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SPATIAL MISMATCH AND SPATIAL JUSTICE IN SOUTH AFRICA’S MAIN URBAN AREAS

TECHNICAL REPORT

November 2016
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Well-located areas are unaffordable for the poor, but living on city edges, far from jobs, makes it more difficult to find a job. This creates a poverty trap whereby living on the periphery leads to poverty, while poverty ensures living on the periphery. It is significant structural features of the South African economy which make people poor and keep them so; peripheral location is one such feature.

The theoretical basis for the above assertions is what has come to be called the “Spatial Mismatch Hypothesis” (SMH). In its most basic form, this is the idea that living far from jobs makes it harder for people to find and retain employment, and that therefore unemployment rates will be higher for people living in areas which do not have appropriate jobs in close proximity. In South African cities, jobs and economic activity are generally concentrated around “urban cores”, with the wealthy (and largely white) urban population living relatively close to these cores, while poorer (overwhelmingly black) South Africans remain on city peripheries, far from economic opportunities (Pieterse, 2009; Turok, 2012). This means that in South Africa, where jobs are concentrated around the urban core, the spatial mismatch question becomes whether people who live on city peripheries face higher unemployment because of their location.

While it is a widely-held assumption in the South African housing sector that spatial mismatch is a significant issue, there is little work which empirically investigates the existence and relative importance of spatial mismatch in South Africa’s cities. In 2015 and 2016 SERI undertook research in into this question, in response to the lack of hard evidence on spatial mismatch in South Africa, the apparently indifferent attitude towards the issue in much of government housing practice, and the necessity of understanding spatial mismatch for conceptualising spatial justice in South African cities.

Using statistical analysis and national spatial data on local unemployment rates and the distribution of jobs, this report examines how important it is for people’s employment...
prospects that their homes are physically close to jobs in South Africa’s major urban areas. We find that across South Africa’s largest cities and conurbations, there is a statistically significant relationship between physical proximity to jobs and local unemployment rates in the vast majority of cases. After controlling for the effects of a variety of potentially confounding factors, we find that the further people live from areas with jobs, the higher their local unemployment rates. These spatial mismatch effects explain a sizable part of already-existing unemployment (though of course other factors remain important), suggesting that location is an important determinant of employment prospects.

If living on the periphery means poor employment prospects, there is little poor people can do about this; they are stuck in a “poverty trap”. While the obvious response is to move to a better-located and more central area, unaffordable rents (due partly to exorbitant property prices) make formal accommodation in well-located areas inaccessible to the poor, and they thus must remain on the periphery. While many people do live informally in central areas, such as the Johannesburg inner city, tenure in these circumstances is typically insecure, and people often face harassment from the state and other abuses. Spatial mismatch implies a poverty trap where poor location causes poverty, and poverty simultaneously causes poor location. Poverty traps of this kind cannot be resolved by the market, and require strategic state intervention. However, one such prospect, the post-apartheid national housing subsidy programme, has in some respects entrenched poverty because of the peripheral location of subsidy housing projects.

The predominant logic of housing policy since 1994 has been to view ownership subsidy housing as a kind of economic “asset”, which can be expected to systematically reduce poverty by virtue of it providing capital to the poor. Despite acknowledging the importance of housing location in policy documents, in practice this logic has been implemented without adequate consideration of the impact of housing location on the performance or value of this “asset”, or the negative spatial mismatch effects outlined in this report. Large-scale housing projects for the poor have been built principally on city peripheries, thus exacerbating prevailing Apartheid spatial forms.

Far from reducing poverty, subsidised housing has in these respects more deeply entrenched it. In light of our spatial mismatch results, and a literature review which suggests that subsidy housing as a self-contained “asset” has limited poverty-reducing capacity, we argue that urban policy which aims to reduce poverty and is in line with commitments to spatial justice should avoid peripheral development and the delivery of mass housing projects which do not have a clear link to the jobs and opportunities which
already exist in city centres. The evidence on the importance of location suggests that the state and city governments should proactively intervene in housing markets to provide well-located and affordable housing for the poor. The provision of this housing needs to move beyond the logic of private sector incentives and restrictions, and should incorporate public rental accommodation provided by the state. Investigating spatial mismatch in South Africa’s main urban areas results in a powerful, evidence-based case for recapturing the national housing subsidy programme as a pro-poor intervention, which can, and indeed should, contribute to reversing the jobs/housing mismatch prevalent in South Africa’s cities.

This work also provides a rigorous, statistical research base for conceptualising an agenda for advancing spatial justice in South Africa’s cities, which is especially important in the light of the legal centrality of spatial justice in the Spatial Planning and Land Use Management Act’s (SPLUMA’s) principles. Apartheid city structure embodies spatial injustice: undoing the jobs/housing mismatch must be central in SPLUMA-required spatial development frameworks, municipal bylaws and land development decisions. Spatial justice requires both a significant reordering of city structures so that these cities facilitate social justice, and a substantial break with Apartheid-era policy and urban development patterns. By quantifying the size of spatial mismatch, something new in the South African context, this research offers a benchmark against which progress towards one aspect of spatial justice can be measured.

This report starts in Chapter 2 by providing some background on the predominant spatial form of South Africa’s “Apartheid cities”, and then discusses the incidence and causes of South Africa’s widespread poverty and intense inequality. The main spatial mismatch analysis is presented in Chapter 3, which discusses the methodology of our quantitative investigation, and then presents results for each urban area under consideration. Chapter 4 asks how “Apartheid City” spatial patterns have been perpetuated in the post-Apartheid period, and questions the theory that RDP housing provision and titling is an effective means of facilitating poverty exit. Chapter 5 explores policy implications while Chapter 6 discusses the implication of this work for conceptualisations of spatial justice in South Africa’s cities. Chapter 7 concludes.
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SPATIAL MISMATCH AND SPATIAL JUSTICE IN SOUTH AFRICA'S MAIN URBAN AREAS

TECHNICAL REPORT
2.1 Chapter Introduction

The Spatial Mismatch Hypothesis (SMH) is fundamentally about the link between city structure and people’s economic welfare. Before discussing mismatch it is therefore useful to outline the prevailing form of South Africa’s “Apartheid cities”, as well as of dominant patterns of poverty and inequality in the country. This background and context chapter firstly discusses city spatial form, and secondly discusses poverty and inequality. The discussion of city spatial form starts with a brief examination of urban policy under Apartheid, and then moves to descriptions of South Africa’s cities today. Contemporary poverty and inequality are first outlined descriptively, and then some discussion is made specifically about chronic poverty and structural “poverty traps”.

The first part of this chapter shows that Apartheid city planning was explicitly designed to prevent urban black workers from living in well-located white areas (though these workers may be employed there), and secondly that the legacy of Apartheid city planning is still clearly evident in South Africa’s cities 22 years after 1994. The second part of this chapter shows that South Africa is a country where extreme wealth exists alongside widespread poverty, which is borne disproportionately by black people. It furthermore argues that poverty in South Africa should not be seen as a transient phenomenon which is primarily the fault of individual failings. There are significant structural features of the economy which make people poor and keep them so, and in particular the South African labour market does not meet people’s employment and earnings needs.

2.2 South Africa’s Apartheid cities

Urban policy under Apartheid

On 5 December 1919, a delegation of residents from the African township of Ndabeni in Cape Town met with the then Minister of Native Affairs to discuss their impending relocation to further away from the city. Unhappy with the planned move, which followed a relocation
to Ndabeni from the city centre two decades earlier, a spokesperson\(^1\) for the delegation said that it seemed as if Africans were not wanted in Cape Town. It seemed as if

“only their hands were needed at work, and that if some mysterious arrangement could be devised whereby only their hands could be daily brought to town for purposes of labour and their persons and faces not seen at all, that would perhaps suit their white masters better.” (Kinkead-Weekes, 1985:210-211).

This central objective, which Maylam (1990:57) characterises as attaining “labour-power without labourers”, defined much of urban housing policy under Apartheid. It was an objective which pitted the political desire for segregation and whites-only urban areas against the economic imperative of having a cheap black urban labour supply for mines and expanding urban industry (Turok, 2012). The dysfunctional spatial form of the contemporary “Apartheid city” is a consequence of this foundational but inherently contradictory impulse.

However, while this contradiction was central to urban policy under Apartheid, its roots predate the election of the National Party (NP) in 1948, as the 1919 Ndabeni delegation makes clear. Simultaneous white social uneasiness towards and economic need for a black urban presence goes back at least as far as the late 1800s and early 1900s. However, it was increased black urbanisation during and after the First World War (coinciding with the development of significant urban manufacturing industry) which prompted the beginning of serious state involvement in urban policy and planning (Maylam, 1990; Wilkinson, 1998; Turok, 2012). The 1922 Stallard Commission’s report formalised growing white opposition to black urban residence, arguing that “the native should only be allowed to enter the urban areas … when he is willing to enter and to minister to the needs of the white man and should depart therefrom when he ceases to so minister” (cited in Wilkinson, 1998:217). The extreme Stallardist approach was not adopted wholesale in the 1930s, however, with the 1932 Native Economic Commission Report concluding that while it was “undesirable” to encourage black urbanisation, “[i]n the interest of the efficiency of urban industries it is better to have a fixed urban Native population” (cited in Maylam, 1990:65). With the election of the NP in 1948, however, and the advent of formal Apartheid, came a powerful and centralised shift at the level of policy and ideology to the original Stallardist idea that urban Africans could at most be considered “temporary sojourners” (Maylam, 1990). This was an important issue of political identity for the NP, with Turok (2012) arguing that the election of the party to government in 1948 was partly a direct reaction to the failure of inter-war laws to curtail black urbanisation. Amongst

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\(^1\) Kinkead-Weekes (1985) does not identify the spokesperson, but lists the Ndabeni deputation as being made up of a Reverend Mahabane, George Solundwana, Edward Ntwana and Alfred Ngaleka.
other mechanisms, the Apartheid government instituted three key policies towards achieving the end of black African ephemerality and impermanence in urban areas: the expansion of existing pass laws, the peripheralisation of black urban enclaves, and the creation of the black “homelands”.

While pass laws have existed in some form in South Africa since the slavery of the 1750s, and have served many different functions (Turok, 2012), their primary urban policy function under Apartheid was to limit the growth of an urban African population and dictate where Africans living in urban areas could stay (Wilkinson, 1998; Seekings, 2000). Generally only Africans who could prove formal employment were allowed in urban areas, and even then access was restricted in white areas to what was needed for this employment. Passes meant that Africans had no inherent right to citizenship in the city, and established African urban workers as “transient and placeless” (Lalloo, 1999:37). Until the system slowly started to collapse in Apartheid’s latter years, the massive administrative control exerted over urban Africans by this system can hardly be overstated, with approximately 750 000 people being arrested for pass law offences every year in the 1960s (Turok, 2012).

While passes prohibited African workers from residing in whites-only urban areas, the other side of urban segregation required the creation and control of black areas (Wilkinson, 1998). Building on the 1923 Urban Areas Act, black townships were established using the 1950 Group Areas Act. The Apartheid ideal was for these townships to be located as far as possible from white residential areas, but as close as possible to industry (Maylam, 1990). The practical effect of this was for townships to typically be established on distant urban peripheries, and for black residents to be moved increasingly further away as white suburbs spread (Seekings, 2000; Turok, 2012). An additional consideration for the design of townships was that they should be easily cordoned off and controlled in the case of urban rebellion, and it was common for Apartheid planners to make use of natural or artificial buffer zones in order to achieve this (Maylam, 1990). The desire to control black urban areas extended beyond the peripheral townships, however, and efforts were taken to uproot and destroy the last remaining “black spots” of freehold tenure, such as Sophiatown in Johannesburg, which were considered difficult to control (Wilkinson, 1998). Relocated residents were then granted 30-year (later extended to 99-year) leases rather than homeownership, both so that African residents could be more easily controlled and to undermine claims to city citizenship (Wilkinson, 1998). Urban relocations under the Group Areas Act (including forced removals from South End in Port Elizabeth, District Six in Cape Town, and Cato Manor in Durban) were frequent and widespread, and ultimately nearly 600 000 black people were forcibly moved under the Act (Turok, 2012).

A more extreme version of the peripheralisation due to the Group Areas Act was subsequently implemented with the legislation and creation of black “homelands” or Bantustans.
The consequences and motivations for the homeland system go far beyond this discussion of urban spatial form, and indeed their distance and rurality sometimes meant homeland-rural interactions were more migrant labour-based than residential, but they still had a substantial impact on city spatial form. An obvious impact of the homelands, which made Africans citizens of these ostensibly tribal areas rather than of South Africa, was to reduce African claims of urban citizenship and increase their urban ephemerality (Maylam, 1990). However while Bantustan policy did create some new black-only cities, such as Mmabatho in Bophuthatswana, for the most part they confined urban Africans to life in vast slums, often just close enough to “white” cities to allow for daily or weekly commuting, but outside the reach of South African pass laws (Crankshaw & Parnell 1996; Seekings, 2000). These settlements, such as Botshabelo 60km outside of Bloemfontein, or the KwaNdebele settlements between 30 and 110km north of Pretoria, represented an extreme form of the black urban peripheralisation already in evidence in South African cities due to the Group Areas Act (Maylam, 1990). However while Bantustan policy did create some new black-only cities, such as Mmabatho in Bophuthatswana, for the most part they confined urban Africans to life in vast slums, often just close enough to “white” cities to allow for daily or weekly commuting, but outside the reach of South African pass laws (Crankshaw & Parnell 1996; Seekings, 2000). These settlements, such as Botshabelo 60km outside of Bloemfontein, or the KwaNdebele settlements between 30 and 110km north of Pretoria, represented an extreme form of the black urban peripheralisation already in evidence in South African cities due to the Group Areas Act (Maylam, 1990). The joint systems described above went some way to achieving urban Apartheid’s unachievable objective of “labour-power without labourers”, but would ultimately break down as anti-Apartheid resistance and economic and urbanising pressures became too great. The legacy of these interventions nevertheless live on, as discussed in the next section. Black South Africans are disproportionately confined to urban peripheries, have very low rates of homeownership, and sometimes live in extreme peripheral urban areas which without the Apartheid context seem to make no sense at all (such as Botshabelo). The long-term effects of these policies also extend beyond urban form, as amongst other things peripheral areas by design tended to have fewer opportunities for education compared to well-located urban areas (Wilkinson, 1998), and prohibitions on black business ownership made the disconnects between residential and formal employment location all the more consequential (Turok, 2012). This chapter presents only a brief description of urban policy under Apartheid to illuminate some of the origins of South Africa’s peculiar urban typology of the “Apartheid city”. For more detailed discussions see in particular Maylam (1990), Wilkinson (1998), and Turok (2012), amongst others.

The “Apartheid City” today

South Africa’s cities are characterised by masses of poor black people living in dense and poorly serviced settlements on city peripheries, while a disproportionately white elite lives in relative comfort in well-located city cores, close to economic activity and the social life which defines cities. It is because of this, and the history described above, that South Africa’s cities are frequently called “Apartheid cities” (Pieterse, 2009).

The South African Cities Network (SACN, 2011) and Turok (2012) argue that Apartheid cities exhibit a number of spatial characteristics
which make them distinct from cities that have developed relatively organically without rigid state controls. A central issue concerns population density. The SACN (2011) and Turok (2012) develop a schema for distinguishing “ordinary” cities from Apartheid cities based on this issue. While an “ordinary” city generally exhibits a gradual gradient as density levels vary across the city, with centrally located areas tending to have higher densities and outer locations having lower densities, Apartheid cities exhibit sharp variations in population density across the cityscape, and it is common to have low-density areas in inner locations and high-density areas in outer locations (SACN, 2011; Turok, 2012). Distances between poor residential areas and economic centres are typically shorter in ordinary cities than they are in Apartheid cities, and while main built-up areas of ordinary cities are broadly continuous, in Apartheid cities these areas are fragmented. The spatial form of Apartheid cities outlined above also manifests along clearly racial lines. It is overwhelmingly black people who live in extreme high-density areas, whether these be peripheral informal settlements or high-density pockets close to the city core (Pieterse, 2009). Well-located central areas of low density are disproportionately white.

While there are some regional idiosyncrasies, South African cities typically exhibit all of the archetypal Apartheid city characteristics. Johannesburg, as South Africa’s most populous and economically largest city, is a typical example. Maps showing population density and racial predominance show this clearly. Figures 1 – 4 show firstly that density patterns in Johannesburg clearly align with the Apartheid city model. There is no gradual gradient of decreasing density from the city-centre outwards, and instead a number of peripheral areas are characterised by extremely high densities. Density is highly variable, with isolated pockets of high density existing throughout the cityscape. Comparing the density map to the map of racial predominance illustrates the extent to which this spatial pattern is racialised. Every high density part of the City is majority black African, with this racial correlation particularly apparent when looking at high-density pockets which are surrounded by non-black African areas, such as the Johannesburg city centre, the South of Lenasia, and the township of Alexandra next to Sandton. In contrast, predominantly white areas have consistently low population densities. This spatial form is not distinct to Johannesburg. Turok (2012) identifies an average population density of between 4-12 people per hectare in Cape Town’s former white suburbs, but between 100-150 people per hectare in the city’s informal settlements. Maps of density and race in Cape Town (below) exhibit this clearly, with high density areas being either predominantly black African or coloured. Similarly to Johannesburg, high density pockets in otherwise white areas such as Blouberg, Durbanville and Hout Bay are black African or coloured, while the high-density peripheral areas of Mitchells Plain and Khayelitsha are also black African or coloured.
These predominantly black and high density areas also tend to correlate with high levels of deprivation and poverty. This report is primarily about the spatial distribution of unemployment, and comparing Figures 1 and 7 shows clearly that density and high unemployment are correlated. Private sector investment is largely non-existent in dense, peripheral and predominantly black areas, and as this report explores in detail, these areas are typically far away from job opportunities (Pieterse, 2009; Todes, 2012; Sinclair-Smith & Turok, 2012; Gotz & Todes, 2014). However, at least in Gauteng, black and high-density areas also tend to have higher rates of income poverty, greater prevalence of crime, worse health outcomes, and residents of these areas are disproportionately likely to indicate dissatisfaction with their life in general (Joseph & Kulwick, 2016). There is significant work which shows that state investment has generally been well-targeted to focus on deprived areas in Johannesburg and Cape Town (Pieterse, 2009; Todes, 2012), but black and high-density areas typically remain relatively under-serviced when it comes to public amenities. The case of policing in Cape Town provides a stark example, with the O’Regan Commission of Enquiry showing that the township of Khayelitsha, which is one of the largest in the country, is assigned only 190 police personnel per 100 000 residents, whereas the affluent area of Camps Bay has a ratio of 960 police personnel per 100 000 residents (O’Regan & Pikoli, 2014). Even where public amenities exist in deprived areas, there are often issues with the quality of public services, such as is the case with public schooling. Any number of social or economic indicators can be used to make the point, but ultimately it is not seriously disputed that 22 years since 1994, the spatial form and distribution of deprivation across South African cities still viscerally demonstrates the legacy and logic of Apartheid-era social engineering.

A last point to be made about the spatial form of South Africa’s cities, perhaps unexpectedly given the discussion above, is that South African cities typically exhibit below-average population density when examined as a whole, and this poses constraints on development (SACN, 2011). While South Africa’s extremely high-density urban peripheries and inner city slums can scarcely be seen as areas conducive to social and economic development, density which is well integrated into a city’s economic and social life is a part of a positive and developmental city structure (Turok, 2016). Instead South African cities in general are characterised by urban sprawl, and areas of high population density are disconnected from jobs and services. The density which does exist can be characterised as dysfunctional density. Functional and well-integrated city density, on the other hand, is understood to stimulate increased production and economic efficiency via economies of agglomeration, and the fostering of social conditions conducive to innovation and a valuable cosmopolitan environment (Glaeser, 2011). Apart from the within-city inequities described already, the prevailing low average density across South Africa’s cities inhibits the social and economic benefits associated with living in cities and puts
pressure on municipal finances because of high servicing costs (Turok, 2012). A policy objective arising from this is that city density should be promoted, but where this increased density is functionally located and can be supported by jobs and services, rather than on peripheries.
2.3 Poverty and inequality in the post-Apartheid era

A descriptive overview

South Africa is technically an upper-middle income country. And yet the country is beset with extraordinarily high levels of income poverty. Statistics South Africa (Stats SA), estimates that 53% of the South African population was income poor in 2011 (Statistics South Africa, 2015). Other work on this subject suggests that a more accurate figure is higher, at 63% poor (Budlender et al, 2015). Both papers agree that about 20% of South Africa’s population should be classified as “extremely poor”. South Africa is also exceptionally unequal, with a 2012 Gini coefficient of 0.67 making the country one of the most unequal in the world, if not the most unequal (Finn & Leibbrandt, 2013). While it is difficult to get reliable estimates of net wealth, it is likely to be more unequally distributed than income, especially between racial groups (Van der Berg, 2011). Daniels et al (2014), using 2010 data, estimate that the richest 5% of South Africans hold 79% of the country’s net wealth, while the net wealth Gini coefficient is exceptionally high at 0.9.

These aggregate figures, while very high, hide extreme racial differentiation; poverty rates are between 40 to 60 times higher amongst black Africans than they are amongst whites, depending on where the poverty line is drawn (Wilkinson, 2016). No matter where this line is drawn, however, poverty rates are highest for black Africans, followed by coloureds, then by Indians/Asians, and finally by whites (Leibbrandt et al, 2010), representing exactly the racial hierarchy imposed by the Apartheid state. In 2008 white mean income per capita was just under 8 times higher than black African mean income per capita, while white median income per capita was just over 11 times higher than the black African equivalent (Leibbrandt et al, 2012).

It is perhaps to be expected that a country which until recently had legislated Apartheid and centuries of colonialism before that, would have high levels of poverty and intense inequality between blacks and whites. What is particularly damning about contemporary South Africa, however, is that there has been virtually no progress made in decreasing income poverty and inequality in the post-1994 period. While Finn et al (2013) have shown that the post-Apartheid state has made significant gains when it comes to non-monetary measures of poverty, such as increased access to electricity and water, decreased child mortality, and vastly increased school enrolment, poverty in money terms remains stubbornly high. Leibbrandt et al (2010) show

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2 A Gini coefficient is an inequality measure which is bounded by 0 and 1. The higher the Gini coefficient, the more unequal a particular sample is. A Gini coefficient of 0 would mean that everyone in a particular sample has the same income, and suggests perfect income equality. A Gini coefficient of 1 means that one person has all of the income in a particular sample while the other sample members have zero income; this suggests a scenario of perfect income inequality.

3 This report bases its racial categories on those defined by Statistics South Africa. Racial groups are divided into black African, coloured, Indian/Asian, and white. The term “black” is used to collectively refer to all people in the black African, coloured or Indian/Asian racial categories.
that income poverty has only very slightly declined between 1993 and 2008, while over this period income inequality measured by Gini coefficient has actually increased. The small decreases observed in income poverty are significantly due to the expansion of social grants, while a major driver of the increase in income inequality has been the increased share of income going to the richest 10% of the population in the post-Apartheid period (Leibbrandt et al, 2010).

The importance of the labour market

A primary cause of South Africa’s stubbornly high poverty and inequality is the country’s dysfunctional labour market. While social grants have become increasingly important for the poor (Leibbrandt et al, 2012), labour market returns such as wages make up the most important part of household income for most of the country (Finn, 2015). The number of employed household members and the level of their wages are therefore important determinants of a household’s poverty status. Indeed, Finn (2015) shows that approximately 91% of total South African income inequality in 2012 was due to differences in wages. This inequality is due to differences between the employed and unemployed, and between the wages of the employed. The presence of a wage-earner in a household is an important determinant of poverty, with 88% of households without a wage-earner below Finn’s (2015) poverty line. Unemployment is exceptionally high in South Africa: Stats SA’s unemployment estimates for the first quarter of 2016 put narrowly-defined unemployment at 26.7% while broadly-defined unemployment is at 36.3% (Statistics South Africa, 2016). At the same time, the presence of a wage-earner is not sufficient to prevent poverty. Prevailing wages are so low that approximately half of households which have a wage-earner in the household are still below the poverty line (Finn, 2015). Leibbrandt et al (2012) show that differences in wages between the employed explain a larger part of total South African inequality than differences between the employed and unemployed, but employment is still important, with 38% of total wage inequality being explained by employed-unemployed differences.

Understanding poverty’s structural causes

Identifying chronic poverty

A key issue for discussing policy on poverty and deprivation concerns whether poverty should be seen as the outcome of structural disadvantages and exploitation, or the result of (a lack of) individual efforts. In the early to mid-2000s, significant work was produced in South Africa which attempted to distinguish between “chronic” and “transitory” poverty. Transitory poverty is understood to be poverty which is due to some kind of unlucky short-term shock or other issue, such as a worker...

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4 The difference between the narrow and broad definitions of unemployment concern whether those who consider themselves unemployed have actively sought out a job in the 4 weeks preceding their enumeration. The narrow condition requires that a person has actively sought out employment; the broad definition does not. While the narrow definition is preferred by Statistics South Africa, Kingdon and Knight (2006) have argued persuasively for the broad definition being a more appropriate unemployment measure in the South African context.
being dismissed or retrenched, which may be resolved over time (Carter and May, 2001). Chronic poverty, on the other hand, is poverty where there can be no expectation that the poor escape poverty in the future. They experience circumstances which will likely cause them to remain “trapped” in poverty, and there is limited if any scope for progression. Carter and May (2001) identify the chronically poor as those with such a low level of assets that they can undertake no expenditure action except to subsist. Without the option of investing in some kind of capital, whether it be business-related or related to self-improvement, there can be no reasonable expectation that these chronically poor have the capacity to meaningfully change their circumstances. They are constrained by the very circumstances which they wish to exit. Carter and May (2001) estimate that about 70% of the South African poor in 1998 were chronically poor, or 37% of the total South African population according to their poverty line. Aliber (2003) expands upon the work done by Carter and May (2001) but, recognising the importance of the labour market for South African poverty dynamics, shifts focus to chronic unemployment being a major criteria for chronic poverty. In particular, Aliber (2003) discusses the chronic poverty of unskilled workers who are replaced by machinery or lose their jobs due to changes in the national demand for certain types of labour. Aliber (2003) identifies further structural causes of chronic poverty such as discrimination, the severance of social networks, living in unproductive rural areas, and health-related issues such as being disabled or suffering from HIV/AIDS. Based on these categories, Aliber (2003) estimates that between 18% and 30% of the total South African poor were chronically poor between 1993 and 1998. It is worth considering that even the lower estimate suggests that one-in-five South Africans were stuck in poverty with no prospect of escape at this time.

Intergenerational poverty and inequality of opportunity

Chronic poverty is often understood to be poverty which is transmitted from one generation to the next (Aliber, 2003). The logic of this understanding is that if parents’ poverty status predicts their children’s poverty status reasonably well, this suggests the children’s poverty was caused by circumstances inherited from their parents. If parents’ poverty does not predict children’s poverty, this means that there is some kind of equality of opportunity for children born in South Africa, and that the socioeconomic circumstances a child is born into are not a major determinant of later success. This would suggest that the individual efforts of the poor are paramount determinants of their wellbeing. Piraino (2015), who looks at inter-generational mobility between fathers and sons, finds that in South Africa this type of mobility is particularly low. He shows that fathers’ incomes very strongly predict sons’ incomes in South Africa. This shows that the economic position of one’s family is a strong predictor of future income, which again emphasises that the poor are likely to remain poor because of circumstances which they inherit rather than because of a lack of individual effort. Piraino (2015) dissects this issue more closely by dividing the determinants of poverty between those which
are due to pre-determined circumstances and those due to individual efforts. Examples of inherited circumstances are gender, race, and parental occupation and parental education. Differences in earnings explained by these variables indicate the importance of inherited circumstances, while differences in earnings not explained by these variables are assumed to be due to individual efforts. Piraino (2015) finds that inherited circumstances play a substantially important role in South Africa compared to other countries, and that race in particular is an important inherited circumstance. This evidence clearly points towards poverty largely being the result of circumstances and structural issues which are beyond the control of poor individuals. It implies the existence of “poverty traps” in South Africa.

Poverty traps

Poverty traps are circumstances where by virtue of being poor, someone is prevented from accessing the means or opportunities necessary for exiting poverty. These are structural conditions which limit the ability and agency of the poor to improve their lives. There is a substantial literature on the existence of poverty traps in the South African context. An often-mentioned poverty trap is poor education (Aliber, 2003; Woolard and Klasen, 2005). Poor children typically receive bad-quality basic education, which does not provide them with sufficient skills, and makes it more difficult to find employment or other decent livelihood opportunities. They therefore cannot afford to send their children to good quality schools, and the cycle is repeated. A similar trap occurs in South Africa’s highly segmented healthcare market, where the poor receive poor quality healthcare which compromises their labour-market prospects (Aliber, 2003). This results in lower incomes, which means only poor quality healthcare is affordable, and this cycle repeats itself. A poverty trap identified by a number of authors is the lack of loan finance available to the poor (Carter and May, 2001; Adata et al, 2006; Pellier & Ranchhod, 2012). This, coupled with the possession of few assets, means the poor cannot take advantage of opportunities which require an initial fixed payment, incorporate some kind of risk, or benefit from other kinds of economies of scale (Adata et al, 2006). This limitation of opportunities curtails opportunities for upward mobility and entrenches poverty. Pellier et al (2011) discuss the importance of living in a neighbourhood which has good services, noting that this increases children’s educational attainment and subsequently incomes. Access to “good” neighbourhoods is mediated by price, meaning that poor families are excluded from these advantages, and thus face a poverty trap. Magruder (2010) shows that an inability to access the network benefits of knowing employed people is a type of poverty trap. Knowing employed people has a significant positive effect on employment prospects, but the unemployed are less likely to be in networks of employed people, and are therefore systematically excluded from this opportunity.

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5 As Piraino (2015) notes, this means that the importance of inherited circumstances is likely to be underestimated in this approach, as not all important inherited circumstances can be accurately measured or included in the model.
While it is not a conventional poverty trap in the strict sense, mention must also be made of the inability of the South African economy to provide jobs at a macro level. This too is a structural issue which limits the ability of the poor to exit poverty. The poverty traps mentioned above deal largely with issues of labour supply, where an individual’s deficient education, health or social networks which puts her at a disadvantage when it comes to finding a job. However the other part of South Africa’s extremely high unemployment rate is deficient labour demand. In general, in order for someone to find employment, a prior condition is a would-be employer looking to hire additional workers. Increasing employment opportunities requires economic growth, and in particular labour-absorbing growth. However South African economic growth is currently stagnant, and is in general not very labour-absorbing or inclusive in another way (Fourie, 2014). The collapse of labour-intensive manufacturing industry and agriculture in the early 1990s and subsequent inability of the demand for labour to keep up with the increase in the size of the labour force has been a major cause of South African unemployment and poverty.

2.4 Chapter Conclusion

In general, South African cities still exhibit a spatial form which was explicitly designed to prevent black people from living in well-located urban areas. Predominantly black areas face disproportionately high rates of economic and social deprivation, while the residents of well-located predominantly white areas experience a standard of living comparable to many developed countries. South African cities in general are spatially dysfunctional, as their low average population density and dysfunctional areas of high population density present developmental constraints.

At the same time, South Africa is defined by widespread poverty, which has remained stubbornly high since the end of Apartheid. Poverty and inequality are sharply delineated on racial grounds, and there are a number of structural features of the South African economy which make poverty exit exceedingly difficult, no matter how hard-working or enterprising an individual may be. Labour market outcomes are the single most important determinant of individual and household incomes, and the labour market in South Africa is dysfunctional, caused both by deficient labour supply and deficient labour demand.

This report investigates the applicability of the Spatial Mismatch Hypothesis to the South African context: the hypothesis that living on city peripheries far from jobs is related to lower employment prospects. In concerning itself with spatial mismatch, this report explores a poverty trap which is intricately linked to the issues of city structure and South Africa’s dysfunctional labour market. If spatial mismatch exists, it suggests that living in a badly-located area is simultaneously a cause of poverty (because it makes it more difficult to find a job), and caused by poverty (because well-located areas are unaffordable for the poor). This is a quintessential poverty trap, which would require targeted and strategic state intervention to address.
3.1 The Spatial Mismatch Hypothesis

The effect that location may have on employment was first explored quantitatively in the United States by John F. Kain, with his 1965 paper “The effect of the ghetto on the distribution of and level of nonwhite employment in urban areas” (Kain, 1965). This work has proved to be hugely influential, especially in the United States, where since the 1960s what has come to be called the “Spatial Mismatch Hypothesis” has attracted significant scholarly debate and discussion in the popular press.\(^6\)

In its most basic form, the essential prediction of the SMH is that unemployment rates will be higher for people living in areas which do not have appropriate jobs in close proximity, because this lack of proximity to jobs will make it harder for people to achieve employment.

This formula has been amended slightly in different contexts, with some trying to show that adverse location can lead to lower wages or lower labour force participation rates. However the literature is most established in relation to adverse location and unemployment. In the United States, where suburbanisation of jobs and “white flight” has turned many inner-cities into zones of economic stagnation, this has typically meant examining whether high unemployment rates in predominantly black inner-cities can be explained by this phenomenon.

Rospabe and Selod (2006) and Gobillon et al (2007) identify a number of possible causal explanations for the spatial mismatch phenomenon. The primary issue is that distance from jobs means long journeys and expensive commuting costs for workers who live far from jobs, and thus hinders these workers’ mobility. High commuting costs when wages are low can make it difficult for workers to settle on
employment which is sufficiently remunerative to be worthwhile, while these commuting costs can also discourage job search or render it less efficient because workers have limited information about where jobs are available. Social networks have been identified as important sources of labour market information through people in the social network who are already employed, but in contexts of high housing market segregation, badly-located areas may also mean social networks which do not include many employed people. Employers may also prefer not to employ badly-located workers, either because of prejudice or because long-distance commutes may make these workers less productive (due to being tired or more likely to be absent). The SMH implies deficiencies both of labour supply (peripheral workers due to their location are not as productive as better-located workers) and of labour demand (there are too few firms looking to employ workers in badly-located areas).

While a variety of different statistical techniques can be used to test for spatial mismatch (Ihlanfeldt & Sjoquist, 1998), the conventional approach is to test for the relationship between some labour market outcome (such as the unemployment rate) and a measure of physical job accessibility (typically some index which captures the distance between residence and job locations), while controlling for the effects of other characteristics related to labour market outcomes, such as race or education level (Gobillon et al., 2007). The statistical significance and size of the estimated unemployment-job accessibility effect is then interpreted as either evidence for or against the spatial mismatch hypothesis in a particular context. This report employs regression analysis for this statistical investigation. For essential information on understanding regression analysis see Text Boxes 1 and 2.

3.2 Spatial mismatch in South Africa

The SMH relationship between location and unemployment can be investigated in contexts apart from the United States, where context-specific spatial patterns of economic dynamism and stagnation will determine the form of the mismatch hypothesis. This report investigates the SMH in South Africa, where, as described in Section 2.2, the spatial structure engendered by Apartheid urban planning is still evident. In general, jobs and economic activity are concentrated around “urban cores”, with the wealthy (and disproportionately white) urban population living relatively close to these cores, while poorer (overwhelmingly black) South Africans remain on city peripheries, far from economic opportunities (Pieterse, 2009; Turok, 2012). This means that in South Africa, where jobs are concentrated around the urban core, the spatial mismatch question becomes whether people who live on city peripheries face higher unemployment because of their location.³

The theorised causal mechanisms of spatial mismatch outlined above are applicable to the South African context. Kerr (2015) shows that long physical distances and inefficient

³ We discuss what types of jobs this report considers in Section 3.3.3.
public transport mean South Africans spend an unusually large proportion of their time commuting, in international comparative perspective, and that the burden of long commuting is borne disproportionately by black people. He calculates further that users of public transport pay an implicit commuting “tax” of between 22 and 40% of their wages, because South Africans spend a significant portion of their day commuting and because transport costs are a high proportion of individual expenditure. This then shows that labour mobility on South Africa’s peripheries is at least in this respect curtailed. At the same time, there is significant evidence that many South Africans do want to work but do not actively search for jobs, because job search costs are high and the probability of finding a job is extremely low (Kingdon & Knight, 2006; Posel et al., 2014). This fits with the mismatch hypothesis, with distance potentially discouraging job search and reducing its efficiency. Posel et al. (2014) note the importance of social networks for finding work in South Africa, suggesting that if social networks are significantly spatial, and if social networks on peripheries have fewer employed people with links to labour markets, this may also contribute to peripheral unemployment because of location. It should be noted, however, that Crankshaw (2014) in his general critique of quantitative attempts to identify spatial mismatch argues that social networks that help people find jobs do extend beyond localised areas, suggesting that social networks may be less affected by spatial mismatch than might otherwise be assumed. Lastly, it is conceivable that South African employers discriminate against peripherally-located workers for reasons of prejudice or because of issues of productivity: the long commuting times identified by Kerr (2015) and South Africa’s relatively under-developed public transport systems (Harris & Selod, 2006) may make peripheral workers disproportionately likely to be tired or absent. While the quantitative work in this section cannot identify the causal mechanisms which underpin spatial mismatch in South Africa, it can identify whether distance from jobs explains some part of existing unemployment. Some of the proposed mechanisms of spatial mismatch do seem applicable to the South African context, and justify an investigation of the relationship.

Indeed, in the South African context, the existence of spatial mismatch is generally taken as given. A substantial body of work exists which shows descriptively how jobs and economic opportunity are concentrated around city centres while the majority of the urban poor and unemployed live in dense settlements on the urban periphery (Turok, 2001; SACN, 2011; Sinclair-Smith & Turok, 2012; Todes, 2012; Turok, 2012; Gotz & Todes 2014; Wray et al., 2015). However, while these studies show that those living far from jobs are

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* Kerr’s (2015) method for calculating a “commuting tax” follows Hausmann (2013), where a worker’s commuting cost is deducted from their wage, commuting hours are added to hours worked, and an adjusted hourly wage is then calculated based on these additional commuting costs and hours. Comparison of the adjusted hourly wage with the unadjusted net or gross hourly wage gives the implicit “tax” associated with commuting.

* It is sometimes called the “jobs-housing mismatch”, for example by the City of Johannesburg (2016).
disproportionately the poor and unemployed, they typically do not attempt to determine whether this distance from jobs actually explains some part of existing unemployment in far-flung areas.

As far as we are aware, only two studies have attempted to test rigorously whether distance from jobs explains some part of unemployment in South Africa. Both present some descriptive analysis, but it is their regression analysis which makes these papers novel in the South African context. Rospabe and Selod (2006) present a sophisticated test for spatial mismatch in the City of Cape Town, using Census data from 1996, commuting data from 1998, and job location data from 2000. After having controlled for a variety of individual, household and neighbourhood characteristics, they test whether individual unemployment probabilities are related to a job density measure (which is a measure of the number of jobs within the immediate proximity of survey respondents), and a job distance measure (whether unemployment is related to the mean commuting time for workers in a survey’s respondent’s census area). They find that local job density cannot be said to affect unemployment probabilities, but that job distance does, and that this result is statistically significant. They conclude that there is evidence which suggests spatial mismatch in Cape Town, but do not interpret the size or practical significance of the effect.

Naude’s (2008) main test for spatial mismatch relates black unemployment rates with distance to city centres, in South Africa’s (then 6) metropolitan municipalities. Using 1996 and 2001 census data, he pools the metropolitan-specific data, thus preventing city-specific analysis, and instead allowing an analysis for the 6 cities as a group. He finds that a collection of distance to city centre variables are indeed positively related to black unemployment, while controlling for a variety of covariates. Naude (2008) does not indicate the size of the distance effects, but shows that they are highly statistically significant. He concludes that this analysis is strong evidence for spatial mismatch in South Africa’s metropolitan labour market.

While these original spatial mismatch studies in South Africa are undoubtedly useful, there are some limitations associated with using these papers for the purposes of using these papers for practical purposes. Perhaps most importantly, neither paper presents clear estimates for the size of the spatial mismatch effects they identify, thus making it difficult to evaluate how significant mismatch is for unemployment rates or individual unemployment probability. Secondly, the geographic coverage of this existing work is hardly all-encompassing. Despite Johannesburg and Gauteng generally being South Africa’s economic centre of gravity, neither of the papers present estimates specific for Gauteng cities. While Rospabe and Selod (2006) present analysis for Cape Town, Naude’s (2008) pooled model prevents city-specific estimates. Lastly, and as identified by Gotz and Todes (2014), this work is now somewhat dated.
This report extends its analysis to all eight of South Africa’s legislatively determined metropolitan municipalities as well as two larger conurbations – Gauteng Province and the area of Johannesburg-Ekurhuleni-Tshwane. The results of this analysis, presented in Sections 3.4 - 3.6 below, show that in 8 of the 10 areas we examine unemployment rates are significantly related to a “proximity to jobs” measure we construct, while controlling for the effects of various demographic characteristics. While two metropolitan municipalities do not show a significant correlation between unemployment and proximity to jobs, we discuss why this may be the result of data and methodological issues rather than being evidence for no spatial mismatch. The impact that proximity to jobs is estimated to have on local unemployment rates is also shown graphically for each area under investigation.

What follows in this section is a discussion of our methodology and results. The methodology is introduced in general, but where specific examples are needed we refer to our analysis of the City of Johannesburg. We use Johannesburg as our reference for explanation both because of the city’s importance in South Africa and because the majority of SERI’s work is based in the city. After this methodological introduction we discuss how our regression results can be interpreted in the Johannesburg example, and then results for other cities and areas are presented and discussed.
3.3 Methodology

3.3.1 Model

Following the literature on spatial mismatch in the United States (Kain, 1992; Ihlanfeldt & Sjoquist, 1998), our quantitative investigation makes use of regression analysis (see Text Boxes 1 and 2) to estimate the effect that a derived “proximity to jobs” variable has on broadly-defined unemployment rates, while controlling for a variety of demographic characteristics.

For our spatial unit of analysis we use Stats SA’s census “small areas”. Our models are estimated using Papke & Wooldridge’s (1996) fractional logistic regression, which is a type of Generalized Linear Model (GLM). This GLM is our preferred specification primarily because our dependent variable (the broadly defined unemployment rate of each small area) is bounded by the values of 0% and 100%, which makes standard Ordinary Least Squares (OLS) regression inappropriate. We nonetheless also present estimates using OLS regression for the sake of comparison with our GLM estimates.

While interpreting our GLM effects requires some extra work compared to OLS, the basic understanding of regressions explained in Text Boxes 1 and 2 holds across these different regression techniques. Estimates in this report

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In using broadly defined unemployment for our analysis we follow Kingdon and Knight (2006) and Posel et al (2014), who argue that broadly defined unemployment is a more appropriate definition for South Africa than unemployment according to the strict definition. The chief difference between the two definitions concerns “discouraged work seekers”, who want to work but have not actively sought employment recently. The strict definition of unemployment excludes these discouraged work seekers from the count of the unemployed, while they are included in the broadly defined unemployment.
are presented so as to be as straightforwardly interpretable as possible.

The demographic characteristics we control for are, for each census small area, the proportion of the population which is white people, the proportion female, the proportion who are defined as living in an urban area, the average age (and age squared), and the total small area population. The effects we estimate for the “proximity to jobs” variable are therefore the part of broadly defined small-area unemployment explained by proximity to jobs when race, sex, urbanity, age and size of population are held constant across the region of interest (for example Johannesburg).

Model weaknesses

There are deficiencies in our model which must be considered. Firstly, we exclude mean years of education in the small area from our regressions. This variable must be excluded because it is highly correlated with proximity to jobs across the areas we examine. This leads to the technical problem of multicollinearity, which renders the effects associated with our proximity to jobs variable nonsensical or impossible to determine.\[1\]

The most straightforward way to deal with multicollinearity is to remove the variable which causes the issue, and we therefore do not include mean years of education as one

\[1\] The intuition behind why multicollinearity is a problem is that if education and proximity to jobs are highly correlated, it becomes difficult to estimate the effect that proximity to jobs will have on unemployment while education remains constant, because the correlation between education and proximity to jobs means education doesn’t stay constant while proximity to jobs changes.

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**Statistical Significance**

Statistical significance is typically reported at a few different levels: the 1% level, 5% level, and the 10% level. Intuitively, statistical significance at each of these levels is the probability that we could have drawn a sample like we did if there is actually no relationship between our variables of interest (unemployment rates and proximity to jobs) in the population as a whole. Therefore results which are significant below the 1% level provide very strong evidence for an actual underlying relationship, while results at the 5% and 10% level provide increasingly weaker evidence. Results which are not significant even at the 10% level are interpreted as statistically insignificant. Statistical insignificance means we cannot be reasonably sure, based on the size of the effect we estimate, the sample size, and the variance of the sample, that the true relationship we are trying to quantify actually exists. This may be because there is no underlying relationship, or because our data is simply too unreliable to make a confident inference.
of our control covariates. This is not an ideal solution, but we are nonetheless left with little choice in this matter. If it is the case that peripheral areas tend to have lower education levels on average than central areas, and if lower levels of education are related to higher unemployment rates, the exclusion of education from our model may cause us to overestimate the effects of spatial mismatch. These are two very plausible assumptions. However, if it is the case that areas far from jobs have low education because peripheral areas tend to lack decent social amenities such as good schools (another plausible assumption), we may not want to control for the effect that education has on unemployment rates, as this is a spatial consequence which can be seen as part of the mismatch phenomenon. An examination of these causal mechanisms and their policy implications requires further work which is beyond the scope of this report.

A second and likely more fundamental issue concerns the method of regression analysis. Ihlanfeldt and Sjöquist (1998) note that spatial mismatch models typically face a number of constraints which cause mismatch effects to be underestimated in the United States. A primary issue related to this which is relevant in the South African context concerns what is called “endogeneity”. In the South African context this may manifest in at least two ways. As is shown in Sections 3.5, rural areas, which are generally extremely peripheral in the context of metropolitan municipalities, tend to have lower unemployment rates than informal settlements, which can be considered “semi-peripheral” to urban centres. However lower unemployment rates in these extremely peripheral rural areas cannot plausibly be caused by better employment prospects than there are in “semi-peripheral” urban areas. A more likely cause is that the rural unemployed know that there are extremely limited job opportunities in the extreme periphery, and thus if looking for work they are better served by moving to semi-peripheral informal settlements. Unlike moving to well-located formal areas, which as explained above is very costly and difficult, moving to semi-peripheral informal settlements is relatively cheap, and South Africa’s informal settlements absorb significant rural in-migration (Turok & Borel-Saladin, 2016). This will cause unemployment rates to be higher in the semi-periphery than in the extreme periphery, but not because extremely peripheral areas have better employment prospects. It will rather be because the unemployed disproportionately choose to be in informal settlements (rather than the extreme periphery). We cannot statistically control for this phenomenon, and this will cause spatial mismatch effects to be underestimated in regions with large peripheral rural areas, as it undermines the distance-employment prospects effect we try to isolate.

12 We do find that even when controlling for mean household income, percentage white, percentage female, percentage urban, mean age and mean age squared, our proximity to jobs variable is still a statistically significant determinant of mean years of education in the vast majority of our areas of analysis.

13 Rural-specific but not distance-related issues such as the increased prevalence of subsistence farming and therefore self-employment should be captured and controlled for in the “proportion urban” variable we include in our regression model.
There may, conversely, be an endogeneity effect which works in the opposite direction. If it is the case that the people in informal settlements who get jobs tend to move to better-located areas after finding work, the negative relationship we find between unemployment rates and job proximity may not fully be because people who are far from jobs struggle to find employment, but simply because those who have jobs have moved away from these distant locations, leaving behind disproportionately the unemployed. This would cause our mismatch effects to be overestimated. This issue is unlikely to be as serious as the underestimation mentioned above, however, because it remains quite difficult for people to move “up a housing ladder” in South Africa, as discussed in Section 4.3. Additional constraints such as racial discrimination in the urban formal housing market and persistent effects of Apartheid urban planning (Rospabe and Selod, 2006) will likely also reduce housing mobility for low-income black people, thus mitigating the seriousness of this effect. Ultimately, cross-sectional regressions, like those we use in this report, cannot identify causal mechanisms. They can identify empirical relationships, which then either through theory or qualitative work can be given causal interpretations.

This study, with its national but city-specific analysis, is the first of its kind in South Africa, and thus should be understood as a first analysis upon which further work can expand. More advanced statistical techniques such as quantile or instrumental variable regressions may further develop understandings of spatial mismatch, and of course better quality data is always preferable. The section below discusses the limitations of the jobs data we use. Spatial mismatch studies in South Africa would also benefit significantly from the availability of better spatial individual-level data.

Data

Estimating the impact of proximity to jobs on unemployment requires spatially defined data which must, at a minimum, include information on local unemployment, and information on where jobs are located. For the purposes of regression, our data must also include information on our regression covariates.

For information on unemployment rates and demographic characteristics we use data from the 2011 South African National Census, made available by Stats SA. In order to preserve respondent anonymity, South African census data is not released at the level of individual records; instead it is released at varying levels of aggregation ranging from province-level to the so-called “small area” level (Statistics South Africa, 2014). This report’s analysis makes use of data at the small area level. Small area level data is the most disaggregated level of data available from Stats SA. Figure 5 presents small area boundaries for Johannesburg, showing that small areas are generally very small but are irregularly sized. Size depends chiefly on population density, with higher population density meaning smaller and more concentrated small-areas.
That the census data is available only at an aggregated level prevents us from modelling or controlling individual-level characteristics such as an individual’s probability of unemployment or an individual’s age. This is a common limitation in the context of empirical work on spatial mismatch (Kain, 1992; Ihlanfeldt & Sjoquist, 1998). We work around this limitation by using neighbourhood-level statistics such as small area unemployment rates or small area average age. For our spatial mismatch analysis we calculate the broadly defined unemployment rate, percentage white, percentage female, percentage urban, mean age, total population, mean years of education, and mean household income for each small area. For descriptive graphics we similarly calculated population densities and the predominant racial group (in terms of population) for each small area.

Unlike demographic data, good quality data on the location and concentration of jobs below municipal level is exceedingly difficult to obtain. We make use of 2011 data produced by the Council for Science and Industrial Research (CSIR) for the collaborative “stepSA” project. The stepSA data is defined by geographic zones (created by the CSIR) called mesozones. These are analogous to the small-areas defined by Statistics South Africa for its census data, but are larger and more uniformly-sized than these Stats SA zones (Mans, 2016). The principal advantage of the mesozones over the Stats SA equivalents is precisely this uniformity in size. While the mesozones are not uniformly shaped (they follow certain administrative and physical boundaries and avoid combining areas with vastly different population densities), they are all approximately 50 km² in size. Figure 6 shows the mesozone boundaries in the City of Johannesburg.
A weakness of all of the available data sources is that they are necessarily restricted to formal sector jobs. The analysis undertaken in this report must therefore be understood as relating local unemployment rates to proximity to formal sector jobs. It is unclear how this will affect our analysis. Gotz and Todes (2014) suggest that informal sector jobs are less spatially concentrated than formal sector jobs, and are often close to where people live. At the same time, data on the location of informal sector jobs is severely lacking. In any case, informal sector jobs are generally less secure and lower-paying than formal sector jobs, and access to formal sector jobs is an important policy issue in and of itself.

Another issue related to the jobs data used in this report concerns the type of formal jobs included in our analysis. Gobillon et al. (2007) note that spatial mismatch studies in the United States are primarily concerned with proximity to low-skilled, entry level jobs. The mesozone jobs data we use is disaggregated into industrial sectors, and it is possible to exclude sectors which are generally understood to be highly skilled from our analysis. In a context where it is commonly assumed that jobs in the “Finance, insurance, real estate and business services” sector are the most highly-skilled (Banerjee et al., 2008; Rodrik, 2008), one could be expected to exclude this sector. Tregenna (2010) puts this assumption into question, however, as she shows that a substantial part of this sector is made up of lowly-skilled cleaners and security guards, who by virtue of being employed by outsourcing companies fall under the “business services” industrial classification. We proceed without excluding any industrial sectors from our analysis. This inclusion or exclusion of apparently highly-skilled sectors makes very little difference to our results in any case.

Descriptive graphics

Figures 7 and 8 show unemployment rates and job concentration for the City of Johannesburg, at the small-area and mesozone levels respectively. The figures clearly suggest spatial mismatch, as areas of relatively high job concentration in the centre and north have low unemployment rates, while the high unemployment and high density areas of the south have high unemployment rates and few jobs. This type of descriptive evidence is similar to that presented in the descriptive studies mentioned in Section 3.2, though some of these studies compare job density to population density rather than unemployment, showing the disconnect between where people live and where jobs are located. We also present population density maps for this comparison – Johannesburg population density can be seen in Figure 1 in Section 2.2.2, and density maps for other areas are presented in Figures A2.1 – A2.10 in the Graphical Appendix.

Turok (2012) notes that the fastest growing employment centres in the municipality are in Midrand, Sandton and Rosebank, but that these areas are insignificant in residential

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14 Some small areas in Figure 7 are coloured grey, indicating that there is no data for those areas. These are small-area zones where fewer than 13 people were enumerated in the census, and as such Statistics South Africa does not report statistics for these areas. These areas are typically industrial and commercial zones, or features such as dams, mines, uninhabited mountains or nature reserves.
terms. While these maps are a useful graphical tool, they cannot indicate the size of the spatial mismatch effect, and therefore how serious a policy priority the phenomena is. Additionally, and as discussed above, this raw correlation does not constitute robust evidence for spatial mismatch. Regression analysis is required to control for potentially confounding factors such as race, and to quantify the size of the effect.

Figure 7: UNEMPLOYMENT
City of Johannesburg

Figure 8: JOBS
City of Johannesburg
Creating a measure of proximity to jobs

Quantifying the relationship between small area unemployment rates and proximity to jobs requires a measure for every small area’s “proximity to jobs”. A number of different techniques for deriving such a variable are possible, and the two existing papers which attempt to identify spatial mismatch in South Africa develop quite different measures, both of which are established in the existing United States spatial mismatch methodology. Naude’s (2008) proximity to jobs variable, for each census area in a specific city, is the distance (by road) between that census area and that city’s city centre. Rospabe and Selod (2006) develop two measures for proximity to jobs: a census area “job density” variable, which measures the number of jobs within a 5, 10, or 15km radius of each census area, and a census area “distance to jobs” variable which measures the average commuting distance for employed people in census areas where there is sufficient data.

An underlying assumption of Naude’s (2008) proximity to jobs variable is that jobs are only significantly located in city centres, and this is why distance to city centre is important for spatial mismatch. This will bias a spatial mismatch model away from identifying mismatch in cities which are polycentric, as some South African cities are. Todes (2012), for instance, notes that while the Johannesburg city centre is still the economic hub of the city, production and jobs have increasingly shifted northwards to areas such as Sandton and Midrand. Naude (2008) himself identifies that the Ekurhuleni municipality is so polycentric that he cannot identify one specific city centre. In any case, even where cities are not significantly polycentric, it is likely preferable to use a proximity to jobs measure which reflects the actually existing distribution of jobs, rather than relying on a fixed assumption about city-centre importance.

Rospabe and Selod’s (2006) “job density” measure is perhaps an extreme version of this. By only examining jobs which are in a 5, 10, or 15km radius of each census area, their measure is very sensitive to the local distribution of jobs but suffers from the exclusion of jobs beyond whichever radius is chosen. To use an example from Cape Town, a person from the area of Bellville, approximately 20kms away from the Cape Town city centre, likely has far greater access to the jobs of the city centre than someone from the area of Atlantis, approximately 40km distant, but the Rospabe and Selod (2006) job density measure cannot identify this. Their “distance to jobs” variable, however, does implicitly consider this. This measure is based on individuals’ actual distances to work, recorded in the 1998 Migration and Settlement in the Cape Metropolitan Area study (the “migration study”). Importantly, this data records survey respondents’ distances to work and the census area that survey respondents live in. This allows Rospabe and Selod (2006) to calculate

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15 This is not to mention that unless a person from Atlantis were to fly or swim over Table Bay, they would have significantly further to travel to get to the Cape Town city centre than 40 kms. The issue of the particularly peculiar geography of Cape Town and the effect that this has on attempts to identify spatial mismatch using straight-line distance is discussed in Section 3.5.8.
the average distance to work for each census area included in the migration study, and then relate this to census area unemployment rates. This kind of spatially disaggregated micro-level data is not yet available at the scale necessary for our present analysis.

The proximity to jobs measure derived for each small area in this report is based on the approach used by Rogers (1997). This proximity to jobs measure incorporates all of the jobs data for a specific metropolitan municipality (or conurbation such as Gauteng or Johannesburg-Ekurhuleni-Tshwane), and creates an index out of 100 for job proximity for every small area within that municipality. For a specific small area, proximity to jobs is a function of the available jobs in every mesozone in the relevant municipality (or larger region), discounted by the distance between that small area and the relevant mesozone. Small areas which are close to mesozones with many jobs have a higher measure of proximity to jobs than small areas which are further away. Figure 9 graphically shows our proximity to jobs variable for the small areas of Johannesburg.

The proximity to jobs index for each municipality or larger region must be interpreted with caution. The index is the result of a rescaling of the underlying data such that for every municipality and region the small area with the highest proximity to jobs is indexed to the value 100. This means the proximity to jobs index is interpretable within regions (such as Johannesburg or Johannesburg-Ekurhuleni-Tshwane), but not between regions. A proximity to jobs value of 40 in Johannesburg implies a very different proximity to jobs than does 40 in Buffalo City. However in both cases a job proximity score of 40 means double the job proximity associated with a score of 20 within the respective municipality.

Figure 9 presents what is expected when it comes to proximity to jobs in Johannesburg. Edge areas have lower proximity to jobs than central areas, and there is a clear gradation as...
areas become more peripheral. Additionally, it shows the northern suburbanization of jobs in Johannesburg, as discussed by Todes (2012). This clearly shows the advantage of a proximity to jobs measure based on data, rather than a measure which assumes the city centre is the only significant jobs centre of the municipality. Some isolated darker spots (where the job proximity index is greater than 90) are evident. As discussed in the Technical Appendix, these are statistical artefacts related to the methodology used to create the job proximity measure, and should not be interpreted substantively. The overall pattern and shape is more important than these isolated spots.

A necessary limitation of the method used to construct our proximity to jobs variable for each municipality is that it only considers proximity to jobs within that specific municipality. If there is a significant concentration of jobs just outside a municipal border, a small area close to that border likely has its real proximity to jobs underestimated by our measures. A case in point is Diepsloot, which in Figure 9 appears to be very badly-located when it comes to jobs, because it is far from the Johannesburg city centre and still somewhat distant from northern suburbs jobs centres. Diepsloot can probably not be called well-located, but the extent of its bad location is over-estimated here, because the major jobs centres of Tshwane metropolitan municipality to the north are not included in the Johannesburg job proximity measure. Diepsloot is in fact closer to the Pretoria city centre than it is to Johannesburg, and is only slightly closer to Midrand than the Tshwane jobs centre of Centurion. The issue of neighbouring municipalities is only particularly serious in Gauteng, however, because metro municipalities in other regions of the country are generally isolated from each other. Gauteng, in contrast, contains 3 adjacent metropolitan municipalities, and contains other productive towns. Border issues may therefore be distortionary. It is in order to address this issue that our study presents analysis for Gauteng Province as a whole, and for the Johannesburg-Ekurhuleni-Tshwane area specifically.

An unresolved weakness of the job proximity measure, however, is that it is based on straight-line distances between small areas and mesozones, as-the-crow-flies. In reality, people travel along roads or railways, and the straight-line distance is only an approximation of actual commuting time. This approximation is also likely to be systematically biased: people living on peripheries are disproportionately poorer than people living in central areas, and thus more likely to rely on public transport than private transport. This means that people living on peripheries not only have longer distances to travel to jobs centres than people in central areas, but also are more likely to use slower forms of transport (which our measure does not incorporate). Kerr (2015) presents evidence which, though it does not control for the distance people commute, shows that commuting times in South Africa are significantly longer for black people than for white people, and that commuting by driving takes much less time on average than commuting by train, bus or minibus taxi. Kerr
EDGED OUT
SPATIAL MISMATCH AND SPATIAL JUSTICE IN SOUTH AFRICA’S MAIN URBAN AREAS
TECHNICAL REPORT

3

TABLES 1 TO 10

The results from our regressions for each area are reported in Tables 1 to 10. These tables show the size of the effect that proximity to jobs is estimated to have on unemployment rates, and the level of statistical significance associated with each of these results. The results are reported under 3 specifications.

Specification 1 shows unit changes according to our GLM specification. In Table 1 for Johannesburg, for example, specification 1 shows that (for the average small area in Johannesburg with demographic characteristics held constant) an increase in the small area’s proximity to jobs index by 1 unit is on average associated with a decrease in that small area’s unemployment rate by 0.238 percentage points. These GLM results are technically “marginal effects at the mean” – which is the technique used for presenting GLM estimates throughout this report.

Specification 2 also uses GLM estimation but shows percentage changes. In the Johannesburg example, it shows that a 1 percent increase in the small area’s proximity to jobs is on average associated with a decrease in that small area’s unemployment rate by 0.771 percent. This is distinct from the unit changes in job proximity and consequent percentage point changes in unemployment in Specification 1. The difference between these approaches is explained in Text Box 4 on the facing page.

Specification 3 shows percentage changes similarly to Specification 2, but estimated using OLS (specifically a log-log model) rather than the Papke and Wooldridge (1996) GLM. This allows for checking our GLM estimates against this standard approach. It shows that our results are relatively similar and therefore robust to model specification choices, except for Cape Town (discussed in Section 3.5.8).

For all specifications, the level of statistical significance is shown with asterisks as indicated in the table legends. All specifications use the same covariates, and full results for Specification 1 are reported in the Technical Appendix.

(2015) explicitly notes that, when combined with evidence on the spatial geography of South African cities, this may lead to spatial mismatch. That our job proximity measure cannot take different commuting times into consideration means we underestimate the extent to which access to jobs is lower in peripheral areas than central areas. This may cause the size of our spatial mismatch estimates to be underestimated (biased against finding spatial mismatch), but is unavoidable given the data constraints.

3.4 Overview of Results

Spatial mismatch is clearly evident across the majority of South Africa’s metropolitan municipalities, and in the larger regions of Gauteng Province as well as in the Johannesburg-Ekurhuleni-Tshwane sub-region. Distance from jobs in these areas is correlated with higher unemployment rates, when controlling for a number of demographic characteristics. This relationship is practically important: even in regions with relatively small mismatch effects, these effects explain a significant part of existing unemployment in peripheral areas.

We use a method for measuring proximity to jobs which has not been applied in this

There are ways to attempt to compensate for this: for example we could square the distance between each small area and mesozone in the construction of our job access measure, which would discount far-away jobs more strongly. However as discussed in the Technical Appendix, the nature of the mesozone data makes this adjustment inappropriate, and indeed because of data issues we are compelled to use the square-root of distance in our job proximity measure, which likely exacerbates the potential identified above for underestimating spatial mismatch estimates.
country before, and present city by city spatial mismatch estimates for the first time. This results in strong evidence that living far away from work reduces people’s employment prospects, and this has significant policy implications (addressed in Chapter 5 below).

While it may not be particularly surprising that spatial mismatch is identified quantitatively, given existing work which shows the general disconnect between jobs and where people live in South African cities, it is the size of the effect that is startling in some regions. The nuance that is gained by analysing each region individually is valuable, as there are differences between cities both in terms of the size of the estimated mismatch effect and in terms of how mismatch should be interpreted.

We do not find sufficient evidence to conclusively identify spatial mismatch in two metropolitan municipalities: Nelson Mandela Bay and Cape Town. In the case of Nelson Mandela Bay, we explain why this may mean there is genuinely not a relationship between proximity to jobs and unemployment in the municipality. However in Cape Town there are significant issues which exacerbate the weaknesses of our spatial mismatch model, and there is sophisticated existing work which finds spatial mismatch in the city. Therefore while we discuss our results and some of the prior work on Cape Town, we do not present a firm conclusion as to whether there is spatial mismatch in the city.

### PERCENT VS PERCENTAGE-POINT CHANGES

Tables 1 to 10 require an understanding of the difference between a percentage point change and a percent change. For an unemployment rate of 40%, for example, a 10 percentage point decrease results in a new unemployment rate of 30%. The percentage point change is a unit change and is simply added or subtracted. A 10% decrease on an unemployment rate of 40%, however, results in a new unemployment rate of 36%. 10% of 40% is 4 percentage points, and it is this which is subtracted from the original unemployment rate in the case of a percent change.

We report percentage point changes under Specification 2 because this scale-independent measure allows for an alternative interpretation of the size of the mismatch effect, which can be better understood (though still imperfectly) without the use of maps.
3.5 City by City Spatial Mismatch Results

City of Johannesburg

Our model suggests that job proximity is a significant determinant of unemployment in Johannesburg.

The City of Johannesburg is South Africa’s most populous municipality, and is also the country’s largest municipal economy. Harrison et al (2014) describe Johannesburg as South Africa’s “Premier City”, and while it is not an official national capital, it is the seat of the country’s highest court, the Constitutional Court. What started as a mining town is now South Africa’s financial capital, and the Johannesburg Stock Exchange is the largest stock exchange in Africa and amongst the largest in the world.

The municipality is almost entirely urban, with only some small rural areas in the extreme north-west and south. Johannesburg exhibits a sharp geographic divide, where the south is typically poorer, disproportionately black, and lacking in infrastructure, while the north (with some notable exceptions such as Alexandra and Diepsloot) is typically wealthier, better-serviced, and disproportionately white. The northern centre of Sandton acts as a second city centre, and the stock exchange is located here, while the original Johannesburg city centre, though still the major economic hub, has undergone various cycles of urban growth, decay, and regeneration.

As shown in Figure 1.1, the distribution of unemployment in the City of Johannesburg has a stark spatial dimension. With the
Spatial mismatch in South African cities

CHAPTER 3

The exception of Diepsloot on the extreme northern periphery and Alexandra in the centre, the City can be divided into two parts: the low-unemployment north, and the extremely high-unemployment south. The issue of uniformly high unemployment is especially evident in the south-west with Soweto, and in the extreme south in the areas of Orange Farm and Ennerdale. In contrast, the disproportionately white “northern suburbs” north of the Johannesburg CBD, and the economic nodes of Sandton and Midrand, exhibit low unemployment rates.

The concentration of jobs in Johannesburg, shown in Figure 1.2, is in many respects a mirror image of the unemployment picture. Most jobs are concentrated in Johannesburg and Sandton, but the north of the municipality as a whole shows relatively large numbers of jobs. The south-west, and in particular the extreme south, have relatively few jobs. Compared to other South African municipalities, the City of Johannesburg exhibits a large amount of jobs across most of its area. This does not however address the relative distribution of jobs within the municipality.

Figure 1.3 presents what is expected when it comes to proximity to jobs in Johannesburg. Edge areas have lower proximity to jobs than central areas, and there is a clear gradation as areas become more peripheral. Additionally, it shows the northern suburbanization of jobs in Johannesburg, as discussed by Todes (2012). Border issues may be somewhat distortionary, given that Johannesburg neighbours the metropolitan municipalities of Tshwane and Ekurhuleni. A case in point is Diepsloot, which in Figure 1.3 appears to be very badly-located when it comes to jobs, because it is very far removed from the Johannesburg city centre and somewhat distant from northern suburbs jobs. Diepsloot can probably not be called well-located, but the extent of its bad location is over-estimated in Figure 1.3, because the major jobs centres of Tshwane metropolitan municipality to the north are not included in the Johannesburg job proximity measure.

The final results of our investigation into spatial mismatch are reported in Table 1 and Figure 1.4. Text Boxes 3 to 5 provide guidance as to how to interpret these results. Figure 1.4 shows that a substantial amount of the variation in unemployment rates in the City of Johannesburg can be attributed to changes in small area proximity to jobs. It is not just living in the city centre which is associated with lower unemployment rates: Johannesburg’s northern suburbs are also very well-located. Soweto has previously been noted as being unusually well-located for an erstwhile informal settlement (SACN, 2011), and this is borne out by this analysis, which shows that the unemployment rates associated with job proximity in Soweto are comparable to those in Roodepoort. Figure 1.4 suggests that Soweto’s much higher actual unemployment rates (as shown in Figure 1.1) are due primarily to factors other than physical location. It is the extreme periphery and south of the metropolitan municipality where proximity to jobs is related to high unemployment rates. Figure 1.4 suggests that
a change in proximity to jobs associated with a move between Orange Farm and city centre correlates to a change in unemployment rate of between 6 and 12 percentage points. Table 1 shows that a 10 unit increase in job proximity in Johannesburg is on average associated with a statistically significant 4.5 percentage point decrease in small area unemployment rates, or equivalently a 10% increase in job proximity is associated with a 7.7% decrease in unemployment rates.

Table 1: Spatial Mismatch in the City of Johannesburg

<table>
<thead>
<tr>
<th></th>
<th>(Spec. 1) GLM unit changes</th>
<th>(Spec. 2) GLM % changes</th>
<th>(Spec. 3) OLS % changes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNEMPLOYMENT RATE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximity to jobs (index)</td>
<td>-0.238*** (0.0153)</td>
<td>-0.771*** (0.0496)</td>
<td>-0.814*** (0.0507)</td>
</tr>
<tr>
<td>Observations</td>
<td>5,791</td>
<td>5,791</td>
<td>5,720</td>
</tr>
<tr>
<td>Regression R-squared</td>
<td></td>
<td></td>
<td>0.657</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Control covariates not shown
City by City Spatial Mismatch Results

City of Johannesburg

**Figure 1.1:** UNEMPLOYMENT
City of Johannesburg

**Figure 1.2:** JOBS
City of Johannesburg

**Figure 1.3:** JOB PROXIMITY
City of Johannesburg

**Figure 1.4:** THE SPATIAL MISMATCH EFFECT
City of Johannesburg
City of Tshwane

Our model suggests that job proximity is a major determinant of unemployment in Tshwane.

Tshwane Metropolitan Municipality, to the north of Johannesburg, is a key part of the Gauteng urban economy. Unlike Johannesburg and Ekurhuleni, however, the Tshwane municipality includes significant rural land. The municipality is geographically very large. The “city proper” is predominantly in the west of the metropolitan municipality area, as can be seen from increased population density in this area as per Figure A2.12 (maps of rural and urban areas are presented in the Graphical Appendix). Small towns such as Bronkhorstspruit lie outside of the city.

Figure 2.1 shows that with the exception of Atteridgeville to the south-west, the Pretoria city centre and the areas immediately around it exhibit very low unemployment rates. Centurion on the southern border of the City of Tshwane exhibits similar low unemployment rates. The highest unemployment rates in the municipality are evident in the semi-peripheral areas of Mamelodi and Atteridgeville, and in the extreme north-west of the municipality, made up of the townships such as Soshanguve and Winterveld. A notable feature of the distribution of unemployment in Tshwane is the relatively low unemployment rates in the peripheral west of the municipality. These areas are largely rural, however, and these low rural unemployment rates are likely because of the endogeneity issue identified in our methods section and discussed in Section 3.3.2, rather than urban dynamics such as spatial mismatch.

Figure 2.2 shows that jobs are focused mainly in the Pretoria CBD and to its south, extending to the jobs centre of Centurion. The data suggests some employment pockets in the north-west, but shows that Tshwane is an economically monocentric city, with most of the formal economic activity focused around the city centre.

Job proximity, as shown in Figure 2.3, is what is to be expected based on the jobs data. It confirms that Tshwane is monocentric, with the Pretoria city centre being the most important node. The area of high job proximity is pulled slightly southwards due to areas such as Centurion, but not significantly so. It is worth noting that if jobs in Johannesburg were incorporated, it is likely that the job proximity score in the south below the Pretoria city centre would be higher. There is considerable commuting between Tshwane and Johannesburg which is not captured by this model. The Gauteng region analysis is instead useful here.

Figure 2.4 is suggestive of strong spatial mismatch effects in Tshwane. It shows that across the Tshwane region, job proximity explains large variation in unemployment rates. For example, the change in job proximity from moving from Winterveld in the North to the Pretoria city centre is associated with a decrease in unemployment rates of between 9 and 15 percentage points.
Table 2 shows that there is indeed a negative relationship between job proximity and unemployment rates in Tshwane, and that this relationship is statistically significant below the 1% level. According to our GLM estimates, a 10 unit increase in job proximity is on average associated with a 3.2 percentage point decrease in small area unemployment rates, or equivalently a 10% increase in job proximity is associated with a 9.95% decrease in unemployment rates (with control covariates held constant at their mean values).

Table 2: Spatial Mismatch in the City of Tshwane

<table>
<thead>
<tr>
<th></th>
<th>(Spec. 1) GLM unit changes</th>
<th>(Spec. 2) GLM % changes</th>
<th>(Spec. 3) OLS % changes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNEMPLOYMENT RATE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximity to jobs (index)</td>
<td>-0.320*** (0.0172)</td>
<td>-0.995*** (0.0530)</td>
<td>-0.863*** (0.0535)</td>
</tr>
<tr>
<td>Observations</td>
<td>4,513</td>
<td>4,513</td>
<td>4,440</td>
</tr>
<tr>
<td>Regression R-squared</td>
<td></td>
<td></td>
<td>0.641</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Control covariates not shown
City by City Spatial Mismatch Results

City of Tshwane

**Figure 2.1:** UNEMPLOYMENT
City of Tshwane

**Figure 2.2:** JOBS
City of Tshwane

**Figure 2.3:** JOB PROXIMITY
City of Tshwane

**Figure 2.4:** THE SPATIAL MISMATCH EFFECT
City of Tshwane
Ekurhuleni

Our model suggests that job proximity is a significant determinant of unemployment in Ekurhuleni.

The Ekurhuleni Metropolitan Municipality does not have one “city centre” – the separate areas of Edenvale, Bedfordview, Germiston, Boksburg, Benoni, Kempton Park and Alberton are all important when it comes to the area’s overall economic activity. The municipality is an agglomeration of economic centres, and because if this it is somewhat unclear how well it constitutes what is conventionally understood to be a single “city”. There is nonetheless a well-defined urban core in the central west of the municipality, where a number of the economic nodes mentioned above are clustered. Ekurhuleni is a very urban municipality, with only a small part of the north east classified as rural. It is economically important in the Gauteng region, and is significantly integrated into the economy of Johannesburg.

Figure 3.1 presents a relatively clear picture of peripheral unemployment, with most unemployment concentrated in the peripheral north-west, east and south. Unemployment is comparatively low around the main nodes of economic activity clustered in the centre-west of the municipality. The low unemployment rates of the extreme north-east are likely related this area’s low population density and rurality.

Figure 3.2 confirms that jobs are concentrated in the municipality’s centre-west, but there is greater dispersion of jobs across this centre-west region than is typical of many other South African cities. The jobs data suggests that while Ekurhuleni may be relatively polycentric, its these multiple centres are ultimately clustered quite closely together, in only one region of the municipal map. The data suggests that few jobs are located in the northern, eastern, or southern peripheries.

Figure 3.3 confirms that despite Ekurhuleni’s unusual polycentricity, the proximity of its various nodes creates its own urban core of high job proximity in the west which includes Edenvale, Bedfordview, Germiston and Boksburg. Actual job proximity is likely underestimated in the west of the municipality, where residents will have easy access to Johannesburg, but this is an area of high job proximity within Ekurhuleni in any case. Peripheral areas which show high unemployment in Figure 3.1 are the same areas which show low job proximity in Figure 3.3.

Figure 3.4 shows that a substantial part of variation in unemployment rates in Ekurhuleni can be explained by changes in job proximity, but not to as great an extent as can be found in Tshwane, for example. The lesser effect of spatial mismatch may be due to the municipality’s polycentrism. A move from
Tembisa or Vosloorus to a central area such as Edenvale is associated with a statistically significant decrease in unemployment rates of between 3 and 9 percentage points, when only the effect of job proximity changes is examined. As per Table 3, a 10 unit increase in job proximity is on average associated with a 3.03 percentage point decrease in small area unemployment rates, or equivalently a 10% increase in job proximity is associated with a 7.35% decrease in unemployment rates.

**Table 3**: Spatial Mismatch in the City of Ekurhuleni

<table>
<thead>
<tr>
<th></th>
<th>(Spec. 1) GLM unit changes</th>
<th>(Spec. 2) GLM % changes</th>
<th>(Spec. 3) OLS % changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximity to jobs (index)</td>
<td>-0.303***</td>
<td>-0.735***</td>
<td>-0.822***</td>
</tr>
<tr>
<td></td>
<td>(0.0268)</td>
<td>(0.0651)</td>
<td>(0.0744)</td>
</tr>
<tr>
<td>Observations</td>
<td>4,603</td>
<td>4,603</td>
<td>4,563</td>
</tr>
<tr>
<td>Regression R-squared</td>
<td></td>
<td></td>
<td>0.630</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Control covariates not shown
City by City Spatial Mismatch Results

City of Ekurhuleni

**Figure 3.1:** UNEMPLOYMENT
City of Ekurhuleni

**Figure 3.2:** JOBS
City of Ekurhuleni

**Figure 3.3:** JOB PROXIMITY
City of Ekurhuleni

**Figure 3.4:** THE SPATIAL MISMATCH EFFECT
City of Ekurhuleni
Our model suggests that job proximity is a significant determinant of unemployment in eThekwini.

The eThekwini Metropolitan Municipality centre of economic activity is focused around Durban Harbour and the Durban city centre immediately to its north. Its coast is to the East. The municipality is adjacent to the Msunduzi municipality along its north-west border, which includes Pietermaritzburg, but economic integration between these municipalities is not comparable with what is found in the Gauteng conurbation. Turok (2012) notes that eThekwini exhibits a particularly fragmented spatial form (see population density patterns in Figure A2.4), and attributes this jointly to Apartheid policies of separate development (Umlazi and KwaMashu were part of the KwaZulu Bantustan), and to eThekwini’s particular “regional topography of undulating hills and valleys which complicate coherent physical development” (Turok, 2012:25). The municipality contains rural areas to the north-west and south-west, but is largely urban.

The picture of unemployment shown in Figure 4.1 is not as clear cut as it is the Gauteng municipalities, due to rural areas with a mixture of high and relatively low unemployment rates, but when looking at urban areas a pattern becomes more apparent. Low unemployment rates prevail along the coast, in the centre around Durban harbour, and in a corridor extending north-west towards the wealthy suburbs of Kloof and Hillcrest. High urban unemployment is found in extremely peripheral areas such as Tongaat and Mpuamalanga, but also in areas which though slightly less peripheral are certainly not part of the urban core, such as Umlazi and KwaMashu.

The jobs data in Figure 4.2 presents a stark mirror image to the spatial distribution of unemployment. Jobs are concentrated around Durban Harbour and along the coast, and also in a jobs corridor which extends north-west to the predominantly white suburbs including Kloof and Hillcrest. The extreme periphery shows few signs of any jobs, and the semi-peripheral Umlazi and KwaMashu exist outside the main jobs corridor.

Figure 4.3 emphasises the importance of the Durban city centre for proximity to jobs, though proximity to jobs scores are pulled somewhat north-west in line with the jobs corridor discussed above. The job proximity index doesn’t seem to fully capture the jobs corridor pattern, however, likely because this corridor is not significant enough relative to the jobs of Durban central. True job proximity in the north-west may be slightly underestimated due to the exclusion of Pietermaritzburg jobs, but this is unlikely to have a significant effect due to the distance and relatively small size of Pietermaritzburg compared to eThekwini.

Figure 4.4 shows that significant variation in unemployment is explained by proximity to jobs in eThekwini. The size of the spatial mismatch effect is more comparable to what is
found in Ekurhuleni than the very large effect identified in Tshwane, but Figure 4.4 shows a clear relationship between proximity to jobs and unemployment in eThekwini. A move to the urban core from the extremely peripheral Tongaat or Mpumalanga informal settlements is associated with an unemployment decrease of between 6 and 10 percentage points, while a move from Umlazi is associated with a 4 to 8 percentage point decrease in unemployment rates. Table 4 shows that a 10 unit increase in job proximity is on average associated with a statistically significant 2.23 percentage point decrease in small area unemployment rates, or equivalently a 10% increase in job proximity is associated with a 4.95% decrease in unemployment rates.

Table 4: Spatial Mismatch in eThekwini Metropolitan Municipality

<table>
<thead>
<tr>
<th>Proximity to jobs (index)</th>
<th>(Spec. 1) GLM unit changes</th>
<th>(Spec. 2) GLM % changes</th>
<th>(Spec. 3) OLS % changes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.223***</td>
<td>-0.495***</td>
<td>-0.557***</td>
</tr>
<tr>
<td></td>
<td>(0.0262)</td>
<td>(0.0584)</td>
<td>(0.0630)</td>
</tr>
<tr>
<td>Observations</td>
<td>4,780</td>
<td>4,780</td>
<td>4,733</td>
</tr>
<tr>
<td>Regression R-squared</td>
<td></td>
<td></td>
<td>0.564</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Control covariates not shown
City by City Spatial Mismatch Results

eThekwini Metropolitan Municipality

Figure 4.1: UNEMPLOYMENT
eThekwini Metropolitan Municipality

Figure 4.2: JOBS
eThekwini Metropolitan Municipality

Figure 4.3: JOB PROXIMITY
eThekwini Metropolitan Municipality

Figure 4.4: THE SPATIAL MISMATCH EFFECT
eThekwini Metropolitan Municipality
Mangaung

Our model suggests that job proximity is a significant determinant of unemployment in Mangaung, though extra care must be taken when interpreting the results for this municipality.

Mangaung is a recent addition to South Africa's legislatively determined metropolitan municipalities, having been added only in 2011. It is unusual when compared to the other metropolitan municipalities in that it is decidedly less dense: Mangaung is the 35th densest municipal area in South Africa, and it is by far the least dense of the eight metropolitan municipalities. Mangaung's low aggregate density comes about because the vast majority of the municipal area is made up of rural land. The urban areas of Bloemfontein and Mangaung Township (distinct from Mangaung metropolitan municipality as a whole), which collectively make up the area that is commonly understood to be the city, are very small geographically. The densely populated townships of Botshabelo and Thaba Nchu (formerly incorporated into the Qwa Qwa and Bophutatswana Bantustans respectively) are a considerable distance from the city centre, but without any economic base of their own there is regular commuting between these areas and Bloemfontein proper (SACN, 2011). The SACN calls Botshabelo a “classic example of displaced urbanisation” (2011:6). The disparities between the city proper and these densely populated but isolated areas makes analysis of spatial mismatch in Mangaung difficult, especially because of the vast expanses of rural land which make up the municipality (evident from Figures A2.5 and A2.15). Care must be taken when interpreting the relevance of spatial mismatch results for the metropolitan municipality as a whole.

Figure 5.1 shows unemployment rates to be highest in Mangaung Township and the towns of Botshabelo and Thaba Nchu. While Mangaung Township is relatively close to the Bloemfontein city centre, Botshabelo and Thaba Nchu are far removed. The well-located areas of central Bloemfontein and its suburbs have low unemployment rates. Similarly to Tshwane, lower unemployment rates in the large rural areas around Bloemfontein are likely unrelated to employment prospects in this region, but are more due to the unemployed tending to leave these areas for informal settlements.

Figure 5.2 present a picture where jobs are only seriously concentrated in the Bloemfontein city centre, with some jobs in its immediate surrounds. Botshabelo and Thaba Nchu show slightly higher jobs prevalence than are evident in the townships' immediate rural surrounds, but very few jobs nonetheless.

Figure 5.3 adds little to the analysis, confirming as it does that Manguang is very monocentric when it comes to jobs, and that Botshabelo and Thaba Nchu are very poorly located. Mangaung Township, while relatively well-located, has slightly worse proximity to jobs than Bloemfontein and its suburbs. This last
nuance should not be over-emphasised, as the small area of the city proper and consequently small number of mesozones may distort the real distribution of jobs within the urban centre.

The extreme rurality of Mangaung, combined with its peculiar spatial form defined by the “displaced urbanisation” of Botshabelo and Thaba Nchu, means our graphic depiction of spatial mismatch needs to be interpreted with care. While Figure 5.4 shows changes in unemployment due to changing job proximity in the areas immediately surrounding Bloemfontein, the lack of significant actual variation in unemployment rates around the Bloemfontein city centre suggests that the main drivers of the changes are the towns of Botshabelo and Thaba Nchu. The low-density rural area between Bloemfontein and these towns, where actual unemployment does not vary significantly, cannot be well represented by predictions from a regression which models change in unemployment as a smooth and linear function of proximity to jobs. Table 5 shows that a 10 unit increase in job proximity is on average associated with a statistically significant 4.66 percentage point decrease in small area unemployment rates, or equivalently a 10% increase in job proximity is associated with a 7.13% decrease in unemployment rates. The issue of these being average estimates presents a particular problem in Mangaung, where the urban dynamic of mismatch is applicable only to small parts of the municipality, and non-contiguous parts of the municipality at that. Because of its peculiar urban structure, Mangaung would perhaps be better modelled by techniques such as quantile regression, mentioned in Section 3.3.2.19

However if low-density rural areas are disregarded, there is useful analysis to be had about the extent to which high unemployment in Botshabelo and Thaba Nchu is explained by poor proximity to jobs. Figure 5.4 suggests that the change in job proximity associated with a move from Botshabelo to the Bloemfontein city centre is on average associated with a decrease in unemployment rates of between 10 and 20 percentage points. There is significant evidence for spatial mismatch in Mangaung as a whole, but it needs to be interpreted carefully. It seems that part of the unemployment of residents of Botshabelo and Thaba Nchu can be explained by poor proximity to jobs, but little can be said about the remaining areas of the municipality, which are predominantly rural or well-located urban areas.

19 Quantile regression is a technique which (amongst other things) would allow for the size of the spatial mismatch coefficient to be different for small areas depending on how high (or low) their job proximity score is. It may help identify the spatial mismatch effect present in Botshabelo and Thaba Nchu without the confounding influence of other very peripheral or non-peripheral areas which do not seem to be affected by spatial mismatch.
Table 5: Spatial Mismatch in Mangaung Metropolitan Municipality

<table>
<thead>
<tr>
<th></th>
<th>(Spec. 1) GLM unit changes</th>
<th>(Spec. 2) GLM % changes</th>
<th>(Spec. 3) OLS % changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximity to jobs (index)</td>
<td>-0.466***</td>
<td>-0.713***</td>
<td>-0.663***</td>
</tr>
<tr>
<td></td>
<td>(0.0350)</td>
<td>(0.0529)</td>
<td>(0.0559)</td>
</tr>
</tbody>
</table>

Observations 1,307 1,307 1,292
Regression R-squared 0.656

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Control covariates not shown

City by City Spatial Mismatch Results

Mangaung Metropolitan Municipality

Figure 5.1: UNEMPLOYMENT
Mangaung Metropolitan Municipality

Figure 5.2: JOBS
Mangaung Metropolitan Municipality

Figure 5.3: JOB PROXIMITY
Mangaung Metropolitan Municipality

Figure 5.4: THE SPATIAL MISMATCH EFFECT
Mangaung Metropolitan Municipality
Nelson Mandela Bay

Our model does not find statistically significant evidence to suggest that job proximity is a determinant of unemployment in Nelson Mandela Bay.

Nelson Mandela Bay is bordered by the coast to the east and south, with the Port Elizabeth city centre on Algoa Bay close to the south-east corner of the municipality. The municipality is not one of South Africa’s main economic centres, but it contains significant heavy industry. The Coega Industrial Development Zone is located on the municipality’s east coast, while the town of Uitenhage contains large factories which produce heavy industry goods such as automobiles. The municipality contains large amounts of rural land, but the centre and south-east are predominantly urban.

Figure 6.1 shows that while areas of high unemployment in Nelson Mandela Bay are very clearly delineated and separated from areas of relatively low unemployment, the pattern of peripheralisation so evident in other South African cities is not immediately apparent when looking at the municipality as a whole. It is clear that areas of low unemployment are concentrated in the city centre and the predominantly white suburbs of southern Port Elizabeth and of Uitenhage. Contrastingly, the areas of iBhayi, Bethelsdorp, Motherwell, KwaNobuhle and the north-west of Uitenhage are the areas of highest unemployment in the municipality. However many of these areas are relatively close to each other at least in terms of direct distance.

The jobs data presented in Figure 6.2 show that the municipality has two predominant jobs centres: a primary node around the Port Elizabeth city centre, and a secondary node around Uitenhage. There is some evidence for a small jobs corridor extending along the east coast, though these jobs should not be overstated. The jobs data suggests that the areas of highest unemployment mentioned above are not particularly far away from jobs. iBhayi and Bethelsdorp are relatively close to the jobs of the city centre and the job corridor which moves along the east coast, while KwaNobuhle is close to the jobs of Uitenhage. Motherwell is likely the worst-located out of these areas, but is still close to the jobs of the east coast and is not very far away the Port Elizabeth city centre compared to what is found in other South African cities.

Figure 6.3 confirms what is to be expected with regard to job proximity, with little variation in job proximity across the urban parts of Nelson Mandela Bay, and some additional evidence for municipal polycentricity. The proximity of Motherwell to the City Centre may be overstated by our job proximity measure, as the Swartkops River presents a geographic barrier between these areas which our straight-line distance measure cannot account for. Nonetheless the descriptive graphics do not seem to suggest a strong relationship between job proximity and unemployment rates.

The lack of statistical significance of our spatial mismatch effect (indicated in Table
6) means that the changes in unemployment due to job proximity predicted in Figure 6.4 are unreliable, and should not have any spatial mismatch interpretation attached to them. It is noticeable, however, that the predicted effect is small in any case, and across the majority of the municipality changes in job proximity do not have a noticeable effect on unemployment. Even if the mismatch estimates were statistically significant, they would suggest that a 10 unit increase in job proximity would on average be associated with only a 0.38 percentage point decrease in small area unemployment rates, while a 10% increase in job proximity would be associated with only a 0.65% decrease in unemployment rates.

Lack of statistical significance suggests that there is not enough evidence to conclude that there is a spatial mismatch effect; this is not the same as evidence of no spatial mismatch. Furthermore, as discussed in Sections 3.3.2 and 3.3.5, our job proximity measure may be biased against finding mismatch. Nonetheless, this regression result together with the descriptive evidence in Figures 6.1 and 6.2 do seem to suggest that spatial mismatch is not a significant issue in Nelson Mandela Bay.

Table 6: Spatial Mismatch in Nelson Mandela Bay Metropolitan Municipality

<table>
<thead>
<tr>
<th></th>
<th>(Spec. 1) GLM unit changes</th>
<th>(Spec. 2) GLM % changes</th>
<th>(Spec. 3) OLS % changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximity to jobs (index)</td>
<td>-0.0380</td>
<td>-0.0654</td>
<td>-0.184*</td>
</tr>
<tr>
<td></td>
<td>(0.0520)</td>
<td>(0.0895)</td>
<td>(0.111)</td>
</tr>
<tr>
<td>Observations</td>
<td>1,803</td>
<td>1,803</td>
<td>1,775</td>
</tr>
<tr>
<td>Regression R-squared</td>
<td></td>
<td></td>
<td>0.660</td>
</tr>
</tbody>
</table>

Table 6: Spatial Mismatch in Nelson Mandela Bay Metropolitan Municipality

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Control covariates not shown
City by City Spatial Mismatch Results
Nelson Mandela Bay Metropolitan Municipality

Figure 6.1: UNEMPLOYMENT
Nelson Mandela Bay Metropolitan Municipality

Figure 6.2: JOBS
Nelson Mandela Bay Metropolitan Municipality

Figure 6.3: JOB PROXIMITY
Nelson Mandela Bay Metropolitan Municipality

Figure 6.4: THE SPATIAL MISMATCH EFFECT
Nelson Mandela Bay Metropolitan Municipality
Buffalo City

Our model suggests that job proximity is a significant determinant of unemployment in Buffalo City, though care must be taken when interpreting the results for this municipality.

Like Nelson Mandela Bay, Buffalo City has a considerable industrial base, especially in automobile manufacturing. The municipality is bordered by the coast to the south-east, and predominantly rural areas inland (with the exception of the town of Stutterheim to its north-west). Buffalo City is a recent addition to the list of legislatively determined metropolitan municipalities: like Mangaung, it was only added to this list in 2011. It is the second least dense out of the 8 metropolitan municipalities, and includes significant rural land. The municipality contains some significant settlements disconnected from the city centre of East London, such as Mdantsane, King Williams Town, and Bisho. The geography of the municipality is also somewhat restrictive, in that central East London is surrounded by rivers to the north and south.

Similarly to Kwazulu-Natal, the picture of unemployment in Buffalo City presented in Figure 7.1 is complicated by the presence of sparsely populated rural areas which have highly variable unemployment rates. When focusing on urban areas, it becomes clear that the areas of lowest unemployment are around the East London city centre, and in King Williams Town. The disconnected areas of Mdantsane, Zwelitsha and Bisho, in contrast, have high unemployment rates.

Figure 7.2 suggests a weak polycentricism when it comes to jobs in Buffalo City. Jobs are mainly concentrated around the East London city centre (and especially along the coast), but there is also a second small jobs node in King Williams Town.

Figure 7.3 confirms the relatively centralised spatial form of Buffalo City’s economic activity. Though there is some localised economic activity in King Williams Town, this is not significant in the broader municipal context. Mdantsane has better proximity to jobs than far-flung Bisho, but the north of the township is still significantly different from central East London areas. Any benefit that Mdantsane residents receive from proximity to King Williams Town is not significantly reflected in our job proximity measure.

Similarly to the case of Mangaung, care must be taken when interpreting the implications of Figure 7.4 for unemployment explained by job proximity when looking to the north and west of East London, as these are predominantly rural areas. Instead, it is useful to see that proximity to jobs explains a significant amount of the difference in unemployment between central areas and the far-flung Mdantsane and even more peripheral Bisho. Figure 7.4 suggests that a move from these areas to the East London city centre is associated with a decrease in unemployment rates of between 4 and 12 percentage points. Table 7 indicates that a 10 unit increase in job proximity is on average associated with a statistically significant 3 percentage point decrease in small area unemployment rates, or equivalently that a 10% increase in job proximity is associated with a 3.34% decrease in unemployment rates.
Table 7: Spatial Mismatch in Buffalo City Metropolitan Municipality

<table>
<thead>
<tr>
<th></th>
<th>(Spec. 1) GLM unit changes</th>
<th>(Spec. 2) GLM % changes</th>
<th>(Spec. 3) OLS % changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximity to jobs (index)</td>
<td>-0.300***</td>
<td>-0.334***</td>
<td>-0.376***</td>
</tr>
<tr>
<td></td>
<td>(0.0568)</td>
<td>(0.0630)</td>
<td>(0.0779)</td>
</tr>
<tr>
<td>Observations</td>
<td>1,383</td>
<td>1,383</td>
<td>1,362</td>
</tr>
<tr>
<td>Regression R-squared</td>
<td></td>
<td></td>
<td>0.555</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Control covariates not shown

City by City Spatial Mismatch Results

Buffalo City Metropolitan Municipality

Figure 7.1: UNEMPLOYMENT
Buffalo City Metropolitan Municipality

Figure 7.2: JOBS
Buffalo City Metropolitan Municipality

Figure 7.3: JOB PROXIMITY
Buffalo City Metropolitan Municipality

Figure 7.4: THE SPATIAL MISMATCH EFFECT
Buffalo City Metropolitan Municipality
City of Cape Town

Our model does not find statistically significant evidence to suggest that job proximity is a determinant of unemployment in the City of Cape Town, but we argue that there are a number of factors which prevent us from drawing conclusions on spatial mismatch in Cape Town.

The City of Cape Town is a major economic hub in South Africa, and is the second most populous metropolitan municipality nationally. It has a particularly irregularly-shaped municipal boundary, constrained as it is by the coast to the south and west, and the Cape Winelands and mountain ranges to the east. It is a predominantly urban municipality. There are some rural areas north of Durbanville and Blouberg, though the extreme northern periphery includes the urban area of Atlantis. A significant geographical feature of the municipality is the mountain range which forms the spine of the Cape Peninsula, and culminates in the north with Table Mountain overlooking the Cape Town city centre. This mountain range intrudes significantly into the Cape Town urban landscape, and areas to the west of the mountain range such as Hout Bay are significantly isolated from the rest of the city.

Figure 8.1 shows that high unemployment in Cape Town is predominantly located in the south-east “Cape Flats”, made up areas such as Mitchells Plein, Khayelitsha, and Nyanga, and in the extreme north in Atlantis. The city centre, the Atlantic seaboard to the west of the city centre, the predominantly white “southern suburbs” which hug the eastern side of the Table Mountain range, and the “northern suburbs” of Blouberg and Durbanville all exhibit relatively low unemployment rates.

Figure 8.2 indicates that jobs are heavily concentrated in the Cape Town city centre, but also extend eastwards and south-west in two different jobs corridors. The eastwards jobs corridor includes areas such as Goodwood and Bellville, while south-west corridor follows the contours of the Table Mountain range, into the southern suburbs. The areas of relatively low jobs intensity are the south-east Cape Flats, and in the peripheral north with Atlantis. Comparison with Figure 8.1 suggest that it is precisely these areas which have disproportionately high unemployment rates relative to the rest of the municipality.

Figure 8.3 presents a picture where job proximity does not vary significantly across Cape Town except when looking at extreme peripheral areas such as Atlantis. This needs to be interpreted with caution. Cape Town’s natural geography confounds our straight-line measure. A straight line from Cape Town city centre to Mitchell’s Plain passes over the Devil’s Peak mountain, while a straight line from the city centre to Atlantis passes over Table Bay. Actual commuting patterns will, in many cases, be significantly longer than our straight-line distance. The Cape Town city centre is in reality relatively isolated from the rest of the municipality due to the mountain and coastal geography, which our jobs proximity measure cannot show.
Our GLM estimates in Table 8 show that a positive relationship between job proximity and unemployment rates is statistically significant below the 10% level, but not at the 5% level (and therefore not at the 1% level). In this case it is ambiguous as to whether the result should be accepted as statistically significant. The direction of the relationship is counter-intuitive and somewhat perplexing – it suggests that living close to jobs will increase unemployment rates. It is difficult to think of a plausible explanation for this effect, and it instead may be an indicator that our model does not work very well in Cape Town. That our OLS results presented in Table 8 (which are suggestive of statistically significant spatial mismatch) are so different to the GLM estimates is further evidence to suggest that our results are sensitive to model specification in the case of Cape Town. It is not unusual for statistically insignificant results to have the “wrong” sign in applied empirical work, and this can be more indicative of limitations in the underlying model than it is of an inexplicable reality. The question of statistical significance is in any case somewhat moot, as according to the GLM estimates from our model depicted in Figure 8.4, even if the relationship between proximity to jobs and unemployment is accepted as true and statistically significant, the size of the effect is very small. Figure 8.4 suggests that proximity to jobs plays essentially no role in explaining unemployment in Cape Town. Even if the GLM results in Table 8 are taken to be statistically significant, they suggest that a 10 unit increase in job proximity would on average be associated with only a 0.27 percentage point increase in small area unemployment rates, while a 10% increase in job proximity would be associated with only a 0.96% increase in unemployment rates.

At face value however this research suggests that there is little reason to think that spatial mismatch manifests in Cape Town. However in light of the weaknesses of our job proximity variable (which will be exacerbated by Cape Town’s irregular physical geography), and the significant existing work which suggests spatial mismatch in Cape Town (Turok, 2001; Rospabe & Selod, 2006; Sinclair-Smith & Turok, 2012), a prudent interpretation of our evidence is to remain agnostic about the existence of spatial mismatch in the city. It is true that the Cape Flats, where most unemployment is found in Cape Town, is actually in quite close physical proximity to the two Cape Town jobs corridors, relative to other major metropolitan municipalities. However this physical proximity may not be translating reliably into shorter commuting times, partly because of physical geography and secondly because highway systems accessible to Cape Flats residents do not travel directly to these corridors. Preliminary evidence for this is found in Rospabe and Selod (2006). Their measure of direct physical proximity to jobs (which they call “local employment density”) is not a significant predictor of unemployment rates in Cape Town (as we find in our work), but their measure of actual commuting distances (which we do not have in our work) is significantly related to unemployment probability, below the 10% significance level (which they accept as statistically significant). In their words:
“The effect of local employment density is not significant, whereas the average commuting distance of workers surveyed in the ‘migration study’ and living in the EA [Enumerator Area, a Census area similar to our small areas] plays a positive and significant role in the unemployment probability. This means that controlling for all other variables, individuals who reside in EAs where employed workers occupy jobs far away are more likely to be unemployed.” (Rospabe & Selod, 2006:278)

This suggests that commuting distances are not well approximated by straight-line distances in Cape Town, and that longer actual commuting distances are indeed related to higher unemployment rates. The result of our analysis is to find no evidence for spatial mismatch in Cape Town, but given past evidence on mismatch in the city and the identified weaknesses of our measure (which seem to be particularly consequential in Cape Town), we remain undecided about the extent to which spatial mismatch manifests in the city. It seems that data on actual commuting times may be necessary for a full analysis of mismatch in Cape Town.

Table 8: Spatial Mismatch in the City of Cape Town

<table>
<thead>
<tr>
<th></th>
<th>(Spec. 1) GLM unit changes</th>
<th>(Spec. 2) GLM % changes</th>
<th>(Spec. 3) OLS % changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximity to jobs (index)</td>
<td>0.0278*</td>
<td>0.0963*</td>
<td>-0.213***</td>
</tr>
<tr>
<td></td>
<td>(0.0165)</td>
<td>(0.0571)</td>
<td>(0.0535)</td>
</tr>
<tr>
<td>Observations</td>
<td>5,324</td>
<td>5,324</td>
<td>5,186</td>
</tr>
<tr>
<td>Regression R-squared</td>
<td></td>
<td></td>
<td>0.656</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Control covariates not shown
City by City Spatial Mismatch Results

City of Cape Town

Figure 8.1: UNEMPLOYMENT
City of Cape Town

Figure 8.2: JOBS
City of Cape Town

Figure 8.3: JOB PROXIMITY
City of Cape Town

Figure 8.4: THE SPATIAL MISMATCH EFFECT
City of Cape Town
Gauteng Province

Our model suggests that job proximity is a major determinant of unemployment in Gauteng Province.

Gauteng Province constitutes the economic centre of South Africa. Despite being the smallest province geographically, it is the only province to contain more than two metropolitan municipalities. It is by far the most urban province, and many of these urban areas are significantly connected to each other, despite being in separate municipalities. The municipalities of Johannesburg and Ekurhuleni could quite easily be seen as one (very large) city, and this may extend to including Tshwane. In any case, Gauteng is certainly a large conurbation, and given the inability of our job proximity variable to take into account jobs in neighbouring municipalities when examining one municipality at a time, there is use in evaluating Gauteng Province as a whole. Despite being the most urban province in South Africa, Gauteng still incorporates significant rural land, in the north-east, south-east, and the periphery of the south-west.

The areas of lowest unemployment depicted in Figure 9.1 are concentrated mainly around the centre of the municipality. Low unemployment rates are evident in the centre-east in the urban centres of Ekurhuleni, and extend northwards from the Johannesburg city centre to the city’s northern suburbs, and through Sandton and Midrand to Pretoria. Though there are pockets of high unemployment within this region, such as Diepsloot, it is mainly the “semi-peripheral” areas which surround the economic centre which have very high unemployment rates, such as Randfontein, Soshanguve, and Daveyton. The extreme rural periphery of the province has somewhat lower unemployment rates than the semi-periphery, but this is likely related to the endogeneity issue outlined in Secton 3.3.2, where the extremely peripheral unemployed will move to the easily accessible semi-periphery in search of jobs.

Figure 9.2 shows that jobs are concentrated in the centre of Gauteng, specifically around Johannesburg, its northern suburbs, and the job centres of Ekurhuleni. However a significant jobs corridor extends northwards from Johannesburg through Midrand to Pretoria. Outside of this jobs corridor and the central Johannesburg-based jobs, there is relatively little else to be found in the province, and there is a sharp contrast between the jobs of the centre and the lack of jobs evident in the semi-periphery.

Figure 9.3 confirms the centrality of Johannesburg and its northern suburbs when it comes to job proximity, but also shows the northern jobs corridor discussed above. It is interesting that our jobs proximity measure implies somewhat similar proximity to jobs for Soweto and the Pretoria city centre. As mentioned above Soweto is relatively well-situated for a major South African township, but this similarity in proximity to jobs is likely more an indication of the limitations in our jobs proximity measure than indicative of any
substantive comparability. The issue identified in Section 3.3.5, where Diepsloot’s proximity to jobs was underestimated in our Johannesburg-specific analysis, is better resolved in this Gauteng-wide picture – its measured proximity to jobs is much higher here, now having taken into account jobs to the north.

Figure 9.4 shows clearly the effect of job proximity on unemployment, and it shows that this effect is large in practical terms. A move from Orange Farm or Soshanguve to the Johannesburg city centre is associated with a decrease in unemployment rates of between 8 and 14 percentage points. Table 9 shows that a 10 unit increase in job proximity is on average associated with a statistically significant 3.04 percentage point decrease in small area unemployment rates, or equivalently a 10% increase in job proximity is associated with an 8.99% decrease in unemployment rates.

Table 9: Spatial Mismatch in Gauteng Province

<table>
<thead>
<tr>
<th></th>
<th>(Spec. 1) GLM unit changes</th>
<th>(Spec. 2) GLM % changes</th>
<th>(Spec. 3) OLS % changes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNEMPLOYMENT RATE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximity to jobs (index)</td>
<td><strong>-0.304</strong>*</td>
<td><strong>-0.899</strong>*</td>
<td><strong>-1.094</strong>*</td>
</tr>
<tr>
<td></td>
<td>(0.00912)</td>
<td>(0.0270)</td>
<td>(0.0306)</td>
</tr>
<tr>
<td>Observations</td>
<td>17,806</td>
<td>17,806</td>
<td>17,588</td>
</tr>
<tr>
<td>Regression R-squared</td>
<td></td>
<td></td>
<td>0.612</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Control covariates not shown
City by City Spatial Mismatch Results

Gauteng Province

Figure 9.1: UNEMPLOYMENT
Gauteng Province

Figure 9.2: JOBS
Gauteng Province

Figure 9.3: JOB PROXIMITY
Gauteng Province

Figure 9.4: THE SPATIAL MISMATCH EFFECT
Gauteng Province
Johannesburg-Ekurhuleni-Tshwane

The possibility that urban mismatch is underestimated in Gauteng, because of outlying rural areas, motivates for an analysis which looks only at its major interconnected urban centres of Johannesburg, Ekurhuleni, and Tshwane. As mentioned above, these municipalities can potentially be seen as one large city, or at least as one large conurbation. They comprise 3 of the top 5 most populous municipalities in South Africa and are significant economic centres. Their adjacency means they are significantly interconnected, with for example the high-speed Gautrain serving only these 3 municipalities, and with plans for line extensions not extending beyond the Johannesburg-Ekurhuleni-Tshwane region. Large rural areas in the east of Tshwane mean that the north-east of the Johannesburg-Ekurhuleni-Tshwane region contains significant rural land, but it is nonetheless a very urban area as a whole.

Figure 10.1 shows that similarly to the case of Gauteng Province as a whole, unemployment rates are very low in central areas of Johannesburg, in Ekurhuleni’s main urban areas, and in a corridor which extends north-south between Johannesburg and Pretoria. Semi-peripheral surrounding areas such as Soweto, Katlehong, Tembisa and Soshanguve have very high unemployment rates. The extreme periphery, which is predominantly rural land, has intermediate levels of unemployment, likely due to the ease of urban in-migration discussed in 3.3.2.

Figure 10.2 depicts Johannesburg-Ekurhuleni-Tshwane jobs as concentrated around Johannesburg’s city centre and its northern suburbs, and then extending upwards in a jobs corridor to Pretoria. To the immediate east of Johannesburg, the jobs of Ekurhuleni’s major urban centres are also apparent. The semi-peripheral south and east show few jobs, as does the north-west of Tshwane. The few jobs in the extremely peripheral north-east of Johannesburg-Ekurhuleni-Tshwane are to be expected, given the region’s rurality, but indicate little about the conurbation’s urban structure.

Job proximity as shown in Figure 10.3 reflects what is to be expected based on the underlying data, and is similar in its pattern as Gauteng-wide job proximity shown in Figure 10.3. The areas of highest proximity to jobs are Johannesburg and its northern suburbs, but there is a clear skewness of job proximity upwards towards Pretoria. Areas of high unemployment such as Tembisa and Diepsloot have good proximity to jobs according to this measure, while more peripheral urban areas such as Soshanguve, Orange Farm, and Katlehong have low proximity.

Figure 10.4 shows that there is a significant negative relationship between job proximity and unemployment rates in Johannesburg-Ekurhuleni-Tshwane. This indicates firstly that Gauteng municipalities outside the region seem to add little in the way of jobs compared
to the Johannesburg-Ekurhuleni-Tshwane municipalities, and secondly that the potential for underestimating spatial mismatch due to extremely peripheral areas may not be as great as previously discussed. Similarly to what is suggested in our Gauteng analysis, a move from Orange Farm or Soshanguve to the Johannesburg city centre is associated with a decrease in unemployment rates of between 9 and 15 percentage points. This is slightly higher than what is predicted when looking at Gauteng as a whole, but is nonetheless very similar. Table 10 shows that a 10 unit increase in job proximity is on average associated with a statistically 3.17 percentage point decrease in small area unemployment rates, or equivalently a 10% increase in job proximity is associated with a 9.92% decrease in unemployment rates.

Table 10: Spatial Mismatch in Johannesburg-Ekurhuleni-Tshwane

<table>
<thead>
<tr>
<th></th>
<th>(Spec. 1) GLM unit changes</th>
<th>(Spec. 2) GLM % changes</th>
<th>(Spec. 3) OLS % changes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNEMPLOYMENT RATE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximity to jobs (index)</td>
<td>-0.317***</td>
<td>-0.992***</td>
<td>-1.212***</td>
</tr>
<tr>
<td></td>
<td>(0.0104)</td>
<td>(0.0323)</td>
<td>(0.0342)</td>
</tr>
<tr>
<td>Observations</td>
<td>14,907</td>
<td>14,907</td>
<td>14,723</td>
</tr>
<tr>
<td>Regression R-squared</td>
<td></td>
<td></td>
<td>0.639</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Control covariates not shown
City by City Spatial Mismatch Results

Johannesburg-Ekurhuleni-Tshwane

Figure 10.1: UNEMPLOYMENT
Johannesburg-Ekurhuleni-Tshwane

Figure 10.2: JOBS
Johannesburg-Ekurhuleni-Tshwane

Figure 10.3: JOB PROXIMITY
Johannesburg-Ekurhuleni-Tshwane

Figure 10.4: THE SPATIAL MISMATCH EFFECT
Johannesburg-Ekurhuleni-Tshwane
3.6 Chapter Conclusion

The city by city analysis presented in this section shows that there is strong evidence that living far away from work reduces people’s employment prospects in most of South Africa’s main urban centres, as well as in the larger regions of Gauteng Province and Johannesburg-Ekurhuleni-Tshwane. Distance from jobs in these areas is correlated with higher unemployment rates, when controlling for a number of demographic and other characteristics. This relationship is practically important: even in regions with relatively small mismatch effects, these effects explain a significant part of existing unemployment in peripheral areas.

The results are summarised below in Table 11, which only shows estimates from our main GLM specifications. The nature of our job proximity variable means that the sizes of the effects reported in the first two “Effects” columns cannot be compared between different municipalities or regions. A one-unit or 10-unit (or indeed a 1% or 10%) change in job proximity will mean something different in each municipality or broader region, and therefore the sizes of the effects are not directly comparable. As discussed in Text Boxes 3 -5, in order for these numbers to be given meaning, they need to be read in conjunction with maps of the areas they represent. Table

Table 11: Spatial Mismatch Overview

<table>
<thead>
<tr>
<th>EFFECTS: PROXIMITY TO JOBS ON UNEMPLOYMENT RATES</th>
<th>Unit changes</th>
<th>% changes</th>
<th>Evidence of spatial mismatch?</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Johannesburg</td>
<td>-0.238***</td>
<td>-0.771***</td>
<td>Yes</td>
</tr>
<tr>
<td>City of Tshwane</td>
<td>-0.320***</td>
<td>-0.995***</td>
<td>Yes</td>
</tr>
<tr>
<td>City of Ekurhuleni</td>
<td>-0.303***</td>
<td>-0.735***</td>
<td>Yes</td>
</tr>
<tr>
<td>eThekwini Metropolitan Municipality</td>
<td>-0.223***</td>
<td>-0.495***</td>
<td>Yes</td>
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<tr>
<td>Mangaung Metropolitan Municipality</td>
<td>-0.466***</td>
<td>-0.713***</td>
<td>Yes</td>
</tr>
<tr>
<td>Nelson Mandela Bay Metropolitan Municipality</td>
<td>-0.0380</td>
<td>-0.0654</td>
<td>No</td>
</tr>
<tr>
<td>Buffalo City Metropolitan Municipality</td>
<td>-0.300***</td>
<td>-0.334***</td>
<td>Yes</td>
</tr>
<tr>
<td>City of Cape Town</td>
<td>0.0278*</td>
<td>0.0963*</td>
<td>No, but inconclusive</td>
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<tr>
<td>Gauteng Province</td>
<td>-0.304***</td>
<td>-0.899***</td>
<td>Yes</td>
</tr>
<tr>
<td>Johannesburg-Ekurhuleni-Tshwane</td>
<td>-0.317***</td>
<td>-0.992***</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.1
Control covariates not shown
For further detail see Tables 1 to 10
11 nonetheless shows that we find significant evidence of spatial mismatch in the majority of South Africa’s metropolitan municipalities, and in Gauteng Province and the Johannesburg-Ekurhuleni Tshwane region.

It is worth re-emphasising that there are a number of limitations to our approach which may cause us to underestimate the size of mismatch effects, or not identify them at all. Better data on jobs location would go some way to resolving this, as would spatially-defined individual-level data (this is mentioned in Section 3.3). The question of how extremely peripheral rural areas affect our analysis is potentially concerning, though comparison between estimates of mismatch in Gauteng and the Johannesburg-Ekurhuleni-Tshwane region suggests that this may not have a large quantitative effect. Conversely there are two issues which may cause mismatch to be overestimated in our models: our inability to control for years of education in each census small area, and the possibility of substantial numbers of employed people moving from peripheral areas into well-located central areas. We explain, however, why these two issues should not be overly concerning.

We use a method for measuring proximity to jobs which has not been applied in to South Africa before, and present city by city spatial mismatch estimates for the first time. The clear evidence for spatial mismatch has potential policy implications across a number of sectors.
4.1 Chapter introduction

With Chapter 2 having described the origin of South Africa’s “Apartheid cities” and Chapter 3 now having confirmed some of the negative consequences of this city structure, a next question concerns why South Africa’s cities are still characterised by black and poor people living on city peripheries while rich and white people living in the well-located urban core, over 20 years since 1994. Apart from the direct and indeed physical legacies of Apartheid planning, which Cousins et al. (2005) and Tissington (2011) argue have been made particularly difficult to undo because of the protections of private property guaranteed in South Africa’s Constitution, two major causes for the permanence of Apartheid cities are immediately evident.

Firstly, commercial developers have generally sought to invest in new developments in well-located city cores and suburbs, rather than in peripheral areas (Pieterse, 2009).²⁰ Unsurprisingly, private sector developers prefer to construct housing and commercial developments in already-established zones of economic and social activity, thus leaving peripheral areas undeveloped and entrenching existing spatial divides (Todes, 2012). Poor households cannot afford accommodation in well-located central areas, and therefore cannot move to these investments, while municipal efforts to induce the private sector to invest in poor areas instead have generally been successfully resisted by these developers (Turok, 2012). An organised property-owner

²⁰ There are of course exceptions to this general trend. Landman and Badenhorst (2012) for example discuss the growing popularity of exclusive security estates, or “security villages” in Johannesburg, which are frequently constructed on the city’s urban edge. Landman and Badenhorst (2012) argue that the primary motivation for this type of peripheral living is fear of crime and other insecurities, with residents quite intentionally choosing to escape “the city”, with its perceived risks and dangers. These affluent yet peripheral settlements are however the exception rather than the rule when it comes to location, race and wealth in South Africa’s cities.
lobby exists in the form of the South African Property Owners Association (SAPOA), which has been able to use its significant financial muscle, technical expertise and networks to prevent policy or projects which may threaten their interests (SACN, 2011), while property developers, as part of a very concentrated and powerful industry, can simply threaten to withhold development wholesale if they believe municipal development strategies and requirements are not in their favour. Established property owners also lobby on a more localised level, including against attempts to establish low income housing in affluent (and well-located) areas, given that this kind of action is understood to negatively impact on existing property evaluations (SACN, 2011). The role of the private sector in entrenching Apartheid divides should not be understated, but it is perhaps to be expected.

However perhaps a more surprising cause of the prevailing city structure is post-Apartheid housing policy, which one would expect to be disrupting rather than entrenching of the Apartheid-designed status quo. However a number of writers have argued that the post-1994 focus on establishing freehold titled housing amongst the poor, via the government’s ambitious RDP housing programme, has in fact entrenched peripheral development for the poor and prevailing spatial structures (Pieterse, 2009; Tissington, 2011; SACN, 2011; Turok, 2012). RDP housing should not necessarily have led to peripheral development, but this has been the dominant pattern of the programme thus far. The reasons for this are complex, and are explored in this chapter and Chapter 5 immediately below. One cause is related to an (at times market-driven) belief that RDP housing is a kind of “asset” which can inherently facilitate poverty exit, and that therefore the delivery of high numbers of RDP houses is a legitimate policy focus rather than looking at issues such as location. This second idea is interrogated by itself in Section 4.3 below, which ultimately argues that there is little evidence in the South African context which supports the concept of “RDP housing as poverty-reducing asset”.

4.2 Post-Apartheid Housing Policy

The Housing White Paper of 1994 was developed in the National Housing Forum, a multi-stakeholder negotiating forum represented by government, private sector interests (represented largely by the Urban Foundation), social movements, labour and political parties in the transition period leading up to the democratic elections. It introduced the national subsidy programme which emphasised the provision of individual ownership housing, on freestanding sites.

The political promise to deliver a capital asset to poor households has had several implications including pressure to implement mass subsidised housing, most currently expressed by the “mega-projects” initiative.

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21 That this is to be expected is of course not an indication that this is normatively acceptable.
championed politically by Minister Sisulu. Another implication has been in relation to the opportunities that opened for a politics of patronage regarding subsidy allocation, sometimes labelled as “give-away” housing. The White Paper did not prioritise informal settlement upgrading and, instead, the drive was for subsidised housing development on vacant land, envisaging a central role for the private sector, including the banking and construction sectors.

The Housing Act 107 of 1997 gave legal effect to the White Paper. The Act establishes general principles for housing development in all spheres of government; defines the functions of national, provincial and local governments in respect of housing development; provides for the establishment of a South African Housing Development Board; continues the provincial boards as ‘provincial housing development boards’; and lays the foundations for financing national housing programmes.

In the Housing Act provincial governments play a central role in the allocation of housing subsidies to municipalities. Although the Act envisages municipal accreditation for the housing function, the process appears to have stalled and all the municipalities, including the large cities are reliant on provincial governments for housing subsidy allocations. Municipalities do not receive their own allocation from which they can determine their priorities on a more flexible and responsive basis.

Section 4 of the Act requires the development of a National Housing Code to operationalise the policy, which was duly developed in 2000 and amended in 2009, to align with Breaking New Ground (BNG), or the Comprehensive Plan for Sustainable Human Settlements, released in 2004. The Code includes all the national housing programmes ranging from the Integrated Residential Development Programme (the most used programme that replaced the old project-linked ownership subsidy), to the Upgrading of Informal Settlements Programme, the Emergency Housing Programme, the Discount Benefit Scheme and the Social Housing Programme.

BNG was billed as a policy “enhancement” (rather than revision) process which emphasised the eradication of informal settlements, the development of housing markets that are more “functional”, and asset creation. The objective of asset creation led to a focus on the performance of the housing subsidy in relation to an “asset triangle” (Rust, 2007) which gave renewed emphasis to ownership housing as a means to accumulate wealth. The idea of a functional property market also deepened the commitment to registered individual title, which is central to the property sales logic that underpins the idea. The rationale regarding a functional housing market was based on research evidence commissioned by the Finmark Trust and, at the time, was heavily reliant on Hernando de Soto’s idea that property holds the key to making capitalism work for the poor, if only “dead capital” (such as property) could become “fungible” and access to loan finance was critical in this equation. The reality that RDP houses function more as a social and livelihood asset, as well as inter-
generational security through inheritance, than a wealth creating accumulation asset through property sale, was under-represented at the time. Subsequently, a considerable backlash against these ideas (Cousins et al, 2005 and Royston, 2004), together with the global financial meltdown in 2008, went some way towards tempering the single-minded focus.

South Africa’s policy has, however, remained committed to housing’s potential as a pathway out of poverty through asset creation.

Section 26 of the constitution, concerning the right to housing, and the Prevention of Illegal Eviction and Unlawful Occupation of Land Act (PIE) Act, are also important elements of the housing framework. They have played a critical role in developing legal principles applicable in the context of evictions.

4.3 Titling and RDP housing for poverty exit

While the South African RDP housing policy was in its conception mainly justified in terms of providing shelter, and in terms of fulfilling the state’s constitutional obligation to progressively provide adequate housing to the poor, it has increasingly become justified with respect to the effect it is imagined to have in facilitating poverty exit. The then Department of Housing (now Department of Human Settlements) landmark Comprehensive Plan for Sustainable Human Settlements, commonly known as Breaking New Ground (BNG), exemplified this shift (National Department of Housing, 2004). The first of the seven objectives outlined under the plan’s “New Housing Vision” was “[a]ccelerating the delivery of housing as a key strategy for poverty alleviation”, while the third objective was “[e]nsuring property can be accessed by all as an asset for wealth creation and empowerment” (National Department of Human Settlements, 2004:7). In the words of then Housing (and now Human Settlements) Minister Lindiwe Sisulu:

“We are moving towards the concept of a house as an asset. You have to give people title deeds to give them complete ownership of the house. Then they can rebond a house and have access to more money... or they can improve the house and sell it a few years down the line and make a profit.” (Delivery, 2005: 47)

While a variety of mechanisms have been proposed for how RDP houses can facilitate poverty exit, they have in common the argument that holding formal legal title of an RDP house is a powerful means for material advancement. These theories rely on a conceptualisation of RDP houses as “assets”, which hold inherent value beyond the shelter they provide. Rust (2007) identifies an “asset triangle” typology, where she categorises approaches to RDP houses as seeing them as either financial assets, economic (productive) assets, or social assets. The financial assets approach is that outlined in Breaking New Ground and by Sisulu above: RDP houses have value as an asset which can be invested in and traded, or used as collateral for a loan. The economic or productive assets approach is to see RDP houses as
facilitative of economic activity such as small-scale landlordism or home-based business. The social assets approach is to acknowledge the significant social value these houses have for residents, and identify how these can improve social outcomes such as security of tenure, citizenship-building, and comfort and security. This report is primarily concerned with economic outcomes such as exiting income poverty and gaining employment, and as such does not evaluate the successes of RDP housing as a social asset. This is not to suggest that the social value of RDP housing is unimportant, and in fact this chapter will suggest that the social value of RDP housing is its most important attribute. The omission of a discussion of RDP housing as a social asset is merely to maintain focus on the question at hand.

Because we do not discuss RDP housing as a social asset, we present a slightly different typology to Rust (2007) in our discussion. We maintain the distinction between understandings of RDP housing as a financial or productive asset, but within its value as a financial asset we further distinguish between its use as a collateral asset (an asset against which loan capital can be borrowed and secured), and its use as an investment asset (an asset which is improved via investment and subsequently sold for a profit). We use the term economic asset to encompass all economic value that an RDP house may hold, including its potential to be used as a productive or financial asset. We examine the effectiveness of RDP housing as each kind of these assets in turn, and conclude with a discussion of an empirical study which evaluate the relationship between RDP housing and improvement in economic outcomes such as employment rates and income.

Housing as a financial asset

The conceptualisation of housing as a financial asset espoused in Breaking New Ground and by Lindiwe Sisulu comes directly from the hugely influential work of Peruvian economist Hernando de Soto. De Soto’s book, The Mystery of Capital (2000), argues that that the poor do have assets which they could use to propel themselves out of poverty, but lack of legal recognition of these assets prevents the effective functioning of a market economy for the poor. In De Soto’s conceptualisation of informal economies, nobody is quite sure who owns what, and if disputes about ownership arise then there is no acceptable way of resolving who the true owner is. This discourages investment in and improvement of assets, as ownership is insecure, and furthermore this informality prevents the possibility of assets being used as collateral for loans. In De Soto’s language, this renders these assets “dead capital”. His solution is to formally incorporate the poor’s assets into the institution of private property, by extending legal title. The explicit assumption is that capitalism is an engine of dynamism and progression, and that the poor remain poor largely because a lack of formalised property rights prevents them from engaging in the market economy as owners of capital.

The South African application of De Soto’s ideas is somewhat different to his original account, as there are few illusions in South Africa as to De Soto’s idea of an apparently vast but
unrecognised assets base held by the poor. In the South African case, the relevant assets, of RDP houses, are created or heavily subsidised for the poor by the state. But the mechanism by which these formalised assets are understood to facilitate economic progression is the same. RDP recipients will either be able to use their RDP house as collateral for a loan, which will unlock business or investment opportunities which can facilitate poverty exit, or they can improve and invest in their RDP houses, sell them for a profit, and move to a new, slightly better home, thus beginning the journey up a “housing ladder” which culminates in exit from poverty and perhaps entry into the middle-class (Rust, 2007). The first progression relies on RDP housing as what we call a collateral asset, while the second relies on it as an investment asset, though of course these processes could in theory operate the same time. The credibility of these progressions in the South African context are dealt with in turn below.

Collateral asset

The idea that RDP houses can be relied upon to act as a source of loan finance for the poor in South Africa is now widely discredited (Nell et al., 2004; Royston, 2004; Cousins et al., 2005; Cross, 2006; Rust, 2007; Payne et al., 2009; Lemanski, 2011; Gordon et al., 2011; Muyeba, 2013). Before even discussing explanations and causes, this becomes evident simply by examining the proportion of RDP homeowners who have actually used their homes for the purposes of loan collateral. Payne et al. (2009) find in their case study in Ekurhuleni that only 13.7% of low-income households borrow money at all, and none of these households used their houses as collateral, while Lemanski (2011) finds that only 3% of households in her case study of RDP houses in West Lake in Cape Town used their homes as security for loan finance. Muyeba (2013) finds that only one of the interview respondents in his study in Khayelitsha in Cape Town used her RDP house as collateral. These case studies are broadly representative of the national condition according to the 2014 General Household Survey produced by Statistics South Africa, which suggests that only 3.7% of RDP residents nationally used their homes as collateral for any kind of loan finance.23

There seem to be two reasons for the low rate at which RDP houses are used for loan collateral. Firstly, RDP recipients are reluctant to take a risk which may see them losing their homes. Royston (2004), Nell et al. (2004) and Cousins et al. (2005) note that there is a significant risk associated with loan finance for poor people, and that the other side of the opportunities offered by this finance are frequent foreclosures and sales in execution. That RDP recipients take this into account is widely evident (Lemanski, 2011; Gordon et al., 2011; Mubeya, 2013), and risk-aversion is to be expected in a context where poor people have few assets to buffer the effects of foreclosure (Royston, 2004). Lemanski (2011) also finds that RDP recipients often attach significant

23 Author’s calculations using the 2014 General Household Survey. This is nationally representative survey data published by Statistics Africa. The sample consists of over 25 000 households across the country, nearly 4 000 of which live in RDP houses. All of the estimates in this section make use of the survey’s household weight to ensure national representativity.
The resilience of Apartheid cities and peripheral RDP housing

CHAPTER 4

Social, emotional and political value to their homes, and are not prepared to risk losing the opportunities for long-term generational stability and familial wellbeing that these houses provide. Concern about this risk is only compounded by low incomes.

The other side of this issue is that formal lending institutions and especially banks are very reluctant to offer loans to poor consumers even if they own an RDP house. Cousins et al. (2005) note that the resale value for RDP houses can be too low for banks to justify the risk of lending, while Payne et al. (2009) similarly note that the South African financial system and property market is ill-suited to lending for the poor, with banks typically not interested in the value of title deeds held by low-income households for low-cost properties. It is well-recognised that banks are often reluctant to provide loans based on property alone to perceived “high risk” social groups (Royston, 2004). These may be people with informal or irregular employment, or people whose assets are situated in “high risk” areas where crime and informality are prevalent (Lemanski, 2011). Many RDP beneficiaries will fall into this category, and thus face a structural constraint when it comes to obtaining loan finance which they can do little about (Cousins et al., 2005).

However the collateral asset conceptualisation is not the only way in which RDP housing is imagined to be a financial asset which can facilitate poverty exit. Cross, recognising that RDP housing performs poorly as a collateral asset, argues that:

“the critical element in housing delivery is housing as a platform for accumulation [original emphasis], to take place through self-investment – that is, the key to poverty reduction is household savings and gradual capital formation rather than credit transactions and entrepreneurial risk-taking on a significant scale” (Cross, 2006: 27).

This approach speaks to the “housing ladder” mentioned above, where investment and improvement in an RDP house, and its subsequent sale and the purchase of a better house with a mortgage bond, facilitates upward progression and the repetition of this process. A number of authors have however found that this housing ladder simply does not exist, or that if it does exist it is deeply dysfunctional.
(Nell et al., 2004; Rust, 2007; Lemanski, 2011; Gordon et al., 2011). It is worth discussing why this is the case.

In the absence of loan finance, homeowners have to rely on surplus income or savings to improve their homes. It should perhaps be immediately apparent that this can hardly be relied upon as a sustainable and forceful method of poverty reduction, as the poor by definition will have limited surplus income to invest into their homes. Nonetheless, some people will manage to save, and invest this surplus in their houses. Lemanski (2011) shows that the recipients of RDP houses in her case study have a strong preference for financing investment in this way rather than through debt-backed finance, and indeed some households in her sample did manage to add value to their homes. Gordon et al. (2011) also show that self-financed home improvement is widespread amongst low-income homeowners, and that this can add significant value to properties. Payne et al. (2009) argue that there is little evidence to suggest that formal titled ownership increases rates of home improvement and investment compared to more informal types of ownership, but ultimately the question of the existence of the housing ladder is not centrally about this question. More important is whether people who have improved their homes can and do sell these homes for a profit, and then move on to better housing.

Nell et al. (2004), Gordon et al. (2011) and Rust (2015) present convincing evidence to the effect that the subsidised housing resale market in South Africa is severely depressed, with very few sales taking place and many of the sales that do take place being informal and at low prices. A potential cause of this low resale rate is the severe administrative delays in delivering physical title deeds to new RDP homeowners, which impedes resale on the formal market, and a legislative rule which dictates that RDP houses cannot be sold on the open market for the first 8 years after beneficiary occupancy, as provincial governments must be given right of first refusal (Nell et al., 2004; Gordon et al., 2011; Kihato, 2014; Rust, 2015). However perhaps an equally important issue is the general reluctance of RDP beneficiaries to sell their homes. As Cousins et al. (2005) discuss, people attach a social and familial significance to their homes far beyond its financial value. A number of homeowners in the Nell et al. (2004) and Lemanski (2011) studies dismiss any talk of selling their homes, saying that they must be kept and passed on to their children. The social and non-market importance of RDP housing is emphasised throughout Lemanski’s (2011) study, and reluctance to sell because of social attachment is also identified by Payne et al. (2009) and Gordon et al. (2011). This complicates a narrow narrative focused on the financial value of the housing asset.

However even if people are willing to sell their improved RDP houses, there is little evidence to suggest that this will necessarily allow movement up a housing ladder. At issue is that the gap in value between RDP houses and new formal sector private housing is simply too large. In the most rigorous analysis of this issue, Rust (2015) explains that the cheapest newly built house in the South African private
market in 2015 was priced at about R370 000. RDP houses can sell for a vast range of different values depending on issues such as location and extent of alteration, but for the purposes of example Rust uses a lower-bound RDP resale price of R70 000, and an upper bound of R150 000. It is not surprising that RDP houses sell for less than new private market housing, and indeed the entire idea of the housing ladder relies on progression to increasingly valuable housing. However as Rust shows, the gap between RDP housing prices and new private market housing prices is typically too large for RDP-recipients to dependably bridge with mortgage finance. With an analysis based on South African mortgage requirements and normal mortgage lending assumptions, Rust shows that in order to afford new private sector housing, RDP-resellers require in addition to a large mortgage either much improved incomes above the R3 500 per month which is the RDP indigency requirement, or need to sell their RDP houses at unrealistically high prices. Lemanski (2011) comes to a similar conclusion in her analysis of the possibility of progression for RDP residents in Westlake, showing that the typical resale value of an RDP house is significantly less than the typical prices of comparable cheap non-RDP houses in Cape Town, and that the gap is too large to be able to reliably bridge with mortgage finance. The issue is compounded by vast numbers of poor people being technically ineligible for mortgage loans, either because of risk profiles or simply because they cannot afford repayments (Rust, 2007; Lemanski, 2011; Rust, 2015).

Housing ladder progression which relies upon material and significant improvements in incomes or unrealistic housing value appreciation cannot be seen as part of a reliable path for poverty exit. Rust (2015) argues that the way for this issue to be resolved while saving the housing ladder concept is for government to stimulate a larger RDP resale market, which would allow for a stepping stone between low-value RDP houses and the private market. However this would rely on a dynamic and active RDP resale market which simply does not exist, and in light of the social and economic constraints outlined above it does not seem to be a market which can be easily developed. It would seem, rather, that an approach which relies upon poverty exit being facilitated by RDP housing as a financial asset is simply unrealistic. Some people will of course progress in this way, but there are large constraints which prevent RDP houses as financial assets being major and systematic poverty reducers.

Housing as a productive asset

While Rust (2007) rejects the idea of freehold titled housing being a transformative financial asset, she nonetheless argues that housing can play an important transformative role as a productive asset. In this understanding the housing asset is essentially a factor of production, in that it either allows for the income generating activity of small-scale

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24 South African mortgages are offered for at most 20 years, interest rates are typically charged at the prime interest rate plus 2% in the affordable sector, and if a household has no other debt monthly instalments are calculated at 25% of household income (Rust, 2015).
landlordism, or can serve as premises for a home-based business (HBE). This view is also supported by Gordon et al. (2011), who suggest that subsidised RDP housing in particular can facilitate enterprise in a way that informal housing cannot. Gordon et al. (2011) argue that informal dwellers, unlike RDP residents, are often legally prevented from making an income off their housing either by general law or because of landlord rules. They suggest additionally that the larger space associated with RDP houses can facilitate rental and business opportunities. There are however persuasive critiques of the idea that RDP houses are a particularly transformative productive asset.

Regarding landlordism, Rust (2007) presents convincing evidence to the effect that small-scale landlords provide a significant volume of housing stock in South Africa, can offer relatively well-located housing at below-market rates, that this sector generates significant income as a whole, and that there is significant potential for growth in the sector. Rust’s (2007) evidence is however not based on analysis of RDP homeowners, and there is reason to believe that RDP houses are not significantly used for the purposes of deriving an income via landlordism. The Nell et al. (2004) analysis of Township Residential Property Markets suggests that while 20% of households in their sample have backyard dwellings, 77% of these households obtain no income from these tenants, with at least one tenant being related to the homeowner in 64% of cases. Only 14% of the RDP households interviewed in the TRPM survey had backyard dwellings. Muyeba (2013) similarly finds that very few of the RDP homeowners in his Khayelitsha study make money from their tenants, and the RDP recipients he talked to were typically opposed to the possibility of renting, being concerned about the possibility of conflict with tenants. Lemanski (2011) in contrast finds widespread renting of backyard dwellings in her case study of RDP housing in Westlake Village, but notes that this may be due to the unusually well-located nature of the settlement. Lemanski (2011) in any case is critical of the notion that small-scale landlordism can be expected to be significantly transformative, noting that the majority of landlords in her study collect very low rentals from tenants. She characterises the activity as being closer to survivalist than capital-generating. Rust (2007) does not discuss per capita income derived from landlordism, but does note that the average income of tenants is only R1 800 per month (in 2005). Bearing in mind that rental could only be a fraction of this total income, it seems doubtful as to whether this type of economic should be characterised as reliably transformative for RDP homeowners.

The other way in which housing may operate as a productive asset is in providing premises for a home-based enterprise (HBE). Rust (2007) shows that there are a significant number of HBEs across South Africa’s townships and inner-city areas, and that this sector generates significant income as a whole. Rust (2007) further argues that HBEs are significantly entrepreneurial and presents evidence showing
that only one third of HBE owners say they would take formal employment if it was offered to them. Similarly to the case with small-scale landlordism, however, Rust (2007) does not discuss whether RDP houses are particularly suited to HBEs. The Nell et al (2004) analysis of the TRPM survey shows that only about 13% of households in black townships run businesses from their homes, and the evidence suggests that HBEs are actually more prevalent in informal settlements than RDP housing settlements. Muyeba’s (2013) comparison of RDP and informal housing in Khayelitsha suggests that RDP home-owners are no more likely to use their homes for business premises than are residents of informal housing. Rust (2007) and Gordon et al (2011) make the point that people who run home-based enterprises say that that their homes made it easier to start their businesses, but this question is not particularly revealing about whether housing is an asset which can be expected to move people out of poverty. A number of factors are required in order for a business to be viable, such as some starting capital, significant expertise and skills on the part of the homeowner, and the existence of sufficient demand for the product in the area of the business. It may be the case that housing can facilitate business opportunities for people who can satisfy all of these requirements (these are necessarily the people discussed by Rust and Gordon et al above), but this does not mean that housing in itself is a sufficient condition which can be expected to systematically and reliably lead to the formation of HBEs.

The effectiveness of small-scale landlordism or HBEs for the South African population at large, and RDP residents in particular, can be preliminarily investigated by examining national survey data. Estimates of the importance of these activities for income-generating purposes are presented in Table 12, and are calculated using the 2014 General Household Survey (GHS).

**Table 12:** Comparing income sources for RDP and non-RDP households

<table>
<thead>
<tr>
<th>Household income sources</th>
<th>National</th>
<th>RDP hholds</th>
<th>Poor excl RDP hholds</th>
<th>Poor RDP hholds</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNEMPLOYMENT RATE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income from business?</td>
<td>13.86%</td>
<td>13.41%</td>
<td>12.39%</td>
<td>12.81%</td>
</tr>
<tr>
<td>Main income business?</td>
<td>7.75%</td>
<td>6.64%</td>
<td>7.00%</td>
<td>6.39%</td>
</tr>
<tr>
<td>Income from other?</td>
<td>2.98%</td>
<td>3.68%</td>
<td>1.81%</td>
<td>2.82%</td>
</tr>
<tr>
<td>Main income other?</td>
<td>1.50%</td>
<td>1.61%</td>
<td>1.11%</td>
<td>1.47%</td>
</tr>
<tr>
<td>Observations</td>
<td>25,363</td>
<td>3,991</td>
<td>10,038</td>
<td>2,611</td>
</tr>
</tbody>
</table>

Author’s calculations using Statistics South Africa’s 2014 General Household Survey

Note: between 3% and 4% of households did not indicate their main income source
Table 12 shows that 13.86% of households nationally report receiving some income from a business, while 7.75% report that business income was their main source of household income. It is up to debate whether these can be considered significant percentages, but it is notable that residents of RDP households are not recorded as being more reliant or more likely to receive income from businesses. While this may be read to suggest that having an RDP house does not improve the likelihood of having a business, it is difficult to compare a national to RDP-resident sample because the national sample is likely much wealthier than the RDP sample. Specification 3, therefore, reports what proportion of income poor households, excluding RDP-residents, receive income from business, and this is compared to specification 4, which reports equivalent proportions for income poor household who are RDP-resident. These results show that when looking at poor households, there is no immediate evidence to suggest that RDP-resident households are more likely to receive business income.

A similar picture is evident when looking at the prevalence of income from rental. There is no category for rental income in the 2014 GHS questionnaire, but the questionnaire explicitly mentions rental income as being included under the “Other income” category.

Empirical investigation

 Likely the most detailed investigation of the causal effect that titled RDP housing is imagined to have on poverty exit is the doctoral thesis of Singumbe Muyeba (2013), entitled Does low-income homeownership work? The effects of titling among beneficiaries in Cape Town and Lusaka. The paper is comprised of both qualitative evidence from case study interviews, the results of which are referenced frequently in the discussions above, and quantitative analysis of the relationship between RDP housing receipt and economic outcomes such as income, working hours, and accumulation of assets. The quantitative evidence used by Muyeba for his Cape Town analysis comes from the Cape Area Panel Survey (CAPS), a large survey which tracks and re-interviews the same households annually.

25 The poverty line used for this calculation is based on that proposed by Budlender et al (2015), and for 2014 prices is equivalent to R1 252 per person per month.
26 As mentioned above, this is preliminary descriptive evidence, and it cannot prove the presence or absence of a causal relationship between RDP-residence and business ownership. These results are purely indicative, but do show that there is little reason to suspect an underlying causal relationship.

27 Muyeba also published another study about this topic in 2011, which found that being a housing subsidy beneficiary is related to increases in an “economic capital” index he constructs. However with the components of this “economic capital” index remaining unclear, and his 2013 dissertation methodology being much more sophisticated, this paper is not discussed here. For details see Muyeba (2011).
The resilience of Apartheid cities and peripheral RDP housing

individuals over time. The study’s first wave of interviews was conducted in 2002, and at the time of Muyeba’s writing the latest available data was from the 5th wave of re-interviews, conducted in 2009. Muyeba restricts his study to households living in the Cape Town informal settlement of Khayelitsha who either received a subsidised house between 2002 and 2004 (having not received one before the start of the CAPS study), or who remained in shacks for this period. He then uses this sample to implement a sophisticated statistical test for the causal effects of receiving an RDP house. The intuition of this test is to compare how outcomes change over time for RDP recipients relative to how they change for shack-dwellers, while controlling for the effects of a number of potentially confounding factors. The use of data which tracks people over time allows for direct causal inferences to be drawn.

Muyeba (2013) chooses three economic outcomes which titling may have an effect on, and tests for a relationship between receiving an RDP house and changes in these variables. He finds that there is no statistically significant relationship between receipt of an RDP house and these outcomes, which are average working hours, per capita income, or accumulation of household durables. Muyeba (2013) does infer causal relationships between RDP-receipt and some social outcomes: receiving an RDP house is associated with an increase in people’s perceptions of their healthiness, for example, but there is no evidence to suggest that receiving an RDP house is associated with an improvement in economic outcomes.

4.4 Chapter Conclusion

Contrary to the stated vision of the National Department of Human Settlements, there is very little reason to believe that RDP housing has special powers to facilitate poverty exit by virtue of its role as an economic asset. Within the broad category of an economic asset we distinguish between the role housing is imagined to play as a collateral asset (against which loan capital can be borrowed and secured), an investment asset (which is meant to appreciate in value and subsequently be sold for a profit), and as a productive asset (which is facilitative of small-scale economic activity).

That poor households can or will use their RDP houses as collateral for loan finance is contrary to all of the available evidence, which suggests instead that a number of economic and social constraints and circumstances preclude the systematic use of RDP housing in this way.

28 Because the effectiveness of titling and ease of poverty exit is likely somewhat context specific, we do not discuss his Lusaka results. The Lusaka study suggests titling leads to increases in some economic outcomes such as higher income and more durable assets, but Muyeba (2013) concludes that titling was not associated with improvement for most of his measures of poverty reduction in his Lusaka study.

29 This gives him a sample of 111 beneficiaries of housing subsidies and 219 shack-dwellers.

30 Specifically he uses difference-in-differences regression.
Gaps in the so-called “housing ladder” mean that economic progression via the RDP house as an investment asset requires significant improvement in incomes or abnormally high appreciation in house value, again suggesting that the asset cannot be seen as systematically poverty-reducing in its own right. There is additionally no evidence to suggest that RDP-beneficiaries are more likely than people living informally without RDP housing to use their homes as a productive asset, for the purposes of small-scale landlordism or for home-based-enterprises. Lastly, Muyeba’s (2013) empirical analysis finds no statistically significant impact of RDP-housing receipt on economic outcomes.

The conclusion to be drawn from this chapter is not that RDP housing is worthless or as a programme should be abandoned. In terms of its original objective, RDP housing does function well in providing people with shelter and it has been an effective way for the state to supply housing in accordance with the South African Constitution. It is also clear that RDP housing is valuable for its recipients, who attach important social and political significance to their homes. However the evidence presented in this section suggests that it is wrong to think that RDP housing will miraculously pull people out of poverty, and housing programmes need to be designed so that housing is well-integrated into existing social and economic networks.

Post-Apartheid housing policy has been evolving since drafting began in the early nineties. At the time of writing, a new process was underway to develop a Human Settlements White Paper which will result in new legislation, the Human Settlements Act. Both the Housing White Paper and the Housing Act will be repealed if this process reaches its logical conclusion.

Recapturing the national housing subsidy programme as a prop-poor intervention should be a priority in the new policy process. This requires a move beyond the logic of housing as an asset, towards proactive intervention in housing markets to provide well-located and affordable housing for the poor, which will address the twin issues of Apartheid spatial form and spatial mismatch. Specific characteristics of a policy programme in line with this are outlined in Chapter 5 below.
5
CHAPTER
POLICY IMPLICATIONS

5.1 Chapter Introduction
The implication of Chapters 3 and 4 is that if housing policy is to be poverty reducing, housing must be well-located with respect to jobs and accessible to the poor. Chapter 3 shows that proximity to jobs matters for employment in almost all of the areas we examine, while Chapter 4 suggests that ownership RDP housing by itself cannot be expected to lift people out of poverty. However, an imperative that housing and jobs be matched still allows for a wide variety of policy conclusions, some of which are contradictory. This chapter seeks to address two key policy questions raised by this report’s analysis. Firstly, what kind of urban spatial form and spatial policy is best-suited for matching housing with jobs? Secondly, what are some of the key characteristics required of affordable housing policy? Can housing policy implementation be poverty reducing?

5.2 Intensive vs extensive development
The Spatial Mismatch Hypothesis suggests that if housing policy is to reduce unemployment, this policy should aim to ensure that housing and jobs are near to each other. What the SMH does not indicate by itself is that if given a dysfunctional spatial form, such as exists in South African cities, whether job-housing matching is better achieved by creating new housing close to existing jobs, or creating new jobs close to existing housing. As outlined in Section 2.2, the structure of South African cities is generally that jobs are overwhelmingly located in the urban core, while dense settlements are located on the urban periphery. In practical terms, choosing between a “housing to jobs” or “jobs to housing” approach in South Africa means choosing between intensive or extensive urban development respectively. Intensive development means focusing policy on already-developed and well-located parts of the city, to take advantage of the infrastructure and economies which already exist in these places. Development here is
about creating new housing close to the urban core, increasing densities, and improving public transport between residential and employment centres (Turok, 2016). Extensive development means development on the periphery, far from the urban milieu and the vested interests and idiosyncrasies which characterise already built-up areas. Extensive developments typically occur on unused “green-field” sites, and theoretically allow for the construction of well-structured urban settings starting from a blank slate. Turok (2016:9) notes that the choice between intensive and extensive development is “[o]ne of the dilemmas at the heart of the new urban agenda globally ... [and] [b]oth approaches have gained support in South Africa in recent years, albeit in different parts of government”.

The concept of mega-projects

Massive extensive developments, distant from the dense cities they are nominally part of, are becoming increasingly popular across the Global South (Cirolia, 2013). Recent events suggest that South African state too is heading down this path, driven primarily by the politically powerful Minister of Human Settlements, Lindiwe Sisulu. The primary reason appears to be frustration with the slow pace of urban transformation, and concern that this may have political consequences (Turok, 2016). Delivery of RDP housing has declined in recent years while urbanisation has increased, and the ANC secretary-general Gwede Mantashe has opined that “Human settlement is at the heart of mass resentment. However, it can be turned around to be the driver of improvement in electoral fortunes for our movement” (cited in Turok, 2016:14). In this context there is political desire for massive housing projects which can deliver units quickly and efficiently. It is presumed that this cannot happen in existing urban areas, as development in these areas is expensive due to the high cost of urban land, difficult because of the power of vested interests, and slow because of the extensive urban bureaucracies which need to be navigated (SACN, 2011; Turok, 2016). Instead, the vision for these housing “mega-projects”, as they have come to be called, is for new stand-alone “cities” to be constructed, mainly on city peripheries (Turok, 2016). To differentiate these new “cities” from the massive peripheral RDP settlements which have characterised much of South Africa’s post-1994 housing policy, explicit commitments have been made that the new mega-projects will include households from a range of income-groups, and will be economically self-sufficient, with their own jobs and even industry (Gauteng Department of Human Settlements 2015).

This policy approach has been championed powerfully by Sisulu’s National Department of Human Settlements and its provincial equivalents, and some private housing developers. The Gauteng Provincial Government has explicitly committed itself to the mega-project approach, promising to build 700 000 units in approximately 40 locations scattered throughout the province, with some mega-projects being made up of nearly 60 000 housing units (Gauteng Department of Human Settlements 2015). The locations of these new “cities” are varied, but generally are
far from jobs centres and instead are located near areas of high population density and high unemployment (GCRO, 2015). In Cape Town, a private mixed-income mega-project called Wescape has been proposed, approximately 25km north of the Cape Town city centre. The developers imagine housing approximately 800,000 people in 200,000 homes, built over 20 years (Furlong, 2016a). The planned settlement is well beyond the Cape Town urban edge, but this boundary was revised by the City of Cape Town in 2013 to make the settlement possible, despite objections from the majority of the City’s departments. Both of these development have come under heavy criticism regarding their sustainability, potential cost to the public, and risk of failure (Cirolia, 2014; Furlong, 2016a; 2016b; Royston & Shawkat, 2015; Turok, 2015; 2016). While some of these critiques are settlement-specific, many are typical of objections to the mega-projects concept as a whole.

Resistance to mega-projects has come from metropolitan municipalities, the National Treasury, the National Department of Cooperative Governance and Traditional Affairs (COGTA), and a broad range of South African academics and planners (Cirolia, 2013; Turok, 2016). This groups favours a consolidation and intensive development agenda, arguing that even if mega-projects could be implemented successfully (and they argue that this is extremely unlikely), the spatial form entailed by extensive development is undesirable from a household, economic, transport, environmental, and financial point of view (Cirolia, 2013; City of Johannesburg, 2016a; Royston & Shawkat, 2015; Turok, 2015; 2016). The main argument goes that the value in cities, or what Turok (2014) calls the “urban premium”, is in the economic and social interactions they engender, through proximity and density, and that therefore the urban sprawl implied by the extensive development agenda is inherently undesirable. A negative view regarding urban sprawl, which is what mega-projects imply, is so entirely accepted in the dominant literature on cities as to be trite.

An additional concern in the South African context in particular relates to the desire to break away from “Apartheid cities”, which are characterised by low aggregate densities and isolated settlements far away from the urban core (City of Johannesburg, 2016a). As discussed in Chapter 4, the dominant post-1994 RDP housing programme has been understood to have reinforced the dysfunctional and inequitable Apartheid spatial form, and there is concern that by entrenching peripheral development the mega-projects will only worsen this. The pro-consolidation group prefers “brown-field” in-fill and intensive development, which while they may acknowledge is more difficult than green-field construction, they insist is possible and is ultimately more sustainable (Turok, 2015).

Economic self-sufficiency?

A straightforward response from advocates of mega-projects to the Apartheid city critique is to argue that because the mega-projects will be economically self-sufficient, they cannot in any reasonable sense be seen as
peripheral or entrenching the Apartheid jobs-housing mismatch. While this defence does not address the “urban premium” argument for consolidation rather than expansion (a mega-project of at most 60 000 households could never match the social and economic premium of an established South African city), the idea that mega-projects can plausibly be expected to be economically self-sufficient deserves special scrutiny. Government proponents of mega-projects argue that (as of yet unidentified) economic incentives will encourage private sector investment in and relocation to these areas, allowing residents to work where they live and thus solving the issues of mismatch and expensive transport costs (Turok, 2016). Private sector property developers similarly argue that mega-projects will contain their own jobs, but with even less of an explanation as to how this will occur, beyond the (presumably temporary) construction jobs needed for initial building (Cirolia, 2013; Furlong, 2016a).

The history of government attempts to direct private sector investment and production in South Africa does not engender optimism about the self-sufficiency of mega-project developments. While there has been some success in directing public investment towards priority areas, there are very few examples of much-needed private sector investment following (SACN, 2011; Gotz & Todes, 2014). Instead, private sector investment has typically consolidated in already-developed areas, or followed its own logic unrelated to government and social priorities (Todes, 2012). Examples abound of the refusal of private capital to be directed where it was not want to go, during both the Apartheid and post-Apartheid era.

Apartheid-era attempts to alter the national spatial distribution of development in aid of “industrial decentralisation” were not very effective, despite extreme pro-business incentives to relocate to targeted areas which would be politically unfeasible today, such as minimum wages being abolished and trade unions being outlawed in some areas, and restrictions being put on industrial expansion in metropolitan areas (Todes & Turok, 2015). The relocation that did occur is understood to have been significantly influenced by non-state market factors, and it seems that many of these areas were unsustainable and collapsed after state support ended (Todes & Turok, 2015). Post-Apartheid attempts to affect the national pattern of industry such as the Spatial Development Initiatives (SDIs) and Industrial Development Zones (IDZs) have similarly failed to reliably stimulate growth and private investment in targeted areas, despite significant public investment (Todes & Turok, 2015). One success story of post-Apartheid spatial targeting in this regard, the Maputo Development Corridor, emphasises that dedicated and sophisticated agencies are required to fruitfully direct private sector investment, and that ad-hoc and short-term political decisions are unlikely to be effective (Todes & Turok, 2015).

Attempts at reconfiguring patterns of private development within urban areas have largely failed too. The town of Atlantis north of Cape Town is a particularly pertinent example in the
context of the proposed mega-projects, with the Wescape Development to be situated about midway between Atlantis and the Cape Town city centre. An Apartheid-era creation designed to be a self-sufficient industrial centre, Atlantis is now an extremely peripheral and isolated dormitory town with no local economy to speak of, whose residents must regularly commute to Cape Town if they work at all (Cirolia, 2013). The inability of the state to direct private sector investment extends to the present in Cape Town, where public investment in the Cape Flats has failed to stimulate almost any private sector interest at all (Pieterse, 2009). A similar scenario exists in Soweto, which produces only 4.6% of Johannesburg’s economic output despite being the site of perhaps the single most concentrated and sustained effort by the post-Apartheid state to stimulate job creation and growth anywhere (Todes, 2012). Similarly, while post-Apartheid development programmes such as the Special Integrated Presidential Projects, the Urban Renewal Integrated Sustainable Rural Development Programmes and the Neighbourhood Development Partnership Grant have been somewhat successful in increasing and directing public investment, they have not successfully guided private sector investment (Todes & Turok, 2015). The one partially successful strategy for targeted private investment, the Urban Development Zones designed to redevelop inner-cities, has attracted private investment by appealing to the urban elite, and has resulted in the exclusion of the poor (Todes & Turok, 2015).

The reasons for the failure of government to successfully direct the private sector are many-fold. Pieterse (2009) and Turok (2012) identify the strong protections of private property enshrined in the South African Constitution as being a primary obstacle, which as Turok notes exacerbates path-dependence by firstly making it more difficult for the state to intervene in urban housing markets and secondly preventing the state from restricting private sector investment in well-off areas, so it is directed elsewhere. Without the power to seriously direct private capital, business prefers to concentrate in areas which are already-wealthy and provide a sure market, and are generally not interested in townships and informal settlements because of prevailing low and unstable incomes (Turok, 2012). That industry in South Africa is typically very highly concentrated increases the power of business to dictate where and whether investment will happen, and there is little the state can do about this at the local level (Todes & Turok, 2012). Lack of capacity and coherence within the state is a significant additional issue, which is taken advantage of by the private sector. Contradictions between different levels of government allow for business to undermine each level’s agenda where it suits them, and sometimes circumvent regulatory instruction.

What does spatial mismatch mean for mega-projects?

There is little reason to believe that the state will be able to successfully direct private investment and thus ensure that mega-projects are self-sustaining. One of the motivations
of the mega-projects is that they should be a break from past dormitory settlements of RDP settlements where people sleep but cannot work. However it seems that under the current trajectory, this is exactly what mega-projects are likely to become. While they may be more economically diverse than RDP settlements, though this is in no way certain, economic diversity does not mean economic self-sufficiency. The case of Cosmo City in Johannesburg is instructive, as while there is a fair range of different income groups resident in the settlement (Haferburg, 2013), it took nearly a decade after its settlement for formal retail outlets to open in the settlement, let alone tradeable activities which can provide a genuine economic base (Turok, 2016). The current depressed state of South Africa’s economy make visions of new industrial and employment centres all the more implausible (SACN, 2011).

The analysis of Chapters 3 and 4 showed that it is important for housing to be close to jobs, if it is to be poverty-reducing. There is little reason to believe that mega-projects built on city peripheries will successfully be able to attract jobs and industry, and it is likely that they will instead simply entrench peripheral poverty and disconnectedness. Housing policy which moves people closer to the city, in contrast, will by definition improve proximity to jobs, and social amenities. Based on South Africa’s experiences with attempts to direct private sector investment, it would seem that a necessary implication of spatial mismatch is that intensive development and consolidation strategies are likely to be more poverty-reducing than extensive developments and mega-projects.

5.3 Well-located affordable housing

As indicated in Chapters 2 and 3, spatial mismatch operates as a type of poverty trap. One of the reasons people on urban peripheries are poor is that they live far from jobs and struggle to find employment. Living closer to jobs may increase their chances of finding employment, but accommodation in well-located areas is scarce and expensive. Poverty means the peripheral poor cannot afford to live close to jobs places, thus perpetuating the cycle of poverty and peripherality. One way to break this cycle is policy which allows the poor to live close to job opportunities. Section 5.2 immediately preceding suggests that this will be best accomplished by opening up housing opportunities in existing well-located areas, close to jobs. This section discusses what effective policy for well-located affordable housing would look like. It works from the uncontroversial assumption that there is presently a serious shortage of well-located affordable housing in South Africa’s major cities, and works specifically from the example of Johannesburg to make policy recommendations.

Inner city housing

In the popular discourse around well-located housing in large cities such as Johannesburg, the conventional emphasis is on provision of affordable rental accommodation in the inner
city. This is well justified, as our analysis in Chapter 3 shows that central city regions are generally close to jobs and on average will be associated with lower unemployment rates. The value of living in the inner city is reiterated by inner city residents themselves, who say that the primary advantage of the region being able to find work more easily and paying low (or no) transport costs (Mayson & Charlton, 2015). These advantages of the inner city are contrasted with an extreme shortage of affordable accommodation, at least in Johannesburg. Tissington (2013) shows that around half of Johannesburg’s inner city residents cannot afford formal accommodation of any kind, and must live in various kinds of informal housing. Table 13 shows the household income distribution for the Johannesburg inner city according to the 2011 Census (in 2011 Rands).  

<table>
<thead>
<tr>
<th>Household income, 2011 Rands</th>
<th>Households</th>
<th>% of total households</th>
<th>Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 800</td>
<td>21162</td>
<td>25.10%</td>
<td>52270</td>
</tr>
<tr>
<td>Less than 1600</td>
<td>27273</td>
<td>32.35%</td>
<td>67364</td>
</tr>
<tr>
<td>Less than 3200</td>
<td>42483</td>
<td>50.39%</td>
<td>104933</td>
</tr>
<tr>
<td>Less than 6400</td>
<td>59865</td>
<td>71.01%</td>
<td>147867</td>
</tr>
<tr>
<td>Between 1600-3200</td>
<td>15210</td>
<td>18.04%</td>
<td>37569</td>
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<tr>
<td>Greater than 6400</td>
<td>24438</td>
<td>28.99%</td>
<td>60362</td>
</tr>
<tr>
<td>Total</td>
<td>84303</td>
<td>100.00%</td>
<td>208228</td>
</tr>
</tbody>
</table>

Estimates for individuals assume average household size of 2.47

---

Table 13: Household income distribution, Johannesburg inner-city.

Our own calculations, based on the Johannesburg inner city Urban Development Zone boundary, and using small area level data.
Table 13 shows that approximately half of inner city households earned less than R3 200 per month in 2011. This is significant because SERI’s detailed survey of the Johannesburg inner city shows that there is essentially no formal rental accommodation affordable to people earning below R3 200 per month, if it is assumed (as is common) that rent should not make up more than 30% of total household income (Tissington, 2013). This issue of affordability is of course worse than it appears when talking only about a R3 200 threshold, because many households earn substantially less than this amount. Table 13 shows that 32% of inner city households earn less than R1600 per month while 25% earn less than R800. There are informal rental options available for people who earn below R3 200, but this is often to rent a “space” or a room rather than a full flat or house, and informal rental frequently means insecure tenure and sometimes substandard living conditions (Tissington, 2013; Mayson & Charlton, 2015). Informal renters are also more vulnerable to various kinds of abuse, including abuse by the state, and are often pathologised by the state and media as “building hijackers”.

Formal private rental accommodation excludes a vast part of the city’s population, while even social housing is often too expensive. Where formal housing is affordable, it is undersupplied. The informal housing market absorbs many people who cannot afford formal housing, but this sector is not a panacea for the City’s shortages and is dysfunctional in many ways. There is little reason to think the case of Johannesburg is a severe aberration from the norms of most South African cities, and indeed there is evidence which shows significant housing backlogs across the different metropolitan municipalities (for example see City of Cape Town, 2015). The implication is that more formal affordable accommodation needs to be developed in Johannesburg’s inner city and likely the inner cities of other major metropolitan municipalities. Closeness to work is likely to have many advantages, and ensuring there is sufficient or at least increased affordable housing in locations close to work should be a policy priority.

Moving beyond the inner city

However while this report has focused overwhelmingly on the economic dimensions of location, the concept of well-located housing when it comes to policy must go significantly beyond this. It is of course the case that well-located housing will be close to jobs, but it should also be close to social amenities and public spaces which allow for recreation in the city. As inner cities across South Africa have declined, the best-serviced and most beneficial areas of the cities have become the suburbs. As discussed in Section 2.2, these suburbs are however overwhelmingly white and wealthy, and indeed a number of quasi-legal mechanisms are employed by suburban residents to keep these enclaves separate from the rest of the city. Housing policy should focus on providing affordable housing in inner cities and other areas close to economic activity, but this does not mean it should shy away from more direct attempts at mixed-income developments in well-off suburbs, which are almost invariably close to jobs and additionally
have better-than-average social amenities. Mixed-income development in general is important, to avoid ghettos which may be relatively well-located but which have little local investment and no cross-subsidisation. While there is little local precedent for these kinds of strong state interventions into affluent private markets, it is common practice globally to require developments in affluent areas to set a portion of new housing for affordable accommodation, and the private sector is often stringently regulated through policy instruments such as rent controls, which don’t exist in South Africa (Silber, 2016).

It seems the most ambitious plan currently to open up wealthy suburban areas is Johannesburg’s “Corridors of Freedom” project, which seeks to connect disparate parts of the city by efficient public transport, and then develop mixed-income housing and various commercial activities at specific nodes along these transport corridors (City of Johannesburg 2016b). While the scale of the project is large, specific details such as how much housing will be reserved for affordable accommodation and what will be taken to constitute affordability remain to be seen. The initiative as a whole is surely a positive development, but suggestions that housing will be provided by private-sector developments make these apprehensions about affordability concerning. As SERI’s research (Tissington, 2013) shows and as is discussed briefly above, there is little reason to believe that private sector housing will be affordable at the levels required in order to be inclusive. Even supposedly “low-cost” private housing is typically priced for above what the typical inner-city resident can afford. Therefore while Corridors of Freedom is a laudable initiative, and it would be likely be a positive development if similar initiatives were launched in other South African cities, there is reason to be suspicious as to how inclusive the final product will really be. Affordable housing should be developed in suburbs as well as in the inner city, but it must be genuinely affordable.

Public rental

The City of Johannesburg (2013), in its Inner City Transformation Roadmap, acknowledges the urgent need for a rental sector which provides formal housing at between R300 and R600 per month. SERI’s view is that the large-scale provision of affordable rental accommodation requires publicly-provided rental accommodation (SERI, 2016a). Private sector rental, at least in Johannesburg, has in general not come close to providing sufficiently affordable accommodation for the poor, and a household income level of R3500 is below the usual target for social housing (City of Johannesburg, 2013). While social housing can in many situations likely be made more affordable than it currently is, the model is unlikely to be able to extend below rentals of R900 per month (SERI, 2016a).

Currently the only government programme which systematically aims to provide housing for households which earn less than R3500 per month is the RDP housing programme. This programme can be better implemented than it has been in the past, and in particular
greater emphasis can and should be placed on location. Rental accommodation will however be a key part of any kind of city densification strategy, and there is a need for government-supported rental accommodation in addition to better RDP housing.

This accommodation will need to have a variety of rental charges and typologies which cater to more than just the top end of the affordable-housing market, will need flexible administrative processes which can make allowances for the reality of precarious incomes, and, importantly, need to be based on public ownership of housing stock. This kind of programme is ambitious but it seems there is indeed little alternative when it comes to well-located housing which must be provided at scale. A number of different financing options are possible, such as re-purposing of existing programmes or the development of a new national funding instrument, and innovative practices used elsewhere in the world can be used to reduce costs, such as demand-side subsidy vouchers or tenant contributions in building maintenance.

Public rental accommodation is an ambitious political target in a time when many state functions are increasingly outsourced (PARI, 2014), and there is concern about an impending fiscal tightening nationally. There seems to be little alternative, however, if South Africa’s cities are going to perform the developmental role they need to in reducing poverty and stimulating growth and mobility.

5.4 Chapter Conclusion

The spatial mismatch analysis presented in this report leads us to two policy conclusions. Firstly, urban development needs to be intensive rather than extensive in its outlook, in order to take advantage of the developmental benefits provided by cities and in order to avoid perpetuating the acknowledged problems of the post-1994 RDP housing programme. Currently in vogue mega-projects do not look promising, and are likely to entrench the already dysfunctional Apartheid spatial forms which characterise South Africa’s cities.

Secondly, intensive development requires affordable and well-located accommodation which does not exist formally in South Africa’s major cities. New affordable housing development is required in inner cities and in well-off suburbs. Public rental housing is a cornerstone of affordable housing in many cities around the world, and is a necessity in the South African context, where the private market has failed to meet the existing demand for low-cost housing. This means the development of a state programme which is affordable, flexible, and which is centred on public ownership of housing stock.

These policy directions would hopefully go some way in transforming dysfunctional spatial forms in South Africa’s cities, but a key policy caveat must be made here. Spatial mismatch is just one determinant of unemployment and poverty in South Africa. Our analysis suggests that it is a substantial determinant, but the discussion in Section 2.3 should make
it clear that poverty in South Africa is difficult to escape and has many structural causes. In the *Dladla*\(^2\) matter, which involved the City of Johannesburg providing temporary alternative accommodation to inner-city evictees in a housing shelter, at various points the City made the argument that after 6 or 12 months living in the shelter, the residents, by virtue of having been provided ostensibly suitable and well-located formal accommodation, should have found suitable jobs and been able to afford their own formal accommodation without state support (SERI, 2016b). It was argued that if residents had not progressed out of the shelter after 6 or 12 months, this could only be attributed to their laziness. This kind of logic is self-evidently absurd in a country such as South Africa, and an argument for the importance of location, which this report puts forward, should not be understood as suggesting that well-located formal accommodation is some type of miraculous developmental silver bullet. Well-located housing is nonetheless likely to be a beneficial development which should be given due emphasis.

\(^2\)Dladla and Others v City of Johannesburg Metropolitan Municipality and Another 2014 (6) SA 516 (GJ)
6.1 Chapter introduction

The idea of spatial justice increasingly underpins the rhetoric of both state and non-state actors when it comes to questions of progressive urban planning in South Africa. The South African National Development Plan (NDP) (National Planning Commission, 2012) lists spatial justice as one of its overarching principles for spatial development, while a commitment to spatial justice is the first development principle in the Spatial Planning and Land Use Management Act of 2013 (SPLUMA). Activists and advocacy groups appealing to the state for the development and implementation of progressive urban policy use the same language. The concept of spatial justice has the potential to be politically powerful in South Africa, where both a state obligation and activist commitment to the concept can be used to transform Apartheid-era spatial forms. However practical definitions of spatial justice remain elusive, which simultaneously renders the state unaccountable to this principle and hinders attempts to use the concept to concretely set policy agendas.

This chapter aims to give content to the idea of spatial justice in South Africa’s cities, based primarily on our empirical analysis of the contemporary condition of South Africa’s cities, and secondly on our short review of Apartheid-era housing policy. The chapter begins by outlining the legislative importance of the concept of spatial justice in South Africa, and then moves to refining the meaning of the concept in our context. We argue that when spatial justice is understood to be about the links between spatial and social phenomena, as it is predominantly understood academically, spatial mismatch is a straightforward example of spatial injustice. If an historical approach is used instead, to define spatial justice as being about “righting the wrongs of the past”, the history of Apartheid-era housing policy leads
to similar conclusions about what spatial justice must mean practically in South Africa’s cities. In both cases the concept means ensuring, at a minimum, the development of well-located housing affordable for the poor in South Africa’s city centres.

6.2 Commitments to Spatial Justice in South African law and policy

In 2013, the Spatial Planning and Land Use Management Act (SPLUMA) was passed into South African law. Apart from other functions, the act is intended to provide a new unitary legislative framework for spatial planning, land development, and land use management in South Africa. It replaces the patchwork of different planning laws which previously prevailed, many of which were inherited from the Apartheid era. SPLUMA is underpinned by a number of “development principles”, with which all action under the act must be consistent. The first development principle is an explicit commitment to “the principle of spatial justice”, which is understood to mean that:

i. past spatial and other development imbalances must be redressed through improved access to and use of land;

ii. spatial development frameworks and policies at all spheres of government must address the inclusion of persons and areas that were previously excluded, with an emphasis on informal settlements, former homeland areas and areas characterised by widespread poverty and deprivation;

iii. spatial planning mechanisms, including land use schemes, must incorporate provisions that enable redress in access to land by disadvantaged communities and persons;

iv. land use management systems of must include all areas of a municipality and specifically include provisions that are flexible and appropriate for the management of disadvantaged areas, informal settlements and former homeland areas;

v. land development procedures must include provisions that accommodate access to secure tenure and the incremental upgrading of informal areas;

vi. a Municipal Planning Tribunal considering an application before it, may not be impeded or restricted in the exercise of its discretion solely on the ground that the value of the land or property is affected by the outcome of the application (SPLUMA, 2013).

The consequence of this principle is that SPLUMA creates a legal obligation whereby future spatial planning, land development and land use management must accord with the principle of spatial justice. The development of a justiciable commitment to spatial justice opens up new opportunities for activists and advocacy organisations to hold the state to account, and to push further for spatial transformation. However this opportunity is weakened by uncertainty as to what spatial justice actually means. Commitments to spatial justice already exist in state policy, such as for example in the National Development Plan (NDP) (National Planning Commission, 2012),
where spatial justice is listed as the first of the “overarching principle for spatial development” outlined in the policy. The NDP commitment is explained as meaning that:

*The historic policy of confining particular groups to limited space, as in ghettoisation and segregation, and the unfair allocation of public resources between areas, must be reversed to ensure that the needs of the poor are addressed first rather than last.* (National Planning Commission, 2012:277)

While these commitments in national policy and legislation are welcome, they are also broad enough that it is difficult to draw out immediate implications for the evaluation of specific spatial policies and actions. It is unsurprising that there will be reasonable disagreement debate about what constitutes “justice”, but without knowing what spatial justice means, legal and policy commitments to the principle lose much of their value. It is for this reason that we discuss competing definitions of spatial justice, and what the practical implications are of these definitions.

6.3 Defining spatial justice in the South African context

6.3.1 Spatial mismatch as spatial injustice

While some of the ideas implicit in it are not new, the specific term “spatial justice” has only recently become popular and widely-accepted (Soja, 2009). David Harvey’s *Social Justice and the City* (1973), attributed as a key development in the formation of the concept (Chatterton, 2010), does not use the phrase “spatial justice” at all, and instead prefers to discuss how “social justice” may be linked to various geographies, or sometimes to the concept of “territorial justice” (Soja, 2009). Henri Lefebvre’s *right to the city*, while widely recognised as a key development leading to ideas of spatial justice (Soja, 2009; Chatterton, 2010; Iveson, 2011), has its own distinct and unique emphases, such as those on radical democratic control and ownership of cities by inhabitants (Harvey, 2008).

Soja (2009:1) argues that new interest in spatial justice is part of a broader “spatial turn” in the past 20 years, where “[a]fter a century and a half of being subsumed under a prevailing social historicism”, spatiality is finally being emphasised as a central concern of human life. While Soja identifies 3 key principles which necessitate spatial thinking, it is the last which is most relevant to our discussion, which is his “socio-spatial dialectic” – the idea that “the spatial shapes the social as much as the social shapes the spatial” (Soja, 2009:2). The idea of a mutual interdependence between social and spatial conditions is also regarded as central by Peter Marcuse (2009:3), who further argues that “[s]patial justice is derivative of broader social injustice” and that “[s]ocial injustices always have a spatial aspect, and social injustices cannot be addressed without also addressing their spatial aspect”. Both Soja and Marcuse identify the linkages between spatial
circumstances and social outcomes, and vice versa, as crucial for identifying cases of spatial justice or injustice.\textsuperscript{33}

In this theoretical context, spatial mismatch presents a quintessential case of spatial injustice. On the one hand, it is spatial circumstances (where poor people and black people are confined to peripheries) which lead to the unjust social outcome of unemployment, poverty, and overall inequality. On the other hand, it is social circumstances (whether they be poverty, housing market discrimination, or something else entirely) which lead to the unjust spatial outcome of poor and black people being confined to areas far from jobs and social amenities. This report’s key empirical finding is that spatial mismatch exists in most South African cities, and that spatial mismatch generally explains a large part of existing unemployment. This evidence has clear implications for at least one aspect of what spatial justice must mean in South Africa’s cities: greater provision of housing affordable for the poor which is located close to jobs and the economic opportunities of major urban centres.

The Apartheid city as spatial injustice

The academic view which seeks to understand spatial justice by examining the relationships between social and spatial phenomena is not the only way to approach the concept. Given the very visible and visceral effects of Apartheid on contemporary South Africa, it is unsurprising that local definitions of justice often have an historical component, and it is indeed the case that definitions of spatial justice put forward by various parts of the South African state emphasise the importance of correcting historical injustices. The definition of spatial justice in SPLUMA includes reference to “past spatial and development imbalances” and the “the inclusion of persons and areas that were previously excluded”, while making commitments to “redress” (SPLUMA, 2013:18). The City of Johannesburg’s Spatial Development Framework summarises the SPLUMA vision of spatial justice is simply meaning that “past spatial and other development imbalances must be redressed through improved access to and use of land” (City of Johannesburg, 2016a:25). The NDP definition of spatial justice also makes explicit reference to correcting “historic policy” which led to “ghettoisation and segregation, and the unfair allocation of public resources between areas” (National Planning Commission, 2012:278).

This report makes the case, in Section 2.2 that the Apartheid City is most fundamentally defined by spatial forms which confine black people to dysfunctional and overcrowded city peripheries while well-serviced and well-located city centres are disproportionately white. The short history of Apartheid-era housing policy in Section 2.2.1 makes clear that the separation of black and white, the reservation of prime land for exclusively white use, and the denial of black people’s rights to live as urban residents with claims to urban citizenship, were primary purposes of

\textsuperscript{33} The significant difference between Soja and Marcuse is about whether spatial remedies by themselves are sufficient for resolving issues for spatial injustice.
Apartheid policy. The implication of this history is that action taken to reverse the legacy of Apartheid-era planning, and therefore action in line with historical conceptions of spatial justice, must emphasise the development of affordable and well-located housing for the poor in South Africa’s urban centres, and the development of more integrated urban cores. A continued focus on peripheral development for the poor, while exclusionary urban centres remain unchanged, will simply entrench Apartheid spatial forms and cannot be in line with historically-oriented conceptions of spatial justice in the South African context.

6.4 Chapter conclusion

In defining what spatial justice means practically for urban and spatial policy, both of our definitions suggest that the provision of well-located housing which is affordable for the poor is a prerequisite for spatial justice. When spatial justice is understood to be about the relationship between spatial circumstances and social outcomes, and vice versa, well-located affordable housing is necessary to break the poverty trap of spatial mismatch. When spatial justice is understood as being about “righting the wrongs” of the past, a necessary conclusion is that development which seeks to open up well-located city areas, which were previously reserved for whites, is necessary for undoing South Africa’s Apartheid cities. Well-located affordable housing is one way of ensuring that city centres and urban cores are accessible to the poor.

It bears mentioning that the matching of affordable housing and jobs is just one component of spatial justice in South Africa’s cities, and indeed could be understood as a minimum prerequisite. It is not just access to economic opportunity which is unequally distributed across South Africa’s cities, but also access to social amenities such as schooling, healthcare, policing services and recreation areas. Commitments to spatial justice should very likely include commitments to the equitable distribution of these resources, and indeed to the principle that all city-dwellers should be able to enjoy the social life and dynamism which characterises cities. This chapter should not be construed to be suggesting that it is only proximity to economic opportunities which is important for spatial justice. Rather, it is evidence on this question which this report investigates, and therefore upon which this report makes recommendations. The matching of housing with jobs, and rejection of Apartheid city forms, are proposed here as necessary conditions for spatial justice, but they by themselves are not assumed to be sufficient conditions.

This necessary condition, nonetheless, can be used to hold the state accountable when development entrenches peripheral development for the poor. Sustainable and realistic attempts aimed at matching people with jobs, in line with spatial justice imperatives, require housing policy which allows poor people to live in and close to urban centres. The alternatives, of massive mega-projects on city peripheries, are unlikely to be successful
in attracting jobs and economic activity, and are instead likely to function simply as large peripheral housing projects. These would not address spatial justice imperatives of matching jobs and housing, or of undoing Apartheid spatial forms. Affordable and well-located public rental housing, on the other hand, both seeks to address the spatial injustice of mismatch and represents a fundamental break from Apartheid-era patterns of exclusively peripheral development for black people. Spatial justice requires addressing prevailing city structures, as there are both implicated in unjust social outcomes and are a direct consequence of Apartheid-era policy.
The primary contribution of this report is in statistically quantifying the effect that distance between housing location and job location has on unemployment rates. The evidence presented in Chapter 3 suggests that a significant part of existing unemployment in most of South Africa’s cities can be explained by distance from jobs. This is not a surprising finding, but it is the first national and city-specific study of its kind in South Africa, and is the first to attempt to quantify the size of the effect that location has on unemployment rates. This study is necessarily preliminary, given some data and methodological constraints, and will likely be improved upon in subsequent work. But its findings are nonetheless important.

South African cities are still characterised by a spatial form which was very deliberately created to keep black people out of well-located white areas, except as workers to service these areas. Urban black people typically live far away from jobs in areas of high density, high unemployment, and which exhibit disproportionately high prevalence of negative socioeconomic outcomes. Black people generally in South Africa bear the brunt of poverty and unemployment, while simultaneous wealth makes South Africa one of the most unequal countries in the world. South African poverty is often chronic and particularly difficult to exit, with substantial evidence showing that there are significant structural causes which keep poor people poor. Our analysis of spatial mismatch shows that across almost all of the urban areas we examine, city structure is one of the structural causes of chronic poverty, and spatial mismatch caused by city structure is a quintessential poverty trap.

The causes of the continued existence of Apartheid city structures in post-Apartheid South Africa are complicated and get to the heart of the 1994 compromise. Constitutional protections of private property combined with highly organised property development and property owner lobbies makes effective state intervention particularly difficult, and
the tendency of the unfettered private market has been to entrench Apartheid spatial forms. At the same time, state housing policy has inadvertently entrenched Apartheid city structures, by building RDP housing for poor black people predominantly on city peripheries. One key justification of this RDP model, which is focused most significantly on delivery of housing units regardless of location and other issues, is that RDP housing can facilitate poverty exit by means of it being an asset which has economic value. This asset-based path out of poverty is however not generally plausible, and there is little theoretical or practical reason to continue to base policy around this particular characteristic of RDP housing.

This is not to say that RDP housing should be abandoned, but it must be used in a way which fits into a coherent spatial development strategy. We argue that this strategy must be based on city densification and intensive development, rather than extensive development which by design will increase urban sprawl. In this context we suggest that housing mega-projects should be opposed, both because the spatial form they envision is undesirable, and because they are likely to fail and simply entrench peripheral housing for poor and black people. Instead, housing policy should focus on well-located affordable rental accommodation, in inner cities and city suburbs. This housing must be affordable for the poor, which suggests that a massive public rental housing programme is needed, which is based on public ownership of housing stock.

South Africa’s cities are exclusionary spaces where the combined influences of largely unchallenged market forces and an Apartheid past mean poor people are confined to urban peripheries. At the same time, cities are places of great dynamism and have significant potential for development. The evidence on the importance of location suggests that the state and city governments should proactively intervene in housing markets, to provide well-located and affordable housing for the poor. This is a necessary part of efforts aimed at dismantling the “Apartheid city”, and moving towards urban spatial justice.


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9.1 Job location data

As mentioned in the main report, it is very difficult to access data on where jobs are physically located in South Africa. Our report uses mesozone-level data 2011 data produced by the Council for Science and Industrial Research (CSIR) for the collaborative “stepSA” project. Other potential sources of jobs data are discussed below, following which the CSIR data is described in more detail.

Alternative data sources

The national statistical agency, Statistics South Africa, does not record information regarding the physical locations of workplaces for census respondents. It instead records the place of interview for survey respondents, which typically means that person’s home. The same issue applies in the case of large-scale survey data which has a spatial component, and survey data is in any case not particularly suited for our purposes due to issues of small sample size when disaggregated by areas such as local municipalities. Researchers attempting to examine spatial mismatch in South Africa have typically had to investigate the use of various kinds of administrative data, associated with either government taxes and levies or with applications for credit.

Sinclair-Smith & Turok (2012) in their descriptive investigation of spatial mismatch in Cape Town exploit business data collected for tax purposes - the Regional Services Council (RSC) levy. This was a levy paid by businesses for bulk services, where the levy depended on business turnover and payroll. The City of Cape Town provided this turnover and payroll data for the City to Sinclair-Smith and Turok for the period January 2000 to June 2006, when the tax was discontinued. As Sinclair-Smith and Turok note, this was a unique use of administrative data for the purposes of examining spatial mismatch in South Africa. Unfortunately, this data is not useful for our purposes in this report, being both out-of-date and restricted to one municipality.
Rospabe and Selod (2006) similarly use the now out-of-date RSC Levy data for Cape Town, and combine this with 1996 Survey Data and 1998 Migration Survey. While their study is greatly strengthened by the different types of data they use, and allows unique insights in their analysis of Cape Town, this data is now too old and geographically restrictive for the purposes of this report.

Wray et al (2015) use administrative data of another type for their brief analysis of spatial mismatch in Gauteng. As a proxy for jobs, they produce a measure of number of businesses per square kilometre, based on AfriGIS’s 2010 Bizcount data. While its precise methodology is somewhat unclear, it seems that the Bizcount data comes from business’s credit applications, which must indicate a number of business characteristics such as address, turnover and number of employees. AfriGIS, with access to data from these applications, performs various quality controls and then publishes the data under its Bizcount brand. There are currently over 52 000 businesses in this dataset. The Bizcount dataset, due to its highly disaggregated nature, large sample size, and not obviously biased selection criteria, is generally well-suited for our purposes. However it is exorbitantly expensive to purchase when attempting to perform a national analysis as is our purpose here, its underlying methodology remains somewhat unclear, and it seems that its geographic coverage is more focused on Gauteng than other parts of the country.

The CSIR/stepSA data

We are thus left with little alternative than to use the CSIR data described in the Section 3.3.3 of the main report. This is not to suggest that the CSIR data is inadequate for our purposes - it performs remarkably well. There are nonetheless drawbacks associated with using the data for the type of analysis we perform here, which deserve exploration.

Because of the issues associated with obtaining job location data outlined earlier, the CSIR/stepSA jobs data is based on jobs and production data which is available at a local municipal level, by industry sector (Mans et al, 2014). For each municipality and each industrial sector, a specific employment intensity is calculated by determining the ratio of the number of employees to Rands generated in that sector in that municipality. This employment intensity ratio is then combined with mesozone-specific and sector-specific production data. This production data, which gives the total Rands generated in each sector in each mesozone, combined with the sector-specific employment intensity ratios, is then used to approximate total jobs in each mesozone.

While this process may sound relatively straightforward, it is very sensitive to data quality issues. The principal issue concerns how production data (Rands per sector in each municipality or mesozone) is imputed. At the most basic level, concerns have been
raised about the quality of municipal-level data which purports to describe sector-specific production. Production data may be reported by head offices of large companies, even where actual production occurs elsewhere (SACN, 2011). This would likely inflate the production estimates for cities such as Johannesburg, where many businesses have their head offices. However while this may be an issue when comparing production or employment between municipalities (as we implicitly do in our Gauteng and Gauteng City-Region analyses), it should not overly affect estimates of which areas within a specific municipality have a relative concentration of production or jobs, which is the main focus of this report. This is not to say, however, that the CSIR estimates of the within-municipality distribution of production and jobs is very robust. Municipal-level production data is assigned to specific mesozones according to the CSIR’s dasymetric mapping techniques (Mans et al., 2016). Based on the information provided by Mans et al. it would seem that the reliability of this process is very sensitive to data quality, an issue which they acknowledge.

Ultimately, however, there is little alternative to the CSIR/stepSA jobs data for an analysis of this kind. And while concerns can be raised about the reliability of the data, there does not seem to be any reason to think that the data will be systemically biased in some direction, which would be a significant concern. Lastly, and, perhaps most comfortably, visually comparing the CSIR/StepSA jobs data to maps based on other data sources suggests no major discrepancies between the different data sources.34

9.2 The job proximity index

Combining distance and job-density information

Regression analysis which examines the determinants of the small-area level unemployment rates requires a measurement of job proximity for each small area. This necessitates the transformation of the mesozone job density data into small-area level data. This task is more involved than it may seem, however, as to simply assign each small area the job-density value of the mesozone under which it falls would not be a realistic measure of job proximity. A small area which is adjacent to a job-dense mesozone should have a similar measure of proximity to jobs as the small area which falls just inside the mesozone. Following Cynthia L. Rogers (1997) approach to measuring spatial mismatch in the Pittsburgh Metropolitan Area of the United States, we construct a job proximity variable which summarizes the distribution of jobs relative to where a person lives. It takes into account a particular small area’s distance from job centres in the relevant areas (in this case Johannesburg), and the number of jobs available in each job centres. Using Rogers’

34 Specifically we compare our Cape Town data to Sinclair-Smith and Turok (2012), our Gauteng data to Wray et al. (2015), and our Johannesburg, Ekurhuleni and Tshwane data to the GCRO’s “Economic Activity” variable (based on the AfriGIS data) visually shown on the GCRO’s GIS website (https://gcrol.wits.ac.za/gcrojsgis/).
notation\textsuperscript{35}, job proximity $E_1$ can be expressed as (equation 1):

$$E_{1i} = \sum_{j} \frac{1}{m_{ij}} (E_j)$$

where subscript $i$ denotes a small area, subscript $j$ denotes a mesozone, $m_{ij}$ denotes the distance between small area level $i$ and mesozone $j$, and $E_j$ denotes the jobs density of mesozone $j$. What this equation reflects is that the job proximity measure $E_1$ for a particular small area (small area $i$) is calculated by dividing the jobs in each mesozone by the distance between small area $i$ and that mesozone, and then summing together all of those quotients to create one composite “proximity to jobs” measure. What this does is create a measure of job proximity for each small area which is lower the further away the small area is from mesozones with jobs (which increases the distance $m_{ij}$), but higher the more jobs there are in each of those mesozones (which increases $E_j$). Small areas closer to mesozones with high job-density will have a higher “proximity to jobs” index than small areas that are farther from job-dense mesozones.

In order to calculate the distance between the irregularly-shaped small areas and the mesozones, we follow Rogers (1997) by first determining the centre-points of each small area and mesozone, and then calculating the distance between the centre-points of each small area and each mesozone. It is this distance which is used for distance $m_{ij}$ in equation 1. Ultimately the mechanism by which job proximity measure $E_1$ is calculated is perhaps

\textsuperscript{35}But simplifying by using only one time-period.
most easily understood visually. Figure A1.1 shows job proximity $E_1$ for Johannesburg, while Figure A1.2 shows the same but is overlaid by the mesozone boundaries with centre-points indicated. Note that for Figures A1.1 and A1.2, as for all of the job proximity figures in this report, job proximity is linearly transformed into an index out of 100 for each area under analysis - in this case Johannesburg. This indexing is discussed in Section 9.2.2 of this Technical Appendix.

Figure A1.1 is notable firstly because job proximity $E_1$ at the small-area level is generally what one would expect, based on the mesozone jobs data in Figure 8 in Section 3.3.4 (upon which the small-area level data is based). Job proximity decreases as we move to the periphery of the City. However when Figure A1.1 is overlaid with the mesozone boundaries and centre-points, shown in Figure A1.2, it becomes clear that some substantial differences in job proximity are based purely on where the mesozone centre-point lies. This is not ideal, as there is little reason to think in general that mesozone centre-points will have an unusual concentration of jobs, relative to the rest of the particular mesozone. We would prefer our job proximity variable to be as uniform as possible across each mesozone, so as to better reflect the underlying jobs data depicted in Figure 8.

It is a natural consequence that combining Equation 1 with our centre-point data produces maps which show such extreme increases in job proximity around the mesozone centre-points. Small areas very close to centre-points will have a very small distance $m_{ij}$ relative to areas further away, even if these areas are within the same mesozone. For very low values for $m_{ij}$, the corresponding $E_1$ will be very large. Our solution to this issue is to reduce the relative importance of very close distances $m_{ij}$ in our job proximity equation. To do this we keep our job proximity equation the same as in equation 1 except that we take the square-root of distance $m_{ij}$ before dividing mesozone jobs by this value. The effect of taking the square-root is to reduce the differences in job proximity caused by differences in distance, as the distribution of distances $m_{ij}$ is compressed. Our new measure of job proximity is shown by equation 2 which is analogous to equation 1:

$$E_{2_i} = \sum_j \frac{1}{m_{ij}}(E_j)$$

Equation 2 results in a new $E_2$ job proximity measure, which when calculated for Johannesburg gives Figures A1.3 and A1.4. Compared to Figures A1.1 and A1.2 under the $E_1$ specification, Figures A1.3 and A1.4 under the $E_2$ specification are affected only negligibly by mesozone centre-point location. The centre-points are still evident in some cases, but the distortion is greatly reduced. It is unfortunate that we are compelled to adopt a job proximity measure which intentionally understates differences in distance from jobs, especially because as discussed in Section 3.3.5, it is likely that physical distance from jobs will in fact be exacerbated by inefficient modes of

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36 This is the opposite of the method used by Rogers (1997) to increase the importance of extreme distances. She takes the square of distance.
transport for people living on peripheries, and the effect of distance on job-proximity should be emphasised as distance increases, rather than reduced.

Nonetheless, Figure A1.3 shows the pattern of job proximity we would expect based on the underlying mesozone data from Figure 8 of Section 3.3.4 of the Main Report, and there is little alternative with the data at hand. It is at least reassuring for this analysis that job proximity is still very clearly spatially defined even with this intentional understatement. The $E_2$ specification is our preferred measure for job proximity throughout the report.

**Indexing job proximity scores**

In order to make job proximity scores easily understandable and interpretable within our regions of analysis, it is necessary to transform the data from the raw numbers produced in Equation 2. This is achieved by simple linear rescaling (with some slight censoring detailed below) such that approximately the largest job proximity score for small areas within a given region of analysis is rescaled to a value of 100, and all other scores in that region are rescaled by the same factor. This preserves the underlying relative distribution of job proximity scores within a municipality (or other region.
of analysis such as Johannesburg-Ekurhuleni-Tshwane). It means our job proximity scores cannot be compared between different areas of analysis (for example between Cape Town and Johannesburg), but this would likely have been inadvisable in any case given the nature of the mesozone data as described in Section 9.2.

Some censoring of the data is required before this rescaling however. Even under specification E2 which makes use of the square-root of distance, some small areas have extremely large job proximity scores because the relevant small area and mesozone centre-points are extremely close to each other. It is not unusual in the uncensored data for the highest small area job proximity score to be more than twice the size of the next highest score. This makes mapping of job proximity scores into easily interpretable intervals as above impossible. In order to overcome this, the linear rescaling outlined above is done with respect to the mean job proximity score of the top percentile of job proximity scores within each region, rather than the actual highest score. Scores which are larger than 100 are then set equal to 100. This approach assumes that large disparities in job proximity score at the very top of the distribution are due to noise introduced by our centre-point method, rather than being reflective of real differences in access to jobs. This seems like a plausible assumption, and some censoring of this nature is in any case necessary for interpretable maps.

Effects on regression results

A last point to be made is that the methodological decisions taken above to construct our job proximity indices only negligibly affect our regression results. Our estimates and the standard errors on these estimates do not vary substantively with the E1 or E2 specifications, and the censoring or non-censoring of our job proximity scores makes almost no difference at all. The adjustments taken above are useful for the interpretability of our results, but do not affect the results themselves significantly.

9.3 Full regression results under Specification 1

The full results from our Specification 1 are produced on the following page in Table A1 (as this is our preferred specification and the specification used to produce our predicted-unemployment maps). Reported are the marginal effects at the mean for each variable for each region of analysis under this specification.
## Table A1: Marginal effects at the mean for each variable, every region

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>CITY OF JOHANNESBURG</th>
<th>CITY OF TSHWANE</th>
<th>CITY OF EKURHULENI</th>
<th>ETHEKWINI METROPOLITAN MUNICIPALITY</th>
<th>MANGAUNG METROPOLITAN MUNICIPALITY</th>
<th>NELSON MANDELA BAY METROPOLITAN MUNICIPALITY</th>
<th>BUFFALO CITY METROPOLITAN MUNICIPALITY</th>
<th>CITY OF CAPE TOWN</th>
<th>GAUTENG PROVINCE</th>
<th>JOHANNESBURG-EKURHULENI-TSHWANE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximity to jobs (index)</td>
<td>-0.238***</td>
<td>-0.320***</td>
<td>-0.303***</td>
<td>-0.223***</td>
<td>-0.466***</td>
<td>-0.3080</td>
<td>-0.300***</td>
<td>0.0278*</td>
<td>-0.304***</td>
<td>-0.317***</td>
</tr>
<tr>
<td></td>
<td>(0.0153)</td>
<td>(0.0172)</td>
<td>(0.0268)</td>
<td>(0.0262)</td>
<td>(0.0350)</td>
<td>(0.0520)</td>
<td>(0.0568)</td>
<td>(0.0165)</td>
<td>(0.00912)</td>
<td>(0.0104)</td>
</tr>
<tr>
<td>SAL Percentage white</td>
<td>-0.611***</td>
<td>-0.431***</td>
<td>-0.450***</td>
<td>-0.367***</td>
<td>-0.576***</td>
<td>-0.607***</td>
<td>-0.927***</td>
<td>-0.293***</td>
<td>-0.484***</td>
<td>-0.484***</td>
</tr>
<tr>
<td></td>
<td>(0.0136)</td>
<td>(0.0104)</td>
<td>(0.0132)</td>
<td>(0.0142)</td>
<td>(0.0276)</td>
<td>(0.0269)</td>
<td>(0.0539)</td>
<td>(0.00857)</td>
<td>(0.00651)</td>
<td>(0.00712)</td>
</tr>
<tr>
<td><strong>SAL Average age</strong></td>
<td>0.611</td>
<td>-0.373</td>
<td>-1.626***</td>
<td>-6.987***</td>
<td>-1.002**</td>
<td>-2.951***</td>
<td>-1.707</td>
<td>-3.878***</td>
<td>-0.783***</td>
<td>-0.799***</td>
</tr>
<tr>
<td></td>
<td>(0.552)</td>
<td>(0.267)</td>
<td>(0.367)</td>
<td>(0.437)</td>
<td>(0.551)</td>
<td>(1.303)</td>
<td>(1.081)</td>
<td>(0.210)</td>
<td>(0.218)</td>
<td>(0.204)</td>
</tr>
<tr>
<td><strong>SAL Average age - squared</strong></td>
<td>-0.00633</td>
<td>0.00734*</td>
<td>0.0187***</td>
<td>0.0746***</td>
<td>0.0115</td>
<td>0.0266</td>
<td>0.0243</td>
<td>0.0382***</td>
<td>0.00826**</td>
<td>0.0104***</td>
</tr>
<tr>
<td></td>
<td>(0.00876)</td>
<td>(0.00378)</td>
<td>(0.00540)</td>
<td>(0.00667)</td>
<td>(0.00880)</td>
<td>(0.0197)</td>
<td>(0.0156)</td>
<td>(0.00350)</td>
<td>(0.00335)</td>
<td>(0.00307)</td>
</tr>
<tr>
<td><strong>SAL Percentage female</strong></td>
<td>-0.106***</td>
<td>0.0222</td>
<td>-0.206***</td>
<td>-0.131**</td>
<td>0.291**</td>
<td>0.0996</td>
<td>-0.0883</td>
<td>0.110</td>
<td>-0.0385</td>
<td>-0.185***</td>
</tr>
<tr>
<td></td>
<td>(0.0389)</td>
<td>(0.0479)</td>
<td>(0.0450)</td>
<td>(0.0578)</td>
<td>(0.134)</td>
<td>(0.175)</td>
<td>(0.188)</td>
<td>(0.0805)</td>
<td>(0.0257)</td>
<td>(0.0262)</td>
</tr>
<tr>
<td><strong>SAL Total population</strong></td>
<td>0.00428***</td>
<td>0.00567***</td>
<td>0.00397***</td>
<td>0.00591***</td>
<td>0.00689***</td>
<td>0.00663***</td>
<td>0.00649**</td>
<td>0.00308***</td>
<td>0.00544***</td>
<td>0.00575***</td>
</tr>
<tr>
<td></td>
<td>(0.000615)</td>
<td>(0.000751)</td>
<td>(0.000676)</td>
<td>(0.000166)</td>
<td>(0.00174)</td>
<td>(0.00194)</td>
<td>(0.00273)</td>
<td>(0.000572)</td>
<td>(0.000438)</td>
<td>(0.000474)</td>
</tr>
<tr>
<td><strong>SAL Percentage urban population</strong></td>
<td>0.0284</td>
<td>-0.00933</td>
<td>0.185***</td>
<td>-0.0375***</td>
<td>0.00319</td>
<td>0.0274</td>
<td>-0.0982***</td>
<td>0.0851</td>
<td>0.0248***</td>
<td>0.0117*</td>
</tr>
<tr>
<td></td>
<td>(0.0240)</td>
<td>(0.00684)</td>
<td>(0.0259)</td>
<td>(0.00797)</td>
<td>(0.0156)</td>
<td>(0.0418)</td>
<td>(0.0144)</td>
<td>(0.0584)</td>
<td>(0.00568)</td>
<td>(0.00642)</td>
</tr>
<tr>
<td>Observations</td>
<td>5,791</td>
<td>4,513</td>
<td>4,603</td>
<td>4,780</td>
<td>1,307</td>
<td>1,803</td>
<td>1,383</td>
<td>5,324</td>
<td>17,806</td>
<td>14,907</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Coefficients are GLM marginal effects at the mean, under Specification 1 (unit changes)
Figure A2.1: POPULATION DENSITY
City of Johannesburg
Figure A2.2: POPULATION DENSITY
City of Tshwane

Graphical Appendix
Figure A2.3: POPULATION DENSITY
City of Ekurhuleni
Figure A2.4: POPULATION DENSITY
eThekwini Metropolitan Municipality
Figure A2.5: POPULATION DENSITY
Mangaung Metropolitan Municipality
Figure A2.6: POPULATION DENSITY
Buffalo City Metropolitan Municipality

Figure A2.7: POPULATION DENSITY
Nelson Mandela Bay Metropolitan Municipality
Figure A2.8: POPULATION DENSITY
City of Cape Town
Figure A2.9: POPULATION DENSITY
Gauteng Province
Figure A2.10: POPULATION DENSITY
Johannesburg-Ekurhuleni-Tshwane
Figure A2.11: URBAN/RURAL DESIGNATION
City of Tshwane
Figure A2.12: URBAN/RURAL DESIGNATION
City of Johannesburg
Figure A2.13: URBAN/RURAL DESIGNATION
City of Ekurhuleni
Figure A2.14: URBAN/RURAL DESIGNATION
eThekwini Metropolitan Municipality
Figure A2.15: URBAN/RURAL DESIGNATION
Mangaung Metropolitan Municipality

Figure A2.16: URBAN/RURAL DESIGNATION
Nelson Mandela Bay Metropolitan Municipality
Figure A2.17: URBAN/RURAL DESIGNATION
Buffalo City Metropolitan Municipality
Figure A2.18: URBAN/RURAL DESIGNATION
City of Cape Town
Figure A2.19: URBAN/RURAL DESIGNATION
Gauteng Province
Figure A2.20: URBAN/RURAL DESIGNATION
Johannesburg-Ekurhuleni-Tshwane