Migrant Labour in Contemporary South Africa

University

by

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A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Commerce Specialising in Economics

School of Economics, Faculty of Commerce

University of Cape Town

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Date: 2014

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Abstract

South Africa has a history of distorted and controlled migration. Remnants of this history are still present to this day. The purpose of this study is to understand the patterns of migration in contemporary South Africa. In particular we focus on the interactions between migration and labour force participation decisions. Using the GPS coordinates in South Africa's first nationally representative panel dataset, the National Income Dynamics Study (NIDS), migration is defined as a movement of individuals across municipal boundaries between waves of the NIDS survey. The analysis then goes on to explore the factors driving this migration. A range of relevant individual and household variables are available in NIDS. In addition community level factors such as socio-economic indicators and local service delivery are derived from Census and Community Survey and merged into NIDS in order to provide a rich dataset. Descriptive analysis is followed by the estimation of a biprobit model of migration and participation. Thereafter, the post-migration earnings of migrants are estimated while accounting for selection. The young, educated and the relatively better-off in migrant communities are more likely to migrate and individuals are found to migrate out of communities with high levels of relative inequality. The interdependence of the migration and participation decisions is affirmed. In modeling earnings of migrants we find that the selection into migration has a negative effect on wages especially for high income earners. In general we find that South Africa is beginning to report similar trends in migration to its developing country peers.

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Part I

Introduction

The purpose of this study is to understand the patterns of migration in contemporary South Africa. Through the reallocation of labour from rural agricultural communities to urban industrialized settings, labour mobility has played a critical role in the economic development (Lewis, 1954; Ranis and Fei, 1961). Internal migration is prominent in developing countries with roughly 187.4 million individuals relocating to cities between 2007-2012 (Esipova et al., 2013). South Africa is no exemption with more than 17% of all households reporting a migrant labourer (Posel and Casale, 2006).

Under the apartheid regime African households were forcefully relocated away from productive economic centres to rural homelands with labour migration being closely regulated (Nattrass, 1976; Spiegel, 1980). The apartheid regulations did not permit African workers to bring their wives and families with them to their places of work resulting in a circular or oscillating pattern of migration whereby labourers would retain their permanent home in the rural areas and return regularly (Casale and Posel 2006a; Posel, 2001).

Despite the removal of restrictions on African urbanization in the mid-1980s labour migration patterns continued to exhibit oscillating trends in the post apartheid era due to the permanent residences of migrant labourers offering an 'insurance' for work-seekers and care of children in the face of increasing labour market insecurity and rising unemployment (Posel et al., 2004). However some studies have suggested gravitational flows replacing circular flows of migration in recent years with migrants reporting a decreased preference to return to their home of origin as time passes and other household members, as well as children, joining migrants in the newly established homes (Bekker, 2001).

A nascent literature has focused on the characteristics of sending households and migrants. Posel and Casale (2006a) find that the incidence of poverty is substantially larger among migrant households with 80% of migrant households below the poverty line, with remittances received by migrant households lower than probable earnings from the local labour market and average employment across migrant households lower than non-migrant households. Young adult males with secondary education are migrating out of rural areas with those with tertiary education remaining in rural labour markets (Van der Berg et al., 2003).

The inherited disassociation of African households from employment opportunities has spawned a literature dedicated to documenting trends in migration patterns (Posel et al., 2004; Posel, 2002; Bekker and C, 2001; Klasen and Woolard, 2009). However few studies have established the determinants and challenges of migration particularly in the latter half of the second decade of democracy. A nascent literature has began to investigate the effects of social pensions on migration as a avenue of relieving the credit constraint in order to search for work (Ardington et al., 2013).

The purpose of this study is to investigate labour migration in contemporary South Africa and in particular who migrates and the migration decision. This requires an ex ante lens in which the examination of migration starts with the migrants in their sending households and communities. We give particular attention to the interactions between migration and labour force participation decisions.

The analysis is oriented by starting with a literature review (Section II) which provides a brief overview of the South Africa's past and current migratory patterns, followed by detailing the available data (Section III). The National Income Dynamics Study (NIDS) is South Africa's first nationally representative panel data set. It provides detailed information on migrants and their households both pre (2008) and post (2012) their migration. Community level data obtained from the Community Survey of 2007 and the Census of 2011 is merged into this panel data set in order to add a set of community factors into the data set. These variables include local social-economic indicators, such as the unemployment rate and water and electricity provision. In addition imputations are conducted in order to obtain a continuous income variable in order to construct controls for inequality.

These data are then used to provide a descriptive profile of migrants in Section IV. The descriptive analysis suggests that migration is particularly prevalent for the young and educated originating from households with sufficient financial resources to overcome liquidity constraints and support migration. However, this is not to say that these migrants are well off. Indeed, migrants appear to stem from communities where lower than average service delivery rates are present and in which income is more unequally distributed.

Although a significant number of migrants do not participate in the labour force, for working age adults, the decisions to migrate and to participate in the labour force are highly intertwined. Section V presents an outlined of an appropriate

methodology to deal with the interrelated decisions using a multivariate analysis that models these two decisions jointly using a bivariate probit model. Section VI, which provides the related estimates affirm that it is the young and educated who migrate. Within their communities they come from relatively better off households who potentially can afford both the costs of migration and sustaining the migrant. However, the community data suggest that migrants come from relatively poorer communities. In addition migrants emanate from communities with lower levels of service delivery and local development as measured through various proxies. Furthermore it is found that individuals prefer to stay in communities with lower levels of relative inequality and migrate out of communities with high levels of relative inequality.

Finally a brief look at the labour market for migrants post migration is provided in Section VII. It is found that a significant proportion of individuals move into the labour market post migration while a smaller proportion become non-active. In addition migrants appear to gravitate towards certain occupations in certain professions. In order to analyse the effect of migration on wages an appropriate approach is derived in Section 14.1. The estimates of this approach, reported in Section 14.2, indicates that selection into migration has a detrimental effect on wages. Without the selection effect migrants in the upper end of the wage distribution would be better off while migrants at the lower end are reportedly worse off without the selection effect into migration.

Part II

Literature Review

Issues surrounding labour mobility are often complex and interrelated as a migration decision embodies factors operating at the levels of the potential migrant's household and community. Labour mobility in South Africa is no exception and is often further convoluted by the impact of the historical apartheid laws. The purpose of this section is to provide a brief outline of migration theories as well as the context to migration in South African. In addition an overview of labour mobility trends and findings in South African is provided in order to guide the forthcoming analysis.

1 Theories of Migration

The theory behind migration has been strongly linked to economic incentives and dates back to the "laws of migration" formulated by Ravenstein (1885). In development economics, Classical and Neo-classical theories postulate that excess rural labour will supply the urban workforce promoting the industrial economy if the marginal returns to urban labour exceed that of the marginal returns to rural labour (Ranis and Fei, 1961; Lewis, 1954). Harris and Todaro (1970) advanced such thinking by framing migration in terms of a strategic cost-benefit analysis whereby individuals synthesise their overall impression of "place utility" and contrast this to an alternative location (Wolpert, 1966). Factors influencing the utility an individual obtains from a place of residence are based on real incomes, probability of attaining such income, cost of travel and psychological costs of migration (Bauer and Zimmermann, 1998). Thus the decision to migrate is not based on real income but the expected wage differentials weighted by the probability of employment as captured by the unemployment rate. Large wage differentials influence regional income inequality resulting in differences in income inequality influencing decision to migrate (Card, 2009).

Lack of knowledge of the world beyond the horizon may result in a mismatch of expectations and actual prevailing situations. Such mistakes can be immensely costly to migrants and their sending households. The use of migrant networks offer considerable risk mitigation in this regard (Tilly and Brown, 1967). Networks connect migrants, former migrants and non-migrants in communities of origin and destination allowing the sharing of resources and information and thus facilitating the migration process by reducing uncertainty (Massey, 1988; de Haas, 2008).

Strong societal norms of the migrant's home society embedded in the migrant's networks may also encourage perpetual (oscillating) migration reversing the direction of migration as migrants relocate back to the communities of origin (de Haas, 2008; Portes, 1994).

In developing countries where factor and credit markets are imperfect, frameworks of migration devised in developed economy contexts might fall short in explaining patterns or individuals choice of migration as marginalized groups struggle to access capital or insurance markets, hampering labour mobility (de Haas, 2008). An alternative to these theories of migration was proposed by Lee (1966) who revised Ravenstein's 19th migration laws into a push and pull framework which identifies the factors associated with the area of origin, the area of destination, personal characteristics and intervening challenges. Empirical applications of the push-and-pull model have found economic incentives, such as higher expected wages luring individuals into urban centers and dissatisfaction with communities of origin, as significant factors in the decision to migrate (Skeldon, 1997; King and Schneider, 1991).

Due to liquidity constraints and initial high migration costs, inequality within communities and across destinations of receiving and sending households affect migration patterns (Stark et al., 1986). With significant liquidity constraints posing a hurdle to migration, households in the upper tail of the local income distribution are the first to migrate, which due to remittances, may perpetuate income inequality in the origin communities (Mckenzie and Rapoport, 2004). Higher income inequality within communities may also act as an incentive for migration as individuals at the lower end of the income distribution aim to increase their relative wellbeing (Stark, 2005; Liebig and Sousa-Poza, 2004). Multiple studies have tried to control for inequality in the migration decision, through the use of inequality measures in the migration decision, with significant but varying results (Liebig and Sousa-Poza, 2004; Chaswick, 1999).

Recent literature has disregarded the view of the maximizing individuals and regarded them as part of households, families and communities which jointly consider the migration decision as risk-sharing behavior among members adopted as a survival strategy (Taylor, 1999). Households, which collectively are better aided in overcoming market constraints, respond to income risk by diversifying household resources in the hopes that migrants' remittances will provide income insurance (Stark and Levhari, 1982; Lucas and Stark, 1985; Taylor and Wyatt, 1996). In addition households may opt to relocate if stressful stimuli, driven by a poor fit

between household needs and environmental resources that the local surroundings present, exceed a household tolerance level (Wolpert, 1966; Speare, 1974; Croy et al., 2009).

Empirical applications in the international literature of internal migration have focussed predominately on developing countries aimed at profiling migrants, capturing migration trends and modeling the decision to migrate. Migrants in Europe and the United States tend to be young, educated and less risk-averse boasting better contacts in receiving areas than the population at large (Todaro, 1980; Bell and Muhidin, 2009). Such migrants typically move from rural areas to urban centers in search of work (United Nations, 2000; 2008; World Bank, 2008). However some countries have attempted to reverse such trends through various direct or subtle state interventions such as restrictive policy regimes in China (Cai et al., 2009), government-sponsored transmigration programmes in Indonesia (Bell and Muhidin, 2009) and central controlled housing in the Netherlands. As a developing country South Africa mimics some of the trends displayed by migrants and migration patterns especially that of Brazil, Indonesia and China despite its distinct history (Bell and Muhidin, 2009). South Africa has it's own long-run history of migrant labour to which we now turn.

Trapped in remote pockets of the country African households face various community level factors affecting the "place utility" obtained from the rural homestead. However rural individuals face liquidity constraints and initially high migration costs as well as large wage differentials and regional income inequality muddling the migration decision. Thus, the historic and modern migratory tends of migration in South Africa are discussed due to the inherited disassociation of African households from employment opportunities which have preverted the employment landscape and adversely affected migration decisions.

2 Historical and Modern Trends

Labour mobility in South Africa has been fundamentally distorted by the institutionalized discrimination of separate development and then apartheid in both the labour market and society. Through a history of segregation and separate development the apartheid regime institutionalized the migrant labour system for African workers. African households were forcefully relocated away from productive economic centres to rural homelands to undertake a process of separate development with labour migration closely regulated (Nattrass, 1976; Spiegel, 1980, Wilson,

2001). The long history of separate development starts with the discovery of diamonds and gold in the nineteenth century (Bundy, 1979). The Land Act of 1913 was seminal. Through this Act, the colonial government ensured a supply of migrant workers by decreasing the cultivable land available for Africans, limiting sharecropping and instituting various administrative controls aimed at pushing African households to turn to wage labour as a means of survival (Walker, 1990).

A range of additional measures adopted by the apartheid government entrenched a pattern of circular migration for African households from rural areas to urban centers. Influx control formally regulated this. All Africans over the age of 16 were forced to carry a passbook permitting movement within urban areas and a comprehensive registry established by the labour bureau listing of all job-seekers, further limited movement of Africans (Posel et al., 2006). Additional "internal controls" imposed a gender division of migrant labour as society through chiefs, husbands and fathers enforced traditional rural production roles for women by restricting mobility through social pressure and economic dependence (Bozzoli, 1985; Posel, 2001a). For migrants, permanent relocation to urban areas, for employment or any other reason, was beyond consideration as laws limited the consolidation of migrant families in urban areas. Migrants were unable to obtain permission to bring their families to places of work due to the passbook system, which restricted movement of non-whites through influx control measures (Spiegel, 1980).

Furthermore migrants had no security of employment, delivery of social services or residential rights in urban areas thus forcing migrants to maintain networks to rural areas (Posel et al., 2004; Wilson, 1996; Beinart, 1980). Migrants thus provided continual financial support to rural households through remittances and used rural households as an insurance against unemployment, uncertainty and the possibility of retirement. These factors put in place an oscillating pattern of movement between their rural homesteads and the urban centers of employment (Stark, 1991; Posel, 2003a). As part of the apartheid ideology of "separate development", the creation of rural "homelands", declared politically independent but economically reliant on the South African economy, further perpetuated the oscillating pattern. Migrant workers were regarded as citizens of their "homeland" and only workers in the economic centres of South Africa (Wilson, 2001; Wilson, 1996). The system of apartheid thus trapped the majority of South Africa's population in remote pockets of the country while instituting dependence on urban economic centres (Grieger et al., 2014).

South African anthropological work suggested that ceremonial traditions, in the

form of beer drinking rituals, surrounding the arrival and departure of migrations in celebration of their return and presence at home, evolved (McAllister, 1980). Migrants were further encouraged to spend their visits socializing with friend and family, free from assumption of commitment to household production, resulting in a rise of "men of two worlds" (Mayer and Mayer, 1974; Simkins, 1983).

The repeal of the passbook system and abolishment of influx control in 1986 opened the possibility of permanent relocation to all South Africans (Savage, 1987). In order for the abolishment of influx control to take place in an orderly manner the apartheid state negotiated with African leaders and endeavored to prepare infrastructure and service sites in preparation for the anticipated influx of Africans in urban areas (Savage, 1987).

Nonetheless, on the arrival of the new democracy in 1994, the past had left a legacy that was clearly a society with very high unemployment, especially in rural areas, very high levels of inequality and a strong rural bias in poverty. All of this amounted to dampened prospects of a new life for the rural inhabitant (van der Berg et al., 2003). Despite the anticipated flood of Africans into urban centres due to the "breaking of the dam wall" associated with the removal of the system of influx control system, coupled with the prospects of a new life in urban centres, aggregate levels of migration did not increase nor did the oscillating pattern of migration disappear (Grieger et al., 2014; Posel, 2003b). Households continued to be "stretched" and "split" with similar flows in individuals migrating reported in the early years of the new democracy (Kok et al., 2003).

However the high rate of rural unemployment has been associated with an increase in the labour force participation of rural African women. Such women searched for work in urban areas as low skilled domestic workers in the hope of securing remittance income for rural households (Burger and Woolard, 2005). At the same time migrant labourers in urban centers were not at the "front of the job queue" as they had inferior characteristics relative to their competitors in urban labour markets. Nonetheless this may have been a better prospect for them than remaining as unemployed in the rural areas. (van der Berg et al., 2003 Burger and Woolard, 2005).

The high unemployment rate in urban areas increased the uncertainty over the possibility of finding work in urban centers requiring migrant workers to take large risks in the pursuit of employment with the highest incidence of poverty reported among newly arrived migrant workers in urban centers (Yu and Nieftagodien, 2008). The inherited disassociation of African households from employment op-

portunities thus continued to perpetuate oscillating trends in migration patterns as the rural homesteads of migrant laborers continue to offer an 'insurance' for work-seekers and care of children in the face of increasing labour market insecurity and rising unemployment (Posel et al., 2006).

Recent literature suggests that as we moved into the second decade of democracy gravitational flows have began replacing circular flows of migration with migrants reporting a decreased preference to return to their home of origin and with other household members, as well as children, joining migrants in the newly established homes (Bekker, 2001). Residential movement is most common for children younger than four years old with most children older than 14 never experiencing a residential move (Ginsburg et al., 2008). Migration started to become associated with the establishment of new households; with migrants being considered as the head of household post migration and parents and other relatives joining the newly established household (Klasen and Woolard, 2008). However health literature in South Africa has noted trends indicating that dying migrants move back to rural households so perpetuating circular migration flows (Clark et al., 2007).

Not all of the migration has been rural to urban migration. A high proportion of migrants opt to migrate to local towns across municipal boundaries but within provincial bounds mainly due to costs associated with covering vast distances (Moses and Yu, 2008). Migration to secondary towns remains evident indicating the relevance of intra-district migration and rural to rural migration patterns (Rogan et al., 2009). Limiting the study of migration to rural-urban migration thus excludes migrants opting for secondary towns and biases the reporting of migration trends.

3 Review of Contemporary South African Migration Trends and Findings

The aggregate trends in migratory patterns conceal the intricate decision making process preceding an observed migration. The international literature on internal migration within developing countries has shown that the migration decision depends on individual-level factors and also involves the entire household and even factors that extend to the community as a whole. For example, Bauer and Zimmerman (1998) highlighted the importance of the relative unemployment rate as an influence on the decision to migrate, as it captures the probability of obtaining income post migration, and Stark (1986) and Liebig and Sousa-Poza (2004)

argue that inequality has an impact on migration. Neighborhood effects in social processes have spawned a vast literature although their impact is considered to be quite small (Clark, 2013).

In response to this literature, various studies have started to analyze the personal, household and community level determinants of migrant labour in an attempt to disentangle these multilayered determinants of migration in South Africa. Several studies have isolated individual demographical factors influencing the decision to migrate such as age, education, gender, marital status and children. This literature suggests that migration is age selective with most age cohorts older than 18 years displaying positive probabilities of migration that decrease with age through to the older adults and the elderly (van der Berg et al., 2003). Young adults are particularly likely to migrate both for schooling and as a transition out of school into the labour market. That said, for those who have finished their education, educational attainment has proved to be a mixed indicator of the decision to migrate. There is some evidence that complete secondary schooling increases the likelihood to migrate while tertiary education reduces the likelihood of migration (van der Berg et al., 2003). Conversely completion of high school has been found to have no influence on the decision to migrate for males (Van der Berg et al., 2003).

There is more consistency is the areas of marriage and gender and migration. Marital status seems to exert no influence on the decision to migrate (van der Berg et al., 2003; Posel et al., 2006). In addition, women are less likely to migrate than men, presumably due to traditional gender roles in household production (van der Berg et al., 2003). Women with children are found to be less likely to migrate, although children age 0-6 are more likely to accompany migrating parents than older children (van der Berg et al., 2003).

Additional factors beyond the individual may influence the individual's decision to migrate. Household and community factors have been found to influence the decision to migrate on multiple levels. Higher levels of poverty on a community level have led to an increase in probability of women migrating (van der Berg et al., 2003). That said, migrants seem to stem from households with adequate household resources to fund the migration process (Alderman et al., 2000) are more likely to be households already receiving remittance income (van der Berg et al., 2003).

The extension of the governmental social protection net to all South Africans post 1994, has led to various studies focusing on the impact of social grants on well-being, fertility, labour market and migration. There is strong evidence that the

rural unemployed have aligned themselves with households who receive a pension (Klasen and Woolard, 2002; Klasen and Woolard, 2009). In a review of the evidence on the state old age pension and labour supply in South Africa, Woolard and Leibbrandt (2010) conclude that the evidence is mixed. However, and of direct relevance to this study, the attainment of the Old Age Pension by a member of a household has led to the encouragement of individuals who have successfully completed high school to migrate in search for work (Ardington et al., 2013). This is especially true for prime aged members of the household and for African women (Ardington et al., 2007, Posel et al., 2006, Edmonds et al., 2003). The arrival of the pension has help overcome the lack of access to labour market networks and information associated with rural areas but, in particular, aided in overcoming liquidity constraints. (Dinkelman and Pirouz, 2001). It seems clear that the arrival of pension income overcomes the cost of migration and also aids a household in affording the risks involved in migration. By potentially sustaining an unemployed household member in an urban area until they find employment, the household is sharing income risk by diversifying household resources through migration.

The impact of community level indicators of socio-economic circumstances, such as unemployment and inequality within communities on the migration decision have, for the most part, not been studied in the South African context. This is despite the relevance of inequality in the theoretical and international empirical literature. Clearly then, the inclusion of these community characteristics on the individual's migration decision is an area of particular interest and investigation for this report.

In sum, aggregate migration trends in modern South African reveal the persistence of apartheid-era oscillating migratory patterns but also some evidence that more stable migration patterns are emerging. The inter-relatedness of migration and labour force participation decisions is still evident despite the abolishment of an entrenched migrant labour system. There is enough evidence to support the premise from the international literature that the intricacies driving labour migration in South Africa are layered with individual, household and community level factors influencing an individual's choice. However, to this point the data available in this country has not allowed for a through interrogation of these interactions. We go on to describe the data that allow us to make this is the particular focus of our study.

Part III

Data

This section begins by briefly discussing several issues regarding migration patterns in household survey data before discussing the available data in South Africa including the community level data. The use of South Africa's first nationally representative panel dataset allows us to overcome most of the challenges that have previously impeded migration studies in South Africa. In addition the Community Survey of 2007 and Census of 2011 are used to derive community level indicators in order to allow for the study of community level factors influencing the decision to migrate. Imputations are utilized in order to derive a continuous income variable required for the construction of a community level inequality measure. This section thus details the various data decisions undertaken before analysing the data through a descriptive and multivariate lens in subsequent sections.

4 Migration in South African Data

Migrants in household survey data can be captured in numerous ways depending on the definition of the household in the data. This is due to the fact migrants may identify themselves as members of the household of origin or may be considered as part of a destination household (Townsend, 1997; Hosegood and Timaeus, 2001). Such ambiguity opens the door to double counting as household members from the origin household identify the migrant as a member while the migrant self-identifies as a member of another household. In order to prevent such double counting, household surveys impose predefined residency requirements on the definition and measurement of households (Posel, 2010). Despite the fact that the inclusion of migrants in origin households can introduce errors in reporting as members attempt to infer aspects of the migrant's life without complete knowledge of the migrant's situation, this has been the primary route for obtaining information on migrants in South African surveys (Posel, 2010).

In general, South Africa has an abundance of post-apartheid household survey data to choose from. An Income and Expenditure Survey has been conducted every five years from 1995 onwards. From 1995 to 2000 Statistics South Africa conducted an annual October Household Survey. From 2000 this survey was split into an annual General Household Survey and a Labour Force Survey which was conducted twice a year. From 2008 this Labour Force Survey was run four times a year as the Quarterly Labour Force Survey.

Unfortunately, this abundance of general socio-economic data is quite limited in terms of analyzing migration. These data sets impose strict residency requirements from the outset, as residents must normally reside at least four nights a week in this household, resulting in an absence of data collected on migrants from such households.

The Project for Statistics on Living Standards and Development (PSLSD) and the National Income Dynamic Study (NIDS) conducted by the Southern African Labour and Development Research Unit at the University of Cape Town in 1993 and 2008 respectively, apply a more liberal residency requirement for the household rooster. By allowing as non-residents those who have stayed at least 15 days out of the past year with the household, demographical information regarding the migrant has been captured (Posel, 2010).

As noted above, using information from the household roster poses several problems due to the fact that the information is not self-reported by the migrant. In addition, the information is post migration, allowing little inference to be drawn on factors and circumstances influencing the ex ante decision to migrate. These issues can be avoided through the employment of panel data, which observes individuals in the pre-migration as well as post migration state over time. Defining migration as a change in location between waves for resident household members allows the user to observe the migrant in both the pre and post migration state and collect full information of the both states. However, such panel data are much less common in developing countries and, in particular, in South Africa.

Both the PSLSD and NIDS have a panel aspect. The PSLSD, initially a nationally representative cross section household survey, gave birth to the KwaZulu-Natal Income Dynamics Survey (KIDS) which utilized the sample frame of the PSLSD in the KwaZulu-Natal (KZN) province of South Africa as a basis for a longitudinal study by treating the KZN subsample of PSLSD as a first wave and conducting subsequent waves (May et al., 1999). 1389 households of all races from the initial PSLSD subsample in KZN were re-surveyed in 1998 and in 2003 with the third wave locating only 867 of the original households in the sample (May et al., 1999).

NIDS was designed from the outset to be South Africa's first nationally representative panel dataset. The first wave was conducted in 2008. A two stage clustered design was applied with first-stage sampling on enumeration area (EA) level and then randomly selecting households within the selected EAs. The result was that

7296 households were being contacted and more than 28 000 individuals were interviewed, thus becoming the nationally representative base wave sample for the panel. Subsequent waves conducted in 2010 and 2012 have traced the majority of sample members across the country with 8040 household interviews and more than 32000 individual interviews being conducted, accounting for increases in sample size due to births of sample members and individuals who migrate (de Villiers et al., 2013). The advantage of using NIDS lies not only in its representativeness of the nation or its large sample size but especially in the fact that individuals are tracked across the country and full information is collected on their individual and household facets. Thus, NIDS provides full pre and post migration information at the individual and household levels. In additional the collection of Geographical Information System (GIS) data on households in the form of the household's location as per global positioning system (GPS) coordinates allows for the measurement of the distances moved by migrants. Due to its national representativeness, tracking of individuals and the collection of GIS data, NIDS is the preferred choice for studying migration and labour force participation in contemporary South Africa.

As previously discussed the relationship between household needs and the local social and economic environment within which people live are considered community level factors influencing the decision to migrate. South Africa's 234 municipal districts including 8 metropolitan cities are the administrative units for basic service delivery to local communities. These local environments may factor into an individual's decision to migrate.

In order to merge these municipal data into NIDS one needs to know the municipality of residence for NIDS sample members. However, in protecting the anonymity of NIDS sample members, the public release versions of NIDS data contain location variables indicating only the district council of residence. The NIDS operation has application procedures to access the secure NIDS data was under tightly controlled circumstances. We applied for and were granted permission to access these data in order to map individuals GPS coordinates to municipal data[1]. Once individuals have been mapped to municipalities, we could merge in the municipal data.

Thus employing GIS data across time allows for the refinement of the definition of migration. In this study, migrants are defined as individuals whose GPS coordinates place them in two different municipalities in two different waves. Between

[1]Municipal boundaries data is obtained from the South African Demarcations Board, and an individuals' GPS point coordinates is mapped to the polygon of GPS points defining a municipal area so that membership to a municipality can be defined as one's GPS coordinates being contained within the polygon of a municipal GPS boundaries. The result is achieved using municipal shapefiles and GPS mapping technics of Brophy et al. (2014).

wave 1 and wave 3, 3190 continuing samples members of the total 28000 continuing sample members moved residence as reported by a change in GPS coordinates (de Villiers et al., 2013). We focus on only individuals over the age of 16 throughout this paper. Rather than imposing an arbitrary distance moved as a requirement for classification as a migrant, we consider movement between municipal districts as migration. South Africa is divided into 9 provinces and subdivided into 234 municipal districts including 8 metropolitan cities which range in populations of 50 000 to 6 million (Census, 2011). This is motivated by the prevalence of rural to rural movement as well as documented migration patterns between municipalities, but within provincial bounds as discussed in Section 2 (See Moses and Yu, 2008).

Thus, we have three waves of NIDS data and community information at the municipal level. We then defined migration as movement across municipal boundaries between wave 1 and wave 3 of NIDS. As we define a migrant as a person who moves between waves, we treat the base wave as the initial pre-migration period and use wave 3 for the post migration period.

5 Community Level Data

NIDS contains very rich data on the respondent's individual and household characteristics. However NIDS is nationally representative and not representative of each municipality and deriving community level data by aggregating up from individual data in the survey is not possible. In addition, the international literature that we reviewed earlier suggests that local inequality and unemployment measures are required.

To access these community variables, we turn to national household surveys to obtain community level data which can be merged into the NIDS dataset. The Community Survey (CS) of 2007 was conducted by Statistics South Africa with the aim of providing data at lower levels of geography, such as district and municipal levels, and to build logistical capacity for Census 2011. The CS conducted 238 067 household interviews in all provinces and municipalities of South Africa. Information regarding demographics, employment, income and housing was collected (Stats SA, 2008). As the CS was a precursor to the Census of 2011, the questionnaire design follows a similar layout and framing of questions as the Census. The census itself was conducted in October 2011 and the first statistics released in 2012 after comparison with the post-enumeration survey.

Given the depth of information and the timing of the CS and the Census, we construct municipal level variables for the 2008 and 2012 waves of NIDS respectively. Particular attention is paid to constructing measures for the size of the local labour market, average per capita income within a municipality, percentage difference in municipal and national employment rates, percentage differences in municipal and national Gini coefficients and various proxies aimed at capturing the level of service delivery and development within a municipality.

The selection of these community factors is driven by the theoretical and South African literature on migration which highlight the role of employment, poverty and inequality in the decision to migrate. As the CS and Census is conducted on a household level, we aggregate per capita income estimates to municipal level. This allows us to derive community level poverty and inequality measures. In addition, we include a set of indicators for service delivery. These are: the proportion of the households with refuse collection conducted by the local municipality, the proportion of the households with tapped water and local development, such as the proportion of households with postal services, the proportion of the households with electric cooking facilities and proportion of the households with internet access. Initially these variables are binary variables which indicate whether an individual has access to these facilities. These binaries are aggregated up to municipal level in order to calculate the proportion of individuals within a municipality who has access to these services.

In both the Community Survey of 2007 and the Census of 2011 individual income inequality is measured through the reporting of income in bounded intervals income categories whereby a respondent is offered the choice of a series of bounds in which her income may fall. The preferred way to make use of bounded income intervals, in order to obtain inequality measures, is to impute an actual individual income using the bounds as guidelines. Consequently an imputation strategy similar to Daniels (2012) is employed. This univariate multiple imputation for bounded data approach is described in detail in the subsequent section. The derivation of a reliable household per capita income measure through imputations allows us to create municipal inequality measures and thus assess the impact of relative community level inequality on the migration decision.

6 Imputations

As mentioned in previous subsection a household income variable is required in order to derive community level inequality indicators required in the evaluation of the impact of community level characteristics for the migration decision. In the two Statistics South Africa surveys, the Community Survey of 2007 and the Census of 2011, individual income is measured through the reporting of income in bounded intervals. Respondents are offered the choice of a series of income categories in which her income may fall resulting in a bounded range as oppose to a point estimate of an individual's income. The preferred way to make use of bounded income intervals, in order to obtain a continuous income variable, is to impute for actual individual income using the bounds as guidelines. This is preferred to deriving an income variable by simply taking the midpoints of the bounds as one does not introduce bias (Daniels, 2012). Imputing for income in South African data is not uncommon. Lacerda (2006) imputes for missing data in order to assess the impact of missing income data on inequality, while Daniels (2012) imputes missing wage income for employees. An imputation strategy similar to Daniels (2012), which involves an univariate multiple imputation for bounded course data can be employed in order to derive individual income measures.

Following Daniels, (2012) by adapting Rubin's (1976, 1987), let $y_{obs,\,ij}$ denote the coarsened variable such that within the sample space Ψ of Y for individual i in the interval j. Then:

$$y_{obs,\,ij} = \begin{cases} y_{ij} & if\ G_{ij}\ = 0 \\ y_L \leq y_{ij} < y_U & if\ G_{ij}\ = \{1, 2, 3, ..., b\} \\ \Psi & if\ G_{ij}\ = \{b+1\} \end{cases}$$

indicates whether the bounded observed variable $y_{obs,\,ij}$ falls within one of the upper and lower bounds of an income bracket, given by y_L and y_U and denoted by G_{ij}. Table 1 reports the bounds, G_{ij}, for both the CS and the Census of 2011 with both datasets allowing for a the lower bound category of no income and an upper bound of more than R204 801. As a respondent reports the value to be within an income bracket the variable indicating the brackets, G_{ij}, is measurement error free (Heitjan and Rubin 1991; Wittenberg 2008). Let $Y^*_{I,\,ij}$ represent the continuos unobserved variable with a corresponding latent model of $Y^*_{I,\,ij} = X_I\beta + \epsilon_I$ where $\epsilon_I \sim N(0, \sigma^2_I I)$. Observation can either be left centered, y_ℓ where $i \in L$ right centered, y_τ where $i \in R$, or observed within an interval, $y_{1j}; y_{2j}$ where $i \in C$, denoted by G_{ij}. Generally the zero income category is captured with

$y_{ij} = 0$ if $G_{ij} = 0$. The log-likelihood as per Wooldridge (2013) and Davidson and MacKinnon (2004) for the interval regression of observed variables $y_{obs,\,ij}$ and X_I is:

$$\begin{aligned} lnL &= \sum_{j \in L} log\Phi(\frac{y_\ell - X_I\beta}{\sigma}) + \sum_{j \in R} log\{1 - \Phi(\frac{y_\ell - X_I\beta}{\sigma})\} + \\ &\quad \sum_{j \in C} log\{\Phi(\frac{y_2 - X_I\beta}{\sigma}) - \Phi(\frac{y_1 - X_I\beta}{\sigma})\} \end{aligned}$$

Using the interval regression on observed data we can impute for individual income values obtaining an unbiased continuous income measure through the use of multiple imputations. Multiple imputations or fully sequential regression multiple imputation, developed by Rubin (1987), is a Monte Carlo technique in which missing values are replaced by m simulated versions generating m simulated complete datasets. The model or statistic used for analysis is then estimated for each individual dataset separately before combining the results in order to produce estimates and confidence intervals incorporating the missing-data uncertainty (Schafer 1999; Van Buuren et al. 1999). If applied correctly, Multiple Imputations lead to efficient estimators and unbiased results (Rubin 1974; Rubin 1996; Schafer 1999). We let $m = 10$ similar to Daniels (2012).

Table 1: Category Bounds for Income in Census and Community Survey

	Monthly		**Annual**	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Category				
1	No Income		No Income	
2	R 1	R 400	R 1	R 4 800
3	R 401	R 800	R 4 801	R 9 600
4	R 801	R 1 600	R 9 601	R 19 200
5	R 1 601	R 3 200	R 19 201	R 38 400
6	R 3 201	R 6 400	R 38 401	R 76 800
7	R 6 401	R 12 800	R 76 801	R 153 600
8	R 12 801	R 25 600	R 153 601	R 307 200
9	R 25 601	R 51 200	R 307 201	R 614 400
10	R 51 201	R 102 400	R 614 401	R 1 228 800
11	R 102 401	R 204 800	R 1228 801	R2 457 600
12	R 204 800 or more		R 2 457 601 or more	

Note: Respondents selection either month or annual income

From the Community Survey of 2007 and the Census of 2011 an appropriate set of covariates is selected similar to that of a standard income regression (Daniels, 2012). As per a standard income regression covariates used for imputation are

individual demographical characteristics which include age, gender, race martial status, years of education, employment status and an indicator for receipt of a social grant. The use of such covaraites has led to successful imputation of individual income on South African data (Wittenberg, 2008; Daniels, 2012). In addition an asset index of household durables is created as the household rankings of income and asset scores are similar and thus provide some guide to missing individual income (Filmer et al., 2001).

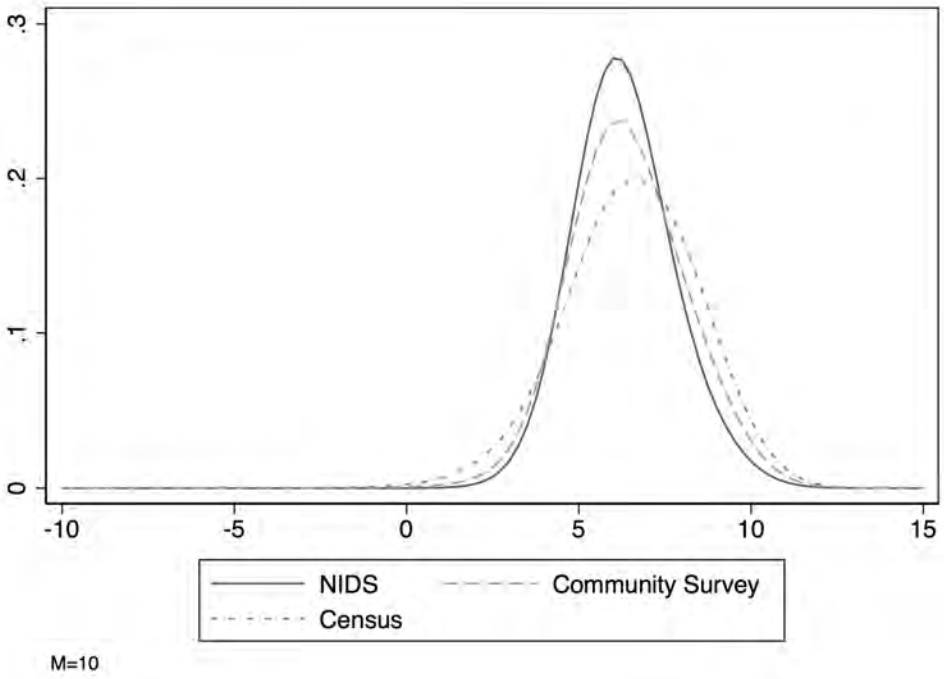
Using the interval regression these covariates are used to impute an income per individual given the reported bounds of the income category, G_{ij}. The procedure is repeated 10 times and the Gini Coefficient of income inequality is calculated for each imputation distribution resulting in 10 Gini coefficients for each municipality. In addition 10 gini coefficients are calculated on the entire distribution in order to obtain a national Gini. The 10 Gini coefficients, both for national and for each municipality, are then combined using Rubin's Rules as outlined by Royston's (2004) in order to obtain a single gini value nationally and for each municipality. For the attainment of a Gini coefficient, the 10 Gini coefficients for a municipality can simply be averaged in order to obtained a single unbiased Gini coefficient for a municipality.

For the use of this study, we create a single variable capturing the difference between the national and municipal inequality. This is achieved by differencing each municipalities Gini Coefficient and the national Gini Coefficient in order to capture differences in equality between municipalities as benchmarked by the national level of inequality as explained in Section 3.

As per Daniels (2012) the densities of the imputed log income per capita variables for the census 2011 and community survey 2007 as well as the un-imputed NIDS variable for comparison is plotted in Figure 6.1. Figure 6.1 plots the densities of the log of the three variables weighted to be nationally representative. The distribution of the imputed community survey and census resemble the distribution of the NIDS variable as a similar mean, dispersion and kurtosis is obtained for all three measures. NIDS has been benchmarked against several national surveys in order to assess the veracity of the income data in NIDS and thus this triangulation of income across the two imputed datasets suggests the imputation individual income measure was derived.

The use of imputations to obtain a continuos income variable from bracketed coarse data has been successfully achieved. Furthermore, the imputed income variables

Figure 6.1: Log of Individual Income from Three Datasets



Note: The variables used are the post imputations income variables from the Community Survey 2007 and the Census 2011 as well as NIDS wave 1.

can now be used to calculate measures of income inequality, such as Gini coefficients, for each municipality and nationally. These municipal measures are then used in the descriptive analysis and in order to provide controls for the impact of inequality in the migration decision. Augmenting the NIDS panel data with the Community Survey of 2007 and the Census of 2011 provides a holistic and informative dataset presenting us with a rich and unique opportunity to study migration in South Africa.

Part IV

Descriptive Analysis

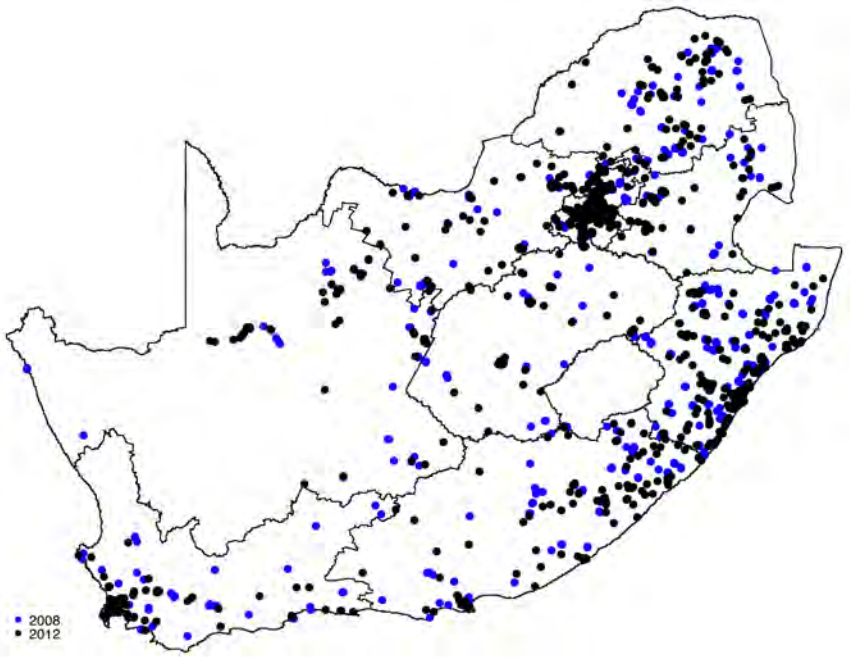
The purpose of this section is to explore the data described in Section 4 through various descriptive figures and statistics in order to capture migratory trends and to provide a descriptive profile of migrants in contemporary South Africa. Trends in migration are first evaluated before profiling migrants through the lens of individual, household and eventually community factors and characteristics. In addition a brief analysis of the post migration labour market outcomes of migrants is undertaken.

7 Migration Locations and Labour Market Status

As mentioned in Section 3, among the advantages of NIDS are its longitudinal nature as well as the collection of GPS data of all respondents. The trends in migratory relocation are captured by contrasting the GPS locations of migrants across the first (2008) and third (2012) waves in order to determine the source and receiving locations of migrants. To be classified as a migrant a person needs to move across a municipal boundary. Figure 7.1 plots the GPS coordinates of all migrants' source (2008) locations and receiving (2012) locations in NIDS. Despite the recent literature, mentioned in Section 2 concerning intra-rural migration, the majority of receiving destinations are centered in Gauteng and the coastline areas around metropolitans of Durban, Cape Town and Port Elizabeth. This indicates a predominance of rural to urban migratory patterns as well as migration within urban areas. In addition the receiving locations which are not located in the metropolitan areas are roughly clustered around small towns throughout South Africa. That said, rural to rural migration cannot be neglected either as Figure 7.1 shows a significant number of 2012 receiving points (black dots) that are not located in urban centers.

Figures 7.2 to 7.10 decomposes Figure 7.1 into 9 separate maps categorized by individual sending provinces but allowing for receiving provinces to be any of the 9 provinces. This approach allows for the detection of corridors of migration. Figures 7.2 indicates that the majority of individuals from sending communities located within the Free State Province migrate to communities inside Gauteng Province. This is also true for individuals in the North West, Mpumalanga and

Figure 7.1: Map of South Africa with Migrants Pre (2008) and Post (2012) Locations



Limpopo as shown in Figures 7.3 to 7.5. Despite some individuals locating to rural locations within their sending province the majority of migrants from the Free State, Mpumalanga, Limpopo and North West migrate to Gauteng. Figure 7.6 provides information on migrants originating from the KwaZulu-Natal (KZN) Province. Similar to Free State, Mpumalanga, Limpopo and North West a large portion of migrants from KZN migrate to Gauteng. However the majority of migrants remain within KZN relocating to coastal regions surrounding the Durban Metropolitan. KZN thus shows high rates of internal migration. Migrants from the Eastern Cape tend to migrate out of the Eastern Cape either to Gauteng Province, Cape Town Metropolitan or Durban Metropolitan as indicated in Figure 7.7. Figure 7.8 indicates the location of migrants who originated from Gauteng. Similar to KZN, Gauteng shows high rates of internal migration. However individuals migrating out of Gauteng relocated to the Free State, Mpumalanga, Limpopo, North West, Eastern Cape and KZN.

From the data we are unable to determine whether is this remigration whereby migrants return back to the feeder provinces of Gauteng or individuals living in Gauteng moving to the countryside. Figure 7.9 indicates that although few migrants originate from the Northern Cape Province the large proportion relocate

within the province with a few relocating to Cape Town metropolitan in the Western Cape Province. Migrants from the Western Cape tend to move within the Western Cape particularly to Cape Town metropolitan as shown in Figure 7.10. However some relocate to the Eastern Cape. This is probably return migration based on a move to the Western Cape in years preceding the first wave of NIDS.

Figures 7.2 to 7.10 highlight certain geographical trends in the migration process. Receiving destinations for migrants appear to be Gauteng Province, Durban Metropolitan and Cape Town Metropolitan. Clear corridors of migration to these three destinations exist from the Eastern Cape Province. In addition the Free State, Mpumalanga, Limpopo, North West, and KZN act as feeder provinces for Gauteng.

Figure 7.2: Free State Province Pre (2008) and Post (2012) Locations of Migrants

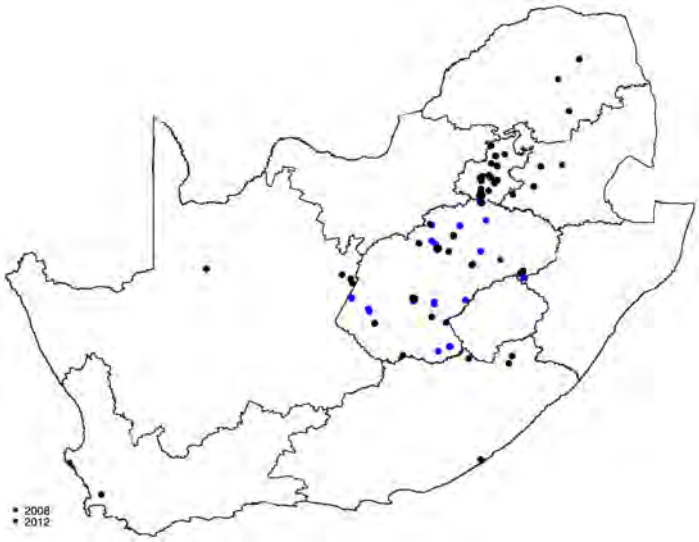


Figure 7.3: North West Province Pre (2008) and Post (2012) Locations of Migrants

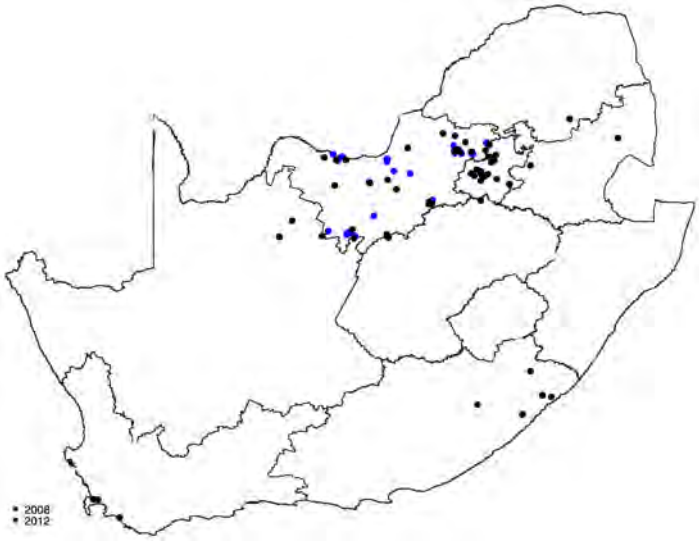


Figure 7.4: Mpumalanga Province Pre (2008) and Post (2012) Locations of Migrants

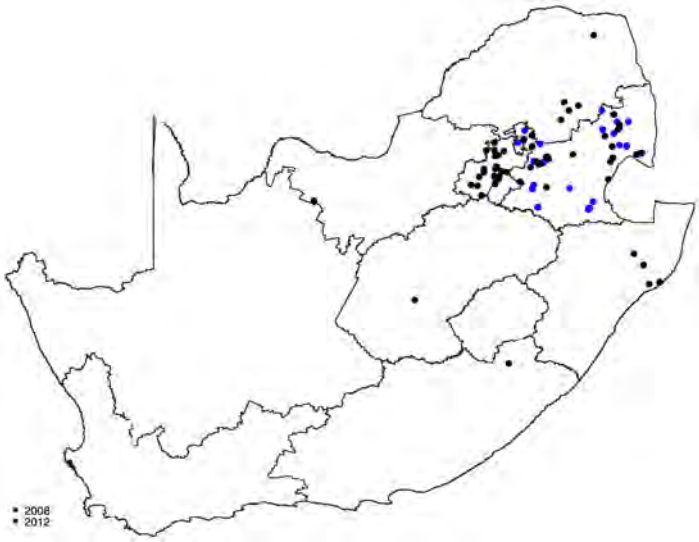


Figure 7.5: Limpopo Province Pre (2008) and Post (2012) Locations of Migrants

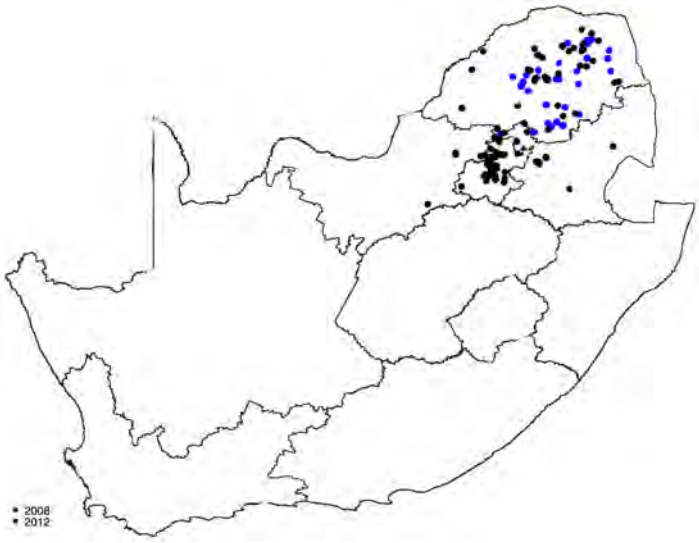


Figure 7.6: KwaZulu Natal Province Pre (2008) and Post (2012) Locations of Migrants

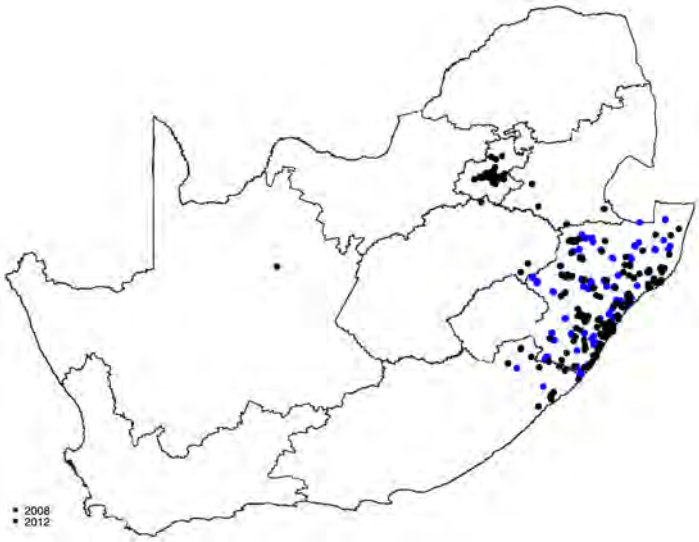


Figure 7.7: Eastern Cape Province Pre (2008) and Post (2012) Locations of Migrants

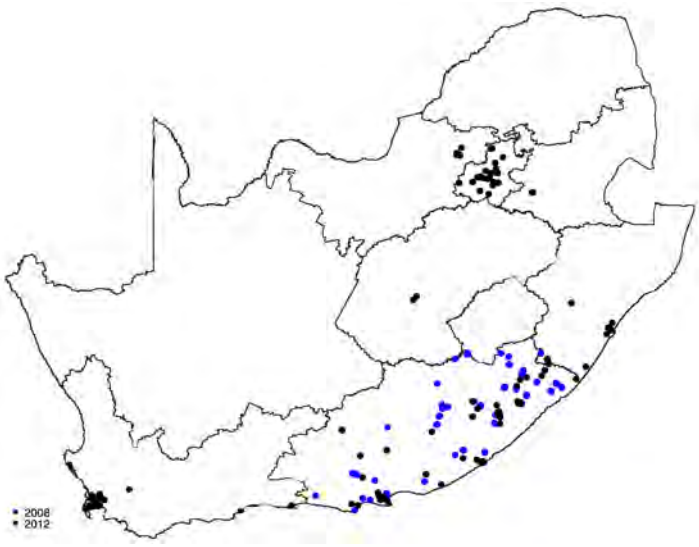


Figure 7.8: Gauteng Province Pre (2008) and Post (2012) Locations of Migrants

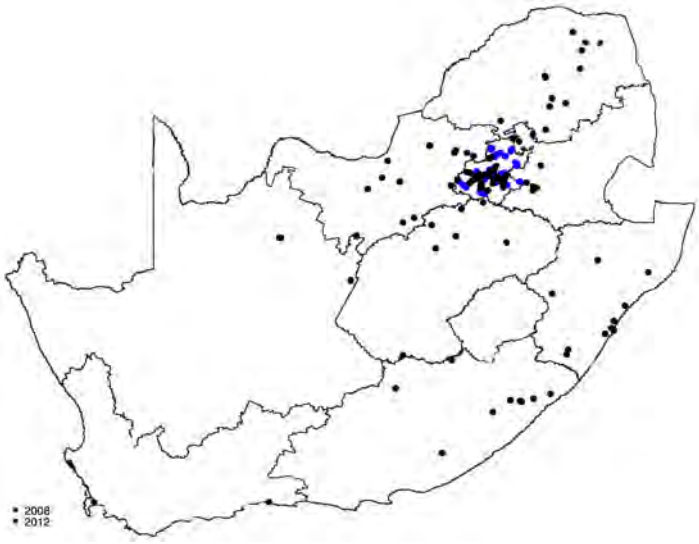


Figure 7.9: Northern Cape Province Pre (2008) and Post (2012) Locations of Migrants

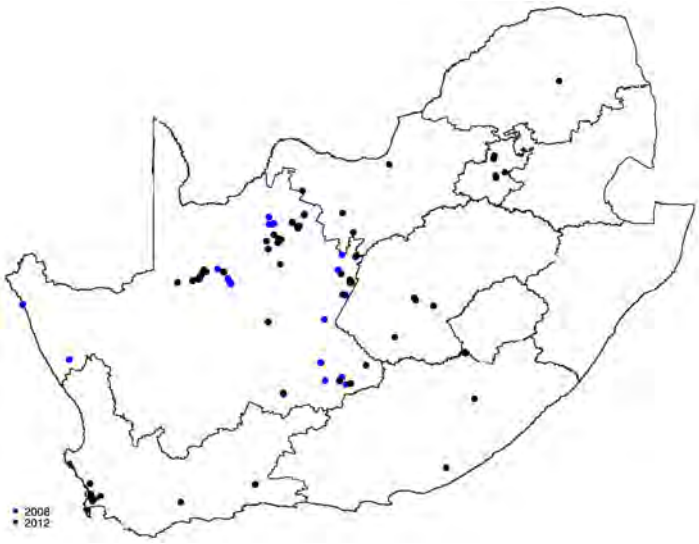


Figure 7.10: Western Cape Province Pre (2008) and Post (2012) Locations of Migrants

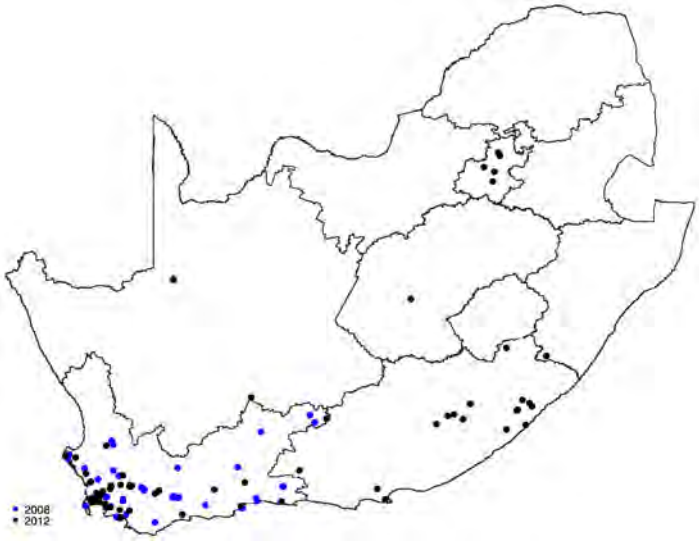


Table 2 provides the percentage of migrants originating from source destinations by province together with the share of the population of non-migrants and the population as a whole. Despite the relatively large population share located in the Western Cape, few migrants originate from the province. This contrasts with Limpopo which has a slightly smaller population share but a substantial share of the migrant population. This indicates an outflow of individuals from the province. Gauteng which has the largest population share also has the largest number of migrants emanating from the province.

Table 2: Population Distribution across Provinces by Migrant/Non-Migrant Populations

	Population Shares	Non-Migrant Shares	Migrant Shares
Western Cape	0.112	0.114	0.0505
	(0.023)	(0.024)	(0.014)
Eastern Cape	0.126	0.128	0.125
	(0.022)	(0.022)	(0.029)
Northern Cape	0.0226	0.0227	0.0251
	(0.0047)	(0.0047)	(0.007)
Free State	0.0544	0.0572	0.0480
	(0.012)	(0.012)	(0.013)
KwaZulu-Natal	0.198	0.209	0.153
	(0.028)	(0.030)	(0.024)
North West	0.0677	0.0623	0.0894
	(0.014)	(0.013)	(0.026)
Mpumalanga	0.0796	0.0823	0.0688
	(0.015)	(0.016)	(0.017)
Limpopo	0.104	0.101	0.155
	(0.019)	(0.018)	(0.031)
Gauteng	0.235	0.223	0.285
	(0.034)	(0.033)	(0.046)
Total	1.00	1.00	1.00
N	26105	23095	1708
Weighted N	46275507	40057873	3080612

Notes: Standard errors in parentheses. Own Calculations Using NIDS data. Cross Sectional Weights used

In order to further assess the rural and urban nature of migration, source, and receiving destinations are classified as tribal, commercial farmlands and urban areas. Table 3 provides the transition matrix of migration between sending areas and receiving areas where these areas are divided into rural tribal authorities, rural commercial farmlands and urban. The diagonal indicates migrants who moved across municipal boundaries during the period from 2008 to 2012 but moved to the same type of area as before while off diagonal elements indicate migrants

whose sending and receiving destinations differed in terms of tribal authorities, farmlands and urban classifications. Of migrants moving from tribal authority areas, the overwhelming majority (71.34%) moved to other tribal authorities. Only 26.11% of migrants originating from tribal authority areas moved to urban centers while only 2.55% moved to commercial farmlands. A similar trend is observed for intra-farmland migration with 64.75% of migrants from farmlands moving to alternative farmlands while only 23.77% relocated to urban centers and 11.48% moved to tribal authority areas. These findings support the literature indicating the prevalence of rural to rural migration. That said, almost a quarter of migrants from tribal and farmlands migrate to urban centers testifying to trends of urbanisation. Migrants from urban centers tend to move between urban centers with 85% of migrant's whose sending community was urban relocating to an alternative urban destination. Only 10% of migrants from urban centers relocated to tribal authority areas while 5% of migrants who emanated from urban areas relocated to farmlands. In general migrants appear to display a tendency towards relocating to areas similar to their sending locations over the short run.

Table 3: Transition Matrix of Migrants Sending and Receiving Locations

		Receiving Destinations (2012)			
		Tribal Authorities	Commercial Farmlands	Urban	
Sending Destinations (2008)	Tribal Authorities	71.34	2.55	26.11	100%
	Commercial Farmlands	11.48	64.75	23.77	100%
	Urban	10.00	5.00	85.00	100%

Notes: Own Calculations Using NIDS data. Cross Sectional Weights used

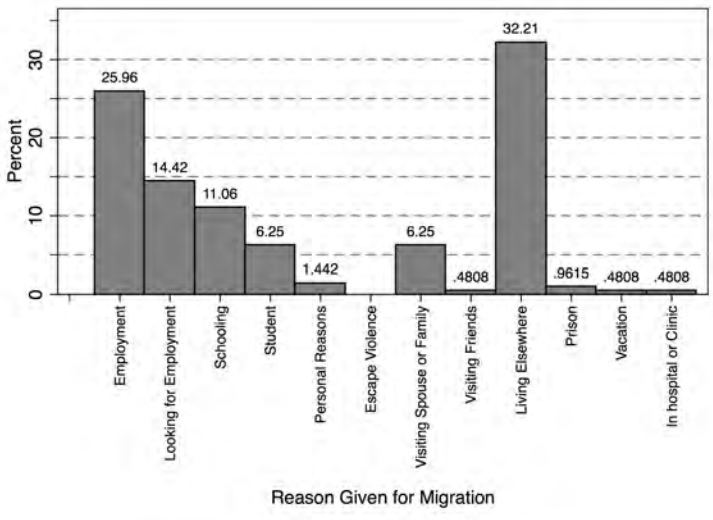
8 Individual Characteristics of Migrants

The profiling of migrants is first viewed through the lens of the individual by detailing person specific characteristics. Migrants and non-migrants are contrasted by demographical characteristics such as age, gender and race as well as education and marital status. However we first use data from the household roster to provide insight into the reason behind individuals migrating.

Using information obtained from the household roster we can gain insight into the motivation behind migration. As previously mentioned the household roster is completed by one well-informed adult household member on behalf of all members of the household. This information is obtained before applying the stricter household definition refining household membership to individuals who reside more than

4 nights a week in the household. Thus information is obtained on individuals who are considered part of the household by the household but may not reside at the household. Using the NIDS panel we obtain information on migrants who are still considered part of a household but do not reside in the origin household for 4 or more nights a week post migration[2]. Thus we study the information of the household roster of wave 3 knowing which individuals have migrated since wave 1. However this is not the entire migrant sample, as some individuals are no longer considered part of the household they used to reside in and are rather considered part of a new receiving households. For such migrants household roster information on migration is not available as they only appear in the data in their residing households for which we have no roster information detailing absenteeism. Thus it is important to note that only a sub-sample (46%) of the total migrant sample is still considered part of households, other than their own, by household members and so have migration roster information. Figure 8.1 indicates the main reason migrants are not present is due to being considered as living elsewhere. The importance of employment decisions in migration is shown by Figure 8.1 with, 26% of migrants being motivated to relocate due to being employed elsewhere while 14.4% are searching for work elsewhere. The labour market accounts for approximately 40% of the reasons supplied as to why migrants have relocated.

Figure 8.1: Reason given for Migration

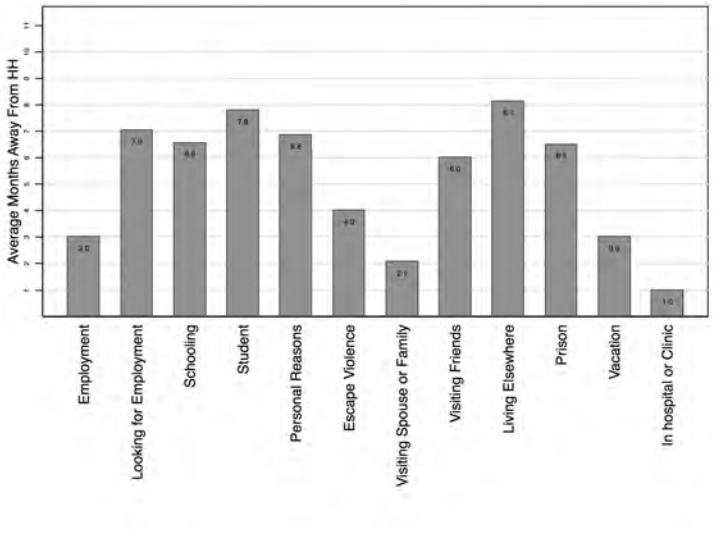


Notes: Own Calculations Using NIDS data. Cross Sectional Weights used

[2]For individuals considered part of the household but do not reside 4 nights a week in the household additional roster information is obtained in order to gain insight into the absenteeism of such individuals.

Using the same information from the household roster we can ascertain the duration of the oscillating migration pattern. Figure 8.2 plots the duration that a migrant has been away from the household by reason for migration. On average, migrants who reside elsewhere return to their household every 8 months. Migrants, who migrated due to participating in the labour market either through employment or by searching for work elsewhere, return to their alternative household roughly every 7 months. Individuals who migrated due to educational reasons return to their alternative household biannually. Figure 8.2 clearly illustrates some persistence of the oscillating pattern of migration present in contemporary South Africa.

Figure 8.2: Duration of Absence from Household by Reason for Migration

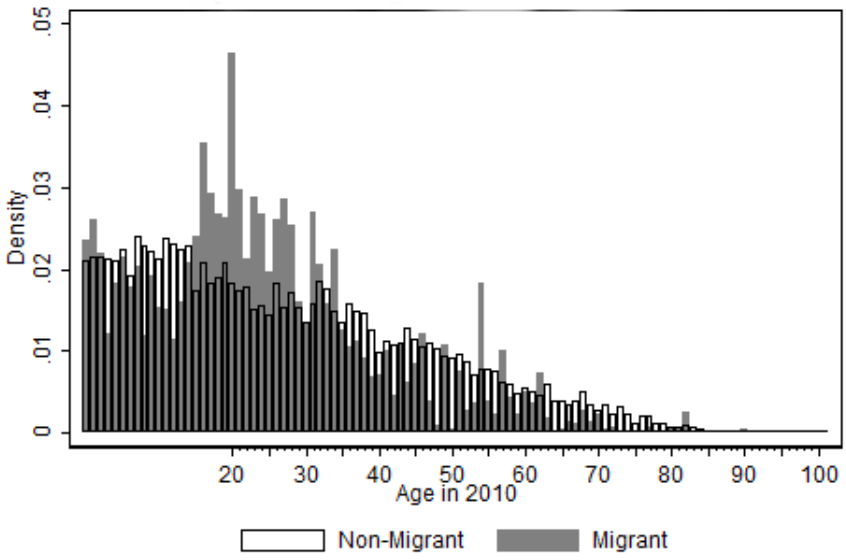


Notes: Own Calculations Using NIDS data. Cross Sectional Weights used

Figure 8.3 presents the frequency distribution of the age of migrant and non-migrant populations. The evident feature of the graph is the strong deviation of the migrant's age profile from the non-migrants profile during the late teens to the mid-thirties. The migrant bulge in age clearly indicates that migration is biased towards the youth. Past age 35 the non-migrant frequency substantially exceeds the migrant frequency. An exception is the age outliers around the late 50s which could be due to migration for retirement.

Supporting the younger age profile of migrants, Table 4 reports the average age of 30 years for migrants in comparison to 37 of the non-migrant population. This

Figure 8.3: Age Distribution of Migrants and Non-Migrants



Notes: Own Calculations Using NIDS data. Cross Sectional Weights used

corroborates the previous literature, discussed earlier in Section 2 (see van der Berg et al., 2003; Grieger et al., 2013). Also, this is in line with expectations as the transition into adulthood experienced during this age band is often associated with leaving the parental nest with the 16-35 age cohort capturing the individual's first entrance into the labour market. The decrease in migration experienced in later years in life is associated with individuals being more established than they were in their younger years (Grieger et al., 2013).

Unlike the dramatic difference between migrants and non-migrants ages, Figure 8.4 highlights the gender neutrality of migration. The gender split in migration differs only by 2 percentage points between the migrant and non-migrant populations with approximately 47% of the non-migrant population belonging to females in comparison to the 49% of the migrant population.

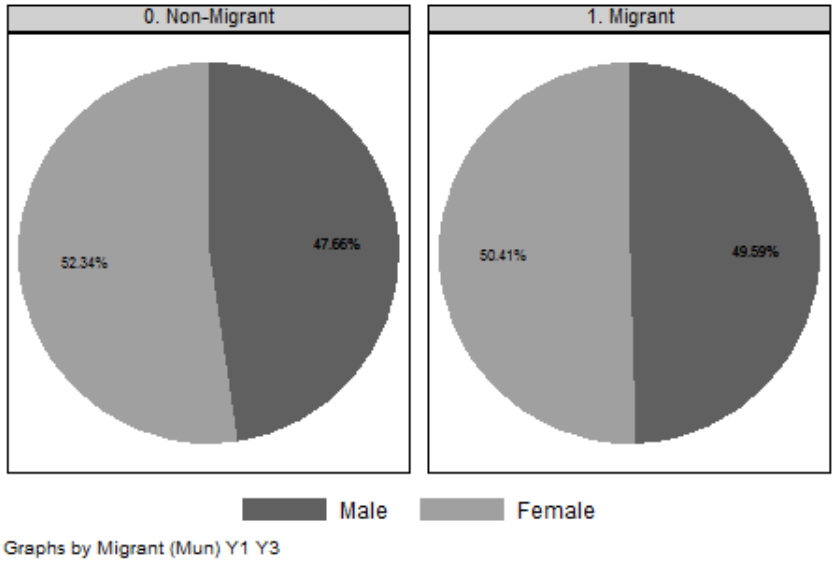
Aside from this gender neutrality, Figure 8.5 indicates that migrants have fewer children both under the age of 6 and between 6 and 16 than non-migrants. This is despite the fact that children below the age of 6 often accompany migrating mothers. However, the difference is most stark for the age group 7-16 year olds,

Table 4: Summary Statistics of Migrants' Characteristics

	2008			2012		
	Pop	Non-Migrant	Migrant	Pop	Non-Migrant	Migrant
Age	37.18	37.44	30.17	39.83	42.00	34.86
	(0.376)	(0.381)	(1.390)	(0.418)	(0.413)	(1.298)
African	0.831	0.828	0.888	0.798	0.804	0.741
	(0.025)	(0.026)	(0.052)	(0.029)	(0.028)	(0.097)
Coloured	0.0785	0.0799	0.0449	0.0836	0.0871	0.101
	(0.018)	(0.018)	(0.030)	(0.020)	(0.020)	(0.055)
White	0.0659	0.0665	0.0596	0.0928	0.0857	0.144
	(0.014)	(0.014)	(0.038)	(0.018)	(0.017)	(0.086)
Female	0.594	0.595	0.561	0.569	0.578	0.530
	(0.009)	(0.009)	(0.055)	(0.009)	(0.010)	(0.042)
Married	0.415	0.415	0.390	0.418	0.410	0.478
	(0.013)	(0.012)	(0.066)	(0.015)	(0.016)	(0.065)
No. of Child Younger 6yrs	0.597	0.602	0.527	0.343	0.145	0.196
	(0.029)	(0.029)	(0.081)	(0.018)	(0.0101)	(0.069)
No. of Child Younger 16yrs	0.931	0.947	0.442	0.821	0.724	0.225
	(0.0376)	(0.0382)	(0.0746)	(0.0386)	(0.0354)	(0.0647)
Life Satisfaction	5.463	5.479	4.933	4.959	4.959	5.660
	(0.085)	(0.085)	(0.259)	(0.108)	(0.117)	(0.235)
Yrs of Education	8.751	8.686	10.63	9.045	9.116	11.20
	(0.133)	(0.135)	(0.358)	(0.136)	(0.146)	(0.251)
Tertiary	0.0968	0.0955	0.146	0.134	0.160	0.344
	(0.012)	(0.013)	(0.041)	(0.012)	(0.015)	(0.048)
Currently Employed	0.433	0.436	0.368	0.420	0.463	0.541
	(0.013)	(0.013)	(0.054)	(0.014)	(0.014)	(0.056)
HH Income per capita	1900.5	1879.6	2495.3	4046.6	3915.4	5542.4
	(249.1)	(251.8)	(807.0)	(1475.9)	(570.9)	(1129.0)
HH Below Poverty Line	0.488	0.495	0.314	0.413	0.304	0.119
	(0.020)	(0.020)	(0.052)	(0.021)	(0.020)	(0.028)
Receives Child Support	0.422	0.426	0.381	0.381	0.399	0.301
	(0.016)	(0.016)	(0.063)	(0.01)	(0.016)	(0.064)
Receives Social Pension	0.198	0.202	0.106	0.232	0.232	0.0327
	(0.012)	(0.012)	(0.024)	(0.015)	(0.014)	(0.014)
Weighted N	14528564	13973398	482268	18695674	17573377	570455

Notes: Standard errors in parentheses. Own Calculations Using NIDS data. Cross Sectional Weights used

Figure 8.4: Gender Ratio for Migrants and Non-Migrants



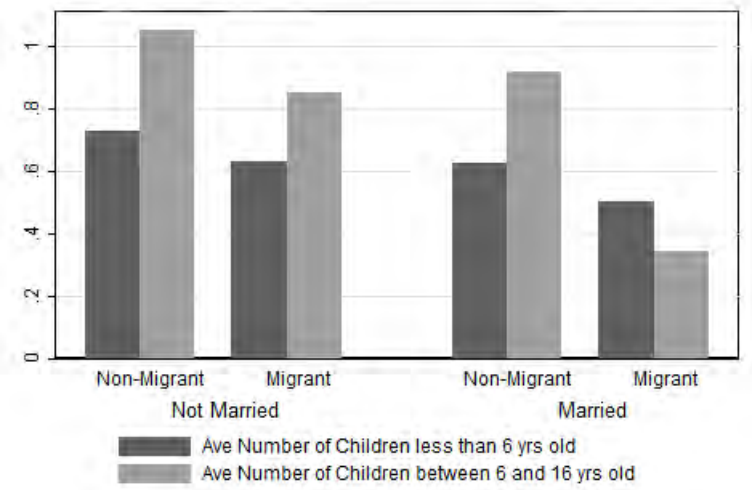
Notes: Own Calculations Using NIDS data. Cross Sectional Weights used

probably due to most migrants ranging in the age band of 20-35 themselves.

In addition fertility between migrant and non-migrant populations is independent of marriage as indicated by Figure 8.5 with married migrants (non-migrants) reporting the same average number of children as unmarried migrants (non-migrants). With marriage rates and gender being similar across the migrant and non-migrant population, this affirms the literature which suggests that marital status has no impact on migration decision (Van der Berg et al., 2003).

Africans constitute the majority of the migrant population with 83% of migrants being African substantially above the population average of 77% as indicated in Table 4 and graphically in Figure 8.6. While Africans may comrpise the majority of the migrant population, the white population only comprises of 4% of the total migration population substantially lower than the non-migrant population of 9%. This is not entirely unsurprising due to historic factors favoring the white population while non-whites and especially Africans were relocated away from urban economic centres. As previously indicated the presence of migration towards economic centres from rural areas still exists and may be driven by African's in-

Figure 8.5: Average Number of Young and Teenage Children of Migrant and Non-Migrants



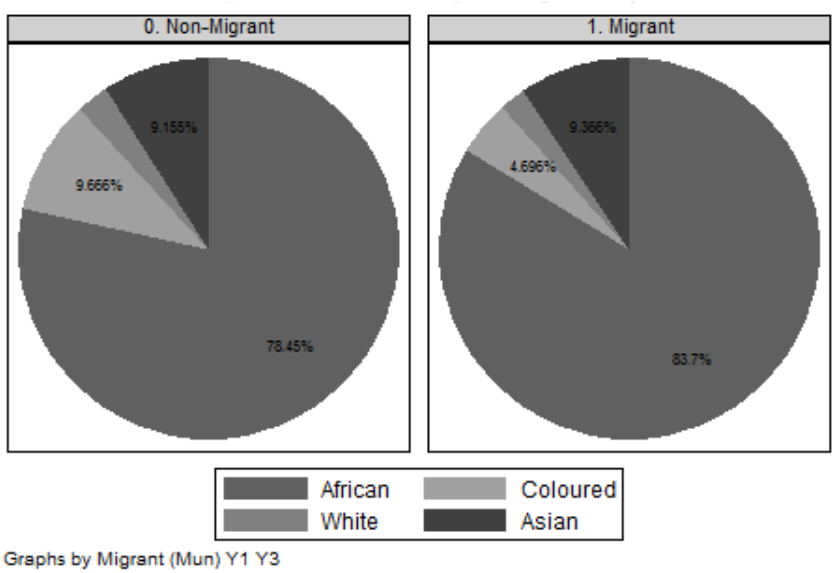
Notes: Own Calculations Using NIDS data. Cross Sectional Weights used

herent dissociation from employment opportunities. Previous studies have shown race has varying interaction effects with other migrant characteristics. Grieger et al. (2014) find that white individuals are more likely to migrate if they had low incomes. On the other hand Africans are more likely to move if they had higher incomes.

Figure 8.7 presents the frequency distribution of years of education of migrant and non-migrant populations. The South African literature that was reviewed earlier indicated an ambiguous effect of education on migration decisions. The Figure shows that the two distributions deviate from one another in several respects with the non-migrant population exceeding the migrant population for no school and the first 8 years of education, while migrants surpass the non-migrant population on high school years of education especially at the 12 year mark indicating complete secondary schooling. Of the individuals holding a matric (12 years of schooling), migrants greatly exceed non-migrants. This trend continues into the first couple of years of tertiary education before equalizing in later years.

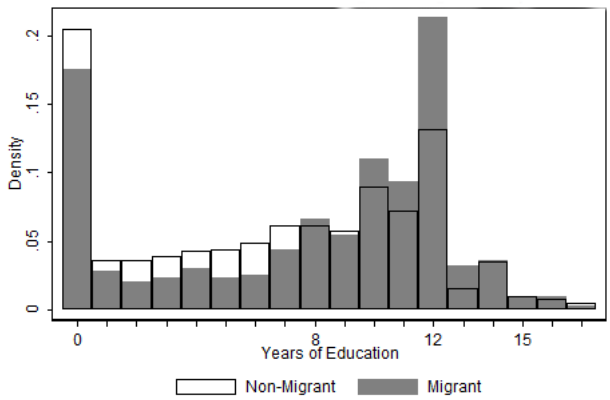
Figure 8.8 divides the years of schooling into completed levels of primary, high and tertiary schooling. More than 40% of migrants hold only a high school diploma

Figure 8.6: Race Distribution of Migrant and Non-Migrants



Notes: Own Calculations Using NIDS data. Cross Sectional Weights used

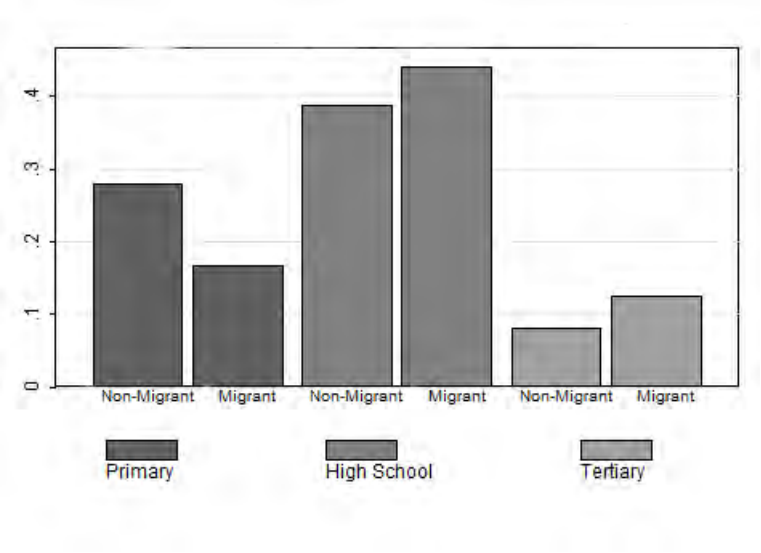
Figure 8.7: Distribution of Years of Education of Migrants and Non-Migrants



Notes: Own Calculations Using NIDS data. Cross Sectional Weights used

while primary and tertiary holders are substantially lower. However in comparison with the non-migrant population, more migrants hold only a high school diploma or a tertiary education while a larger share of the non-migrant population hold only a primary school education in comparison to the share of migrants with only a primary school education. It seems that migration favours the educated. There are two plausible reasons for this: the educated may hold more information regarding migration costs and benefits, and they may be better suited for the kind of employment which is located away from their current location.

Figure 8.8: Percentage of Migrants and Non-Migrants with Various Levels of Education



Notes: Own Calculations Using NIDS data. Cross Sectional Weights used

From the individual characteristics migrants appear to be younger and more educated than the non-migrant population. Interestingly migration does not appear to be gender biased, a reversal from apartheid migratory trends which heavily dependent on migrant mineworkers. In addition, as most children below the age of 6 accompany migrating parents, child bearing may not be a hindering factor for female migrants.

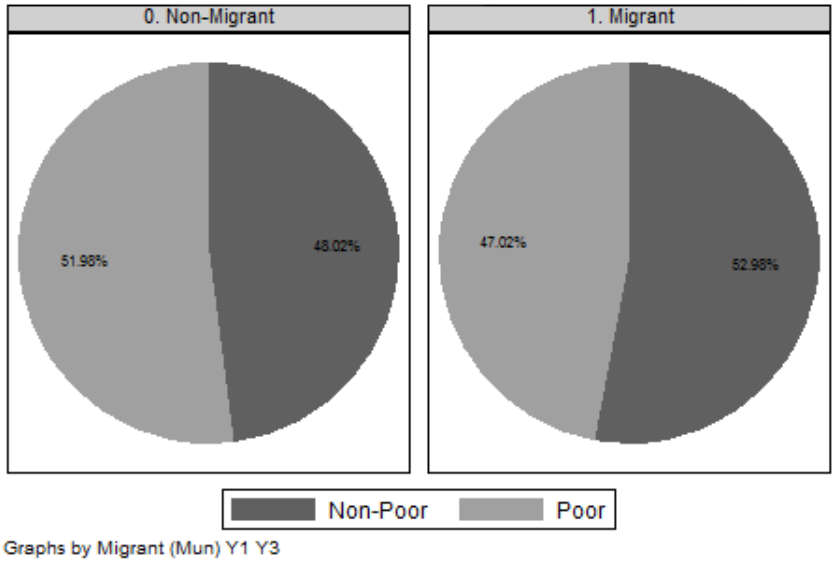
9 Sending Household Characteristics

Even though migration is undertaken by individuals, the migration decision may be taken at the level of the household as households are more equipped to overcome

liquidity constraints, spread the risks involved in migration as well as collectively decide on who migrants. We start by profiling migration by household poverty status, go on to talk about grants recipients and conclude by talking about household headship.

Using a R515 poverty line common in South African literature for 2008, Figure 9.1 plots the proportion of poor and non-poor households for both households sending a migrant and households not sending a migrant and thus not involved in the migration process. In comparison with migrant sending households a larger proportion of non-migrant sending households live in poverty with 52% reporting earnings below the poverty line in comparison with 47% of non-migrant households. In addition, Table 5 provides the monthly household per capita expenditure for the population of non-migrants and migrants. On average migrants originate from wealthier households than their non-migrant peers reporting a per capita income of approximately R25 more per month per person than non-migrants.

Figure 9.1: Share of Migrant and Non-Migrant Population in Poverty



Notes: Own Calculations Using NIDS data. Cross Sectional Weights used

The cost of migration coupled with migrants using sending households as insurance against the risks involved in migration supports the notion that migration

Table 5: A Comparison of Social Grant Support and Expenditure of Migrant and Non-Migrant Households.

	Pre Migration (2008)		
	Pop	Non-Migrant	Migrant
Percentage of Individuals Living in HH with an Old Age Pension	0.193	0.202	0.154
	(0.003)	(0.004)	(0.011)
Percentage of Individuals Living in HH with a Child Support Grant	0.448	0.466	0.367
	(0.005)	(0.005)	(0.017)
Mean of Household Expenditure Per Capita	1658.9	1626.5	1651.6
	(51.64)	(57.97)	(129.2)

Notes: Standard errors in parentheses. Own Calculations Using NIDS data. Cross Sectional Weights used

is a costly affair undertaken by individuals originating from households that can afford the costs. It seems that relatively wealthier households are able to overcome the liquidity constraints and so afford the cost of migration as well as the cost of sustaining a migration while he/she is still searching for work away from home. As per the international literature (Alderman et al., 2000), it seems that there are many households who are unable to fund the migration process.

As previously mentioned in Section 2, there is South African evidence that the attainment of a social grant by a household member has led to other household members migrating. Table 5 provides further information regarding social grants by providing the percentage of households receiving an Old Age Pension and Child Support grant for both the migrant sending households and non-migrant households. For both forms of social protection, on average fewer migrant sending households receive social assistance from the government in comparison with non-migrant households. This is not surprising. On average migrant sending households report higher per capita expenditure and on average migrant's sending households have fewer recipients of social grants as indicated in Table 5. Also, on average, grant recipient households have more residents who are not in the migrant-intensive age ranges. This does not contradict the existing literature which indicates that an Old Age Pension can facilitate migration. Such a claim concerns the fact that an Old Age Pension can facilitate migration in households with members who would like to migrate.

Table 6 provides insight into household dynamics of migration by providing information on the relation to head of household for the migrant and non-migrant population in order to gain a perspective on who moves out of a household. Within the migrant population heads of household and their partners are still the major-

Table 6: Relation to Head of Household

	Non-Migrant	Migrant	Total
Head	0.427	0.388	0.424
	(0.009)	(0.021)	(0.009)
Partner	0.187	0.140	0.184
	(0.006)	(0.018)	(0.006)
Child	0.243	0.244	0.243
	(0.008)	(0.020)	(0.008)
Parent	0.008	0.008	0.008
	(0.001)	(0.003)	(0.001)
Sibling	0.036	0.06	0.040
	(0.003)	(0.014)	(0.003)
Extended Family	0.086	0.145	0.090
	(0.005)	(0.015)	(0.005)
Non-Family	0.0126	0.0180	0.0130
	(0.002)	(0.005)	(0.002)

Notes: Standard errors in parentheses. Own Calculations Using NIDS data. Cross Sectional Weights used

ity group comprising a collective share of approximately 53% (38.85%+14%) of the migrant population. However, heads of households and partners of the head of household comprises a smaller proportion of the migrant population than their counterparts in the non-migrant population with only 53% of the migrant population comprising of heads and their spouses as opposed to the 61.4% of the non-migrant population. Interestingly children of the head of household comprise roughly the same proportion in the migrant and non-migrant population at 24%. On average extended family members comprise a larger share of the migrant population than the non-migrant population. 14.5% of the migrant population is considered extended family of the head of household as oppose to the 8.6% of the non-migrant population. Heads of households and partners of the head of household comprise a smaller proportion of the migrant population than their counterparts in the non-migrant population. Sending household dynamics may play an important role in the migration decision. Table 6 indicates that extended family members are more likely to migrate than close family members despite the majority of migrants being heads of households and their partners.

10 Community Characteristics

Few studies have taken into account howcommunity level factors influences the migration decision in South Africa. Using the Community Survey of 2007, to augment the NIDS wave 1 data, Table 7 provides summary statistics on a various

community level variables.

In the household section above we found that within communities, migrant households tend to have higher per capita incomes than non-migrant households. The community data tell us that on average migrants originate from communities with lower average per capita income than non-migrants. Thus the between community situation is different to the within-community situation.

Several measures are constructed to measure the size of the local labour market of migrant and non-migrants in order to assess the impact of labour market related factors on migratory decisions. In particular the total size of the labour market as measured by the total unemployed and employed within a municipality as well as the total number of employed is calculated. Migrants stem from labour markets smaller in size and with fewer employed than non-migrants. The smaller labour markets from which migrants stem may be viewed as push factors in the migration decision.

A variety of variables are used to proxy for service delivery and community facilities provided by the local municipality to communities. Shown in Table 7 are the percentage of homes from which refuse is collected from households, the availability of household postal services and cooking as well as water provision. On average migrants stem from communities where slightly fewer homes have refuse collection by local municipalities.

In addition migrants on average emanate from communities where few households have post services. These two variables aim to capture service delivery of municipalities to communities where future migrants currently reside and these results suggest that migrants reside in communities with lower service delivery than non-migrants. Poorer service delivery in migrants sending communities may be a push factor in migrant's decision to reside elsewhere.

Furthermore migrants on average stem from communities where fewer households have a water source less than 200m from their homes and a lower proportion of households having electricity for cooking than non-migrants. Water and electricity is a municipal responsibility though a part of the acquisition resides with the household. These findings concerning water and electricity present further substantiation that migrants reside in poorer communities than non-migrants on average.

The respective roles of inequality and the probability of finding employment in the migration decision have not been studied in South Africa. In considering how inequality and the probability of finding employment affects the migration decision we assume that it is unlikely for inequality and a given probability of finding employment within a particular community to be a push factor in the migration decision unless the migrant has some notion of a higher probability of finding employment and of a more equal society beyond the borders of his own community. Thus it is some notion of relative inequality and the relative probability of finding employment which would be relevant. We observe the migrant pre and post migration and, therefore, we know the level of inequality and probability of finding employment at the receiving destination of migration. However, ex ante the migration decision, we feel that the assumption that the migrant knows and considers the relative levels of inequality and the probability of finding employment between sending and receiving destinations is too strong. Instead we benchmark the sending destinations level of inequality and probability of finding employment to national level benchmarks.

Table 7 provides the difference in the national and local municipality Gini coefficients and unemployment rates in order to assess the impact of inequality and probability of finding employment on migration. The communities from which migrants stem are slightly more equal than the national level reporting a negative difference with the national level. On average non-migrant sending communities have a level of inequality closer to the national level than migrant communities. In addition communities from which migrants originate have a lower percentage difference in the unemployment rate than non-migrant communities. Thus, it does not appear to be the case that these variables are key in explaining migration. However, this situation might change in the multivariate analysis.

The aim of this section was to explore the data in order to profile migration patterns and to examine the individual, household and community factors affecting the migration decision. Migration appears to be biased towards the young and educated who stem from households with enough financial resources to overcome liquidity constraints and support migration. In addition the percentage of households receiving an Old Age Pension and Child Support grant is lower for migrant sending households than non-migrant households Nonetheless these migrants also appear to come from communities with lower than average per capita incomes and service delivery rates than none migrants. Preliminary findings suggest that migrant sending communities are more equal.

Table 7: Summary Statistics of Community Factors

	Pop	Non-Migrant	Migrant
Average per Capita Income within Municipality	1956.2	1967.6	1818.5
	(12.61)	(13.05)	(48.71)
Total Size of Labour Market (Unemployed+Employed)	917125.5	931542.0	743482.4
	(14162.5)	(14726.3)	(50613.3)
Size of Labour Market (Employed only)	450017.5	457036.9	365471.2
	(7353.0)	(7632.5)	(26961.1)
% Difference in Municipal and National Unemployment Rates	0	0.335	0.321
	.	(0.001)	(0.004)
% Difference in Municipal and National Gini	0	-0.0434	-0.0462
	.	(0.0004)	(0.002)
Percentage Employed in Labour Market	0.662	0.663	0.649
	(0.001)	(0.001)	(0.004)
Percentage Employed in Farming	0.0871	0.0873	0.0856
	(0.0008)	(0.0009)	(0.003)
Refuse Removed by Local Authority	0.617	0.623	0.550
	(0.004)	(0.004)	(0.06)
Proportion of HH with Post facilities	0.419	0.422	0.383
	(0.002)	(0.002)	(0.009)
HH has water <200m from house	0.794	0.796	0.770
	(0.002)	(0.002)	(0.009)
HH use electricity to cook	0.668	0.672	0.622
	(0.003)	(0.003)	(0.0109)
Household goods: Internet facilities	0.0681	0.0690	0.0572
	(0.0007)	(0.0007)	(0.003)

Notes: Standard errors in parentheses. Own Calculations Using NIDS data. Cross Sectional Weights used

11 Labour Market for Migrants Post Migration

Migrants have been profiled based on the individual, household and community characteristics pre-migration. The purpose of this section is to analyze a part of a migrant's life post migration. Due to the continual theme of employment in migration we restrict the post migration analyses to the labour market for migrants and consider only individuals age 16 or above. In particular we focus on the employment, occupations and earnings of migrants post migration.

11.1 Employment and Occupations

Table 8 provides the transition matrix of migrants between three labour market statuses; not active, unemployed and employed. The diagonal elements highlight migrants whose labour market status did not change during the period 2008 and 2012. Off diagonal elements indicate migrants whose labour market status changed. The majority of non-active migrants pre-migration in 2008 remained non-active in 2012 with 60% indicating that they have moved but not changed their labour market status. In contrast 40% of these non-active migrants in 2008 moved into the labour force post migration. Of those who moved into the labour force, roughly half are employed.

Of the migrants who were unemployed in 2008, 34% remained unemployed post migration while 38% of the unemployed migrants pre-migration became non-active labour market participants post migration and 26% found employment post migration. Thus, for the unemployed who migrate, no clear pattern of transition emerges with all three post migration labour market states reporting roughly the same percentages in the region of 25%-35%.

This contrasts with the pre-migration employed. The vast majority of this group remained employed with 64% reporting no change in their employed status. A quarter of migrants who were employed pre-migration are no longer participating in the labour market post migration while 10% of the pre-migration employed are unemployed post migration.

All in all, the transition matrix of pre- and post-migration labour market statuses of migrants indicates the importance of employment in migration. A significant proportion of individuals move into the labour market post migration while substantially smaller proportions of labour market participants become non-active post migration.

Using the International Standard Classification of Occupations (ISCO) codes in NIDS[3] we are able to analyse the occupations that employed migrants hold post migration. Table 9 provides the share of migrants and non-migrants in the first level occupation codes of ISCO. Roughly the same proportion of migrants and non-migrants can be found in occupations such as managers and plant and machine operators. However a smaller proportion of migrants occupy positions in cleri-

[3]Note that only the first level of ISCO codes are provided in the NIDS public release data. Subsequent levels are contained in the NIDS Secure Data.

Table 8: Transition Matrix of Migrants Labour Market Status

		Labour Market Status (2012)			
		Non-Active	Unemployed	Employed	
Labour Market Status (2008)	Non-Active	60.19	20.38	19.43	100%
	Unemployed	38.85	34.39	26.75	100%
	Employed	25.44	10.53	64.04	100%

Notes: Own Calculations Using NIDS data. Cross Sectional Weights used

cal support workers, craft and related trade workers and the armed forces than non-migrants. Interestingly migrants are disproportionately found in high skilled occupations such as professionals, technicians and associate professionals and service and sales workers. This is not surprising as migration favours the educated.

Table 9: Occupations Post Migration for Migrants and Non-Migrants

	Non-Migrants	Migrants	Total
Managers	0.068	0.05	0.066
	(0.011)	(0.017)	(0.01)
Professionals	0.149	0.182	0.152
	(0.015)	(0.035)	(0.014)
Technicians and Associate Professionals	0.054	0.075	0.056
	(0.006)	(0.022)	(0.006)
Clerical Support Workers	0.071	0.057	0.069
	(0.009)	(0.016)	(0.008)
Service and Sales Workers	0.162	0.232	0.169
	(0.012)	(0.035)	(0.011)
Skilled Agriculture, Fishery and Forestry	0.002	0.001	0.002
	(0.001)	(0.001)	(0.001)
Craft and related Trade Workers	0.100	0.079	0.098
	(0.009)	(0.019)	(0.008)
Plant and Machine Operators	0.112	0.115	0.113
	(0.01)	(0.025)	(0.009)
Armed Forces Occupations	0.282	0.209	0.275
	(0.017)	(0.035)	(0.016)
	1.0	1.0	1.0

Notes: Standard errors in parentheses. Own Calculations Using NIDS data. Cross Sectional Weights used

Using the second level ISCO codes we are able to provide further details regarding the occupations migrants hold. Table 10 provides the second level ISCO occupa-

tions within the broad occupations categories favoured by migrants namely professionals, technicians and associate professionals and service and sales workers. Roughly the same proportion of professional migrants and non-migrants can be found in teaching. However professional migrants are dramatically under represented in occupations such as health and business and administration. Occupations in ICTS and legal, social and cultural professionals are favoured by professional migrants. For these two sub-categories the migrants' proportion exceed that of non-migrants by approximately10-13 percentage points. Within the professional occupational category certain occupations are clearly favoured by migrants.

Within the board category of technicians and associate professionals the proportion of migrants and non-migrants are approximately the same for business and administration and legal, social and cultural category. The proportion of migrants exceed the proportion of non-migrants in science and engineering and business and administration occupations. However fewer migrants are found in ICTS and teaching than non-migrants. Contrasting the results of the technicians and associate professionals category to the professional category highlights some interesting findings. While professional migrants favour ICTS and legal, social and cultural while migrants in the technicians and associate professionals are under represented relative to non-migrants in these very categories. Technicians and associate professionals migrants are drawn to teaching while professional migrants are relatively under represented in teaching.

Finally we turn to details of the service and sales occupations category. Relative to non-migrants migrants are under represented in sales and personal care workers. However migrants favour personal service and protective services occupations. Within the service and sales occupation category certain occupations are clearly favoured by migrants.

The analysis of the occupations employed migrants hold post migration highlighted that not only are high skilled positions favoured by migrants, but that certain occupations within the board high skills categories are preferred by migrants in comparison of that of non-migrants. What is unclear from these findings is whether these occupations draw migrants out of sending communities or whether individuals favour certain occupations as they are aware of the opportunity in leaving their sending communities in pursuit of these occupations. Further investigation using occupational transitions for migrants who were employed pre and post migration is required to be able to tease these points out.

Table 10: Specific Occupations Post Migrants for Migrants and Non-Migrants

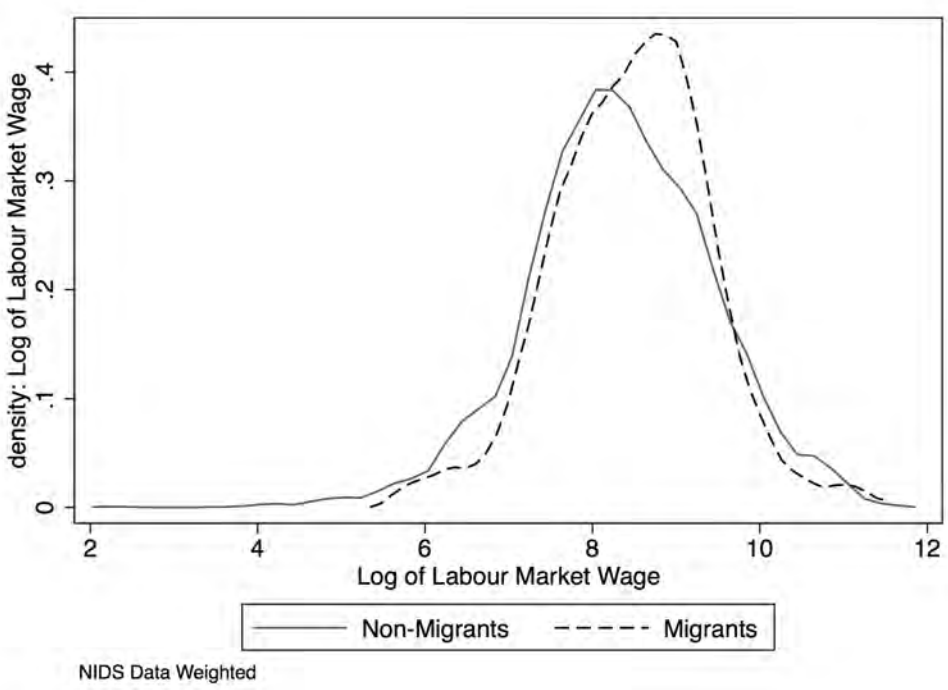
	Non-Migrants	**Migrants**	**Total**
Professionals			
Science and Engineering	0.064	0.091	0.068
	(0.018)	(0.08)	(0.018)
Health	0.206	0.063	0.189
	(0.03)	(0.046)	(0.027)
Teaching	0.430	0.404	0.427
	(0.04)	(0.113)	(0.036)
Business and Administration	0.179	0.073	0.166
	(0.03)	(0.03)	(0.03)
ICTS	0.048	0.162	0.062
	(0.018)	(0.08)	(0.019)
Legal, Social and Cultural	0.073	0.207	0.089
	(0.019)	(0.09)	(0.02)
	-	-	1.0
Technicians and Associate Professionals			
Science and Engineering	0.088	0.120	0.093
	(0.03)	(0.066)	(0.03)
Teaching	0.158	0.082	0.146
	(0.044)	(0.06)	(0.04)
Business and Administration	0.54	0.654	0.557
	(0.066)	(0.15)	(0.06)
ICTS	0.195	0.135	0.186
	(0.057)	(0.11)	(0.051)
Legal, Social and Cultural	0.02	0.008	0.0186
	(0.016)	(0.009)	(0.01)
	1.0	1.0	1.0
Service and Sales			
Personal Service Workers	0.143	0.189	0.149
	(0.02)	(0.063)	(0.019)
Sales Workers	0.328	0.260	0.318
	(0.033)	(0.057)	(0.03)
Personal Care Workers	0.048	0.0337	0.0459
	(0.014)	(0.02)	(0.012)
Protective Services Workers	0.481	0.518	0.486
	(0.042)	(0.08)	(0.039)
	1.0	1.0	1.0

Notes: Standard errors in parentheses. Own Calculations Using NIDS data. Cross Sectional Weights used

11.2 Earnings

Having detailed the employment and occupations of migrations post migration we turn to analyzing the earnings of migrants. The aim of this section is to provide insights into the wages of migrants post migration. This is done through both a descriptive lens.

Figure 11.1: Wages of Migrants and Non-Migrants



Notes: Own Calculations Using NIDS data. Cross Sectional Weights used

Figure 11.1 provides the densities of migrants and non-migrants' wages post migration. The two densities do not lie on top of each other indicating that the distribution of migrants and non-migrants' wages differ somewhat. Migrants at the lower end of the wage distribution are slightly better off than their non-migrant peers as indicated by the migrant density lying to the left of the non-migrant distribution at the lower end. However migrants at the upper end of the wage distribution appear to be somewhat worse off than their non-migrant peers as indicated by the migrant density lying to the right of the non-migrant distribution at the upper end.

To unpack this further we turn to Table 11 which provides the proportion of

migrants and non-migrants in wages quintiles as determined by the entire wage distribution. Migrants and non-migrants are pooled and the respective wage quintiles are calculated before reporting the proportion of migrants and non-migrants in each quintile. A larger proportion of non-migrants appear in the first quantile of the total wage distribution than non-migrants. 20.53% of Non-migrants are found in the first quintile in comparison with the 14.94% of non-migrants. A slightly large proportion of migrants are found in quintiles 2 and 3 in comparison to the proportion of migrants found in quintiles 2 and 3. A significantly large proportion of migrants are found in quintile 4 than non-migrants 22% in comparison with the 19% from non-migrants. Finally in quintile 5, the proportion of migrants is slightly above that of non-migrants reporting 20.77% in comparison to the 19.91% of non-migrants. By comparing the proportions of migrants and non-migrants across quintiles as ranked by the entire wage distribution indicates that a larger proportion of migrants are found in the upper quintiles. Non-migrants are disproportionately found in the first quintile.

Table 11: Earnings Post Migration for Migrants and Non-Migrants

	Non-Migrants	Migrants	Total
Wage Quantiles			
Quantile 1	20.53	14.94	20.01
Quantile 2	19.86	21.29	20.00
Quantile 3	20.38	20.99	20.44
Quantile 4	19.32	22.00	19.57
Quantile 5	19.91	20.77	19.99
	100	100	100

Notes: Standard errors in parentheses. Own Calculations Using NIDS data. Cross Sectional Weights used

Despite Figure 11.1 and Table 11, which contrast the wages of migrants to non-migrants, we are unable to infer much of wages through a descriptive lens. The appropriate analysis of wages would be conducted through a multivariate lens accounting for selection into the labour market. In a multivariate analysis one could include controls in order to access the impact of the past migration on wages. However throughout the analysis we have highlighted that migrants are a non-random sample from sending communities. Not only do migrants differ on observable characteristics as shown but also in unobservable characteristics such as motivation, which are difficult to quantify and assess (Mackenzie et al., 2006). Thus modeling wages in a multivariate arena can be plague by non-random sample selection into migration on both observables and unobservables as well failure to account for the

interlinked migration and participation decision. In order to provide insight into the labour market wages of migrants post migration we developed a multivariate approach in the subsequent sub-section which accounts for the non-random selection into migration as well as the intertwined migratory and labour market decisions. The goal of such a multivariate undertaking is to access the impact of the migratory process on wages post migration.

Part V

Multivariate Methodology

Section IV provided a clear profiling of migrants' personal, household and community characteristics. The descriptive analysis indicated that migration is biased towards the educated. However we can only assess the impact of education on the migration while controlling for education which may be highly correlated with age. Yet the interplay of these characteristics cannot be assessed without the use of multivariate techniques. We undertake this task in this section of the report.

Given South Africa's history of migrant labour as well as the descriptive findings from the previous section on contemporary migration patterns, it is clear that migration cannot be solely viewed through the lens of itinerant behaviour. It was clear that the migration of children is tied to the migration decisions of their mothers. Migration of the youth was mostly tied to decision making around education. As the focus of this section is on the working age population, it is clear that our estimation work needs to take account of the intertwined migration and labour force participation decisions.

Let migration be captured by $Y^*_{m,i}$ for individual i. The decision to migrate can then be modeled by:

$$Y^*_{m,i} = X'_{m,i}\beta_m + \epsilon_{m,i} \tag{11.1}$$

Where $X_{E,i}$ is a $i \times k$ matrix of explanatory variables influencing, β is a $k \times 1$ vector coefficients and $\epsilon_{M,i}$ is a vector of idiosyncratic error terms with $E(\epsilon_{M,i} \mid X_{E,i}) = 0$. As this not observed, but only the decision to migrate, define $y_{M,i}$ as a binary variable indicating migration such that:

$$y_{m,i} = \begin{cases} 1 & if\ Y^*_{m,i} > 0 \\ 0 & if\ Y^*_{m,i} \leq 0 \end{cases} \tag{11.2}$$

Using I_M as an indicator function it can be shown that:

$$y_{m,i} = I_m(X'_{m,i}\beta \geq \epsilon_{m,i}) \tag{11.3}$$

Similarly, let the labour force participation be captured by

$$Y^*_{p,i} = X'_{p,i}\beta_p + \epsilon_{p,i} \tag{11.4}$$

for individual i, we achieve

$$y_{p,i} = \begin{cases} 1 & if\ Y^*_{p,i} > 0 \\ 0 & if\ Y^*_{p,i} \leq 0 \end{cases} \tag{11.5}$$

$$y_{p,i} = I_p(X'_{p,i}\beta_p \geq \epsilon_{p,i}) \tag{11.6}$$

in a similar fashion. Note that if $\epsilon_{m,i}$ and $\epsilon_{p,i}$ is assumed to be independent and normally distributed then the standard probit models are obtained for the decision to migrate and to participate in the labour market and no interaction of the decisions is considered. The decision to migrate can be viewed as a binary decision with individuals electing to either migrate ($I_m = 1$) or to continue to reside in their source communities ($I_m = 0$)[4]. Similarly the decision to join the labour market can be viewed as binary ($I_p = 1, I_p = 0$)[5]. If we were to model each of these decisions independently we would estimate two separate binary (probit or logit) models (See Greene and Hensher, 2009). However we need to model the migration and labour force participation decisions in a way that gives account to their interdependence. We do this by using a bivariate probit model which allows for correlations between the underlying decision processes (Greene and Hensher, 2009).

Table 12: Migration and Labour Force Participation States

		I_m = 0	I_m = 1
I_p	0	S_1	S_2
	1	S_3	S_4

Adapting the approach outlined by Tunali (1986), the two decisions facing a working age individual, a person may be hosted in one of four states represented in Table 12 where S_j indicates individuals falling into the j^{th} subsample with $j = 1, ..., 4$. Thus individuals in subsample S_1 are those who neither migrated ($I_m = 0$) nor joined the labour market ($I_p = 0$), while individuals who migrated ($I_m = 1$) and joined the labour market ($I_p = 1$) are in subsample S_4 and individuals who made either one of the choices but not the other ($I_m = 1,\ I_p = 0$ *or* $I_m = 0,\ I_p = 1$) are in subsamples S_2 and S_3 respectively. Table 13 divides our sample into states $S_1, ..., S_4$ of migration and labour force participation for the working age population. Although the table is on the unweighted sample the multivariate model will be estimated using the appropriate sample weights.

[4]Where I_m is an indicator variable indicating migration or not.
[5]Where I_m is an indicator variable indicating labour force participation or not.

One of the strengths of the NIDS panel data set is that all four states are represented in our sample. A substantial portion of our migrant sub-sample participates in the labour force post migration ($S4_4 = 837$)motivating the joint modeling of the migration and labour force participation decision. However a smaller fraction of migrants opt not to participate in the labour post migration ($S_2 = 436$). This is of notable importance as it indicates that not all migration is driven by migrant labour in present day South African society. Non-labour market related activities such as education and travel had previously been outlawed for the majority of the population (African) in pre-democratic South Africa.

Table 13: Migration and Labour Force Participation Cross Tabulation

		I_m = 0	I_m = 1
I_p	0	4824	436
	1	7121	837

Notes: Own Calculations Using NIDS data.

Thus, following Tunali (1986) we have the probability of an individual being observed in S_4 given by:

$$\begin{aligned} P_4 &= Pr(Y_{m,i} = 1,\ Y_{e,i} = 1) = Pr(Y^*_{m,i} > 0,\ Y^*_{p,i} > 0) && (11.7)\\ &= Pr(\epsilon_{m,i} > -X'_{m,i}\beta_m,\ \epsilon_{p,i} > -X'_{e,i}\beta_p && (11.8)\\ &= \Phi(X'_{m,i}\beta_m, X'_{p,i}\beta_p, \rho) && (11.9) \end{aligned}$$

Where Φ denotes the standard bivariate normal distribution with correlation coefficient ρ. Similarly we have the probability that individuals are observed in each of $S_{1,}S_2$ and S_3 given by:

$$P_1 = Pr(Y_{m,i} = 0,\ Y_{e,i} = 0) = \Phi(-X'_{m,i}\beta_m, -X'_{p,i}\beta_p, \rho) \quad (11.10)$$

$$P_2 = Pr(Y_{m,i} = 0,\ Y_{e,i} = 1) = \Phi(-X'_{m,i}\beta_m, X'_{p,i}\beta_p, -\rho) \quad (11.11)$$

$$P_3 = Pr(Y_{m,i} = 1,\ Y_{e,i} = 0) = \Phi(X'_{m,i}\beta_m, -X'_{p,i}\beta_p, -\rho) \quad (11.12)$$

The non-linear bivariate probit model takes into account all four states and the factors affecting the decision to locate in one of the four states. In addition the non-linear biprobit captures the correlation between the underlying decision processes masked by the binary choices reflected in the data in order to provide some indication of the strength of the interdependent migratory and labour force decision processes. If one could only participate in the labour force through migration and migration was solely for job search purposes, the two decisions would mimic each

other and a perfect correlation would be obtained. A biprobit would not be the parsimonious model as the two decisions are effectively one and thus a migration probit would be employed. This would be represented in Table 13 with individuals only located in S_1 and S_4. Historically the African population in South Africa were located in rural areas far from urban economic centers due to the apartheid system (Savage, 1987). Migration to urban centers was only permitted for job search purposes and closely regulated through the passbook system (Wilson, 2001). Such a scenario would not require the use of a biprobit as outlined. However in modern South Africa individuals are allowed to move freely and thus migration might be driven by more than just labour force participation and labour force participation decisions not be driven by migration. A biprobit model which takes into account both labour force participation and migration decision is thus appropriate.

The bivariate probit parameters can be estimated using maximum likelihood estimation as per Ashfors and Sowden (1970). The log likelihood function is given by:

$$lnL_{m,p} = \sum_{i=1}^{n} ln\Phi(q_{1i}(X'_{,i}\beta_p),\ q_{2i}(X'_{m,i}\beta_m), \rho_i^*) \tag{11.13}$$

$$\begin{pmatrix} \epsilon_p \\ \epsilon_m \end{pmatrix} = N\left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \rho_{p,\,m} \\ \rho_{m,\,p} & 1 \end{pmatrix}\right] \tag{11.14}$$

where $q_{1,i} = \begin{cases} 1 & if\ y_{p,i} \neq 0 \\ -1 & otherwise \end{cases}$ and $q_{2,i} = \begin{cases} 1 & if\ y_{m,i} \neq 0 \\ -1 & otherwise \end{cases}$ and $\rho_i^* = q_{1i}q_{2i}\rho$. ρ is the tetrachoric correlation[6] between the underlying continuous variables y_m^* and y_p^* if they could be observed (Greene, 1996). If no relation between the decision to migrate and employment exists then $\rho = 0$. Marginal effects of the bivariate probit can be calculated as per Greene (1996).

The use of a non-linear biprobit model allows us to capture the interrelate migratory and labour force participation decisions. The outlined approach is applied to the data described in Section III in order to analyse the individual, household and community level factors affecting the migration decision. The results of the models are addressed in Section VI.

[6]Tetrachoric correlation is a special case of polychoric correlation. It is a method used to estimate the correlation between two normally distributed continuous latent variables both observed through dichotomous variables.

Part VI

Multivariate Analysis

Despite the informative Descriptive Analysis in Section IV, a multivariate approach is required in order to evaluate the interplay of various characteristics. Consequently Section V outlined an appropriate multivariate approach to model migration. The purpose of this section is to interpret the estimates obtained from the application of these various techniques on NIDS data. We begin by detailing the results obtained from these probit estimates of migration and labour force participation. This is done to ground the interpretation and provide insights into the two decisions. In addition the probit results act as a benchmark in order to evaluate subsequent multivariate analyses. After the probit discussion the biprobits accounting for the intertwined migration and labour force participation decisions are contrasted to the probit estimates. The comparison allows us to assess the effect of correlated unobservables affecting both decisions as well as allowing the two decisions to be interlaced, during the modeling process, on the coefficients.

12 Probits

The probit estimates of the decision to migrate and to participate in the labour force, as per equations 11.1-11.6 and 11.4-11.6 in Section V, are reported in Tables 14 and 15. The models are estimated on the sample of adults[7] who are not only able to migrate but also participate in the labour force. For all of the models a stepwise addition of covariates is applied whereby only person specific characteristics are first controlled for, before adding household specific characteristics and final community factors to the model, resulting in a total of 5 models as labeled in Tables 14 to 17.

12.1 Probit Estimates of the Migration Decision

Table 14 provides the results for all five of the probit estimates of the decision to migrate with the corresponding marginal effects reported in Table 16. Five models are estimated with each model containing an additional set of covariates. The additional covariates are added in categories with the first model including only personal characteristics followed by the addition of household characteristics and finally the addition of community level controls. For all models reported in Table 14 and 16, provincial controls are included but not reported.

[7] Individuals age 16 or older

12.1.1 Individual Characteristics of Migrants

The decision to migrate is not gender biased with an insignificant coefficient reported on Female across all five models. Despite the feminization of the South African labour force, as mentioned in Section II with rural African women migrating to urban centers in search of work, the results suggest that male and female rates of migration are roughly the same. This is a reversal from a situation in which migration was formally about the movement of men under apartheid. This is in line with the gender ratio reported in Descriptive Analysis of Figure 8.4 (Section IV) where the ratio of gender participating in migration is similar to the gender in the population. This is in contrast to the existing literature outlined in Section II. Previously it was found that women were less likely to migrate than men, presumably due to traditional gender roles in household production (van der Berg et al., 2003; Posel et al., 2004).

Interestingly the coefficient on the number of children under age 6 is not significant across all models. As noted in the literature discussed in Section II children below the age of 6 are likely to migrate with their mothers (see van der Berg et al., 2003). This is significant as Spiegel (1980) indicated that during apartheid migrants were unable to obtain permission for their families to accompany them during migration under the passbook system. However significant and negative results for the number of children between the ages 6-16 born to an individual is obtained. For the potential migrant, each additional child in this age band decreases the probability of migration by a small but significant amount of roughly 2%. This suggests that small children do not hamper the decision to migrate but older children, who still require child care, hinder migration.

As per van der Berg et al. (2003) and Grieger et al. (2013) the results suggest that the migration is biased towards the young and well educated. Migration is age selective with individuals aged between 16-20 and 21-30 being significantly more likely to migrate than individuals over the age of 70. Young adults are likely to migrate for schooling and as a transition out of school into the labour market (van der Berg et al., 2003). Individuals with a tertiary or high school education are more likely to migrate reporting 7% and 4% respectively increased probability across all models. In comparison to the coefficients on other covariates, tertiary education reports the highest increase in probability to migrate, ceteris paribus. This is in contrast to some of the literature suggesting that secondary schooling increases the probability to migrate while tertiary education reduces the probability of migration (van der Berg et al., 2003). However numerous other studies have found positive effects of education on migration (Posel, 2003a).

Interestingly, race reports varying results across all models, with no clear racial bias emerging in the decision to migrate. Despite the apartheid influx controls along racial lines, race does not appear to be a determining factor in migration in contemporary South Africa.

The F Statistics and related p values reported at the bottom of the migration sections of Table 14 provide the F statistics from the test of joint significance of the variables included in the respective model but excluded in the previous models. The P-value corresponding to the F-statistic indicates the joint significance of the personal characteristic variables at the 1% level.

12.1.2 Sending Household Characteristics

Despite the literature of Stark and Levhari (1982) and Lucas and Stark (1985), which regards a migrant as a member of a household that collectively overcame liquidity constraints and diversify income risks, few of the coefficients on household factors are statistically significant. As previously mentioned the use of migrant networks offers considerable risk mitigation as it overcomes the lack of knowledge of the world beyond the horizon and managed expectations of migrants. However the control as to whether a household receives remittances, which act as a proxy for potential migration networks, appears to have no impact on the migration decision. This is in contrast to the existing literature which finds that migrants stem from households already receiving remittances (van der Berg et al., 2003). In addition the role of social grants in migration decisions, prominent in the literature and as discussed earlier, do not appear to influence the migration decision. Some of the binary variables indicating the per capita income quintile a particular individual belongs to are found to affect the migration decision. In comparison to the base category of the first quintile, individuals in higher quintiles are more likely to migrate. However this is only found for individuals in the second and third quintile. This is in line with existing studies, which argued that migrants originate from households with sufficient resources able to fund the migration process by overcoming the costs of migration (Alderman et al., 2000).

In summary, the individual coefficients in the household characteristic set are not uniformly significant. However the household characteristics variables are found to be jointly significant at the 10% as indicated by the P-value of the F-statistic.

12.1.3 Community Characteristics

Community characteristics, obtained from merging in data from the 2011 Census and 2007 Community Survey, are included in order to account for differences in locations across the country. This is done to account for Wolpert's (1965) "place utility". However similar to the household characteristics few of the controls for community characteristics are significant.

Only the difference in the local municipal and national Gini coefficient has a significant, but negative result across models. The negative coefficient on the difference in the Gini suggest that individuals residing in communities with higher than the national level of inequality are less likely to migrate, while individuals with inequality levels lower than the national level are more likely to migrate, ceteris paribus. Stark (2005) argued that individuals at the lower end of the income distribution are more likely to migrate out of communities with higher income inequality in order to increase their relative wellbeing. However the household characteristics indicated that migrants stem from households in the upper quintiles. This may also be the case of binding credit constraints in which, amongst the relatively disadvantaged communities, the more unequal the community, the more likely that there are those with the income levels to migrate.

Migrants may thus be moving to locations with high income inequality in order to improve their relative wellbeing. Community controls such as the proportion of households with postal services, municipal refuse services and electric cooking, all controls for local service delivery are not significant. Local service delivery may thus not be a push factor out of sending communities. This yields interesting empirical findings in contrast to expectations. As discussed in the descriptive section, Table 7 indicates differences between community characteristics of migrants and non-migrants. However the multivariate analysis indicates an insignificant role for local service delivery and development in the migration decision. Further discussion of community factors will be undertaken in the discussion of the biprobit results.

Apart from the controls for poverty and inequality, the community characteristics are not significant. However the F-statistics listed below model 4 and 5 indicates the joint significance of the community characteristics at the 1% level.

12.2 Probit Estimates of the Participation Decision

Labour force participation has historically played an important role in migration in South Africa (Posel et al., 2004). Due to this interlaced migration and labour force participation decision we explicitly model the labour force participation. This is done in order to benchmark the forthcoming biprobit results. However as labour participation is not the central focus of this study the discussion of participation is brief. The labour force participation probits are estimated on the same sample as the migrant probits, namely individuals who are above the age of 16 and thus legally able to join the labour force. Probit estimates are reported in Table 15 with the marginal effects reported in Table 17 in a similar stepwise fashion resulting in 5 models. Similar to the migration model, provincial controls are included but not reported.

12.2.1 Individual Characteristics

Females are substantially less likely to participate in the labour force than their male counterparts as reported by the negative and significant coefficient on female binary variable. Women are on average roughly 16% less likely to participate in the labour force. This surprising result might be due to the burden of child caring being shared with other family members. This result is not uncommon the South African literature (see Bhorat et al., 2007). Similar to the migration estimates, selection into the labour force is age and education biased with individuals aged between 21-30 and 31-50 being more likely to participate in the labour force than individuals over the age of 60, while 51-60 year old are less likely to participate in the labour force than the 60 year olds.

The high school and tertiary binary variables report significant and positive probabilities for participation supporting the notion that the educated contribute to the labour force. The controls for race are insignificant except for white individuals which report a significant and lower probability of contributing to the labour force than their coloured counterparts. Individuals who have previously migrated are substantially more likely to participate in the labour with a 5% increase in probability reported across the models similar to Mckenzie and Rapoport (2004). This alludes to the intertwined decision of migration and labour force participation.

12.2.2 Household and Community Characteristics

Household characteristics paint an ambiguous picture. Individuals residing in a household where someone receives the social pension are less likely to participate in the labour force. However for individuals residing in households where someone

receives the child support grant are more likely to participate in the labour market. Thus the social pension and child support grants report contrasting signs, yet both are significant.

Similar to the probit estimates of migration, the community factors yield little significance. Only the coefficient on the difference between the local and national unemployment rate yields significant results. As the variable is a difference, a positive value indicates that the local unemployment rate is higher than the national unemployment rate, which when combined with the negative and significant coefficient indicates that individuals are less likely to participate in the labour when the local unemployment rate is higher than the national unemployment rate.

The decision to migrate has been unpacked in some detail and this has provided a platform for multivariate description with a rich set of individual, household and community variables. In the descriptive results it was clear that, for individuals aged 16 years and older, this migration decision is integrally related to a decision to participate in the labour market. To found this, in this section we have estimated a probit model of the decision to participate in the labour force focusing too on the impact of individual, household and community factors impacting the decision. These two independent estimations have laid the groundwork for a biprobit analysis that gives account of the intertwined decision of migration and participation.

Table 14: Probit Estimates of Migration

	(1) Migrant	(2) Migrant	(3) Migrant	(4) Migrant	(5) Migrant
Migrant					
Female	-0.021	-0.048	-0.044	-0.046	-0.047
	(0.044)	(0.048)	(0.048)	(0.048)	(0.048)
Number of Children <6 Living in HH	-0.024	-0.029	-0.037	-0.038	-0.038
	(0.031)	(0.033)	(0.036)	(0.036)	(0.036)
Number of Children >6 Living in HH	-0.140***	-0.154***	-0.157***	-0.158***	-0.163***
	(0.026)	(0.028)	(0.031)	(0.030)	(0.031)
Ages 16-20	0.374***	0.402***	0.366***	0.362***	0.346***
	(0.085)	(0.095)	(0.094)	(0.094)	(0.095)
Ages 21-30	0.266**	0.387***	0.359***	0.357***	0.351***
	(0.086)	(0.096)	(0.094)	(0.095)	(0.096)
Ages 31-50	0.007	0.168	0.144	0.136	0.136
	(0.093)	(0.104)	(0.105)	(0.105)	(0.106)
Ages 51-60	0.023	0.127	0.100	0.093	0.095
	(0.138)	(0.154)	(0.151)	(0.152)	(0.153)
Tertiary Education	0.385***	0.439***	0.450***	0.454***	0.479***
	(0.094)	(0.105)	(0.113)	(0.113)	(0.112)
High School Education	0.283***	0.323***	0.332***	0.332***	0.360***
	(0.064)	(0.073)	(0.077)	(0.078)	(0.077)
Asian	-0.083	0.045	0.032	0.031	0.088
	(0.334)	(0.354)	(0.348)	(0.344)	(0.342)
White	0.091	0.125	0.096	0.094	0.076
	(0.131)	(0.142)	(0.157)	(0.156)	(0.156)
African	0.208	0.163	0.139	0.130	0.101
	(0.112)	(0.119)	(0.121)	(0.123)	(0.128)
Employed		-0.150	-0.135	-0.132	-0.147
		(0.077)	(0.077)	(0.078)	(0.079)
HH Received Remittances			0.080	0.081	0.080
			(0.076)	(0.076)	(0.077)
HH receives Old Age Pension			-0.086	-0.095	-0.090
			(0.080)	(0.080)	(0.081)
HH receives Child Support Grant			-0.029	-0.028	-0.019
			(0.073)	(0.072)	(0.073)
HH per Capita Expenditure Quantile 2			0.124**	0.124**	0.110**
			(0.009)	(0.008)	(0.010)
HH per Capita Expenditure Quantile3			0.073 *	0.071 *	0.048 *
			(0.00)	(0.0001)	(0.0000)
HHper Capita Expenditure Quantile 4			0.195	0.189 *	0.151
			(0.106)	(0.080)	(0.110)
HH per Capita Expenditure Quantile 5			0.108	0.099	0.052
			(0.145)	(0.143)	(0.143)
% Difference in Municipal and National Gini				2.254**	1.923*
				(0.830)	(0.816)
% Difference in Municipal and National Unemployment Rates				-0.345	0.091
				(0.328)	(0.293)
Proportion of HH with Post facilities					-0.719
					(0.378)
Refuse Removed by Local Authority					-0.000
					(0.222)
Proportion of HH with Electric Cooking					-0.270
					(0.282)
Province Variables	Yes	Yes	Yes	Yes	Yes
Observations	15351	12880	12880	12880	12880
F Statistic	10.26	5.61	3.24	5.79	4.79
P Value	0.000	0.000	0.096	0.003	0.002

Notes: Standard errors in parentheses. Own Calculations Using NIDS data. Cross Sectional Weights used
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 15: Probit Estimates of Participation

	(1)	(2)	(3)	(4)	(5)
	Participate	**Participate**	**Participate**	**Participate**	**Participate**
Participate					
Female	-0.471***	-0.456***	-0.473***	-0.472***	-0.471***
	(0.039)	(0.038)	(0.039)	(0.040)	(0.039)
Number of Children <6 Living in HH	0.025	0.054	0.057	0.055	0.055
	(0.048)	(0.050)	(0.052)	(0.052)	(0.052)
Number of Children >6 Living in HH	-0.048*	-0.014	-0.012	-0.009	-0.009
	(0.019)	(0.022)	(0.022)	(0.023)	(0.023)
Ages 16-20	-0.160	-0.117	-0.234*	-0.236*	-0.238*
	(0.110)	(0.112)	(0.112)	(0.113)	(0.113)
Ages 21-30	0.445***	0.483***	0.381***	0.380***	0.381***
	(0.055)	(0.057)	(0.061)	(0.061)	(0.061)
Ages 31-50	0.836***	0.847***	0.705***	0.707***	0.708***
	(0.049)	(0.050)	(0.053)	(0.053)	(0.053)
Ages 51-60	-0.173*	-0.180**	-0.192**	-0.190**	-0.190**
	(0.068)	(0.069)	(0.069)	(0.069)	(0.069)
Tertiary Education	0.947***	0.825***	0.769***	0.779***	0.783***
	(0.083)	(0.092)	(0.097)	(0.097)	(0.098)
High School	0.415***	0.371***	0.330***	0.332***	0.334***
	(0.040)	(0.041)	(0.043)	(0.043)	(0.044)
Asian	0.054	-0.087	-0.124	-0.116	-0.117
	(0.191)	(0.186)	(0.177)	(0.181)	(0.181)
White	-0.227*	-0.340**	-0.417***	-0.391***	-0.397***
	(0.106)	(0.110)	(0.111)	(0.109)	(0.109)
African	0.056	0.092	0.042	0.088	0.082
	(0.061)	(0.060)	(0.068)	(0.069)	(0.070)
Previously Moved		0.135*	0.137*	0.139*	0.141*
		(0.060)	(0.059)	(0.061)	(0.061)
HH Received Remittances		-0.070	-0.069	-0.050	-0.050
		(0.056)	(0.057)	(0.057)	(0.057)
HH per capita below poverty line		-0.048	-0.011	-0.002	-0.003
		(0.087)	(0.085)	(0.087)	(0.086)
HH per Capita Expenditure Quintile 2		0.069	0.097	0.087	0.086
		(0.073)	(0.070)	(0.071)	(0.071)
HH per Capita Expenditure Quintile3		0.089	0.110	0.103	0.102
		(0.110)	(0.105)	(0.106)	(0.106)
HH per Capita Expenditure Quintile 4		0.214*	0.255*	0.240*	0.238*
		(0.107)	(0.101)	(0.101)	(0.101)
HH per Capita Expenditure Quintile 5		0.321**	0.319**	0.307*	0.304*
		(0.122)	(0.119)	(0.119)	(0.119)
HH receives Old Age Pension			-0.597***	-0.586***	-0.585***
			(0.043)	(0.042)	(0.042)
HH recieves Child Support Grant			0.095*	0.099*	0.097*
			(0.039)	(0.039)	(0.039)
% Difference in Municipal and National Gini				0.701	0.739
				(1.202)	(1.221)
% Difference in Municipal and National Unemployment Rates				-1.701***	-1.717**
				(0.501)	(0.543)
Proportion of HH with Post facilities				0.121	0.177
				(0.092)	(0.230)
Refuse Removed by Local Authority					0.000
					(0.195)
Proportion of HH with Electric Cooking					-0.211
					(0.212)
Province Variables	Yes	Yes	Yes	Yes	Yes
Observations	12803	12766	12764	12764	12764
F Statistic	79.72	3.26	71.17	4.76	0.99
P Value	0.000	0.001	0.000	0.003	0.397

Notes: Standard errors in parentheses. Own Calculations Using NIDS data. Cross Sectional Weights used
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 16: Marginal Effects of Migration from Probit

	(1)	(2)	(3)	(4)	(5)
	Migrant	**Migrant**	**Migrant**	**Migrant**	**Migrant**
Migrant					
Female	-0.003	-0.006	-0.006	-0.006	-0.006
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Number of Children <6 Living in HH	-0.003	-0.004	-0.005	-0.005	-0.005
	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)
Number of Children >6 Living in HH	-0.018***	-0.020***	-0.020***	-0.020***	-0.020***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
Ages 16-20	0.057***	0.063***	0.056**	0.055**	0.051**
	(0.015)	(0.018)	(0.017)	(0.017)	(0.017)
Ages 21-30	0.037**	0.058***	0.053**	0.052**	0.051**
	(0.013)	(0.017)	(0.016)	(0.016)	(0.016)
Ages 31-50	0.001	0.022	0.019	0.018	0.017
	(0.012)	(0.014)	(0.014)	(0.014)	(0.014)
Ages 51-60	0.003	0.018	0.014	0.012	0.013
	(0.018)	(0.023)	(0.022)	(0.021)	(0.021)
Tertiary Education	0.061***	0.072***	0.074**	0.074**	0.078***
	(0.018)	(0.021)	(0.022)	(0.022)	(0.022)
High School Education	0.034***	0.039***	0.040***	0.040***	0.043***
	(0.008)	(0.009)	(0.009)	(0.009)	(0.008)
Asian	-0.010	0.006	0.004	0.004	0.012
	(0.037)	(0.048)	(0.046)	(0.045)	(0.048)
White	0.012	0.017	0.013	0.013	0.010
	(0.018)	(0.021)	(0.022)	(0.022)	(0.021)
African	0.024*	0.019	0.017	0.016	0.012
	(0.012)	(0.013)	(0.014)	(0.014)	(0.015)
Employed		-0.019*	-0.017	-0.016	-0.018
		(0.010)	(0.010)	(0.010)	(0.010)
HH Received Remittances			0.011	0.011	0.010
			(0.010)	(0.010)	(0.010)
HH receives Old Age Pension			-0.010	-0.011	-0.011
			(0.009)	(0.009)	(0.009)
HH receives Child Support Grant			-0.004	-0.003	-0.002
			(0.009)	(0.009)	(0.009)
HH per Capita Expenditure Quantile 2			0.015**	0.015**	0.013**
			(0.002)	(0.003)	(0.002)
HH per Capita Expenditure Quantile3			0.009 **	0.009 **	0.006 **
			(0.001)	(0.002)	(0.001)
HHper Capita Expenditure Quantile 4			0.023	0.022*	0.017
			(0.014)	(0.011)	(0.012)
HH per Capita Expenditure Quantile 5			0.013	0.012	0.006
			(0.017)	(0.016)	(0.017)
Percentage Difference in Municipal and National Gini				0.284**	0.239*
				(0.106)	(0.103)
Percentage Difference in Municipal and National Unemployment Rates				-0.043	0.011
				(0.041)	(0.036)
Proportion of HH with Post facilities					-0.089
					(0.046)
Refuse Removed by Local Authority					-0.000
					(0.028)
HH use electricity to cook					-0.033
					(0.035)
Province Variables	Yes	Yes	Yes	Yes	Yes
Observations	15351	12880	12880	12880	12880

Notes: Marginal effects. Standard errors in parentheses. Own Calculations Using NIDS data. Cross Sectional Weights used.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 17: Marginal Effects of Participation from Probit

	(1) Participate	(2) Participate	(3) Participate	(4) Participate	(5) Participate
Participate					
Female	-0.168***	-0.473***	-0.169***	-0.168***	-0.168***
	(0.013)	(0.039)	(0.014)	(0.014)	(0.014)
Number of Children <6 Living in HH	0.009	0.057	0.021	0.020	0.020
	(0.018)	(0.020)	(0.019)	(0.019)	(0.019)
Number of Children >6 Living in HH	-0.017*	-0.014**	-0.004	-0.003	-0.003
	(0.007)	(0.005)	(0.008)	(0.008)	(0.008)
Ages 16-20	-0.060	-0.023	-0.089*	-0.089*	-0.090*
	(0.042)	(0.117)	(0.043)	(0.044)	(0.044)
Ages 21-30	0.153***	0.3808***	0.132***	0.132***	0.132***
	(0.018)	(0.0610)	(0.020)	(0.021)	(0.020)
Ages 31-50	0.283***	0.7051***	0.242***	0.243***	0.243***
	(0.015)	(0.052)	(0.017)	(0.017)	(0.017)
Ages 51-60	-0.064*	-0.192***	-0.072**	-0.071**	-0.071**
	(0.026)	(0.069)	(0.027)	(0.027)	(0.027)
Tertiary Education	0.279***	0.2639***	0.238***	0.241***	0.241***
	(0.019)	(0.015)	(0.024)	(0.024)	(0.024)
High School Education	0.151***	0.324***	0.120***	0.121***	0.122***
	(0.015)	(0.042)	(0.016)	(0.016)	(0.016)
Asian	0.019	-0.124	-0.046	-0.043	-0.043
	(0.068)	(0.177)	(0.067)	(0.069)	(0.069)
White	-0.085*	-0.416***	-0.160***	-0.150***	-0.152***
	(0.041)	(0.110)	(0.044)	(0.043)	(0.043)
African	0.020	0.0419	0.015	0.032	0.030
	(0.023)	(0.0677)	(0.025)	(0.026)	(0.026)
Previously Moved		0.1368**	0.049*	0.049*	0.050*
		(0.059)	(0.021)	(0.021)	(0.021)
HH Received Remittances		-0.068	-0.025	-0.018	-0.018
		(0.058)	(0.021)	(0.021)	(0.021)
HH per capita below poverty line		-0.011	-0.004	-0.001	-0.001
		(0.057)	(0.031)	(0.031)	(0.031)
HH per Capita Expenditure Quantile 2		0.0968	0.035	0.031	0.031
		(0.070)	(0.025)	(0.025)	(0.025)
HH per Capita Expenditure Quantile3		0.110	0.040	0.037	0.037
		(0.105)	(0.037)	(0.037)	(0.037)
HH per Capita Expenditure Quantile 4		0.255	0.089**	0.084*	0.084*
		(0.101)	(0.034)	(0.034)	(0.034)
HH per Capita Expenditure Quantile 5		.318**	0.110**	0.106**	0.105**
		(0.011)	(0.039)	(0.039)	(0.039)
HH receives Old Age Pension		-0.596***	-0.226***	-0.222***	-0.222***
		(0.042)	(0.016)	(0.016)	(0.016)
HH recieves Child Support Grant		0.095**	0.035*	0.036*	0.035*
		(0.038)	(0.014)	(0.014)	(0.014)
% Difference in Municipal and National Gini			-0.052	-0.049	-0.050
			(0.031)	(0.031)	(0.031)
% Difference in Municipal and National Unemployment Rates				0.255	0.268
				(0.437)	(0.443)
Proportion of HH with Post facilities				0.044	0.064
				(0.034)	(0.083)
Refuse Removed by Local Authority					0.019
					(0.071)
Proportion of HH with Electric Cooking					-0.077
					(0.077)
Province Variables	Yes	Yes	Yes	Yes	Yes
Observations	12803	12803	12764	12764	12764

Notes: Marginal Effects. Standard errors in parentheses. Own Calculations Using NIDS data. Cross Sectional Weights used
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

13 Biprobits

The estimates of the biprobits are reported in Table 13.3 for five models. Similar to the probit models, each model adds an additional set of covariates. The first model includes only personal characteristics followed by the addition of household characteristics and finally the addition of community level controls in the final two models.

The coefficients reported in Table 13.3 are the raw coefficients from the biprobit which capture the effect of covariates on the underlying continuous unobserved variables as described in equation 11.3 and 11.6 and thus do not directly report the probability of moving into migration or participating in the labour force (see Greene and Hensher, 2009). They are not intuitive to interpret and the discussion below focusses on the sign and the significance of the coefficients while contrasting these to the probit estimates whose marginal effects estimates were reported in the previous section.

The rho reported at the bottom of Table 13.3 is the estimation for the correlation coefficient for two binary variables that are assumed to be obtained by censoring an underlying continuous bivariate normal population (Greene and Hensher, 2009). The estimated correlation is thus the correlation between the underlying unobserved continuous variables $y*_m$ and $y*_p$ obtained from the biprobit (Greene, 1996). The correlation is obtained by estimating the biprobit model without independent variables and thus differs from the correlation of the two observed binary variables (Greene and Hensher, 2009). High values exceeding 0.69 are reported across most models. This shows the intertwined nature of the two decisions. In addition rho captures the correlation of unobservables. As it is statistically different from zero it indicates the importance of unobservables in both decision. Most importantly therefore, this implies that one obtains superior multivariate estimates of migration and or labour participation by estimating them jointly and interdependently.

We now proceed to discuss the results by variable for both migration and labour.

13.1 Individual Characteristics of Migrants

As in the descriptive discussion, the negative and significant coefficient on the female binary variable in the participation sub-section of Table 13.3 shows that labour force participation is biased towards men. Now though a slight bias against females in migration is reported too in models 3-5. This is in contrast of what

was found with probit estimates and descriptive analysis, which modeled the two decisions separately. When accounting for the interrelatedness of migration and labour force participation as well as controlling for additional factors, the results suggest that females are less likely to migrate.Once accounting for the labour force participation migration is biased towards males.

We look now at the effect of children on adult migration and participation. An increase in the number of children age 6-16 negatively affects the migration decision. In contrast, an increase in children of any age has no effect on the decision to participate in the labour force. This is similar to the findings of the probit and supports the findings from previous studies (van der Berg et al., 2003).

Looking at models 1 and 2, migration appears to be aged biased as there are significant coefficients on binary age variables for the 16-20 and 21-30 year old age categories. However post 30 years of age the effect disappears with no significance obtained for older age categories. However age does seem to be a determining factor in labour force participation across all age groups. Both 21-30 and 30-50 are cohorts are more likely to participate than those over 60 and the 51-60 year cohort reporting negative but significant coefficients. This is similar to the probit estimates which found age to be significant in labour force participation and migration to be age selective.

The role of education in both the migration and participation decisions is evident with both sets of tertiary and high school indicators significant and positive. This supports the conclusions drawn from the descriptive analysis and migration probits that migration favours the educated. This provides strong affirmation that the more educated are both more likely to migrate and to participate in the labour market.

The F Statistics and related p values reported at the bottom of the migration and participation sections of Table 13.3 provide the F statistics from the test of joint significance of the variables included in the respective model but excluded in the previous models. For the first model, the F statistic is simply the F statistic from the included variables. The F statistic related to the models indicate the joint significance of the individual characteristics for the migration and participation decisions. In both the migration and participation equations the individual characteristics' explanatory variables in questions are found to be jointly significant at the 1% and 5% level affirming the importance of individual factors affecting the two decisions.

Similar to the probit estimates, the biprobit results confirm that migration of adults is biased towards the young, educated and relatively wealthy.

13.2 Sending Household Characteristics

Household characteristics are also accounted for in the modeling process. Binary variable indicators for a household's position in the household per capita income distribution are included to capture the effect of income on the migration decision. Compared to the base category of individuals in the first quantile of household per capita income, individual in the second and third quantile are more likely to migrate as indicated by the positive significant coefficients. This may be due to wealthier households being able to overcome the liquidity constraints of poorer households and so afford the cost of migration as well as the cost of sustaining a migrant while he/she is still searching for work away from home. This confirms the earlier conclusion of the probit estimates. South Africa thus reports similar results in terms of the age and social economic standing of migrants as its developing country peers (see Bell and Muhidin, 2009).

Similar to the probits, the indicator for whether a household receives a government grant is found to be insignificant in the migration decision. Grants bring an influx of money into households and thus the effect of higher household income may already be accounted for in the model by controlling for household income and thus producing an insignificant coefficient. Grant income thus does not appear to facilitate migration. This finding contrasts to the result of Ardington et al. (2013). However despite the positive impact household income has on labour force participation, individuals who reside in a household receiving the State Old Age Pension are significantly less likely to participate in the labour force. Individuals who reside in a household receiving child support are more likely to participate in the labour market. The effect of social grants are found to be similar to the obtained in the probit estimates.

Following Ardington et al. (2013) we include whether a household already receives remittances as a proxy for the migrant networks that are highlighted in the literature. In line with the probit estimates this variable is found to have no impact on the migration decision in all of the models.

The F statistics of the joint test of significance of household level variables in the migratory and participation decisions are provided in Table 13.3 below Model 3. In contrast to the probit estimates, the F statistic obtained indicates that the

household characteristics are not jointly significant at the 10% level. However for the participation decision the household characteristics are found to be jointly significant at the 1% level.

13.3 Community Characteristics

The inclusion of community characteristics has varying effects. The community factors controlling for service delivery (refuse collection by municipality and postal services) and local development (water access) are once again found to be individually insignificant for both migration and participation decisions.

However, not all community characteristics are insignificant. The difference in the local and national inequality levels and unemployment rates are found to be significant factors in the migration and participation decision. The relative unemployment measure is found to be significant in predicting participation but not migration. The converse is true for inequality which is significant in the migration decision but not the participation decision. In the migration equation this indicates that higher levels of inequality promote migration out of a community. Thus individuals prefer to stay in communities with lower levels of relative inequality and migrate out of communities with high levels of relative inequality. This is in direct contrast to the probit estimates. Using the biprobit model, which accounts for the interlaced migration and participation decision, we find that an increase in inequality, relative to the national level, increases an individual's chances of migrating out of a community. This is in line with existing literature of Stark et al. (1986).

Participation is driven by the probability of employment as captured by the relative local unemployment rate to the national level. The unemployment rate captures the probability of finding employment and realizing the gains from migration if migration is based on job search as noted by Bauer and Zimmer (1998). It is thus no surprise that relative unemployment is a significant determinant in the labour force participation decision. The community factors affecting migration and labour participation decisions are found to be related to social-economic factors, such as inequality and unemployment, and not realted to factors associated with the utility of a place such as local service delivery and development.

The F statistics of joint significance for the community level Gini and unemployment rate is provided below model 4. In both the migration and participation decisions the Gini and unemployment rate are found to be jointly significant at the 1% level. The F statistics of joint significance for additional community level

controls, provided below model 5, indicate that community level controls are not jointly significant in the participation decision at the 10% level. However for the migration decision the community level controls are found to be jointly significant at the 1% level.

Table 18: Bivariate Probit Estimates of Migration and Participation

	(1)	(2)	(3)	(4)	(5)
	Migrant	**Migrant**	**Migrant**	**Migrant**	**Migrant**
Migrant					
Female	-0.070*	-0.076 *	-0.096 *	-0.046 *	-0.049 **
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
Number of Children <6 Living in HH	0.008	0.006	-0.027	0.019	0.017
	(0.033)	(0.034)	(0.034)	(0.034)	(0.034)
Number of Children >6 Living in HH	-0.172***	-0.190***	-0.154***	-0.186***	-0.195***
	(0.029)	(0.030)	(0.030)	(0.032)	(0.033)
Ages 16-20	0.394***	0.438***	0.136***	0.496***	0.481***
	(0.090)	(0.107)	(0.102)	(0.102)	(0.102)
Ages 21-30	0.271**	0.402***	0.043 ***	0.541***	0.541***
	(0.090)	(0.112)	(0.108)	(0.107)	(0.107)
Ages 31-50	-0.032	0.136	-0.082	0.183	0.186
	(0.102)	(0.118)	(0.115)	(0.107)	(0.107)
Ages 51-60	-0.054	0.065	-0.096	0.068	0.079
	(0.139)	(0.161)	(0.159)	(0.139)	(0.138)
Tertiary Education	0.493***	0.569***	0.615***	0.439***	0.455***
	(0.117)	(0.129)	(0.123)	(0.126)	(0.124)
High School Education	0.300***	0.341***	0.347***	0.261**	0.284***
	(0.069)	(0.071)	(0.065)	(0.080)	(0.079)
Asian	-0.352	-0.221	-0.298	-0.075	-0.001
	(0.369)	(0.388)	(0.358)	(0.371)	(0.357)
White	0.242	0.207	0.146	0.200	0.181
	(0.213)	(0.211)	(0.214)	(0.219)	(0.213)
African	0.345**	0.308*	0.316**	0.256	0.215
	(0.106)	(0.131)	(0.113)	(0.144)	(0.146)
Employed		-0.107	-0.222**	0.065	0.065
		(0.079)	(0.071)	(0.097)	(0.097)
HH Received Remittances			0.081	0.132	0.139
			(0.072)	(0.076)	(0.076)
HH receives Old Age Pension			-0.118	-0.082	-0.075
			(0.071)	(0.074)	(0.074)
HH receives Child Support Grant			-0.036	-0.020	-0.011
			(0.069)	(0.071)	(0.072)
HH per Capita Expenditure Quantile 2			0.098**	0.154 **	0.142 **
			(0.012)	(0.013)	(0.005)
HH per Capita Expenditure Quantile3			0.045 **	0.060 **	0.041 *
			(0.011)	(0.018)	(0.001)
HHper Capita Expenditure Quantile 4			0.161*	0.227*	0.188**
			(0.060)	(0.06)	(0.066)
HH per Capita Expenditure Quantile 5			0.026	0.057	0.010
			(0.148)	(0.142)	(0.141)
% Difference in Municipal and National Gini				-2.304*	-1.810 *
				(0.916)	(0.931)
% Difference in Municipal and National Unemployment Rates				-0.201	0.265
				(0.307)	(0.278)
Proportion of HH with Post facilities					-0.358
					(0.389)
Refuse Removed by Local Authority					-0.252
					(0.206)
HH use electricity to cook					-0.209
					(0.264)
Constant	-1.905***	-1.900***	-1.426***	-1.939***	-1.529***
	(0.152)	(0.162)	(0.189)	(0.226)	(0.274)
F Statistic	12.51	3.31	0.870	4.30	5.43
P Value	0.000	0.037	0.526	0.014	0.0012
In Labour Market	**Participate**	**Participate**	**Participate**	**Participate**	**Participate**
Female	-0.468***	-0.449***	-0.430***	-0.407***	-0.404***
	(0.038)	(0.042)	(0.041)	(0.049)	(0.048)
Number of Children <6 Living in HH	0.023	0.030	0.035	0.027	0.028
	(0.048)	(0.052)	(0.050)	(0.050)	(0.049)
Number of Children >6 Living in HH	-0.048*	-0.009	-0.020	0.011	0.011
	(0.019)	(0.021)	(0.021)	(0.020)	(0.020)
Ages 16-20	-0.155	-0.066	-0.086	-0.199	-0.200
	(0.111)	(0.116)	(0.106)	(0.109)	(0.109)
Ages 21-30	0.452***	0.517***	0.422***	0.321***	0.321***
	(0.055)	(0.061)	(0.059)	(0.074)	(0.073)
Ages 31-50	0.836***	0.874***	0.642***	0.663***	0.662***
	(0.051)	(0.054)	(0.056)	(0.066)	(0.065)
Ages 51-60	-0.157*	-0.143*	-0.170*	-0.148*	-0.148*
	(0.069)	(0.071)	(0.067)	(0.074)	(0.074)
Tertiary Education	0.952***	0.791***	0.759***	0.595***	0.589***
	(0.084)	(0.092)	(0.086)	(0.111)	(0.108)
High School Education	0.413***	0.331***	0.334***	0.220***	0.218***
	(0.040)	(0.044)	(0.040)	(0.048)	(0.048)
Asian	0.081	-0.212	-0.233	-0.181	-0.189
	(0.221)	(0.202)	(0.198)	(0.203)	(0.204)
White	-0.245*	-0.437***	-0.432***	-0.449***	-0.454***
	(0.110)	(0.112)	(0.121)	(0.114)	(0.115)
African	0.053	0.061	0.073	0.011	0.007
	(0.063)	(0.075)	(0.088)	(0.083)	(0.084)
Previously Moved		0.177**	0.137*	0.144*	0.149*
		(0.067)	(0.059)	(0.064)	(0.064)
HH Received Remittances		-0.102	-0.096	-0.077	-0.079
		(0.065)	(0.058)	(0.056)	(0.056)
HH per capita Inc below poverty line		-0.065	-0.033	-0.008	-0.007
		(0.096)	(0.088)	(0.090)	(0.089)
HH per Capita Expenditure Quantile 2		0.079	0.091	0.086	0.084
		(0.066)	(0.061)	(0.062)	(0.061)
HH per Capita Expenditure Quantile3		0.079	0.085	0.089	0.088
		(0.109)	(0.096)	(0.098)	(0.097)
HHQper Capita Expenditure Quantile 4		0.228*	0.230*	0.235*	0.227*
		(0.109)	(0.098)	(0.100)	(0.099)
HH 5per Capita Expenditure Quantile 5		0.350**	0.291**	0.288**	0.278*
		(0.118)	(0.105)	(0.108)	(0.108)
HH recieves Old Age Pension			-0.581***	-0.558***	-0.553***
			(0.048)	(0.052)	(0.051)
HH recieves Child Support Grant			0.048	0.069	0.067
			(0.039)	(0.041)	(0.040)
Percentage Difference in Municipal and National Gini				1.395	1.331
				(1.185)	(1.197)
Percentage Difference in Municipal and National Unemployment Rates				-1.511***	-1.441***
				(0.512)	(0.532)
Proportion of HH with Post facilities				0.107	0.202
				(0.091)	(0.208)
Refuse Removed by Local Authority					0.105
					(0.178)
HH use electricity to cook					-0.245
					(0.201)
Constant	-0.012	-0.041	1.089***	-0.861*	-0.899**
	(0.040)	(0.042)	(0.188)	(0.336)	(0.329)
Province Variables	Yes	Yes	Yes	Yes	Yes
F Statistic	8.65	4.37	8.63	3.94	1.99
P Value	0.000	0.001	0.000	0.008	0.115
Observations	12715	10781	10781	10781	10781
Rho (ρ)	0.012	0.041	0.797	0.697	0.716

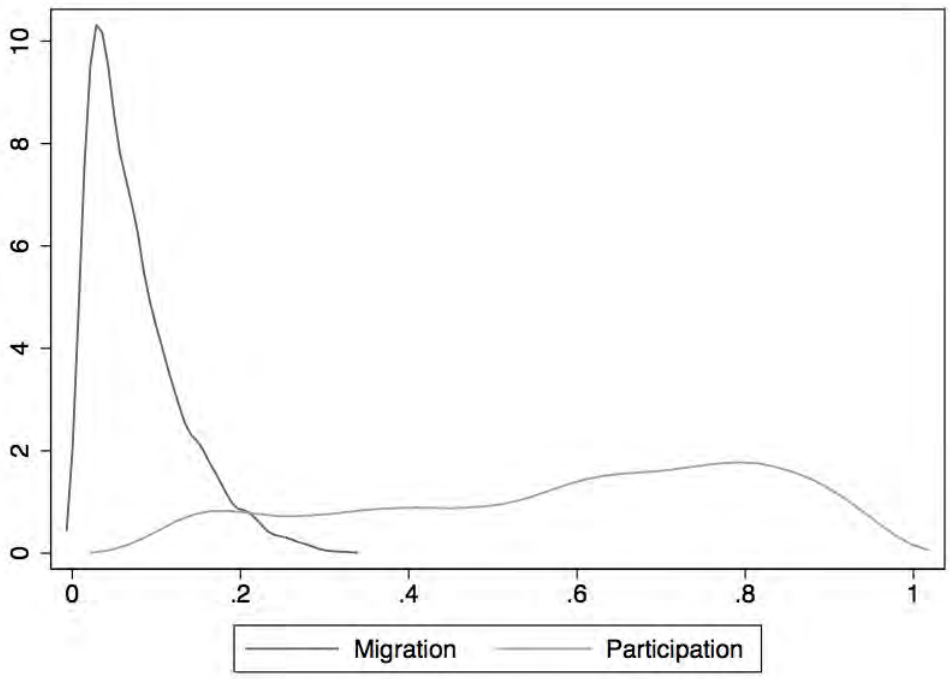
Notes: Standard errors in parentheses. Own Calculations Using NIDS data. Cross Sectional Weights used
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

14 Probability of Migration and Participation

Using both the probit and biprobit models we can predict the probability of migration and labour force participation. This allows us to directly assess the impact of modeling process through two different lenses.

Using the complete specification (model 5) we are able to predict the probabilities of migration and participation from the two probit estimates. Figure 14.1 plots the densities of the predicted probabilities from the separate probit models of migration and participation on one axis. The density of participation probability is relatively flat increasing slightly to 0.8 before tapering off. It appears that the predicted probability is roughly uniformly distributed. However for the predicted probability of migration it is heavily skewed below 0.4 peaking at roughly 0.15 before tapering off. This is to be expected as fewer individuals are likely to migrate and thus predicted migration probabilities have a lower and tighter distribution than labour force participation probabilities.

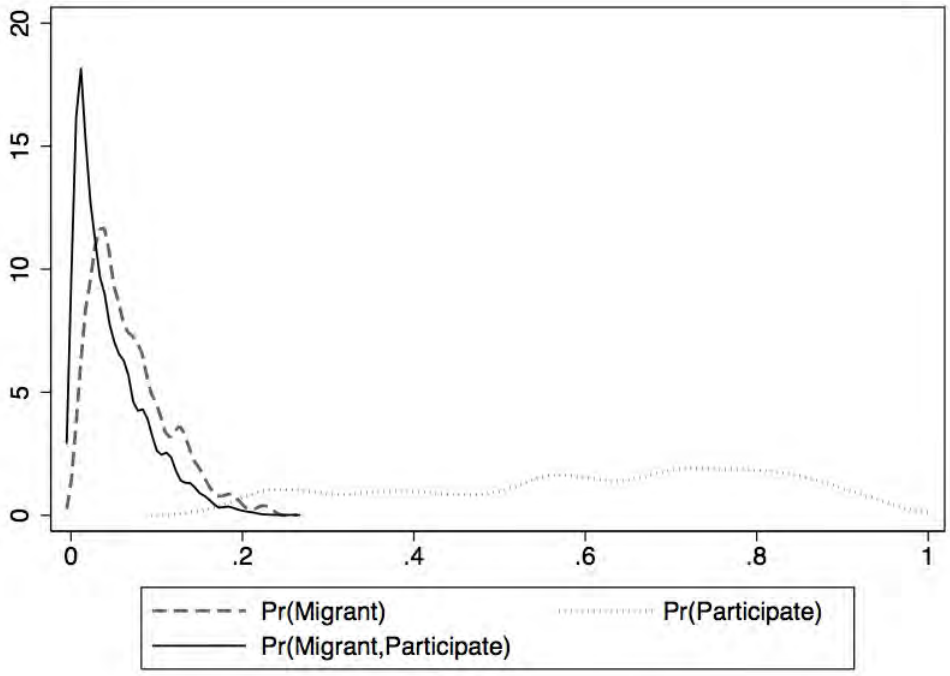
Figure 14.1: Predicted Probability of Migration and Participation from Probits



Similar to the probit estimates of migration and participation we can predict probabilities for migration and participation using the biprobit. However as probits

model only a binary decision the predicted probability is simply the probability of making the decision in question. Biprobits model two interrelated choices resulting in four states whereby an individual can participate and not migrate, migrate and not participate, participate and migration or not participate and not migrate. As a result 4 predicted probabilities can be obtained from the biprobits indicating the probability of each state. Using the complete specification (model 5) of the biprobits, Figure 14.2 plots the densities for all four state's predicted probabilities. The probability for participating and not migrating is relatively flat increasing slightly to 0.7 before decreasing. Similar to this is the probability of not migrating and not participating. However a large proportion of the density of participating and not migrating lies to the upper end of the 0,1 range, while a larger proportion of the density of not participating and not migrating lies to the bottom end of the 0,1 range. The densities of migration and not participating and migration and participating are similarly shaped and lie in a similar region. Both densities peak between 0.1-0.15 and tapper off before 0.4.

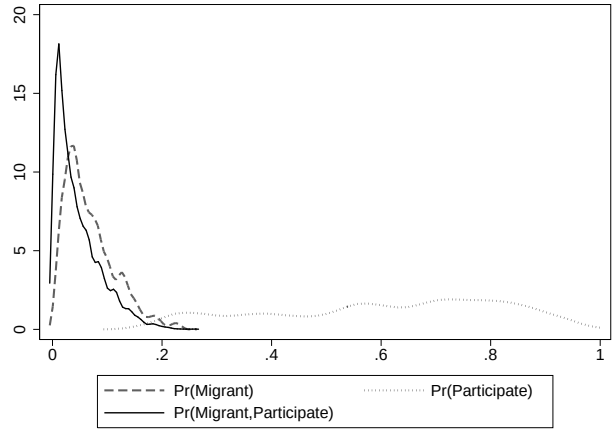
Figure 14.2: Predicted Probability of Migration and Participation from Biprobit



Using the predicted probabilities from the probits and biprobits we construct Figure 14.3. Figure 14.3 plots the densities of the predicted probability of migrating as well as participating as obtained from the probits. In addition Figure 14.3 plots

the density of the predicted probability of migration and participation from the biprobits ($P = 1,\ M = 1$). All three sets where plotted separately in Figures 14.1 and 14.2 for evaluation. The predicted probability of migrating and participating follows a similar distribution as the predicted probability of migrating. This indicates that the probability to migrate and participate, obtained from the biprobits, is mostly driven by the probability to migrate as it somewhat mimics its distribution. Individuals opting to migrate and participate in the labour force are thus largely influenced by the decision to migrate. The density of the probability to migrate and participate lies slightly to the left of the density of the probability to migrate. This indicates that on average lower probabilities are obtained for participating and migrating than only for migrating. This is inline with expectations as some coefficients changed between the two modelling process. In particular in the biprobit estimates females were found to be less likely to migrate and relative inequality had a negative impact on the probability of migrating. Figure 14.3 highlights the importance of the migration decision in the migrating and participating decision. When individuals opt to migrate and participate the migration decision plays an important role in the joint decision making process. This process is uniquely captured using the biprobit model.

Figure 14.3: Predicted Probability of Migration and Participation from Biprobit and Probit



Part VII

Labour Market for Migrants

Section IV briefly analysed the labour market for migrants post migration. However analyzing the earnings of migrants post migration is hampered due to sample selection issues. Traditionally the modeling of wages has accounted for sample selection into the labour market. However as Section VI has shown labour force participation and migration are interlinked and migrants constitute a non-random sample from sending communities. The purpose of this section is to derive and apply an appropriate technique that can be used to model wages accounting for both selection effects. Drawing on the biprobit estimates two sample selection terms are derived and used in the modeling of wages.

14.1 Methodology for Earnings

As migrant labourers are not a randomly selected sample of individuals, but instead exhibit different characteristics to the population as a whole, econometric modeling of the wages of migrants is plagued by sample selection (Mackenzie et al., 2006). Two selection issues play a central role in the modeling of the returns to migration (Co et al., 2000). Firstly, individuals who opt to leave their communities and migrant to receiving destinations are a self select group exhibiting observable and possibly unobservale traits that differ from individuals who opted to stay behind. In addition unobservables such as increased motivation and higher ability or disconnectedness with the community and being less-abled may manifest in migrants. Consequently self selection into migration may well be favourable as individuals which are more-abled and motivated to migrate out of communities in search of a better life or unfavourable as individuals who are unable to assimilate to the local environment and labour market demands migrate to more suitable environments (Gabriel and Schmitz, 1995). Secondly, returns to migration quantified through labour market renumeration face the standard labor force participation selection problem which may again be influenced by observable and non-observables (Co et al., 2000).

The econometric literature has dealt with dual selection effect in numerous fields employing a variety of econometric techniques. The extension of the Heckman (1976, 1979) and Lee (1976) approach, whereby qualitative information regarding selection is incorporated into a two-stage regression model assuming a multivariate normal distribution, has led to a proliferation of models accounting for two sample

selection rules (Tunali, 1986).

Once again we reply on Table 13 which divided the population into four subsamples and motivated the use of the biprobit in the analysis of migration and labour market participation. Wages are potentially observed only for individuals in S_3 and S_4 who are part of the labour market. Let the wages of migrants and non-migrants follow the Mincer's (1979) reservation wage offer such that $Y^*_{w,i}$ denote the wage offer for individual i which depends on labour market characteristics ($X_{w,i}$) in the form:

$$Y^*_{w,i} = X'_{w,i}\beta_w + \epsilon_{w,i}$$

$Y^*_{w,i}$ is only observed if the wage offer exceeds the individuals reservation wage conditional on the individual participating in the labour market ($y_{p,i} = 1$). If the wage offer ($Y^*_{w,i}$) is less than the reservation wage an individual is in the labour market ($y_{p,i} = 1$) it follows that the individual is unemployed. Denote $y_{w,i}$ as observed wage where $Y^*_{w,i}$ is larger than the reservation wage. The observed wage is thus given by:

$$y_{w,i} = X'_{w,i}\beta_w + \sigma_w\epsilon_{w,i} \tag{14.1}$$

where σ_w is an unknown scale parameter. Taking expectations of equation 14.1

$$E(y_{w,i} \mid X'_{w,i}\, Y) = X'_{w,i}\beta_w + \sigma E(\epsilon_{w,i} \mid X'_{w,i}\, Y)$$

Sample selection manifests itself in the model as $E(\epsilon_{w,i} \mid X'_{w,i}\, Y) \neq 0$ indicating that the relevant subsample is not random and thus inconsistent estimates of β_w are obtained. As per Tunali (1986) the log wages is given by:

$$y_{w,\,i} = X'_{w,i}\beta_w + \gamma_1\hat{\lambda}_m + \gamma_2\hat{\lambda}_p + e_1 \tag{14.2}$$

where $\hat{\lambda}_m$ and $\hat{\lambda}_p$ is consistent estimates of λ_m and λ_p denoting the inverse mills ratio used as sample selection correction terms for migration and labour partici-

pation similar to the Heckman (1979) approach. Estimation of equation 14.2 can be conducted using least squares estimation obtaining consistent estimations of $\beta_w,\ \gamma_1,\ \gamma_6$ (Ham, 1980). To obtain $\hat{\lambda}_m$ and $\hat{\lambda}_p$ we model the selection probabilities $(P_1, ..., P_4)$ we need to explicitly model both selection rules. The Heck-probit approach to dual selection issues, whereby two sequential binary choices are faced only by those who selected the first option as is the case with remigration, is not plausible as individuals opt not to migrate still face the participation choice, or individuals who opt not to participate may still migrate as indicated by individuals in $S_{2,}\ S_3$. Instead the decision to migrate and participate in the labour market should be modeled simultaneously as those considering to enter the labour market may also consider migrating, and visa versa, leading to a correlation between the two choices. This approach is similar to Ham (1980) which derived an approach to account for sample selection using two correlated selection rules in order to study labour supply accounting for two correlated selection rules of underemployment and participation.

Consequently we drawn on our biprobit estimates to construct the sample selection term by predicating the probability density functions and cumulative density functions for both the migration and participation equations in order to construct two separate inverse mills ratios. Under a trinormal specification, the probability density function for $y_{w,\,i}$ can be computed for each cell (Tunali, 1986). As per Ham (1980) let:

$$Z_k = \frac{y_k - X_k'\beta_k}{\sigma_k}$$

where $k = 1, ..., 4$ for individuals in subsample cells $S = 1, ..., 4$ respectively. And

$$Z_j = X_j'\beta_j$$

where $j = m\ or\ p$ corresponding to equations 1 ($Y^*_{m,i} = X'_{m,i}\beta_m + \epsilon_{m,i}$) and 4 ($Y^*_{p,i} = X'_{p,i}\beta_p + \epsilon_{p,i}$) which indicate the latent selection equation and $\sigma_m = \sigma_p = 1$. The errors $\epsilon_{m,i}, \epsilon_{p,i}, \epsilon_{w,i}$ are assumed to be distributed independently and identically distributed across the sample with a joint tri-normal distribution. Similar to Ham (1980) the likelihood for wages accounting for the dual selection rules is:

$$L_w = \prod_1 G_1(Z_1, -Z_m, -Z_p) \prod_2 G_2(Z_2, -Z_m, Z_p) \prod_3 G_1(Z_1, Z_m, -Z_p) \prod_4 G_1(Z_1, Z_m, Z_p)$$

Where the number below the multiplication sign refers to the subsample in which the individuals falls similarly to $S_1, ..., S_4$ and $P_1, ..., P_4$ as indicated in Section V and the function G_k is the integrals over the relevant standard trivariate normal density function. The associated correlation matrix is then given by:

$$C_1 = \begin{Bmatrix} 1 & -\rho_{m,\,w} & -\rho_{p,\,w} \\ & 1 & \rho_{m,\,p} \\ & & 1 \end{Bmatrix}$$

Maximum likelihood estimation is an appealing approach for dual selection issues, however it is rarely applied with researchers opting for the two-stage approach whereby the inverse mill ratios obtained from the first stage selection models are included in the specification and interpreted (Blank, 1990; Co et al., 2000). Consequently we proceed by employing the two-stage approach in the spirit of Heckman (1979) similar to that outlined by Rabe (2009). First the selection equations of migration and participation are jointly estimated using our initial biprobit model number 5 using maximum likelihood estimation of the log likelihood in equation 13. In this step we assume migration and participation are not independent processes after controlling for observed heterogeneity. The results yields an estimation of $\rho_{m,\,p}$ which can testifies to the dependence of the selection processes. From the bivariate probit the estimates of λ_m and λ_p are obtained which are defined as follows, similar to Ham (1980):

$$\lambda_m = \frac{\phi(Z_m)\Phi(Z_m^*)}{F(Z_m,\ Z_p,\ \rho_{m,\,p})}$$

$$\lambda_m = \frac{\phi(Z_p)\Phi(Z_p^*)}{F(Z_m,\ Z_p,\ \rho_{m,\,p})}$$

Where $Z_m^* = \frac{Z_p - \rho_{m.\,p} Z_m}{(1-\rho_{m,\,p}^2)^{\frac{1}{2}}}$ and $Z_p^* = \frac{Z_m - \rho_{m.\,p} Z_p}{(1-\rho_{m,\,p}^2)^{\frac{1}{2}}}$ and $F(.)$ is the bivariate standard normal distribution function. With $\hat{\lambda}_m$ and $\hat{\lambda}_p$ obtained from the bivariate probit equation 11.13 ($y_{w,\,i} = X'_{w,i}\beta_w + \gamma_1 \hat{\lambda}_{i,\,m} + \gamma_2 \hat{\lambda}_{i,\,p} + e_{i,\,1}$) can be consistently estimated using least squares (Wetzels and Zorlu, 2003). Note that given the dual

selection rules the error in equation 14.2, e_1, is defined as follows:

$$e_{i,\,1} = \epsilon_{w,\,i} + \epsilon_{m,i}(\lambda_m - \hat{\lambda}_m) + \epsilon_{p,i}(\lambda_p - \hat{\lambda}_p)$$

resulting in OLS estimates of $e_{i,\,1}$ being inconsistent. Combing Buchinsky (1998) and Lee et al. (1980) a simulation technique can be applied to obtain a pseudo-Heckman error correction. Parameters $\rho_{m,\,p}$, $\rho_{p,\,m}$, β_m and β_p obtained from the bivariate probit and define $\eta_{m,\,p}$ and $\eta_{p,\,m}$ as random errors generated according to a bivariate normal distribution. The adapted correction terms can then be obtained obtained via a Monte Carlo simulation with S repetitions. The resulting pseudo-correction terms are given by:

$$H(\hat{\lambda}_m) = \frac{1}{S}\sum_{s=1}^{S}\frac{\phi}{\Phi}[max\{\frac{1}{\hat{\rho}_{m,\,p}}(X'_m\hat{\beta}_m + \eta^s_{m,\,p})\ ;\ X'_m\hat{\beta}_m\}]$$

Which corrects for selection into migration, and:

$$H(\hat{\lambda}_p) = \frac{1}{S}\sum_{s=1}^{S}\frac{\phi}{\Phi}[max\{\frac{1}{\hat{\rho}_{p,\,m}}(X'_p\hat{\beta}_p + \eta^s_{p,\,m})\ ;\ X'_p\hat{\beta}_p\}]$$

As per Efron and Tibshirani (1986) and Ferraria and Cribari-Neto (1998) the estimation procedure is bootstrapped in order to obtain bootstrapped standard errors.

The outlined procedure explicitly accounts for the complex variety of social and familial interactions which affect the migration and participation decisions. The decision to migrate and participate in the labour force is first modeled as outlined in Section V by accounting for selection into one of the subsamples $S_1, ..., S_4$ using a simultaneous bivariate probit. Estimation of migrants and non-migrants' wages participating in the labour force can then be estimated using the inverse mills ratios to account for the dual selection effects. Applying various corrections through a Monte Carlo simulation procedure and bootstrapping the final log wages estimation provides us with consistent estimates of the desired parameters (Tuanli, 1986).

14.2 Earning Results

The results of equation 14.2, capturing this procedure as outlined in Section 14.1, is provided in Table 19. As the model is estimated using least squares the coefficients obtained and reported are also the marginal effects. The sample selection effects (λ) is generated using the complete biprobit model number 5.

Females report earning lower wages than their male counterparts. In addition african and coloured workers report lower earnings than their white counterparts while Asians report higher wages than their white counterparts. The various sectors and occupations report ranging coefficients in comparison to their base value of the electricity sector and technicians. In line with expectations, higher skilled occupations and service sectors report higher than average wages while low skilled occupations report similar to lower wages than elementary occupations. Both age and education, which capture experience and ability in wage model, are found to positively affect wages, with diminishing returns, as indicated by the significant but negative coefficient on age and education.

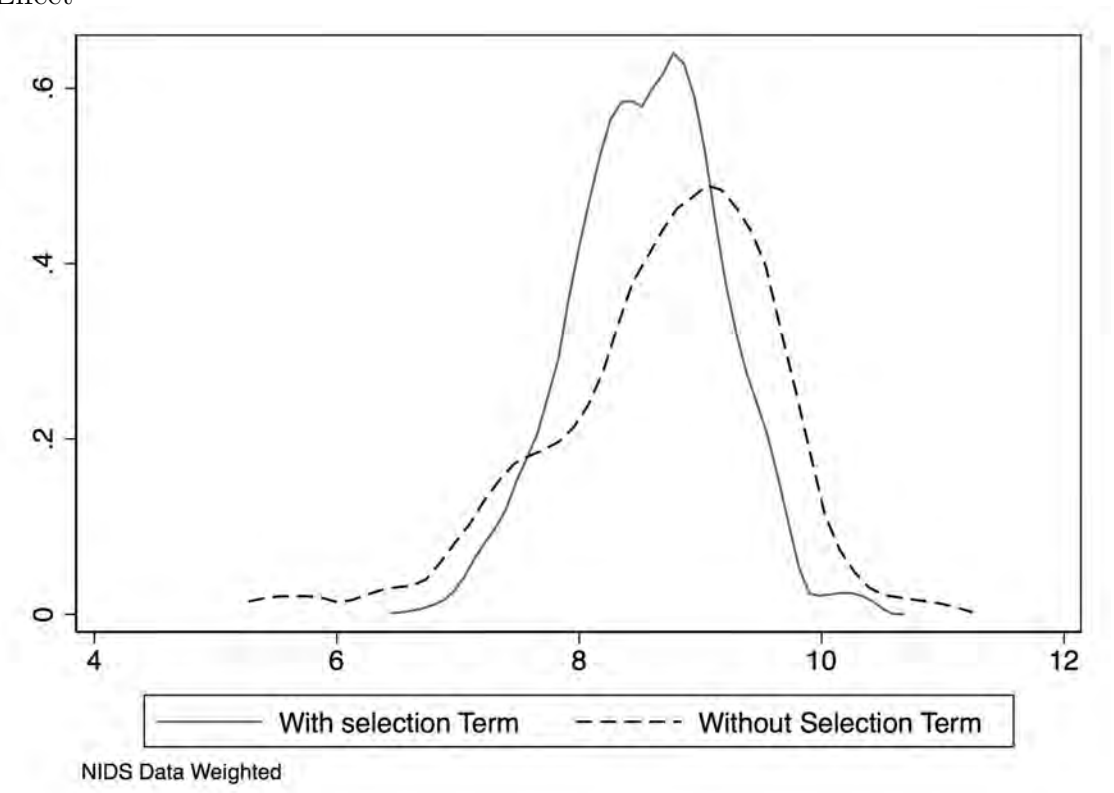
A positive and significant coefficient is obtained on the participation Lambda indicating the non-random selection into the labour force. The positive coefficient on the labour force participation is common in the South African literature (see Bhorat et al., 2007; Kingdon and Knight, 2004; Bhorat and Leibbrandt, 1999; Walker, 2003). The coefficient of interest is that on the Lambda controlling for selection into migration, which reports a negative but significant coefficient. This indicates that the wages of those who migrate are negatively influenced by their non-random selection into migration. The negative selection effect may be due to individuals negatively selecting into the migration or due to the migration process having a negative impact. As mentioned in Section VI the migration process, as captured by the biprobits used to generate these selection effects, is high in cost. International literature suggests that migrants often select positions lower remuneration in order to start recouping the costs of migration as soon as possible (see Borjas and Tienda, 1993; Cabral and Duarte, 2010; Bratsberg et al, 2006). Instead of searching for extended periods of time migrants accept relatively lower wages at first. Over time the wages of migrants gradually increase as migrants adjust to their new environments having recouped the migration cost. Note that even though migration is biased towards the young and educated, a negative selection effect for migration is obtained after controlling for individual characteristics such as age and education, which proxies for experience and ability, in the wage model. However it should be noted that the negative selection is only obtained for those earning a wage and does not extend to migrants not participating in the labour

force.

Figure 14.4 plots the predicted wage using the above model for migrants. In addition the predicted wages of migrants are plotted using the same model but excluding the negative migration selective term. This is done in order to visually assess the impact of the selection effect on migrants' wages. For migrants in the upper end of the predicted wage distribution the density of their predicted wages without the selection effect lies to the left of the density of their wages including the selection effect. This indicates that migrants in the upper end of the predicted wage distribution would be better off without the negative selection effect. Interestingly the same is not true for migrants at the lower end of the wage distribution. The density of migrants' predicted wages including the selection effect lies to the right of the density of their predicted wages' density. This indicates that migrants at the lower end of the wage distribution are worse off excluding the selection effect. The coefficient on the selection effect is the average effect of selection into migration on wages holding all else constant. Despite the selection effect into migration having a negative effect on wages on average this may be driven by migrants in the upper end of the wage distribution.

The analysis of labour market for migrants post migration has yielded some interesting insights into the life of a migrant post migration. A large proportion of migrants move into the labour market post migration. In addition employed migrants assume high skilled occupations. Further analysis of the occupations held by migrants post migration reveals that migrants clearly favour certain occupations above others. However the wages of migrants appear to be relatively similar to the wages of non-migrants. Explicitly modeling of wages indicated the negative selection effect of migration. This effect appears to be specifically influenced by migrants in the upper end of the wage distribution.

Figure 14.4: Predicted Wages of Migrants with and without Migration Selection Effect



Notes: Own Calculations Using NIDS data. Cross Sectional Weights used

Table 19: Log Wage Estimates with Dual Selection

	Log of Labour Market Wage
Selection Term Participation ($\hat{\lambda_p}$)	0.706*
	(0.280)
Selection Term Migration ($\hat{\lambda_m}$)	-0.759**
	(0.285)
Age	0.020***
	(0.001)
Age^2	0.043
	(0.023)
Female	-0.301***
	(0.026)
African	-0.434***
	(0.041)
Coloured	-0.234***
	(0.051)
Asian	0.113
	(0.060)
Years of Education	-0.050***
	(0.011)
Years of Education^2	0.009***
	(0.001)
Private households	-0.608***
	(0.076)
Agriculture	-0.378***
	(0.070)
Mining	0.217**
	(0.076)
Manufacturing	-0.255***
	(0.068)
Construction	-0.368***
	(0.080)
Wholesale	-0.272***
	(0.065)
Transport	-0.260***
	(0.075)
Financial	0.154*
	(0.073)
Personal Services	-0.099
	(0.068)
Legislators	0.330***
	(0.058)
Professionals	0.067 *
	(0.005)
Clerks	-0.152*
	(0.061)
Service Workers	-0.249***
	(0.046)
Skilled Agricultural	-0.124*
	(0.060)
Craft Worker	-0.219***
	(0.048)
Plant Operator	-0.228***
	(0.053)
Elementary Occupations	-0.395***
	(0.046)
Province Variables	Yes
Observations	3266
$N_{population}$	8 062 114

Notes: Standard errors in parentheses. Own Calculations Using NIDS data. Cross Sectional Weights used

* $p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Part VIII

Conclusion

Historically labour migration has played a critical role in defining labour market conditions for many workers in South Africa. Given the legacy of the apartheid regime's policies a unique pattern of labour migration continued to exist into the post-apartheid era. However little is understood about the challenges migrant labourers face 20 years after the end of apartheid and what drives decision-making around migration. There are many questions regarding migratory behavior and household coping strategies that warrant further investigation. This study has sought to make a contribution in this regard.

International literature shows that decisions around labour migration involve complex social and economic factors operating at individual, household and community levels. Labour migration in South Africa is no exception which, due its historical racial segregation, exhibits strong biases and patterns aimed at overcoming the former institutionalized disassociation of labour from labour markets.

By employing the National Income Dynamic Study (NIDS) as well as the Census of 2011 and the Community Survey of 2007 we have been able to disentangle the effects of individual, household and community characteristics on the migration decision. Through profiling migrants and through the use of multivariate models that incorporated the interdependence between the migration decision and labour force participation, a holistic picture of migration in South Africa has been painted.

Through the use of such data we have been able to identify corridors of migration within South Africa. The province of Gauteng draws in migrants from nearby provinces. Migrants originating from KwaZulu Natal not only move to Gauteng but are also drawn to the KwaZulu Natal costal cities. For the Western Cape migrants prefer to move internally particularly toward Cape Town.

In alignment with existing South African literature on migratory patterns, the descriptive analysis finds that migrants are young and educated. Migrants stem from relatively better off households who potentially can afford both the costs of migration and sustaining the migrant in comparison to other households in the migrant's sending community.

Furthermore the percentage of households receiving an Old Age Pension and Child

Support grant is lower for migrant sending households than non-migrant households. Migrants also originate from local communities with lower than average per capita incomes. In addition sending communities of migrants have lower levels of service delivery and local development than non-migrant communities. Preliminary findings suggest individuals prefer to stay in communities with lower levels of relative inequality and migrate out of communities with high levels of relative inequality

Furthermore the post migration labour market for migrants indicated that a significant proportion of individuals move into the labour market post migration and a rather substantially smaller proportions of labour market participants become non-active post migration. For migrants who are employed occupational data indicates that migrants hold high skill positions. In contrast to non-migrants, large proportions of migrants are found in specific occupations within professional disciplines highlighting a trend that migrants gravitate towards certain positions.

Similar results are achieved when employing a multivariate model in order to take into account the interrelated nature of migration and labour force participation. However, unlike the descriptive analysis the role of gender in migration is found to be significant in the multivariate analysis with females less likely to migrate than males.

In contrast to the descriptive analysis community characteristics such as service delivery and local development are found to be insignificant in the decision to migrate and participate in the labour force. In addition the multivariate models confirmed the interrelatedness of the migration and labour force participation decisions.

Inequality within local communities are also found to influence the decision to migrate out. Individuals prefer to reside in local communities with lower levels of inequality relative to the national level and migrate out of communities with high levels of relative inequality.

The earnings of migrants post migration differ somewhat from the earnings of non-migrants at certain points in the earnings distribution. However by explicitly modeling earnings and accounting for the selection into migration it is found that the migration selection process has a negative effect on wages.

The inherent disassociation of individuals from economic centers has continued to

influence migratory decision perpetuating the interdependence of migratory and labour force participation decisions. Despite the fall of apartheid remnants of the migrant labour system are still present in contemporary South Africa. However we find that South Africa reports similar results in terms of the age and social economic standing of migrants as its developing country peers.

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