

People on the Move: Spatial Mismatch and Migration in Post-Apartheid South Africa

Forhad Shilpi, Lu Xu, Raisa Behal, Brian Blankespoor
April 2018

Summary

Internal migration is a key process in the urbanization process as it helps urban areas to densify and improve urban forms to reap agglomeration benefits. Migration is also a powerful mechanism to melt away inter-regional differences be it welfare inequality between rural and urban areas or segregation in terms of race, ethnicity and otherwise. The role of migration takes on a greater prominence in the context of South Africa where flows of people across areas were severely regulated under the Apartheid regime and demise of Apartheid was expected to result in massive movement of people. In this broader context, this paper focuses on three key questions: (i) how pattern of migration and spatial distribution of population evolved during the post-Apartheid period; (ii) what factors motivate and help households to migrate (income, provision of infrastructure/services, ethnic and language differences etc.); and (iii) whether social transfers act as a disincentive to migration.

Spatial Mis-Match: As a result of historical legacy of Apartheid, spatial structure of South African economy displays three fundamental spatial mis-matches: (i) in both developed and developing countries, population density is highest in the city centers and decreases steadily with an increase in distance from cities. The census data from 1996 show clearly that density of population was quite high in many areas which were not urban and the high density areas outside urban centers are all former Homelands established under apartheid; (ii) In a typical developing country, because of ease of provision of infrastructure and services in more dense areas, urban areas have on average better infrastructure and services, resulting in a strong positive correlation between density and access to amenity (housing and other). In South Africa in 1996, the correlation between

population density and housing and other amenity was weak and even of opposite sign; and (iii) As urban areas attract skilled workers, it produces a positive correlation between population density and proportion of skilled/educated workers. For South Africa, this correlation is at best weak leading to “*misalignment of density and human capital*”. This spatial mis-match implies a robust migration flow across areas that were formerly segregated and that such robust flow should help to realign densities to allow urban areas to reap benefits of agglomeration on the one hand and to reduce population pressure in previous homelands on the other hand.¹

Migration Pattern: Consistent with expectations, South Africa experienced massive population movement in the immediate aftermath of demise of Apartheid, as more than a quarter of population reported to have moved within the five-year period from 1996. The overall migration rate was 26.4 percent in 1996, dipped to 13.8 percent in 2001 and then rose to 16.4 percent in 2011. While migration pattern in South Africa appears to be similar to other developing countries in terms migrants’ characteristics and reasons behind migration, two features stand out. First, inter-municipality migration rates in South Africa is high among young adults and is comparable to inter-county migration rates in USA which is considered one the most mobile population in the world. Where migration South Africa falls seriously behind USA is intra-municipality migration. Second, though intra-municipality mobility is quite low for all different racial groups, it is especially low for black Africans. Analysis of census data indicates that areas close to Homelands established under apartheid are experiencing net outmigration and areas in and around urban areas are gaining net migrants. The migration flow is contributing to reducing the spatial mismatch and to urbanization by augmenting skill formation in urban areas, and by improving racial diversity. The slower intra-municipality

¹ The Bantustans or homelands, established by the Apartheid Government, were areas to which the majority of the Blacks population was moved to prevent them from living in the urban areas of South Africa. In total, ten homelands were created in South Africa. These were the Transkei, Bophuthatswana, Ciskei, Venda, Gazankulu, KaNgwane, KwaNdebele, KwaZulu, Lebowa, and QwaQwa. The homelands were designed for specific ethnic groups. The South African Homelands or Bantustans ceased to exist on 27 April 1994, and were re-incorporated into the new nine provinces of a democratic South Africa.

particularly among economically disadvantaged groups (black Africans, coloreds) suggests presence of significant barriers in terms skill, affordability of housing and credit.

Determinants of Migrants' location choice: To understand what factors attract migrants to a given location, a two-stage estimation process has been implemented using the 2011 census data for three different groups: whites, skilled black africans (secondary or above education) and unskilled (below secondary education) black africans. The empirical analysis shows that better income opportunities and lower unemployment rates are the two most important determinants of migration destination choice in South Africa. This analysis highlights several areas that require attention for urbanization and territorial development of South Africa. First, large urban areas in Western Cape and Gauteng are ranked high as destinations, and will continue to attract more migrants. These urban destinations are especially valued by skilled black africans and whites as they prefer moving to areas with higher ratio of educated/skilled over less educated/unskilled populations. Second, job creation in these urban areas should be of highest priority as unemployment rate is the biggest concerns in choosing a destination among black africans who face higher unemployment rates regardless of their education levels.

Third, along with employment and income opportunities, improving educational attainments should be a priority. Educational attainments are relatively low among the black africans. The evidence shows that mobility is higher among relatively skilled workers, and that those relatively skilled workers are able to secure better living conditions in their destinations as well. These would mean investing in education not only in the origins - which are mostly in the lagging areas (homelands established under apartheid in particular) that are experiencing net outflow of people - but also in destinations. The investment in the quality and quantity of education may also help alleviate the unemployment which plagues the poorer black african and colored population. Investment in education in the lagging regions on the other hand will equip the migrants to avail better jobs, and thus reduce pressure on labor markets and improve wages and living standards of those staying behind.

Fourth, provision of services in poorer neighborhoods in the destination municipalities will be another area that requires policy attention. Areas of particular importance are access to electricity and roads. Access to electricity is also tied to access to formal housing. Given the historical residential segregation that forced black africans and coloreds to neighborhoods/townships which are usually far off from employment centers, access to road has also a housing dimension.² Provision of these services should be coordinated with provision of housing.

Fifth, there is an urgent need to examine the housing policies and urban housing markets. The intra-municipality movement of households is quite low. Despite robust expansion of formal housing in townships, outmigration from these economically depressed areas continued and will perhaps continue. Similarly, provision of formal housing in outlying black african/colored townships in urban areas will improve access to some services (such as electricity) for the poor, but it would not be able to reverse the Apartheid trends of putting all low-income households of given racial background in selected neighborhoods creating poverty traps. Understandably, there are concerns as to whether current human settlement policies are cementing the barriers built under the Apartheid. Given these concerns, South Africa should explore alternative housing policies to improve working of the housing markets to facilitate mobility within municipalities, and alternative ways to integrate the housing market both racially and spatially.

Credit Constraint and Migration: Lower rate of migration among black africans and coloreds could be due to credit constraints. To check this, we use exogenous change in income due to arrival of pension. The empirical analysis shows that instead of acting as a disincentive for work migration, social transfers such as old age pensions help increase migration from rural areas. The analysis also finds negative effects of pension status change on employment rates. This result is driven mainly by the fact that probability of household members working increases significantly with a loss of pension. This result is suggestive of pension arrival relieving credit constraint during job search period.

Introduction

In a typical developing country where rural areas dominate in both population and economic activities, rural and urban areas are interlinked in many ways - through flows of goods, services and people. For a highly urbanized country such as South Africa where agriculture's contribution to GDP is rather small (2.2%), the predominant linkage between rural and urban areas is through migration. Migration from rural areas could influence urbanization quantitatively and qualitatively. Migration of skilled workers from rural areas can enhance quality of urban labor force. Migration of unskilled workers can also help to contain the cost of labor in urban areas. Migration on a large scale on the other hand creates pressure on urban housing and services, and adds to urban blight creating popular discontent in the urban areas. Indeed, visibility of urban unemployment and blights in contrast with the invisible benefits of migration for urban population and productivity growth has long prodded policymakers and politicians to seek and enact policies that would curb this migration flow to

² The access to road is defined a principal component of five types of roads within the municipality (kilometers of highways, main roads, secondary roads, streets and others in 2004).

urban areas. In the wake of World Development Report (2009) on economic geography, policy focus has been shifting towards better understanding of migration's role in urbanization and of making cities work better for all residents including new migrants. This shift in attitudes coincided with the arrival of new evidence on the benefits of migration for both sending and receiving regions. A series of recent influential research papers provided convincing evidence that longer term benefits of migration may more than outweigh the shorter-term inconvenience: arrival of migrants leads to adjustments in both labor and housing markets in a way that are beneficial to residents born in urban areas. In the labor market, migration leads to reallocation of workers with migrants taking up relatively lower paid jobs and natives moving into higher paid jobs. In the housing markets, migrants tend to push housing prices up benefitting the native homeowners. Remittances from urban areas on the other hand help those left behind in rural areas. Migration thus plays a powerful role in regional convergence by benefiting both sending and receiving regions.

The role of migration takes on a greater prominence in the context of South Africa where flow of people across areas were severely regulated under the Apartheid regime. As Turok (2012) noted, "a wide range of policy instruments, laws and institutions was used to influence household mobility, including racially discriminatory government controls on people's ability to own land, their ability to settle where they wished, the regulation of employment, and the education and training system." After the demise of Apartheid during mid-1990s, these repressive controls had been withdrawn and migration from rural areas was neither encouraged nor discouraged. With the virtual disappearance of migration restrictions that were instituted under the Apartheid, it was hoped that migration of black africans will lead to higher racial diversity and help to dismantle the legacy of racial segregation in South Africa. It was also hoped that such migration would help to increase density and reduce fragmentation that was too common and too costly in terms of economic and environmental consequences for South African cities. Two decades after the dismantling of Apartheid, the hope appears to have given rise to dismay that not much has happened in terms of melting the legacy of racial segregation within urban areas or improving urban forms that are necessary to unleash and sustain agglomeration forces.

A series of papers examined migration patterns in South Africa since 1950s. Todes(2001), Kok and Collinson (2006), Anderson (2006) and Reed (2013) analyzed migration pattern and urban population growth for different years covering the period from 1950 to 2000. An interesting finding from these studies is that the surge of black migration began during 1980s well before the end of Apartheid and that temporary migration continued to be as strong if not stronger during post-Apartheid period. Posel and Marx (2013) examined determinants of circular migration and related it to intention to return to origin. They find that half of the migrants who identified having another household elsewhere did not want to return to

this household. They conclude that conventional way of defining temporary migrants (those with more than one household) considerably tends to overstate the extent of temporary migration. Camlin, Snow and Hosegood (2014) analyzed the difference between male and female migration pattern.

This report focuses on how migration affects spatial pattern of population distribution in South Africa, extending the period covered to 2011. As already noted above, while patterns of migration have been examined in the context of South Africa, there is a lack of evidence on the factors that motivate people and households to migrate and whether such flow is helping to improve overall spatial pattern of population settlements. In this broader context, this report will focus on three key questions: (i) how pattern of migration spatial distribution of population evolved during the post-Apartheid period; (ii) what factors motivate and help households to migrate (income, provision of infrastructure/services, ethnic and language differences etc.); and (iii) whether social transfers act as a disincentive to migration. The first two questions will be addressed using publicly released 10 percent sample from the population censuses covering the period from 1996 to 2011 and the last one by using National Income Dynamics Surveys. The publicly released population censuses do not provide location information for areas smaller than main places and thus do not allow us to explore within city movement of population. Though three questions addressed in this report are inter-related, their analysis involve different empirical methodology and are thus organized as three different sections.

Section I: Spatial Distribution of Population and Migration

In a spatial equilibrium, distribution of population across areas is determined by locational endowments (such as natural geographical advantages in productivity) and equilibrium prices of factors (wages, rents etc.), goods and services. Migration in these models represents a disequilibrium force that arises due to shocks or changes in the endowments and prices. For instance, a discovery of a gold mine in an area makes that area more attractive in terms of income prospects, instigating reallocation of people across entire spatial spectrum as people start migrating to newly found gold mine. A natural starting point for the analysis of how migration affects urbanization is thus a portrayal of geographic distribution of population.

Historical legacies played an extraordinary role in determining the spatial distribution of population during the colonial and Apartheid periods in South Africa.

The need for cheap labor for mining and industries on the one hand and the desire to keep political control in the hands of the white minority led to convoluted and draconian laws and rules that governed rural to urban migration as well as urbanization of the black africans in South Africa before World War II (Turok, 2012 and references in there). During the post-World War II period, the grand Apartheid laws and regulations were implemented to impose residential segregation among four identified racial groups (whites, black africans, coloreds and Asians). The migration of black africans was strictly controlled through a pass system that allowed black africans to come to cities only to render temporary services/jobs and to leave it after the work was done. The Homelands were created and consolidated in areas which lacked economic opportunities and adequate human and financial resources to provide basic health, education and infrastructure services. The majority black African population were forced to live in these Homelands established under apartheid. Forced resettlements were carried out within the cities itself to clear neighborhoods of disenfranchised people (black africans and coloreds) - those of races other than the designated one and move them to townships designated for them but often in places that were far from economic centers of the cities. These Apartheid laws and regulations had profound influence not only on spatial distribution of population within the country itself but also on the ways cities were organized leading to serious spatial mismatches. To see whether these mismatches were rectified by the population movements during the period after the demise of Apartheid, we first describe the mismatches that are relevant for migration flows.

The data for the description of spatial distribution of population are drawn from the publicly released 10 percent sample of population censuses of 1996, 2001 and 2011. The censuses included geographical details that enabled this work. However, boundary of sub-places, main places, municipalities, and districts have changed from one census to next. Extensive GIS work was conducted to define a common set of location boundaries over the years. Moreover, while aggregated population information is available for 2001 and 2011 census at sub-place level, individual information is not available at this level. This is a major stumbling block in examining the spatial inequality within each metropolitan city. The empirical analysis in this report has been limited to migration between municipalities for which we are able to define common boundary for the three census years. While all three censuses included questions on migration, there are differences in the sets of questions asked especially regarding reasons for migration and origin of the migrants. Similarly, income information was collected using income categories whereas the income cut-offs for each category also changed between the censuses. Using midpoint of each category, we defined a continuous measure of income. For inter year comparison, incomes are deflated using relevant consumer price indices.

Spatial Distribution of Population and Spatial Mismatches

To see how Apartheid may have affected spatial distribution of population in South Africa, we use 1996 census data. Though there was a census in 1991, geographic details of that census are not available (except Cape Town) particularly the data cannot be matched even at the provincial level. Moreover, 1991 census did not collect migration information. Though 1996 was a post-Apartheid year, it was almost an immediate post-Apartheid year as Apartheid was formally dismantled in 1994. In Figure 1, we plotted the distribution of South Africa's population in 1996. Each dot in the map represent 3,000 people. The dots are color-coded also to show the distribution of population of four races: light gray for black african, blue for white, red for colored and green for asian. The dots are randomly distributed within the boundary of magisterial districts to highlight the population density. While other layers such as national parks can be added to the map, it was excluded to reduce clutter. Figure 1 clearly shows that density of population was quite high in many areas which were not urban. When we plot the boundary of former Homelands established under apartheid (highlighted in brown), it is clear that the high density areas outside urban centers are all former Homelands established under apartheid. The legacy of Apartheid is thus quite evident in the distribution of population in 1996. This may be due to the fact that it takes time to adjust to a new equilibrium distribution of population even though Apartheid was not there anymore and that there may be hysteresis and path dependence in the way people move, it is difficult to overcome the consequences of historical events in such a short period.

It was widely believed that since Apartheid forcefully kept different races segregated and black people in rural areas, a massive movement of people - especially black people - will ensue after the demise of Apartheid. To see if that process is in progress, we plotted 2001 population in Figure 2. Population in 2001 appears to be much more scattered compared with that in 1996. Although the density of Homelands established under apartheid is higher, Figure 2 indicates quite substantial movement of people out of Homelands established under apartheid. However, instead of moving to large urban cities, people appear to have moved to places nearer to their origins. This is expected when migration is mostly "push" migration where people move to escape dismal conditions in their origins more than to responding to economic opportunities ("pull" migration). This is also expected when migration is costly in terms of access to information about jobs, travelling and finding a new place to live as well as psychological adjustments.

Figure 1: Distribution of Population, Census 1996

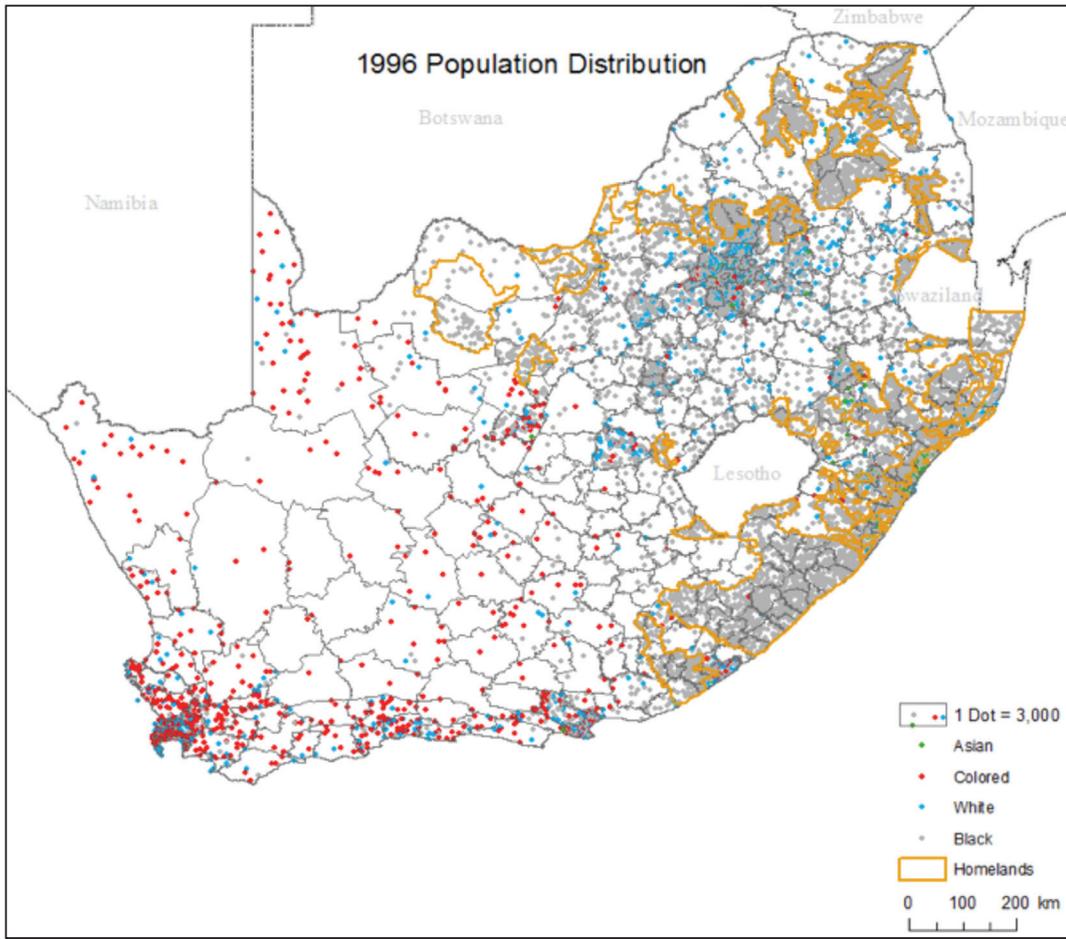
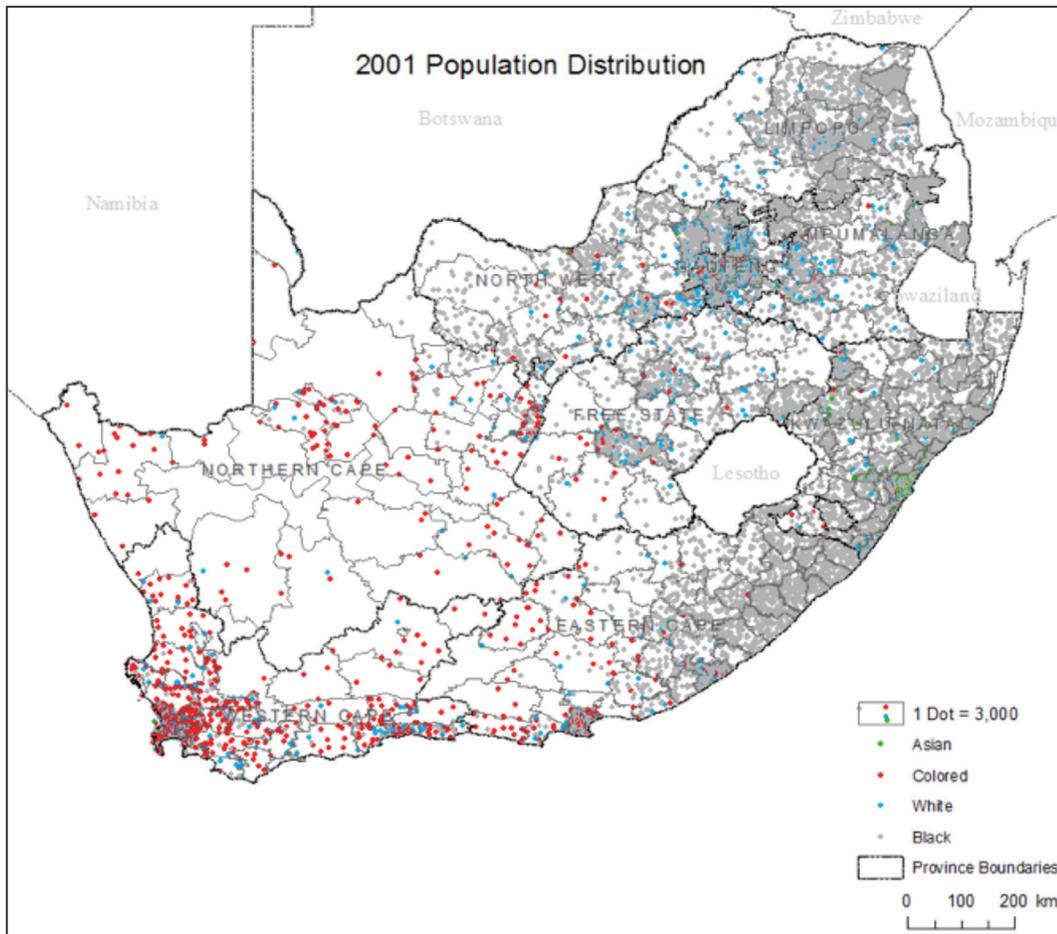


Figure 3 plots the distribution of population in 2011. The boundaries of Homelands established under apartheid are less visible in this map compared with that of 1996 and 2001. More importantly, population appear to be finally coalescing around major urban centers leading

massive expansion of urban areas particularly in Gauteng. Population movements in South Africa in 2011 have started to resemble the trends in other developing countries with rural areas losing and urban areas gaining population.

Figure 2: Distribution of Population, 2001 Census



Though there is encouraging sign of emerging pull migration, the Apartheid rules left many divisions and spatial mismatches, some of which bear special importance with respect to migration and household's location decisions. The first spatial mismatch is already evident in the Figures 1-3 discussed above. In nearly all countries with relatively free labor mobility, *population density decreases steadily as one moves away from urban centers*. This phenomenon is so widely observed around the world that urban areas are often defined in terms of density in cross-country comparisons (WDR, 2009).

This linear relationship between population density and distance to urban centers does not hold in the case of South Africa. Figure 4 plots the major urban areas in South Africa with each city/town identified as a bubble whose size depends on its total population. Comparison of Figures 3 and 4 shows that there is a large swath of country (e.g. Eastern Cape, Limpopo) where population density is high yet there are few cities particularly of larger size. *The "misalignment in density" is perhaps one of the most fundamental spatial mismatch created by the Apartheid.*

Figure 3: Distribution of Population, 2011 Census

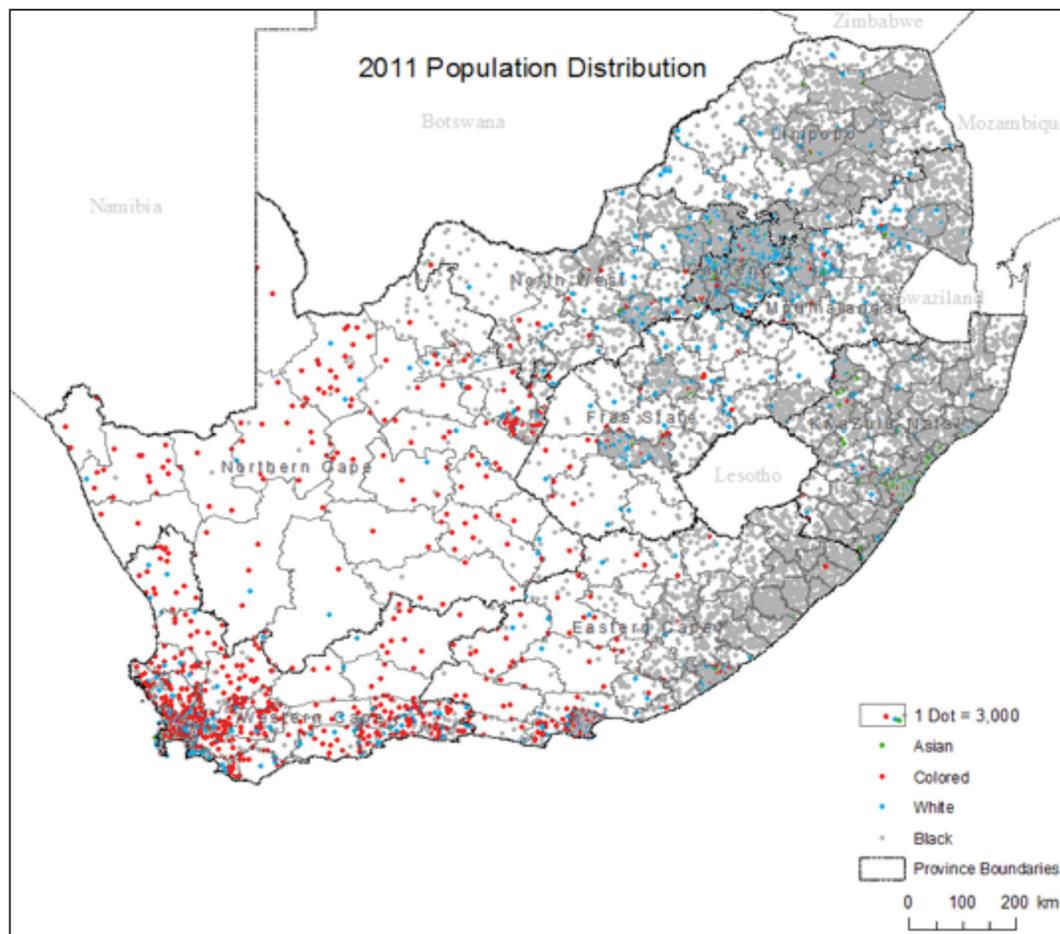
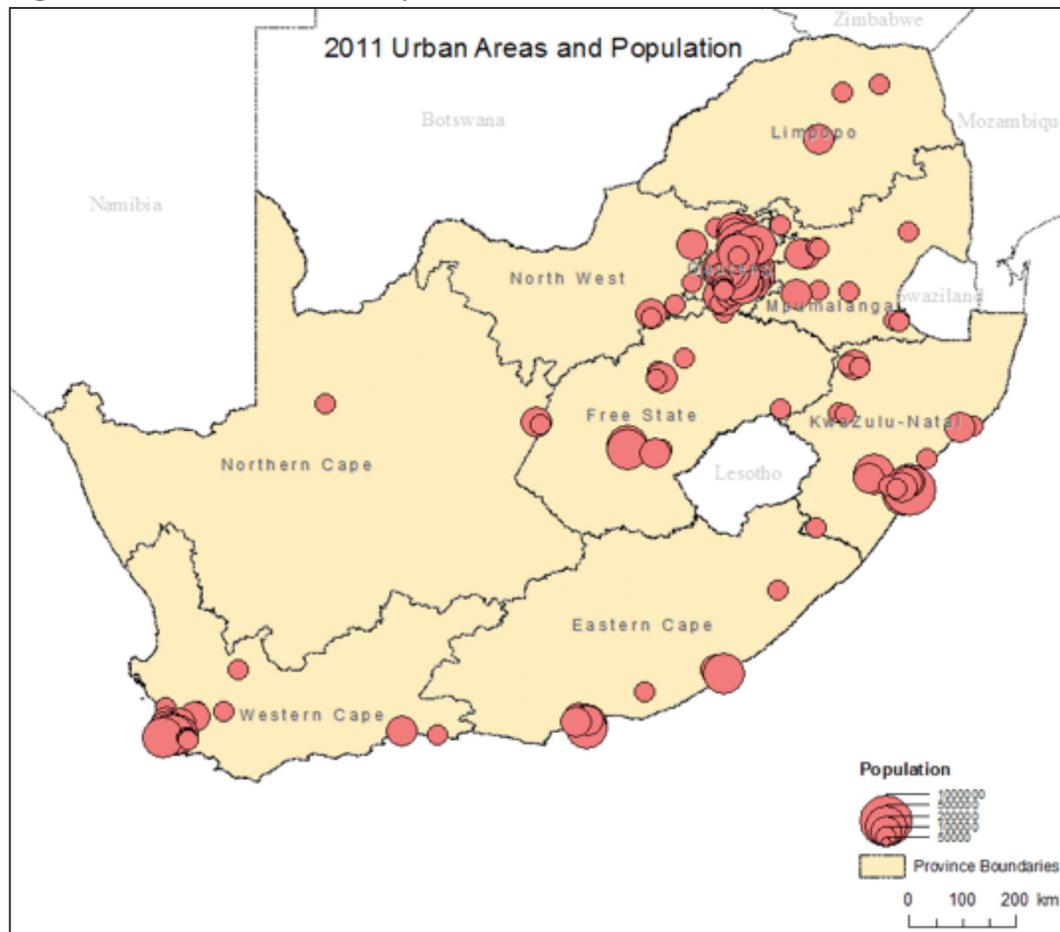


Figure 4: Urban Areas and Population



The higher population density makes it much easier to provide infrastructure and services in urban areas. In a typical developing country, *urban areas have on average better infrastructure and services, resulting in a strong positive correlation between density and access to amenity (housing and other)*. As migrants go predominantly from rural areas to urban areas, migration avails them access to better jobs and better amenities. South Africa is atypical in this regard. As black africans predominates in terms of population share and have faced restricted and regulated

mobility under Apartheid, population density and proportion of Black in population overlaps significantly (Figure 5). Because of the history of lack of provision of basic services in Homelands established under apartheid and Black townships, predominantly Black areas have poor amenities as well (Figure 6 on housing). This produced the second important spatial mismatch in South Africa: *correlation between population density and housing and other amenity was weak and even of opposite sign (Figure 7)*.

Figure 5: Proportion of Population African/Black

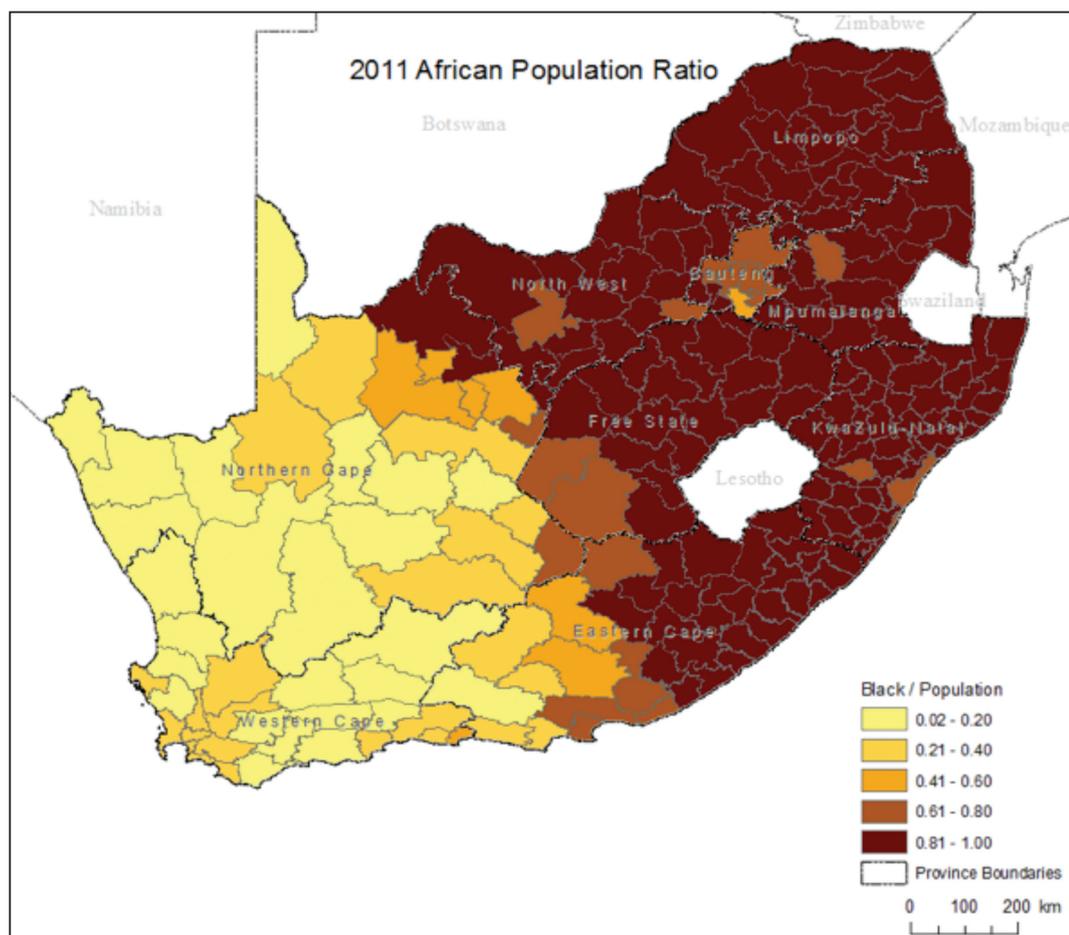


Figure 6: Proportion of Population with Access to Formal Housing

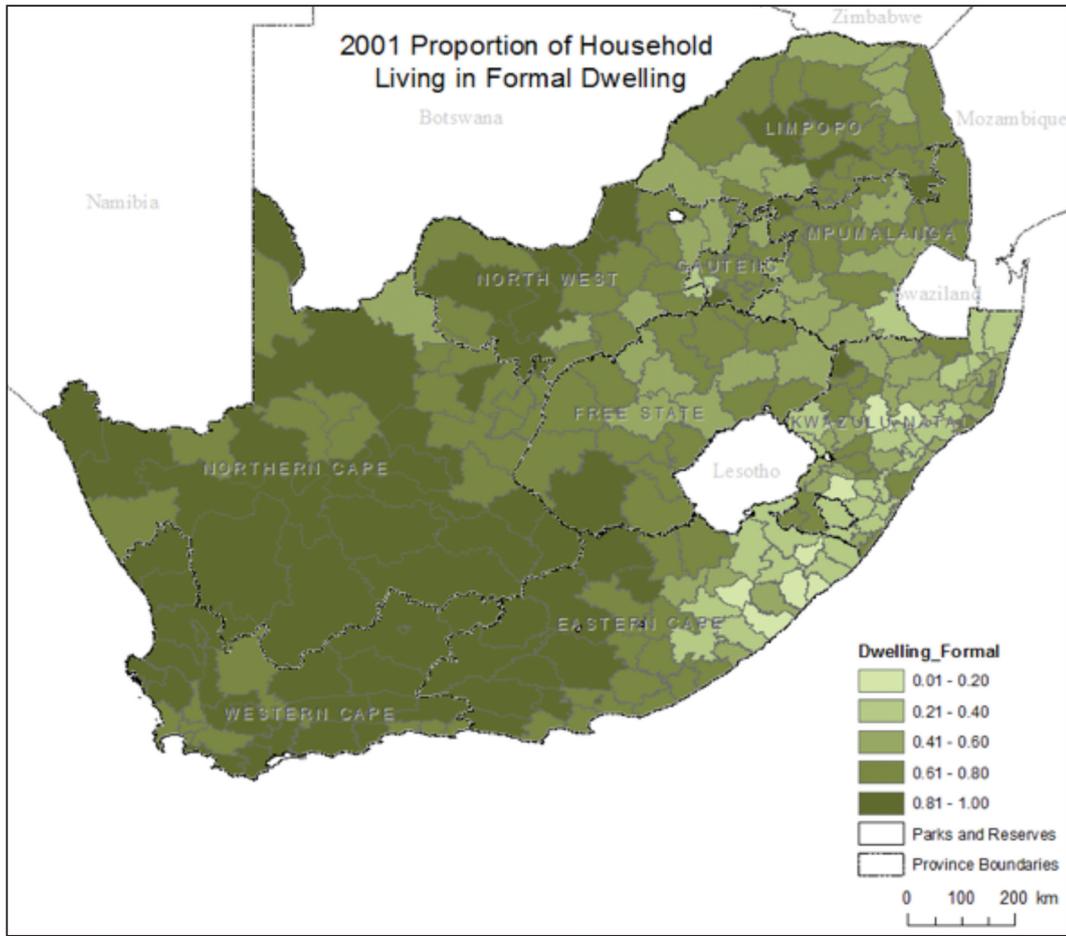
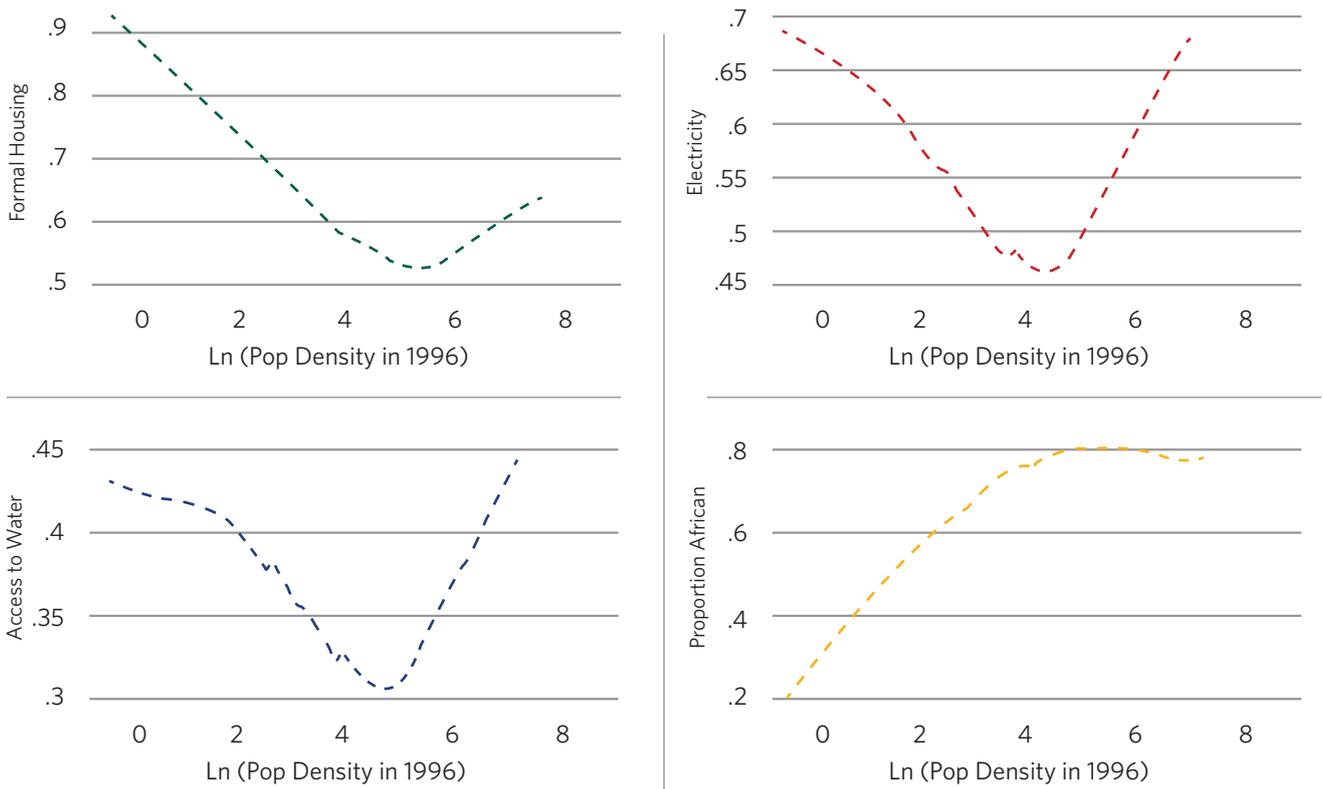


Figure 7: Population Density, Proportion African and Access to Infrastructure and Services

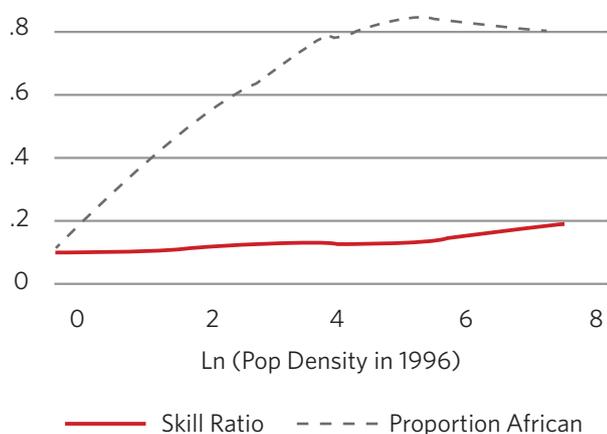
Infrastructure, Services and Population Density 1996



An enduring characteristic of urban areas is that they attract skilled workers. This is true both in developed and developing countries. Concentration of skilled workers is argued to be the fundamental source of agglomeration economies. *Thus, one observes a positive correlation between population density and proportion of skilled/educated workers.* For South Africa, we defined skilled workers as those having secondary or above education and skill ratio is defined as the ratio of skilled over unskilled/semi-skilled (below secondary education). As is clear from Figure 8, there is a weak correlation between the ratio of skilled workers and population density, this leads to third spatial mismatch in South Africa: *“misalignment of density and human capital”*.

Figure 8: Population Density and Ratio of Skilled and Unskilled Workers

Skill Ratio and Population Density 1996



Finally, the spatial mismatch between place of work and place of residence within cities is well documented in the context of South Africa. Because of racial segregation in the place of residence enforced under Apartheid, black and colored townships are often located far from center of economic activities. *This further reinforces the overlap between proportion of black and lack of access to jobs, services and amenities within urban areas.*

The mismatches between population density and access to jobs and services have important implication for households' location choice and migration. On the one hand, the existing spatial imbalances portends vigorous movement of people in the coming years. On the other hand, they make it difficult to value provision of amenities and services using a standard household location choice model which relies on the assumptions of availability of adequate choices and absence of certain constraints (e.g. credit, skill) that are likely to be important for South Africa. Before we discuss the location choices in more detail, we provide evidence on migration flows as well as migrants' characteristics in the following subsection.

Migration Trends and Migrants Characteristics

We utilize data from three censuses to compare migration rates overtime. The census questions for collecting migration information were different among all three censuses. To ensure comparability, we focus on migrants who moved into his/her new residence during the last five years of the censuses and above the age of 5. The overall migration rate was 26.4 percent in 1996, dipped to 13.8 percent in 2001 and then rose to 16.4 percent in 2011. There are differences in the migration rates among different racial groups (Figure 9a). Migration rate among black africans³ is by far the slowest, and among whites the highest. About 48 percent of whites moved during 1991-1996 period while the rate came down to 30 percent during 2006-2011. As a result of slower migration rate among black africans, their share in total migrant population is about 71 percent compared with their population share of 80 percent in 2011 (Figure 9b).

³ Black African and Black can be interchangeable.

Figure 9a: Migration Rates among Population Groups

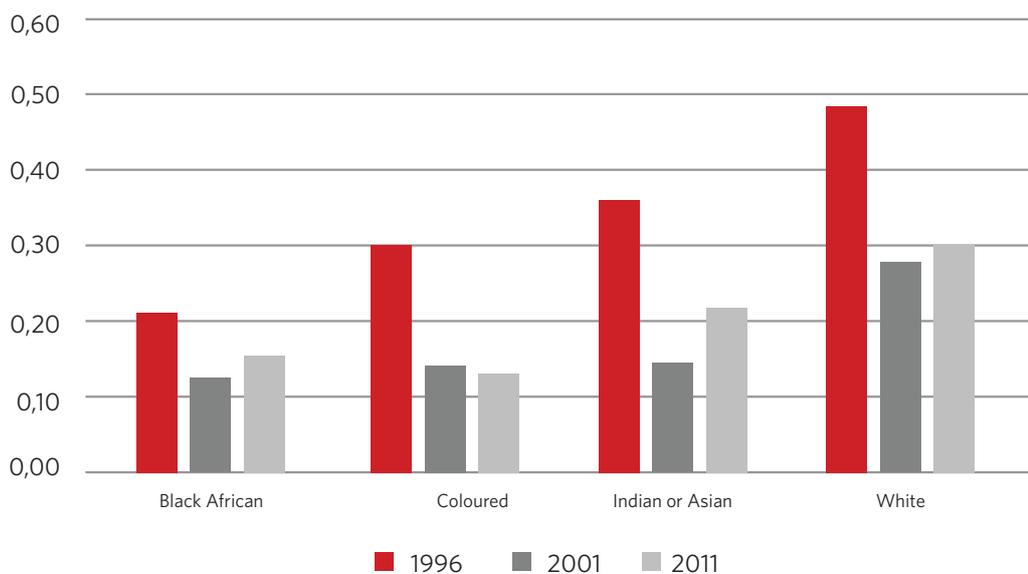
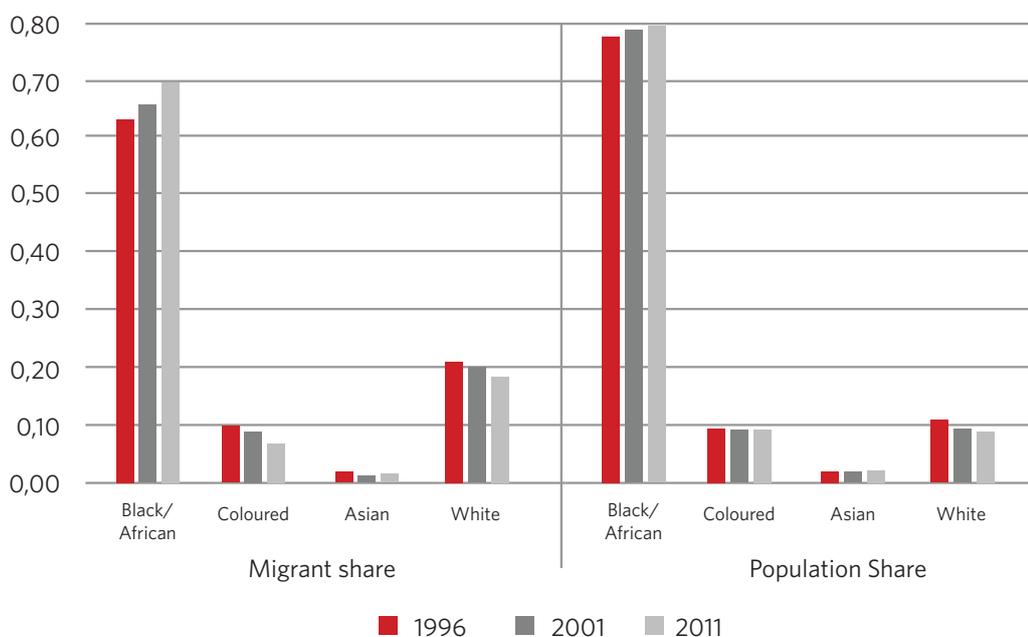


Figure 9b: Racial Composition of Migrants and Population



How does migration rate in South Africa compare with other countries? Population in the USA is amongst the most mobile in the world. We compare the migration rates observed in South Africa with that of USA. A direct comparison could be somewhat misleading because migration rates vary over the life cycle of the migrants and thus depend on the age and demographic composition of population. Migration rates vary by education levels as well with more educated tend to be more mobile than less educated. Migration rates among racial groups vary even when there is no formal or informal migration barriers. For instance, migration rates among hispanics and blacks are lower than whites in USA. This is partly due to skill and age differences among racial groups but may also arise when different races face different degrees of racial discrimination in the labor, credit/mortgage and housing markets. The migration rates in South Africa even

in 2011 is likely to be influenced by historical Apartheid because older generations were exposed to Apartheid restrictions that shaped their migration behavior. Because of these reasons, the safest comparison is between whites in both countries since they likely faced little frictions in their movement to opportunity. The counties in USA are comparable to municipalities in South Africa. We distinguish between intra- and intercounty/municipality migration. Apart from the significant increase in migration during 1991-96 period, the inter-municipality migration rates in for whites in South Africa are nearly indistinguishable from that in USA (Figure 10a). In contrast, within municipality movement is much lower in South Africa. This could be because USA has a vibrant housing markets whereas Apartheid legacy of segregated and fragmented housing markets within municipalities are still alive and well in South Africa.

For the sake of completeness, we also compared migration rates of black africans between the two countries. The intra-municipality migration rate for black africans in South Africa is about half or smaller than that in USA but the difference between inter-municipality migration rates are much smaller (9 vs. 12 percent). The slower migration

among black africans - as discussed above - can be an indication of Apartheid's negative effects especially among older black africans. It could also be due to greater barriers still faced by black South Africans.

Figure 10a: Migration Rates Comparoson: South Africa vs. USA

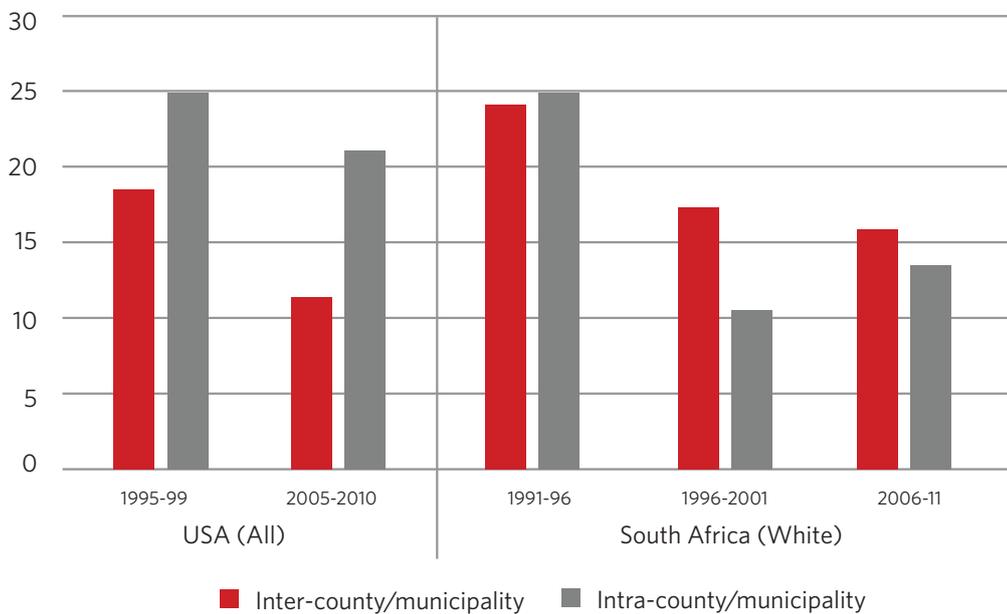
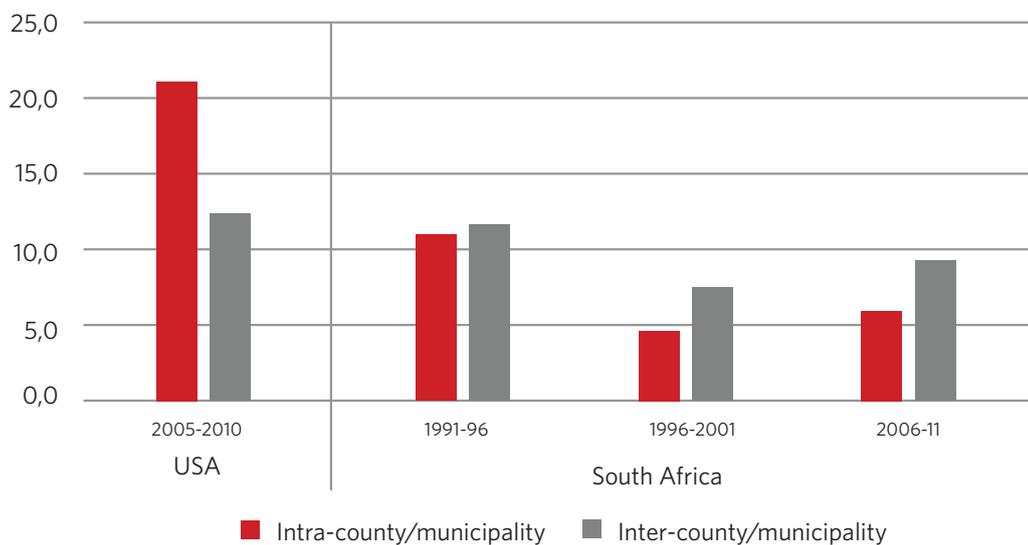


Figure 10b: Migration Rates for Blacks: USA vs. South Africa



The Apartheid rules also created numerous split households among black africans where adult male members may have gone to work in cities and other areas while rest of the family lived in homelands established under apartheid or native townships. Because of such large incidence of split households, it is expected that a significant fraction of those migrated did so to reunite with their respective family. Moreover, the older generations were exposed to Apartheid which may have shaped their migration behavior already. To focus better on recent work migrants, we restricted our sample to household heads belonging to the age group 20 to 35 year. This is usually the most mobile of population.

Figure 11a shows the total migration rates among these young adult household heads overtime. According to 1996 census, nearly half of South Africa's young adult

Black population moved during 1991-1996. The rates were even higher reaching up to 80 percent among whites. The migration rate slowed down somewhat during the early 2000. It appears to have settled down to 32-37 percent among black africans and coloreds and 57-63 percent among asians and whites respectively during 2006-2011. These rates are much higher than the rates for overall population discussed above (Figure 9a). For the same age group, migration rate in USA was about 50 percent and there was no difference between whites and black africans in overall migration rates (not shown in graph).

We have already shown that intra-municipality migration rate is much lower in South Africa, however, when comparing inter-municipality migration, the migration rate among black africans in South Africa is higher than that in USA (24 vs. 18 percent) (Figure 11b).

Figure 11a: Migration Rates of Young Adult Household Heads by Race in South Africa

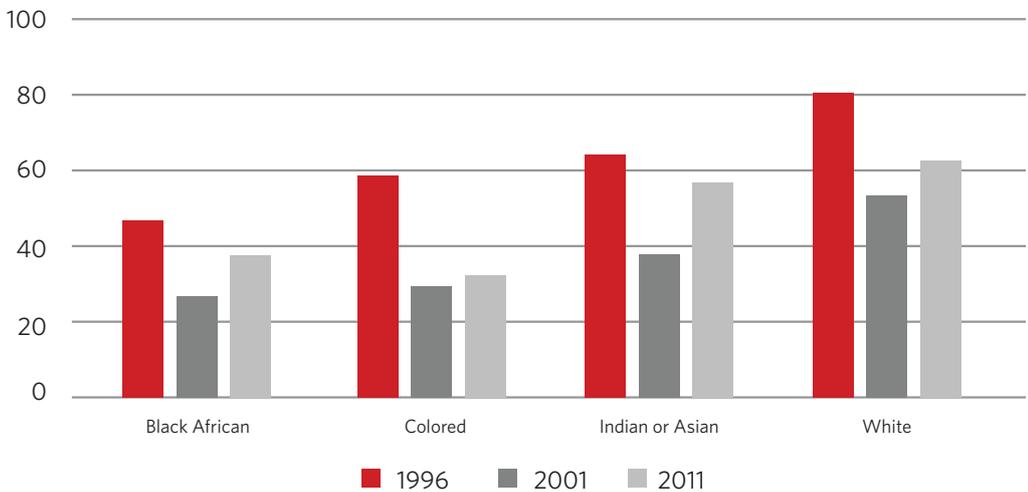
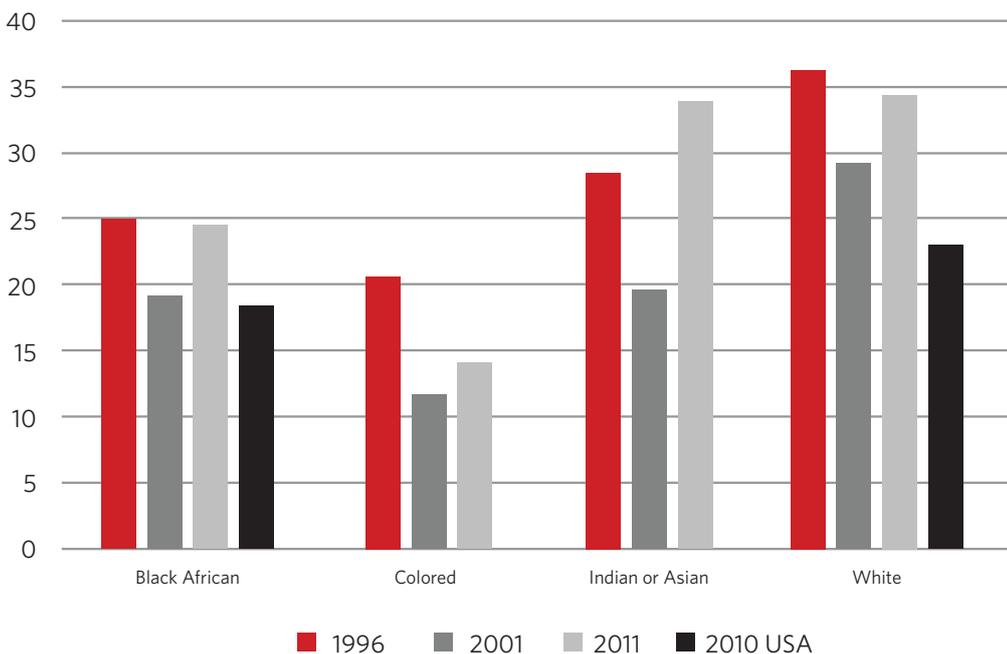


Figure 11b: Inter-Municipality Migration rates by race in South Africa and USA



No matter what types of migration we consider, migration rates among black africans and coloreds are smaller than that of Asians and whites. The slower migration among black africans and coloreds tends to suggest presence of barriers for these groups compared with whites and Asians. Those barriers may emanate from the fact that black africans and coloreds are poorer and have fewer skills due to myriad of restrictions placed on them historically. To check if migration rates vary by education levels, we defined two groups: skilled who have education secondary or above and unskilled/semi-skilled who have education below secondary level. To reduce clutter, we compare black africans and whites. Regardless of race, overall migration rates for unskilled/semi-skilled young adults are much smaller compared with skilled household

heads (Figure 12a). However, migration rates of black africans are not only lower than whites at the same skill level, migration rates of skilled black africans are smaller than that of unskilled/semi-skilled whites. The differences in the rates are less pronounced if we consider inter-municipality migration rates, even then migration rate of skilled Black is about 22.5 percent compared with 31.5 percent for unskilled/semi-skilled whites. Slower intra-municipality migration among black africans indicates presence of barriers in the housing markets. While having more education certainly helps in moving to opportunities, even skilled black africans appear to face some important frictions in migration. On the positive side, inter-municipality migration even among unskilled black africans appear to be quite high by international standards.

Figure 12a: Migration Rates among Skilled and Unskilled Whites and Blacks

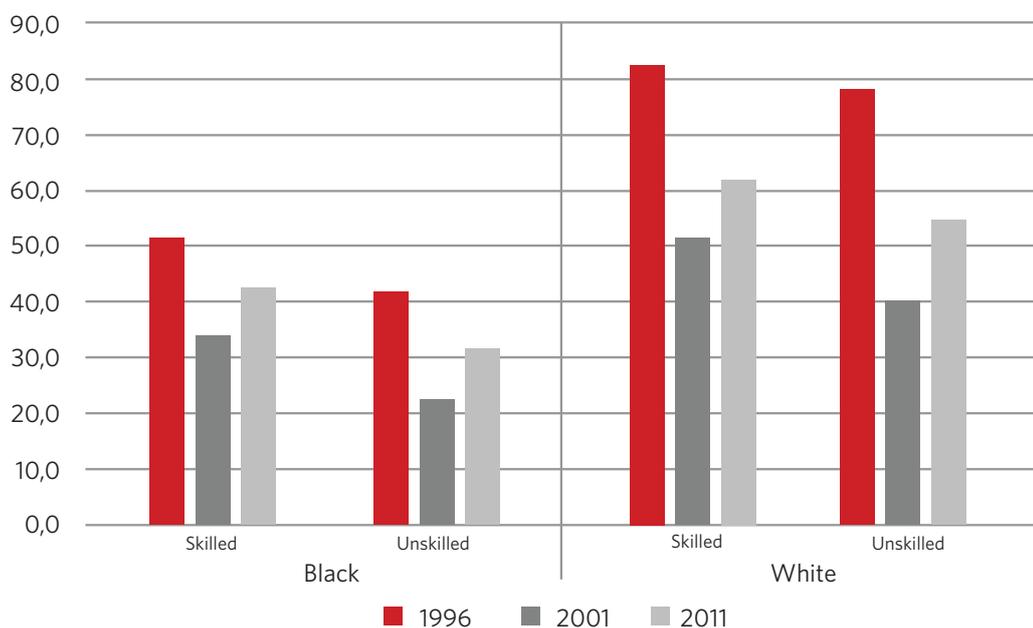
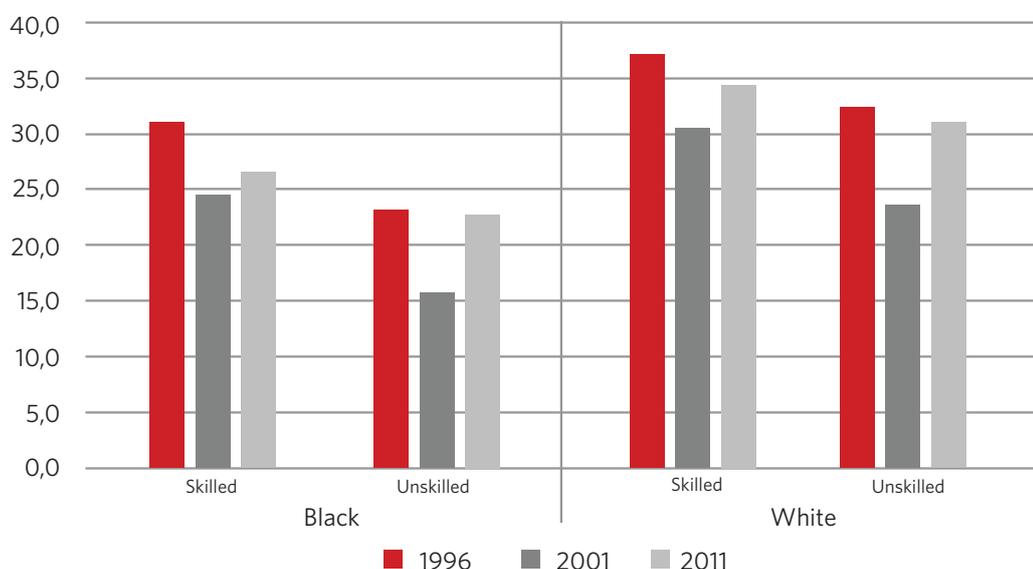


Figure 12b: Inter-Municipality Migration Rates by race and skill levels



Characteristics of Migrants and Non-migrants

A key finding of the vast migration literature is that migrants are not random selection from the population. Migrants are usually selected individuals who tend to be more educated and enterprising compared with the population at their origin. To check this, we compare the characteristics of migrants and natives using data from all three censuses (Table 1). The unskilled in Table 1 are defined as those who have education below primary level and semi-skilled are those with education level in the range between primary and secondary. Consistent with international evidence, migrants tend to be more educated than natives regardless of racial group or year. The evidence in Table 1 also shows that migrants tend to earn higher income than natives as well.

In 1996, more than half of the black africans (55%) had below primary education, the share fell to 36 percent by 2011. Among the Black young migrants, only 10 percent had education above secondary level in 1996 which rose to 25 percent in 2011. Similar progresses in educational attainments of both natives and migrants are evident for all other racial groups as well though more than half of the whites (57%) had above secondary education even in 1996. In 2011, majority of African migrants are semi/unskilled (58%) compared with whites (29%) and Asians (34%). This is despite impressive improvement in educational attainments of black migrants. In terms of income, all migrants experienced an increase in income as native black africans, coloreds and Asians. For native whites, incomes appear to have declined.

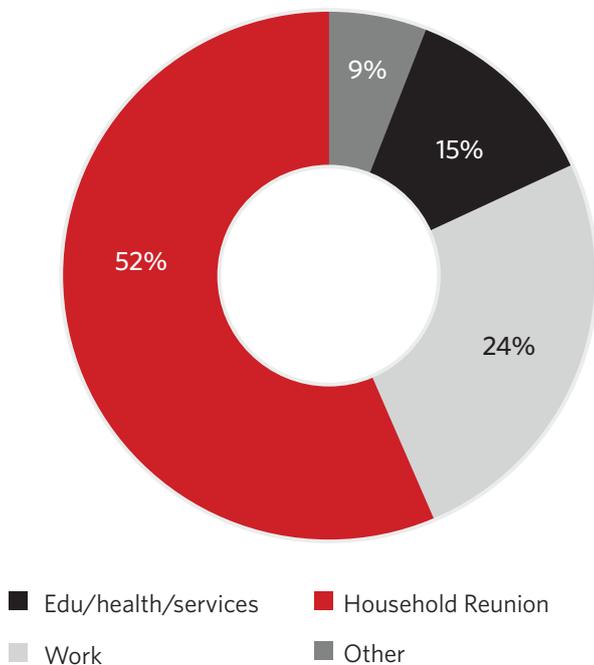
Table 1: Characteristics of Population and Migrants

	Population			Migrants		
	1996	2001	2011	1996	2001	2011
African/Black						
Unskilled (Below primary education)	0.55	0.51	0.36	0.45	0.37	0.16
Semiskilled (Primary but some secondary)	0.35	0.34	0.39	0.41	0.39	0.42
Skilled (secondary or above)	0.10	0.14	0.25	0.14	0.25	0.42
Income (Rand, monthly deflated)	3713	4178	5775	3812	4781	7051
Migration rate (proportion of population)	0.22	0.12	0.15			
Colored						
Unskilled (Below primary education)	0.43	0.39	0.31	0.41	0.35	0.17
Semiskilled (Primary but some secondary)	0.45	0.44	0.45	0.44	0.41	0.43
Skilled (secondary or above)	0.12	0.17	0.24	0.16	0.23	0.40
Income (Rand, monthly deflated)	4841	5594	7103	5189	7208	10015
Migration rate (proportion of population)	0.30	0.14	0.13			
Asian						
Unskilled (Below primary education)	0.27	0.23	0.19	0.24	0.19	0.10
Semiskilled (Primary but some secondary)	0.41	0.38	0.3	0.38	0.29	0.24
Skilled (secondary or above)	0.32	0.39	0.5	0.38	0.53	0.66
Income (Rand, monthly deflated)	8604	11774	15362	9348	15685	18211
Migration rate (proportion of population)	0.35	0.14	0.21			
White						
Unskilled (Below primary education)	0.15	0.14	0.13	0.14	0.14	0.07
Semiskilled (Primary but some secondary)	0.32	0.29	0.23	0.29	0.25	0.22
Skilled (secondary or above)	0.53	0.56	0.64	0.57	0.61	0.72
Income (Rand, monthly deflated)	15124	22667	22426	14715	22796	22302
Migration rate (proportion of population)	0.48	0.28	0.30			

Reasons for Migration

As mentioned earlier, during Apartheid, black africans and coloreds were allowed in the cities mostly as transient workers. As a consequence, South Africa has a high incidence of split households where household members scattered around geographically. A major fraction of the population movement immediately after the demise of Apartheid is expected to be due to household reunification. The censuses did not have complete information on the reasons for migration and so this hypothesis cannot be checked directly. We used data from the Community Survey 2016 which collected information on reasons for migration. Figure 13 shows that family reunification is indeed the predominant reason for migration with 52 percent of migrants moving to join the family. Another 25 percent migrate for work, and 15 percent for health, education and other service related reasons.

Figure 13: Reasons for migration



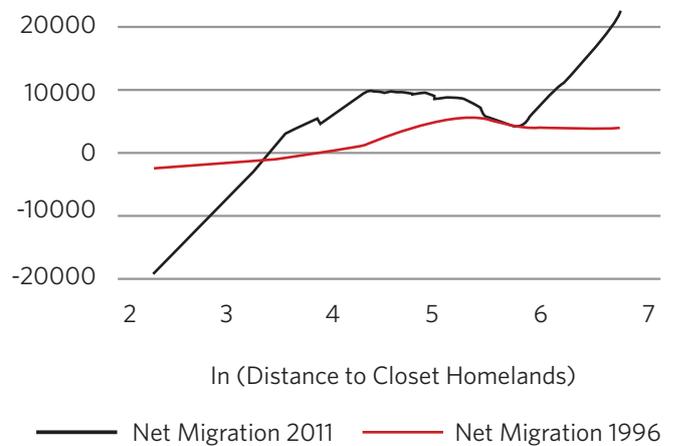
Net migration

The spatial distribution of population in South Africa (Figures 1-4) clearly shows disconnect between population density and urbanization as Apartheid created Homelands established under apartheid for black africans with high population density but little economic opportunities. After the dismantling of Apartheid, one would expect significant outflow of people from Homelands established under apartheid. We plot net migration (difference between in-migrants and out-migrants) against distance to homelands established under apartheid in Figure 14. The net outmigration rates from areas near Homelands established under apartheid were modest in 1996 and there was little evidence of massive inflow in high density urban cities (at the right hand side of the horizontal axis in the Figure). This is

consistent with the population distribution map in Figure 2. Though people moved in great numbers in the second half of 1990s, they did not travel far. However, by 2011, the large urban areas far from Homelands established under apartheid experienced substantial net positive migration whereas homelands established under apartheid saw significant outmigration. Peak is at distance that is the average distance between homelands established under apartheid and Gauteng area. The uptick in the line for 2011 is due to Cape Town which is not near any homelands established under apartheid.

Figure 14: Net Migration and Distance to Homelands

Net Migration and Distance to Homelands

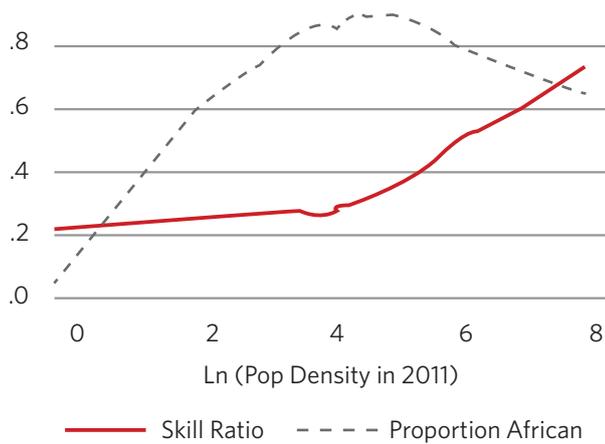


Migration and Urbanization

The migration trends and patterns discussed above show that migration rates are picking up in South Africa, and that more educated are more likely to migrate, and that direction of migration is consistent with what one would expect given the spatial mismatch created by colonial and Apartheid regimes. How does this migration flows affect urbanization process? We noted that the correlation between population density and proportion of skilled population was weak in 1996 (Figure 8). We plotted the same relationship for 2011 in Figure 15. Note that proportion of black africans are highest in the Homelands established under apartheid which is in the middle range of population density in Figure 15. Encouragingly, it is evident that proportion of skilled in the population appears to be positively correlated (upward sloping) at least for the larger cities which are again at the right hand side of horizontal axis. People are not only on the move but migration appears to be bringing South African spatial distribution of population closer to that observed in other countries. Given the spatial mismatches, we expect high migration in South Africa not only in the past but also in coming years and such migration is likely to reinforce urbanization.

Figure 15: Migration and Skill Ratio

Skill Ratio and Population Density 2011

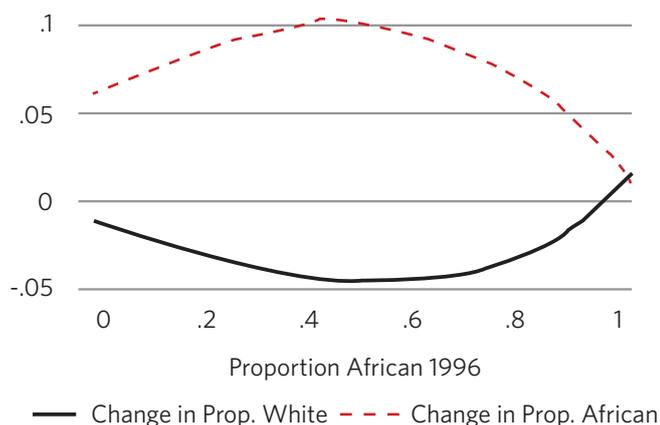


Migration and Racial Diversity

The evidence presented so far clearly indicates a mobile population seeking for better opportunities. The net outmigration from Homelands established under apartheid to urban areas should improve racial diversity in South Africa unless black africans are migrating predominantly to Black municipalities and vice versa. To see if there is any indication of racial convergence, we plot change in share of black africans, and of whites against share of black africans in 1996 in Figure 16. Figure 16 shows clear evidence of convergence: share of black africans in population is growing at a much faster rate in non-African majority areas. Share of whites on the other hand is declining everywhere but it is declining at a much slower rate in Black majority areas. While racial segregation within cities may have remained largely intact, the municipality level analysis shows that migration during the last decade and a half is leading to increasing racial diversity at the municipality level.

Figure 16: Migration and Population Growth by Races

Change in Race Ratios 1996-2011 and Prop. African 1996



Summary

Analysis of census data indicates that inter-municipality migration rates in South Africa is high among young adults. There are differences across racial groups in migration with much lower migration rates among black africans and coloreds compared with whites and Asians. Evidence suggests that though within municipality moving is quite low for all different racial groups, it is especially low for black africans. The slower intra-municipality indicates presence of frictions in the housing markets. Consistent with international evidence, migrants are positively selected in terms of education levels and tend to earn more than natives as well. Though family reunification is the predominant reason behind migration, migration for work is also substantial. Areas close to Homelands established under apartheid are experiencing net outmigration and areas in and around urban areas are gaining net migrants. The migration flow is contributing to reducing the spatial mismatch and to urbanization by augmenting skill formation in urban areas, and by improving racial diversity. The evidence also indicates that black africans and coloreds who are far behind in terms skills and education are relatively less mobile than whites or Asians. Because black africans and coloreds tend to live in areas that lack economic opportunities, one would expect these groups to have higher migration rates particularly during post-Apartheid periods. In the next section, we examine households' location decisions to find out what factors explain slower migration rates particularly among black africans.

Section II: Determinants of Location Choice of Households

The spatial mismatches in South Africa are inducing people to move. In the vast literature on both internal and international migration, income difference between the origin and the destination is taken as the primary factor driving migration (Greenwood (1975); Borjas (1994); Lall, Selod and Shalizi (2006)). Along with income, recent literature has also highlighted the importance of migration costs as well as migrants' networks in determining migration flows. In the case of developed countries, local amenities are found to influence migration, though such evidence for developing countries is only emerging (Lall, Timmins and Yue (2009); Fafchamps and Shilpi (2013)). This issue is however important in developing countries where amenities are largely determined by provision of public goods which in turn varies widely across areas. In a Tiebout (1956) sorting model, such disparity in the provision of public goods such as roads, electricity, schools, hospitals, etc. should induce people to "vote with their feet" and to migrate to areas with better access to these infrastructures and services.

From a policy perspective, it is important to know how migrants respond to the provision of public goods for a number of reasons. As already noted, there are stark spatial differences in living standards and provisions of public goods particularly during the Apartheid. If migrants do respond to income as well as provision of public infrastructure and services, then migration can act as a powerful instrument in mitigating regional differences in welfare during the post-Apartheid period. Second, as households/workers vote with their feet, their location choices reveal desirability of different areas as places of work and residence. An examination of households' location choices helps us to learn about what motivate them to move, what they value in terms of city amenity, and what barriers they face in moving. Given neighborhood/area characteristics, the revealed preferences of the households and individuals show how density within a neighborhood/area is expected to evolve overtime: areas with desirable characteristics (e.g. better access to jobs or services or schools) can expect to grow. The willingness to pay for different amenities can in turn help prioritizing public investment in their provision.

In this section, we describe a simple discrete choice model of migrant's destination choice, and estimate the model using 2011 census data. The estimation of destination choice model sheds light on the factors that help or hinder migration behavior. The estimates are then used to compute the willingness to pay for different infrastructure and services. The estimation is done separately for skilled and unskilled/semi-skilled Black household heads. The whites faced few frictions and restrictions in moving to opportunities either during or post- Apartheid periods and is thus used as a benchmark. The destinations that coloreds or Asians/Indians travel to are much fewer in numbers leading to convergence problems in the estimation of discrete choice model. Because migration behavior of coloreds is similar to black africans, and Asians/Indians to whites, we do not carry out estimation for these two groups separately.

A Model of Location Choice by Migrants

We start from a simple model of migration choice where an individual household head makes a utility maximizing migration decision among multiple destinations within the country.⁴ Individual h in her place of residence s decides whether to stay at s or to migrate to any of $i \in I = \{1, \dots, N\}$. Let utility of individual h in location i be denoted U_{si}^h . Following the literature, we assume that utility U_{si}^h is a function of the income y_i^h (or wages) that the individual can achieve in location i and a vector of location-specific characteristics/amenities A_i (Bayoh, Irwin and Haab, 2006). The utility from migrating to a given destination i depends on the migrant's utility from income and amenities $U_{si}^h(y_i^h, A_i)$ and on the costs C_{si}^h of moving from

s to i . The cost term C_{si}^h captures the physical distance between origin and destination. It also reflects costs incurred by individuals due to social distances (e.g. cultural, ethnic and language differences) between the origin and destination. The expected permanent income of individual h in destination i is the average income y_i . The expected utility in the destination depends also on the services and amenities available there. This is important particularly for internal migration where individuals and households may move not only to capture income gain but also to avail themselves of better services and amenities -- for instance better schools or health services -- at the destination.

Following the standard migration literature, we assume that utility from locating in i can be expressed as:

$$U_{si}^h = \alpha y_i^h + \beta A_i - \gamma C_{si}^h + \xi_i + \mu_{si}^h \quad (1)$$

where $\alpha, \beta, \gamma > 0$ are parameters. The individual specific term μ_{si}^h denotes the idiosyncratic parts of the utility and cost associated with migration by individual h . ξ_i is the unobserved location characteristics. Collecting the location specific terms, equation (1) can be rewritten as:

$$U_{si}^h = \theta_i + \alpha y_i^h - \gamma C_{si}^h + \mu_{si}^h \quad (2)$$

$$\theta_i = \beta A_i + \xi_i \quad (3)$$

Where θ_i is the mean utility level enjoyed by all migrants who chose i as their destination. Assuming $\mu_{si}^h \sim \text{iid}$ Type I Extreme Value distribution, the probability that individual h chooses a location i as a destination can be expressed as:

$$P(U_{si}^h \geq U_{sl}^h, \forall l \neq i) = \frac{\exp(\theta_i + \alpha y_i - \gamma C_{si})}{\sum_{l=1}^N \exp(\theta_l + \alpha y_l - \gamma C_{sl})} \quad (4)$$

Assuming H as the total population, it follows from equation (4) that:

$$\text{pop}_i = \sum_{h=1}^H P(U_{si}^h \geq U_{sl}^h, \forall l \neq i)$$

Which in equilibrium should be equal to observed population in location i (pop_i). For the estimation, we follow a two-step procedure suggested by Bayer and Timmins (2007) and Lall et. al (2009). At the first stage, parameters α, γ and $\theta_1, \theta_2, \dots, \theta_N$ are estimated using a maximum likelihood procedure suggested by Berry, Levinsohn and Pakes ((1995). At the second stage, estimates of θ_i are then decomposed into location specific determinants using the specification in equation (3).

⁴ Because we focus on the migration decisions of household heads in the empirical section, individual and household can be used interchangeably in the model.

Data and Estimation Strategy

The destination choice of household heads model is estimated using census 2011 individual level data. The census asked each individual if he/she was living in the current residence since 2001 and if not when he/she moved into the current residence. We utilize this information to determine migration status of the household head. We restrict sample to 20-35 year old household heads who participated in the labor force. This age cohort of young adults is one of the most mobile in any country. Because of life cycle decisions, those older than 35 years tend to be less mobile (“more settled”) and in the context of South Africa, might have made their location decisions during the Apartheid period. Those in the age group (20-35) have mostly completed schooling and comprise bulk of job seekers and young workers during the post-Apartheid period.

The lowest level of geographical unit identified in the 2011 census is main place. Because we also use earlier censuses to define some of the explanatory variables in the regressions, the lowest administrative level that can be matched across censuses is municipality. The migration destinations are 234 municipalities in 2011 census. The first stage estimation requires specification of outside option which is defined as “not moving” in our context. Note that a large number of municipalities have relatively high population density though they receive few in-migrants (e.g. municipalities in former homelands established under apartheid). Inclusion of these municipalities in the estimation causes convergence problems. It may also lead to confusing inference about the willingness to pay for different services due to the spatial mismatch between population density and service provision. For these reasons, we drop municipalities

which received less than 0.1 percent of all migrants. We also drop household heads who are unemployed because income information of the latter groups is missing. Our final sample consists of 173,396 household heads in 106 municipalities which account for 90 percent of all employed household heads in this age group. Among these household heads, 84,178 are non-migrants and 89,218 are migrants.

Census collected information on income for each employed individual at their current residence. Estimation of the first stage regression also requires income that a household head can expect to earn in alternative destinations. We estimate the counterfactual average incomes by estimating the following regression for each municipality:

$$y_{ij} = \eta_i Z_j + v_{ij}$$

Where Z_j is a vector of characteristics of individual j and v_{ij} is the idiosyncratic residual term. We estimated η_i parameter for each location i . The vector of individual characteristics include age, gender, marital status, education/skill level and race. The mean of estimates and their standard errors are reported in Table 2. As expected, age and male dummy has positive and statistically significant coefficients. While White earns a significant positive premium, black africans face significant negative penalty. Semi-skilled workers receive a slight premium over unskilled but premium for skilled (above secondary) worker is substantially high. We use the estimated income regressions to compute the expected incomes for workers of certain gender, age, skill and race for all different locations. These incomes are then used as explanatory variables in the first stage regressions.

Table 2: Coefficients of Income Estimations

	Ln (Age)	Male	Married	African	White	Semi-Skilled	Skilled
Coef.	0.851	0.241	0.083	-0.438	0.709	0.163	0.953
Std. Deviation	0.029	0.010	0.009	0.026	0.034	0.016	0.016
No. of Municipalities	106	106	106	106	106	106	106

The first stage regression as specified in equation 4 requires controls for physical distance between origin and all possible destinations. These distances are computed using GIS software as crow-fly distances. Apart from physical distances, individual’s migration decision can

be influenced by social distances where social distance can arise from difference in languages, and ethnicity. We computed an index of linguistic distance which measures the difference in share of people speaking the same primary language as the migrant between municipalities.

Determinants of Migrants' Destination Choice: First Stage Regression

We estimated the first stage regressions using Maximum Likelihood procedure separately for unskilled/semi-skilled black africans, skilled black africans and whites. The results are reported in Table 3. As expected, income appears to be a statistically significant predictor of migration decisions for all skilled household heads and whites. For unskilled/semi-skilled black africans, income coefficient is small though statistically significant. For all different groups, both physical and linguistic distances have the correct negative sign and coefficients are highly statistically significant. The physical distance matters most for unskilled black africans, implying that these migrants are unlikely to travel far from their origins. This could be due to credit constraint which restrict their

ability to travel far and to gather information about jobs in far-away places.

The first stage regressions produced estimates of mean utility of each destination. Using the mean utility estimates, we rank the top 15 destinations for all different types of household heads which are reported in Table 4. City of Cape Town is the most coveted destination by all different groups. For other municipalities, the precise ranking depends on household head type - unskilled or skilled black africans, whites and coloreds. Remarkably, top 15 choices are nearly the same municipalities despite slight differences in the rankings. Interestingly, nearly all of these choices are located either in Western Cape or in Gauteng regions. The cities in Western Cape and Gauteng regions are not only the main metropolitan cities in South Africa, they grew at a much faster pace during last decade, and if migration trend is any indication, then they will probably continue to grow in the coming years. Thus, these cities will perhaps need to pay more attention to provision of housing, infrastructure and services in future.

Table 3: Coefficients of First Stage Estimations

		Unskilled/ Semi-Skilled African	Skilled African	White
Predicted Income	Coef.	0.051	0.548	1.486
	Std. Deviation.	0.014	0.016	0.027
Distance	Coef.	-0.013	-0.009	-0.005
	Std. Deviation	2.23E-05	1.69E-05	1.66E-05
Linguistic Distance	Coef.	-4.956	-4.797	-8.788
	Std. Deviation	0.013	0.011	0.042

Table 4: Top 15 Municipalities ranked by mean utility of migrants

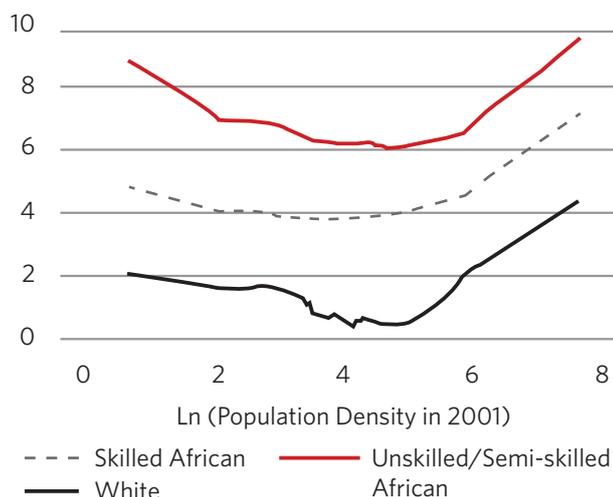
Skilled Black		Unskilled/Semi-skilled Black		White	
Municipality	Province	Municipality	Province	Municipality	Province
City of Cape Town	WC	City of Cape Town	WC	City of Cape Town	WC
City of Johannesburg	GT	Witzenberg	WC	City of Tshwane	GT
Ekurhuleni	GT	Saldanha Bay	WC	Nelson Mandela Bay	EC
City of Tshwane	GT	Kai !Garib	NC	Ekurhuleni	GT
Saldanha Bay	WC	Stellenbosch	WC	Stellenbosch	WC
Overstrand	WC	Theewaterskloof	WC	City of Johannesburg	GT
Stellenbosch	WC	Drakenstein	WC	Mangaung	FS
Witzenberg	WC	Overstrand	WC	Overstrand	WC
Kai !Garib	NC	Swartland	WC	George	WC
Drakenstein	WC	Bergrivier	WC	eThekwini	KZN
Rustenburg	NW	Breede Valley	WC	Drakenstein	WC
Swartland	WC	City of Johannesburg	GT	Buffalo City	EC
Theewaterskloof	WC	Ekurhuleni	GT	Swartland	WC
Breede Valley	WC	City of Tshwane	GT	Mossel Bay	WC
Emfuleni	GT	Rustenburg	NW	Mbombela	MP

Note: WC: Western Cape; GT: Gauteng; NC: Northern Cape; NW: North West; EC: Eastern Cape; FS: Free State; KZN: KwaZulu-Natal; MP: Mpumalanga.

We explore how desirability of destination as measured by mean utility varies with population density. Figure 17 plots the non-parametric relationship between desirability of destinations and log of population density at destination for three main population groups. Interestingly, all three population groups (unskilled and skilled black africans and whites) appear to have similar ranking of places. The relationship between desirability and population density is convex for all three groups and the minimum is reached at log of population density of around 5. Recall that the Black dominated homelands established under apartheid and townships have density which is in the middle range of horizontal axis ($\log(\text{density})$ between 3 and 6, with maximum around 5). The large metropolitan cities have population densities that lie to the right of horizontal axis ($\log(\text{density}) > 6$). Thus those cities rank high in terms of desirability by all different groups. The curves showing the relationship between desirability and population density are similar in shape though there is a scale difference.

Figure 17: Desirability and Population Density

Desirability and Population Density by Population Group

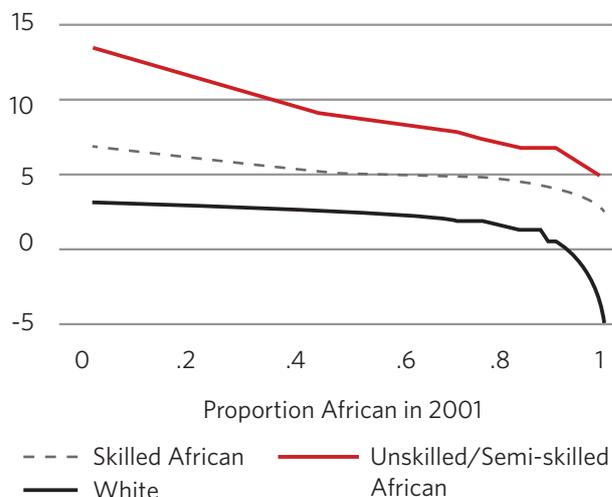


The curve for unskilled black africans lies above other two curves indicating that though all different groups rank the locations similarly, the unskilled black africans attach higher desirability to each location compared with others. The curve for skilled Black is the middle one with that of White is the bottom most one. To provide a concrete example, Cape Town is most desirable to all population groups, but unskilled black africans attach much higher mean utility to Cape Town followed by skilled black africans and then by whites. The higher mean utility assigned by unskilled and skilled black africans compared with whites to Cape Town could be due to the fact that black africans come from areas which are much worse than Cape Town in terms of job prospects and amenities.

Figure 18 plots desirability of destinations against proportion of black africans in 2001. The Black predominant destinations are ranked low by all population groups, particularly by whites. This shows that though density in Black dominated areas such as former homelands established under apartheid are high, they are not viewed as desirable destinations.

Figure 18: Desirability and Proportion of African/Black

Desirability and Population African by Population Groups



Decomposing the Destination Desirability (Mean Utility): Second Stage Regression

The first stage regressions results suggest considerable variations in the way households assign utilities to different destinations. In this subsection, we explore whether characteristics of locations can explain the mean utilities. To this end, we decompose mean utilities of locations estimated in the first stage into characteristics of respective locations. We focus particularly on three types of location characteristics: initial conditions, public goods and crime and unemployment. Among the initial conditions, we focus on two factors in particular: proportion of Black in the destination municipality in 1996, and ratio of skilled to semi- and unskilled workers in 1996. The proportion of black africans in 1996 is a good indicator of spatial mismatches that Apartheid regime had created in the provision of services: higher proportion of Black meant lower provision of services. Similarly, the skill ratio – as shown in Section I – relates to urbanization and hence is useful in distinguishing urban areas from other potential destinations. Among local services and amenities, we consider provision of roads, electricity, piped water and formal housing. The census collected information of whether household uses electricity for lighting, and electricity provision is defined as percentage of households in the municipality which use electricity for lighting. Provision of piped water is similarly defined as percentage of households that have piped water inside their dwelling. To avoid reverse causality, these location variables are taken from 2001 census which was prior to arrival of migrants. The access to road is defined a principal component of five types of

roads within the municipality (kilometers of highways, main roads, secondary roads, streets and others in 2004). The municipality level crime level is proxied by average number of incidents per police station per square

kilometers. Unemployment rate is defined as ratio of unemployed population to the population in labor force (sum of employed and unemployed population). Summary statistics for these variables in Table 5.

Table 5: Summary Statistics of Explanatory Variables

	Mean	Std. Dev.	Minimum	Maximum
Ratio of Skilled to Unskilled/Semi-Skilled in 1996	0.19	0.08	0.05	0.46
Proportion of Population Black in 1996	0.70	0.26	0.02	0.99
Index of Road Availability	0.32	2.08	-1.19	11.34
Proportion of households using electricity for lighting, 2001	0.71	0.14	0.19	0.93
Proportion of households with piped water inside house, 2001	0.30	0.19	0.01	0.74
Crime rate (per police station per sqkm)	21.38	44.64	0.28	278.47
Unemployment rate in 2001 (proportion)	0.40	0.13	0.08	0.65
Median house rental (in log value)	9.76	1.63	5.12	19.79
Proportion of households with formal dwelling in 2001	0.67	0.13	0.27	0.97
Change in log of proportion of formal housing between 1996 and 2001	-0.01	0.10	-0.28	0.23

The results from second stage regressions are reported in Tables 6-9. The results show that access to roads and electricity and unemployment rate are perhaps the three most important determinants of a destination's attractiveness to Black migrants whereas only unemployment rate matters for whites. All population groups dislike destinations with higher unemployment rates. While crime rate has expected negative sign in all regressions, they are not statistically significant partly because it is quite correlated with unemployment rate. Unskilled black africans also did not prefer locations with higher proportions of black africans in 1996. Skilled black africans on the other hand preferred locations which were already more urbanized in 1996 (higher skill ratio).

A concern for the results in Table 6 is that regressions included only limited number of explanatory variables and whether omitted variable biases are confounding the estimates. To check this, we note that all relevant locational characteristics (positive or negative) are capitalized in housing prices. We estimate a housing price regression where median transaction price of housing (per square meter) is regressed on the location characteristics included in the regressions of Table 6. The residual from this regression is used as a control for unobserved locational characteristic in the regressions results reported in Table 7. The results show that the concerns about omitted variable bias is somewhat

justified for whites, inclusion of housing price residual reduced the magnitude and statistical significance of the coefficient of unemployment rate. For unskilled and skilled black africans, the regression results remain nearly the same as in Table 6 and thus conclusions about their preference remain intact. In Table 8, we added percentage of households with formal housing as an explanatory variable.⁵ The results for black africans remain unchanged and the coefficients of formal housing lack statistical significance.⁶ This is due to the fact that access to formal housing is highly correlated with access to electricity and unemployment rate.

South African government invested heavily on the expansion of formal housing during the last decade. As a result, access to formal housing and consequently to electricity improved dramatically since 1996 (Figure 19a). Much of this expansion happened in Black majority areas including the former homelands established under apartheid (Figure 19b). We investigate whether expansion of formal housing attracted migrants to these areas which were economically depressed to begin with. The regression results reported in Table 9 suggest quite the opposite: formal housing expansion did not contribute to attractiveness of these destinations as they are viewed in negative lights by both unskilled and skilled Black migrants.

⁵ Formal housing is defined to include the following categories: "House or brick/concrete bloc structure on a separate stand or yard or on a farm"; "Flat or apartment in a block of flats"; "Cluster house in complex"; "Town house (semi-detached house in complex)"; "Town/cluster/semi-detached house"; "House/flat/room in back yard"; "Room/flat-let on a property or a larger dwelling/servants' quarters/granny flat".

⁶ The coefficients on formal housing for both groups become statistically significant if we drop access to electricity and piped water variables. The results suggest that unskilled Blacks value it more than skilled Blacks.

Table 6: Decomposition of Destination Mean Utilities: Results from Second Stage Regressions

VARIABLES	(1) Unskilled Black	(2) Skilled Black	(3) White
Ratio of Skilled to Unskilled workers in 1996	0.328 (0.124)	3.110* (1.822)	9.184* (1.772)
Proportion of Population Black in 1996	-3.132*** (-2.998)	-0.334 (-0.495)	2.100 (1.025)
Index of Road Availability	0.379*** (3.112)	0.313*** (3.983)	0.409* (1.713)
Proportion of households using electricity for lighting, 2001	4.617*** (3.675)	2.979*** (3.671)	6.084** (2.469)
Proportion of households with piped water inside house, 2001	-1.118 (-0.733)	0.354 (0.360)	3.632 (1.214)
Crime rate [per sqkm]	-0.00262 (-0.405)	0.000624 (0.149)	-0.0105 (-0.828)
Unemployment rate in 2001	-8.322*** (-4.449)	-3.344*** (-2.768)	-7.179* (-1.957)
Intercept	9.358*** (6.176)	2.725*** (2.785)	-4.978* (-1.675)
Observations	105	105	105
R-squared	0.731	0.703	0.440

Note: t-statistics in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7: Decomposition of Destination Mean Utilities: Controlling for Unobserved Locational Heterogeneity

VARIABLES	(1) Unskilled Black	(2) Skilled Black	(3) White
Ratio of Skilled to Unskilled workers in 1996	0.331 (0.123)	3.073* (1.765)	7.712* (1.769)
Proportion of Population Black in 1996	-3.156*** (-2.912)	-0.361 (-0.515)	0.00821 (0.00467)
Index of Road Availability	0.373*** (3.012)	0.312*** (3.891)	0.426** (2.119)
Proportion of households using electricity for lighting, 2001	4.357*** (3.139)	2.944*** (3.273)	2.584 (1.147)
Proportion of households with piped water inside house, 2001	-1.064 (-0.679)	0.327 (0.322)	4.060 (1.597)
Crime rate [per sqkm]	-0.00176 (-0.266)	0.000862 (0.201)	-0.0106 (-0.991)
Unemployment rate in 2001	-8.464*** (-4.133)	-3.357** (-2.530)	-1.807 (-0.544)
Median house rental (residual)	-0.0816 (-0.825)	-0.0183 (-0.285)	0.0221 (0.138)
Intercept	10.38*** (5.413)	2.965** (2.385)	-3.071 (-0.986)
Observations	102	102	102
R-squared	0.696	0.667	0.365

Note: t-statistics in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 8: Decomposition of Destination Mean Utilities: Access to Formal Housing

VARIABLES	(1) Unskilled Black	(2) Skilled Black	(3) White
Ratio of Skilled to Unskilled workers in 1996	0.288 (0.107)	2.983* (1.711)	7.939* (1.817)
Proportion of Population Black in 1996	-3.297*** (-2.782)	-0.654 (-0.855)	0.744 (0.389)
Index of Road Availability	0.382*** (2.984)	0.331*** (4.010)	0.378* (1.829)
Proportion of households using electricity for lighting, 2001	4.591*** (2.880)	3.428*** (3.334)	1.368 (0.531)
Proportion of households with piped water inside house, 2001	-1.060 (-0.674)	0.334 (0.329)	4.042 (1.589)
Crime rate [per sqkm]	-0.00219 (-0.321)	-1.87e-05 (-0.00426)	-0.00843 (-0.767)
Unemployment rate in 2001	-8.251*** (-3.793)	-2.915** (-2.078)	-2.919 (-0.830)
Median house rental (residual)	-0.0817 (-0.822)	-0.0185 (-0.289)	0.0227 (0.142)
Proportion of households with formal dwelling in 2001	-0.469 (-0.302)	-0.972 (-0.971)	2.447 (0.976)
Intercept	10.56*** (5.243)	3.331** (2.563)	-3.991 (-1.226)
Observations	102	102	102
R-squared	0.696	0.671	0.371

Note: t-statistics in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Figure 19a: Housing and Access to Basic Services

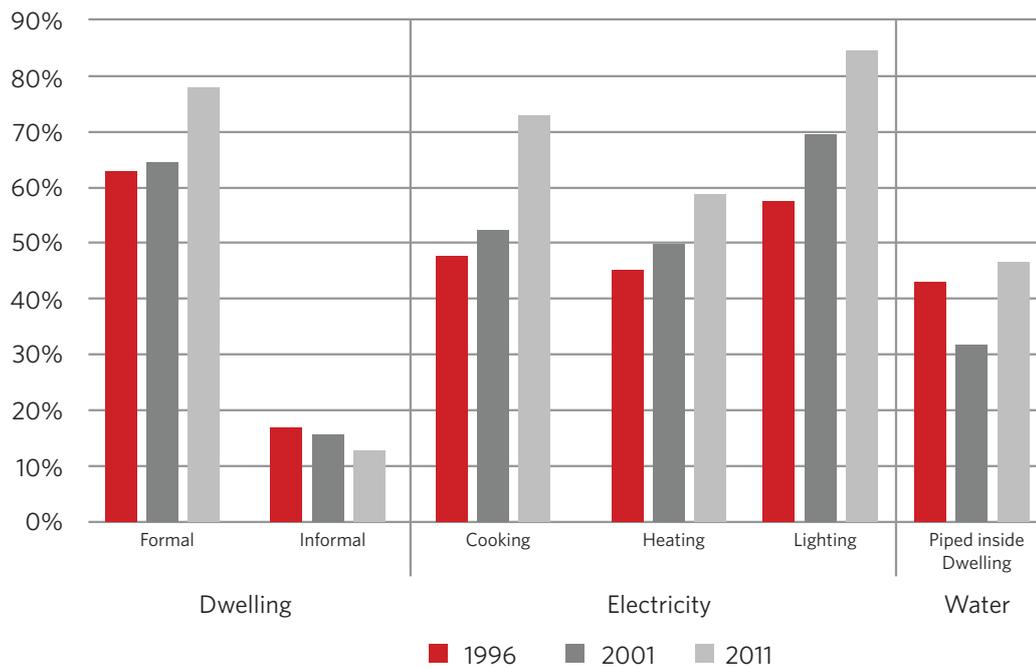


Figure 19b: Access to Formal Housing in 2011

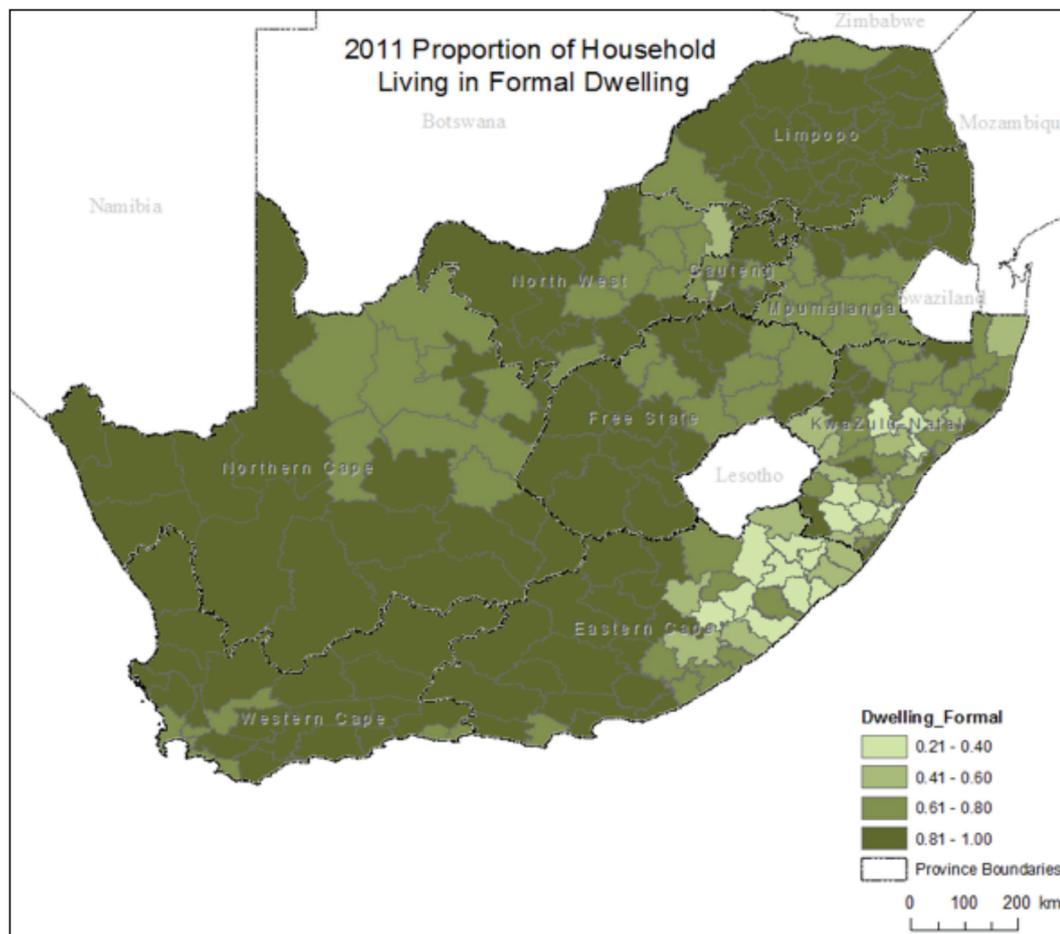


Table 9: Decomposition of Destination Mean Utilities: Expansion of Formal Housing

VARIABLES	(1) Unskilled Black	(2) Skilled Black	(3) White
Ratio of Skilled to Unskilled workers in 1996	-2.667 (-0.995)	1.355 (0.769)	5.735 (1.257)
Proportion of Population Black in 1996	-1.922 (-1.625)	0.104 (0.134)	1.769 (0.880)
Index of Road Availability	0.353*** (2.920)	0.315*** (3.967)	0.357* (1.734)
Proportion of households using electricity for lighting, 2001	3.474** (2.263)	2.813*** (2.789)	0.535 (0.205)
Proportion of households with piped water inside house, 2001	0.0265 (0.0175)	0.933 (0.937)	4.853* (1.882)
Crime rate [per sqkm]	0.00128 (0.197)	0.00189 (0.444)	-0.00585 (-0.530)
Unemployment rate in 2001	-7.036*** (-3.384)	-2.246 (-1.644)	-2.013 (-0.569)
Median house rental (residual)	-0.0658 (-0.702)	-0.00979 (-0.159)	0.0346 (0.217)
Proportion of households with formal dwelling in 2001	3.343* (1.841)	1.128 (0.946)	5.290* (1.712)
Change in proportion of formal housing between 1996 and 2001	-7.492*** (-3.543)	-4.128*** (-2.972)	-5.586 (-1.553)
Intercept	7.331*** (3.481)	1.551 (1.121)	-6.400* (-1.786)
Observations	102	102	102
R-squared	0.733	0.700	0.387

Note: t-statistics in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Willingness to Pay for Amenities/Services

The first and second stage estimates can be combined to compute the willingness to pay for factors that appear to affect migrants' utility. The willingness to pay for road for unskilled black africans for example is the ratio of coefficient of road in the second stage regression over the coefficient of income in the first stage regression for unskilled black africans. Since income is expressed in logarithms, the ratio thus represents the percentage of income (monthly) that unskilled black africans are willing to pay for the improvements in roads in their destination. The estimates of willingness to pay for an improvement in infrastructure (roads) and services (electricity), and a reduction in unemployment rate along with summary statistics for these factors along with income are reported in Table 10. We used estimates from Table 7 to compute

the willingness to pay. Unskilled black africans are willing to pay for an improvement any of the three factors much more than skilled black africans and whites. A reduction in unemployment rate ranks highest in terms of willingness to pay for all three groups. Unskilled black africans who face a very high unemployment rate (52 percent) are willing to sacrifice more than a month and a half's income (165 percent of monthly income or Rand 4,482) to reduce the unemployment rate by a percentage point, compared to 6.7 percent of monthly income by skilled black africans, and 1.2 percent of monthly income by whites. To increase the coverage of electricity by one percentage point, the unskilled black africans are willing to pay 85 percent of their monthly income. Relative to reduction in unemployment or improvement in electricity coverage, they are willing to pay lot less for improved roads (7.3 percent). Note also that what unskilled black africans are willing to pay for any of these three factors are far larger than other two groups both in percentage and in absolute income terms

Table 10: Willingness to Pay for an Improvement in Location Characteristics

	Black Africans		Whites
	Unskilled	Skilled	
Willingness to Pay (% of income)	Percent of Average Monthly Income		
Road	7.31	0.57	0.29
Electricity	85.43	5.36	1.74
Reduction in Unemployment	165.96	6.13	1.22
Willingness to Pay (amount)	In Rand		
Road	194	44	65
Electricity	2262	415	394
Reduction in Unemployment	4394	474	276
Summary statistics			
Monthly Income (Rand) in 2001	2648	7743	22667
Proportion of households using electricity for lighting, 2001	0.76	0.90	0.99
Unemployment Rate (proportion) in 2001	0.52	0.45	0.06

Note: Estimates are based on regression coefficients in Table 7.

In Brazil, Lall, Timmins and Yue (2009) find that poorer migrants are willing to accept lower wage to achieve access to better services while richer migrants are influenced only by income differences. For example, a Brazilian minimum wage worker earning R\$7 an hour was willing to pay R\$420 a year to have access to better health services, R\$87 for a better water supply, and R\$42 for electricity. Fafchamps and Shilpi (2013) find a statistically significant and numerically large effect of access to paved roads on migrants' destination choice in Nepal: migrants prefer a destination that is closer to a paved road. The results for South Africa also confirm the importance of provision of infrastructure and services – particularly roads and electricity – in the destinations.

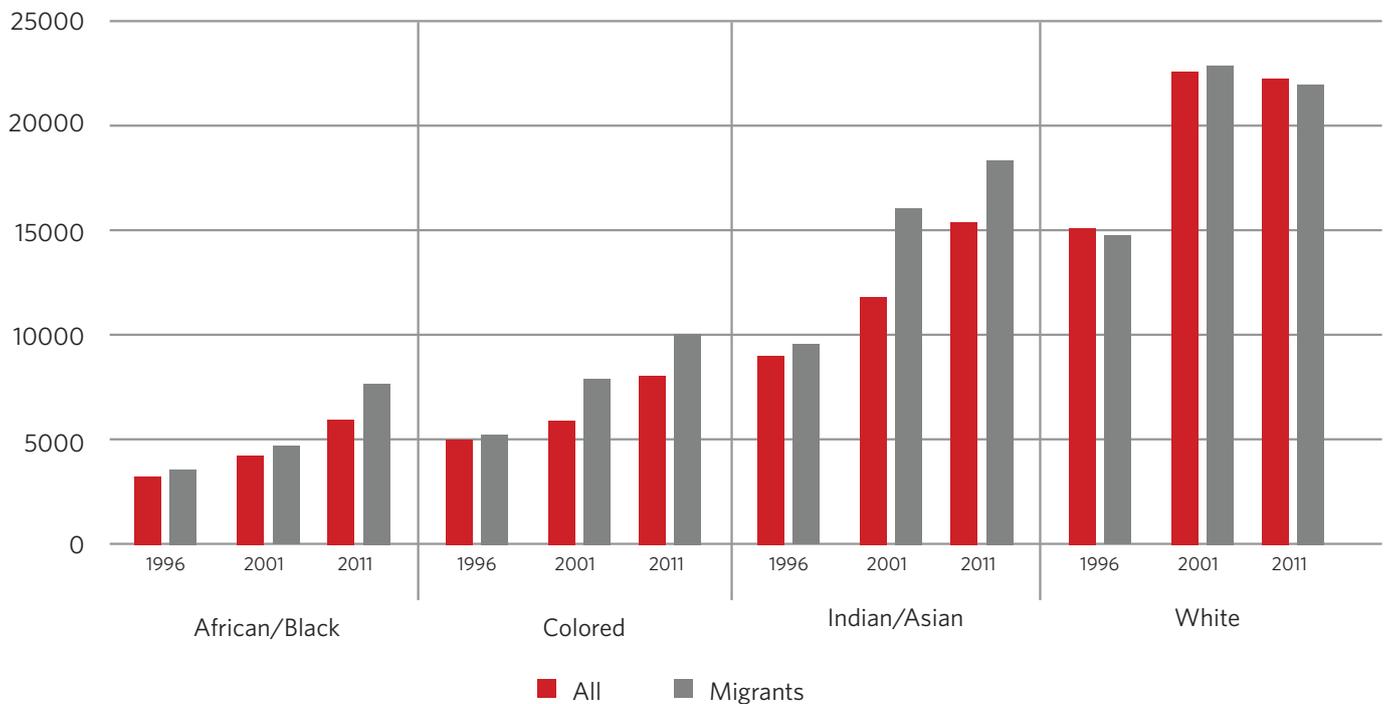
Intra-Municipality Migration and Housing Markets

The empirical analysis above could indicate the willingness to pay for municipality level characteristics. This is because publicly released census data do not allow us to track migration/movement within municipality. While data can be used to distinguish between within and across municipality moves, the geographical location of migrants below main places are not made available. An important finding of migration analysis presented in Section I is that intra-municipality migration remains quite low in South Africa. Without finer geographical data on within municipality moves (e.g. sub-place level), it is

not possible to shed light on what motivates households to change residence within municipalities. One possible culprit, as mentioned before, is the working of the housing markets. While overt or covert racial discriminations in housing markets are observed in USA as well, the reasons for slower movement within municipality undoubtedly relate directly to economic circumstances. Figure 20

shows the average monthly incomes of different racial groups. Though migrants earn slightly higher incomes than natives, income of a typical Black migrant is less than a third of that of White native. Given this wide disparity in incomes, an increase in intra-municipality mobility will require reforms as well as appropriate policy incentives in the provision and working of housing markets.

Figure 20: Average Monthly Income (in Rand) of Migrants and All Population by Race Groups



Constraints to Migration

Comparison of results for White and black africans indicates some interesting differences. The results suggest that whites are concerned only about roads, and does not value location amenities such as access to electricity. This is most likely due to the fact that they live in neighborhoods within the municipality which already are disproportionately better off in terms of provision of electricity and that they are not the marginal users of these services. Relative to unskilled black africans, skilled black africans are more likely to come from better off places and also have access to better off neighborhoods within the destination municipality. This explains why they attach lower value to access to electricity and roads compared with unskilled black africans.

The results from migration pattern and location choice clearly suggest presence of many constraints for unskilled black africans. They are least mobile among all population groups. Lack of skill is perhaps the biggest constraints to their mobility. Lack of skill translates into higher unemployment rate and lower paid jobs and thus possible credit constraints both in moving and in securing jobs and residences in their destinations. Even when they move to a destination, the neighborhoods that they live have poorer housing conditions in terms of provision of electricity,

piped water and formal housing. Moreover, because of Apartheid legacy, neighborhoods where different population groups within a city or municipality can live are racially and economically segregated. As a consequence, poorer neighborhoods are also far from economic centers. Not surprisingly, unemployment rate, access to electricity and roads are a major concerns for both skilled and unskilled black africans, more so for the later.

Policy Implications

The analysis of migration patterns along with households' location choice highlights several areas that require attention for urbanization and territorial development of South Africa. First, large urban areas in Western Cape and Gauteng are ranked high as destinations, and will continue to attract more migrants. The urban destinations are especially valued by skilled black africans and whites as they prefer moving to areas with higher ratio of educated/skilled over less educated/unskilled populations. Second, job creation in these urban areas should be of highest priority as black africans who face higher unemployment rates regardless of their education levels prefer areas with higher employment rates. Better income opportunities and lower unemployment rates are the two most important determinants of migration in South Africa.

Third, along with employment and income opportunities, improving educational attainments should be a priority. Educational attainments are low among the black africans. The evidence shows that mobility is higher among relatively skilled workers, and that those relatively skilled are able to secure better living conditions in their destinations as well. These would mean investing in education not only in the origins – which are mostly in the lagging areas (homelands established under apartheid in particular) that are experiencing net outflow of people – but also in destinations. The investment in the quality and quantity of education may also help alleviate the unemployment which plagues the poorer black African and colored population. Investment in education in the lagging regions on the other hand will equip the migrants to avail better jobs, and thus reduce pressure on labor markets and improve wages and living standards of those staying behind. The success of the strategy of investing in people's skill regardless of geographical location (origin or destinations) however depends on the critical assumption of having adequate administrative and teaching capabilities across areas. The validity of this assumptions is clearly suspect as educational outcomes in the sending provinces proxied by the annual Grade 12 examinations point to poorer learning outcomes in these provinces than in the receiving provinces of Gauteng and Western Cape. These sending provinces also have weaker annual Auditor General outcomes. South Africa should examine alternative models of provision of quality education in provinces with weaker public administrations and education department capacity.

Fourth, provision of services in poorer neighborhoods in the destination municipalities will be another area that requires policy attention. Of particular importance are access to electricity and roads. Access to electricity is also tied to access to formal housing. Given the historical residential segregation that forced black africans and coloreds to neighborhoods/townships which are usually far off from employment centers, access to road has also a housing dimension. Provision of these services should be coordinated with provision of housing. The caveats about administrative capacity apply in the provision of these services as well.

Fifth, there is an urgent need to examine the housing policies and urban housing markets. The intra-municipality movement of households is found to be quite low. Intra-municipality disparity in housing provision is also apparent in the disparity in the housing conditions of skilled and unskilled black africans. South Africa invested heavily on the expansion of formal housing particularly in areas that were ill served during the Apartheid. As a result, formal housing coverage has increased substantially in former homelands established under apartheid and black townships. But evidence in this paper shows clearly that despite expansion of formal housing, outmigration from these economically depressed areas

continued and will perhaps continue. Similarly provision of formal housing in outlying Black/Colored townships in urban areas will improve access to some services (such as electricity) for the poor, but it would not be able to reverse the Apartheid trends of putting all low income households of given racial background in selected neighborhoods. This may be reinforcing the mismatch between place of work and place of residence. This may have the unintended consequence of creating poverty traps in urban areas which will perpetuate low quality neighborhoods leading to lower human capital accumulation due to dubious quality of education to poorer labor market outcomes to low quality neighborhoods. Understandably, there are concerns as to whether current human settlement policies are cementing the barriers built under the Apartheid. Given these concerns, South Africa should explore alternative housing policies to improve working of the housing markets so as to facilitate mobility within municipalities, and alternative ways to integrate the housing market both racially and spatially.

Section III: Social Transfers and Migration

The empirical evidence on migration pattern by races is suggestive of presence of credit constraints. The poorer and unskilled black household heads tend to migrate to nearby places, and their migration rates are far smaller than other groups. Both of these facts could be explained by the presence of credit constraints which limit poorer black Africans' ability to search for jobs in distant places and to sustain them during the job search process in their destination. The job search process is expected to be lengthy in light of the very high unemployment. While census data allowed us to paint a fine grain picture of migration patterns, it does not allow us to test for presence of credit constraints given the limited information on incomes. In this section, we utilize the nationally representative National Income Dynamics Surveys which is a panel dataset of nearly 11,895 unique households and 30,089 individuals. To identify if credit constraint is important for migration decision, we rely on the arrival or loss of old age pensions in the household as the exogenous shock in household income and estimate how such social transfers affect migration and employment outcomes of the adult members of the households.

South Africa has generous social transfer programs that provide a substantial supplement to incomes of poorer and rural households.⁷ The scope and generosity of the programs have raised the questions of whether these programs induce behavioral changes among young adults in the households receiving these supports. A concern in

⁷ *The social transfer programs provide means tested old age pension above 60 years of age, and means tested child support grant up to 18 years. There is no grant for poor working age adults though.*

this regard is whether social transfers act as disincentives for work and migration and in turn contributes to the higher unemployment rate observed in South Africa. Among many different social transfer programs, one of the well-researched program is the old-age pension whose eligibility is determined based on age cut-offs (60 for women, 65 for men). The pension program provides a generous means of supports in old age for the pensioners and a general safety net for the household. In a cross-sectional study, Bertrand, Mullainathan and Miller (2003) conclude that "pension dramatically reduces the labor supply of prime age members of the household". In a study using panel data, Ardington, Case and Hosegood (2009) on the other hand show that while in a cross-section analysis, labor force participation is lower in the pensioner households, this is mainly because disabled and unemployed (extended) family members join the household after pensions arrival. Using pension's age eligibility criterion to determine treatment status, and focusing on the change in pension status of households overtime, Ardington, Case and Hosegood (2009) arrive at the opposite conclusions that prime age household members tend to migrate more and work more after the arrival of pensions. Pension is thus found to relieve two constraints: credit constraints for migrants and child care constraint for the household.

While the empirical evidence in Ardington, Case and Hosegood (2009) is causal and convincing, their data come from rural areas in one district in South Africa (Umkhanyakude district of KwaZulu-Natal province) raising questions about external validity of the empirical evidence. We revisit the issue of pension's effects on migration behavior using data from two waves (Wave 1 (2008) and Wave 4 (2015)) of the National Income Dynamics Surveys (NIDS). Because NIDS covers both rural and urban areas and empirical analysis can thus be conducted separately for these areas. We utilize the timing of pension arrival and or loss along with change in migration and labor market decisions to estimate the causal impacts of pension. The panel dimension of data is utilized to control for unobserved household and individual characteristics that may affect migration and employment decisions. Our identification strategy is same as Ardington, Case and Hosegood (2009). We focus on two outcomes: employment and migration status. Individual level behavior is described by the following regression specification:

$$y_{iht}^j = \mu_i^j + \beta P_{ht} + \gamma X_{iht} + \epsilon_{iht}^j, \quad j = M, E \quad (5)$$

Where y_{iht}^j the dependent variable for j outcome for individual i in household h and survey wave t . y_{iht}^M takes the value of unity if individual i is a migrant and zero otherwise. y_{iht}^E takes the value of unity if individual i is employed and zero otherwise. μ_i^j is the individual specific fixed term relevant for outcome j , where j corresponds to migration and employment outcomes. P_{ht} is a dummy variable which takes the value of unity if a household member is age eligible for pension and zero otherwise. X_{iht} is the individual/household characteristics relevant for the outcome in question and ϵ_{iht}^j is the residual term. Differencing equation (5) provides us the estimating regression as:

$$y_{iht}^j - y_{iht-1}^j = \beta(P_{ht} - P_{ht-1}) + \gamma(X_{iht} - X_{iht-1}) + (\epsilon_{iht}^j - \epsilon_{iht-1}^j), \quad j = M, E \quad (6)$$

Each regression include (X_{iht}) the change in the number of resident members, and the number of days that elapsed between Wave1 and Wave4. The sample is restricted to household members greater than age 17 at Wave1 and less than age 51 at Wave4. The parameter of interest is β . Each regression is estimated for three samples: full sample including both rural and urban areas, urban sample and rural sample.

Table 11 reports the results for migration decision for the full sample. Migrants are defined as non-residents absent because of employment/looking for employment. The top panel shows the results for all household members. On average, change in pension status is associated with 2.5 percentage point increase in propensity to migrate for work (first row). The increase is slightly larger for men than women. We make a distinction between arrival of pension as a member becomes eligible versus loss of pension due to eligible member leaving the household. The results are reported in the next two rows. Arrival of pension is associated with higher propensity to migrate whereas loss has no statistically significant effect on migration. Arrival pension increases migration rate for men by 4.7 percentage points. In the second panel, we restrict the sample to individuals who were already migrant during wave 1 of the survey. Despite a rather small sample size, we find statistically significant effects for women. Arrival of pension increases migration of women by nearly 20 percentage points. In the final panel, we restrict sample to potential migrants who were not migrant in wave 1. For all three samples, we find no evidence of an effect of pension loss on migration but evidence of a significant positive impacts of pension gain on migration.

Table 11: The Effect of Change in Pension Status on Migration for Work*

	Dependent Variable: Change in Labor Migrant Status W4-W1		
	All members	Women only	Men only
Change in household pension status Wave 4 - Wave 1	0.025*** (0.01)	0.021*** (0.01)	0.029*** (0.01)
Observations	9,767	5,344	4,423
Indicator: Household lost pension status Wave 4 - Wave 1	-0.009 (0.01)	-0.01 (0.01)	-0.007 (0.01)
Indicator: Household gained pension status Wave 4 - Wave 1	0.033*** (0.01)	0.020** (0.01)	0.047*** (0.01)
Observations	9,767	5,344	4,423
	Dependent Variable: Change in labor migrant status for those who were labor migrants at W1		
	All members	Women only	Men only
Indicator: Household lost pension status Wave 4 - Wave 1	-0.158 (0.11)	-0.104 (0.13)	-0.023 (0.21)
Indicator: Household gained pension status Wave 4 - Wave 1	0.147* (0.08)	0.198* (0.11)	0.115 (0.12)
Observations	210	95	115
	Dependent Variable: Change in labor migrant status for those who were not labor migrants at W1		
	All members	Women only	Men only
Indicator: Household lost pension status Wave 4 - Wave 1	-0.002 (0.01)	0.003 (0.01)	-0.007 (0.01)
Indicator: Household gained pension status Wave 4 - Wave 1	0.038*** (0.01)	0.025*** (0.01)	0.054*** (0.01)
Observations	9,557	5,249	4,308

Note: Standard Deviation in parentheses. Table 11 reports the coefficients and standard errors from OLS regressions of change in labor migrant status (Wave4-Wave1) on change in the presence of a resident member age eligible for the pension (Wave4-Wave1). Also included in each regression are the change in the number of resident members, and the number of days that elapsed between Wave1 and Wave4. The sample is restricted to household members greater than age 17 at Wave1 and less than age 51 at Wave4.

Tables 12 and 13 report the results for rural and urban samples respectively. The results for rural sample are largely similar to overall results discussed above. One exception is that the effects of pension status change appear to have no statistically significant effect on existing migrants. For all migrants and potential migrants, the magnitudes of effects are larger for rural samples compared with full sample. For urban sample, the overall effects of pension status change are statistically significant and positive all three groups, but the absolute magnitudes of effects are somewhat smaller than those found for rural sample and consequently for full sample. The sample for existing migrant is too small to be taken seriously. For potential migrants, pension gain has significant positive effects on male migration for work but not for female migration. For all migrants sample, pension loss appears to have negative impact on female migration. The effects of pension status change - particularly pension gains-- found in NIDS rural sample are similar to those found by Ardington, Case and Hosegood (2009). However, we do not find any significant impacts of pension loss on migration which is contrary to the findings of by Ardington, Case and Hosegood (2009). This could be due to the expansion for childcare facilities in recent years which reduced the need to have family member at home for childcare. We find that the effects are smaller in magnitudes in urban areas, and statistically insignificant for potential female migrants. The results do confirm the key finding of Ardington, Case and Hosegood (2009) that work migrants face credit constraints. The effects in urban areas are smaller perhaps because individuals in urban areas already have access to larger labor market and do not need to migrate as much as their rural counterparts.

Following Ardington, Case and Hosegood (2009), we also estimate the impacts of pension status change employment status. The results for full, rural and urban samples are reported in Tables 14-16. In addition to all, male and female members, we also estimate it separately for resident members only. For all three samples (full, rural and urban), change in pension status is associated with a decrease in employment rates though there are some differences across gender. The change in pension status has no statistically significant effect on employment status of men in rural areas and women in urban areas. When we distinguish between pension gain and loss, the results for full sample suggest that pension loss has significant positive impacts on employment rate for all four groups (residents, male, female and all members). This is true in rural sample as well though there pension gain has a negative impact on female employment rate and positive but statistically not significant impact on male employment. For urban sample, pension loss is associated with a rise and gain with a fall in probability of employment for men, producing a statistically significant decrease in employment rate with a change in pension status. For women, pension gain or loss has not significant impacts.

Table 12: The Effect of Change in Pension Status on Migration for Work* - Rural Household Head Only

	Dependent Variable: Change in Labor Migrant Status W4-W1		
	All members	Women only	Men only
Change in household pension status Wave 4 - Wave 1	0.028*** (0.01)	0.024** (0.01)	0.031** (0.02)
Observations	4,061	2,272	1,789
Indicator: Household lost pension status Wave 4 - Wave 1	-0.003 (0.01)	-0.001 (0.01)	-0.005 (0.02)
Indicator: Household gained pension status Wave 4 - Wave 1	0.042*** (0.01)	0.034** (0.02)	0.048** (0.02)
Observations	4061	2272	1789
	Dependent Variable: Change in labor migrant status for those who were labor migrants at W1		
	All members	Women only	Men only
Indicator: Household lost pension status Wave 4 - Wave 1	0.001 (0.14)	0.024 (0.17)	0.175 (0.26)
Indicator: Household gained pension status Wave 4 - Wave 1	0.122 (0.09)	0.155 (0.13)	0.073 (0.13)
Observations	145	65	80
	Dependent Variable: Change in labor migrant status for those who were not labor migrants at W1		
	All members	Women only	Men only
Indicator: Household lost pension status Wave 4 - Wave 1	-0.004 (0.01)	0.005 (0.01)	-0.012 (0.02)
Indicator: Household gained pension status Wave 4 - Wave 1	0.052*** (0.01)	0.043*** (0.01)	0.059*** (0.02)
Observations	3,916	2,207	1709.00

Note: Standard Deviation in parentheses. Table 12 reports the coefficients and standard errors from OLS regressions of change in labor migrant status (Wave4-Wave1) on change in the presence of a resident member age eligible for the pension (Wave4-Wave1). Also included in each regression are the change in the number of resident members, and the number of days that elapsed between Wave1 and Wave4. The sample is restricted to household members greater than age 17 at Wave1 and less than age 51 at Wave4.

Table 13: The Effect of Change in Pension Status on Migration for Work: Urban sample

	Dependent Variable: Change in Labor Migrant Status W4-W1		
	All members	Women only	Men only
Change in household pension status Wave 4 - Wave 1	0.020*** (0.01)	0.018*** (0.01)	0.021*** (0.01)
Observations	5,706	3,072	2,634
Indicator: Household lost pension status Wave 4 - Wave 1	-0.015** (0.01)	-0.019** (0.01)	-0.01 (0.01)
Indicator: Household gained pension status Wave 4 - Wave 1	0.018** (0.01)	0.006 (0.01)	0.034*** (0.01)
Observations	5706	3072	2634
	Dependent Variable: Change in labor migrant status for those who were labor migrants at W1		
	All members	Women only	Men only
Indicator: Household lost pension status Wave 4 - Wave 1	-0.377** (0.15)	-0.218 (0.17)	-0.26 (0.35)
Indicator: Household gained pension status Wave 4 - Wave 1	0.11 (0.17)	0.154 (0.22)	0.106 (0.24)
Observations	65	30	35
	Dependent Variable: Change in labor migrant status for those who were not labor migrants at W1		
	All members	Women only	Men only
Indicator: Household lost pension status Wave 4 - Wave 1	-0.004 (0.01)	-0.001 (0.01)	-0.009 (0.01)
Indicator: Household gained pension status Wave 4 - Wave 1	0.016*** (0.01)	0.004 (0.01)	0.032*** (0.01)
Observations	5,641	3,042	2,599

Note: Standard Deviation in parentheses. Table 13 reports the coefficients and standard errors from OLS regressions of change in labor migrant status (Wave4-Wave1) on change in the presence of a resident member age eligible for the pension (Wave4-Wave1). Also included in each regression are the change in the number of resident members, and the number of days that elapsed between Wave1 and Wave4. The sample is restricted to household members greater than age 17 at Wave1 and less than age 51 at Wave4.

The results for employment rate are consistent with the findings in Bertrand, Mullainathan and Miller (2003) but in contrast with Ardington, Case and Hosegood (2009). Ardington, Case and Hosegood (2009) finds a small but positive impact of pension status change on employment probabilities for female members. This was driven by a negative effect of pension loss on female employment. We find no case where pension loss is associated with a decline in employment probabilities for female or male. In urban areas where child care facilities are perhaps more accessible, we find pension loss or gain has no impacts on female employment. In rural areas, we find pension gain

leading to a decline in female employment. An increase in income is observed to lead to a decline in female employment if income increase is associated with status increase. Further analysis is needed to ascertain if that is indeed the case in South Africa. More importantly, we find that pension loss forces people to back to work whereas pension gain has no statistically significant effects on employment rate though coefficients have negative signs. Note also that pension gain leads to higher rate of work migration, yet lower overall employment rate because of strong negative effects of pension status change on household residents.

Table 14: The Effect of Change in Pension Status on Employment

	Dependent variable: Change in employment status (Wave 4 - Wave 1)			
	Resident members only	All members	All members Women	All members Men
Change in household pension status Wave 4 - Wave 1	-0.066*** (0.02)	-0.053*** (0.02)	-0.055*** (0.02)	-0.052* (0.03)
Indicator: Household lost pension status Wave 4 - Wave 1	0.074*** (0.02)	0.066*** (0.02)	0.059** (0.03)	0.080** (0.04)
Indicator: Household gained pension status Wave 4 - Wave 1	-0.043* (0.03)	-0.025 (0.02)	-0.043 (0.03)	0.001 (0.04)
Observations	6,021	6,323	3,824	2,499

Note: Standard Deviation in parentheses. Table 14 reports the coefficients and standard errors from OLS regressions of change in employment status (Wave4-Wave1) on change in the presence of a resident member age eligible for the pension (Wave4-Wave1). Also, included in each regression are the change in the number of resident members and the change in age. The sample is restricted to household members older than age 17 at Wave 1 and younger than age 51 at Wave 4. The sample in column 1 is restricted to members who were resident at both Wave4 & Wave1.

Table 15: The Effect of Change in Pension Status on Employment - Rural Household Head Only

	Dependent variable: Change in employment status (Wave 4 - Wave 1)			
	Resident members only	All members	All members Women	All members Men
Change in household pension status Wave 4 - Wave 1	-0.063*** (0.02)	-0.051** (0.02)	-0.086*** (0.03)	0.003 (0.04)
Indicator: Household lost pension status Wave 4 - Wave 1	0.091*** (0.03)	0.088*** (0.03)	0.084** (0.04)	0.099* (0.06)
Indicator: Household gained pension status Wave 4 - Wave 1	-0.042 (0.03)	-0.017 (0.03)	-0.070* (0.04)	0.055 (0.05)
Observations	2661	2870	1779	1091

Note: Standard Deviation in parentheses. Table 15 reports the coefficients and standard errors from OLS regressions of change in employment status (Wave4-Wave1) on change in the presence of a resident member age eligible for the pension (Wave4-Wave1). Also, included in each regression are the change in the number of resident members and the change in age. The sample is restricted to household members older than age 17 at Wave 1 and younger than age 51 at Wave 4. The sample in column 1 is restricted to members who were resident at both Wave4 & Wave1.

Table 16: The Effect of Change in Pension Status on Employment - Urban Household Head Only

	Dependent variable: Change in employment status (Wave 4 - Wave 1)			
	Resident members only	All members	All members Women	All members Men
Change in household pension status Wave 4 - Wave 1	-0.062** (0.02)	-0.049** (0.02)	-0.015 (0.03)	-0.108*** (0.04)
Indicator: Household lost pension status Wave 4 - Wave 1	0.061* (0.03)	0.047 (0.03)	0.038 (0.04)	0.06 (0.05)
Indicator: Household gained pension status Wave 4 - Wave 1	-0.027 (0.04)	-0.019 (0.04)	0.006 (0.05)	-0.066 (0.06)
Observations	3,360	3,453	2,045	1,408

Note: Standard Deviation in parentheses. Table 16 reports the coefficients and standard errors from OLS regressions of change in employment status (Wave4-Wave1) on change in the presence of a resident member age eligible for the pension (Wave4-Wave1). Also, included in each regression are the change in the number of resident members and the change in age. The sample is restricted to household members older than age 17 at Wave 1 and younger than age 51 at Wave 4. The sample in column 1 is restricted to members who were resident at both Wave4 & Wave1.

What explains the negative effects of pension status change on employment rates? Note that this result is driven by the fact that household members start working at a higher rate after pension loss. This in turn means that arrival of pension perhaps increases reservation wages of household members, leading to more job search and better quality of job matching. Members on the other hand cannot afford longer job search in the event of pension loss and may accept whatever jobs they can get. The NIDS did not collect job search data for us to check this hypothesis. However, it is possible that those who started working after loss of pension may have accepted more casual jobs. Though NIDS collected these information, occupation data are not publicly released and hence we cannot check this hypothesis either.

Summary

Using NIDS data, we confirm the findings in Ardington, Case and Hosegood (2009) that arrival of pension relieves credit constraints for migrants particularly in rural areas. Instead of acting as a disincentive for work migration, social transfers such as old age pensions help increase migration from rural areas. Contrary to Ardington, Case and Hosegood (2009), we find negative effects of pension status change on employment rates. This result is driven mainly by the fact that probability of household members working increases significantly with a loss of pension whereas Ardington, Case and Hosegood (2009) found this probability to increase with a gain in pension. While Ardington, Case and Hosegood (2009) explained their findings in terms of child care constraint, that appear not to be so pressing in NIDS data. Further work is needed to understand the employment pattern.

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This is one of nine background papers prepared as part of the South African Urbanisation Review (UR), which was commissioned by the Cities Support Programme (CSP) of the National Treasury to inform national policy and the Integrated Urban Development Framework (IUDF) on options for enhancing spatial integration. The other background papers and the overall report ('Managing Urbanisation to Achieve Inclusive Growth') is available from the CSP website.

NATIONAL TREASURY

Private Bag X115, Pretoria, 0001
Tel: +27 12 315 5944

40 Church Square, Pretoria, 0002
Fax: +27 12 406 9055

For further information :

Email: roland.hunter@treasury.gov.za
Visit: <https://csp.treasury.gov.za>
Tel: +27 (0)12 315 6515

