing	80 519	86 753	7.7%
Electricity	9 476	5 825	-38.5%
Construction	49 084	42 127	-14.2%
Wholesale and retail	98 141	118 335	20.6%
Transport	43 193	35 880	-16.9%
Finance	61 317	72 266	17.9%
Other services	258 033	240 347	-6.9%

Source: Own Calculations using 1996 and 2001 Census

[7] For the purposes of the study, industries are classified by the 1-digit SIC code as follows: 1. Agriculture: Agriculture; hunting; forestry and fishing. 2. Mining: Mining and quarrying. 3. Manufacturing. 4. Electricity: Electricity; gas and water supply. 5. Construction: Construction. 6. Wholesale and retail: Wholesale and retail trade. 7. Transport: Transport; storage and communication. 8. Finance: Financial; insurance; real estate and business services. 9. Other services: Community; social and personal services.

The observed employment variation across gender and industry also exists across magisterial district. The distribution of employment across magisterial districts is presented in Figure 3. Relative employment is estimated by dividing each magisterial districts' employment by the average national employment.

Figure 3: Box Plot of Relative Employment across Magisterial Districts



Relative employment which is equal to one means that the magisterial districts had employment equal to the national average. The mean and median for the overall population was 1.17 and 0.40 in 1996 dropping to 0.93 and 0.33 in 2001, respectively. In 1996 Pearston in the Eastern Cape Province had the lowest relative employment of 0.03 and Johannesburg in the Gauteng Province had the largest with 13.40. Franserburg in the Northern Cape Province was the lowest in 2001 with 0.02 and Johannesburg had the largest relative employment of 13.05. This shows that the gap between the lowest and highest relative employment widened between 1996 and 2001, increasing the disparity across magisterial districts.

Figure 4 presents the distribution of relative employment across magisterial districts by gender. The mean and median of male relative employment dropped from 1.29 and 0.47 in 1996 to 1.06 and 0.35 in 2001 respectively. While Johannesburg had the highest relative male employment of about 15.19 in 1996 and 14.42 in 2001, magisterial districts with the lowest values was Pearston with 0.04 in 1996 and Noupoort in the Northern Cape 0.02 in 2001. Female relative employment had a mean of 0.86 and median was 0.30 in 1996 which fell to 0.79 and the median remained the same at 0.28 in 2001. Pretoria, in the Gauteng Province, had the highest relative employment for female in 1996 and 2001 with 11.80 and 11.67 respectively.

The magisterial districts with the lowest female relative employment in 1996 was Pearston with 0.03 and Franserburg 0.02 in 2001.

Figure 4: Box Plot of Relative Employment across Magisterial Districts by gender

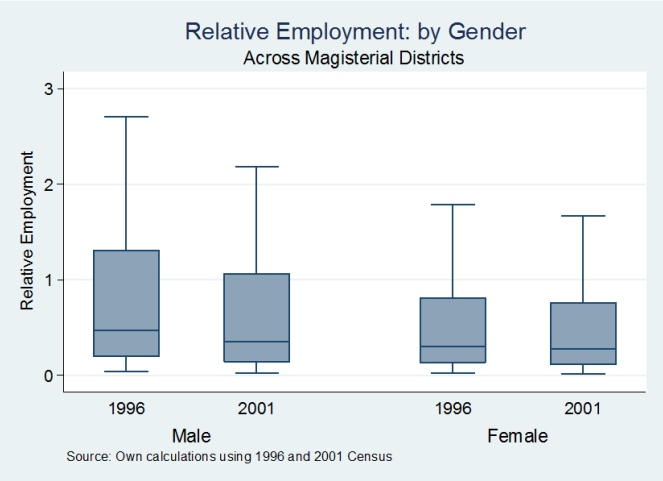
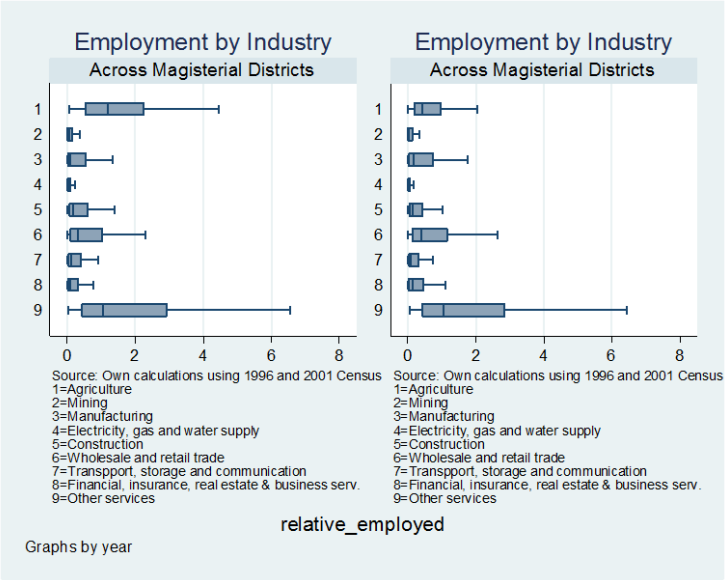


Figure 5 presents relative employment across magisterial districts by industry. The figure reveals that in 1996 relative employment mean across magisterial district for the agriculture, wholesale and retail as well as other services industries was above one. In 2001, the largest employers were the manufacturing, wholesale and retail as well as other services industries. The wholesale and retail industry was the main driver of employment in both years.

Figure 5: Box Plot of Relative Employment by industry across Magisterial Districts



Source: Own calculations using 1996 and 2001 Census

3. Theoretical Framework

This section discusses the theoretical framework for the study. The distribution of economic activity is best explained by the New Economic Geography (NEG) theory. The focus on unbalanced growth across space has been reinforced over the past two decades by Krugman (1991), Venables (1999) and Fujita et al. (2001).

The main assumptions of the NEG theory include imperfect competition and increasing returns to scale (Krugman, 1991). The core idea of the theory is that geography determines the level of economic activity. The theory explains that physical geography or location play a significant role in the agglomeration of economic activity to regions mainly because of lower transport costs (Brakman et al., 2001). Firms agglomerate in regions where there are large markets and are in close proximity to ports and borders (Fujita et al, 2001). Such regions will provide firms with increased demand for goods and lower transport costs compared to remote regions. Labour will also migrate to regions with high economic activity. The agglomeration of firms to certain regions allows for inter-industry linkages which come in a form of economies of scale (Venables, 1999). These linkages foster close relationship between industry players. Accompanying the relocation and agglomeration of firms is labour migration to regions with high demand for labour, higher wages and wider variety of goods.

Therefore, disparity between regional economies is a consequence of the interaction between transactions costs (including transport costs), increasing returns to scale, factor mobility and factor endowments across regions. These factors form a hierarchy of regions with cities at the top (providing a large variety of goods and services) with towns and villages at the bottom having limited supply (Krugell, 2014).

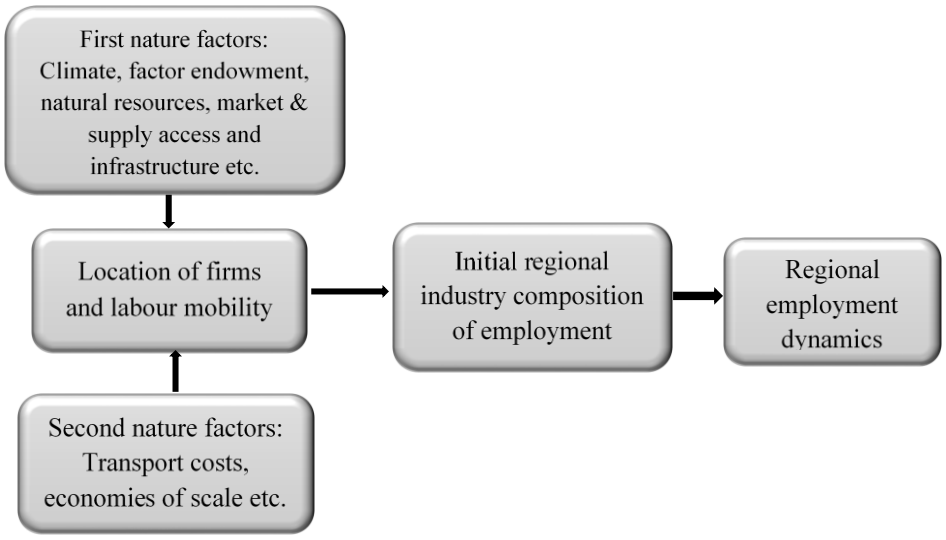
Criticism of the theory include the fact that it does not incorporate social, cultural, institutional factors because it is mathematically modelled (Martin and Sunly, 1996). Martin (1999) argues that the theory does not provide complete results as it ignores the region's history (in terms of initial conditions) and path dependence. Martin (1999) criticises the theory for also not employing the correct definition of "regions" or "locations". He argues that the theory defines "regions" or "locations" as theoretical point and not actual communities thus limiting the understanding of spatial economies (Martin, 1999). Other critics argue that the theory ignores firm competition within regions and spill over effects across regions (Cochrane, 2011).

Although the theory has some shortcomings, critics concede that the theory provides adequate understanding of geographical (regional) economies.

3.1 Conceptual Framework

The conceptual framework for the study is explained by Figure 6. The analysis of regional employment dynamics begin with what Cochrane (2011) terms first and second nature features. First nature features consist of mainly climate, factor endowments, natural resources and accessibility to markets (Cochrane, 2011) while second nature features determine the spatial interaction of economic agents. These features such as transportation costs and economies of scale are some of the main contributors to the decision making process of economic agents when deciding where to locate. The location of firms and labour in turn form the regional industry composition. Regional composition of employment together with changes in the structure of the economy result in the expansion of some industries and contraction of other, causing employment gains or losses to regions. The unequal distribution of industries across regions leads to variation in regional employment growth.

Figure 6: Conceptual Framework



4. Empirical Literature Review

There is extensive literature on regional economies globally including Mitchell & Carlson (2003), Brox and Carvalho (2008) and Matlaba et al. (2012). There is consensus in these studies that employment growth in a large number of regions is driven mainly by the industry-mix and regional factors. A small number of regions followed the national employment growth trend.

In South Africa empirical evidence has been provided by Nel (2002), Krugell and Naudé (2005), Naudé et al. (2009), Kleynhans & Sekhobela (2011) and Kleynhans & Classen (2012), to name a few. The evidence provided by these studies show that there are some regions in South Africa that remain marginalised. Economic activity continues to be concentrated in few regions.

4.1 International Literature

There is growing interest in regional economy as a result of differentials in industrial and regional composition of employment. Most of the empirical studies which investigated regional economies employed the Shift-Share analysis as the preferred empirical method (Mitchell & Carlson, 2003; Brox & Carvalho, 2008, Cheng, 2011 and Matlaba et al., 2012).

Mitchell and Carlson (2003) analysed regional employment growth rates in Australia for the period 1985 to 2003. They found that the region-specific factors played a significant role in employment growth for non-metropolitan areas while metropolitan areas benefited from a favourable industry structure (Mitchell and Carlson, 2003). In addition, only 2 regions in Australia had positive national effect, that is, employment growth in these regions was proportional to the national average (Mitchell and Carlson, 2003). The authors propose a new paradigm in policy making which they term "spatial Keynesianism" which call for government funds to be distributed spatially, focusing on regions which have an unfavourable industry structure or inadequate regional factors. For such regions, Mitchell and Carlson (2003) suggest that spending should be geared towards improving physical and social infrastructure.

Brox and Carvalho (2008) contributed to empirical literature by analysis regional labour markets in Canada using various age-gender cohorts in the Shift-Share analysis. The study covered the period between 1986 and 1995. One of the main findings of the study was that younger workers had an advantage over adult workers in most regions when labour force is adjusted (Brox and Carvalho, 2008). The study also found that regional competitiveness had a predominantly negative effect on the employment of younger workers (both male and female) in the Atlantic region while adult female workers had a positive competitive effect (Brox and Carvalho, 2008). When regions and gender cohorts are aggregated, the study shows that adult workers were more employed than younger or older age cohorts (Brox and Carvalho, 2008). Moreover, the competitive share by gender results shows that employment of female workers was higher than male workers.

A study on employment change across states in Brazil was done by Matlaba et al (2012). The study was done for 27 states between 1981 and 2006. The main finding in this study was that employment growth in underdeveloped states was mostly attributed to the regions' comparative advantage, a combination of the appropriate industry-mix and competitiveness (Matlaba et al, 2012). The national effects component had very little effect on regional employment growth. Matlaba et al (2012) extended the literature by examining the industry-mix and regional competitiveness components using the explanatory spatial data analysis (EDSA). They found a positive association of the two components and thus providing evidence of agglomeration of industries (Matlaba et al, 2012). Furthermore the authors followed Nazara and Hewing (2004) by exploring the role of spatial autocorrelation on regional employment growth. The results of the Spatial Shift-Share decomposition revealed that spatial spill over effect and spatial competitive effect were the main contributors of employment growth for the northern and middle-west regions (Matlaba et al, 2012). The authors also found that differences in initial conditions which favoured the core states in terms of concentration of economic activity in those states would have a permanent effect on the periphery states.

4.2 South African Literature

Empirical literature at a sub-national level in South Africa has covered a broad range of topics including labour market outcomes, demographics, urbanisation, inequality, poverty and migration. Some of these studies focus only on one region, for example Kleynhans & Sekhobela (2011) and Kleynhans & Classen (2012) focused the North West province whereas Yu and Nieftagodien (2008) performed a study on poverty and migration in the Khayelitsha/Mitchells' Plain Area in the Western Cape and Lund and Ardington (2006) investigated the concept of security using data collected in Kwamsane in the Kwa-Zulu Natal province. Based on the reviewed literature there are a few studies that have analysed regional employment changes and the key drivers of this change at a magisterial level.

Of relevance to this study is Krugell and Naudé (2005) as well as Kleynhans & Sekhobela (2011) and Kleynhans & Classen (2012) mainly because these studies have analysed regional economic activity. Krugell and Naudé (2005) investigated the sources of economic growth at a magisterial district level from 1998 to 2002 using Regional Economic Focus (REF) which is compiled by Global Insight Southern Africa. The main finding of the study is the determinant of regional growth include distance from local and international markets lead to firm agglomeration (Krugell and Naudé, 2005). The study found no evidence of convergence across

regions. This study supports the analysis into regional economies, in particular regional employment dynamics.

Studies that have used the shift-share decomposition in the South African context include Kleynhans & Sekhobela (2011) and Kleynhans & Classen (2012). Kleynhans and Sekhobela (2011) employed the method and Rex database from Global Insight Southern Africa to investigate the value-added production in the manufacturing industry within the Southern District municipality in the North West province between 1996 and 2006. The study found that the industry-mix in the region had a negative effect on value-added production while the national effect had an overwhelmingly positive effect (Kleynhans and Sekhobela, 2011).

Extending the shift-share analysis in South Africa, Kleynhans & Classen (2012) evaluated the job creation and economic growth potential of the manufacturing industry in the North West province from 1996 to 2006 using the Rex database to compare with the Platinum Spatial Development Initiative (SDI). The Platinum SDI is a corridor between the North West and Botswana which is aimed at promoting economic activity. The authors found evidence that the SDI had higher economic growth relative to the rest of the province. Employment growth in the SDI was not significantly different from the rest of the province and was mainly driven by the industry-mix and regional competitive effects.

This study deepens the empirical analysis of regional employment change by employing the classic shift-share method across all the magisterial districts in South Africa. Furthermore, the study extends the literature by analysing regional employment change by gender. Lastly the study will use alternative definition of shift-share decomposition components.

5. Data Sources

The study employed the 1996 and 2001 South African Population Census, 10% sample for the analysis. The Censuses are a national representative cross-sectional surveys released by Statistics South Africa. Three Censuses have been conducted in 1996, 2001 and 2011. The advantage of the Census data is that (a) it has a large number of observations, (b) it has detailed regional information, (c) it provides detailed information on employment status, gender and industry in which people work.

The study defines a region as the magisterial districts in which people resided. This level of analysis will provide adequate regional heterogeneity and it is the common level of unit of analysis for both periods. The magisterial district of employment is only available for 1996 with more than half of the individuals (62.1%) in 1996 lived and worked in the same magisterial district.

There are 9 provinces, 52 districts, 8 metropolitans, 234 local municipalities and 354 magisterial districts in South Africa. The Census data contains 3 621 201 and 3 725 655 observations for 1996 and 2001 respectively. Using the official definition[8] of employment, the 1996 Census data shows that there were 810 092 employed individuals and the 2001 Census data contains 767 180 employed individuals of the working age population. Some individuals in the 2001 sample did not adequately define which industry they worked in, 69 812 individuals and were therefore dropped from the final sample.

Our final sample contained 810 092 employed individuals of which 59.9% are male and 40.1% are female in 1996 and 697 368 employed individuals with 57.3% of those being male and 42.7% being female in 2001. Descriptive statistics presented in table 2. Mean age in the sample is 37 years both years. Individuals residing in urban areas constitute 73% and 76% of the sample for 1996 and 2001 respectively. Coloureds account for 12.5% and 13.1% of the sample while Indians/Asians account for 4.2% and 4.3%, Whites constitute 20.6% and 18.4% and Blacks comprise of 61.8% and 64.2% in 1996 and 2001 respectively. Gauteng contained the largest percentage of employed individuals, 28.5% in 1996 and 29.7% in 2001. KwaZulu-Natal and the Western Cape were the second largest province with 16.9% and 15.6% in 1996 to 15.5% and 16.2% in 2001. The Northern Cape had the least employed people in the sample with 2.3% in both years. The proportion of employed individuals with degrees in the sample dropped from 11% in 1996 to 6.1% in 2001. In 1996, other services industry had the largest share of employed individuals (20.1%), followed by agriculture (20.1%) and wholesale and retail (12.1%). Other services remained the largest employer in 2001 with a share of 34.5% of employed individuals, followed by wholesale and retail (17%) and manufacturing (12.4%).

[8] The official definition of employment (also referred to as narrow definition) stems from official unemployment. The narrow definition of unemployment includes individual that (a) are not working; (b) looking for work and are available to work; and (c) have taken active steps to look for work or be self-employed. As a result this study applies the official definition of employment for individuals that are working only.

Table 2: Descriptive Statistics

1996							2001					
Variable	Obs	Mean	Std. Dev.	Min	Max		Variable	Obs	Mean	Std. Dev.	Min	Max
Magisterial district	810 092	522.963	245.869	101	931		Magisterial district	697 368	531.300	250.945	101	931
Eastern Cape	810 092	0.088	0.283	-	1		Eastern Cape	697 368	0.082	0.274	-	1
Northern Cape	810 092	0.023	0.149	-	1		Northern Cape	697 368	0.023	0.150	-	1
Free State	810 092	0.078	0.268	-	1		Free State	697 368	0.063	0.243	-	1
KwaZulu-Natal	810 092	0.169	0.375	-	1		KwaZulu-Natal	697 368	0.155	0.362	-	1
North West	810 092	0.081	0.273	-	1		North West	697 368	0.082	0.274	-	1
Gauteng	810 092	0.285	0.452	-	1		Gauteng	697 368	0.297	0.457	-	1
Mpumalanga	810 092	0.063	0.242	-	1		Mpumalanga	697 368	0.069	0.254	-	1
Limpopo	810 092	0.058	0.234	-	1		Limpopo	697 368	0.067	0.250	-	1
Rural	810 092	0.269	0.443	-	1		Rural	697 368	0.244	0.430	-	1
Age	810 092	36.639	10.500	15	64		Age	697 368	37.370	10.486	15	64
Female	810 092	0.401	0.490	-	1		Female	697 368	0.427	0.495	-	1
Coloured	810 092	0.125	0.331	-	1		Coloured	697 368	0.131	0.338	-	1
Indian or Asian	810 092	0.042	0.201	-	1		Indian or Asian	697 368	0.043	0.203	-	1
White	810 092	0.206	0.404	-	1		White	697 368	0.184	0.388	-	1
Other	810 092	0.009	0.096	-	1		Other	-	-	-	-	-
Primary	810 092	0.027	0.162	-	1		Primary	697 368	0.079	0.269	-	1
High school	810 092	0.689	0.463	-	1		High school	697 368	0.675	0.468	-	1
Diploma	810 092	0.016	0.125	-	1		Diploma	697 368	0.073	0.260	-	1
Degree or higher	810 092	0.110	0.313	-	1		Degree or higher	697 368	0.061	0.239	-	1
No schooling	810 092	0.046	0.209	-	1		No schooling	697 368	0.096	0.295	-	1
Employed	810 092	1.000	-	1	1		Employed	697 368	1.000	-	1	1
Mining	810 092	0.058	0.234	-	1		Mining	697 368	0.044	0.205	-	1
Manufacturing	810 092	0.099	0.299	-	1		Manufacturing	697 368	0.124	0.330	-	1
Electricity	810 092	0.012	0.108	-	1		Electricity	697 368	0.008	0.091	-	1
Construction	810 092	0.061	0.239	-	1		Construction	697 368	0.060	0.238	-	1
Wholesale and retail	810 092	0.121	0.326	-	1		Wholesale and retail	697 368	0.170	0.375	-	1
Transport	810 092	0.053	0.225	-	1		Transport	697 368	0.051	0.221	-	1
Finance	810 092	0.076	0.265	-	1		Finance	697 368	0.104	0.305	-	1
Other services	810 092	0.319	0.466	-	1		Other services	697 368	0.345	0.475	-	1

Source: Own Calculation using 1996 and 2001 Population Census

6. Econometric Methodology

To meet the objective of determining regional employment change and drivers of the change thereof, the study employed the Classic Shift-Share analysis. The Shift-Share is pioneered by Dunn (1960) and is a regional analysis tool used for decomposing the sources of regional employment growth. Its advantage lies in the accessible data requirements[9] which provide relatively easily-interpretable results (Kleynhans and Sekhobela, 2008). Even though the decomposition enables us to investigate the region's competitiveness resulting from the industry-mix and specific regional factors, this method ignores international trade and inter-regional trade (Dinc and Hayes, 2005). It is important to bear in mind that the Classic Shift-Share method is a descriptive method and therefore does not provide a causal effect.

[9] The shift-share methodology requires data of national employment, employment for each industry and regional/magisterial district employment.

The Classic Shift-Share technique has been criticised for being static in nature and not provide insight into the evolution of regional employment (Barff and Knight, 1988). Additionally, the fact that the analysis does not predict causality and only provides an indication of the direction of influence of the various components to regional employment growth (Patterson, 1991 and Ray, 1995) is also a weakness of the technique. The most popular criticism is the association of industry-mix effect and the competitive effect. Although the shift-share analysis method has some drawbacks, it remains a popular and useful tool for analysing regional employment.

The Classic Shift-Share decomposes the change in employment into three main components namely: national growth effect, industry-mix effect and regional competitive effect. Regional growth is directly linked to national growth therefore diversion of regional growth from national growth can be attributed to the composition and growth of the industries in the regions (Cochrane, 2011). Given that industries are not uniformly distributed across regions, this led to unequal regional growth. Regions that are richly endowed with industries that are growing nationally are likely to experience higher employment growth compared to regions that have few and declining industries. In addition, region-specific factors such as geography, climate infrastructure and institutions, among others, provide comparative advantage which results in increased employment change.

The classic shift-share decomposes the sources of the change in employment as follows:

$$\Delta E_{im}^{t} \equiv E_{im}^{t} - E_{im}^{t-1} \equiv NE_{im}^{t} + IM_{im}^{t} + CE_{im}^{t} \quad (1)$$

Where:

E_{im}^{t}= employment in the i^{th} industry in the m^{th} magisterial district (md) at the end period (t).

E_{im}^{t-1} = employment in the i^{th} industry in the m^{th} md at the initial period (t-1).

NE_{im}^{t}= national growth effect on industry *i* in the m^{th} md between initial period and end period.

IM_{im}^{t}= industry-mix effect on industry *i* in the m^{th} md between initial period and end period.

CE_{im}^{t}= competitive effect on industry *i* in the m^{th} md between initial period and end period.

The dependent variable is the change in employment and represents the total number of employment opportunities added or lost in the region as a net effect of national growth, industry mix and regional competitive components.

The national growth effect measures the share of the regional industry's growth which is explained by the national employment growth. The component shows the hypothetical employment change if a region had grown at the national growth rate. The national growth effect is defined by the following two equations:

$$NE_{im}^{t} = E_{im}^{t-1} g^{t} \quad (2)$$

$$g^{t} = (E^{t} - E^{t-1})/E^{t-1} \quad (3)$$

Where:

E^{t} = national employment at the initial period.

E^{t-1} = national employment at the end period.

g^{t}= growth rate in total national employment between initial period and end period.

Equation (2) defines the national growth effect (NE) for each magisterial districts in each industry as a product of initial employment in magisterial district *m* in industry *i* and total national employment growth rate.

The industry-mix effect (IM) represents the growth share of employment which is explained by the industry composition in that region and reflects regional distribution of industries. For example, a region with a "favourable" or "appropriate" mix of industries (industries which are growing fast nationally) is likely to experience rapid growth in employment. Specifically, if a region has a large share of industries which are growing fast (or slow) nationally, it will have a positive (or negative) industrial mix component (Cheng, 2011). The following equations define the IM:

$$IM_{im}^{t} = E_{im}^{t-1}(g_{i}^{t} - g^{t}) \quad (4)$$

$$g_{i}^{t} = (E_{i}^{t} - E_{i}^{t-1})/E_{i}^{t-1} \quad (5)$$

g_{i}^{t} represents growth rate of national employment on industry *i* between initial period and end period.

Equation (4) estimates the industry-mix effect using initial employment in magisterial district *m* in industry *i* and the difference between national industry employment growth rate and total national employment growth rate.

The regional competitive effect (CE) measures the part of employment growth that is due to region specific factors which contribute to regional industries growing faster or slower than national industries. It reflects the hypothetical regional employment growth had the regional industries grown at the national industry rate. Regional competitive effect is defined as follows:

$$CE_{im}^{t} = E_{im}^{t-1}(g_{im}^{t} - g_{i}^{t}) \quad (6)$$

$$g_{im}^{t} = (E_{im}^{t} - E_{im}^{t-1})/E_{im}^{t-1} \quad (7)$$

g_{im}^{t} estimates the growth rate of employment on industry *i* in md *m* between initial period and end period.

Equation (6) defines the regional competitive effect as a product of initial employment in magisterial district *m* in industry *i* and the difference between regional industry employment growth rate and national industry employment growth rate.

Drawing on the NEG theory and empirical literature, the hypotheses of the study are: (a) industry-mix and regional competitiveness components are the main sources of regional employment change in South Africa. Implying that industry composition and region-specific factors are responsible for deviation of regional employment away from national employment. In addition, this would suggest that regions with high employment change have either a large share of industries that are growing nationally or comparative advantage in those industries or both. (b) The key drivers of regional employment change will be vary across gender mainly because the study has shown variation in employment between male and female. It is likely that the sources of regional employment also differ between across gender. (c) Wholesale and retail, finance and manufacturing industries are the main sources of regional employment change drawing on the evidence of national industry employment change presented in table 1.

7. Empirical Results

The section provides empirical results of the Classic Shift-Share analysis, the Alternative Shift-Share Analysis and robustness checks. We identify the major drivers of regional employment change by decomposing the change in employment into national effects, industry-mix effects and regional competitive effects.

7.1 Regional Employment Change

Before discussing the magisterial shift-share results, it is important to analyse the national results to gain insight about the drivers of national employment growth. The analysis of national employment change was achieved by aggregating magisterial district results. The results are presented in table 3 and show that regional competitive effect and the industry-mix counteracted the huge negative effect of national growth. These results suggest that if the regions had followed the national trend, 112 677 jobs would have been lost. However, the reasonably favourable industry-mix and regional factors contributed to the creation of 19 and 98 jobs respectively. The share of employment change is calculated by dividing each component by initial employment. The contribution shows that the national effect accounts for 13.9% of the decline in employment while industry-mix effects account for 0.002% and regional competitive effect contributed 0.012% of the gains in employment. The main concern in employment creation and the results show that the regional competitive effect is the main driver of employment creation.

Table 3: National Shift-Share Results

	NE	IM	CE	Total Change
Employment Change	-112677	19	98	-112559
Contribution	-13.909%	-0.002%	0.012%	-13.895%

Source: Own calculation using 1996 and 2001 Census

Decomposing the aggregate results by magisterial districts, we find that the regional competitive effect continues to be the main contributor to regional employment creation. The statistics of the results are presented in table 4. Only the regional competitive component has a positive mean while the national growth effect and industry-mix effect were negative. Regional competitive effect on average accounts for about 8.7% of the positive employment change. On average, the industry-mix accounted for 9.2% and national growth effect accounted for 13.9% of the reduction in regional employment. The maps showing the distribution of regional competitive effect and industry-mix effect is provided in annexure 2. The darker colours show magisterial districts that had the highest employment change as a result of these components and lighter colours show the magisterial districts with the least or negative employment change. It is evident from the maps that regional competitive effect contributed to employment creation in more magisterial districts compared to the industry-mix effect. A map on the national growth effect is not provided as this component resulted in negative employment change.

Table 4: Regional Shift-Share Results

Share	NE	IM	CE	Total Change
Mean	-0.139	-0.092	0.087	0.144
Std dev.	0.001	0.106	0.250	0.230
Min	-0.139	-0.350	-0.650	-0.818
Max	-0.126	0.141	1.654	1.351

Source: Own calculation using 1996 and 2001 Census

7.2 Employment Change by gender

The decomposition national employment change by gender shows that the effects of the shift-share components is heterogeneous for male and female. Even though all the components are negative regarding male employment change, the regional competitive effect has a less negative effect, accounting for 0.7% of the decline in male employment. National growth effect continues to be the largest contributor to the drop in employment, accounting for 12.7%. On the other hand, both industry-mix and regional competitive effects had a positive effect on employment change. The industry-mix is the main driver of female employment creation, and accounts for 7.8% of the jobs created. The regional competitive effect accounts for 1.1% becoming the second most significant driver of female employment change.

Table 5: National Results

Male	NE	IM	CE	Total Change	Female	NE	IM	CE	Total Change
Empl. change	-67747	-11521	2151	-77117	Empl. change	-44930	11541	-2052	-35442
Contri-bution	-14.0%	-2.4%	0.4%	-15.9%	Contri-bution	-13.8%	3.5%	-0.6%	-10.9%

Source: Own calculation using 1996 and 2001 Census

Regional shift-share results by gender show the same trend as the national results as shown in table 6. Regional competitive effect emerged as the main driver for regional employment change for both male and female.

Table 6: Regional Results

Male (Share)	NE	IM	CE	Total Change	Female (Share)	NE	IM	CE	Total Change
Mean	-0.14	-0.14	0.08	-0.20	Mean	-0.13	-0.01	0.10	-0.04
Std dev.	0.06	1.88	0.29	0.31	Std dev.	0.08	0.22	0.33	0.36
Min	-0.30	-0.61	-0.94	-1.2	Min	-0.37	-0.86	-1.03	-1.67
Max	-0.003	0.22	1.65	1.52	Max	0	0.34	1.85	1.74

Source: Own calculation using 1996 and 2001 Census

7.3 Industry Composition Results

The part of the paper investigates the main sources of employment change by industries. Table 7 presents the share of each industry in total national employment in 1996 and 2001 and the change in the share of the industry. The results show only four out of nine industries contributed to employment creation, namely: manufacturing, wholesale and retail, finance and other services. Three out of four of these industries (wholesale and retail, finance and other services) are in the services sector or non-tradable sector, reflecting a structural shift away from the tradable towards the non-tradable sector.

Table 7: National Industry Composition

Industry	Share_96	Share_01	Change
Agriculture	20.2%	9.3%	-10.8%
Mining	5.8%	4.4%	-1.4%
Manufacturing	9.9%	12.4%	2.5%
Electricity	1.2%	0.8%	-0.3%
Construction	6.1%	6.0%	0.0%
Wholesale and retail	12.1%	17.0%	4.9%
Transport	5.3%	5.1%	-0.2%
Finance	7.6%	10.4%	2.8%
Other services	31.9%	34.5%	2.6%

Source: Own calculation using 1996 and 2001 Census

7.4 Shift-Share Classifications

To summarise the Classic Shift-Share results, Table 8 provides the classification criteria as adopted from Mitchell and Carlson (2003). The classification shows that regions in groups 1 to 3 are growing faster than the national average and regions in group 4 to 6 are falling behind the nation average. Regions with a negative IM have a concentration of static or declining industries. According to Mitchell and Carlson (2003), a negative CE indicates weak social and productive infrastructure.

Table 8: Shift-Share Groups

Group	**Condition**	**Interpretation**
1	Both IM and CE positive	Regional growth exceeds national average which is fuelled by industry composition and regional factors providing advantages.
2	Positive IM > Negative CE	Regional growth exceeds national average. Industry composition of employment is offsetting unfavourable region specific factors.

Group	Condition	Interpretation
3	Positive CE > Negative IM	Regional growth exceeds national average with regional competitiveness offsetting unfavourable industry composition.
4	Positive CE < Negative IM	Regional growth lagging behind than national average but regional factors offset unfavourable industry composition.
5	Positive IM < Negative CE	Regional growth slower than national average. Favourable industry composition offsetting unfavourable regional factors.
6	Both IM and CE negative	Regional growth slower than national average with unfavourable industry composition and regional factors.

The results are provided in Table 9. Group 3 has the most magisterial districts (124 out of 354), followed by group 6 with 83 and group 4 with 66 magisterial districts. The results also show that 159 of magisterial districts belong to group 1 to 3 and grew in excess of national employment while more than half of the magisterial districts (195) had employment growth of less than the national average.

Table 9: Classification of Magisterial Districts according to Classic Shift-Share Results

Shift-Share Classification	Frequency	Percent	Cummulation
Group 1	28	7.91	7.91
Group 2	7	1.98	9.89
Group 3	124	35.03	44.92
Group 4	66	18.64	63.56
Group 5	46	12.99	76.55
Group 6	83	23.45	100
Total	354	100	

Source: 1996 and 2001 Census

8. Conclusion

The study utilised the Shift-Share analysis to decompose the sources of regional employment change at a magisterial district level between 1996 and 2001. The study has shown that the South Africa's unique history has contributed to the unequal regional employment growth in terms of the initial development of regional economies and the facilitation of regional industries. The study focused on the fact that regional employment dynamics in South Africa are brought about by regional industry composition. Regions can be classified into two broad categories in terms of employment change, (a) regions that grew faster than national average as a result of the appropriate industry-mix and/or regional factors and (b) regions that grew

below national average because of the industry-mix and/regional factors which slowed the rate of employment creation. The majority of the regions fall into the second category. These regions require targeted policies to improve the industry and regional factors.

The results of the analysis showed that regional competitiveness is the main contributor to regional employment change for the majority of the magisterial districts implying that regional factors have a positive influence on regional employment change. Future research can focus on identifying the specific regional factors that are driving regional competitiveness in South Africa. The second most important source of regional employment change is the region's industry-mix. Regions with the higher share of industries that were growing faster nationally, experienced higher employment change. The study also found that employment change was predominantly in the services sector (particularly wholesale & retail trade and financial, insurance, real estate & business services) and to a lesser extent, the manufacturing industry. Therefore we do not reject the hypothesis that industry-mix effect and regional competitive effect are the main sources of employment change. Furthermore, we also do not reject the hypothesis that national and regional employment change was mainly driven by wholesale and retail, finance and manufacturing industries.

The results suggest that both national and regional factors contribute to employment creation and growth. However given the dynamics in South Africa, with the majority of regions lagging behind national growth, we see that the industry structure and region-specific factors are dominant. The results imply that regional and industry development should be made a priority.

Policies should be targeted at improving social infrastructure in terms of improving education and skills as well as physical infrastructure and institutions in marginalised regions. Together these improvements will attract industries in the peripheral regions which is likely to bring about balanced growth.

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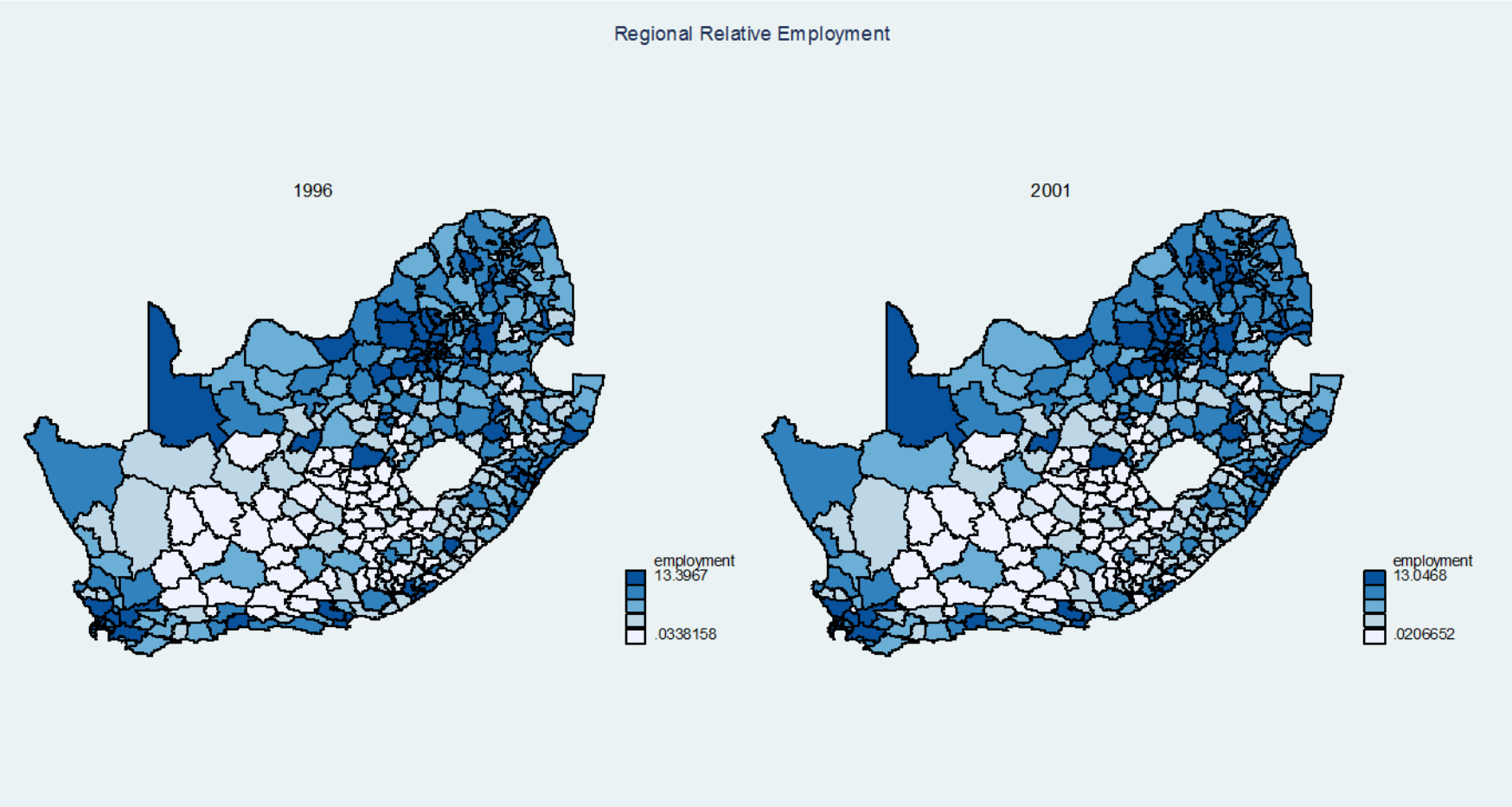
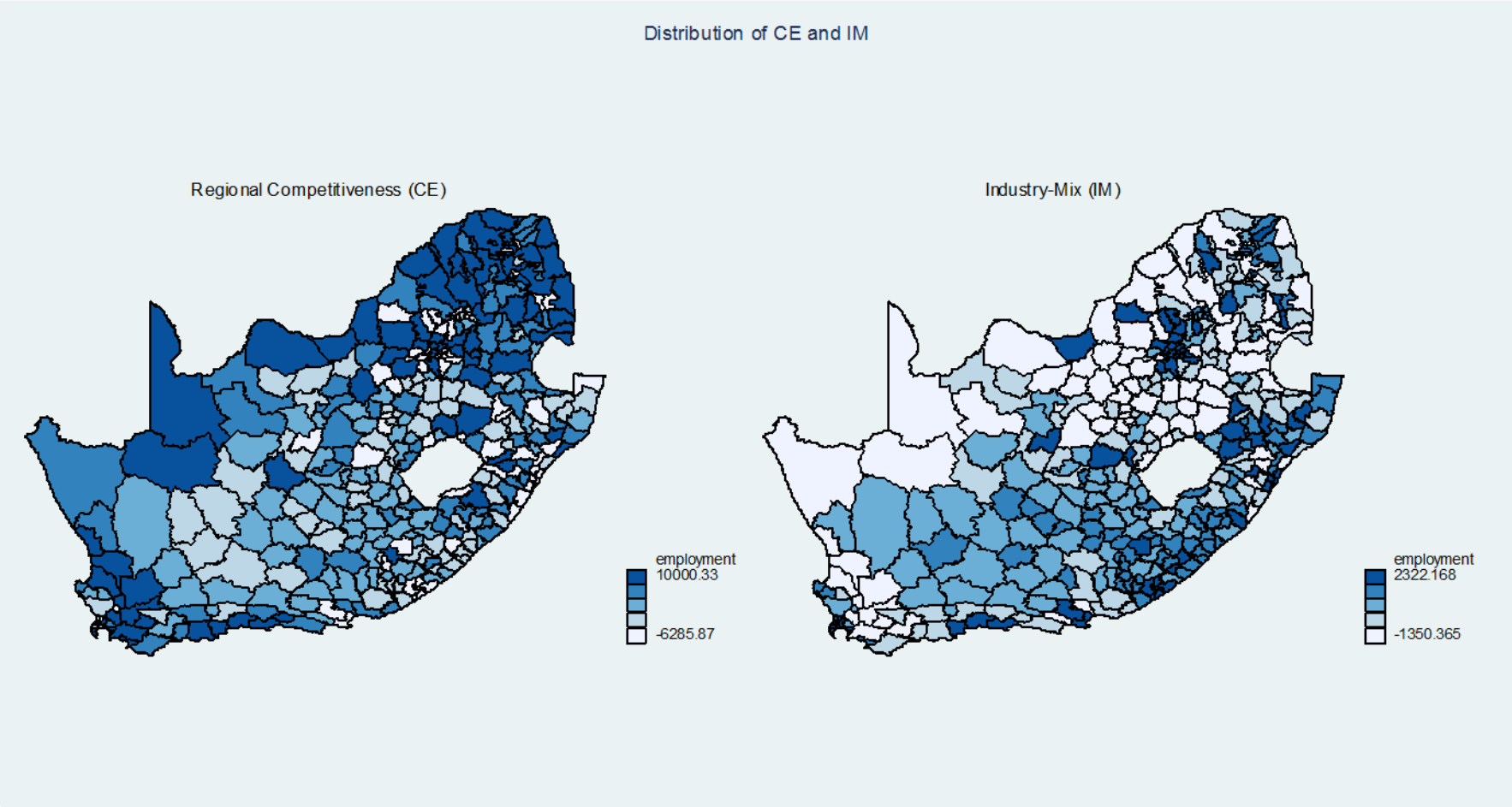
Annexure 1: Map of Regional Relative Employment



Source: Own Calculations using 1996 and 2001 Census

Annexure 2: Distribution of Regional Competitiveness and Industry-Mix.



Source: Own Calculations using 1996 and 2001 Census

Source: Own calculation using 1996 and 2001 census