

**Migration and Urbanisation
in South Africa and Namibia:
An investigation of the intersection between location,
deprivation and opportunity in a developing country
context**

by
Eldridge Granville Moses

*Dissertation presented for the degree of Doctor of Philosophy
(Economics) in the Faculty of Economic and Management Sciences
at Stellenbosch University*



Supervisor: Professor Servaas van der Berg

March 2020

The financial assistance of the National Research Foundation (NRF) towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at, are those of the author and are not necessarily to be attributed to the NRF.

Declaration

By submitting this dissertation electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

Date: March 2020

Copyright © 2020 Stellenbosch University

All rights reserved

Abstract

South Africa and Namibia are two of the most unequal countries in the world. These inequalities have very strong and persistent racial and geographic dimensions due to the legacy of colonial and apartheid segregationist policies, which today manifest themselves in large rural-urban area and racial differences in education and labour market opportunities. Spatial inequalities in both countries have encouraged rapid urbanisation despite labour market prospects being poor. As a result, numerous studies have investigated the roles of spatial location and mobility, and the role that that mobility has in alleviating poverty and inequality in the Southern African context over time.

This dissertation contributes to the Southern African literature in two ways. Firstly, it identifies individual and region-level characteristics that influence migration decisions at the individual level, and at the aggregate level by analysing gross migration flows. Secondly, it contributes to a very small body of South African literature using panel data to study the dynamics of new urban household formation.

The empirical evidence presented in this dissertation shows that internal migration in South Africa continues to be an age and education-selective process. Previous migration experience, as well as sending area net out-migration rates significantly increase the probability of internal migration in South Africa. These findings are robust to the inclusion of various individual and region-level controls. The study of urban informal area household formation in South Africa reveals that relative youth, marital status changes and recent migration positively affect the probability of forming a new urban informal household. The study also finds that urban informal area residents have weak labour market prospects relative to urban formal area residents, but in most respects fare as well as or better than traditional authority residents.

The gravity model estimated using Namibian data shows that constituency-level factors affect migration flows in different ways, dependent on the distance traveled. The contribution of this study to the literature is the finding that studying migration flows without group disaggregation may mask differences in migrant motivations.

Opsomming

Suid-Afrika en Namibië is twee van die mees ongelyke lande in die wêreld. Hierdie ongelykheid het baie sterk en voortdurende rasse- en geografiese aspekte weens die erfenis van koloniale en apartheid-segregasiebeleide, wat hul vandag manifesteer as groot landelik-stedelike en rasse-verskille in opvoeding en geleenthede in die arbeidsmark. Ruimtelike ongelykhede in beide lande het vinnige verstedeliking aangemoedig, ten spyte van swak arbeidsmark geleenthede. Gevolglik het verskeie studies die rolle van ruimtelike ligging en mobiliteit ondersoek, en die rol wat daardie mobiliteit speel in die verligting van armoede en ongelykheid in die Suidelike Afrika-konteks oor tyd.

Hierdie verhandeling dra by tot die Suider-Afrikaanse literatuur op twee wyses. Eerstens identifiseer dit individuele en streekvlak-kenmerke wat migrasie-besluite op die individuele vlak en in die algemeen beïnvloed, deur bruto migrasie-vloei te analiseer. Tweedens dra dit by tot 'n baie beperkte Suid-Afrikaanse literatuur deur die gebruik van paneeldata om die dinamika van die vorming van nuwe stedelike huishoudings te bestudeer.

Die empiriese bewyse aangebied in hierdie verhandeling toon dat interne migrasie in Suid-Afrika steeds 'n ouderdom- en opvoeding-selektiewe proses is. Vorige migrasie ondervinding, sowel as die netto uit-migrasiekoerse uit die brongebied, verhoog die waarskynlikheid van interne migrasie in Suid-Afrika aansienlik. Hierdie bevindings is geldig, selfs met die insluiting van verskillende individuele en streekvlak-kontroles. Die studie van stedelike huishouding-vorming in informele gebiede in Suid-Afrika onthul dat relatiewe jeugdigheid, veranderinge in huwelikstatus, en onlangse migrasie 'n positiewe verband het met die waarskynlikheid dat 'n nuwe stedelike informele huishouding gevorm sal word. Die studie vind ook dat stedelike inwoners van stedelike informele gebiede swak arbeidsmark-vooruitsigte het vergeleke met stedelike inwoners van formele gebiede, maar in die meeste opsigte goed vaar of beter vaar as inwoners van gebiede met tradisionele owerhede.

Die gravitasie-model beraam, met die gebruik van Namibiese data, dat faktore op distriksvlak die migrasie-vloei op verskillende wyses beïnvloed, afhangend van die afstande wat gereis word. Die bydrae van hierdie studie tot die literatuur is die bevinding dat die bestudering van migrasie-vloei, sonder om te onderskei tussen groepeerings, die verskille in migrasie-motiverings mag verbloem.

Acknowledgements

Thank you to my supervisor, Professor Servaas van der Berg, who has not only patiently guided me through the writing of this dissertation, but also introduced me to the topic of development economics through his work in the public domain. His enormous patience, humility, work ethic and genuine interest in others' work have made him an excellent supervisor and mentor. Thank you for your wisdom, guidance and patience, Servaas.

I would also like to thank my colleagues, in particular Professor Dieter von Fintel and Dr Kholekile Malindi, who have not only given inputs into this thesis but also encouraged me in many ways. I would also like to thank Professor Andrie Schoombee for his constant support and encouragement throughout this process.

Lastly, I would like to thank my family. To my wife, Lynne: Your words of encouragement, patience and willingness to whisk the kids away while I needed to work on this is appreciated. To my parents-in-law, my siblings on all sides, my mother and my departed father: your supportive words and practical assistance made this possible. Thanks to all of you.

Table of Contents

Declaration	ii
Abstract	iii
Opsomming.....	iv
Acknowledgements	v
List of Figures.....	x
List of Tables.....	xii
CHAPTER 1: Introduction	2
1. Background and Context of the Study.....	3
2. Problem Statement.....	7
3. The structure and contribution of this dissertation	8
CHAPTER 2: Internal Migration in South Africa: Evidence from Census 2011	10
Abstract	11
1. Introduction.....	12
2. Migration theories from the economist’s perspective: a brief overview	13
3. Internal migration in 20 th century South Africa	15
3.1 Internal migration and settlement under apartheid	15
3.2 Internal migration in the post-apartheid era.....	16
4. Data	17
5. Descriptive statistics	20
5.1 Contemporary internal migration patterns in South Africa.....	20
5.2 Individual characteristics affecting the migration decision	24
5.2.1 Gender.....	24
5.2.2 Age.....	24
5.2.3 Race	26
5.2.4 Educational attainment.....	27
5.2.5 Previous migration experience	28
5.3 Regional factors affecting the migration decision	29

5.3.1	Municipal poverty	30
5.3.2	Net out-migration from municipality of origin.....	31
5.3.3	Unemployment rates by municipality	33
5.3.4	Access to government services.....	34
5.4	Summary statistics	35
6.	Empirical estimation.....	36
7.	Results	37
7.1	Any inter-municipal move	37
7.2	Intra-provincial and interprovincial migration.....	39
7.3	Migration from Rural Areas	41
7.4	Migration from urban areas	43
8.	Conclusion	45
CHAPTER 3: Places of Promise or Poverty: Urban informal settlements in South Africa		
	47
	Abstract	48
1.	Introduction.....	49
2.	The growth of urban informal settlements: two competing theoretical explanations	50
	
2.1	The ladder-to-work and modernisation theory perspectives	50
2.2	Informal settlements as poverty traps	51
2.3	Low levels of investment and the persistence of urban informal settlements	53
3.	Urban informal settlements in South Africa: From policies of eradication to	
	acceptance and upgrading.....	55
4.	Towards a working definition of informal settlements	61
5.	Who settles in urban informal settlements in South Africa?	63
5.1	Data.....	64
5.2	Descriptive evidence	65
5.3	Methodology	70

5.4	Results.....	71
5.5	Discussion	75
6.	Employment and earnings prospects in South Africa’s urban informal settlements	76
6.1	Descriptive evidence from NIDS	77
6.2	Employment.....	78
6.3	Labour market earnings	80
6.4	Empirical strategy	82
6.5	Descriptive statistics.....	85
6.6	Results.....	88
6.7	Discussion	91
7.	Conclusion	92
8.	Appendix.....	94
CHAPTER 4: Long and short-distance migration motivations in Namibia: a gravity model approach.....		
		97
Abstract		
		98
1.	Introduction.....	99
2.	Migration and Urbanisation in 20 th century Namibia.....	100
3.	Short and long-distance migration: differences in motivations	107
4.	Data	109
5.	Methodology.....	111
5.1	Gravity variables: population size and distance	112
5.2	Economic and labour market variables.....	114
5.3	Government service and environmental variables	116
5.4	Demographic variables	117
5.5	Previous in-migration	118
6.	Choosing an appropriate model for overly dispersed count data	121
7.	Results	124

7.1	Full sample estimation	124
7.2	Full sample estimation by distance travelled	128
7.3	Gravity model estimation for the African-language speaking sample only	131
8.	Conclusion	135
	Appendix.....	136
	CHAPTER 5: CONCLUSION.....	137
1.	Summary of the dissertation.....	137
2.	Implications of the research findings.....	138
3.	Suggestions for future research	139
	REFERENCES	141

List of Figures

Chapter 1

Figure 1.	Age structures of Khomas and Ohangwena in 2011	4
Figure 2.	Median age by South African municipality in 2011	5
Figure 3.	Non-working age to working age ratio and poverty headcount ratios by South African municipality in 2011	6
Figure 4.	Poverty headcount ratios by municipality in 2011.....	5

Chapter 2

Figure 1.	Filtering of Census 2011 sample	19
Figure 1.	Inter-municipal migration flows in the twelve months before Census 2011 night.....	20
Figure 3.	Age of migrant at the last recorded intermunicipal move by gender 2010/11 (ages 15 to 64 years)	26
Figure 4.	Percentage of individuals 15 to 64 years who migrated in 1996 and 2011, by race and gender.....	27
Figure 5.	Migrants and non-migrants by race and education category (ages 20 to 64 years), 2011.....	28
Figure 6.	Municipality-level poverty headcount rates 2007.....	31
Figure 7.	Net out-migration rates by municipality 2001 to 2009.....	33

Chapter 3

Figure 1.	Black household size reduction between 1996 and 2011, by province	57
Figure 2.	Growth in the percentage of Black-headed formal households between 1996 and 2011, by age category	59
Figure 3.	Overlap between Black and Coloured individuals living in urban informal settlements and urban informal dwellings not in a backyard 2008 (NIDS Wave 1) and 2014/15 (NIDS Wave 2)	62
Figure 4.	Age distribution of movers and stayers by selected area type.....	66
Figure 5.	Number of years living in same household, ages 20 to 64 years (2014/15).....	68
Figure 6.	Monthly per capita incomes Black and Coloured individuals by area type (2008).....	69
Figure 7.	Employment stability, by area type (2008 to 2014/15)	78

Figure 8.	Occupational mobility of unskilled workers, by area type (between 2008 and 2014/15).....	79
Figure 9.	Occupational mobility of semi-skilled workers, by area type (between 2008 and 2014/15).....	79
Figure 10.	Unconditional education-earnings distributions by gender and area type	81
Figure 11.	Migration status–current area type interaction effects, conditional on selection into employment.....	91

Chapter 4

Figure 1.	Bantustan borders, as determined by the Odendaal Commission in 1964	101
Figure 2.	Internal migration paths in Namibia 2010 to 2011	104
Figure 3.	Migration paths between constituencies in Namibia 2010 to 2011, by migration distance interval	106
Figure 4.	Kernel density of distance covered, by language spoken.....	113
Figure 5.	Per capita incomes in Namibia 2009, by constituency.....	115
Figure 6.	Broad age structures in Namibia in 2011, by region.....	117
Figure 7.	Previous migrants as proportions of receiving constituency populations	119
Figure 8.	Distribution of total recent migrant flows in Namibia 2010/11	121
Figure 9.	Logged distribution of total recent migrant flows in Namibia 2010/11 ..	122
Figure 10.	Comparison of Poisson distribution and negative binomial distribution, with same means and variances.....	123
Figure A1.	Lowess regression: Income per capita in 2009 vs Highly educated adult population in 2010	136
Figure A2.	Kernel densities showing distance traveled, by migration type.....	135

List of tables

Chapter 2

Table 1.	Inter-municipal migration volumes by previous province (2010/2011).....	23
Table 2.	Summary statistics	35
Table 3.	Binomial logit model: All inter-municipal moves 2010/11 (vs. no move in 2010/11).....	38
Table 4.	Multinomial logit model: Intra– and inter-provincial moves 2010/11 (vs no moves 2010/11).....	40
Table 5.	Multinomial logit model: rural-rural and rural-urban moves 2010/11 (vs no moves from rural area 2010/11)	42
Table 6.	Multinomial logit model: urban-rural and urban-urban moves 2010/11 (vs no moves from urban area 2010/11)	44
Table A1.	Inter-municipal migrant volumes by current province (2010/11).....	46

Chapter 3

Table 1.	Number of households in 1996 and 2011, by province for Black households and households of other groups	59
Table 2.	Area types ages 20 to 64 years, by race (2014/15).....	64
Table 3.	Current and previous area types in South Africa (2008 to 2014/15).....	67
Table 4.	Partnership events (Black and Coloured moving household heads 20 to 64 years by current area type).....	70
Table 5.	Probit regressions: probability of becoming an urban informal household head (NIDS pooled estimates)	73
Table 6.	Summary statistics, by area type.....	86
Table A1.	Population by dwelling type, selected years from 2001 to 2011 (absolute frequencies)	94
Table A2.	Population by dwelling type, 2001 to 2011 (percentages).....	95
Table A3.	Sanitation service by area type in 2014/15.....	95
Table A4.	Main water source by area type in 2014/15.....	95

Chapter 4

Table 1.	Summary statistics and description of independent variables.....	119
Table 2.	Distribution of total migrant flow aggregates between constituency i and j	122
Table 3.	Gravity model of all adult migration flows in Namibia in 2010.....	125
Table 4.	Gravity model: inter-constituency migration flows of all migrants, by distance covered.....	129
Table 5.	Gravity model: inter-constituency migration flows of African-language speaking migrants, by distance covered.....	133

CHAPTER 1: Introduction

1. Background and Context of the Study

The legacy of apartheid government policies in South Africa and Namibia¹ is dishearteningly visible through the lens of spatial segregation. Economic development in both countries has historically been skewed severely in favour of urban areas, leading to stark rural-urban and urban-urban divides in economic opportunity that have remained remarkably persistent over time (Pendleton *et al.*, 2014; Turok, 2012). Much of South African citizens' economic vulnerability is concentrated in the mostly rural former homelands, where inhabitants are often subject to the double disadvantage of being poor in a poor region. The same is true of Namibia's former homelands, which like the South African equivalents, were the 20th century formalisation of the rural native reserves or communal lands that existed before then. For more than a century these homelands served as reservoirs for cheap Black labour for the South African mining and agricultural industries since the mid-19th century.

Movement and settlement of black people outside of the homelands continued to be strictly controlled in the 20th century, with 317 laws being promulgated to prevent black movement in urban areas unless they were employed by white companies or households (Wilson, 1972; Frayne and Pendleton, 2002; Chloe and Chrite, 2013). It was only from the 1960s onwards that the tension between the growing need for cheap Black contract labour in urban areas in the 20th century led to the begrudging acceptance of informal settlement development on the peripheries of urban areas and proactive management of black settlement in townships located outside of white urban areas.

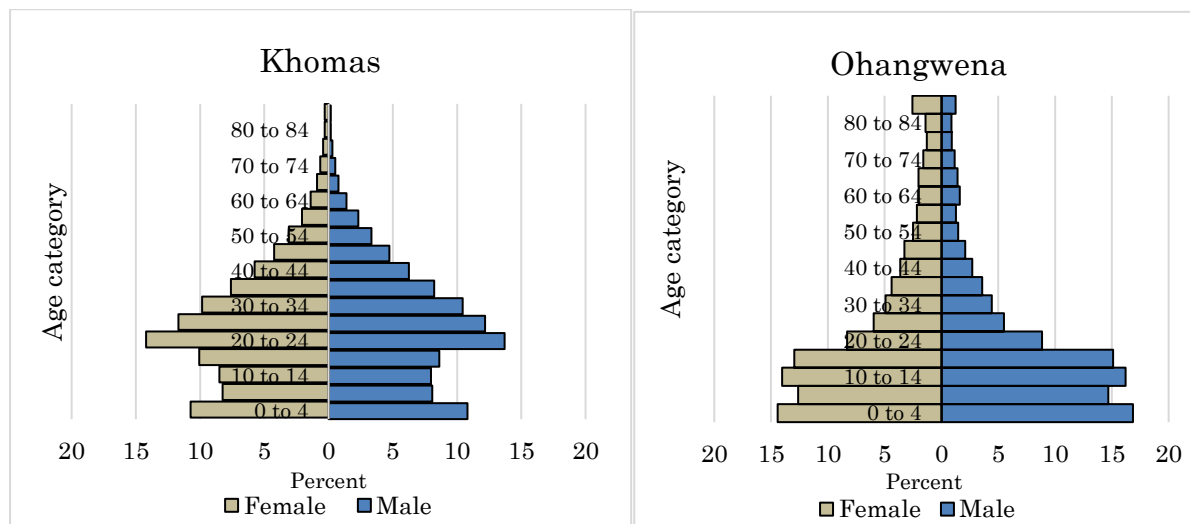
Despite gradual relaxation of laws preventing Black settlement in urban areas, the circular labour migration system that had its beginnings in the 19th century continued to dominate Black migration flows until the late 20th century. By and large, it would be able-bodied Black men who would migrate to urban areas upon appointment to contract labour positions, spend a number of months away from the rural home working, and return to the homelands once the contract had reached its end. Under apartheid, the homelands were also subject to severe public infrastructure underinvestment and underspending on services relative to urban areas. These historical spatial inequalities still manifest

¹ Namibia, formerly South West Africa, was under South African rule from 1915 to 1990.

themselves in rural-urban migration streams that continue unabated despite labour market prospects in urban destination regions having weakened considerably over time.

Relatively persistent migration flows from the former homelands to urban centres, as well as the age and education-selective nature of migration, combine to produce highly skewed age structures between regions that send many migrants and those that receive many migrants. The age structures of a large migrant-sending region in Namibia as well as a net receiving region in 2011 are shown in Figure 1. The large sending region, Ohangwena, is characterised by a child-heavy age structure, while Namibia's most popular destination region for migrants is characterised by an age structure that has proportionally more young adults.

Figure 1. Age structures of Khomas and Ohangwena in 2011

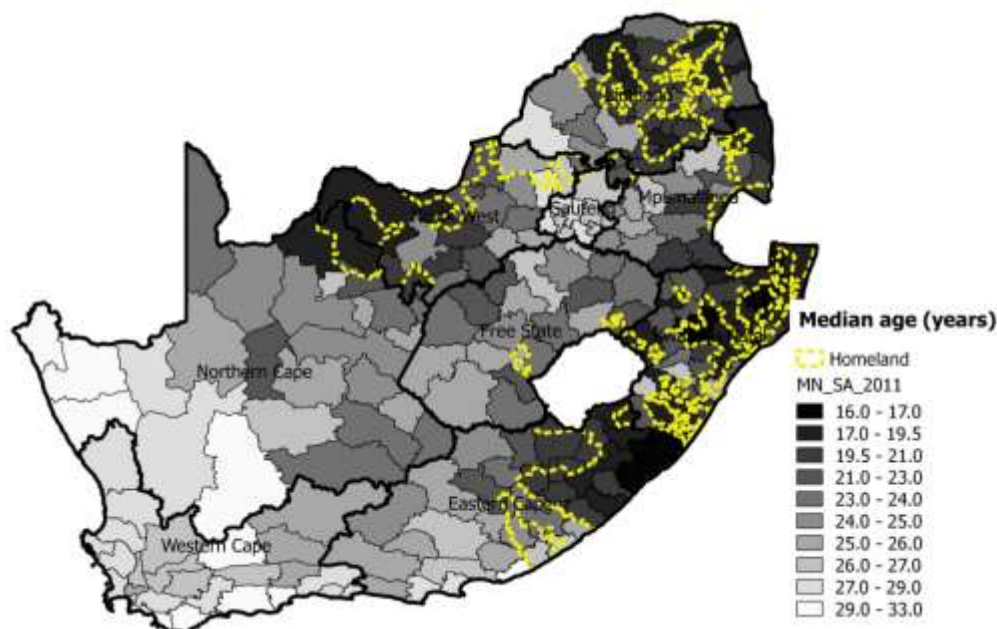


NOTES: Own calculations based on Namibian Census 2011 data.

These age structure differences are also apparent between large net receiving and net sending regions in South Africa. Figure 2 shows an alternative representation of age distributions, the median age, by South African municipality. The yellow borders in Figure 2 show the former homeland borders. Previous migration patterns involved mostly male migrants leaving families behind. In more recent years, women have also increasingly joined the labour market, often leaving children in the care of grandparents. The result is an extremely unequal distribution of age profiles between rural and urban areas: median ages are extremely low in rural areas that are proportionally child-heavy,

while urban provinces such as Gauteng and the Western Cape benefit from a population distribution composed mostly of working-aged adults.

Figure 2. Median age by South African municipality in 2011



NOTES: Own calculations based on South African Census 2011 data.

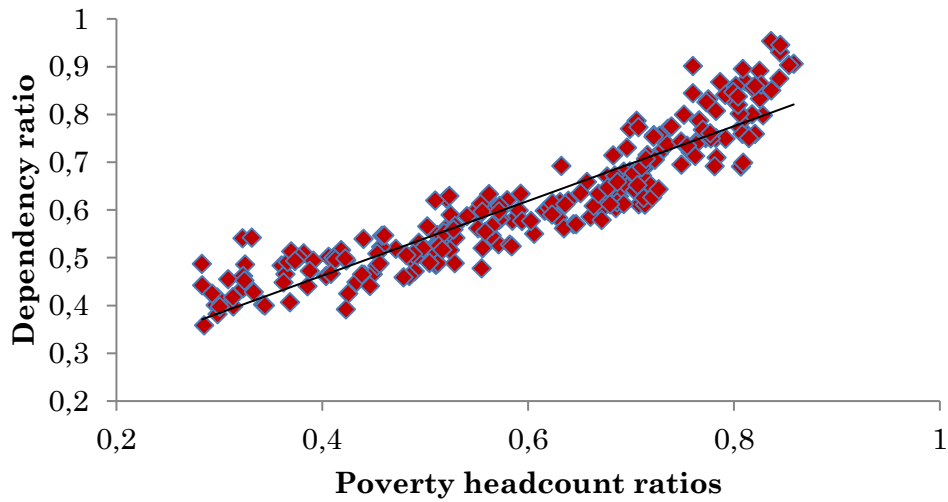
Age structures of regions are of critical importance as a prerequisite for economic development. Where countries experience a demographic shift to sustained lowered fertility rates and having a relatively large population of young working-aged adults, it lowers the dependency ratio (individuals younger than 15 years and adults older than 64 years as a proportion of the total population). This is recognised in the National Planning Commission's (2012: 99) assertion that South Africa is now demographically positioned for higher economic growth.

The relationship between South African poverty and age structures is shown in Figure 3, which shows a slightly modified dependency ratio² plotted against the poverty headcount ratio. Figure 3 shows that poverty headcount ratios are predicted very strongly by age structures at the municipality level. This is partly because children and older adults who no longer work have low to absent economic productivity levels, but also because the

² This dependency ratio in this case is calculated as [non-working aged population divided by the working-aged population] in each municipality.

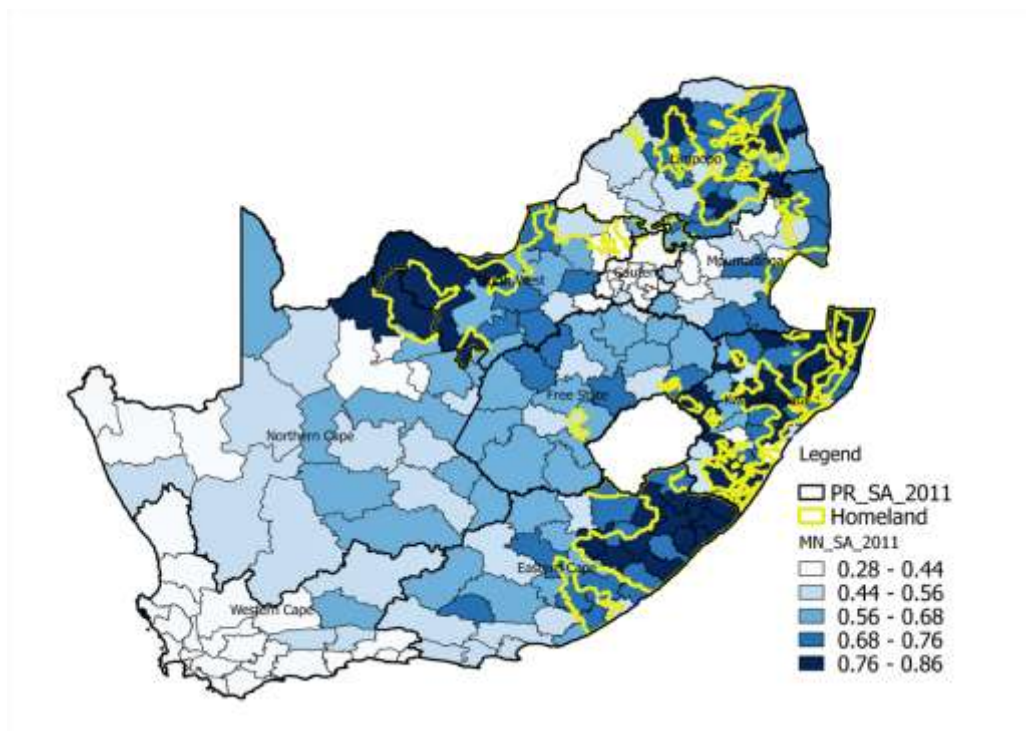
remaining young adult residents in deep rural areas are often employed in low-skilled occupations, if they are employed at all.

Figure 3. *Non-working age to working age ratio and poverty headcount ratios by South African municipality in 2011*



NOTES: Own calculations based on South African Census 2011 data.

Figure 4. *Poverty headcount ratios by municipality in 2011*



NOTES: Own calculations based on South African Census 2011 data.

The concentration of the poor in South Africa's former homelands, as shown in the poverty headcount ratio map in Figure 4, is concerning for future economic development in these regions. Depressed conditions in these areas act as migration push factors for the most able working-aged part of the rural population. However, their departure further increases the dependency burdens in rural regions. This self-perpetuating inequality of age structures between poor and rich municipalities therefore do not bode well for rural development programmes designed to uplift regions. Large injections of private investment are unlikely to locate themselves in areas where suitably skilled and aged labour *and* better-off consumers with jobs are scarce.

2. Problem Statement

The findings in Section 1 of this introductory chapter suggest that many municipalities that overlap substantially with former homeland borders are regional poverty traps, or at serious risk of becoming such traps. The existence of these regional poverty traps makes migration to the economic centres of the Western Cape, Gauteng, Khomas and Erongo, as income-maximisation and diversification strategies, an attractive option for households and individuals who can engage in the process.

However, spatial inequalities are remarkably visible and persistent in urban areas as well. Relatively high formal housing prices encourage many migrants in pursuit of urban employment to settle in established or relatively new urban informal settlements on the periphery of economic activity in towns and cities. The growth of informal settlements close to economic activity is not a peculiar phenomenon in developing countries (Marx *et al.*, 2013). Urban informal settlements theoretically serve as low-cost entry points for migrants into the urban labour market, substantially reducing job search costs and transport costs once employed (see for instance World Bank, 2009; Glaeser, 2011; Cross, 2010). Modernisation theory holds that these areas therefore serve an important function as holding areas for labour in a modernising economy, which through trickle-down growth, will eventually reward the migrant with upward income and dwelling mobility over time.

However, urban labour market experiences in developing countries suggest that migration to urban areas may not be as beneficial as neoclassical perspectives in the 1960s and 1970s (for example Fei and Ranis, 1961; Herrick, 1965) intimated. In a number of

African countries rapid urbanisation has occurred despite weak economic growth, with urban informal sectors developing to absorb jobseekers outside of the formal labour market. Residents of urban informal settlements, who are predominantly employed in marginal occupations such as domestic work and construction, value these areas for their proximity to labour market opportunities. These informal sector jobs are often poorly remunerated, offering little chance of social mobility. In addition, these urban informal receiving areas present a number of environmental and health risks that exist because infrastructure and basic services are often deficient or entirely absent (Marx *et al.*, 2013; Brown-Luthango *et al.*, 2016). Thus rural-urban migrants are at risk of exchanging labour market marginalisation in rural areas for marginalisation that is vastly more complex in urban areas.

Urban informal settlements therefore present complex challenges to communities and policymakers alike. The very informality that makes urban informal settlements somewhat attractive to migrants also makes them vulnerable to policy neglect. Policymakers who may be afraid to encourage in-migration of economically vulnerable individuals may fear that investment may contribute to a growing population dependent on the fiscus. Over time, policy neglect and rapid urbanisation contribute to the growth and persistence of urban informal settlements.

It is against this backdrop of multiple spatial inequalities that span both rural and urban areas that this dissertation investigates the dynamics and outcomes of migration and urbanisation in the southern African context. The dissertation therefore advances an empirical understanding of human movement and settlement coping strategies that individuals use to overcome the spatial legacies of past segregationist policies in South Africa and Namibia. It aims to contribute broadly to the goals of poverty alleviation and inclusive sustainable economic growth, as espoused in South Africa's National Development Plan 2030 (2012) and Namibia's 5th Development Plan (2017).

3. The structure and contribution of this dissertation

The first paper in this dissertation uses a combination of South Africa's Census (Statistics South Africa, 2011), Community Survey (Statistics South Africa, 2007) and General Household Survey data (Statistics South Africa, 2009) to understand contemporary individual and regional factors affecting migration in South Africa. This paper contributes

to the literature by linking present and retrospective³ individual and regional level data to estimate the determinants of internal migration in South Africa. Using retrospective data as far as possible partly overcomes the endogeneity problems inherent in cross-sectional migration studies, allowing for a more causal analysis of internal migration in the South African context.

The second paper in this dissertation contributes to the relatively sparse literature on urban informal household formation in the Southern African context. The availability of a relatively large longitudinal data set in the form of the National Income Dynamics Survey (SALDRU, 2016) presents an opportunity for researchers to study how characteristics of individuals in previous periods influence their probabilities of forming new urban informal area households in South Africa. The paper also considers labour market prospects for this vulnerable group relative to urban formal area dwellers, who also compete for jobs in the urban labour market. The paper therefore contributes to an understanding of the forces that shape the decision to form a new urban informal household. Its secondary contribution is in the form of labour market analysis to determine whether relocating to urban informal labour markets deliver the labour market benefits suggested by “ladder-to-work” theories.

The final paper in this dissertation estimates a zero-inflated negative binomial gravity model of contemporary internal migration flows in Namibia using the Namibian Population and Housing Census 2011. While gravity models of migration have been estimated in South Africa before (see for example Bouare, 2000; Von Fintel and Moses, 2018), this paper contributes to an understanding of the different forces that influence the decision to move short distances or long distances. This disaggregation of migration motivations by distance travelled is unique in the South African, and possibly the African, context. This paper therefore contributes to the literature by presenting a more nuanced perspective on internal migration in a country that is characterized by its vast, sparsely populated landscape and deep rural-urban area inequalities.

³ Retrospective data in this instance refer to the variables in period $t - n$ (where t refers to the year and n refers to the number of years before t) that are presumed to affect the migration decision in period t .

CHAPTER 2: Internal Migration in South Africa: Evidence from Census 2011

Abstract

This paper contributes to the literature by linking present and retrospective individual and regional level data from recent nationally representative data sets to estimate the determinants of internal migration in South Africa. Using retrospective data as far as possible partly overcomes the endogeneity problems inherent in cross-sectional migration studies, allowing for a more causal analysis of internal migration in the South African context.

This paper finds that contemporary South African internal migration is highly age and education-selective. Personal previous migration experience positively affects migration probabilities. Adding region-level controls reveals that out-migration probabilities are higher for residents of municipalities with a history of sending more migrants than they receive, and lower for residents living in municipalities with a history of sending fewer migrants than they receive. The finding is robust to the inclusion of other regional push factors such as the poverty headcount ratio, unemployment rate and government service quality in earlier years. The disaggregation of migration streams by sending and receiving area type reveal that migrants from rural and urban areas respond similarly to the individual and region-level factors affecting aggregate migration. The study also finds that migrants are more likely to confine the migration move within provincial borders.

1. Introduction

The consequences of large migration streams from rural to urban provinces, particularly as they relate to the provision of municipal services and education, are constantly at the forefront of policy discussions and political wrangling. The impact of internal migration is therefore of critical importance politically in a country where migration streams are no longer legally controlled, as well as economically for the purposes of resource allocation and investor confidence because of possible migration-inspired political instability.

Given the importance of understanding migration volumes, incentives, processes and consequences, a considerable literature on the South African experience has developed in recent years with much of it focused on the outcomes of adult migrants (particularly on labour market outcomes) or the household at the aggregate level (see for example Bouare, 2002; Moses and Yu, 2009). From a microeconomic perspective, internal migration offers individuals a chance to improve their individual welfare without necessarily increasing educational attainment. Changing economic prospects by changing geography is also possibly more economically rewarding in the short run than investment in educational attainment, particularly in countries where access to and the quality of educational institutions are compromised.

This paper uses the most recent South African population Census 2011⁴ to determine which individual and region-level factors are linked to internal migration probabilities in South Africa. It contributes to the literature by linking present and retrospective⁵ individual and regional level data from recent nationally representative data sets to estimate the determinants of internal migration in South Africa. Using retrospective data as far as possible partly overcomes the endogeneity problems inherent in cross-sectional migration studies, allowing for a more causal analysis of internal migration in the South African context. Section 2 introduces the theoretical lenses through which economists often study migration, while Section 3 discusses internal migration trends in 20th century South Africa. Section 4 discusses the data used to analyse the migration decision, followed by Section 5 that describes the individual and region-level variables to be used in the analysis of South African internal migration. Section 6 explains the empirical approach.

⁴ Since the Community Survey 2016 was not explicitly designed to provide estimates of migration volumes between municipalities, the decision was taken to use Census 2011 data as it is likely to be more representative of the migrant population estimates at municipality level.

⁵ Retrospective data in this instance refer to the variables in period $t - n$ (where t refers to the year and n refers to the number of years before) that are presumed to affect the migration decision in period t .

Section 7 discusses the results of the empirical estimation, while Section 8 concludes with a discussion of the main findings.

2. Migration theories from the economist's perspective: a brief overview

Neo-classical migration theory typically focuses on differences in economic conditions or expected payoffs as being central to the migration decision. Developed in the 1950s and 1960s to explain how labour migration influenced economic development, macro-level migration theories posit that migration is a process that is responsive to regional differences in the demand and supply of labour. In these views (such as Ranis and Fei, 1961; Herrick, 1965), internal migration was considered to be a desirable process of reallocation of surplus labour in rural areas to rapidly industrialising centres in need of inexpensive manpower. Regions with abundant labour and scarce capital are likely to have lower wages, while regions with scarce labour and abundant capital are likely to have higher wages. These wage differentials encourage migration from the labour-abundant regions to the labour-scarce region, until wage differentials between the regions have been eliminated (Massey *et al.*, 1993).

Dualistic models of economic development also informed micro-level migration theory in the 1960s and 1970s. The two-sector Harris-Todaro model of migration (Todaro, 1969; Harris and Todaro, 1970) modelled the rural-urban migration decision as being dependent on a consideration of the differences between the expected wages in the rural sending region, and the expected wage in the urban receiving region (the average urban wage tempered by the probability of being employed in the urban area). As long as the expected urban wage exceeds the rural wage, migration will occur and continue until the expected wages are equal. This equilibrium model in its original form was developed to explain the seemingly puzzling migration to urban areas in developing countries, even when faced with the possibility of unemployment. Extensions to the model in later years included the pecuniary and psychological costs of migration, such as the costs of moving, anxiety associated with the separation from family and friends, and the costs of learning a new language or adapting to a new environment (Massey *et al.*, 1993; Bauer and Zimmerman, 1998).

Neo-classical migration theory has also been merged within the human capital framework, where differences in educational attainment and other productive characteristics determine differences in the returns to investment in migration (de Haas, 2008). This approach could explain to some degree the selectivity of migration, with migrants' productive characteristics enabling them to reap returns to migration that are superior to that of their stationary counterparts.

In sum then, neo-classical migration theory asserts that migration is primarily a function of differences in expected labour market outcomes. While the neo-classical perspectives' focus on economic factors as drivers of migration is inherently attractive in that the primary variables being analysed are often observable, migration researchers increasingly became less confident that the benefits of migration were universal. Todaro (1980: 362), for instance, cast doubt on the unambiguity of the benefits to migration and instead suggested that rural-urban migration might exacerbate structural imbalances between rural and urban sending regions. From a labour market perspective, rural-urban migrants who are generally more educated than their stationary counterparts, not only increase the growth rate of urban jobseekers beyond the region's ability to absorb them but also drain the sending rural region of invaluable human capital. This pattern of human capital depletion in the sending rural region also makes that region less attractive as an investment destination which could lead to the deterioration of that region relative to the urban centre. Migration, instead of being "the tide that lifts all boats", could actually exacerbate regional inequalities (Rubenstein, 1992; Binford, 2003). It is therefore of some importance for the success of rural development initiatives and public resource allocation in both rural and urban areas that individual and regional variables are studied to better understand the factors driving internal migration.

Further criticisms of neo-classical migration theory include assertions that it is more explanatory of 19th and early 20th century European economic development than countries developing later (Skeldon, 1997), and the focus on migration as an economic consideration at the expense of understanding the social processes, networks, individual aspirations and other non-economic variables that shape the decision to stay or migrate (Petersen, 1958; Cross *et al.*, 1998; de Haan, 2008). Nevertheless, the neo-classical perspectives on migration offer an useful point of analytical departure as the variables that are often observable in cross-sectional data sets are economic in nature. The approach in this paper will therefore be to focus primarily on socio-economic factors driving migration, while

being mindful of the limitations of the pure neo-classical approach, and including proxies for non-economic considerations where possible.

3. Internal migration in 20th century South Africa

South Africa's current internal migration patterns were formed for the most part by the end of the 19th Century. Persistent labour shortages after the abolition of slavery in the 1830s plagued the South African economy for much of the 19th century (Wilson, 1972: 2). The shortage of labour prompted the recruitment of labour from other Southern African countries to work in South Africa's growing agricultural sector but the discovery of diamonds in the 1860s heralded an era characterised by a greater need for vast amounts of cheap labour to mine in these regions (Moses and Yu, 2009: 19). Migrant labourers from South Africa and other Southern African countries were recruited to satisfy this labour demand. These workers were initially housed in closed, single-sex compounds, with no option of settling permanently in urban areas, setting in motion a circulatory migration system that saw Black men leave their rural-bound families for months at a time to work in various urban industries. This circulatory migration system that contributed tremendously to the development of South Africa's mining industry development persisted well into the 20th century, in large part due to the institutional barriers to Black settlement in urban areas that continued, and in some ways became more aggressive.

3.1 Internal migration and settlement under apartheid

Between 1948 and 1991 the incumbent National Party government formulated and implemented 317 laws that affected nearly every facet of Black existence, most notably the movement and settlement of Black people in urban South Africa (Choe and Chrite, 2014: 83). The Bantu Self-Government Act (1950) forced Black individuals to homelands, which were created by the apartheid national government to function as independent states. Movement anywhere outside of the homelands was strictly regulated by the Pass Laws Act (1950). The Act restricted Black population movement in urban areas to holders of pass books that proved that they were gainfully employed in the area (Kok *et al.*, 2006). Under this Act family members not employed in the same urban area were not allowed to accompany the pass book holder or be in an urban area for more than 72 hours, effectively cementing the previous patterns of heavily gendered Black internal migration driven to labour-intensive industries in urban areas.

Impending labour and skill shortages in the 1970s prompted the government to relax its stance on the movement of Black people, with many African townships developing on the outskirts of urban areas. By the 1980s labour demand had decreased considerably and employers' preference for labour located in urban areas encouraged many rural dwellers to move closer to employment opportunities. Until its abolishment in 1986, the Pass Laws effectively ensured that Black temporary migrants were disadvantaged relative to their permanent resident counterparts in terms of labour market opportunities, services and housing (Hindson, 1987).

The last of South Africa's discriminatory laws affecting Black population movement and settlement were repealed in June 1991. Along with the change of government, changes in trade orientation and changes in the broader social, economic and political environments, it was envisaged that post-apartheid migration patterns were likely to be profoundly different than those under the apartheid system.

3.2 Internal migration in the post-apartheid era

The demise of apartheid provided a further impetus for rural-urban migration. Legal and institutional barriers to mobility were eliminated to a large degree and new job opportunities arose with increasing trade liberalisation. However, new job opportunities were only one feature of a rapidly changing labour market, which had become less accepting in terms of the skills it demanded. This diminished absorption capacity along with the displacement of existing workers from the labour market, if considered in isolation, would suggest that migration streams from rural to urban areas would have slowed down somewhat. The evidence on the pace of change is mixed. Kok *et al.* (2003) find that migration volumes in the 1992 to 1996 period were not that different to that of the 1975 to 1980 period, while Reed (2013) finds that while rural-rural migration became less common, rural-urban, urban-rural and rural-urban migration increased dramatically between 1993 and 2000.

A number of researchers contend that South African migration volumes were still dominated by circular migration some years after apartheid (see for example Cross *et al.*, 1998; Posel, 2004). Nevertheless, there is some evidence from declining remittances and weakening rural ties that migration to urban areas has become more permanent after the

advent of democracy (Mosoetsa, 2004; Reed, 2013⁶). Internal migration has also feminised considerably since the early 20th century (Van der Berg *et al.*, 2002: 14). Despite legislative reform, the geographical impact of segregationist laws under apartheid is still evidenced by the fact that in 2011 only 55 percent of Blacks resided in urban areas while the comparative figures for Coloureds, Indians/Asians and Whites were 90, 97 and 92 per cent respectively⁷. Despite economic growth being persistently low and unevenly distributed in the last ten years, internal migration from rural to urban areas continues almost unabated. It is in this environment that this study now turns to the analysis of internal migrant characteristics and region-level motivators using recent Census data.

4. Data

The primary data set that will be used to analyse contemporary South African internal migration will be the 10 percent sample of the 2011 Census (Statistics South Africa, 2011). Three distinct forms of migration information can easily be determined from the South African Census data for individuals moving within the borders of the country:

- 1) Migration between the place of birth and the current place of residence within the same country, known as lifetime migration;
- 2) the last move within a certain time period, by comparing the current place of residence to the last place of residence; and
- 3) of less importance for this study, from points 1 and 2 above one can also capture whether individuals have migrated at least twice in their lifetimes by comparing the current place of residence to the last residence and the place of birth.

In order to define migrants, migration researchers generally have to make two decisions: (1) which geographic units will be used to delineate the origin and destination regions; and (2) which time period should be considered. A number of other filters are then applied in an attempt to make the definition and scope most relevant to the study. Quite often the definition is underpinned by the notion that migrants move from one labour market to another with different opportunities (Molloy *et al.*, 2011: 3). County or municipal

⁶ Reed (2013: 88) asserts that the fivefold increases in family migration rates between 1976 and 1994 is suggestive of the increased permanence of migration in South Africa.

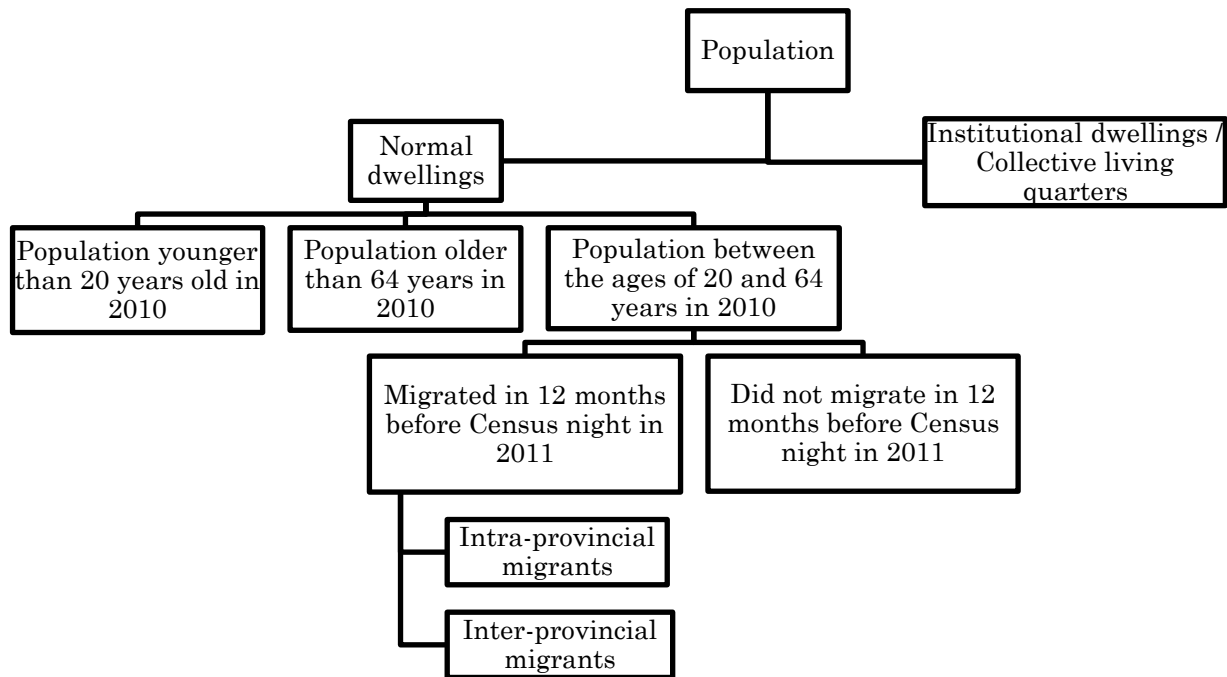
⁷ The 1980 population census revealed that only 33 percent of Blacks resided in urban areas, compared to 81 percent of Whites and 91 percent of Coloureds (Simkins, 1983: 119).

boundaries can therefore be used as geographical units when analysing migration characteristics or trends.

In this study migrants are defined as individuals who changed their municipality of residence in the period of interest. Municipalities are considered to be the most appropriate migration-defining spatial unit (a) because they are notionally the most convenient to represent different labour markets; and (b) because it is the finest level of geographical aggregation consistent across Censuses. The advantage of using this approach is that municipal boundaries cover the entire country and remain relatively stable over time⁸. The risk of defining migrants in this manner is that it might overstate migration. If, for example, a researcher is interested in the migration of individuals from one labour market to another, it is possible that migration from the periphery of one municipality to the nearby periphery of an adjacent municipality may not translate into a labour market change for the migrant. Similarly, larger municipalities might have more than one distinct labour market and a move between these labour markets within the same municipality would not be classified as migration. Where cases like these abound, migration is misclassified (if the intent of the study is to consider differentials in labour market conditions as incentives for migration).

The sample will be restricted in a number of ways to reduce measurement error. The basic hierarchy of exclusion is shown overleaf in Figure 1. The analysis is restricted to those individuals residing in non-collective, non-institutional living quarters. This restriction is applied mainly because household characteristics are difficult to extrapolate in cases where a number of unrelated individuals cohabit in the same abode (household income is difficult to determine and by extension per capita income is likely to be underestimated) but also because migration to these living quarters may be involuntary from the individual's perspective. An example of less voluntary migration to collective living quarters would be migrating from conventional living quarters such as a house or apartment to prison.

⁸ There were some boundary changes between Census 2001 and Census 2011, which are detailed in the Census 2011 metadata document (2013).

Figure 2. *Filtering of Census 2011 sample*

The sample is also restricted to individuals between the ages of 20 and 64 years of age. The lower bound is chosen to minimise the possibility of including individuals who may contemplate returning to secondary school. The upper bound is chosen to coincide with the legal upper age bound of South Africa's labour force.

Migration streams and trends can be measured in any number of ways, but generally data sets necessitate analysis of migration as transitions or events (Bell *et al*, 2002: 437). Transition data identify the migrant's usual place of residence at the time of enumeration t and the previous place of residence in $(t - n)$. Migration data collected in the South African Censuses are typical of transition data: the migrants are asked in which year they last moved and where they last moved from. There are a number of shortcomings when using this approach, the most serious of which are the absence of information on how frequently the individual moves, whether the last move is a return move or not and the exclusion of individuals who died and / or were born⁹ in the period of consideration.

⁹ Individuals who were born in the period are generally excluded from migration analysis, particularly when the research focus is on labour market outcomes.

In order to minimise the probability of under-capturing the propensity of individuals to migrate and to ensure a closer relationship between time-variant variables (even education levels which may be slightly time-variant), researchers analysing Census data can restrict the sample of migrants being studied to those who moved in the year prior to the Census. The sample therefore only includes inter-municipal moves in the twelve months before Census night 2011 to reduce the differences between reported educational attainment in 2011 and educational attainment in the year that the migration decision is taken. This approach is similar to the one used by Van der Berg *et al.* (2002) who restrict their sample to those who migrated and did not migrate in the nine months prior to the Census 1996 survey month. In this way the study reduces some of the inherent income generation and household formation endogeneity problems that often plague migration studies using cross-sectional data.

Individual characteristics likely to affect migration decisions include age, race, educational attainment, work experience, gender and whether the migrant's previous municipality of residence differs from his / her birthplace (as a proxy for migration experience). Receiving community variables include variables such as the proportion of individuals in the receiving enumeration area who previously migrated from the same municipality as a proxy for social network strength. Municipal-level differences between sending and receiving communities in the forms of access to basic services and labour market indicators such as unemployment rates can also be extracted from other data sets such as the Community Survey 2007 (Statistics South Africa, 2007).

5. Descriptive statistics

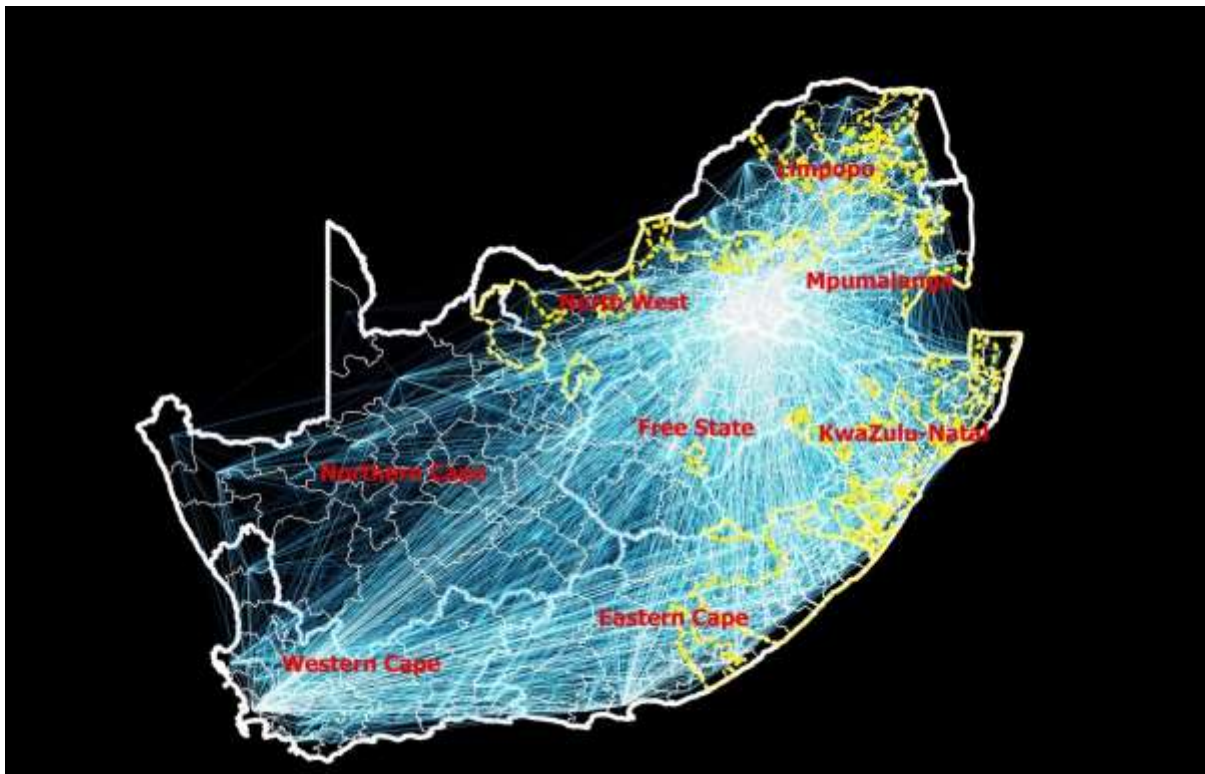
In this section, contemporary internal migration volumes and patterns are discussed briefly to contextualise the study. An overview of the individual characteristics and regional factors that are expected to affect the migration decision is then provided, accompanied by selected tables and figures using Census 2011 data. A summary table of all variables is presented at the end of Section 4.

5.1 Contemporary internal migration patterns in South Africa

Recent data from the South African National Census 2011 show very distinct patterns of contemporary internal migration. Figure 2 contains a high-contrast map that shows inter-

municipal migration flows of South Africans between the ages of 20 to 64 years¹⁰. The former homeland (Bantustan) borders are highlighted in yellow. The centrality of the Gauteng province as a migration hub is immediately obvious. Inter-municipal migration flows are dominated by corridors involving Gauteng and the Western Cape as sending or receiving regions, albeit to a lesser degree for the latter province.

Figure 3. *Inter-municipal migration flows in the twelve months before Census 2011 night*



NOTES: Own calculations based on Census 2011 data. Includes 20 to 64-year-old persons only.

Table 1 shows inter-municipal migration volumes by previous province for adult South Africans in the sample, which allows for some analysis of the direction of inter-municipal migration flows. In Gauteng, the Western Cape and the Northern Cape, more than 40 per cent of inter-municipal migration is within the same province. In every other province, all of them to some degree overlapping with former homeland borders, in excess of 60 per cent of inter-municipal migration also involves crossing provincial borders. In each of these cases Gauteng is the most favoured destination province, followed by the Western Cape.

¹⁰ The 714 273 migrants who moved between municipalities represent 2.65 per cent of all South Africans between the ages of 20 and 64 years old.

Table A1 in the Appendix shows migrant volumes by current province for adult South Africans in the sample. Almost one-third of all 2010/11 inter-municipal migrants currently living in the Western Cape originate from the Eastern Cape. Limpopo, the Eastern Cape and Kwazulu-Natal, the provinces with the largest overlaps with former homeland borders, are relatively unattractive as receiving provinces for inter-provincial migrants, with less than 40 per cent of inter-municipal moves having originated from outside of their respective borders. The map and tables suggest that contemporary migration flows are highly skewed in terms of migrant destinations, testament to current regional economic differentials and the enduring legacy of the migrant labour system in shaping contemporary migration flows. To understand the factors affecting these migration flows, Sections 4.2 and 4.3 will discuss the various individual and regional factors expected to influence the probability of migration for South African adults.

Table 1. *Inter-municipal migration volumes by previous province (2010/2011)*

		Previous province									Share of inter-mun migrants sent
		WC	EC	NC	FS	KZN	NW	GA	MP	LMP	
Current Province	WC	44.34%	21.05%	12.65%	4.92%	3.83%	2.30%	6.62%	2.43%	1.35%	9.87%
	EC	16.95%	31.06%	2.18%	3.28%	4.15%	1.33%	3.33%	1.14%	1.03%	8.23%
	NC	4.45%	1.68%	52.62%	5.52%	0.62%	13.65%	1.30%	0.90%	0.57%	4.41%
	FS	1.93%	2.80%	6.43%	33.15%	2.08%	3.14%	3.50%	1.67%	1.28%	4.73%
	KZN	4.91%	11.72%	2.57%	4.05%	47.51%	1.67%	5.45%	4.48%	1.18%	11.45%
	NW	2.51%	6.40%	8.36%	9.99%	2.39%	40.69%	9.25%	4.55%	5.78%	9.37%
	GA	20.16%	20.01%	9.93%	31.19%	31.90%	27.19%	56.55%	36.12%	47.86%	36.56%
	MP	2.40%	2.98%	3.21%	5.16%	5.76%	3.56%	7.38%	39.01%	7.61%	7.27%
	LMP	2.35%	2.30%	2.05%	2.74%	1.75%	6.47%	6.63%	9.70%	33.35%	8.11%
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		33 910	82 788	16 823	33 944	74 303	44 125	129 515	28 360	65 428	509 196

NOTES: Own calculations based on Census 2011 data (Statistics South Africa, 2014). Includes South Africans 20 to 64 years old.

5.2 Individual characteristics affecting the migration decision

5.2.1 Gender

19th century South Africa's segregationist economy relied heavily on temporary Black male labour migration, with dedicated influx control laws designed not only to extract cheap Black labour from rural reserves but also to prevent Black women from migrating from rural homelands (Feinstein, 2005). Although these efforts initially produced an overwhelmingly male Black migrant population, many women migrated independently since the end of the 19th century. The gold boom in the Witwatersrand produced opportunities for work in the domestic work and informal sectors, which developed along with the Black male migrant labour system (Camlin *et al.*, 2014: 529). However, the migration gender bias in favour of men persisted for much of the 20th century, resulting in marked gender imbalances in the former homelands as well.

More recent studies have documented a "feminisation of migration" for at least the past three decades (see for example Feinstein, 2005). More localised studies in Mpumalanga (Collinson *et al.*, 2006) and in Kwazulu-Natal (Muhwava *et al.*, 2010) also attest to the rapid feminisation of inter-regional migration since the 1990s. Changes in gender norms since the end of apartheid, related to changes in women's perceived roles in the household, increased labour market opportunities for women and changes in marriage and fertility patterns amongst younger women (Statistics South Africa, 2015) have contributed to increased female labour market participation, and concomitantly their ability to migrate to search for and take advantage of those labour market opportunities (see for example Posel, 2004). Women account for 46 per cent of all adult inter-municipal migration in 2010/11. Women also make up roughly the same proportion of migration volumes between district councils in South Africa (Von Fintel and Moses, 2018: 252). Reed (2013) attributes the equalisation between male and female migration partly to an increase in women joining their partners in urban destinations.

5.2.2 Age

The age selectivity of migration is well documented in the migration literature. Migrants are largely young adults between school-leaving age and 30 years (Muhwava *et al.*, 2010: 268). Their physical prowess positions them ideally for more physically demanding occupations which are relatively more accessible to migrants than other occupations.

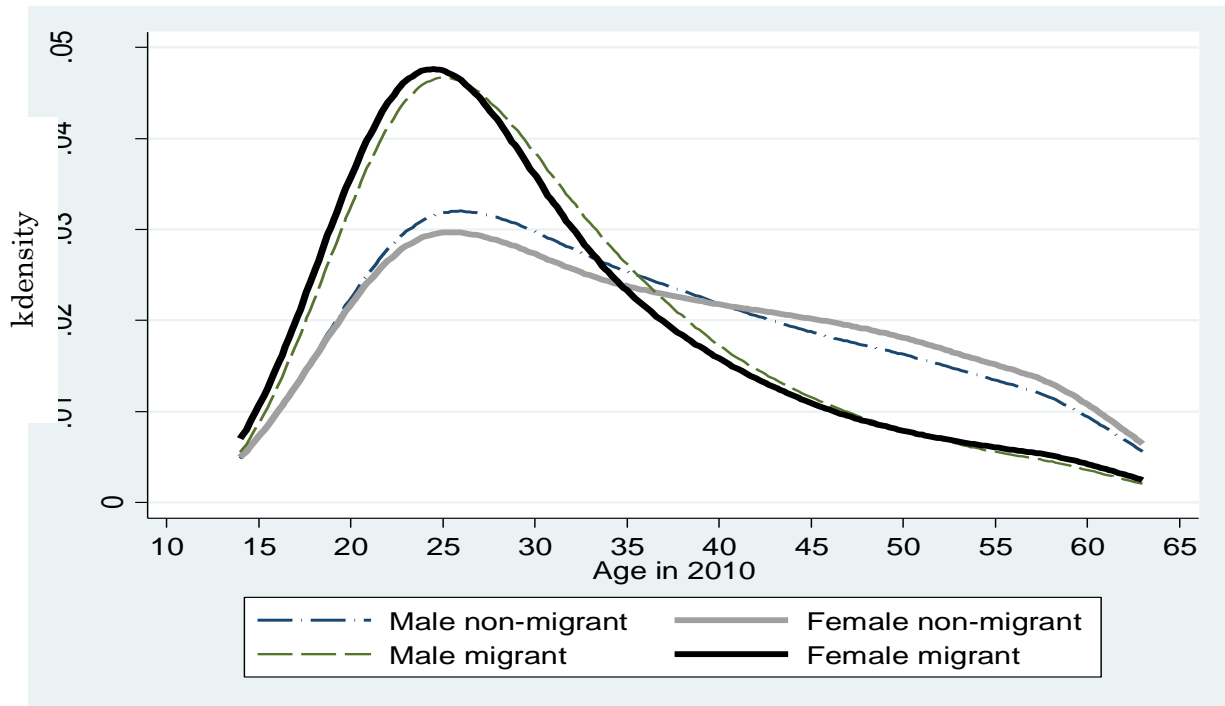
Young people also have relatively fewer assets and less social capital in their regions of origin, making the opportunity cost of migration small relative to their older counterparts. In addition, they are often less likely to be attached matrimonially to their regions of origin. Age also provides some indication of work experience.

Life-course transition theory postulates that changes in residences are more often than not precipitated by the transition from dependant to independent adult. Such transitions include exiting the education system or becoming part of the labour force (Venhorst *et al.*, 2011), the formation of new households because of partnership formation or childbirth (Kulu, 2008), all of which contribute to a densification of pivotal life events such as migration in the early adulthood years. Bernard *et al.* (2014) find that the link between migration age profiles and life course transitions holds true for both men and women in 27 countries, with differences between genders mostly due to women being more restricted in movement through childbirth and childcare, and differences in countries due to differences in cultural norms dictating new household formation.

In South Africa the age-specific migration trends remained the same from the late 70s until the early 1990s (Kok *et al.*, 2006: 55). In the 1992 to 1996 period, the migrant population was largely between the ages of 15 and 44 years, with a pronounced peak between the ages of 25 and 29 years. Using Census 2001 data, Moses and Yu (2009: 87) also find evidence of migration probability declining with increasing age amongst Northern Cape migrants. Muhwava (2010: 268) reports the same type of age distribution effects amongst migrants from Kwazulu-Natal between 2001 and 2008.

Figure 3 shows labour market eligible migrants and non-migrants in 2010/11 by age and gender. The age-selective nature of internal migration for both genders is quite clear. Relative to non-migrants, migrants are substantially younger on average, with the average non-migrant age being 36.65 years compared to 31.14 years for migrants. On average, female migrants are slightly younger than male migrants (30.97 vs 31.29 years, respectively).

Figure 4. Age of migrant at the last recorded intermunicipal move by gender 2010/11 (ages 15 to 64 years)



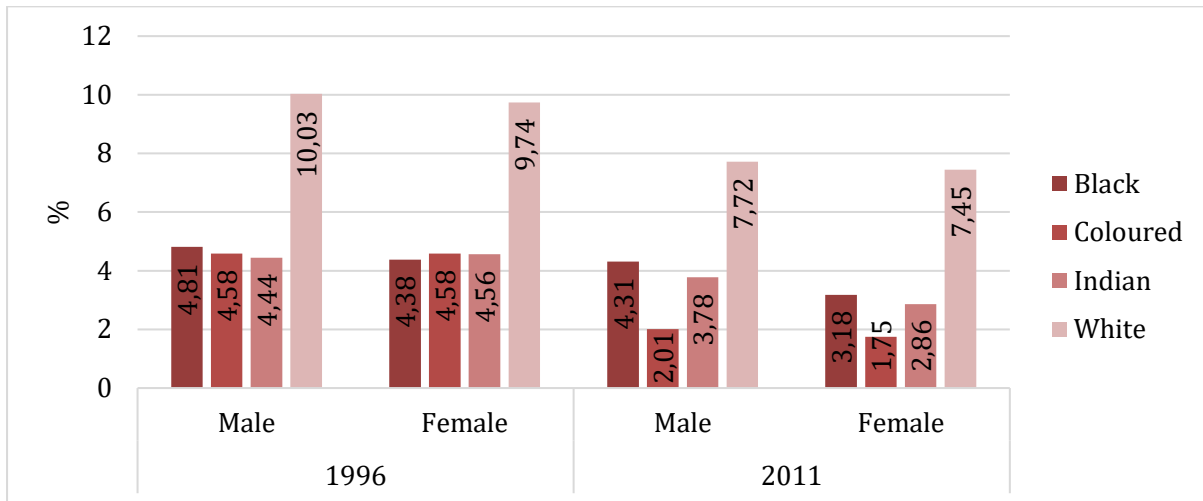
NOTES: Own calculations based on Census 2011 data.

5.2.3 Race

The use of race as a predictor of migration probability is premised upon the *a priori* assumption that as more time passes since the abolition of influx controls and *de jure* apartheid, migration probabilities are likely to converge between races. Figure 4 shows the proportions of individuals between the ages of 15 and 64 years who migrated across municipal boundaries in the Census 1996 and Census 2011 periods. Census 1996 shows that there were negligible differences in migration propensities between Black, Coloured and Indian males and females (just more than 4 percent each), while White males and females displayed significantly higher migration propensities (approximately 10 percent each).

By 2011 Coloured males and females had become significantly less likely to migrate than all other racial groups. While White males and females had both experienced declines in likelihoods of migration, they were far more likely to migrate than all other race groups. Black male inter-municipal migration only declined slightly between 1996 and 2011 (by 0.5 percentage points), while Black female migration declined by 1.15 percentage points.

Figure 5. *Percentage of individuals 15 to 64 years who migrated in 1996 and 2011, by race and gender*



NOTE: Own calculations based on Census 1996 and Census 2011 data.

5.2.4 Educational attainment

The level of educational attainment is also generally a strong predictor of socioeconomic status. Education is positively associated with migration probabilities due to its roles in enhancing individuals' ability to acquire labour market information about remote regions and their ability to capitalise on labour market opportunities prior to or upon relocation.

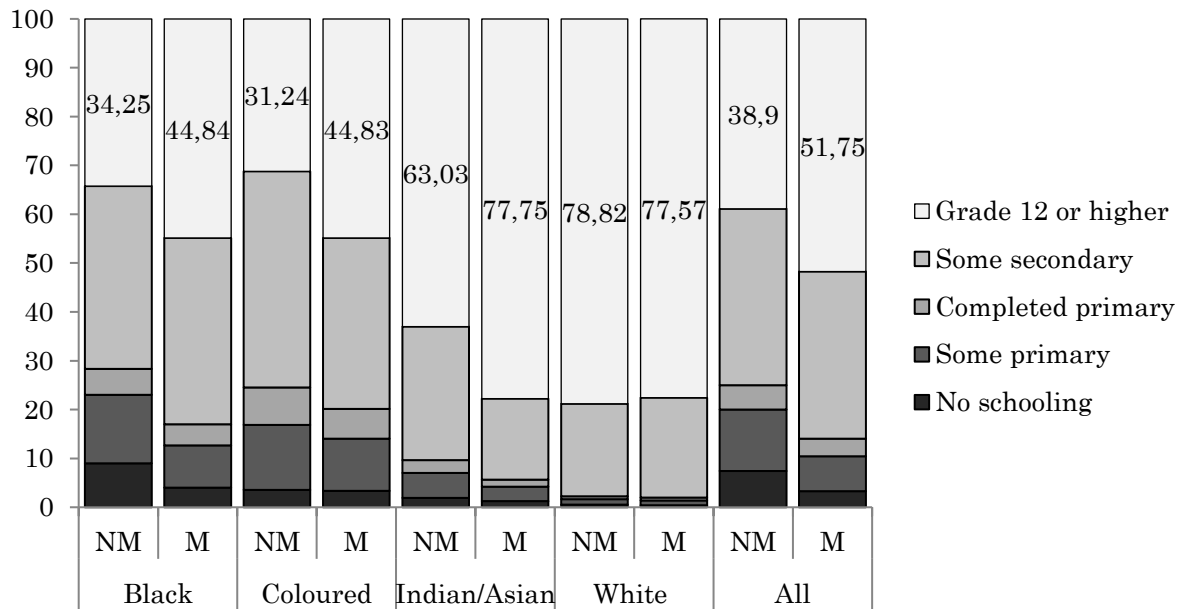
Since there is also a very strong link between educational attainment and earnings in South Africa, it is conceivable that educational attainment is likely to contribute positively to the probability of internal migration (Ritsilä and Ovaskainen, 2001: 319). Thus, in the absence of longitudinal data other than the National Income Dynamics Survey (which would allow for estimation of income before migration but suffers from some attrition bias issues¹¹, the educational attainment of adults in the year before making the migration decision is assumed to be the same in 2011.

Figure 5 shows the educational attainment of migrants and non-migrants by race (percentages displayed in the lightest bar are those who completed at least grade 12). While there are almost no educational attainment differences between White migrants

¹¹ Lechtenfeld and Zoch (2014) note that attrition rates differ dramatically by race between waves of the National Income Dynamics Survey. Attrition of Whites is three times more than that of Blacks, introducing an undesirable element of bias in the race coefficients.

and non-migrants, there are substantial educational attainment differences in favour of migrants among Black, Coloured and Indian/Asian individuals.

Figure 6. *Migrants and non-migrants by race and education category (ages 20 to 64 years), 2011*



NOTES: Own calculations based on Census 2011 data. NM on the x-axis refers to non-migrants, while M refers to migrants.

5.2.5 Previous migration experience

A number of studies have linked prior migration experience to increased probabilities of future migration (see for example Ritsilä and Ovaskainen, 2001). The psychological cost of migration is likely to be lower for individuals who have previously already experienced migration, as the initially large cost of breaking family ties has already been borne. 67.98 per cent of the study sample identified in section 4.1 were living in a province other than their province of birth in 2009 (the year before the migration decision in 2010/11).

5.3 Regional factors affecting the migration decision

Traditionally, two-sector models of migration provided the primary framework for economic analysis of migration decisions (Sjaastad, 1962; Harris and Todaro, 1970; Greenwood, 1975). These earlier views espoused the view that inter-regional migration was entirely based on a consideration of regional differentials between expected wages. Thus, in the two-sector model, the expectation was that migration equilibrium (or cessation of migration) would be achieved when expected wages across the agricultural and modern sectors equalised over time. However, empirical work in the 1980s on American internal migration found that out-migration would still occur when the wage in the region of origin was higher (Fields, 1980; House and Rempel, 1982). These findings contributed to the realisation that factors other than wage differentials may matter in the migration decision, leading to a focus on “push factors” both at the household and regional levels as important factors affecting migration decisions (see for example Greenwood and Hunt, 1989; Knapp and Graves; 1989).

Since then, an increasing amount of attention have been given to the possibly pivotal role that region-level factors and amenities play in encouraging or deterring migration as well. Regional amenities include natural amenities such as the regional climate, and man-made amenities such as schools, hospitals or access to government services. The relative strength of regional amenities as drivers of the migration decision is the subject of much debate. Some scholars view regional amenities as a secondary driver of migration volumes and probabilities (Glaeser *et al.*, 2001; Rappaport, 2007; Partridge, 2010; Arntz, 2010). Others suggest that the strength of the amenities-migration link is conditional on the potential migrant’s life course stage and therefore of less relevance to young working-age adults (Chen and Rosenthal, 2008), while others question the validity of the amenities-migration association (Storper and Scott, 2009).

In one of the few South African studies on internal migration, Bouare (2002) finds that relative gross domestic products, relative unemployment rates and relative crime rates between regions explain inter-regional migration flows in South Africa in the 1990s. Recently Choe and Chrite (2014) also analysed the Black migration decision using the 1996 Census data. Using a conditional logit model, they find that individuals choose to migrate to areas where their predicted wages are higher than it would be in their area of origin and where relative unemployment rates are lower. They also find that crime and distance are deterrents both to the probability of migration and where migrants settle.

Given that a central tenet of migration theory is that individuals migrate in the belief that the same individual characteristics are likely to be rewarded differently in different locales, it stands to reason that regional characteristics of both the sending and receiving regions are likely to influence an individual's proclivity to migrate. However, this paper focuses on the *sending* region characteristics, or regional migration "push" factors", that are observable in the South African data. Municipal poverty, net outmigration and unemployment rates in the sending municipality are discussed below as possible drivers of internal migration.

5.3.1 *Municipal poverty*

The association between rural poverty and migration from the countryside has sometimes been misconstrued as migrants being negatively selected. While poor rural areas are likely to be large senders of migrants (Crush *et al.*, 2006: 19), migrants are generally positively selected by income levels and educational attainment. Those who are most educated and most financially able to do so are generally more likely to migrate than those who are less educated and have less means to migrate. The implication is that poor rural areas are likely to send their most able inhabitants to urban cities.

The municipal poverty headcount rates in this paper are estimated using the Community Survey 2007 and are shown in the municipality-level map in Figure 6. Respondents in the Community Survey report personal incomes for all individuals, which are then aggregated at the household level¹². An income poverty line of R4 097¹³ per capita per annum is set, yielding a national poverty headcount rate of 46.26 percent. This is somewhat higher than the poverty headcount of 38.9 percent reported by Statistics South Africa (2010: 7) but as the two counts are derived from different measures of welfare, discrepancies between the two are to be expected.

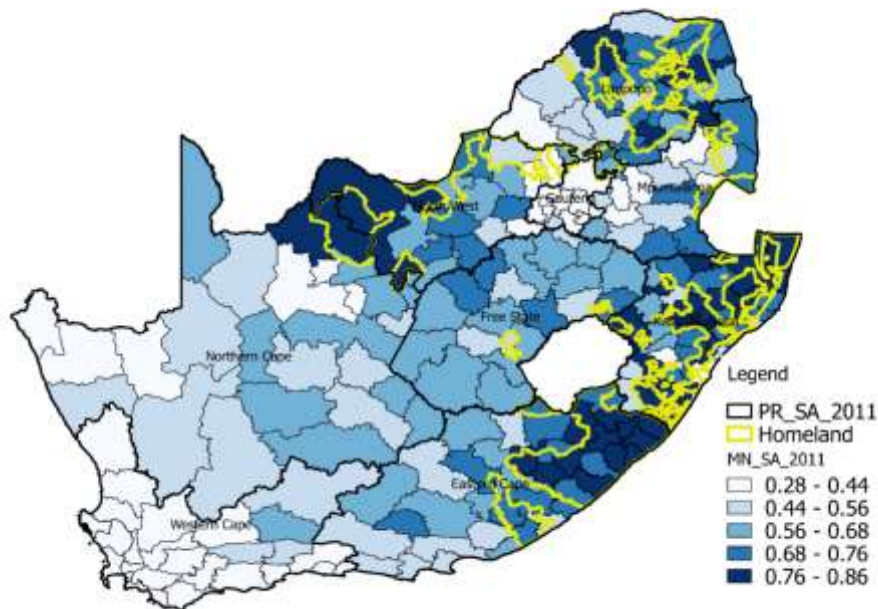
Nevertheless, it is the *ranking* of municipal poverty headcount rates rather than the actual headcount rates which matters more for the purposes of migration decision analysis, as the underlying assumption is that individuals maximise utility by moving away from municipalities with higher poverty headcount rates. The implication therefore

¹² The midpoint of the reported personal income category is assigned to the individual. In the case of the open category at the upper end of the income distribution, the lower bound is taken. These values are then aggregated at household level and divided by the household size to get a continuous per capita household income distribution.

¹³ Using the March 2009 poverty line of R4 896, deflated to February 2007 values (when CS 2007 was enumerated).

is that it is ranking of sending municipalities relative to other municipalities that matters rather than the exact poverty headcount rates of municipalities.

Figure 7. *Municipality-level poverty headcount rates 2007*



NOTES: Own calculations from Community Survey 2007. Shades represent poverty quintiles, constructed at municipality level.

For the most part, poverty headcount rates are highest within former homeland borders, clearly demonstrating the lasting impact of discriminatory policies designed to advance White interests with cheap Black labour since the late 19th century.

5.3.2 *Net out-migration from municipality of origin*

Social networks have been demonstrated to play a pivotal role in migration, in that they reduce the costs of migration, as well as accommodation and labour market information costs in the destination region (Boyd, 1989). For example, in their study of Mexico to United States migration, Massey and Espinosa (1997) posit that family members and friends who have migrated in the past are able to help new migrants by escorting them across the border or showing them new routes. New migrants with strong social networks are also more likely to be employed and earn higher wages than those with weaker or non-existent networks (Munshi, 2003).

While the importance of migration networks is generally mentioned with respect to their strength in the destination region (see for example Massey et al., 1993), there is little reason to believe that network effects may not be observable in the region of origin as well. Areas with high net out-migration (where the number of out-migrants substantially exceed the number of in-migrants) could conceivably produce migration networks in the area of origin over time that reduce the information costs associated with out-migration benefits and costs in far-flung areas (Mabogunje, 1970; Levitt, 1998). In addition, inter-regional migration could also be “internalised” as a rite of passage for some groups (for instance, young adult males) over time in some communities (see for example Monsutti, 2007: 167), rather than primarily being a function of labour demand and supply conditions (Britz, 2002: 43). In South Africa, for example, segregationist laws preventing the permanent settlement of unemployed black people in urban areas effectively separated urban economic opportunity from family life in the rural homelands. This set in motion the circular migration of young adults from the former homelands to urban areas that has proven to be remarkably persistent over time (Posel and Casale, 2003; Goldberg, 2013), despite labour prospects being poor for many migrants.

Municipal net outmigration rates between 2001 and 2009 are calculated using Census 2011 data. Net out-migration prior to 2010 is calculated simply by subtracting the number of out-migrants by municipality from the number of in-migrants. Migrants who report moving between 2001 and 2009 are placed back in their respective municipalities of origin to estimate the 2009 municipality population sizes¹⁴. The 2001 to 2009 municipality level net out-migrant stock is then divided by the 2009 municipality population size to obtain an approximation¹⁵ of net out-migration rates by municipality for the 2001 to 2009 period.

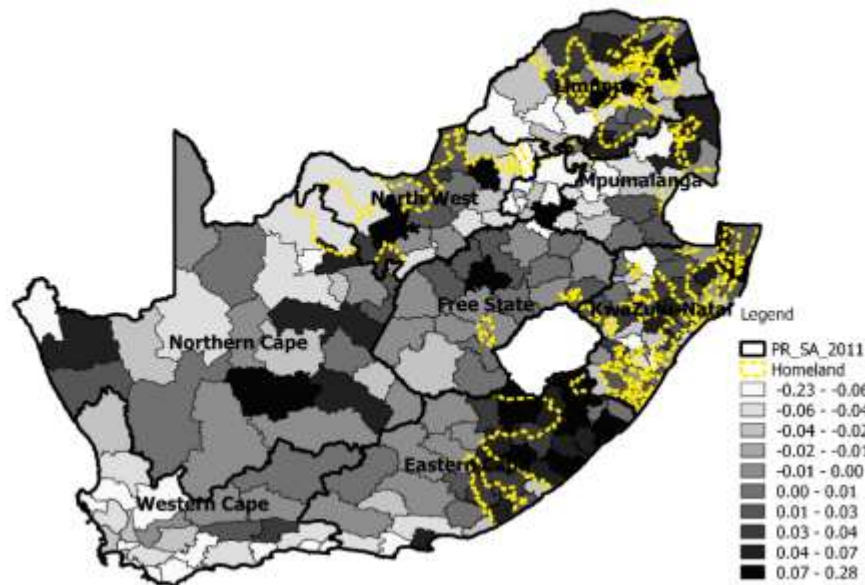
Figure 7 shows net out-migration rates by municipality calculated in this manner. Positive net out-migration rates indicate that more migrants leave a municipality than migrate to it. Negative net out-migration rates indicate that fewer migrants leave a municipality than migrate to it. Positive net out-migration rates are mostly located within

¹⁴ The population sizes estimated in this way approximate rather than accurately reflect 2009 population sizes.

¹⁵ The net outmigration rate is an approximation which would more accurately reflect true net outmigration rates if all migrants had only moved once in the reporting period. However, since the Census questionnaire only requires the last move to be recorded, national migration volumes are likely to be underestimated for the reporting period.

previous homeland borders, while negative net out-migration rates are more often located in the more urbanised provinces of Gauteng and the Western Cape.

Figure 8. Net out-migration rates by municipality 2001 to 2009



NOTES: Own calculations based on Census 2011.

5.3.3 Unemployment rates by municipality

Harris-Todaro (1970) type approaches to migration probabilities generally emphasise wage differentials between the agricultural and modern industrial sector as the primary labour market drivers of internal migration. However, the estimation of these differentials is difficult in the developing country context (Brauw *et al.*, 2014; Fox and Gaal, 2008). Returns to agricultural labour are difficult to measure, for instance, particularly when the dominant return is in-kind payment (such as accommodation and food). Equally difficult is measuring returns to labour in developing country urban areas, where individuals move in and out of employment within the same year or are informally employed.

As an alternative, regional unemployment rates can be used to capture differentials in labour market conditions (Liu and Chen, 2013). Regions with high unemployment rates are likely to be net senders of unemployed adult migrants, while low unemployment regions are likely to be net receivers of unemployed adult migrants.

5.3.4 *Access to government services*

Glaeser *et al.*'s (2001) characterisation of the consumer city implies that the growth of urban city populations is partly dependent on those cities' respective abilities to provide public goods and services to individuals. In the South African context Cross *et al.* (1998), for instance, find that internal migrants from Kwazulu-Natal tend to migrate to regions where better opportunities in the form of better infrastructure and government services exist. For this study access to government services is proxied by the average time taken in minutes to get to a hospital at municipal level, using General Household Survey 2009 data.

5.4 Summary statistics

The summary statistics for all individual and region-level covariates are presented below in Table 2. The population size for the region-level covariates is 234 since South Africa has 234 municipalities listed in Census 2011.

Table 2. *Summary statistics*

Variable	Data source	N	Mean (prop)	SD
Inter-municipal migrant 2010/11	Census 2011	19 962 312	97.45	
Stays in same municipality	Census 2011	509 196	2.55	
Age	Census 2011	19 962 312	38.03	12.17
Black	Census 2011	15 525 723		
Coloured	Census 2011	2 065 338		
Indian/Asian	Census 2011	529 688		
White	Census 2011	1 841 563		
Male	Census 2011	9 459 124		
Female	Census 2011	10 503 188		
Educational attainment in years	Census 2011	19 962 312	9.58	4.48
Previous migrant	Census 2011	4 757 916	23.83	
Net out-migration rate 2009	Census 2011	234	0.004	0.06
Unemployment rate 2007	Community Survey 2007	234	35.83	13.56
Poverty headcount index	Community Survey 2007	234	0.52	0.17
Average time to hospital	General Household Survey 2009	234	28.78	11.85

6. Empirical estimation

To overcome the problem of incongruence between income being measured at the time of the survey and migration decisions in different periods, this paper will follow the same approach as Van der Berg *et al.* (2002) by analysing the link between socioeconomic status and migration by restricting the migration decision to the 2010 and 2011 years and using education levels as a proxy for individual socioeconomic status.

The migration determinant analysis begins with an elementary logit model containing basic demographic characteristics and then develops into a more nuanced model that includes time-variant individual and regional variables. A more inclusive logit regression model with the following basic form will then be employed to determine the probability of migrating dependent on individual and regional characteristics:

$$\log \left[\frac{p_{it}}{1-p_{it}} \right] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + e_i$$

with y_i as the binary outcome of the decision to migrate between municipalities and X_1 and X_2 being vectors of individual and sending municipality characteristics.

The key independent individual variables are age (specified in 5-year increments), race, gender, educational attainment (in categories) and migration experience. The migration experience variable assumes a value of 0 if the individual was in the same province as their province of birth in 2009 and 1 if the individual is in a province other than their place of birth in 2009. Municipality-level indicators in the sending region are included as regional push factors.

7. Results

7.1 Any inter-municipal move

In Model 1 the probability of moving between municipalities dependent on demographic characteristics is shown. Migration is decidedly age-selective. Individuals aged 15 to 24 years are most likely to be inter-municipal migrants. The probability of migration is negatively and significantly related to the age category, with strictly declining probabilities of migration as age categories increase. This is consistent with previous findings in the South African context that migration probabilities are highest for young adults (Van der Berg *et al.*, 2002; Moses and Yu, 2009). Model 1 also reveals that Whites are far more likely than any other race group to migrate, followed by Black individuals. Coloured individuals are least likely to migrate. Women are also less likely than men to be migrants.

Model 2 also controls for the highest level of education achieved (by category) and the individual's migration experience (proxied by whether their 2009 province of residence was different to their province of birth). In general, educational attainment is positively and significantly related to the probability of migration, which is consistent with Muhwava *et al.*'s (2010) findings. Individuals with previous migration experience were significantly more likely than those with no prior migration experience to migrate in 2010 or 2011. The probability of migration is still a strictly declining function of age and race is still a statistically significant predictor of migration probability.

Model 3 reveals that residents living in areas with particularly historically high net outmigration rates between 2001 and 2009 are more likely to migrate in 2010/11. This is consistent with Von Fintel and Moses' (2018) findings that internal migration volumes in South Africa mainly flow along well-worn paths.

Additional regional push factors are included in Model 4. Unemployment rates in 2007 are negatively associated with the probability of migration in 2010/11 (although the significance level is low), as is the municipal service indicator proxied by the average time to a health facility in 2009. The municipal poverty headcount coefficient reveals that individuals are significantly more likely to move if they resided in high poverty regions than residents from less poor regions.

Table 3. Binomial logit model: All inter-municipal moves 2010/11 (vs. no move in 2010/11)

	Model 1	Model 2	Model 3	Model 4
15 to 24 years	0	0	0	0
25 to 34 years	-0.3009***	-0.4582***	-0.4095***	-0.3746***
35 to 44 years	-0.9132***	-1.0345***	-0.9936***	-0.9587***
45 to 54 years	-1.4366***	-1.4885***	-1.4663***	-1.4381***
55 to 64 years	-1.6730***	-1.6766***	-1.6764***	-1.6568***
Black	0	0	0	0
Coloured	-0.6114***	-0.0645***	0.1423***	0.3577***
Indian/ Asian	0.0841***	0.0137	0.1071***	0.2341***
White	1.0660***	0.7086***	0.7248***	0.8021***
Male	0	0	0	0
Female	-0.2446***	-0.1596***	-0.1926***	-0.2099***
No schooling		0	0	0
Incomplete primary		0.0134	0.0843***	0.1350***
Complete primary		0.0229*	0.1255***	0.2040***
Incomplete secondary		0.0224**	0.1698***	0.2756***
Grade 12/Std 10		0.0813***	0.2486***	0.3666***
Tertiary		0.4551***	0.6353***	0.7582***
No previous migration experience		0	0	0
Previous migration experience		1.9005***	2.2620***	2.4067***
Net out-migration rate 2001 to 2009			10.9139***	9.4015***
Poverty headcount 2007				1.6008***
Unemployment rate 2007				-0.0004*
Average time to hospital				0.0054***
_cons	-3.0157***	-3.9609***	-4.3925***	-5.4237***
N	19 962 312	19 962 312	19 962 312	19 962 312
Pseudo R-squared	0.1327	0.1873	0.1933	0.1912
Prob>chi-squared	0.0000	0.0000	0.0000	0.0000

* p<0.05, ** p<0.01, *** p<0.001.

7.2 Intra-provincial and interprovincial migration

Multinomial logit regressions modelling the decision to migrate intra-provincially (within province) or inter-provincially (between provinces) are shown in Table 4.

Younger individuals are more likely to migrate, and men are more likely to migrate than women. White individuals are most likely to migrate in any form. While Black individuals are second most likely to migrate within provinces, inter-provincial migration is less likely for Black individuals than it is for Coloured and Indian individuals. Educational attainment and previous migration experience both increase intra and inter-provincial migration. Having less education increases the probability of migrating within a province, which may be indicative of poorly educated migrants having to do so under economic duress (if the link between educational attainment and socioeconomic status is strong).

Net outmigration rates also are positively associated with the probability of migration, affecting both intra and inter-provincial migration in relatively similar ways. Migration experience appears to be positively associated with the probability to migrate. Individuals with some migration experience are more likely to engage both in intra-provincial migration than inter-provincial migration. Higher poverty rates in sending municipalities also significantly increase the likelihood of inter-provincial migration but decrease the likelihood of intra-provincial migration.

Table 4. *Multinomial logit model: Intra- and inter-provincial moves 2010/11 (vs no moves 2010/11)*

	Model 6	Model 7
	Intra-provincial	Inter-provincial
15 to 24 years	0	0
25 to 34 years	-0.1047***	-0.4242***
35 to 44 years	-0.6373***	-1.0530***
45 to 54 years	-1.2015***	-1.5259***
55 to 64 years	-1.5137***	-1.7652***
Black	0	0
Coloured	-0.2109***	0.5536***
Indian/Asian	-0.3149***	0.5263***
White	0.9275***	0.6018***
Male	0	0
Female	-0.1773***	-0.223***
No schooling	0	0
Incomplete primary	0.0694***	0.1340***
Complete primary	0.1080***	0.2040***
Incomplete secondary	0.1381***	0.2716***
Grade 12/Std 10	0.2452***	0.3269***
Tertiary	0.7625***	0.6333***
No previous migration experience	0	0
Previous migration experience	0.2128***	24.734***
Net outmigration rate 2001 to 2009	8.8486***	9.6126***
Poverty headcount 2007	-0.4830***	3.0724***
Unemployment rate 2007	-0.0043***	0.0004
Average time to hospital	-0.0047***	0.0194***
_cons	-3.9336***	-28.73***
N	19 962 312	
Pseudo R-squared	0.2559	
Prob>chi-squared	0.0000	

* p<0.05, ** p<0.01, *** p<0.001.

7.3 Migration from Rural Areas

Models 8 and 9 consider the migration probabilities of those individuals residing in predominantly rural municipalities¹⁶.

In both rural-rural and rural-urban streams, migration probabilities are highest amongst younger adults. Black individuals are most likely to migrate from rural to rural areas. White individuals are least likely to migrate from rural to urban areas. This may point to involvement in agricultural concerns at relatively high levels of income, and the group's predominant location in rural *formal* areas rather than traditional authority areas (also captured in the rural municipality category).

As expected, having more education increases the probability of migration for both groups, as does prior migration experience (particularly so in the case of rural-urban migrants). The poorer the rural municipality, the more likely it is that migration will take place to other rural and urban municipalities. High unemployment in the rural sending municipality increases the probability of rural-urban migration but high unemployment rates decrease the probability of rural-rural migration. The same is true for access to service. Poorer access to service (more time to hospital) in the base municipality increases rural to urban migration but decreases rural to rural migration. It is possible that rural inhabitants responding to high unemployment rates and poor access to service only prefer to migrate if it is to an urban area.

¹⁶ Rural areas are defined as areas where the proportion of the population residing in rural areas exceeds 50 percent.

Table 5. *Multinomial logit model: rural-rural and rural-urban moves 2010/11 (vs no moves from rural area 2010/11)*

	Model 8 Rural to Rural	Model 9 Rural to Urban
15 to 24 years	0	0
25 to 34 years	-0.0574***	-0.3753***
35 to 44 years	-0.5889***	-1.2012***
45 to 54 years	-1.0906***	-1.8260***
55 to 64 years	-1.6644***	-2.1923***
Black	0	0
Coloured	-0.4827***	0.2250***
Indian/Asian	-0.5212***	0.3341***
White	-0.2750***	-0.3734***
Male	0	0
Female	-0.4154***	-0.3824***
No schooling	0	0
Incomplete primary	0.1240***	0.2419***
Complete primary	0.2505***	0.4764***
Incomplete secondary	0.3650***	0.7814***
Grade 12/Std 10	0.3898***	0.8830***
Tertiary	0.8029***	0.9183***
No previous migration experience	0	0
Previous migration experience	2.0178***	4.1518***
Net outmigration rate 2001 to 2009	12.6628***	13.5898***
Poverty headcount 2007	1.5625***	1.2749***
Unemployment rate 2007	-0.0063***	0.0016***
Average time to hospital	-0.0028***	0.0092***
_cons	-6.0368***	4.1518***
N	6 305 797	
Pseudo R-squared	0.3105	
Prob>chi-squared	0.0000	

* p<0.05, ** p<0.01, *** p<0.001.

7.4 Migration from urban areas

Table 6 shows a multinomial logit regression that models urban-rural and urban-urban migration. Aging has a much stronger negative effect on urban-urban migration than it does on urban-rural migration. All urban race groups are more likely to migrate to urban areas than to rural areas. Coloured and Indian/Asian individuals are far less likely than other race groups to migrate from urban to rural areas.

While urban women are less likely than men to move to urban and rural areas, the gender differential is smaller in urban-urban streams than it is in urban-rural streams. This may be an indication of women who are able to remain in urban areas not being subject to the same gender-related dynamics that affect women that move from urban to rural areas.

As expected, education increases the likelihood of being an urban-urban migrant while it decreases the likelihood of migrating from urban to rural areas. Educational attainment is negatively related to urban-rural migration, suggesting that having more education significantly decreases chances of moving to a rural area. An alternative interpretation is that uneducated urban residents are negatively selected for migration to rural areas. This could be an artefact of return migration, which is likely to be highest for migrants with low levels of education.

Migration experience and the municipal net out-migration rate increase both urban-rural and urban-urban migration probabilities. High unemployment and poverty rates in the sending municipality act as push factors for both streams of migration from urban areas. Urban to rural migrants respond in the expected way to distance from a hospital.

Table 6. *Multinomial logit model: urban-rural and urban-urban moves 2010/11 (vs no moves from urban area 2010/11)*

	Model 10 Urban to Rural	Model 11 Urban to Urban
15 to 24 years	0	0
25 to 34 years	-0.2729***	-0.2579***
35 to 44 years	-0.6515***	-0.8171***
45 to 54 years	-1.0659***	-1.3306***
55 to 64 years	-1.1880***	-1.5672***
Black	0	0
Coloured	-1.2757***	0.4697***
Indian/Asian	-1.4223***	0.3947***
White	0.2404***	1.1399***
Male	0	0
Female	-0.2263***	-0.1054***
No schooling	0	0
Incomplete primary	-0.2377***	0.0398**
Complete primary	-0.4073***	0.0421**
Incomplete secondary	-0.4809***	0.0125
Grade 12/Std 10	-0.4992***	0.1540***
Tertiary	-0.1093***	0.6080***
No previous migration experience	0	0
Previous migration experience	1.6798***	1.9170***
Net outmigration rate 2001 to 2009	7.3293***	7.6023***
Poverty headcount 2007	0.2357***	1.1829***
Unemployment rate 2007	0.0094***	0.0106***
Average time to hospital	0.0131***	-0.0130***
_cons	-5.6990***	-5.0810***
N	13 656 515	
Pseudo R-squared	0.1352	
Prob>chi-squared	0.0000	

* p<0.05, ** p<0.01, *** p<0.001.

8. Conclusion

This paper linked Census 2011 data to retrospective region-level data from household surveys to analyse contemporary migration volumes and patterns in South Africa. The overall results indicate that internal migration is highly age and education-selective. Previous migration experience also increases the probability of internal migration. These factors also influence the distance that migrants travel in the same way (where distance is defined by crossing a municipal or provincial border).

Multinomial logit models are used to analyse differences between migrants from rural areas moving to rural or urban areas, and migrants from urban areas who move to rural and urban areas. Disaggregation of migration by sending and receiving area types reveals that the same factors affecting aggregate migration flows affect migration probabilities in the same way, regardless of sending and receiving area types. Multinomial logit regression analysis also reveals that migrants are generally more likely to move within provincial borders if they move, possibly indicative of distance-related cost or uncertainty aversion. Regions with higher poverty levels and poorer service levels often encourage out-migration. However, there is some evidence to suggest that migrants in rural areas responding to high unemployment rates and poor access to service will only choose to migrate if it is to an urban area.

The findings in this thesis therefore contribute to an empirical understanding of South African internal migration as a process that involves both individual and region-level determinants. The linking of retrospective region-level data to the current migration decision avoids the temporal issues associated with conventional cross-sectional data analysis, and allows for more causal inference than is normally the case in analysis of the migration decision.

Table A1. *Inter-municipal migrant volumes by current province (2010/11)*

		Current province								Share inter-mun migrants received	
		Western Cape	Eastern Cape	Northern Cape	Free State	Kwazulu-Natal	North West	Gauteng	Mpumalanga		Limpopo
Previous province	Western Cape	29.92%	13.71%	6.72%	2.72%	2.86%	1.79%	3.67%	2.20%	1.93%	6.66%
	Eastern Cape	34.67%	61.33%	6.21%	9.62%	16.64%	11.10%	8.90%	6.67%	4.62%	16.26%
	Northern Cape	4.23%	0.87%	39.47%	4.49%	0.74%	2.95%	0.90%	1.46%	0.84%	3.30%
	Free State	3.32%	2.66%	8.36%	46.71%	2.36%	7.10%	5.69%	4.73%	2.26%	6.67%
	Kwazulu-Natal	5.67%	7.35%	2.07%	6.42%	60.53%	3.73%	12.73%	11.56%	3.16%	14.59%
	North West	2.02%	1.40%	26.85%	5.75%	1.26%	37.62%	6.44%	4.25%	6.91%	8.67%
	Gauteng	17.05%	10.30%	7.52%	18.83%	12.10%	25.09%	39.34%	25.80%	20.78%	25.44%
	Mpumalanga	1.37%	0.77%	1.14%	1.96%	2.18%	2.71%	5.50%	29.88%	6.67%	5.57%
	Limpopo	1.75%	1.61%	1.66%	3.48%	1.32%	7.92%	16.82%	13.45%	52.85%	12.85%
	Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100%
		50 259	41 924	22 432	24 086	58 313	47 722	186 157	37 017	41 286	509 196

CHAPTER 3: Places of Promise or Poverty: Urban informal settlements in South Africa

Abstract

This paper investigates how new urban informal households are formed, and whether settlement in these areas allows for social mobility through the labour market. The results suggest that youth and recent migration significantly positively affect the probability of becoming the head of a new urban informal area household. Additionally, the longitudinal data shows that residential mobility for urban informal area residents is limited, casting doubt on the characterisation of informal areas as transitory phenomena.

Labour market analysis finds evidence of poor labour market outcomes for urban informal area dwellers, in the forms of weak employment prospects, weak occupational mobility and low wages for urban informal area residents relative to their urban formal area counterparts. In addition, urban informal area adults also more often report being in poor health than urban formal area residents. However, urban informal area residents often have similar or better labour market outcomes and better access to basic services than residents of traditional authority areas. This paper's contribution to the literature is its use of longitudinal data to shape a dynamic perspective on new urban informal household formation, and labour market prospects for urban informal area residents in the South African context.

1. Introduction

More than half of the world's population now resides in urban areas (United Nations, 2014). In many developing countries, urban population growth has disproportionately involved rural migration to urban informal settlement areas in (and on the outskirts of) cities and larger towns. These areas, interchangeably referred to as slums¹⁷ or informal settlements, are characterised by high population densities with poor-quality forms of shelter, inadequate living space, poor access to public services and insecure tenure.

Since the 1970s informal settlements have grown dramatically in number and size on the outskirts of South Africa's economic centres in order to satisfy urban unskilled and semi-skilled labour demand. 2009 estimates indicated that South Africa had approximately 2 700 shack areas (South African Cities Network, 2011). However, the provision of basic services has not kept pace with the rapid growth of the urban informal settlement population (Brown-Luthango *et al.*, 2016). Many urban informal settlement households do not have access to basic services such as sanitation, electricity or running water from safe sources¹⁸, imposing considerable health costs on individuals. The mismatch between urban population growth and service delivery has also manifested itself in service delivery protests, which are often violent and damaging to political stability (Van Niekerk, 2013: 3).

The South African experience, and indeed that of developing countries in general, suggests that while migration to urban informal areas may serve a necessary labour market function of reducing search costs for both the firm and worker, it is unclear whether or not urban informal settlements allow for social mobility in South Africa.

This paper therefore investigates how new urban informal households are formed, and asks whether living in or moving to an informal settlement allows for social mobility. The paper first discusses recent theories explaining the growth of urban informal settlements in Section 2. This is followed by a brief discussion on South African urban informal settlement growth since the 1950s, and government responses in Section 3.

¹⁷ The pejorative and reductionist nature of the term "informal settlement" is discussed in great detail in Mayne (2017). The decision to use the term in this paper is based on its common usage in international literature.

¹⁸ Table A3 in the Appendix of this paper reveals that only 50.6 percent of working-age adults living in urban informal areas had access to a flush toilet in 2014/15, while the comparable figure for urban formal residents was 94 percent. Table A4 in the Appendix shows that 67.9 percent of urban informal area residents and 95.7 percent of urban formal area residents had access to piped water on their residential stands.

Section 4 discusses the definition of informality for the purpose of this paper. Section 5 analyses the National Income Dynamics Survey data (SALDRU, 2016) to identify the characteristics of individuals most likely to become urban informal settlement dwellers. Section 6 uses the same dataset to shed light on informal settlement dweller labour market outcomes relative to their counterparts residing in other areas. The paper then concludes with a summary of the main findings in Section 8.

This work contributes to the literature by using longitudinal data to shape a dynamic perspective on new urban informal area household formation, and labour market prospects in the South African context. Its relevance lies in its ability to assist in the formulation of evidence-based policy and targeting of government services in urban municipalities where in-migration flows are particularly large.

2. The growth of urban informal settlements: two competing theoretical explanations

2.1 The ladder-to-work and modernisation theory perspectives

Historically, the growth of urban informal settlement areas has been due in large part to the important labour market access function that they serve for urban in-migrants – these areas are low-cost entry points where the urban in-migrant can live while searching for employment (Huchzermeyer and Karam, 2006). Urban informal settlements can therefore be seen as providing an initial toehold for in-migrants in the urban labour market. Once workers have gained the necessary skills and contacts in the urban area for better-paid work, they should ideally be able to afford better housing. Informal settlements are therefore widely regarded as being transitory phenomena, with rural in-migrants and their children eventually being able to move to urban formal areas, or at the very least, upgrade their dwelling qualities in situ (Marx *et al.*, 2013: 188).

According to ‘modernisation’ theories the transitory nature of informal settlements extends to the persistence of settlements over time as well (see for example Glaeser, 2011). This perspective suggests that informal settlement growth in rapidly growing economies is necessary for economic development. Informal settlements are assumed to be located close to well-paying urban labour market opportunities, opportunities for informal sector employment and better access to basic services than is the case for rural area inhabitants (Turok and Borel-Saladin, 2016: 5).

First-generation urban informal settlement residents are assumed to earn incomes higher than what would have been the case in their previously rural settings, which would then allow them to upgrade in situ or through relocation (Turner, 1968). New urban informal settlement residents, unfettered by traditional norms and rural social arrangements, are also now able to pursue individually beneficial enterprise in a larger market and build wider social networks (Turner, 1967; Glaeser, 2011; Cross, 2013). The modernisation hypothesis therefore predicts that informal settlement growth, or at the very least informal settlement living for individuals, is transitory and a necessary step in economic growth and social mobility in developing countries. In summary, this perspective holds that while informal settlements are symptomatic of poverty external to these settlements, they can also be powerful tools to reduce poverty in the long run.

2.2 Informal settlements as poverty traps

The teleological perspectives on informal settlement development discussed in Section 2.1, was pioneered in the late 1960s by authors such as Frankenhoff (1967) and Turner (1967, 1968). The ladder-to-work and modernisation hypotheses are underpinned by four assumptions that may not necessarily be generalisable to all countries in all time periods. The first is that informal settlements offer relatively low-cost accommodation to those who decide to locate there. The evidence supporting this hypothesis is mixed, with some studies suggesting that informal settlement housing prices actually vary a great deal and that residents may in fact pay a premium for housing and access to services (see for example Gulyani and Talukdar, 2008; Posel and Marx, 2013). Because many informal settlements are located on the immediate outskirts of economic centres and because there generally is limited space to erect one's own dwelling, urban informal settlement dwellers could be subjected to high rental prices, which effectively diminish the possibility of saving. Marx *et al* (2013) show that while the urban poor in Kenya spend a relatively small proportion of their income on rent, their food expenditure is proportionally large enough to dispel any notion of saving. On average rural dwellers in Kenya spend 1 percent of their income on rent while urban informal settlement dwellers spend on average approximately 10 percent of their incomes on rent.

The second contentious assumption deals with the transitory nature of residence in informal settlement areas, and informal settlement areas themselves. A number of studies show that not only are informal settlement areas often relatively permanent in

nature but that there is less churning than the modernisation hypothesis would suggest (see for example Krishna, 2013¹⁹).

Third, central to the modernisation hypothesis is the assumption of abundant and / or well-paying urban labour market opportunities for first-generation urban informal settlement dwellers that would facilitate social mobility over time. In developing countries, the few available labour market opportunities that are available are concentrated in marginal sectors (where employment is precarious and wages extremely low (see for instance Akter and Rahman; 2017; Turok and Borel-Saladin, 2016). This renders the assumption of social mobility through the labour market less credible than the modernisation hypothesis suggests, particularly in low-growth, low labour market absorption environments. Evidence from India suggests that intergenerational social mobility (and by extension, area mobility) is limited for many informal settlement dwellers (Krishna, 2013).

Finally, there is abundant evidence from sub-Saharan African countries that urbanisation need not always be positively related to country economic growth (Arimah, 2010; Cheru, 2005). While informal settlement development may have accompanied growth for some countries in earlier decades, the experience of sub-Saharan Africa has been one of rapidly urbanising populations in almost chronically low growth environments. In a cross-country study Arimah (2010: 15) finds that a 1 percent increase in GDP per capita is associated with a 7.6 percent reduction in the urban informal settlement population. However, that average masks a mixed effect. In Latin-American countries, economic growth is accompanied by the expected reduction in informal settlement population sizes, but in African countries economic growth *increases* informal settlement population sizes.

A number of explanations exists to explain the apparent contradiction in African countries. Economic growth in Africa may not have been high or sustainable enough to reduce informal settlement dweller numbers. Another plausible explanation concerns the geographical distribution of economic growth: because growth is often heavily concentrated in urban areas, rural-urban migration volumes in pursuit of urban opportunities may simply be too overwhelming for the formal housing market to accommodate. Such environments, characterised by slow or non-inclusive economic

¹⁹ Krishna (2013: 1014) finds that just over 70 per cent of Bangalore slum residents were fourth-generation slum residents. Very few slum residents were first-generation migrants.

growth, poor governance and rapid urbanisation, are common in sub-Saharan Africa and parts of Asia (Cheru, 2005).

Excessive land use regulation can shift the cost of housing beyond migrant affordability (Payne, 2005; Quigley and Raphael, 2005; Kironde, 2006), particularly in rapidly urbanising countries. Stricter land use regulation may reduce the availability of land for construction, as well as decrease the demand for and supply of urban formal housing (Cavalcanti *et al.*, 2018). The combination of formal housing shortages, formal housing prices and large in-migrant volumes may encourage the growth of informal housing and areas.

The proliferation of informal settlements on the periphery of cities and towns create an urban divide (Todes, 2011: 116) where the well-educated are able to insulate themselves in high-security, well-regulated villages, while the poor bear the brunt of urban physical risk in the forms of proximity to pollution, higher risk of fires and little to no protection from extreme weather events (Benjamin, 2000; Krishna, 2013). The impacts of the aforementioned risks are likely to be long-lasting, often undermining successive generations' possibilities of transcending their initial informal areas of birth.

2.3 Low levels of investment and the persistence of urban informal settlements

In addition to possibly being trapped in low-level equilibria, urban informal settlements are characterised by low levels of physical capital, weak institutions and consequently, low levels of private and public investment. Four factors which contribute to a depressed investment environment (Marx *et al.*, 2013). The first is the fact that property rights are not formally defined in informal settlements. Since many informal settlements have been built on government land, informal settlement dweller property rights and security of tenure are precarious at best. Therefore, the incentive to improve the quality of homes and by extension, neighbourhoods, is less developed than in other situations. There is some evidence to suggest that formal property rights of land may encourage private and public investments in poorer urban areas (Fields, 2005). The reasons extended are not simply a feeling of permanency for the individual but include quite crucially the unlocking of credit markets due to formal ownership of land.

Secondly, due to low returns from investments in housing and infrastructure, it may not be economically rational for informal settlement dwellers to make such investments.

Relatively minor upgrades to properties may be rather expensive and a risky investment in the urban informal settlement environment, which may discourage both private and public investment.

Another factor which discourages private investment in informal settlements is the absence of formal governance and significant failures in coordination of resources. This governance vacuum may be filled by unscrupulous private actors, such as the drug cartels in Brazil who effectively enforce their own rules, tax informal settlement dwellers and direct expenditure. As many informal settlement dwellings are also built on land owned by private individuals, it is often the case that these landowners can collude with local authorities to slow any progress in formal housing provision (Joireman and Vanderpoel, 2011).

The fourth potential contributor to low levels of investment in informal settlement areas is the possibility that it may incentivise more rural-urban migration. The Harris-Todaro model (1970) predicts that rural-urban migration is driven primarily by expected wage differentials but later work by researchers such as Bates (1981) suggests that pull factors such as urban-biased public spending and policy may also contribute to rural-urban migration. Urban policymakers are therefore likely to exert more caution when considering decisions to invest in urban informal settlements for fear of encouraging additional flows of rural-urban migrants. Local tax bases may be burdened unduly by costs related to government service provision, much of which is unlikely to be recoverable (Buckley and Kallergis, 2014).

These findings point to a more pessimistic view of informal settlement development and persistence in the developing country context: informal settlements are a physical manifestation of government failure to manage urbanisation of socioeconomically vulnerable individuals, in terms of strategic direction, policy and implementation. Urban informal area residents are therefore marginalised by the very informality that makes their chosen or imposed residential area type attractive. Without intervention, housing marginalisation of this nature for one generation could possibly be inherited by or be perpetuated by subsequent generations. In the following section the historical policy approaches by the South African government to urban informal settlement are briefly discussed, with a view to contextualising the challenges and opportunities associated with the growth of informal settlements in South Africa.

3. Urban informal settlements in South Africa: From policies of eradication to acceptance and upgrading

In the past eight decades policy responses to informal settlements and informal settlements have evolved from an initial laissez-faire approach in the 1940s, to a stricter approach in the 1950s and 60s, to more pragmatic approaches from the 1980s to modern times that implicitly and explicitly acknowledge and formally include informal settlements in service provision strategy and implementation. These approaches, summarised by Arimah (2010) include (1) altruistic neglect, (2) evictions and eradications, (3) forced relocation, (4) in situ upgrading, and (5) securitisation of tenure. South Africa's policy experience with informal settlements has also been one that fluctuated from benevolent indifference (where Black informal settlement dwellers were begrudgingly accepted as important inputs for development but not encouraged to settle permanently in urban areas), to eradication and relocation, before finally settling on a constitutional obligation of providing dignified accommodation to all in the late 1990s. Each of these periods was accompanied by regime changes that are discussed briefly below.

After a relatively strict focus on denying Black individuals the right to settle permanently in urban areas since the beginning of the 20th century, the 1940s saw the emergence of a more pragmatic view of Black urban settlement. The progressive realisation of the importance of cheap, Black urban labour was articulated in the Fagan Commission's recommendation to the ruling United Party in 1948 that South Africa's urbanisation be managed to accommodate growing urban labour demand (Omer-Cooper, 1994). The Commission also recommended that South Africa's urban Black population be accepted as part of the permanent urban population (Webb, 1948). These ideas were roundly rejected by the National Party, who were voted into power by a White electorate that seemingly favoured its proposed apartheid policies of segregation and Black oppression.

The newly elected apartheid government²⁰ prioritised the eradication of informal settlements in the 1950s, with many residents from these areas forcibly relocated from their urban informal areas to townships on the periphery of towns and cities. Forced relocations and removals took place alongside two other social engineering schemes

²⁰ The National Party, led by DF Malan, won South Africa's general election in 1948.

designed to complement the broader apartheid objective of ostensibly “benevolent” segregation: the building of townships to promote the development of a stable Black working class, and secondly the large-scale industrialisation of previously rural areas (Hunter and Posel, 2012; Huchzermeyer, 2003). Race-selective rights to the city eventually saw urban accommodation for blacks limited to state-owned housing leased to families, single-gender workers’ hostels and illegal forms of housing erected either in the backyards of state-leased housing or in the mushrooming informal settlements.

The ruling National Party’s three-pronged strategy of informal settlement eradication, resettlement and rural industrialisation ensured that many informal settlements were indeed transitory in nature up until at least the 1970s, when labour shortages in urban areas forced a relaxation of Black urban settlement restrictions. The apartheid State also used housing rights as a means of suppressing the civic movements that increasingly threatened political stability in South Africa. Upgrading townships, private sector involvement in the provision of housing for Black individuals (Crankshaw, 1993) and the establishment of Black urban local authorities won some support for the apartheid State. The apartheid State had finally embraced the “orderly urbanisation” of South Africa’s Black population, proposed by the Fagan Commission in 1948.

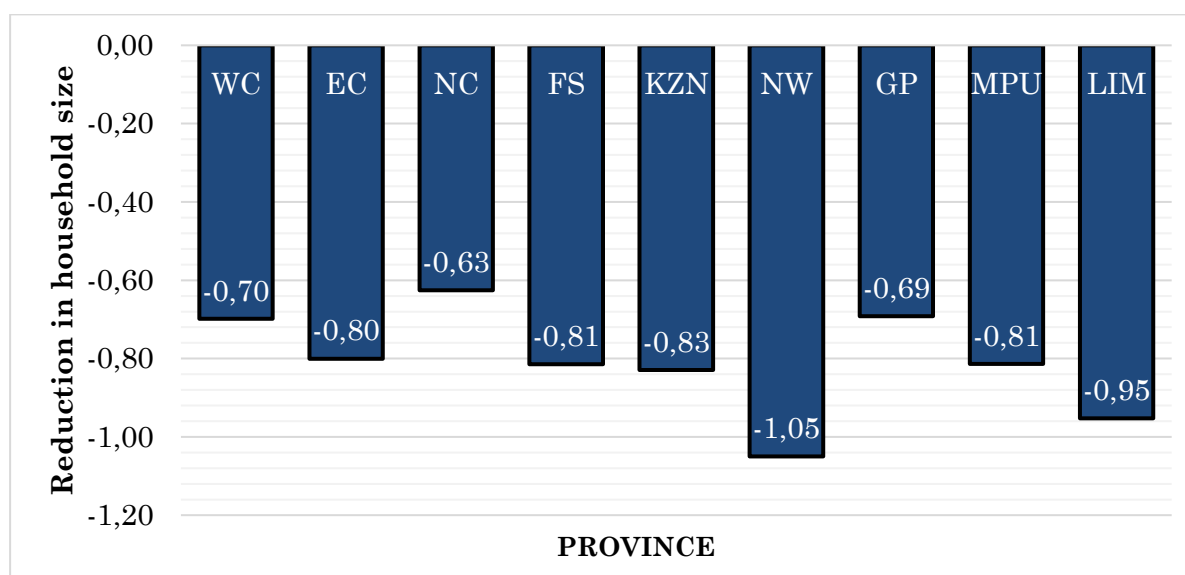
During the 1980s the harsh apartheid environment of surveillance, intimidation and imprisonment began to break down for a number of economic and political reasons. International boycotts and disillusionment with the administrative burden of registering Black workers meant that employers became more willing to hire Black workers without formally registering them (Turok, 2012). The 1980s also witnessed the first time since the 1950s that the urban population started exceeding the rural population (World Bank, 2019). This rapid urbanisation trend, along with the laws preventing permanent settlement in urban areas for Black people, meant that informal settlements grew rapidly on the outskirts of economic centres (Turok, 2012). The number of urban informal settlements continued to grow in the 1990s as well, as the last apartheid-era restrictions on settlement were repealed in 1991.

By the 2000s approximately 9 percent of South Africa’s population resided in urban informal areas (Housing Development Agency, 2012). As a response to the challenge of burgeoning informal settlements and overcrowding (even in formal housing), the ruling African National Congress government prioritised the rollout of formal housing in the Reconstruction and Development Programme of 1994. The state programme has resulted

in 3 million units being delivered within two decades to one-fifth of South Africa's population (National Treasury, 2013). Yet, by 2012 the formal housing backlog in South Africa was still estimated to be 2.1 million units (National Planning Commission, 2012).

A possible factor contributing to the persistent formal housing backlog in South Africa is declining household sizes over time, particularly within South Africa's Black population. Figure 1 shows the average Black household size changes between 1996 and 2011, by province. Black household sizes declined substantially, with the average number of household members declining by between 0.63 and 1.05 over this period.

Figure 1. *Black household size reduction between 1996 and 2011, by province*



NOTES: Own calculations based on Census 1996 and Census 2011 data.

Falling household sizes amongst Black households are also evidenced in the mismatch between Black population growth and Black *household* growth. The Black population grew from 31.1 million in 1996 to 40.9 million in 2011, representing a 31.3 per cent increase. However, the *number* of Black households grew by 73.9 per cent in the same period (shown in the bottom right cell of Table 1).

In addition, Black household growth rates between 1996 and 2011 were extremely unevenly distributed geographically. The highest levels of household growth were recorded in the more urbanised provinces of Gauteng and the Western Cape, where total household growth over the period was 104 per cent and 69 per cent, respectively. Much of the household growth in these two provinces was concentrated within the Black population, with households in this group growing by 169 per cent in the Western Cape

and 133 per cent in Gauteng, much faster than was the case for other race groups. This was possibly due to the Black population geographical distribution adjusting to the elimination of apartheid-era restrictions on movement and settlement, which affected Black individuals most profoundly before.

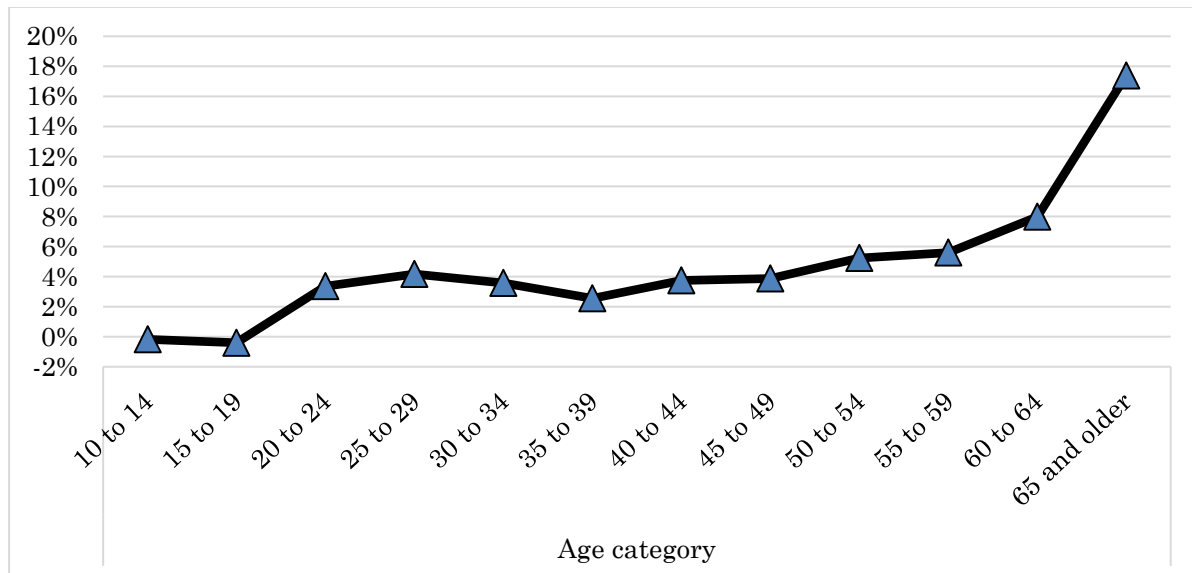
Table 1. *Number of households in 1996 and 2011, by province for Black households and households of other groups*

			1996 TO 2011			<i>ANNUALISED</i>		
	1996	2011	Total household growth(%)	Household growth Black (%)	Household growth other races (%)	<i>Total household growth(%)</i>	<i>Household growth Black (%)</i>	<i>Household growth other races (%)</i>
Western Cape	966 390	1 633 366	69.02%	168.92%	39.79%	<i>6.27%</i>	<i>15.36%</i>	<i>3.62%</i>
Eastern Cape	1 316 783	1 685 985	28.04%	27.94%	28.58%	<i>2.55%</i>	<i>2.54%</i>	<i>2.60%</i>
Northern Cape	185 413	301 161	62.43%	136.48%	23.05%	<i>5.68%</i>	<i>12.41%</i>	<i>2.10%</i>
Free State	618 505	823 128	33.08%	40.14%	1.47%	<i>3.01%</i>	<i>3.65%</i>	<i>0.13%</i>
Kwazulu-Natal	1 624 062	2 534 007	56.03%	71.46%	6.62%	<i>5.09%</i>	<i>6.50%</i>	<i>0.60%</i>
North West	708 587	1 061 416	49.79%	50.61%	43.07%	<i>4.53%</i>	<i>4.60%</i>	<i>3.92%</i>
Gauteng	1 918 252	3 907 612	103.71%	133.17%	40.19%	<i>9.43%</i>	<i>12.11%</i>	<i>3.65%</i>
Mpumalanga	592 763	1 074 492	81.27%	91.01%	16.92%	<i>7.39%</i>	<i>8.27%</i>	<i>1.54%</i>
Limpopo	967 986	1 417 392	46.43%	46.90%	35.23%	<i>4.22%</i>	<i>4.26%</i>	<i>3.20%</i>
SA	8 898 740	14 438 558	62.25%	73.90%	30.13%	<i>5.66%</i>	<i>6.72%</i>	<i>2.74%</i>

NOTES: Own calculations based on Census 1996 and Census 2011 data. Annualised growth figures presented in italics.

The age-selective impact of subsidised housing projects for South Africa's majority Black population can be seen in Figure 2, which shows the growth of formal housing units by age for Black-headed households between 1996 and 2011 in South Africa. The data show some evidence of age-selective growth of Black formal housing headship in South Africa. Older Black household heads in 2011 were significantly more likely to be the heads of formal housing units than their same-aged counterparts fifteen years before. However, there were only marginal increases in formal headship probabilities for prime-aged Black adults between the ages of 20 and 39 years of age.

Figure 2. Growth in the percentage of Black-headed formal households between 1996 and 2011, by age category



NOTES: Own calculations based on Census 1996 and Census 2011 data.

As Chapter 2 showed, South Africa's economic centres of Gauteng and the Western Cape are the largest recipients of internal migrants. This growth of urban population through migration, slowing government housing delivery²¹ and a trend towards declining household sizes, create a demand for housing that cannot immediately be satisfied by the formal housing market.

²¹ In the period under review in this paper, a housing delivery decline from 160 403 housing units in 2008/09 to 105 936 units in 2013/14 was observed (Department of Human Settlements, 2014).

The opportunities and challenges presented by urban informal settlements suggest that they are likely to be a more permanent feature of South Africa's urban landscape than modernisation theory would predict. Slow and uneven economic growth, coupled with rapid urbanisation pressures, may force government to reduce its involvement in informal settlement upgrading to basic infrastructure and service provision. It is therefore important to understand how new urban informal settlement households are formed, who resides in them, and what benefits they derive from that settlement in order to allocate resources more efficiently in a low growth environment.

4. Towards a working definition of informal settlements

To answer the central questions of this paper, a coherent definition of informal living conditions is needed. Informal settlement areas have defied consistent definition since the word fell into common use in 19th century England (Mayne, 2017). UN-HABITAT (2003: 21) defines an informal settlement household as one where a group of individuals co-reside in a dwelling which is deprived of one or more of the following:

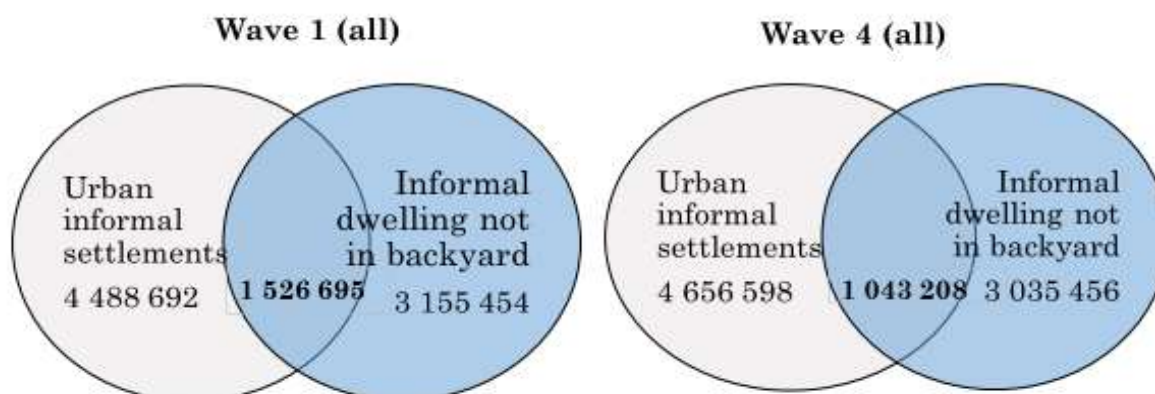
1. Durable housing. A house is deemed to be durable if it is built on a non-hazardous location, is permanent and structurally able to withstand extreme climatic conditions such as rain, cold, heat and humidity.
2. Adequate living space which is quantified as three or fewer people per room.
3. Access to improved water sources, which include piped water into the dwelling, plot or yard, boreholes, protected wells and springs and rainwater collection sites.
4. Access to improved sanitation facilities which include flush systems connected to a sewer system, pit latrines, septic tanks, ventilated pit latrines and pit latrines with slabs and composting toilets.
5. Security of tenure which is defined as the right of individuals to state protection against unlawful evictions.

While the UN-HABITAT definition of informal dwellings is multidimensional, it refers to individual informal settlement households, and is more or less consistent with the South African definition of an informal *dwelling*. Therefore, it does not address the intuitive understanding of informal settlements as being a *collection of households* living in precarious circumstances. UN-HABITAT (2003: 13) also offers a definition of informal settlements, although less widely used, which refers to informal settlements as being “a contiguous settlement where the inhabitants are characterised as having inadequate

housing and basic services”. This is more or less consistent with Statistics South Africa’s (2003: 9) definition of an *informal settlement*, which is an “unplanned settlement on land which has not been surveyed or proclaimed as residential, consisting mainly of informal dwellings (shacks)”.

As Figure 3 using National Income Dynamics Survey data (SALDRU, 2016) shows, informal dwelling and informal settlement status need not be synonymous. The overlap between informal dwelling not in a backyard and settlement type in 2008 and 2014/15 is limited. In 2008, 34 per cent of informal dwellings not in backyards were located in urban informal settlements. By 2014/15 that percentage had decreased to 22 per cent, which may be illustrative to some extent of in situ upgrading of dwellings. Nevertheless, the number of individuals living in urban informal settlements has increased while the number of informal dwellings decreased, suggestive of the powerful push and pull factors that still influence illegal settlement on vacant land.

Figure 3. *Overlap between Black and Coloured individuals living in urban informal settlements and urban informal dwellings not in a backyard 2008 (NIDS Wave 1) and 2014/15 (NIDS Wave 2)*



Source: Own calculations from National Income Dynamics Survey (SALDRU, 2016).

In the developing country context, slum or informal area settlement households are subject to the most environmental risks, such as crime, pollution, poor access to services and tenure insecurity. These environmental or neighbourhood factors impact individual welfare negatively far beyond dwelling quality (Ezeh *et al.*, 2017). Therefore, to capture these negative externalities, for definitional purposes in this paper, an informal settlement household will be defined as a household living in an urban informal settlement.

5. Who settles in urban informal settlements in South Africa?

Adults settling in urban informal settlements are typically former rural residents and younger adults from urban (formal) townships who cannot access urban formal housing (Crankshaw, 1993). Informal settlements therefore seem to grow due to an unmatched demand for housing following rapid urbanisation since the 1980s, when influx control (of Black individuals to urban areas) was abandoned by the apartheid government.

Hunter and Posel (2012) extend two further reasons for the increased formation of urban informal households. Household sizes have decreased substantially between 1995 and 2006. Marriage rates have also declined in the same period, with individuals living in informal households most likely to either be unmarried and single, or unmarried and cohabiting with a partner. Urban informal settlements have historically been safe havens for unmarried couples preferring to cohabit and not pay *lobola*²², a practice which is less acceptable in rural areas (Hunter, 2010). Conversely, *escaping* from restrictive partnership arrangements may also incentivise the migration of young women from rural areas to urban informal settlements. Erlkar *et al.* (2006), for example, finds that 23 percent of their female sample residing in Addis Ababa informal settlements had migrated between the ages of 10 and 14 years to avoid being married in their rural home areas.

In theory then, new urban informal area residents are likely to be younger, hail from a rural area, and may be incentivised by impending events that change marital status and growth in household sizes to form new urban informal area households. In this section South Africa's first nationally representative longitudinal study, the National Income Dynamics Survey (SALDRU, 2016) is employed to test whether these hypotheses hold true in contemporary South Africa.

²² Bride payment.

5.1 Data

This study uses the National Income Dynamics Survey (NIDS) waves 1 to 4, collected between 2008 and 2015 at roughly two-year intervals, to examine how individuals select into informal settlements. The sample is restricted to Black and Coloured individuals between the ages of 20 and 64 years old, who report being the household head, or partner to a household head in the current wave. This sample is restricted in this manner because it is assumed that individuals who are currently at the head of a household have more autonomy in choosing where they move to, and because a number of life stage events associated with new household formation are most likely to occur in the labour market participation age interval specified above. The upper limit of the age distribution coincides with South Africa's labour market participation upper limit on age. Only Black and Coloured individuals are included, as South Africa's two other population groups (Asian/Indian and White) are extremely unlikely to move to urban informal settlements.

Under scrutiny is the probability of an individual selecting into an informal settlement, if the previous residential area type was not an informal settlement. The National Income Dynamics Survey has two geographical classifications, based on demarcation for the 2001 and 2011 Censuses respectively. While the 2011 Census classification does not disaggregate urban areas into formal and informal, the 2001 classification does, dividing South Africa into four distinct categories: rural formal, traditional authority, urban formal and urban informal areas. The more detailed latter area categories will be used to identify urban informal settlement dwellers.

As this study deals with a very select sample (urban informal settlement dwellers), and because the NIDS weighted sample may not be representative of the full population once it is disaggregated by area type²³, the unweighted pooled sample will be analysed. The descriptive evidence and regression results therefore describe the characteristics of the sample in NIDS, which may not be generalisable to the South African population. Nevertheless, the use of longitudinal data does allow the researcher to link retrospective data to location decisions, which is rare in the study of informal settlements in developing countries.

²³ Informal settlement populations are also notoriously difficult to enumerate and are often undercounted in many countries (Marx *et al.*, 2013: 198).

5.2 Descriptive evidence

In this section, selected summary statistics are discussed individually.

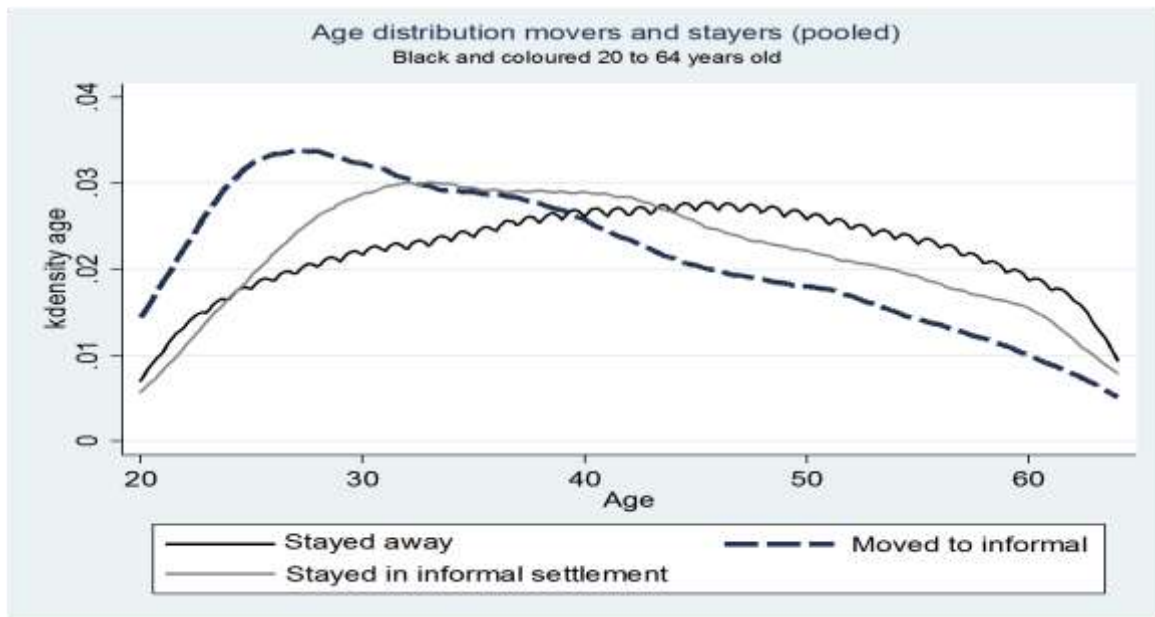
Table 2 shows that 94.5 percent of the sample living in urban informal settlements in 2014 was Black and 5.5 percent was Coloured. No Asians and no Whites in the sample resided in urban informal settlements.

Table 2. *Area types ages 20 to 64 years, by race (2014/15)*

	Rural formal	Tribal authority	Urban formal	Urban informal	SA
Black	62.96	99.84	70.14	94.49	82.51
Coloured	29.19	0.16	24.93	5.51	14.49
Asian	4.77	0	1.19	0	1.03
White	3.09	0	3.74	0	1.97
	100	100	100	100	100

NOTES: Own calculations based on National Income Dynamics Survey data.

The relative youth of new urban informal area residents is evident in Figure 4, which shows the age distribution of movers and stayers by selected area types. The age distribution of new urban informal entrants is skewed to the left, indicating their relative youth when compared to urban informal residents who had not moved in the two years prior to data collection. The mean age of new urban informal area entrants in the selected sample is 36.4 years, while their urban formal, tribal authority and rural formal resident counterparts have mean ages of 42.4, 45.2 and 41.2 years, respectively.

Figure 4. Age distribution of movers and stayers by selected area type

NOTES: Own calculations based on National Income Dynamics Survey 2008 to 2014/15.

Table 3 shows the area type in the current wave and the area type in the previous wave²⁴. 85.4% of residents who had resided in urban informal areas were still living in urban informal areas two years later. Figure 5 disaggregates the tenure of the sample in wave 4 by area type. Fully 60% of urban informal settlement households who had responded in 2014/15 had not moved within the last 15 years. While residents in all other area types are less likely to move than their urban informal settlement dweller counterparts, the latter finding is striking in its seeming contradiction of the view of informal settlements as temporary holding areas.

Table 3 reveals two other salient facts – very few individuals who previously lived in urban informal settlements are able to move into urban formal areas two years later (4.88%). Almost double that number move to tribal authority areas two years later, possibly indicative of failed urban-rural migration.

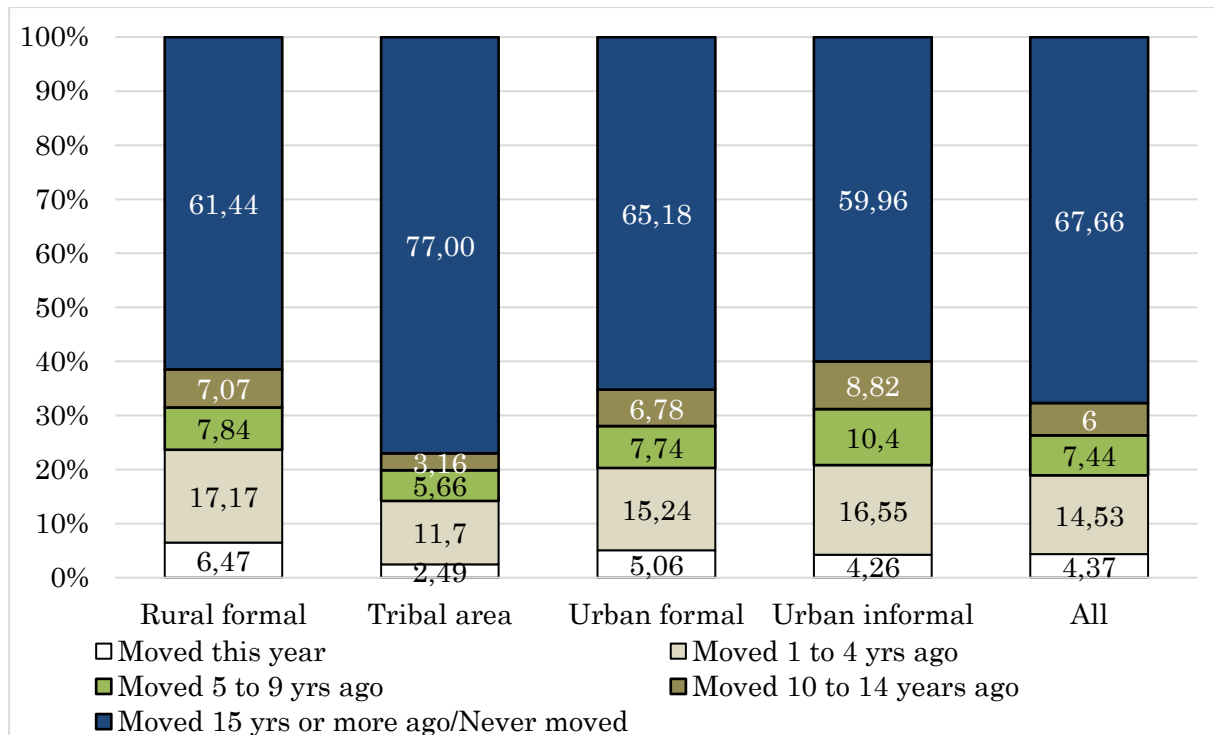
²⁴ NIDS waves were generally spaced two years apart.

Table 3. *Current and previous area types in South Africa (2008 to 2014/15)*

		Previous area type				
		Rural	Tribal	Urban formal	Urban informal	SA
Current area type	Rural formal	2 158 86.22	148 5.91	171 6.83	26 1.04	2 503 100
	Tribal authority	72 1.05	6639 96.39	148 2.15	29 0.42	6 888 100
	Urban formal	157 1.66	558 5.89	8 638 91.19	120 1.27	9 473 100
	Urban informal	27 1.61	137 8.15	82 4.88	1 435 85.37	1 681 100
	Total	2 414 11.75	7 482 36.42	9 039 44	1 610 7.84	20 545 100

NOTES: Own calculations based on National Income Dynamics Survey 2008 to 2014/15.

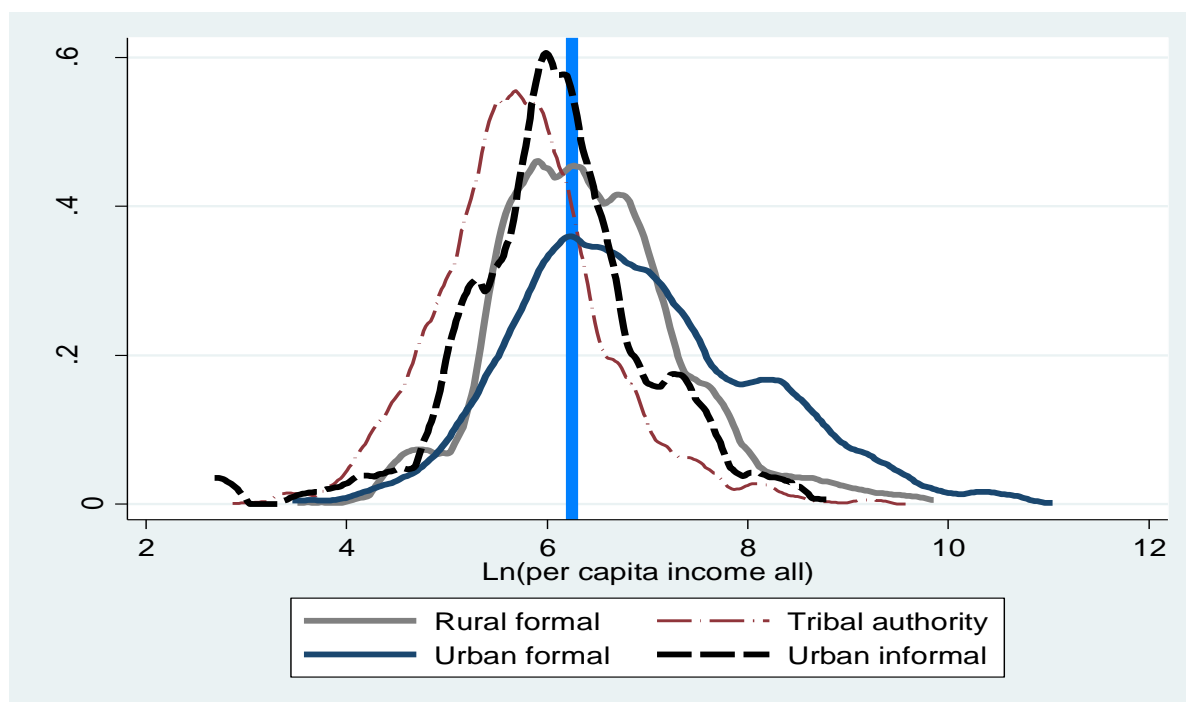
The immobility of informal settlement dwellers (shown in Table 3 and Figure 5) in general is consistent with developing country literature elsewhere (see for example Krishna, 2013) and reveals to some extent how impermeable informal settlements are both in terms of entry and exit. Relatively few individuals move into informal settlements from elsewhere and less than half of adult informal settlement dwellers have moved within the last fifteen years. The finding is remarkable for two reasons – informal settlements may not be the transitory phenomena they might have been in the 1950s to 1970s. Secondly, relative immobility of individuals is also indicative of their relative inability to exit informal settlement conditions after entry.

Figure 5. Number of years living in same household, ages 20 to 64 years (2014/15)

NOTES: Own calculations based on National Income Dynamics Survey 2014/15 data.

The relative immobility of informal settlement dwellers may be attributable to their low incomes relative to other residents in other area types. Figure 6 shows the monthly per capita income distributions of Black and Coloured individuals by area type in 2008. The bold blue line shows the upper bound poverty line of R515 per capita in 2008 rands per month (Statistics South Africa, 2010).

A possible explanation is South Africa's structurally exclusive labour market, where high unemployment rates amongst youth may also affect individuals living in urban formal areas. In contrast, urban informal areas have an income distribution that is skewed to the left with a mode of approximately 6 logarithmic rands (relative to the tribal authority and mode of 5.6 and urban formal mode of 6.3). The distributions suggest crudely that residents in urban informal households are better off than those in tribal authority area households but worse off than those in urban formal households (who they compete with in urban labour markets).

Figure 6. Monthly per capita incomes Black and Coloured individuals by area type (2008)

NOTES: Own calculations based on National Income Dynamics Survey 2014/15 data.

Informal settlements may offer a significantly cheaper way for newly married couples to form new households. Table 4 shows changes in marital status by current area type. Compared to urban formal residents, urban informal residents are more likely to have changed their marital status in the two years prior to being interviewed (15.34 per cent and 22 per cent respectively). Newly married adults may be incentivised to form new households in urban informal areas, while newly divorced adults may also be incentivised by the financial hardship associated with divorce to do the same.

Table 4. Partnership events (Black and Coloured moving household heads 20 to 64 years by current area type)

		RURAL FORMAL			TRIBAL AUTHORITY		
		<i>Married t</i>			<i>Married t</i>		
		No	Yes	Total	No	Yes	Total
<i>Married t-1</i>	No	57.32	16.56	73.89	47.32	9.82	57.14
	Yes	5.73	20.38	26.11	9.82	33.04	42.86
	Total	63.06	36.94	100	57.14	42.86	100
		URBAN FORMAL			URBAN INFORMAL		
		<i>Married t</i>			<i>Married t</i>		
		No	Yes	Total	No	Yes	Total
<i>Married t-1</i>	No	73.15	12.33	85.48	57.8	15.6	73.39
	Yes	3.01	11.51	14.52	6.42	20.18	26.61
	Total	76.16	23.84	100	64.22	35.78	100

NOTES: Own calculations based on National Income Dynamics Survey 2014/15 data.

5.3 Methodology

Probit regression analysis is employed to investigate the characteristics of new urban informal settlement entrants and to determine which factors are associated with new urban informal settlement household formation. The basic functional form of the probit regression is:

$$\Pr(u_i = 1) = \mathbf{X}\beta + \varepsilon$$

where X is a vector of current and previous covariates that are assumed to influence the probability of an individual from a non-informal settlement area²⁵ becoming the head of, or partner to the head of an urban informal area household.

Race, gender and age are included as demographic controls. The age variable is specified in five-year intervals from 20 to 64 years. Educational attainment is specified as a categorical variable. N1 and N2 qualifications are categorised as incomplete secondary,

²⁵ Non-informal settlement areas in South Africa include rural formal areas, tribal authority areas and urban formal areas.

while an N3 qualification is seen as equivalent to grade 12. Labour market participation in previous waves is also included as a control in some specifications. Marital status is reduced to a binary form, where single, divorced and widowed are categorised as unmarried, while legally married and residing with a partner are categorised as married. Combining the current marital status with the marital status in a previous wave allows the construction of a marital change variable.

The National Income Dynamics Survey also asks individuals a number of questions related to migration, including the year in which they last moved. Duration of residence could serve as a proxy for social network strength and specific labour market information. The individual's previous area type is also identifiable from previous waves, as is their relation to the head of the household in the previous wave.

Wave-specific effects are included to account for temporal effects, independent of the covariates included in the models. In the following section, selected descriptive characteristics to be used in the regression analysis are presented.

5.4 Results

The probit regression results presented in Table 5 show the predicted probabilities of becoming the head, or partner to the head, of an urban informal household for all Black and Coloured individuals between the ages of 20 and 64 years. The coefficients have been converted to marginal effects. Model 1 considers the demographic characteristics – age, gender and race expected to affect the probability of an individual moving into an urban informal area and becoming a household head (or partner) after residing in another area type in the previous wave. The reference age category group includes 20 to 24 year olds, while the reference gender and race categories are male and Coloured, respectively.

The age coefficients suggest that there is some age selectivity in choosing to move to an urban informal area. Aging progressively and significantly reduces the probability of moving to an urban informal settlement, as does being a woman. Coloured individuals are also significantly less likely than Black individuals to move to urban informal areas.

Model 2 introduces educational attainment categories as a proxy for previous socioeconomic status and labour market potential. Including the educational attainment variable reduces the explanatory power of age. However, the age coefficients remain significant.

Model 3 includes migration status and the relation to the household head. The reference group for migration status includes people who have not migrated across district council borders. Migrants are significantly more likely to form new urban informal area households. This result remains robust even after the addition of more controls. Including migration status in Model 3 further reduces the size and significance of the age coefficients, which may be suggestive of a life course transition link between age and migration. Being the household head in a previous wave does not significantly affect urban informal household formation.

Model 4 introduces a marital status change variable, where the reference group includes individuals who remain single. Individuals who were unmarried in the previous period and then married in the next are significantly more likely to move to an urban informal residence than individuals who remain single across two waves. Individuals who report getting divorced between waves are as likely to attain urban informal residency as their newly married counterparts.

Model 5 reveals that moving to a metro municipality from a non-metro district council significantly increases the probability of urban informal residence entry (relative to individuals who stay or migrate within non-metro district councils).

Model 6 tests the probability of “upgrading” to an urban formal area if the previous area type was not an urban formal area, using the same variables used in the full urban informal model. Age is an insignificant predictor of urban formal area entry. Coloured individuals are more likely than Black individuals to upgrade. Educational attainment plays a significant role in the probability of upgrading, with more education significantly increasing the probability of upgrading to an urban formal area. This is robust to the inclusion of migration status, marital status events and district council type, suggesting that educational attainment (and its associated labour market benefits) is instrumental in upward area type mobility for Black and Coloured individuals. Individuals getting married are not statistically different from individuals remaining unmarried in terms of upgrading, while divorce and marriage stability between waves decreases the probability of upgrading. Moving to a metro DC increases the probability of upgrading to an urban formal area, relative to current non-metro DC stayers.

Table 5. *Probit regressions: probability of becoming an urban informal household head (NIDS pooled estimates)*

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age 25 to 29 yrs	-0.007 (0.009)	-0.004 (0.007)	0.005 (0.004)	0.004 (0.004)	0.004 (0.004)	0.003 (0.007)
Age 30 to 34 yrs	-0.029*** (0.007)	-0.023*** (0.006)	-0.004 (0.004)	-0.006 (0.004)	-0.005 (0.004)	0.003 (0.007)
Age 35 to 39 yrs	-0.037*** (0.007)	-0.029*** (0.006)	-0.010*** (0.004)	-0.011*** (0.004)	-0.010*** (0.004)	-0.006 (0.007)
Age 40 to 44 yrs	-0.036*** (0.007)	-0.029*** (0.006)	-0.009** (0.004)	-0.009** (0.004)	-0.009** (0.004)	0.001 (0.008)
Age 45 to 49 yrs	-0.035*** (0.007)	-0.027*** (0.006)	-0.006 (0.004)	-0.007* (0.004)	-0.007 (0.004)	-0.003 (0.009)
Age 50 to 54 yrs	-0.038*** (0.007)	-0.030*** (0.006)	-0.011*** (0.004)	-0.012*** (0.004)	-0.011*** (0.004)	-0.009 (0.011)
Age 55 to 59 yrs	-0.038*** (0.007)	-0.031*** (0.006)	-0.011*** (0.004)	-0.012*** (0.004)	-0.011*** (0.004)	0.001 (0.012)
Age 60 to 64 yrs	-0.039*** (0.007)	-0.031*** (0.006)	-0.012*** (0.004)	-0.013*** (0.004)	-0.013*** (0.004)	0.005 (0.015)
Female	-0.003 (0.002)	-0.003 (0.002)	-0.003 (0.002)	-0.003 (0.002)	-0.003 (0.002)	-0.005 (0.004)
Coloured	-0.006*** (0.002)	-0.006*** (0.002)	-0.002 (0.003)	-0.002 (0.003)	-0.002 (0.003)	0.042*** (0.012)
Incomplete primary		-0.009** (0.004)	-0.009** (0.004)	-0.009** (0.004)	-0.009** (0.004)	0.016** (0.006)
Complete primary		-0.004 (0.005)	-0.003 (0.005)	-0.003 (0.005)	-0.003 (0.005)	0.018** (0.008)
Incomplete Secondary		0.000 (0.004)	0.000 (0.004)	0.001 (0.004)	-0.000 (0.004)	0.038*** (0.007)
Complete secondary		-0.002 (0.004)	-0.004 (0.005)	-0.003 (0.004)	-0.003 (0.004)	0.054*** (0.010)
Secondary plus 1-year diploma		-0.004	-0.006	-0.005	-0.005	0.065***

		(0.005)	(0.005)	(0.005)	(0.005)	(0.011)
Degree or higher		-0.007	-0.010**	-0.009**	-0.010**	0.094***
		(0.005)	(0.005)	(0.005)	(0.004)	(0.034)
Previous rural formal area			0.001	0.002	0.001	
			(0.003)	(0.003)	(0.003)	
Previous urban formal area			-0.002	-0.001	-0.001	
			(0.003)	(0.003)	(0.003)	
Migrated out of district council			0.053***	0.053***	0.038***	0.172***
			(0.010)	(0.010)	(0.010)	(0.024)
Was a head in previous wave			-0.002	-0.002	-0.002	-0.016***
			(0.002)	(0.002)	(0.002)	(0.005)
Got married				0.009**	0.009**	0.002
				(0.004)	(0.004)	(0.010)
Got divorced				0.009*	0.010*	-0.033***
				(0.005)	(0.005)	(0.009)
Remained married				0.001	0.001	-0.031***
				(0.002)	(0.002)	(0.005)
Move to metro from non-metro					0.010**	0.088***
					(0.005)	(0.020)
Move to non-metro from metro					-0.004	0.029
					(0.004)	(0.054)
Remain in metro					0.004	0.023
					(0.004)	(0.018)
Wave 3	0.005***	0.005***	0.005***	0.005***	0.005***	0.012***
		(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
Prob>chi-squared	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo R-squared	0.1321	0.2817	0.2827	0.2912	0.3004	0.5407
Observations	11 311	11 311	11 311	11 311	11 311	5 999

Standard errors in parentheses.
* p<0.05, **p<0.01, *** p<0.001

5.5 Discussion

Section 2 considered the institutional factors that affect and perpetuate the creation of urban informal settlements in South Africa, as well as the factors that shape individual decisions to form new urban informal households. Rapid urbanisation, inadequate formal housing supply and weak economic growth act in concert to incentivise the formation of informal settlement areas on vacant urban land.

In Section 5 probit regression analysis of longitudinal data reveals a number of individual factors that influence new urban informal settlement household formation. New urban informal household formation is highly age-selective. New households in urban informal areas are likely to be formed by younger individuals. Age may be a proxy for life stage transitions, with young adulthood in South Africa coinciding with labour market entry, partnership formation and migration. These critical life stage transitions are conceivably associated with the transition from the teenage years to adulthood, a hypothesis that is lent support by the declining significance of age as a predictor of urban informal household formation when marital status changes are added to the model in Table 5.

While area of origin does not predict urban informal household formation, being a migrant and the destination area type are significant predictors of urban informal household formation. Migrating across district council (DC) borders increases the probability of forming an urban informal household (relative to staying within DC boundaries). Moving to a metro municipality from a non-metro municipality also increases the probability of forming a new urban informal household.

While education is not predictive in the urban informal household formation model, it is strongly significant in the model showing the probability of “upgrading” from other area types to urban formal areas. Coloured individuals are more likely than Black individuals to form new urban formal households, while migrants are significantly more likely than non-migrants to become new urban formal HH heads. Moving to a metro or staying in one positively affects the probability of “upgrading”.

Social relations matter somewhat in becoming the head of a newly urban formal household. Contrary to expectation, remaining married decreases the probability of “upgrading”. In line with expectation, divorce is also negatively associated with “upgrading”. Being a head two years ago is also associated with a higher probability of “upgrading” (relative to previous non-heads).

6. Employment and earnings prospects in South Africa’s urban informal settlements

As explained in the previous section of this paper, labour market entry and ascension opportunities for urban informal settlement residents are often also viewed through the ladder or cul-de-sac lenses. The optimistic perspective of informal settlement suggests that these low-cost settlements provide basic shelter for recent incomers (Turner, 1967; 1968), whose primary motive for informal settlement residence is to access the urban labour market. Relative to rural areas, urban areas are generally home to larger, denser and more diverse labour markets, where employment opportunities in domestic work and security, for example, exist for unskilled and semi-skilled labour (World Bank, 2013). Failing absorption into gainful employment in the formal sector, urban residents have the option of engaging in small self-employment business pursuits or menial work at the bottom of the labour market in lieu or anticipation of formal sector work (Cross, 2013).

The primary advantage of urban informal settlements is thus their proximity to urban labour market opportunities for rural-urban migrants. However, despite urban informal areas typically serving as affordable havens for migrants who wish to move closer to urban economic activity (Saunders, 2012), residents in these areas may still have weak access to formal sector jobs beyond their immediate surroundings (Salon and Guylani, 2010). Undeveloped transport networks, particularly in newer settlements, and poor access to labour market information in distant urban suburbs may contribute to an extreme localisation of labour market search activity and opportunities for urban informal settlement residents. Information poverty and poor transport in informal settlement areas may contribute to wage differences between residents in these areas and urban formal area residents.

In a low-growth environment with intense competition for jobs at the lower end of the formal sector, urban informal settlement residents may get stuck in a repetitive cycle of menial, poorly remunerated work and unemployment (Turok and Borel-Saladin, 2016: 7). Some evidence exists of persistence of marginal employment or unemployment in India. Mukherji (2001) finds that poorly educated Indian migrants can often only afford to live in urban informal settlements and remain there as lowly paid workers in marginal employment. Weak financial and social support and intense competition for jobs may mean that Indian workers residing in informal settlement areas may be compelled to accept work, regardless of wage offers and security of employment (Duriasamy and Narasimhan, 1997).

The lower accommodation costs associated with living in informal settlement areas may lead to lower reservation wages for those living in these areas, relative to their urban formal resident counterparts. The lower reservation wage, due both to the urgent need to enter the labour market and lower living costs, could therefore theoretically manifest itself as a lower observed wage, relative to urban formal area residents.

This section of the paper investigates whether differences exist between urban formal and urban informal workers in terms of employment probabilities and stability, and whether workers from urban informal areas are subject to a wage penalty (relative to their urban formal area counterparts). Section 6.1 provides descriptive evidence of labour market performance by area type, followed by section 6.2 where regression analysis is employed to examine whether an urban informal area residence wage penalty exists in the South African context.

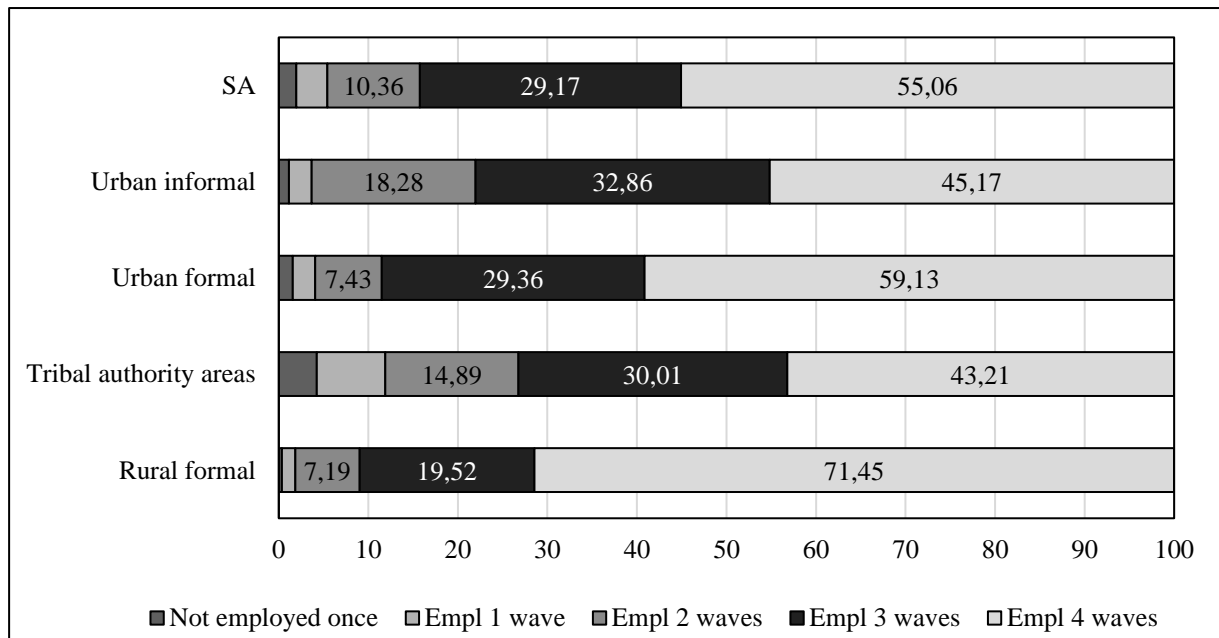
6.1 Descriptive evidence from NIDS

The labour market sample is restricted to individuals between the ages of 20 and 64 years old. However, in this section, the sample includes individuals of all races, as race is assumed to play a substantial role in explaining employment and income differentials. Furthermore, workers in the armed forces are also excluded from the analysis, as their areas of residence are assumed to be unrelated to their employment probabilities and wages.

6.2 Employment

Figure 7 shows employment stability by the area type of residence in wave 1 for workers born between 1950 and 1993²⁶. Workers living in rural formal areas in wave 1 appear to enjoy the most employment stability between 2008 and 2015, with 71.45 per cent of workers found to be employed across all waves. In contrast, only 43.21 per cent of workers residing in tribal authority areas in wave 1 were employed in all four waves. Similarly, only 45.17 per cent of urban informal area residents reported being employed in all four waves.

Figure 7. *Employment stability, by area type (2008 to 2014/15)*



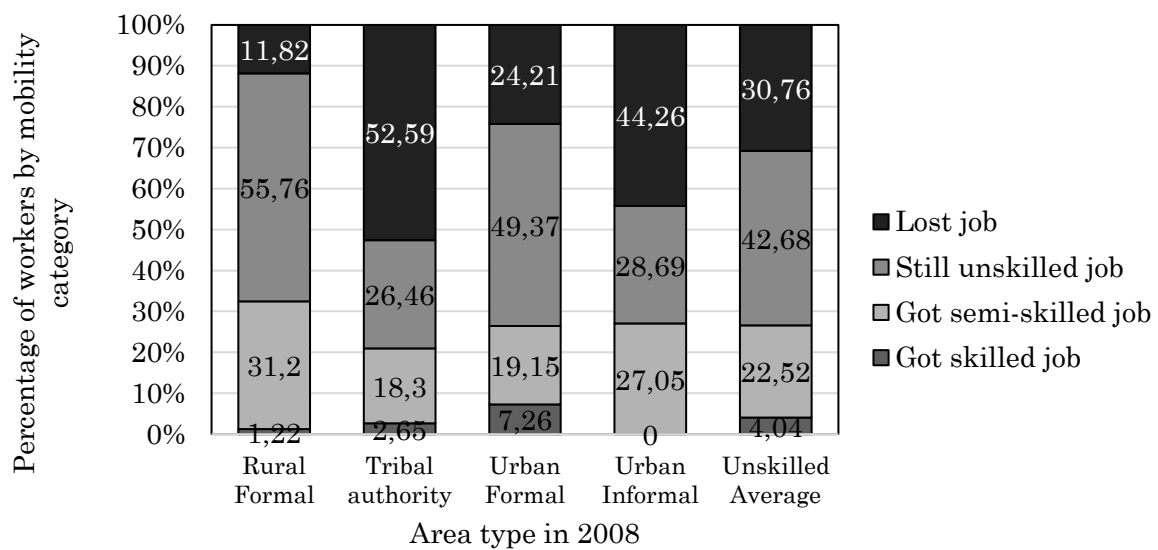
NOTES: Own calculations based on NIDS 2008 to 2014/15 data.

A slightly more nuanced perspective of upward mobility prospects for informal settlement dwellers can be obtained by considering whether labour market mobility differs by residential area type. Figure 8 shows the occupational mobility by initial area type for workers who report being in unskilled and semi-skilled positions in 2008. Approximately 27 percent of unskilled workers residing in both urban formal and urban informal areas (bottom two bars) had achieved some form of upward occupational mobility (ascended to semi-skilled or skilled occupations) between wave 1 and wave 4 of NIDS. However, 44 per cent of employed unskilled workers residing in urban informal

²⁶ Workers born between 1950 and 1993 would have been a minimum of 15 years old in 2008, and a maximum of 64 years in 2014.

areas in wave 1 had become unemployed by wave 4. The comparable figure for unskilled workers from urban formal areas was 24.21 per cent. Only traditional authority area residents fared worse in the same period (52.59 per cent of unskilled workers in this area type had lost their jobs). There is therefore limited upward mobility, and large downward mobility risk for urban informal unskilled workers, despite relatively favourable proximity to urban labour market opportunities.

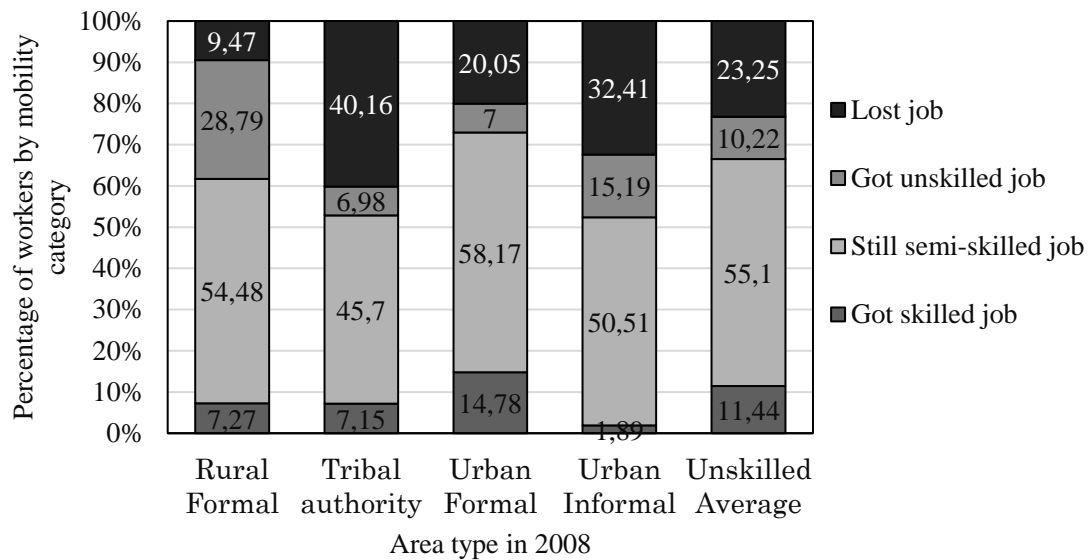
Figure 8. Occupational mobility of unskilled workers, by area type (between 2008 and 2014/15)



NOTES: Own calculations based on NIDS 2008 to 2014/15 data.

Semi-skilled workers in urban informal areas also fared worse than their urban formal area equivalents (shown in Figure 9). While 14.78 per cent of workers in the latter group experienced some mobility (graduated to skilled employment), only 1.89 per cent of workers in the former group had experienced the same. In addition, 15.19 percent of semi-skilled workers living in informal settlements had slipped into unskilled employment, and 32.41 per cent had lost their jobs between waves. Only semi-skilled traditional authority workers fared worse in terms of job losses.

Figure 9. Occupational mobility of semi-skilled workers, by area type (between 2008 and 2014/15)

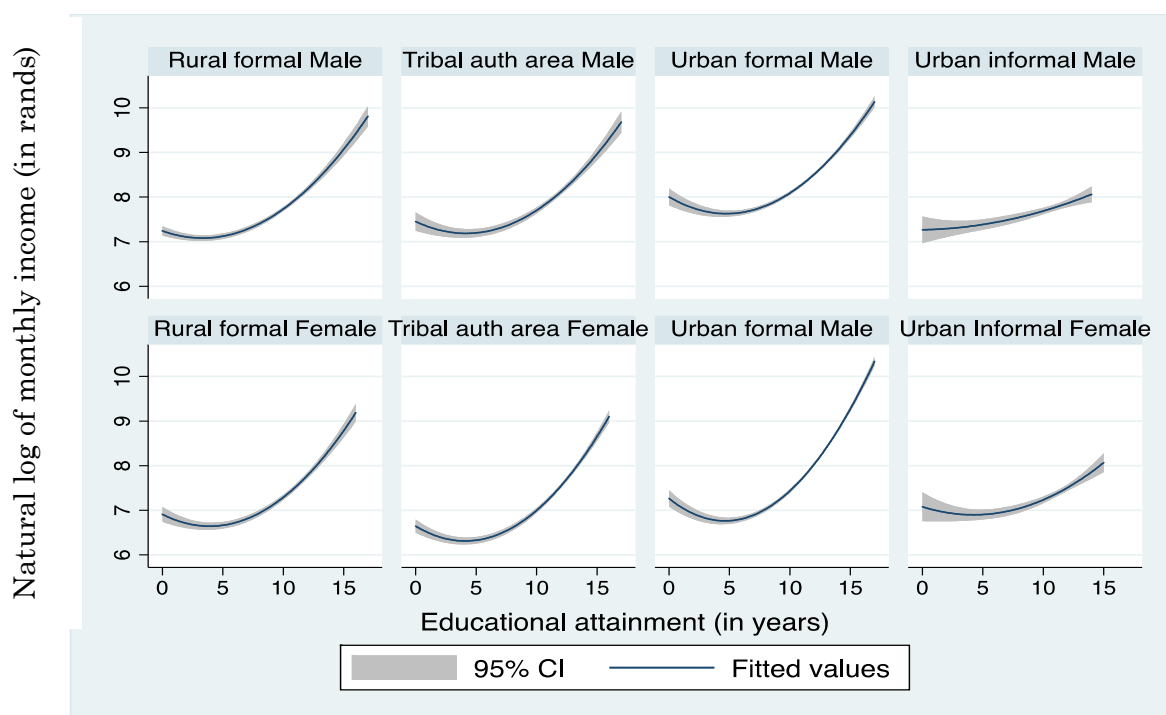


NOTES: Own calculations based on National Income Dynamics Survey data 2008 – 2014/15.

The weak occupational mobility for unskilled and semi-skilled workers living in South Africa's urban informal areas is symptomatic of a weak growth environment and skills mismatches and is cause for concern. These factors combine with large internal migration volumes to the country's urban centres to produce poor gainful employment prospects for many migrants bound for urban areas. However, traditional authority workers also fare relatively badly in terms of employment stability and occupational mobility. The relative similarities between these two groups highlight how vulnerable urban informal area residents are in the labour market, despite being closer to economic centres.

6.3 Labour market earnings

Figure 10 shows the unconditional education-earnings distributions of individuals between the ages of 20 and 64 years, by gender and residence area type across all four waves (earnings are expressed in real terms). While male and female employed individuals in rural formal, tribal authority and urban formal areas exhibit the convex education-earnings distributions often seen in the South African context, the urban informal male distribution is positively sloped but almost linear. There is evidence of some convexity in the urban informal female earnings-education distribution, but that convexity is markedly less pronounced than the distributions for female workers in other residence area types.

Figure 10. Unconditional education-earnings distributions by gender and area type

NOTES: Own calculations based on National Income Dynamics Survey data 2008 – 2014/15.

Of interest for this paper is the difference between urban formal and informal returns to education, so explanations for these differences will be confined to comparisons between these two distributions. The possibility exists that reservation wages may differ across area types. Reservation wages may be lower for residents of urban informal areas, relative to their urban formal area counterparts, since their accommodation costs are likely to be lower or because they may be more desperate for income. This could explain the much lower wages for urban informal residents at every year of educational attainment. Similarly, residents from urban formal areas could also have very high reservation wages, due to having more stable financial support while unemployed, and stronger social networks which may positively influence their ability to enter and remain in the labour market at higher incomes than would be the case for urban informal residents.

Hunter and Posel (2012: 299) show that the mean earnings of individuals living in informal dwellings were consistently lower than mean urban formal earnings between 1999 and 2004. While their study of earnings focuses on *dwelling* type rather than area type, the informality and relatively low cost of settlement common to both dimensions could both contribute to lower reservation wages. Their finding is consistent with that of Turok and Borel-Saladin (2016), who find that urban informal settlement residents are

largely restricted to occupations with low earnings, although those earnings are higher than that of rural area²⁷ residents.

Being a recent migrant is also likely to affect wage and employment possibilities. In an analysis of National Income Dynamics Survey (NIDS) data, Finn *et al.* (2012: 19) find that people who had moved between 2008 and 2010 had benefited from a much larger increase in incomes than those who had not moved²⁸. However, as that study considers all moves, it is less relevant than studies that explicitly model rural-urban migrant wage premiums. Also using the NIDS data, Mbatha and Roodt (2014: 667) find that migration from urban to rural, and from rural to urban areas, significantly increases the odds of individuals of moving into formal and informal employment. Migration from one area type to the next also improves income for the unemployed, regardless of whether the move is from urban to rural areas, or from rural to urban areas.

6.4 Empirical strategy

In this section of the paper, the National Income Dynamics data is employed in pooled form to determine whether an urban informal settlement wage penalty exists, relative to *urban formal area* residence. The sample is restricted to South African individuals between the ages of 20 and 64 years at the time of the survey, who indicated that they were economically active in the broad sense.

²⁷ Turok and Borel-Saladin's (2016) definition of rural areas include both rural formal and tribal authority areas (the latter being home to most of South Africa's rural Black population).

²⁸ In Finn *et al.*'s (2012) mover-stayer analysis, mover refers to all moves, irrespective of distance.

To estimate the returns to education, occupation and area of residence type, a Mincer-type pooled data regression is estimated in the following fashion:

$$\ln W_i = \alpha_0 + \alpha_1 \text{edu} + \alpha_2 \text{indust} + \alpha_3 \text{area} + \alpha_4 X_i + \mu_i$$

where the dependent variable $\ln W_i$ is the natural logarithm of real wages earned by worker i in the labour market, edu indicates the educational attainment in years, indust denotes the industry of employment, and area refers to the area of residence type. X is a vector of individual and home characteristics that are expected to affect wages earned, while μ_i is an error term that is assumed to be normally distributed.

The dependent variable for the earnings functions, monthly wages from the labour market, is adjusted to account for inflation from the base year of 2008. As monthly wages are assumed to accrue only to the employed, unemployed individuals are excluded from the wage regressions²⁹. In addition, due to the logarithmic specification of the wage variable, employed individuals reporting incomes of zero rands per month are treated as missing observations. While a number of statistical techniques exist to deal with zero values that are assumed to be incorrectly reported, only 0.77 percent of observations in this sample report monthly incomes of zero rand per month. Zero-truncation is therefore expected to have little to no observable effect on the estimation of wage functions.

Race (in this section of chapter 6 all four of South Africa's race categories are included) and gender are included as demographic controls. Educational attainment is specified as a categorical variable (N1 and N2 qualifications are categorised as incomplete secondary, while an N3 qualification is treated as equivalent to grade 12) to account for possible convexity or concavity of its distribution. Marital status is reduced to a binary form, where 'single', 'divorced' and 'widowed' are categorised as unmarried, while 'legally married' and 'residing with a partner' are categorised as married. Experience in years is derived as [age minus educational attainment minus 6 years]³⁰. Broad occupation types are also included as control variables. Individuals employed in the armed forces are excluded from the analysis.

²⁹ Where unemployed individuals report non-zero labour market incomes, these are transformed into missing values for the sake of consistency.

³⁰ A general school starting age of 6 years is assumed. The individual is assumed to enter the labour market directly after completing schooling.

The National Income Dynamics Survey also asks individuals a number of questions related to migration, including the year in which they last moved. Duration of residence could serve as a proxy for social network strength and specific labour market information that may affect wages positively. Regional effects, as well as wave-specific effects, are included to account for geographic and temporal effects, independent of the covariates included in the models.

The presence of possible selection bias in the South African labour market, for various reasons, may necessitate the use of more sophisticated methods than OLS regression. As a robustness check of the OLS estimators, a Heckman (1979) two-step regression is employed, where the first step considers factors influencing selection into employment, while the second step takes the factors influencing the individual wage into account. The reason for including a selection stage as a first step is because simple wage regression analysis only considers positive wage incomes, i.e. those in employment. Wage regressions that ignore the attributes that separate those selecting into or out of employment could produce inconsistent estimators and deceptive levels of significance (Burger, 2008).

The risk of collinearity arises when variables that appear in the selection function overlap significantly with those that appear in earnings regression (Puhani, 2000: 57). It is therefore important to have at least one variable that affects selection into employment but does not affect the wage earned once employed at all, or does so with very little impact (Sartori, 2003). These variables, referred to as exclusion restrictions, are chosen for their ability to affect the probability of observations appearing in a sample, but not influence the dependent variable that is ultimately of interest. In this paper's analysis, an exclusion restriction would therefore affect individual i 's probability of selecting into employment, without influencing his or her wage once employed.

Puhani (2000: 58) suggests that household-level variables are most likely to fulfil the aforementioned requirement and are therefore most suited for use as an exclusion restriction. In the South African context, whether a household receives a social grant or not has been used as an exclusion restriction with some success (see for example Bhorat and Kimani, 2017). Theoretically, a household receiving a social grant may increase employment probabilities of other household members due to its income-improving

effects (Ardington *et al.*, 2009³¹). The number of employed adults in a household, meant to represent the strength of the household attachment to the labour market is also expected to positively affect the probability of being employed (Burger, 2008). However, the number of employed adults within a household is insensitive to household size. It therefore measures social network strength but does not capture how thinly spread that network strength could be across working-aged adults in the household.

Selection into employment is therefore estimated as:

$$S_i = \beta_0 + \beta edu_i + \alpha X_i + \beta otheradultgrant_i + \beta migrant + \beta propempladults_i + \varepsilon_i$$

where S_i assumes a value of 1 if individual i is employed and 0 when not. *Otheradultgrant* is a binary variable indicating the presence or absence of an adult in the household who receives a social grant. *Propempladults* represents the employed adults, as a proportion of all labour market aged individuals, within a household. The theoretical justification for the inclusion of this exclusion restriction in the selection equation, is that the proportion of working-aged adults into employment, but not influence their wage.

6.5 Descriptive statistics

The summary statistics of the sample is presented below in Table 6. The dependent variable for the earnings functions, monthly income from the labour market, is deflated to account for inflation from the base year of 2008. This real monthly income variable is then log-transformed to impose more normality on the skewed wage distribution. As monthly labour market incomes are assumed to accrue only to the employed, unemployed individuals are excluded from the wage regressions.

Regional effects, as well as wave-specific effects, are included to account for geographic and temporal effects, independent of the covariates included in the models.

³¹ Ardington *et al.* (2009) find that households receiving the old-age pension grant are more likely to have employed adults attached to them. Labour migration for prime-aged adults are now made possible because of a monthly windfall, and because recipients of the old age grant are able to care for small children while labour migrants work away from the home.

Table 6. *Summary statistics, by area type*

	Rural formal		Traditional authority area		Urban formal area		Urban informal area	
	Proportion/ (Mean)	Std. Dev	Proportion/ (Mean)	Std. Dev.	Proportion/ (Mean)	Std. Dev.	Proportion/ (Mean)	Std. Dev.
Educ attainment (yrs)	(8.38)	4.03	(10.02)	3.80	(11.20)	3.02	9.87	3.07
Experience (years)	(23.76)	12.08	(21.45)	12.78	(21.63)	11.76	19.40	11.77
African Black	0.68		1.00		0.68		0.98	
Coloured	0.15		0.00		0.13		0.01	
Asian/Indian	0.13		0.00		0.03		0.00	
White	0.03		0.00		0.16		0.00	
Married	0.40		0.64		0.49		0.60	
Not married	0.60		0.36		0.51		0.40	
Male	0.65		0.52		0.56		0.54	
Female	0.35		0.48		0.44		0.46	
Armed forces	0.00		0.00		0.00		0.00	
Managers	0.04		0.02		0.08		0.01	
Professionals Technicians & assoc professionals	0.05		0.13		0.14		0.03	
Clerical support	0.02		0.04		0.07		0.04	
Clerical support	0.02		0.04		0.09		0.03	
Services and sales Skilled agric, forestry & fishery workers	0.11		0.18		0.17		0.22	
Craft & related trades workers	0.01		0.00		0.00		0.00	
Plant & machine operators	0.11		0.12		0.11		0.17	
	0.20		0.12		0.12		0.12	

Elementary occups	0.45		0.35		0.22		0.37
Non-migrant	0.92		0.92		0.92		0.93
Migrant	0.08		0.08		0.08		0.07
Prop employed adults in HH	0.93	0.48	0.84		0.92	0.18	0.88
Adult grant recipient in HH	0.64		0.54		0.74		0.59
No adult grant recipients in HH	0.36		0.46		0.26		0.41
Sample size	1 748		2 507		6 107		878
Weighted population	2 621 433		4 792 492		18 388 663		2 694 093

NOTES: weighted data used in estimation of variable values.

Source: Own calculations based on National Income Dynamics Survey data 2008 to 2014/15.

6.6 Results

The simple OLS and Heckman two-step estimators are presented in Table 7. In all models, provincial fixed effects are included to represent regional labour market differences not explicitly accounted for in the models. Wave fixed effects are also included to account for intertemporal variation in wages that may be due to fluctuations in economic activity over time.

Model 1 shows that an additional year of education increases the monthly wage by approximately 19 percent. Experience also positively and significantly increases wages, although the effect of experience is small and linear (approximately 1 percent for each additional year of experience). Wages follow the general racial pattern in South Africa, with wages highest among Whites, followed by Indians, Coloureds and then Black individuals (the reference group). Women earn approximately 42 percent less than the average male, while married individuals earn 19.9 percent more than unmarried individuals.

However, of interest for this study are the earnings differences between urban informal residents and their urban counterparts. Area type dummies reveal that the reference group, urban formal area residents, earn substantially more than individuals living in all other area types. The average urban informal resident earns 24.3 percent less than the average urban formal resident. Theoretically, urban informal area residents may earn less because of recent migration. The inclusion of a migration status dummy variable in Model 2 does little to diminish the area type coefficients of Model 1. Once occupation fixed effects are introduced in model 3, migrant earnings are no longer significantly different from that of non-migrants.

The full specification in Model 3 reveals that area type still matters for wages. Urban informal area residents earn more than their rural and traditional authority area counterparts. However, because the OLS regressions in columns 1 to 3 are estimated using observed wages (and therefore exclude the non-earning unemployed), a Heckman two-step model is introduced in columns 4 and 5 to correct for potential selection bias. The selection equation coefficients can also reveal whether residence area type matter for selection into employment.

Table 7. Pooled OLS and Heckman two-step estimators wage

Dependent variable: <i>Ln (monthly wages in rands)</i> VARIABLES	OLS			HECKMAN 2-STEP	
	Model 1	Model 2	Model 3	Heckman marginal coefficients	Selection probit coefficients
Educational attainment(yrs)	0.190*** (0.006)	0.190*** (0.006)	0.141*** (0.004)	0.141*** (0.006)	-0.010 (0.009)
Experience (yrs)	0.011** (0.005)	0.012** (0.005)	0.016*** (0.003)	0.012** (0.005)	0.025*** (0.007)
Black (ref group)	–	–	–	–	–
Coloured	0.267*** (0.061)	0.271*** (0.061)	0.175*** (0.034)	0.173*** (0.060)	0.046 (0.085)
Indian	0.529*** (0.103)	0.536*** (0.103)	0.328*** (0.051)	0.354*** (0.096)	-0.244 (0.174)
White	0.625*** (0.064)	0.628*** (0.063)	0.447*** (0.031)	0.495*** (0.068)	-0.456*** (0.095)
Female	-0.418*** (0.026)	-0.416*** (0.026)	-0.394*** (0.018)	-0.403*** (0.026)	0.093** (0.046)
Married	0.199*** (0.030)	0.200*** (0.030)	0.150*** (0.018)	0.154*** (0.029)	-0.008 (0.051)
Urban formal area (ref group)	–	–	–	–	–
Rural formal area	-0.286*** (0.042)	-0.286*** (0.042)	-0.209*** (0.031)	-0.233*** (0.039)	0.178** (0.081)
Tribal authority area	-0.288*** (0.038)	-0.286*** (0.038)	-0.259*** (0.028)	-0.230*** (0.037)	-0.134** (0.064)
Urban Informal area	-0.243*** (0.037)	-0.239*** (0.038)	-0.172*** (0.030)	-0.168*** (0.039)	-0.001 (0.086)
Migrated since last wave		0.064* (0.038)	0.033 (0.030)	0.016 (0.040)	-0.029 (0.084)
Proportion adults employed HH					1.210*** (0.097)
Other adults in HH rec grant					-0.303*** (0.049)
Constant	5.436*** (0.094)	5.423*** (0.095)	6.697*** (0.075)	6.824*** (0.128)	-0.253 (0.177)
CONTROLS					
Province and wave	Y	Y	Y	Y	Y
Occupation	N	N	Y	Y	–
Observations	9 289	9 289	9 289	11 209	11 209
Selected				9 288	
Non-selected				1 921	
Wald Test independent eqs.					11.94

NOTES: Own calculations based on National Income Dynamics Survey data 2008 to 2014/15. Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Both exclusion restrictions significantly affect selection into employment. The number of employed adults as a proportion of working-aged adults in the household (the proxy for labour market attachment) positively affects selection into employment. Having at least one adult in the household receiving a grant in the household (a proxy for medium to long-term household economic vulnerability) negatively affects selection into the labour market. This finding appears to be consistent with findings by Bertrand *et al.* (2003) using 1993 data that pension receipt negatively affects labour supply in the household of

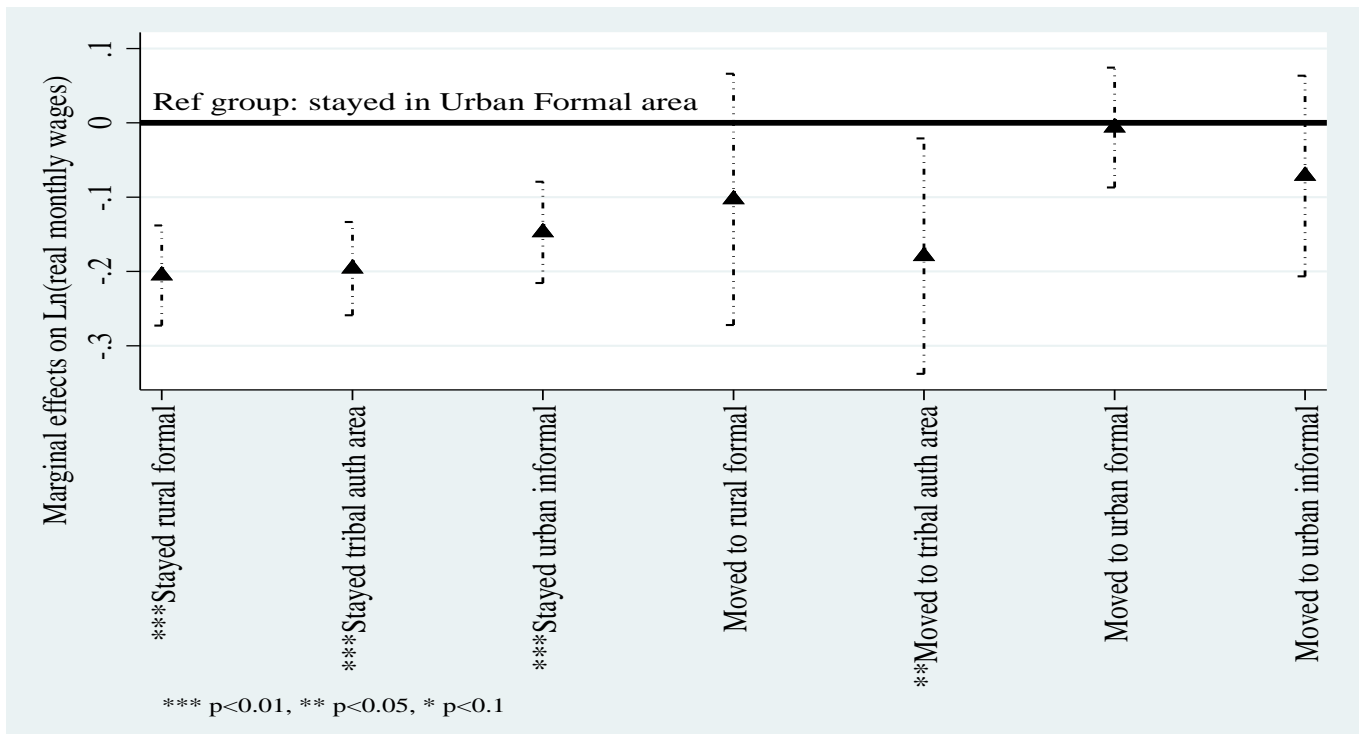
the pension recipient. The selection probit coefficients reveal that rural formal and tribal authority area residents are significantly more likely to select into employment than their urban formal area counterparts.

There are, however, no significant employment probability differences between urban informal area residents and urban formal residents. The second step of the Heckman regression shows that even after correcting for possible selection bias and various factors expected to affect productivity, the urban informal area resident earns almost 17 percent less than the average urban formal resident. Urban informal area residents still earn more than their rural formal and traditional authority area counterparts, suggesting that proximity to urban labour markets does provide some benefit to the urban informal area resident (although that proximity may entail higher living costs).

The effects of migration status and the current area type of residence can be examined more closely using interaction effects, shown in Figure 11 below. The interaction effects are specified as categorical dummies below and are thus interpretable as marginal effects. The reference group includes those individuals in urban formal areas who had not crossed district council boundaries since the previous wave. This reference group is chosen because of their theoretically superior labour market opportunities due to proximity to urban areas, access to formal area amenities such as transport infrastructure, and superior social network strength from staying in an area for at least two years (relative to recent migrants).

Figure 11 shows that recent migrants who now lived in urban informal areas had earnings that were not significantly different from urban formal stayers (had not crossed district council boundaries since last wave). However, urban informal stayers earned significantly less (14.75 percent less) than urban formal stayers. The urban informal stayer wage penalty shown in figure 14 is suggestive of weak labour market prospects for urban informal area residents, even if they have stayed in the same district council for two years or more. Weak occupational mobility (and substantial risk of unemployment) for unskilled and semi-skilled urban informal area residents, as shown in section 6.2, may also contribute to the acceptance of low wage offers.

Figure 11. Migration status–current area type interaction effects, conditional on selection into employment



NOTES: Dashed lines represent 95 percent confidence intervals. Own calculations based on National Income Dynamics Survey 2008 to 2014/15.

6.7 Discussion

Some caution should be exercised when studying the relationship between area type and labour market opportunities. Correlations between area type and wages may show that urban informal settlement residents may be subject to a wage penalty, relative to urban informal settlement counterparts. However, care should be exercised in the interpretation of these findings as causal relationships (Bird *et al.*, 2017: 503). Residents of urban informal settlements may have selected into these area types under duress, and therefore may earn lower wages than urban formal residents because of unobservable differences between the two groups. Sorting amongst urban informal and urban formal neighbourhoods is also likely to follow affordability distributions, with lower-earning individuals being attracted to the more affordable urban informal settlement settlements.

Secondly, because the analysis in this instance deals with pooled data estimators rather than panel estimators, it is possible that the relative wage penalty attributable to urban informal settlement residents is partly due to high churning rates within urban informal settlement areas. Low-earning urban informal settlement residents may upgrade or downgrade to other areas and be replaced with new low-earning informal settlement residents. The characteristics and relative earning potential within urban informal settlements may therefore appear to vary little over time. Nevertheless, evidence from the National Income Dynamics Survey suggests that urban informal area residents are disadvantaged relative to urban formal area residents in the labour market.

7. Conclusion

This study set out to determine who moves to urban informal settlements in South Africa, and how their experiences of the labour market and access to services differed from other area types. The evidence suggests that youth is a strong predictor of urban informal household formation, as is being a migrant who has moved from one district to another. The probability of forming an urban household increases even further when individuals move from a non-metro district council to a metro district council. These factors, along with marital status changes between waves, coincide with key life transitions at the onset of adulthood. These findings are consistent with international literature on the timing and nature of new household formation.

The descriptive analysis of labour market outcomes suggests that labour market participants who live in urban informal settlements have less employment stability and lower chances of upward occupational mobility than their urban formal counterparts, despite being located in urban areas. The descriptive analysis also shows that returns to education are vastly different across area type. Workers living in urban informal areas have lower returns to education on average than any other area-type worker, possibly because of lower reservation wages or unobserved factors that diminish the productivity of urban informal area workers relative to other workers. This urban informal area wage penalty is confirmed in regression analyses. This finding is robust to the inclusion of other factors expected to produce variation in productivity, such as educational attainment, experience and occupation type.

Residents of urban informal settlements face numerous challenges that may affect social mobility in urban areas. Urban informal settlement inhabitants with poor levels of

human capital may find it difficult to escape from a low-skill, low-wage environment given the various challenges that they face. There is the added challenge of rapidly growing metropolises due to rural-urban migration, which could depress wages, and ultimately threaten social mobility for existing urban informal settlement inhabitants. These challenges may therefore make informal settlement inhabitation less transitory than is suggested by the modernisation hypothesis mentioned in Section 2. However, not only is higher educational attainment synonymous with higher wages but it is also a powerful predictor of who is able to upgrade to urban formal areas.

The National Income Dynamics Survey data used for this study was collected in a period when economic growth was particularly weak, so this may have impacted the prospect of social mobility for South Africa's most vulnerable urban residents. However, there are still clear indicators that educational attainment was associated with the probability of being able to move to urban *formal* areas. In light of these findings, the improvement of education outcomes and health outcomes by accelerating basic service provision to urban informal areas are of utmost importance to increase the probability of social mobility for this economically vulnerable group of South Africans.

8. Appendix

Table A1. *Population by dwelling type, selected years from 2001 to 2011 (absolute frequencies)*

	Census 2001	GHS 2003	GHS 2005	GHS 2007	GHS 2008	GHS 2009	GHS 2010	Census 2011
House or brick structure	25 103 172	29 600 109	28 063 601	29 858 796	33 264 797	33 346 207	34 613 643	33 772 348
Traditional dwelling	8 177 284	6 783 734	7 262 034	6 410 099	6 618 486	6 945 871	6 383 964	4 946 648
Flat/apartment	1 741 724	1 492 334	1 568 224	1 594 105	1 480 241	1 404 536	1 450 747	1 810 497
Semi-detached house	1 003 153	1 560 282	1 303 212	1 167 879	555 864	958 900	1 145 997	1 229 601
Dwelling/ house/ flat in backyard	1 170 824	810 961	978 512	1 307 291	1 016 676	869 138	715 838	1 080 671
Informal dwelling/ shack in backyard	1 337 739	903 316	1 379 705	1 975 038	1 931 939	1 664 916	1 750 400	1 722 480
Informal dwelling/ shack not in backyard	4 367 722	3 969 547	4 805 733	3 886 257	3 141 761	3 353 512	2 814 545	3 279 377
Room/ Flatlet	310 133	841 355	907 599	720 032	245 647	450 349	665 221	229 909
Caravan/ Tent	87 418	17 100	38 324	38 734	23 879	21 936	4 720	27 217
Other	597 668	402 963	490 274	492 792	247 319	319 224	126 806	319 960
Unspecified	927 828	14 674	31 228	315 293	83 014	0	0	2 795 966
Total	44 824 665	46 445 749	46 858 740	47 796 008	48 640 831	49 334 589	49 671 881	51 214 674

NOTES: Own calculations based on Census 2001, General Household Survey 2002 to 2010, and Census 2011 data. Retirement units excluded from count.

Table A2. *Population by dwelling type, 2001 to 2011 (percentages)*

	Census 2001	GHS 2003	GHS 2005	GHS 2007	GHS 2008	GHS 2009	GHS 2010	Census 2011
House or brick structure	56.00%	63.73%	59.89%	62.47%	68.39%	67.59%	69.68%	65.94%
Traditional dwelling	18.24%	14.61%	15.50%	13.41%	13.61%	14.08%	12.85%	9.66%
Flat/apartment	3.89%	3.21%	3.35%	3.34%	3.04%	2.85%	2.92%	3.54%
Semi-detached house	2.24%	3.36%	2.78%	2.44%	1.14%	1.94%	2.31%	2.40%
Dwelling/ house/ flat in backyard	2.61%	1.75%	2.09%	2.74%	2.09%	1.76%	1.44%	2.11%
Informal dwelling/ shack in backyard	2.98%	1.94%	2.94%	4.13%	3.97%	3.37%	3.52%	3.36%
Informal dwelling/ shack not in backyard	9.74%	8.55%	10.26%	8.13%	6.46%	6.80%	5.67%	6.40%
Room/ Flatlet	0.69%	1.81%	1.94%	1.51%	0.51%	0.91%	1.34%	0.45%
Caravan/ Tent	0.20%	0.04%	0.08%	0.08%	0.05%	0.04%	0.01%	0.05%
Other	1.33%	0.87%	1.05%	1.03%	0.51%	0.65%	0.26%	0.62%
Unspecified	2.07%	0.03%	0.07%	0.66%	0.17%	0.00%	0.00%	5.46%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

NOTES: Own calculations based on Census 2001, General Household Survey 2002 to 2010, and Census 2011 data. Retirement units excluded from count.

Table A3. *Sanitation service by area type in 2014/15*

	Rural Formal	Tribal Authority	Urban Formal	Urban Informal	South Africa
Flush toilet with onsite disposal	30.17	4.63	54.21	28.92	36.73
Flush toilet with offsite disposal	29.26	5.13	39.77	21.68	28
Chemical toilet	2.62	3.25	0.73	4.91	1.96
Pit latrine with ventilation pipe	7.02	31.42	1.43	21.9	11.83
Pit latrine without ventilation pipe	19.48	46.99	2.43	14.34	16.68
Bucket toilet	4.65	5.23	0.57	5.38	2.6
None	5.66	3.22	0.8	2.73	2.01
Other	1.15	0.13	0.08	0.14	0.18
	100	100	100	100	100

NOTES: Own calculations from National Income Dynamics Survey 2008 to 2014/15. Only 20 to 64-year-old residents are included. Weighted data used to represent population estimates.

Table A4. *Main water source by area type in 2014/15*

	Rural Formal	Tribal Authority	Urban Formal	Urban Informal	South Africa
Piped (tap) water in dwelling	42.61	11.97	72.56	22.55	49.84
Piped (tap) water on site or in yard	18.99	24.3	23.13	45.37	25.43
Public tap	20.69	36.69	3.87	30.94	16.21
Water carrier/tank	2.96	2.53	0.15	0	0.94
Borehole on site	3.34	1.2	0.09	0	0.59
Borehole off site/	3.12	1.23	0.01	0.5	0.59
Rain-water tank on site	1.98	1.23	0.02	0	0.46
Flowing water/stream	1.93	10.4	0	0	2.78
Dam/pool/stagnant water	1.97	5.47	0	0	1.53
Well	0.72	0.59	0.02	0	0.22
Spring	0.49	1.95	0	0	0.53
Other	0.93	0.72	0	0.4	0.29
Neighbour	0.27	1.73	0.15	0.25	0.57
	100	100	100	100	100

NOTES: Own calculations from National Income Dynamics Survey 2008 to 2014/15. Only 20 to 64-year-old residents are included. Weighted data used to represent population estimates.

**CHAPTER 4: Long and short-distance
migration motivations in Namibia: a gravity
model approach**

Abstract

The paper estimates a gravity model to analyse migration in contemporary Namibia, with the specific aim of understanding differences in long and short-distance migration. The sample is restricted to migrants moving in 2010 and 2011, who are between the ages of 20 and 49 years. Given Namibia's history of apartheid-era segregation, the sample is later restricted to African-language speaking migrants to determine whether the distances traveled to satisfy information and finance-constrained needs differ from that of the full population. A zero-inflated negative binomial model is applied to estimate the effects of constituency-level economic indicators, labour market conditions, agricultural activity, and built amenities on migration flows. Regression analysis shows that analyzing internal migration flows in Namibia without accounting for distance-related differences in migrant motivations may produce misleading results.

Disaggregation of migration flows by distance reveals that for both the entire population and the restricted African-language speaking sample, constituency differences in amenity quality are significant predictors of intermediate-distance migration volumes. Per capita income differences in favour of the receiving constituency increase long-distance migration volumes. For all distances, previous migration in the sending constituency is a strong positive predictor of migration volumes.

1. Introduction

Namibia's independence in 1990 solidified its borders with South Africa, which up until that point had been porous for citizens from both countries (Pendleton *et al.*, 2014: 193). These new cross-border controls, along with the elimination of internal migration controls (Frayne and Pendleton, 2002), were expected to set in motion two profound changes in Namibian population movement: labour migration to South Africa would likely decrease dramatically from its pre-independence levels, and *internal* migration and urbanisation in Namibia would possibly increase rapidly as labour markets could adjust more naturally.

The phenomenon of rapid urbanisation in Namibia since independence is evidenced by the population share growth of its most urbanised regions, Khomas and Erongo. By 2011 these two regions alone accounted for 23.3 percent of the population, up from 15.7 percent in 1991 (Namibian Statistics Agency, 2015: 2). While the role of migration in that urbanisation has been documented with descriptive statistics by the Namibian Statistics Agency's (2015) Migration Report, there has been no published research based on the 2011 Census delving into the regional *determinants* of migration flows.

Namibia's extremely low population density of 2.6 inhabitants per km² is the third lowest worldwide (World Bank, 2018). This, along with previous discriminatory legislation that contributed to much of its African-language speaking population still being concentrated on or near its northern borders, means that many Namibians have to migrate long distances to access urban labour markets in the economic centres of Windhoek, Walvis Bay and Swakopmund.

The combination of a vast landscape, and previous discriminatory controls on settlement that placed a large part of the population far from economic centres present two distance-related questions that may be of interest to migration researchers. The first is: Does distance act as deterrent in a country where traveling vast distances is inevitable? And secondly, do the distances that migrants travel differ because their motivations differ?

This paper therefore estimates a gravity model to analyse migration motivations in Namibia³², with the specific aim of understanding differences in long and short-distance

³² The gravity model approach is similar to the one used by Von Fintel and Moses (2018) in their study of South African migration.

migration flows. While gravity models have been popular for some time in analysing migration flows in and to developing countries, the paucity of bilateral data at small region level, particularly in panel data form, have made the application of similar models difficult in the African context. However, the recent Namibian Census 2011 has provided constituency-level information about migration choices, which make it a suitable candidate for gravity model estimation of internal migration flows.

The paper is organised as follows: Section 2 contextualises the contemporary migration and urbanisation space in 20th century Namibia. Section 3 presents some of the international evidence on short and long-distance migration. Section 4 and 5 discuss the data and methodology, while Section 6 discusses the appropriate gravity model form. The results of the models are then presented in Section 7. The paper concludes in Section 8 with a brief discussion of the implications for future research on internal migration patterns in Namibia.

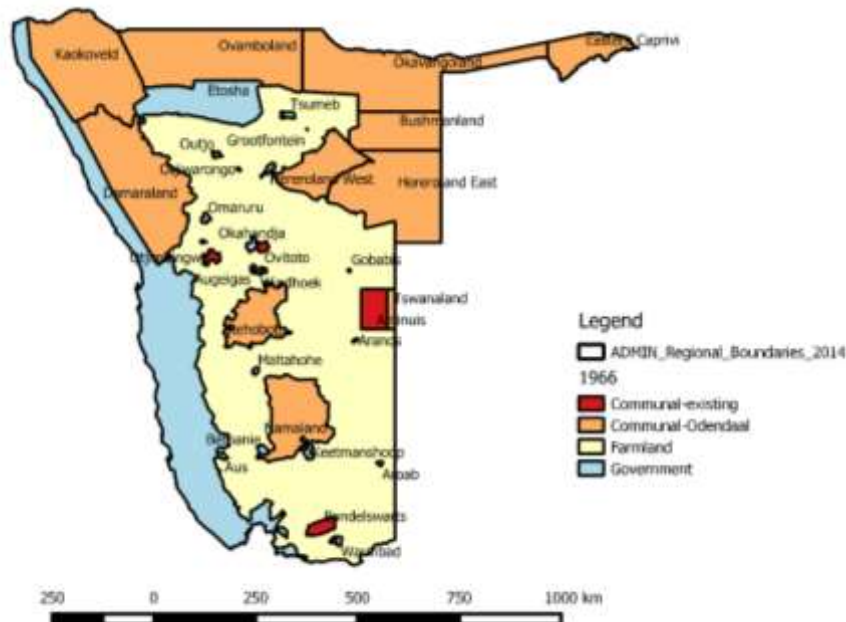
2. Migration and Urbanisation in 20th century Namibia

Namibia's economic and population centres largely grew in colonial times (Tvedten, 2004: 400). Urban settlements in the South and the centre of the country grew under German rule from 1842 to 1914 as the country developed commercial centres in a bid to assert economic independence. Namibia's contemporary migration patterns have been shaped in large part by the South African occupation since the first World War. From 1915 to 1990, the South African government administered Namibia (then South West Africa) almost as a fifth province, extending its racially discriminatory policies to the region (Lawrie, 1964: 4; Frayne and Pendleton, 2001: 207). The migration of Black individuals to town and farming areas outside of communal land was therefore limited and controlled strictly, as was the case in apartheid-era South Africa.

Labour migration from Namibia's northern regions was officially governed by the South West African Labour Association (SWANLA) from World War II until the 1970s (Cooper, 1999: 122). Migrants were mostly contracted through SWANLA for physically demanding work in poor conditions on Namibia's diamond mines on its southern borders, farms, fishing factories in Walvis Bay and in small towns. Upon contract termination, workers were compelled to return to one of ten Bantustan regions of origin in the north (shown in orange in Figure 1). These Bantustans were created upon the recommendation of the Odendaal Commission of 1962, who recommended that Namibia's Black

population only be allowed to own agricultural land and settle in these Bantustans (Frayne and Pendleton, 2002: 4).

Figure 1. Bantustan borders, as determined by the Odendaal Commission in 1964



NOTES: Shapefile uses 1966 boundaries as this is the first map that was produced by the Surveyor General of South West Africa after the Odendaal Commission's Proposals were implemented in 1964.

The development of commercial agricultural areas in Namibia's southern and central regions was made possible by cheap government-provided loans and relatively good market access (Pendleton *et al.*, 2014). Outside of commercial farms, Namibia's rural areas were characterised by poor growing conditions and low carrying capacity (Pendleton, 2014: 195). While the commercial farming sector, developed by White German and South African settlers, received much government assistance, the communal areas where Black residents had farming rights received almost no development assistance (Frayne *et al.*, 2001: 1059).

While Namibia's economic development continued to be biased towards the centre under South African rule, increased militarisation of the northern areas, and later incursions into Angola in the 1970s, fuelled the expansion of towns in the north. Initially established as administrative centres for the homelands proposed by the Odendaal Commission, these towns had basic government departments, schools, hospitals and police stations (Tvedten, 2004: 401). Towns in the north were typically segregated, with relatively well-

serviced White suburbs, and informal settlements on the outskirts, where Black people could reside.

The war fought between SWAPO and the apartheid-era South African Defence Force from 1966 until the 1980s also heavily impacted the movement and settlement of Namibians in the north, with many rural inhabitants being forced to move by the military (Frayne and Pendleton, 2001: 1060). South African separatist laws and policies applied to Namibia as well, forcing rural Black Namibians into communal areas outside of the White areas. These areas received very little from the government in the way of development assistance, further entrenching the deep inequality between deep rural and more urban areas (Kössler, 2000: 450). In addition, a veterinary fence³³ was created to separate communal areas in the north from commercial farming areas, and to prevent people and animals from crossing (Frayne and Pendleton, 2002: 4). Persistently low levels of agricultural activity in these regions have contributed to Namibia's rural areas being reserves for cheap labour, even after the country attained independence in 1990.

One of the more prominent towns to develop in the north under South African rule was Oshakati, established in 1966 and serving as a military stronghold for South African Defence Force incursions into Angola in the 1970s and 80s (Tvedten, 2004: 411). Its initial population of mostly military personnel grew as the needs of those military personnel grew. Military activity not only brought military employment opportunities for the local Ovambo people but also ushered in excellent road networks (Freund, 2006: 154), as well as a number of informal employment opportunities as a result of increasing settlement. This historical concentration of economic development in Oshakati makes it the most popular northern destination for rural-urban migrants³⁴, despite employment prospects and living conditions being poor.

Apartheid controls on Black urbanisation were eventually relaxed in the 1980s, acting as a catalyst for rural-urban internal migration to Namibia's economic centres of Windhoek, Walvis Bay and Swakopmund. Windhoek, for example, the country's capital and one of its economic centres, had a population of 57 000 in 1968, with more than half of its inhabitants being White. By 1991, one year after independence, Windhoek's population had increased to 147 000 (Pendleton *et al.*, 2014: 193), with approximately

³³ The fence, known as the Red Line, was ostensibly created to prevent the transmission of cattle disease.

³⁴ According to the Namibian Population and Housing Census, recent in-migration rates to Oshakati town are only eclipsed by in-migration rates in Khomas and Erongo constituencies.

two-thirds of its population now Black. While Namibia no longer classifies its population by race, examination of the Namibian Population and Housing Census 2011 reveals that 69% of Windhoek's 325 828 inhabitants speak an African language as a first language³⁵.

The high net outmigration rates from Namibia's northern regions have been shaped in large part by apartheid-era migration and settlement policies. Migration is therefore a central part of many Namibian's lives, with many Namibians exposed to or actively participating in migration relatively early. Rural-born children often migrate temporarily to attend distant schools, while children born to parents in urban areas are also often sent to rural areas to be looked after by grandparents (Greiner, 2011: 611). This fostering period in rural areas often ends when school-going age is reached, as schools are predominantly located in Namibia's urban areas.

Adult Namibians from more rural regions also migrate to take advantage of urban labour market opportunities (Indongo *et al.*, 2013; Pendleton *et al.*, 2014). Throughout the migration process, urban-based families maintain strong relationships with their rural bases, allowing for what Greiner (2011: 610) refers to as a translocal organisation of households. This translocality allows the rural household with links to urban areas the ability to benefit from urban labour market opportunities through monetary and in-kind remittances. It also benefits the urban migrant in that they may have access to cheaper meat or dairy products, childcare for children left behind, and a possible place to retire after leaving the urban labour market.

While the growth in Namibia's urban population from 28% in 1991 to 42% of its national population is in line with its blueprint for national development, Vision 2030³⁶ (Namibia, 2004), urban employment opportunities and formal housing have unfortunately not kept pace with urbanisation trends. Unemployment in 2011 in urban areas was estimated at 36.1%, while the rural area unemployment rate was 37.8% (Namibia Statistics Agency, 2013).

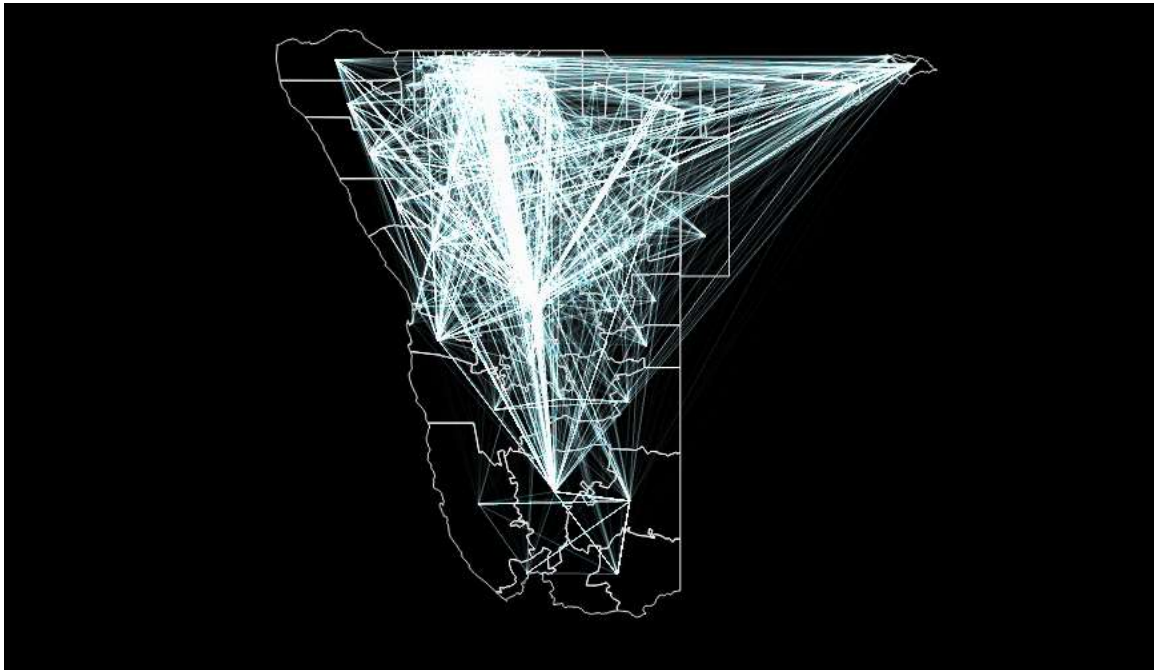
Despite high unemployment rates in urban areas, in-migration rates to the economic centres of Windhoek, Swakopmund and Walvis Bay are still amongst the highest in the country. Figure 2 shows internal migration flows for Namibians between the ages of 20

³⁵ Author's own calculations based on the Namibian Population and Housing Census 2011.

³⁶ Vision 2030 highlights urbanisation as one of the key components to achieve a successful transition from its current mineral-based economy to an industrialised, knowledge-based economy

and 64 years old, within the twelve months preceding the Namibian Population Census 2011 interviews. The migration corridor from Namibia's northern region to the centre are clearly visible.

Figure 2. *Internal migration paths in Namibia 2010 to 2011*



NOTES: Own calculations based on Namibian Population and Housing Census 2011.

Disaggregation of the 2010/11 migration flows³⁷ by distance (shown in figure 3) reveals a few distinct flow patterns. Firstly, most long-distance migration (600 kilometres and further) originates from Namibia's far north-eastern regions. Secondly, intermediate-distance moves are dominated by migration between Namibia's former Ovamboland and Khomas. Lastly, short-distance migration flows are concentrated between constituencies along Namibia's northern border. More pointedly, 58.1% of Namibia's short-distance migration originates from regions within the former Ovamboland homeland borders (Oshana, Omusati, Oshikoto, Ohangwena).

These distinct migration corridors are only visible when disaggregating migration by distance travelled. However, the possible reasons why these migration corridors manifest themselves this way remain unanswered. It is for this reason that the next section of this

³⁷ The migration distance intervals were constructed to roughly coincide with the bottom 25 percent, middle 50 percent and upper 25 percent of the actual migration distance distribution. Most rural-rural moves in Namibia are over relatively short distances, while rural-urban moves require moving longer distances on average.

paper delves into the international literature on short and long-distance migration, to understand the possible factors determining the distance travelled by internal migrants.

Figure 3. Migration paths between constituencies in Namibia 2010 to 2011, by migration distance interval



NOTES: Namibian Population Census 2011 data used for the calculation of all migration flow volumes and distances between constituencies (d). Sample includes only African language-speaking men and women between the ages of 20 and 64 years old.

3. Short and long-distance migration: differences in motivations

Much of the research attention on migration in both the developing and developed worlds has focused on individual migrant motivations, but little work has been done to determine whether those motivations differ by the distance travelled. Distance has typically entered migration models as a deterrent to migration due to the economic and psychological sacrifices that migrants make. This framing of distance as a deterrent underpins the notion that migrants will move as short a distance as possible to achieve their (information-constrained) goals (Stouffer, 1960; Ritchey, 1976). As a result, internal migration in an information-constrained environment is likely to be dominated by moves that are as short as possible (and by implication least costly) to satisfy migrant's desires.

In the few migration studies that disaggregate migrant motivations by distance, crossing administrative borders has typically served as proxies for distance travelled (White and Meuser, 1988). Movements within regional or provincial borders would generally be defined as short-distance moves, while movements across those initially defined borders would be defined as long-distance moves. Such studies have produced results that are largely consistent with conventional understandings of migrant motivations: short-distance migration is motivated by housing quality or size changes, while long-distance moves are motivated by labour market considerations. Owen and Green (1992), for example, find that British home buyers with mortgages generally moved short distances (16 kilometres and nearer) in response to housing factors, such as home size increases, or life-stage factors such as a change in marital status. Long-distance migration, on the other hand, is often associated with a change in residence as a result of, or in anticipation of, a change in employment or employment-seeking strategies (Owen and Green, 1992; Clark and Huang, 2004; Stilwell and Thomas, 2016).

The same dominant motivations for short and long-distance migrations are found using longitudinal data between 1970 and 1992 in the United States (Clark and Davies-Withers, 2007), Census data in the United States (Schachter, 2001) and longitudinal data in Sweden (Niedomsyl, 2011; Niedomsyl and Fransson, 2014). While these studies use varying thresholds to define the difference between short and long-distance migration, the overarching view is consistent – short-distance moves are motivated by housing reasons, more often than not, while long-distance moves are mainly for employment reasons.

The disruptive nature of long-distance moves relative to short-distance moves is explained in Roseman's (1971) categorisation of migration types as either partial displacement or total displacement migration. Partial displacement involves a change of only one or some important places normally visited on a regular basis, such as a change in workplace or school. Total displacement would involve a change of all places normally visited, normally because the dominant place of residence is some distance from the previous place of residence. Given that the level of disruption increases with distance, potential migrants are disincentivised to move further than would satisfy their needs.

While the findings for developed countries are relatively consistent in the literature, applying the same distance yardsticks to developing countries, particularly in the African context, may prove difficult. The difficulties stem not only from the paucity of longitudinal data, but also the spatial configurations of economic activity in developing countries. Developed countries generally have a number of economic nodes that sustain employment spread across most of their respective landscapes. In contrast, developing countries generally have economic activity concentrated in and around capital cities, while large parts of their respective landscapes are dominated by rural or semi-urban regions with low levels of economic activity and employment. In addition, many African countries' rural regions are large in area, sparsely populated and have poor transport infrastructure.

There are some technical hindrances involved in the border-crossing approach to distance differentiation (Wong, 2009; Niedomsyl and Fransson, 2014: 359), the most obvious of these manifesting itself in the case where migration involves crossing two boundary levels. For simplicity's sake, assume that in a study short-distance migration is defined as crossing a municipal boundary, while long-distance migration is defined as crossing *both* municipal and provincial boundaries. Using this framework, migrating between municipalities that are adjacent to each other, with each municipality located in a different province, would be classified as long-distance migration. Similarly, moving from one municipality to another within a very large province could be classified as short-distance migration, when the determinants and outcomes of that migration decision are more consistent with that of long-distance migration. While this zonation effect can be dealt with by adding a further qualifier of contiguity or non-contiguity of areas (as in Jun and Chang, 1986), the distinction between short and long-distance migration is still likely to be inconsistent within and across studies, making analysis of the differences between the two phenomena difficult.

An alternative to measuring distance for use in migration models is calculating the centroid-to-centroid distance between areas (Stilwell and Thomas, 2016: 32). Distance can be measured from direct responses to survey questions or inferred from migration question responses that detail where the previous place of residence was, and the current residence. Coupling this information to shapefile coordinates, the Euclidean distance in kilometres between centroids can be calculated³⁸. Naturally, as the areas of sending and destination regions increase, the accuracy of centroid-to-centroid distance declines. While it is not a perfect measure, in the absence of detailed address information or coordinates, the centroid-to-centroid method of computing distance is an improvement over simple binary distance measures (such as intra vs inter-provincial migration).

4. Data

The primary source of data to describe and analyse internal migration in Namibia is the full Namibian Population and Housing Census 2011 collected and produced by the Namibian Statistics Agency (2011). The Census questions that allow for the analysis of internal migration patterns are:

1. “Where was (NAME)'s mother usually living when (NAME) was born?”
2. “Where does (NAME) usually live?”
3. “For how long has (NAME) been living at this place?”
4. “Where did (NAME) usually live since September 2010?”

(Namibian Statistics Agency, 2012)

These questions allow researchers to analyse migration propensities and correlates along two dimensions:

1. The birthplace, coupled with the usual place of residence, allows researchers to analyse lifetime migration patterns. Lifetime migrants are defined as those individuals whose current place of residence differs from their place of birth. If the place of birth and usual place of residence are specified at the same level of geographical aggregation within the same Census, net lifetime migration frequencies and rates can be estimated.

³⁸ This paper makes use of the Stata package *geodist* (Picard, 2019) to calculate the Euclidean distance between centroids.

2. “Where did (NAME) usually live since September 2010?” allows researchers to consider short-term migration propensities and patterns in the year preceding Census 2011 (which was collected between 28 August and 15 September 2011). Again, this would provide more current insights into which regions and constituencies are the largest and smallest net gainers and losers of population through migration.

Census 2011 data can also be combined with the Namibia Household Income and Expenditure Survey 2009/10 (hereinafter referred to as NHIES 09/10) data to determine whether constituency-level factors such as unemployment rates and poverty rates (or differences therein between regions) may contribute to lifetime and short-term migration probabilities. The NHIES 09/10 is temporally convenient to match with Census 2011 migration data as it describes labour markets and living conditions immediately prior to the migration decision (to stay or migrate) made in the September 2010 to September 2011 period.

Analysis of inter-constituency migration was previously not possible in Namibia, as older datasets did not have the required depth of geographical disaggregation. For example, while the 2001 Namibian Census also asks questions related to migration, the sending region for migrants is only specified at regional level. Since the 2011 Census is a full Census, the combination of coverage and geographical depth allows for a nuanced analysis of migration that is rare in the African context.

This study analyses internal migration flows of individuals aged 20 to 49 years between constituencies in the year preceding the collection of the 2011 Census (NSA, 2014). The lower age limit is chosen based on the assumption that individuals aged 20 and older are likely to have left school. The upper age limit is assumed to coincide with pronounced decreases in migration probabilities. The study excludes immigration flows into Namibia as well as foreign-born nationals from the sample, as their birth places are not defined in as great detail as it is for locally born individuals.

In line with Long *et al.* (1988: 634), this study assumes that migration starts where regular commuting ends. In other words, when commuting becomes too inconvenient or expensive due to the distance between the home and the workplace, a change in residence to overcome the vagaries of long commutes is understood to be migration (Shyrock and

Siegel, 1971: 617). The uppermost bound of commuting is therefore assumed to be 100 kilometres, which is consistent with Von Fintel and Moses (2018).

5. Methodology

A gravity model will be used to investigate migration flows between constituencies in Namibia. For the purpose of this paper, migration will be defined as the crossing of any one of Namibia's constituency borders for resettlement purposes.

Gravity models of migration are used to measure the degree of interaction between two locations and are rooted in Newton's law of universal gravitation, which was popularly applied to migration research in the 1960s (see for example Sjaastad, 1964). When applied to migration flows between two locations, the gravitational relationship between regions predicts that demographic interaction is directly proportional to the population sizes in both sending and receiving regions and inversely related to the distance between sending and receiving regions (Stewart, 1941: 89). In its early forms, the gravity model was often specified as $M_{ij} = \frac{P_i^{\beta_1} P_j^{\beta_2}}{D_{ij}^{\alpha}}$, which in double-logarithmic form would yield elasticities of migration flows between regions i and j in response to regional factors.

A comprehensive migration flow equation includes variables which describe economic, political and demographic characteristics in both sending and receiving locations. Only inter-constituency flows are considered, so that 107 constituencies with 106 possible destinations produce a matrix of 11 342 migration dyads (sending-receiving constituency combinations). Following Karemera, Oguledo and Davis (2000: 1747 – 1748), the empirical specification of the gravity model between constituencies i and j will be:

$$m_{ij} = \beta_0 + \beta_1 d_{ij} + \beta_2 n_i + \beta_3 n_j + \beta_4 Y_i + \beta_5 Y_j + \beta_6 U_i + \beta_7 U_j + \beta_8 G_i + \beta_9 G_j + \beta_{10} A_i + \beta_{11} A_j + \beta_{12} K_j e_{ij}$$

where d_{ij} is the straight-line (or Euclidean) distance between the centroids of regions (which is a proxy for the costs of migration between regions), n_i and n_j the respective populations in the sending and destination regions before September 2010 and Y_i and Y_j are the incomes per capita in regions (from the NHIES 09/10 and which serve as a proxy for regional economic performance). U_i and U_j are the unemployment rates in regions i and j . G_i and G_j refer to government services in both regions while A_i is the proportion of the population in the sending area that is between 20 and 49 years old. K_j refers to a

“migrant-friendliness” variable in the destination region, which is specified as the percentage of previous migrants in region j who were not born in region j , but did not move in the last 12 months. The independent variables are specified separately by sending and receiving region, but can also be specified in ratio form (x_i/x_j) when the need arises.

The relatedness of constituencies in close proximity to each other is a possible source of bias and inconsistency if not controlled for. To account for spatial autocorrelation between constituencies i and j , a spatial weighting matrix will be estimated. This matrix, where the off-diagonal elements contain the inverse of distance d_{ij} between constituencies, are included as an additional control in regressions to describe the strength of the relationship between constituencies (Von Fintel and Moses, 2018: 260).

The eigenvectors of $(I - \frac{1}{n})W(I - \frac{1}{n})$ are estimated, where the identity matrix is I , and 1 is a unit vector. The sum of eigenvalues within these eigenvectors represent the level of spatial autocorrelation. The gravity model includes all eigenvectors where the absolute value of $\frac{\lambda_i}{\lambda_1} > 0.25$ (λ_1 being the largest eigenvalue).

A brief justification for the inclusion of each of these variables is included in sections 5.1 to 5.5, categorised as gravity, economic and labour market, environmental and network variables. A summary table of variables and their descriptions follow.

5.1 Gravity variables: population size and distance

Gravity variables include distance between origin and destination regions, which is negatively related to migration flows, and population sizes in both regions, which is positively related to migration flows (the initial component of the gravity model explained earlier in this section). It may also include a destination area network component, which is expected to be positively related to migration flows.

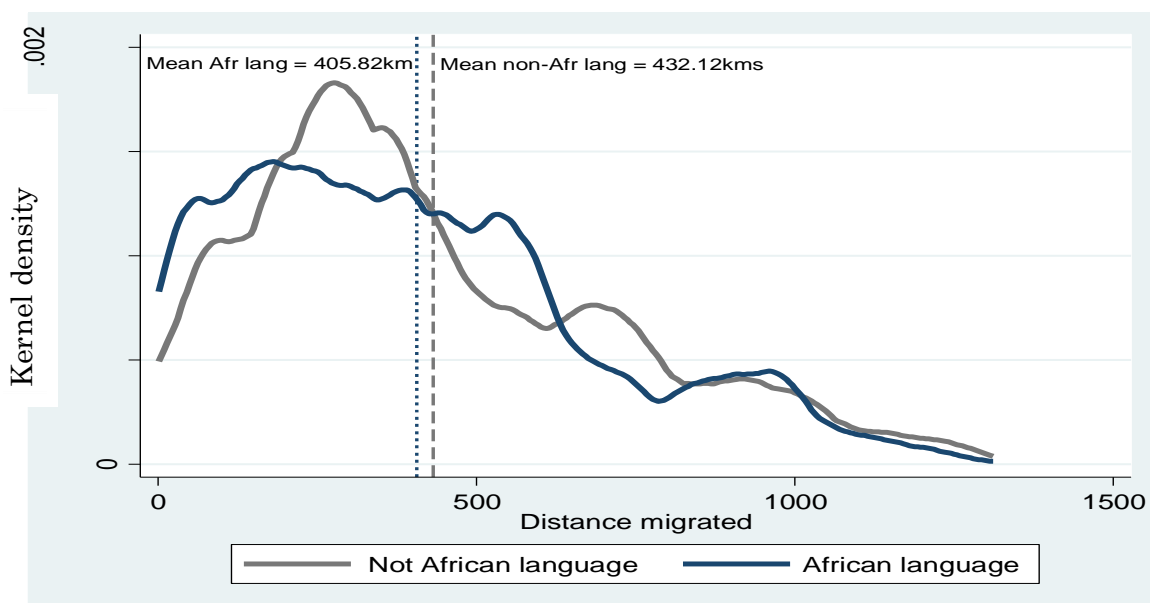
Tobler (1970: 236) developed the First Law of Geography as an extension of gravitational principles, stating that “everything is related to everything else, but near things are more related than distant things”. This formal statement of the principle of distance decay for migrant volumes has been explained theoretically in a number of ways. The inclusion of distance in gravity models was originally meant to serve as a proxy for the pecuniary costs of relocation, such as transport and accommodation costs, and the cost of obtaining

information about the destination region, which enjoy a positive relationship with distance.

The intervening opportunities literature also posits that the longer the distance between origin and destination regions, the more job opportunities migrants would have to sacrifice between origin and destination (Wadycki, 1974). Later literature also recognises the non-pecuniary costs of migration that presumably increase with distance (Bouare, 2002: 25). Some of the resistance to traveling long distances is rooted in the desire for proximity to the family base, where social capital and economies of scale benefits are likely to be strongest (Stillwell and Thomas, 2016: 31).

Kernel densities for distances travelled by adult migrants are shown in figure 4, disaggregated by the individual's first language. Migrants are split into these two language groups to examine the possibility that previous racially discriminatory barriers to migration and settlement in Namibia may still affect the distance travelled by migrants. The mean distance travelled by African-language speaking migrants is 405.82 kilometres, while the mean distance travelled by other-language speaking migrants is 431.12 kilometres. The difference between these two distributions is driven in large part by the fact that many migrants from Namibia's northern regions migrate within the northern regions (shown before in Figure 3).

Figure 4. Kernel density of distance covered, by language spoken



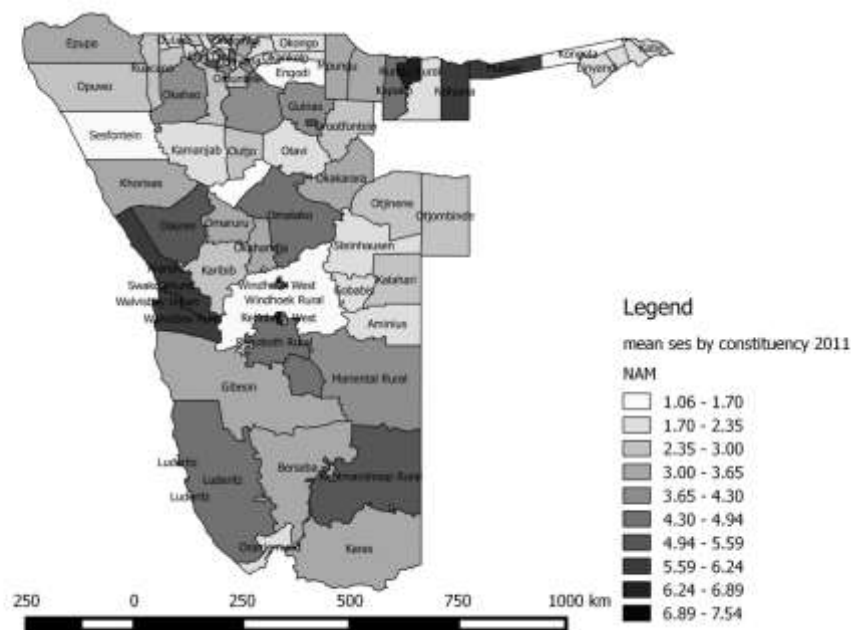
NOTES: Own calculations based on Namibian Population and Housing Census 2011.

This study therefore employs the Euclidean distance between constituency centroids as a proxy for economic and psychological costs of migration. The distance variable's secondary role will be to differentiate migration motivations.

5.2 Economic and labour market variables

Differences in economic opportunity between regions have long been a central explanation for inter-regional migration. The central prediction of the disequilibrium model of migration, popularised by Hicks (1932), is that migration flows between regions arise because of initial inequalities in unemployment and wages. These regional disparities would continue to fuel migration until wages and unemployment rates were equalised over space. Figure 5 shows per capita incomes at the constituency level using data from the National Household Income and Expenditure Survey. Higher incomes are concentrated on Namibia's coast in the Erongo region, and within a few constituencies in Khomas.

Figure 5. Per capita incomes in Namibia 2009, by constituency



NOTES: Own calculations based on Namibian Household Income and Expenditure Survey 2009 data. The income per capita is calculated at the household level, and then aggregated and averaged at constituency level.

The income per capita of a region is expected to be a key determinant of the attractiveness of a region (see for example Shen, 1999; Biagi *et al.*, 2011: 116; Beine, Bertoli and Moraga, 2014: 13), not only as a signal of labour market returns to migration but also as a signal of other quality-of-life factors which are expected to increase with income, such as more choice of non-essential consumption items, entertainment and reduced crime rates. These quality-of-life factors are also assumed to be positively related to regions where there are high education levels on average. As the NHIES is not representative at the national level, the relationship between incomes per capita from NHIES and the proportions of adults who are highly educated within constituencies (considered to be a slow-moving variable) from Census 2011 is tested using a lowess regression. The results are shown in Figure A1 in the Appendix of this paper. The piecewise correlation coefficient between these two variables is 0.83. This indicates that incomes per capita are very closely tied to the proportions of the population that are highly educated in Namibia, and inspires some confidence that incomes per capita from NHIES are not unsuitable for use at constituency level.

Labour market conditions have been included in seminal discussions of internal migration decisions by luminaries such as Harris and Todaro (1970). Differences in unemployment rates between origins and destinations have been shown to stimulate migration flows in the southern African context (Kok *et al.*, 2006). Moses and Yu (2009: 95) show that broad unemployment rates act as a push factor affecting migration from the Northern Cape (a South African province on Namibia's border).

The effect of differences in economic opportunity on migration flows are therefore tested using unemployment rate and household income differences between constituencies, from the National Household Income and Expenditure Survey 2009/10 (Namibia Statistics Agency, 2010). Constituency-level unemployment rates are calculated as individuals between the ages of 15 and 64 years, unemployed and actively looking for work, as a proportion of the active labour force.

5.3 Government service and environmental variables

The importance of natural and non-natural amenities as being a driver of internal migration has been explored in some detail since the early 2000s. The relative weight of natural amenity differences in migration decisions have varied from significant to insignificant. Areas with more temperate climates has been found to be instrumental attractors of migrants in the United States, for example (Rappaport, 2007). Regional disparities in natural amenities such as national parks and climate have also been found to influence migration flows between regions in the United States (Partridge and Rickman, 2006). However, the evidence supporting migration as a function of natural amenity differences is weaker in Canada (Ferguson *et al.*, 2007) and Europe (see for example Biagi *et al.*, 2011). Nevertheless, as the agricultural sector provides jobs for 27.4% of Namibia's employed population (Namibia Statistics Agency, 2013: 9), a normalised differenced vegetation index (NDVI) aggregated at constituency level is included to represent the agricultural performance for each constituency.

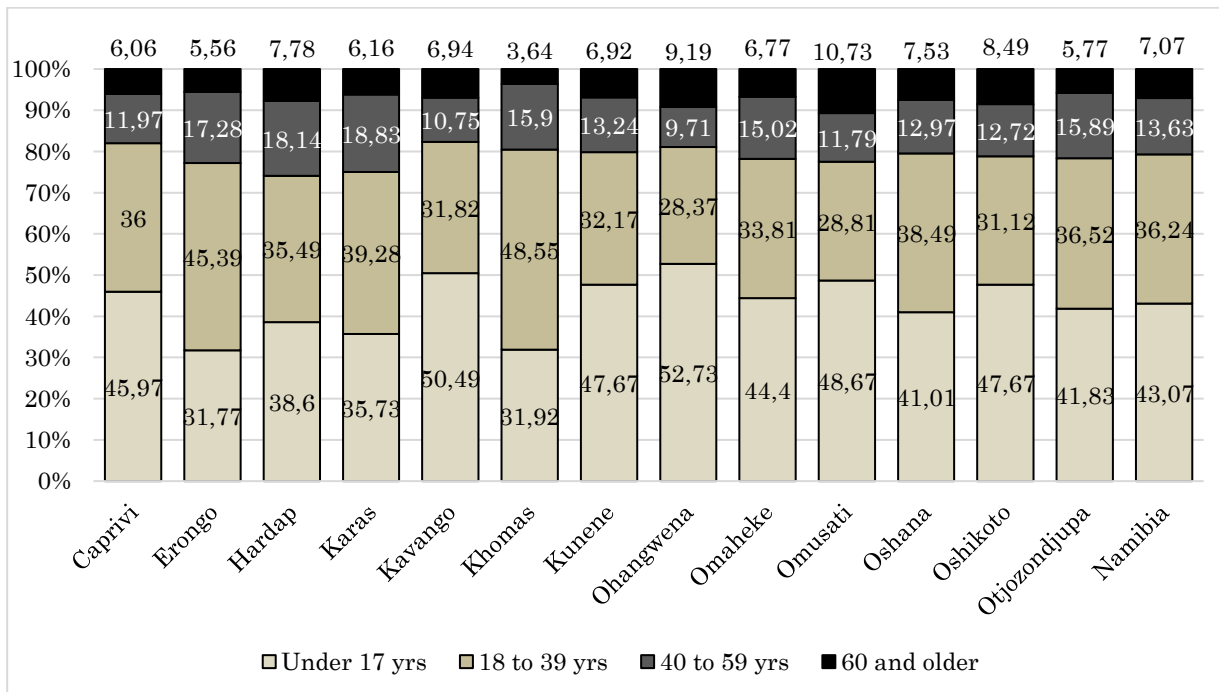
Environmental variables not only refer to those variables related to the physical environment such as climatic conditions and shocks but also factors related to the built environment such as the degree of urbanisation and access to leisure activities. Schools in Namibia are generally clustered in more urban areas, with rural areas having few schools. The Namibian National Household Income and Expenditure Survey 2009/10 contains data on the distance to school in kilometres. The data is converted from its

original interval form to midpoints, after which the mean distances to school are determined for each constituency.

5.4 Demographic variables

Contemporary approaches to internal migration have attempted to find rational explanations for the paradox of continued migration flows from rural areas in the face of poor labour market prospects in urban destination areas. The New Economics of Migration school of thought depicts rural-urban migration as being an attempt by the rural household to diversify income sources (Stark, 1991). According to this theory, internal migration is a decision to maximise total household income by splitting the household into the rural base and satellite household. By diversifying income streams in this way, total household income is supplemented by cash income from young adults sent to urban areas. Young adults are more likely to migrate for a number of reasons that include lower psychological costs and higher education levels which position them more ideally for labour market success than would be the case if older household members migrate (Greiner, 2011: 611). Namibia’s age structure by region is shown in Figure 6.

Figure 6. Broad age structures in Namibia in 2011, by region



NOTES: Own calculations from Namibian Census 2011. Age categories defined as child (younger than 17 years), younger adult (18 to 39 years), older adult (40 to 59 years), and retirement age adults (60 years and older).

Its most urbanised regions, Khomas and Erongo, have the highest proportions of young adults at 48.55% and 45.39%, respectively. In contrast, Namibia's more rural northern regions, such as Kavango, Ohangwena and Omusati, have very child-heavy populations, with approximately half of their citizens being younger than 18 years of age. Just as is the case in many sub-Saharan African countries, these age structure differentials between urban and more rural regions illustrate the impact of age-selective nature of migration (Tvedten, 2004: 404).

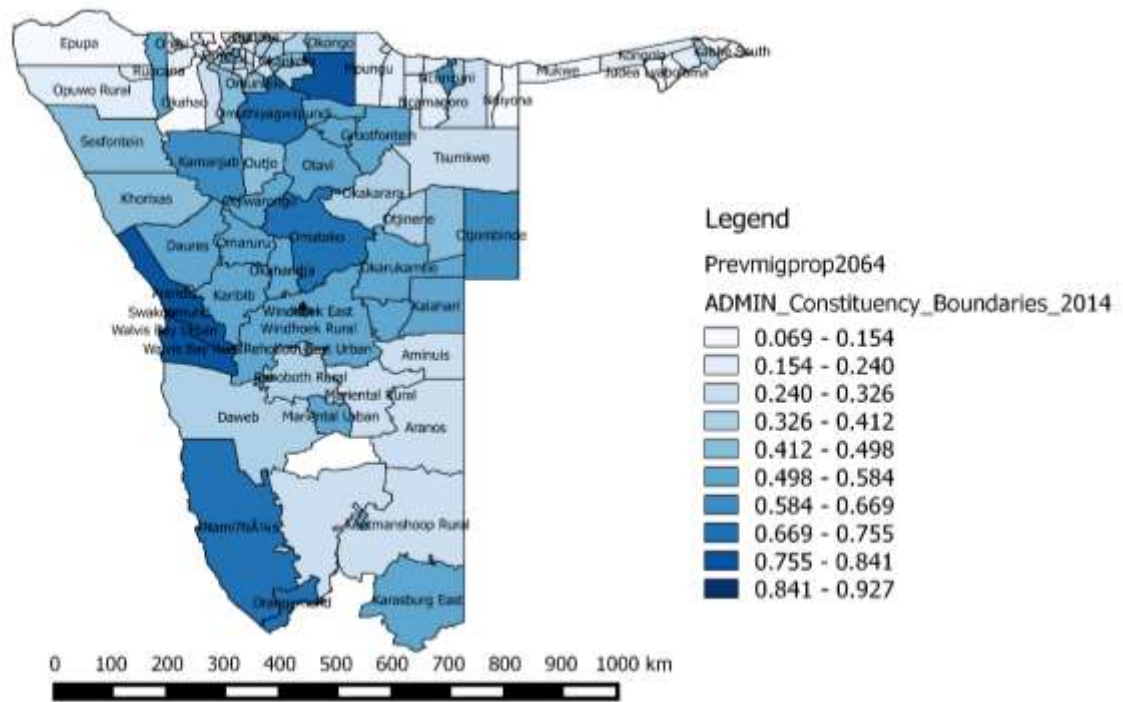
The inclusion of constituency-level age structures in migration modelling is based on findings from microeconomic analyses that migration is highly age-selective (Biagi *et al.*, 2014). Therefore, migration flows are expected to be larger between constituencies where young adults constitute a large proportion of the total sending population. Thus, in this paper, the proportion of adults between the ages of 20 and 49 years in sending and receiving regions are both expected to positively affect the gross migration flows of prime-aged adults between constituencies i and j .

5.5 Previous in-migration

Von Fintel and Moses (2017) show that in South Africa current migration paths are very similar to previous migration paths. The migrant destinations are typically urban areas where economic activity is concentrated. If this is true for Namibia as well, migrant destinations that were popular in the not-too-distant past are likely to be popular in the period under consideration, barring major shocks to the other variables that are expected to affect migration decisions profoundly.

Figure 7 shows the proportions of constituency populations who identify as having been born elsewhere than their current constituency but did not migrate in the last year (the proxy for previous in-migration rates). The constituencies with the highest proportions of previous migrants are Windhoek East, Arandis, Swakopmund and Walvis Bay, all of them concentrated in Namibia's most affluent regions of Khomas and Erongo.

Figure 7. Previous migrants as proportions of receiving constituency populations



NOTES: Own calculations based on Namibian Health, Income and Expenditure Survey 2009 data .

Table 1. Summary statistics and description of independent variables

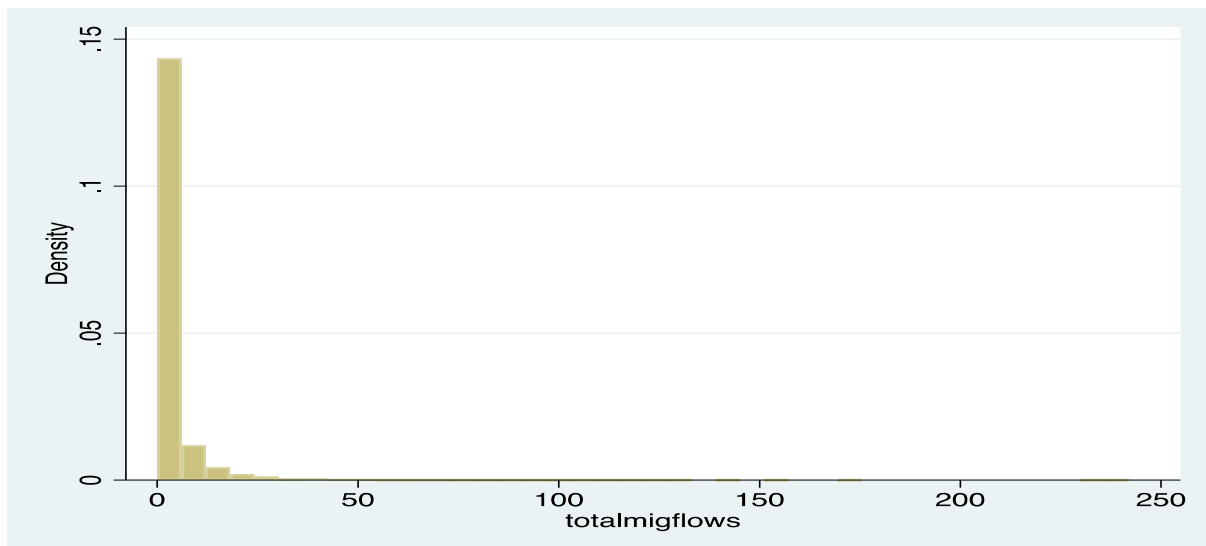
VARIABLES	Description		Mean/ Proportion	SD
Migration flows	Migration flows of prime-aged adults between i and j (including zero values)	<i>Source: Census 2011</i>	3.30	9.23
Distance	Euclidean distance in kms between constituency centroids		413.56	285.54
<i>Economic variables</i>				
Unemployment rate	Strict unemployment rate (at constituency level)	<i>Source: NHIES 2009/10</i>	31.26	8.62
Regional socioeconomic status	Mean annual per capita income (at constituency level)	<i>Source: NHIES 2009/10</i>	13924.07	15207.99
<i>Demographic variables (before current migration)</i>				
Population size	Population by constituency (before migration flows in 2010/11)	<i>Source: Census 2011</i>	18 221.92	10 509.64
Adult:population ratio before 2010 migration	Sum of adults 20-49 yrs old as proportion of total population	<i>Source: Census 2011</i>	0.41	0.49
Previous migrant population in receiving region	Adult population 20 to 64 years old whose birth constituency differed from their current constituency, but had not moved in 2010/11	<i>Source: Census 2011</i>	0.54	0.50
<i>Human capital</i>				
Highly educated	Percentage of population with grade 12 and higher	<i>Source: Census 2011</i>	0.26	0.44
<i>Amenities</i>				
Distance to secondary school	Distance to school in kilometres (using midpoints of distance brackets)	<i>Source: NHIES 2009/10</i>	4.16	1.68
Vegetation cover	Normalised differenced vegetation index in 2010 (at constituency level)	<i>Source: NASA</i>	0.44	0.14

NOTES: Own calculations based on Namibian Population and Housing Census 2011, Namibian Health, Income and Expenditure Survey 2009/10 data

6. Choosing an appropriate model for overly dispersed count data

As the dependent variable is the gross migrant population flows between constituencies i and j , a count model is most appropriate (Chun, 2008; Biagi et al., 2012). Count data are generally assumed to follow a Poisson distribution, where the mean is assumed to be equal to the variance. However, quite often, where data is left-censored or right-censored (as shown by the inter-constituency migration volumes in Figure 8), Poisson regression modelling is no longer appropriate.

Figure 8. *Distribution of total recent migrant flows in Namibia 2010/11*



NOTES: Own calculations based on Namibian Population and Housing Census 2011.

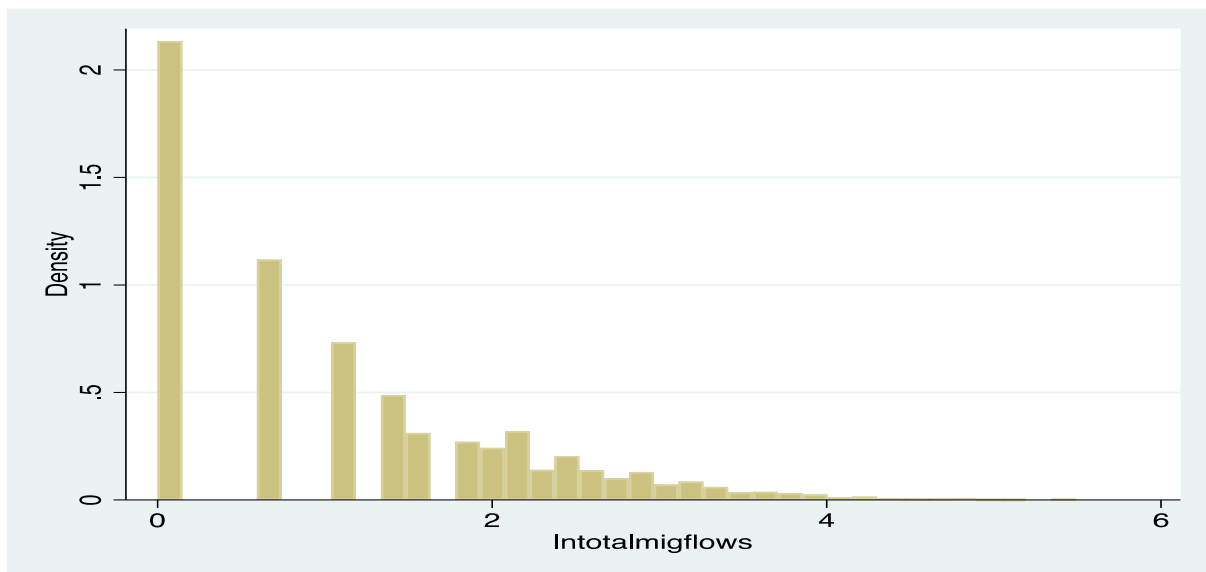
Columns 1 to 3 in Table 2 show the dyadic distribution of total migrant flow aggregates in percentiles. Many of the dyads have no population flows between constituencies, resulting in a migrant flow distribution that contains an excessive number of zero values. In situations where excess zeroes exist, Poisson regression is inappropriate as the mean and variance are no longer equal. Table 2 reveals that the mean for inter-constituency migration flow (including zero flows) is 3.3, while the variance is 85.21. The migration flow distribution therefore suffers from overdispersion, which renders the Poisson distributional assumption invalid.

Table 2. *Distribution of total migrant flow aggregates between constituency i and j*

<i>Percentiles</i>	<i>Smallest</i>			
1%	0	0		
5%	0	0	<i>Obs</i>	11 342
10%	0	0	<i>Sum of Wgt.</i>	11 342
25%	0	0		
			<i>Mean</i>	3.30
50%	1		<i>Std. Dev.</i>	9.23
		<i>Largest</i>		
75%	3	172	<i>Variance</i>	85.21
90%	8	231	<i>Skewness</i>	9.92
95%	15	237	<i>Kurtosis</i>	169.38
99%	39	242		

NOTES: Own calculations based on Namibian Population and Housing Census 2011.

One option to remedy the skewed distributions is log transformation of the dependent variable, as in Figure 9. Unfortunately, where there are excess zeroes, log transformation of the zeroes produces undefined values that therefore are seen as missing values.

Figure 9. *Logged distribution of total recent migrant flows in Namibia 2010/11*

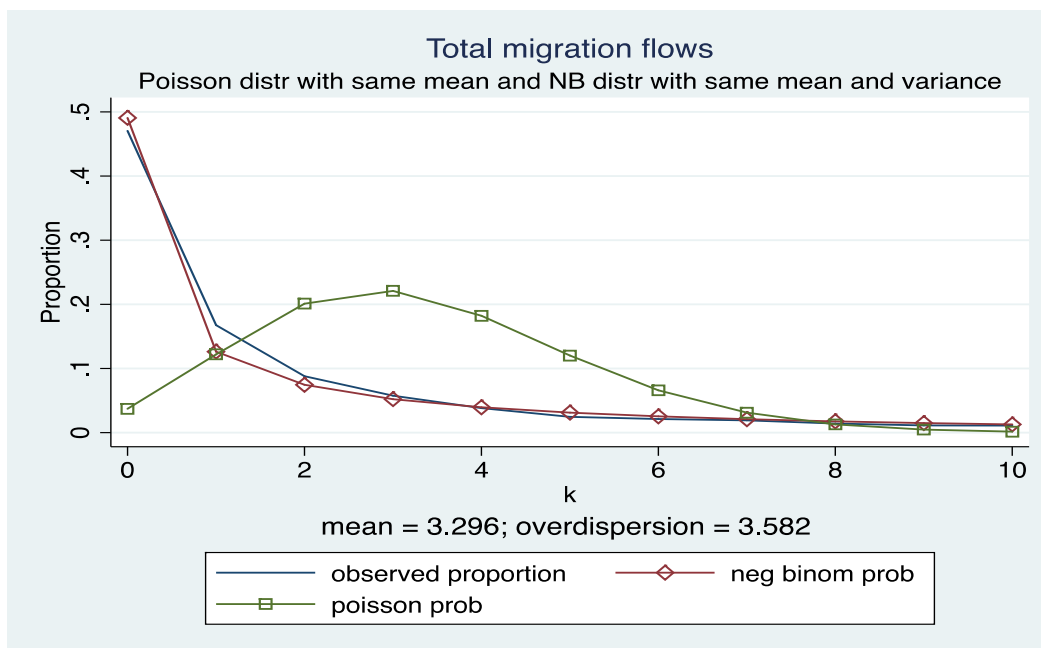
NOTES: Own calculations based on Namibian Population and Housing Census 2011.

Zero values can be dealt with in a number of ways, the most common of which are excluding them entirely, or adding a small positive constant to ensure that the logarithm is defined. Exclusion of zeroes, however, ignores the possibility that they are true zero values, and by design then also ignores the information contained in those zero values (Ramos, 2016: 5). In the gravity modelling context, for example, zero flows between regions could exist because region j and k are wholly unattractive destinations to

migrants in each of these regions, or because j actually has no power to send migrants to destination k .

Figure 10 compares the observed distribution of dyadic migration flow data with distributions under Poisson assumptions (green curve) and negative binomial distribution assumptions (red curve).

Figure 10. Comparison of Poisson distribution and negative binomial distribution, with same means and variances



NOTES: Own calculations based on Namibian Population and Housing Census 2011.

The observed data (blue curve) suffers from overdispersion ($\text{variance}(X) > \text{mean}(X)$), resulting in a poor fit between observed data and the hypothetical Poisson distribution³⁹ (green curve). While the shortcomings of the Poisson distribution assumption of equi-dispersion are immediately obvious, the negative binomial distribution fits the observed value distribution rather closely.

A possible solution for dealing with overdispersion is the two-stage zero-inflated negative binomial regression (ZINB) model (Hur *et al.*, 2002: 6), which relaxes the Poisson distribution assumption of the mean being equal to the variance *and* corrects for the

³⁹ The dispersion parameter is 3.58, indicating that the data are overly dispersed. Poisson modelling would have been appropriate if the parameter was equal to 0.

presence of excess zeros in the data. The first stage of the ZINB model is a logit-style function, which models the probability that there are no migrants flowing between constituencies i and j . This stage corrects estimates in the second stage of the ZINB.

7. Results

7.1 Full sample estimation

Table 3 shows the gravity model estimates of migration flows of *all* prime-aged adults between Namibian constituencies in 2010/11. All models account for possible spatial autocorrelation by including spatial filters. Preliminary diagnostic tests at the bottom of Table 3 reveal that the ZINB model is the most appropriate model for the data. The alpha dispersion parameter is not equal to 0, therefore Poisson distributional assumptions are inappropriate. The Vuong test statistic is significantly positive, suggesting that the ZINB model is preferable to the conventional negative binomial model.

The inflation function, used as a first stage to correct for the presence of excess zeroes in migration flows, contains the basic gravity variables included in gravity models. i.e. distance and respective population sizes in sending and receiving region combinations. These variables are assumed to also affect the probability of there being no flows between constituencies i and j . The inflation function coefficients perform as expected: distance between constituencies i and j increases the probability of there being zero population flows between i and j (although the significance of distance decreases somewhat as more variables are added to the gravity model from models 1 to 5).

Table 3. Gravity model of all adult migration flows in Namibia in 2010

Dependent variable: Gross migration flows between <i>i</i> and <i>j</i>	Model 1	Model 2	Model 3	Model 4	Model 5
Distance	-0.0006*** (0.0001)	-0.0006*** (0.0001)	-0.0007*** (0.0001)	-0.0007*** (0.0001)	-0.0008*** (0.0001)
Population 2010 in sending region	0.0000*** (0)	0.0000* (0)	0.0000* (0)	0 (0)	0 (0)
Population 2010 in receiving region	0.0000*** (0)	-0.0000*** (0)	-0.0000*** (0)	-0.0000*** (0)	0 (0)
Adults as proportion of total pop 2010 rec		0.0002*** (0)	0.0001*** (0)	0.0001*** (0)	0.0001*** (0)
Adults as proportion of total pop 2010 send		0.0001*** (0)	0.0001*** (0)	0.0000*** (0)	0.0001*** (0)
Per capita income ratio 2010 (rec: send)			0.0510*** (0.0084)	0.0480*** (0.0084)	0.0384*** (0.0081)
Unemployment ratio 2010 (rec: send)			0.1738*** (0.0358)	0.1856*** (0.036)	0.2039*** (0.0363)
Distance to school ratio 2010 (rec: send)				-0.0490* (0.0203)	-0.0517* (0.0202)
NDVI 2010 ratio (rec: send)				0.0332* (0.0133)	0.0309* (0.0132)
Previous migrant adults as prop of 2010 adult pop (rec)					1.2833*** (0.1194)
_cons	-0.3776*** (0.0646)	0.1443* (0.067)	-0.0915 (0.0779)	-0.0644 (0.0855)	-0.7072*** (0.104)
<u>inflate</u>					
Distance	0.0005* (0.0002)	0.0005* (0.0002)	0.0004 (0.0002)	0.0004 (0.0002)	0.0004 (0.0002)
Population 2010 in sending region	-0.0002*** (0)	-0.0002*** (0)	-0.0002*** (0)	-0.0002*** (0)	-0.0002*** (0)

Population 2010 in receiving region	-0.0001*** (0)	-0.0001*** (0)	-0.0001*** (0)	-0.0001*** (0)	-0.0001*** (0)
_cons	1.8524*** (0.2171)	2.3127*** (0.2118)	2.3235*** (0.2108)	2.3292*** (0.2098)	2.3229*** (0.2108)
SPATIAL FILTERS	Y	Y	Y	Y	Y
N	10 402	10 402	10 402	10 402	10 402
alpha	1.995***	1.809***	1.789***	1.782***	1.749***
Vuong test (ZINB vs NB)	7.67	8.66	8.57	8.55	8.61

NOTES: Standard errors in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

The baseline ZINB in Model 1 in Table 3 contains the basic gravity variables included in gravity models. i.e. distance and respective population sizes in sending and receiving region combinations. Distance between constituencies reduces migration volumes between constituencies from models 1 to 6. Larger populations in both sending and receiving regions increase migration volumes in model 1.

Model 2 adds another variable of a demographic nature: prime-aged adults as proportions of their respective sending and receiving regions. Migration volumes are positively associated with both sending and receiving population prime-aged adult proportions. This relationship is statistically significant and consistent across models 1 to 6.

Model 3 adds economic and labour market incentives for migration. Migration volumes respond positively when the per capita income of receiving regions is higher than those of sending regions. This relationship holds throughout table 3 and is consistent with expectations that better earning potentials elsewhere is likely to increase the probability of migration.

Migration to urban areas despite high unemployment rates is also possible if natural and man-made amenities in the receiving constituency are superior to those in the sending constituency. Model 4 adds the amenity variables: distance to school for school-going children is a proxy for urban amenities and population density, while the normalised vegetation index is a proxy for natural amenities. Migration volumes are higher where the distance to school in the receiving region is lower than the distance to school in the sending region. Proximity to schools (and by proxy, government services) is therefore an important predictor of migrant volumes. Migration volumes also respond positively to potential destinations where the NDVI is higher than it is in their sending constituency. Thus, constituencies with greener land appear to attract migrants.

Model 6 includes the proportion of the receiving constituency population who are previous migrants. The presence of previous migrants in receiving constituencies positively affects migration flows to those receiving constituencies. This finding is consistent with the situation in South Africa, where migrants typically follow previous migration paths (Von Fintel and Moses, 2017). The result here can possibly be explained by inertia in migration flows to economic centres, or because select migrant destination

constituencies are favoured because non-economic factors such as ease of settlement or assimilation positively affect migration volumes.

7.2 Full sample estimation by distance travelled

Table 4 disaggregates all inter-constituency movements by distance, separating migration flows into move distances between 100 and 200 kilometres, between 200 and 600 kilometres and moves of 600 kilometres and further. Moves shorter than 100 kilometres are discarded in the distance disaggregation to focus on moves that may more closely resemble very disruptive moves. Column 1 in table 4 shows the full model estimated at the end of Table 3.

Most of the variables in the regression retain the significance and signs they had in the final regression in Table 3, but there are some noteworthy exceptions. Long-distance moves are generally in the direction of higher average incomes, while short-distance migration appears to flow in the direction of destination constituencies that are poorer than sending constituencies. While the unemployment ratio displays the expected negative sign for short-distance moves, the relationship is statistically insignificant. As before, migrant volumes still respond positively to unemployment rates that are higher in the receiving constituency than in the sending constituency.

The distance-to-school ratio coefficient is negative and weakly significant for intermediate-distance moves as expected but insignificant for short and long-distance moves. The NDVI ratio coefficient is also positive and significant only for intermediate distance moves, implying that natural and man-made amenity differences are stronger motivators for these types of moves.

Table 4. Gravity model: inter-constituency migration flows of all migrants, by distance covered

Dependent variable: Gross migration flows between <i>i</i> and <i>j</i>	Full sample (incl <100kms)	>=100 & <200kms	>=200 & <600kms	>=600kms
Distance	-0.0008*** (0.0001)	-0.002 (0.002)	-0.0011*** (0.0002)	0.0001 (0.0002)
Population 2010 in sending region	0 (0)	0 (0)	0.0000** (0)	0 (0)
Population 2010 in receiving region	0 (0)	0 (0)	0 (0)	0 (0)
Adults as proportion of total pop 2010 rec	0.0001*** (0)	0.0001* (0)	0.0001*** (0)	0.0001* (0)
Adults as proportion of total pop 2010 send	0.0001*** (0)	0.0001** (0)	0.0001*** (0)	0.0001*** (0)
Per capita income ratio 2010 (rec: send)	0.0384*** (0.0081)	-0.1404** (0.0473)	-0.0121 (0.0101)	0.1425*** (0.0204)
Unemployment ratio 2010 (rec: send)	0.2039*** (0.0363)	-0.249 (0.1353)	0.1311** (0.0407)	0.5393*** (0.0848)
Distance to school ratio 2010 (rec: send)	-0.0517* (0.0202)	-0.0643 (0.0767)	-0.0589* (0.0242)	0.0538 (0.0408)
NDVI 2010 ratio (rec: send)	0.0309* (0.0132)	0.0206 (0.0389)	0.0367* (0.0181)	-0.0074 (0.0222)
Previous migrant adults as prop of 2010 adult pop (rec)	1.2833*** -0.1194	1.6813*** (0.4349)	1.4201*** (0.1498)	1.4765*** (0.2519)
_cons	-0.7072*** (0.104)	0.6767 (0.4296)	-0.8249*** (0.156)	-2.2991*** (0.2737)
<u>inflate</u>				
Distance	0.0004 (0.0002)	-0.0073 (0.0066)	-0.0003 (0.0008)	0.001 (0.0008)

Population 2010 in sending region	-0.0002*** (0)	-0.0001*** (0)	-0.0002*** (0)	-0.0002*** (0)
Population 2010 in receiving region	-0.0001*** (0)	-0.0001*** (0)	-0.0001*** (0)	-0.0001*** (0)
_cons	2.3229*** (0.2108)	-1.428 (1.9553)	2.6784*** (0.48)	0.0647 (0.9309)
SPATIAL FILTERS	Y	Y	Y	Y
N	10 402	981	5 290	3 100
alpha	1.782***	1.478***	1.491***	1.736***
Vuong test (ZINB vs NB)	8.55	5.24	5.60	4.63

NOTES: Standard errors in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

7.3 Gravity model estimation for the African-language speaking sample only

Table 5 restricts the sample to the African-language speaking population only. This group was particularly negatively affected by apartheid-era restrictions on movement and settlement. It is therefore of some interest to study the relationship between migrant motivations and distance travelled for this group only. Column 1 shows the full model for the African-language speaking population only for comparison purposes. Columns 2 to 4 again show factors affecting migration flows of varying distances, where short-distance migration is characterised as migration that covers distances between 100 and 200kms. Intermediate-distance migration are those moves that are between 200 and 600kms long, while long-distance moves are moves that are further than 600 kilometres.

In the full African sample, the gravity model variable coefficients behave mostly as expected. Distance reduces migration volumes, while population size in the sending constituency increases migration volumes. Migration flows respond positively to income premia in the receiving constituency but flows also increase when the unemployment rate is higher in the receiving constituency. Migration volumes increase when the distance-to-school ratio is negative. In addition, migrant volumes increase as the NDVI difference increases in favour of the receiving constituency. The distance-to-school and NDVI ratio variables imply that amenities (or agricultural productivity) are significant predictors of migration volumes for the African-language speaking population.

Disaggregation of migrant volumes by distance reveal that per capita income premia in the receiving constituency are extremely strong motivators for migrants to travel long distances. This is not the case for short and intermediate-distance moves, where the income premia coefficients are insignificant. For long-distance moves, migrant volumes increase when unemployment rate differences increase in favour of the receiving constituency. Migrants are willing to migrate long distances, even when employment probabilities are lower in the destination constituency. This may be because the migrant expects to earn a wage in the destination constituency that is substantial enough to offset the labour market opportunity cost of migration.

Only intermediate-distance migration flows seem to be responsive to differences in amenity quality between constituencies, with both the distance-to-school and NDVI ratio variables displaying the expected signs. As before, the previous migration variable is positive and significant for all distances travelled. Migrants simply travel where other migrants have gone before, possibly because of momentum in migration flows from previous years that is yet to dissipate, or because unobservable receiving constituency conditions facilitate easy in-migration.

Table 5. Gravity model: inter-constituency migration flows of African-language speaking migrants, by distance covered

Dependent variable: Gross migration flows between <i>i</i> and <i>j</i>	African sample only (all distances)	>=100 & <200kms	>=200 & <600kms	>=600kms
Distance	-0.0008*** (0.0001)	-0.0007 (0.0021)	-0.0012*** (0.0002)	0.0001 (0.0002)
Population 2010 in sending region	0.0000* (0)	0 (0)	0.0000*** (0)	0 (0)
Population 2010 in receiving region	0 (0)	-0.0000** (0)	0.0000* (0)	0.0000** (0)
Adults as proportion of total pop 2010 rec	0.0001*** (0)	0.0001*** (0)	0.0001*** (0)	0 (0)
Adults as proportion of total pop 2010 send	0.0001*** (0)	0.0001** (0)	0.0001*** (0)	0.0001** (0)
Per capita income ratio 2010 (rec: send)	0.0237* (0.0098)	-0.034 (0.0556)	-0.0186 (0.0119)	0.1167*** (0.023)
Unemployment ratio 2010 (rec: send)	0.2638*** (0.0388)	-0.1145 (0.1517)	0.1755*** (0.0458)	0.5874*** (0.0879)
Distance to school ratio 2010 (rec: send)	-0.0483* (0.0203)	0.0282 (0.0738)	-0.0568* (0.0249)	0.0596 (0.0412)
NDVI 2010 ratio (rec: send)	0.0329* (0.0136)	0.0288 (0.0405)	0.0389* (0.0186)	-0.011 (0.0233)
Previous migrant adults as prop of 2010 adult pop (rec)	1.2750*** (0.0909)	1.4266*** (0.3033)	1.3610*** (0.1182)	1.3175*** (0.1951)
_cons	-0.8831*** (0.0906)	0.045 (0.3789)	-0.9886*** (0.1454)	-2.3078*** (0.2715)
<u>inflate</u>				
Distance	0.0006** (0.0002)	-0.0056 (0.0063)	0 (0.0008)	0.0005 (0.0007)
Population 2010 in sending region	-0.0001*** (0)	-0.0001*** (0)	-0.0001*** (0)	-0.0002*** (0)
Population 2010 in receiving region	-0.0001***	-0.0001***	-0.0001***	-0.0001***

	(0)	(0)	(0)	(0)
_cons	2.2129*** (0.1937)	0.6639 (1.4378)	2.3875*** (0.4406)	1.1272 (0.8431)
SPATIAL FILTERS	Y	Y	Y	Y
N	10 402	981	5 290	3 100
alpha	1.741	1.478	1.468	1.810
Vuong test (ZINB vs NB)	8.86	4.96	5.61	4.87

NOTES: Standard errors in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

8. Conclusion

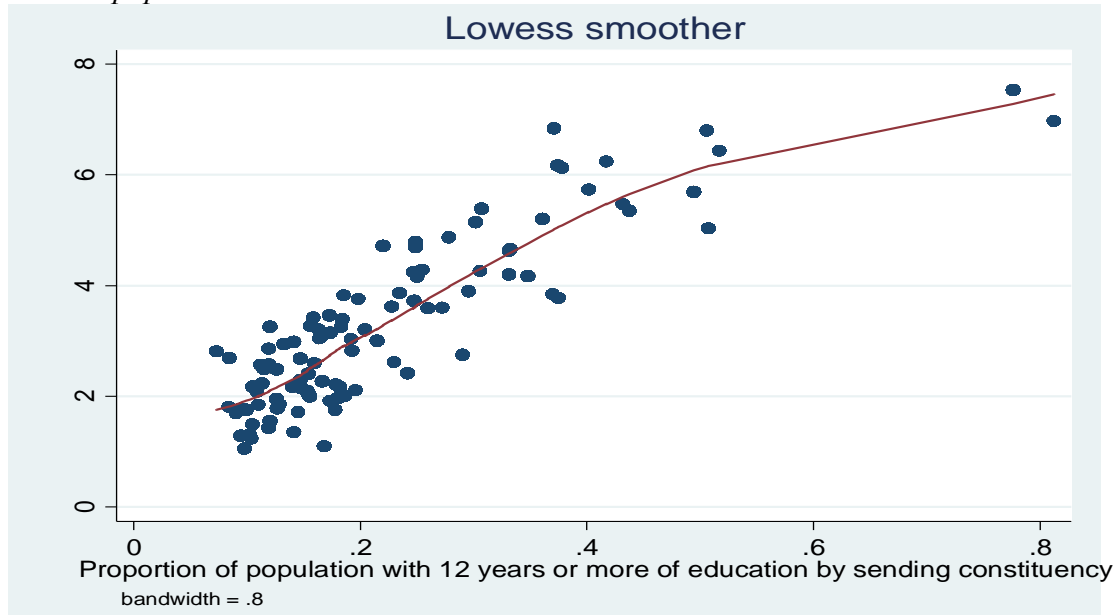
Although a number of papers have estimated gravity models in the developing country context, few, if any, have analysed which region-level factors drive the migrant's decision to engage in short-distance or long-distance migration. Namibia's history of apartheid-era restrictions on movement and settlement of its African-language speaking citizens, combined with its vast, sparsely populated landscape with few economic centres, provides researchers with an interesting opportunity to study sub-Saharan African country internal migration patterns.

The disaggregation of Namibian migration flows by distance reveals that for both the entire population and the restricted African-language speaking sample, constituency differences in amenity quality are significant predictors of intermediate-distance migration volumes. Per capita income differences in favour of the receiving constituency increase long-distance migration volumes. For all distances, previous migration in the sending constituency is a strong positive predictor of migration volumes.

The finding that migration volumes respond differently to the same economic and non-economic incentives depending on the distance traveled suggests that aggregation of migration volumes at the country level are likely to produce results that oversimplify the migration process. While migration flows have been decomposed by distance in developed countries before, this study is the first of its kind in southern Africa. It would therefore be instructive to replicate such a study with more detailed data on larger populations in sub-Saharan Africa to determine whether similar patterns exist elsewhere.

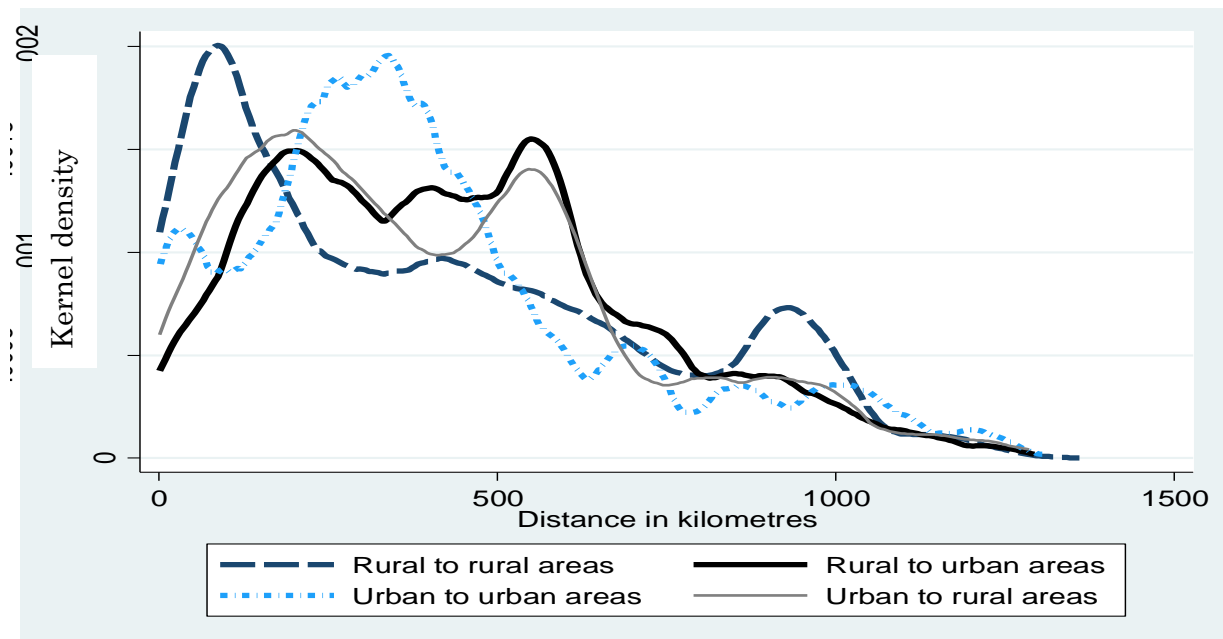
Appendix

Figure A1. Lowess regression: Income per capita in 2009 vs Highly educated adult population in 2010



NOTES: Own calculations based on Namibian Population and Housing Census 2011 and National Household Income and Expenditure Survey 2009 – 2010.

Figure A2. Kernel densities showing distance traveled, by migration type



NOTES: Own calculations based on Namibian Population and Housing Census 2011.

CHAPTER 5: CONCLUSION

1. Summary of the dissertation

This dissertation contributes to the Southern African literature in two main ways. Firstly, it identifies individual and region-level characteristics that influence migration decisions at the individual level in South Africa. The determinants of gross migration flows are analysed in Namibia by combining retrospective region-level data with the current migration decision. Secondly, it contributes to a very small body of South African literature on the dynamics of new urban household formation using longitudinal data.

The empirical evidence presented in this dissertation shows that internal migration in South Africa continues to be an age and education-selective process. Previous migration experience, as well as sending area net out-migration rates significantly increase the probability of internal migration in South Africa. These findings are robust to the inclusion of various individual and region-level controls. The gravity model estimated using Namibian data shows that constituency-level factors affect migration flows in different ways, dependent on the distance travelled. The contribution of this study to the literature is the finding that failure to disaggregate migration flows may mask differences in migrant motivations. High regional poverty and unemployment rates in the former homelands push many of the most potentially productive rural inhabitants to urban areas, where they are often slightly better off than rural inhabitants, but still face multiple challenges in their new urban environments.

The study of urban informal area household formation in South Africa reveals that relative youth, marital status changes and recent migration positively affect the probability of forming a new urban informal household. The study also finds that urban informal area residents have weak labour market prospects relative to urban formal area residents, but in most respects they fare similarly to or better than traditional authority area residents. The results are sobering: migration to South Africa's urban informal areas often does not produce results consistent with the ladder-to-work hypothesis. Residents of urban informal areas often do not ascend to urban formal areas. 60 per cent of residents of urban informal settlements report having lived there for 15 years or more. This is possibly due to poor labour market prospects for this vulnerable group, due to a combination of marginalisation from formal economic activity, low wages and poor access

to basic services that compromise health and productivity. Evidence from Namibia indicates that Namibians also continue to migrate to urban economic centres, despite high unemployment rates in these destination regions.

2. Implications of the research findings

The findings in this thesis contribute to a more nuanced understanding of South African internal migration as a process that involves both individual and region-level determinants. The linking of retrospective region-level data to the current migration decision avoids the temporal issues associated with conventional cross-sectional data analysis, and allows for more causal inference than is normally the case in analysis of the migration decision.

In the Namibian case a zero-inflated negative binomial model is applied to estimate the effects of constituency-level economic indicators, labour market conditions, agricultural activity, and built amenities on migration flows. Regression analysis shows that analyzing internal migration flows in Namibia without accounting for distance-related differences in migrant motivations may produce misleading results. Researchers are therefore encouraged to consider disaggregation of migration data where possible to distinguish differences in underlying motivations.

In the study of urban informal household formation, labour market analysis finds evidence of poor labour market outcomes for urban informal area dwellers, in the forms of weak employment prospects, weak occupational mobility and low wages for urban informal area residents relative to their urban formal area counterparts. In addition, urban informal area adults also more often report being in poor health than urban formal area residents. However, urban informal area residents often have similar or better labour market outcomes and better access to basic services than residents of traditional authority areas.

Overall, the evidence in this dissertation's analysis of migration and urbanisation in two southern African countries suggests that migrants move to urban areas in large numbers despite poor labour market prospects. A number of strong negative push factors in the region of origin contribute to the decision to migrate, which suggests that rural development and better access to service in both countries' rural areas could help stem the loss of their most productive inhabitants.

The poor prospects for migrants to urban informal areas present an opportunity for local, provincial and national government to rethink the organization of the urban environment to increase access to jobs and increased labour market productivity for its most vulnerable citizens. This assumes the utmost importance while the returns from rural development initiatives are still to be realized. Aggressive infrastructure rollout in informal settlement is also a possible way of contributing to development within these marginalized areas. Government may also want to consider 'controlled' informal settlement development that anticipates the possibility of in-situ upgrading. Not doing so increases the risk of dwellings being located close to flood lines, being located too close to each other and the unnecessary escalation of costs related to future infrastructure development.

3. Suggestions for future research

While the data used in this analysis allowed for relatively detailed analysis of the migration and settlement decision for South Africans and Namibians, more regular Censuses in both countries would facilitate the analysis of migration incentives that are closer temporally to the period in which they are being analysed. There is also the added issue of migration intensities being underestimated for individuals who may have moved multiple times between Censuses but are only captured as having moved once. Although issues of confidentiality may affect the request, it may be of more use to policymakers to also be presented with data that is aggregated at lower than municipality level. The more regular release of finer data is likely to be of great use to researchers and policymakers in understanding the microeconomic drivers of urbanization in an environment of poor economic growth.

The study on informal settlement entry is limited by the fact that little good household level data exists that is disaggregated at a fine level to assist policymakers with evidence that is localized. A suggestion for further research in this domain would be small-scale surveys that not only interview residents in informal settlements but also question people in established sending regions what their intentions are in the urban destination if they would like to migrate, and if they want to and expect to exit urban informal settlements if they move there.

The study of urban informal household formation could possibly be extended to add more detailed analysis of formal household formation in the South African context. The

rudimentary analysis in this dissertation suggests that the drivers are indeed different to that of informal household information. Such a study could therefore shed some much needed light on how individuals achieve upward area mobility.

Namibia and South Africa's histories have been shaped in such a way as to produce inequalities that are characterized by race and geography. While research has often focused on delineation of deprivation by race, and rightfully so, not centering geography as a primary channel of poverty and inequality production misses the opportunity to reap the returns from human capital and infrastructure investment.

REFERENCES

- Akter, S. and Rahman, S. 2017. Investigating Multiple Domains of Household Livelihood Security: Insights from Urban Slums in Bangladesh. *Journal of Poverty*, 21 (4): 289 – 309.
- Alder, G. 1995. Tackling poverty in Nairobi's informal settlements: developing and institutional strategy. *Environment and Urbanization*, 7 (2): 85 – 108.
- Angrist, J.D. 2001. Estimation of limited dependent variable models with dummy endogenous regressors. *Journal of Business and Economic Statistics*, 19(1): 2 – 28.
- Ardington, C., Case, A. and Hosegood, V. 2009. Labour Supply Responses to Large Social Transfers: Longitudinal Evidence from South Africa. *American Economic Journal: Applied Economics* 1 (1): 22 – 48.
- Ardington C., Bärnighausen T., Case, A. and Menendez, A. 2013. *Social protection and labour market outcomes of youth in South Africa*. SALDRU Working Paper 96. Cape Town: University of Cape Town.
- Arimah, B.C. 2010. The face of urban poverty: *Explaining the prevalence of slums in developing countries*. Working paper No. 2010/30. Helsinki: World Institute for Development Economics Research.
- Arntz, M. 2010. What Attracts Human Capital? Understanding the Skill Composition of Interregional Job Matches in Germany, *Regional Studies*, 44 (40): 423 – 441.
- Banerjee, A., Pande, R., Vaidya, Y., Walton, M. and Weaver, J. 2012. *Delhi's Slum-Dwellers: Deprivation, Preferences and Political Engagement among the Urban Poor*. International Growth Centre Conference proceedings (Growth Week 2011). In Marx, B., Stoker, T., and Suri, T. 2013. The Economics of Slums in the Developing World, *Journal of Economic Perspectives*, 27 (4): 187 – 210.
- Bates. 1981. *Markets and States in Tropical Africa: The Political Basis of Agricultural Policies*. Los Angeles: University of California Press.
- Bauer, G. 1998. *Labor and Democracy in Namibia, 1971–1996*. Athens: Ohio University Press.
- Bauer, T. and Zimmermann, K. 1998. *Causes of International Migration: A Survey*. In Gorter, P., Nijkamp, P. and Poot, J. (eds) *Crossing Borders: Regional and Urban Perspectives on International Migration*. Aldershot: Ashgate.
- Beine, M., Bertoli, S. and Fernández-Huertas Moraga, J. 2016. A Practitioners' Guide to Gravity Models of International Migration. *The World Economy*, 39: 496 – 512.

- Bell, M., Blake, M., Boyle, P., Duke-Williams, O., Rees, P., Stillwell, J., and Hugo, G. 2002. Cross-National Comparison of Internal Migration: Issues and Measures. *Journal of the Royal Statistical Society. Series A (Statistics in Society)*, 165 (3): 435 – 464.
- Benjamin, S. 2000. Governance, economic settings, and poverty in Bangalore. *Environment and Urbanization*, 12: 35 – 56.
- Bernard, A., Bell, N and Charles-Edwards, E. 2014. Life-Course Transitions and the Age Profile of Internal Migration. *Population and Development Review*, 40 (2): 213 – 239.
- Bertrand, M., Mullainathan, S. and Miller, D. 2003. Public Policy and Extended Families: Evidence from Pensions in South Africa. *World Bank Economic Review*, 17(3): 27 – 50.
- Bhorat, H. and Kimani, M. 2017. *The Role of Post-School Education and Training Institutions in Predicting Labour Market Outcomes*. Labour Market Intelligence Partnership Report 23. Pretoria: Education and Skills Development Programme. Human Sciences Research Council.
- Biagi, B., Faggian, A. and McCann, C. 2011. Long and Short Distance Migration in Italy: The Role of Economic, Social and Environmental Characteristics, *Spatial Economic Analysis* 6 (1): 111 – 131.
- Biermann, S. 2011. Planning support systems in a multi-dualistic spatial planning context, *Journal of Urban Technology*, 18(4): 5 – 37.
- Binford L. 2003. Migrant remittances and (under)development in Mexico. *Critique of Anthropology*, 23: 305 – 36.
- Bird, J., Montebruno, P., and Regan, T. 2017. Life in a slum: understanding living conditions in Nairobi's informal settlements over time. *Oxford Review of Economic Policy*, 33 (3): 496 – 520.
- Borjas, G. 1999. Immigration and Welfare Magnets, *Journal of Labour Economics*, 17 (4): 607 – 637.
- Borjas, G. and Trejo, S 1991. Immigrant Participation in the Welfare System. *Industrial and Labor Relations Review*, 44 (2): 195 – 211.
- Bouare, O. 2002. Determinants of internal migration in South Africa. *South African Journal of Demography* 8 (1): 23 - 48.
- Boyd. 1989. Family and Personal Networks in International Migration: Recent Developments and New Agendas. *The International Migration Review*, 23 (3): 638 – 670.

- Bradley, D., Stephens, C. Harpham, T., and Cairncross, S. 1992. *A Review of Environmental Health Impacts in Developing Country Cities*. Washington D.C.: The World Bank.
- Brauw, A., Mueller, V. and Lee, H. 2014. The Role of Rural–Urban Migration in the Structural Transformation of Sub-Saharan Africa. *World Development*, 63: 33 – 42.
- Brown-Luthango, M., Reyes, E. and Gubevu, M. 2016. Informal settlement upgrading and safety: experiences from Cape Town, South Africa. *Journal of Housing and the Built Environment*, 32 (3): 471 – 493.
- Bunea, D. 2012. Modern Gravity Models of Internal Migration. The Case of Romania, *Theoretical and Applied Economics*, XVIII, 4 (569):127 – 144.
- Camlin, C., Snow, R. and Hosegood, V. 2014. *Gendered Patterns of Migration in Rural South Africa*. *Population, Space and Place* 20 (6): 528–551.
- Cavalcanti, T. da Mata, D. and Santos, M. 2018. On the Determinants of Slum Formation. *The Economic Journal*. <https://doi.org/10.1111/econj.12626>
- Cebula, R. 2005. Internal Migration Determinants: Recent Evidence. *International Advances in Economic Research* 11: 267 – 274.
- Chen, Y. and Rosenthal, S. 2008. Local amenities and life-cycle migration: Do people move for jobs or fun? *Journal of Urban Economics*, 64 (3): 519 – 537.
- Cheru, F. 2005. *Globalization and Uneven Development in Africa: The Limits to Effective Urban Governance in the Provision of Basic Services*. Los Angeles: UCLA Center for near Eastern Studies. Available at <https://www.international.ucla.edu/cnes/article/107324> . Accessed on the 19th of August 2019.
- Choe, C. and Chrite, E. L. 2014. Internal Migration of Blacks in South Africa: An Application of the Roy Model. *South African Journal of Economics*, 82: 81–98.
- Chun, Y. 2008. Modeling Network Autocorrelation Within Migration Flows by Eigenvector Spatial Filtering. *Journal of Geographical Systems*, 10 (4): 317 – 344.
- Clark, W. and Davies-Withers, S. 2007. Family migration and mobility sequences in the United States: spatial mobility in the context of the life course, *Demographic Research*, 17: 591 – 622.
- Clark, W. and Huang, Y. 2003. The life course and residential mobility in British housing markets. *Environment and Planning*, 35: 323 – 339.
- Clark, W. and Huang, Y. 2004. Linking migration and mobility: individual and contextual effects in housing markets in the UK. *Regional Studies*, 38: 617–628.

- Collinson, M., Tollman, S. and Kahn, K. 2007. Migration, settlement change and health in post-apartheid South Africa: Triangulating health and demographic surveillance with national census data. *Scandinavian Journal of Public Health*, 35 (69): 77 – 84.
- Cooper, A. 1999. The Institutionalization of Contract Labour in Namibia. *Journal of Southern African Studies*, 25 (1), 121 – 138.
- Crankshaw, O. 1993. Squatting, apartheid and urbanization on the southern Witwatersrand”, *African Affairs*, 92 (36): 31 – 51.
- Cross, C., Mngadi, T. and Mbhele, T. 1998. Constructing Migration: infrastructure, poverty and development in KwaZulu-Natal. *Development Southern Africa*, 14 (4): 635 – 659.
- Cross, C. 2013. *Delivering human settlements as an anti-poverty strategy: Spatial paradigms*. In Pillay U., Hagg, G. and Nyamnjoh F. (eds) *State of the Nation: South Africa 2012 – 13*. Cape Town: HSRC Press.
- Crush, J., Peberdy, S. and Williams, V. 2006. *International Migration and Good Governance in the Southern African Region*. Migration Policy Brief No. 17. Southern African Migration Project. Canada: International Migration Research Center.
- Dasgupta, S. 2003. Structural and behavioural characteristics of informal service employment: Evidence from a survey in New Delhi. *Journal of Development Studies*, 39 (3): 51–80.
- De Haan, H. 2008. *Migration and Development: A theoretical perspective*. Working Paper 9. Oxford: International Migration Institute, University of Oxford.
- Duriasamy, P. and Narasimhan, S. 1997. Wage Differentials between Migrant and Non-migrant and the Discrimination in Urban Informal Sector in India. *Indian Journal of Labour Economics*. 40 (2): 223 – 235.
- Enchautegui, M. 1997. Welfare Payments and Other Economic Determinants of Female Migration. *Journal of Labor Economics*, 15: 529 – 554.
- Environmental Information Service. 2019. Shapefile from *Fig 5.13 The Odendaal Commission's 1964 proposals*. Available at: http://www.the-eis.com/data/Atlas_Data/Fig%205.13%20The%20Odendaal%20Commission%201964%20proposals.zip . Accessed on the 20th August 2019.
- Erulkar, A., Mekbib, T. Simie, N. and Gulema, T. 2006. Migration and Vulnerability among Adolescents in Slum Areas of Addis Ababa, Ethiopia. *Journal of Youth Studies*, 9 (3): 361 – 374.

- Ezeh, A., Oyebode, O., Satterthwaite, D., Chen, Y., and Lilford, R.J. 2017. The history, geography, and sociology of slums and the health problems of people who live in slums. *The Lancet*, 389: 547-558.
- Faling, W., Tempelhoff, J. and Van Niekerk, D., 2012. Rhetoric or action: Are South African municipalities planning for climate change? *Development Southern Africa*, 29 (2): 241 – 257.
- Fei, J., and Ranis, G. 1961. A theory of economic development. *American Economic Review*, 51: 533-65.
- Feinstein, C.H. 2005. *An Economic History of South Africa: Conquest, Discrimination and Development*. United Kingdom: Cambridge University Press.
- Ferguson, M., Ali, K., Olfert, M. R., and Partridge, M. D. 2007. Voting with their feet: Jobs versus amenities. *Growth and Change*, 38: 77– 110.
- Field, E. 2005. Property Rights and Investment in Urban Slums. *Journal of the European Economic Association*, 3 (2-3): 279 – 290.
- Finn, A., Leibbrandt, M. and Levinson, J. 2012. *Income mobility in South Africa: Evidence from the first two waves of the national income dynamics study, NIDS Discussion Paper 2012/5*. Cape Town: National Income Dynamics Study.
- Fox, S. 2014. The political economy of slums: Theory and evidence from Sub-Saharan Africa. *World Development* 54: 191–203
- Frankenhoff, C. A. 1967. Elements of an Economic Model for Slums in a Developing Economy. *Economic Development and Cultural Change*, 16(1): 27 – 36.
- Frayne, B. and Pendleton, W. 2001. Migration in Namibia: combining macro and micro approaches to research design and analysis. *International Migration Review*, 3: 1054 –1085.
- Frayne, B., and Pendleton, W. 2002. *Mobile Namibia: Migration Trends and Attitudes. Southern African Migration Project*. Cape Town and Canada: Idasa and Queen's University.
- Freund, B. 2006. *The African City: A History*. New York: Cambridge University Press.
- Gelderblom, D. 2007. Does poverty constrain migration in South Africa? Evidence, explanations and implications. *Development Southern Africa*, 24 (2): 241 – 255.
- Giulietti, C. & Wahba, J. 2012. *Welfare Migration*. IZA Discussion Paper No. 6450. Bonn: Institute for the Study of Labor.
- Gladwell, M. 2008. *Outliers: The story of success*. New York: Little, Brown and Company.
- Glaeser, E. 2011. *Triumph of the City*. New York: Penguin Press.

- Goldberg, R. 2013. Family Instability and Pathways to Adulthood in Cape Town, South Africa. *Population and Development Review*, 39 (2), 231 – 256.
- Government of Namibia. 2004. Vision 2030. Windhoek: Namibian Government Press.
- Government of Namibia. 2012. *Namibia 2011: population and housing census*. Windhoek: National Planning Commission
- Grant, U. 2010. Spatial Inequality and Urban Poverty traps. Chronic Poverty Research Centre Working Paper 166. London: Overseas Development Institute.
- Greenwood, M.J., & Hunt, G.L. 1989. Jobs versus amenities in the analysis of metropolitan migration. *Journal of Urban Economics*, 25 (1): 1-16 .
- Greiner, C. 2010. Patterns of Translocality: Migration, Livelihoods and Identities in Northwest Namibia. *Sociologus*, 60 (2): 131 – 161.
- Greiner, C. 2011. Migration, Translocal Networks And Socio-Economic Stratification In Namibia. *Africa: Journal of the International African Institute*, 81(4): 606 – 627.
- Gulyani S. and Talukdar, D. Slum real estate: the low-quality high-price puzzle in Nairobi's slum rental market and its implications for theory and practice. *World Development*; 36: 1916–37.
- Hare, D. 1999. 'Push' versus 'pull' factors in migration outflows and returns: Determinants of migration status and spell duration among China's rural population. *Journal of Development Studies*, 35 (3): 45–72.
- Harris, J. and Todaro, M.P. 1970. Migration, Unemployment Development: A Two Sector Analysis. *American Economic Review*, 60: 126-42.
- Heckman, J. 1979. Sample Selection Bias as a Specification Error. *Econometrica*, 46 (1): 153 -161.
- Herrick, B. 1965. *Urban migration and economic development in Chile*. Cambridge: Massachusetts Institute of Technology Press.
- Hicks, J. 1932. *The Theory of Wages*. London: Macmillan.
- Hindson, D. 1987. *Pass Controls and the African Proletariat*. Johannesburg: Ravan Press.
- Housing Development Agency. 2012. *South Africa: Informal settlements status*. Killarney: The Housing Development Agency.
- Huchzemeyer, M. 2003. The legacy of control? The capital subsidy for housing and informal settlement in South Africa, *International Journal of Urban and Regional Planners*, 27: 594 – 606.
- Huchzemeyer, M and Karam, A. (editors). 2006. *Informal Settlements. A Perpetual Challenge*. Cape Town: UCT Press.

- Huchzermeyer, M. 2006. The new instrument for upgrading informal settlements tributions and constraints. In M. Huchzermeyer & A. Karam (Eds.), *Informal settlements. A Perpetual Challenge*. Cape Town: UCT Press.
- Hunter, M. and Posel, D. 2012. Here to work: the socioeconomic characteristics of informal dwellers in post-apartheid South Africa. *Environment and Urbanisation*, 24 (1): 285 – 304.
- Hur, K., Hedeker, D., Henderson, W., Khuri, S. and Daley, J. 2002. Modeling Clustered Count Data with Excess Zeros in Health Care Outcomes Research. *Health Services and Outcomes Research Methodology*, 3: 5-20.
- Indongo, N., Angombe, S. & Nickanor, N. 2013. *Urbanisation in Namibia: Views from semi-formal and informal settlements*. Windhoek: University of Namibia.
- Joireman, S. F., and Vanderpoel, R. S. 2011. *In Search of Order: State Systems of Property Rights and Their Failings*. In S. F. Joireman (ed.) 2011. *Where There is No Government: Enforcing Property Rights in Common Law Africa*. Oxford: Oxford University Press.
- Karemera, D., Oguledo, V. and Davis, B. 2000. A gravity model analysis of international migration to North America. *Applied Economics*, 32 (13): 1745 – 1755.
- Kironde, J.M.L. 2006. The Regulatory Framework, Unplanned Development and Urban Poverty: Findings from Dar es Salaam, Tanzania. *Land Use Policy*, 23: 460 – 472.
- Knapp, T., and Graves, P. 1989. On the role of amenities in models of migration and regional development. *Journal of Regional Science*, 29: 71 – 87.
- Kok, P., O'Donovan, M., Bouare, O. and Van Zyl, J. 2003. *Post-apartheid patterns of internal migration in South Africa*. Cape Town: HSRC Publishers.
- Kok, P., Gelderblom, D., Ouchou, J.O. & Van Zyl, J. 2006. *Migration in South and Southern Africa: dynamics and determinants*. Cape Town: HSRC Publishers.
- Kordi, M., Kaiser, C. and Fotheringham, A. 2012. *A possible solution for the centroid-to-centroid and intra-zonal trip length problems*. Multidisciplinary Research on Geographical Information in Europe and Beyond Proceedings of the AGILE 2012 International Conference on Geographic Information Science, Avignon, April, 24 – 27, 2012.
- Kornienko K. 2014. Waiting, hope, democracy and space: How expectations and socioeconomic rights shape two South African urban informal communities. *Journal of Asian and African Studies*; 52 (1): 34 – 49.
- Kordi, M., Kaiser, C. and Fotheringham, A. 2012. *A possible solution for the centroid-to-centroid and intra-zonal trip length problems*. Multidisciplinary Research on

- Geographical Information in Europe and Beyond Proceedings of the AGILE 2012 International Conference on Geographic Information Science, Avignon, April, 24 – 27, 2012.
- Kössler, R. 2000. From Reserve to Homeland: Local Identities and South African Policy in Southern Namibia, *Journal of Southern African Studies*, 26 (3): 447 – 462.
- Krishna, A. 2013. Stuck in Place: Investigating Social Mobility in 14 Bangalore Slums, *The Journal of Development Studies*, 49 (7): 1010 – 1028.
- Kulu, H. 2008. Fertility and Spatial Mobility in the Life Course: Evidence from Austria. *Environment and Planning A: Economy and Space*, 40 (3): 632 – 652.
- Lechtenfeld, T. and Zoch, A. 2014. *Income Convergence in South Africa: Fact or Measurement Error?* Working Papers 10/2014. Stellenbosch: Stellenbosch University, Department of Economics
- Levine, P.B., and Zimmerman, D.J. 1995. An empirical analysis of the welfare magnet debate using the NLSY. *Journal of Population Economics*, 12: 391-409.
- Levitt, P. 1998. Social Remittances: Migration Driven Local-Level Forms of Cultural Diffusion. *International Migration Review*, 32: 926 – 48.
- Liu, Y. and Shen, J. 2014. Jobs or Amenities? Location Choices of Interprovincial Skilled Migrants in China, 2000–2005. *Population, Space Place*, 20: 592 – 605.
- Long L., Tucker C. J. and Urton, W. L. 1988. Migration distances: an international comparison, *Demography*, 25: 633 – 640.
- Mabogunje, A. 1970. Systems Approach to a Theory of Rural-Urban Migration. *Geographical Analysis*, 2:1 – 18.
- Marx, B., Stoker, T., and Suri, T. 2013. The Economics of Slums in the Developing World, *Journal of Economic Perspectives*, 27 (4): 187 – 210.
- Massey, D., Arango, J., Hugo, G., Kouaouci, A., Pellegrino, A. and Taylor, J. 1993. Theories of international migration: A review and appraisal. *Population and Development Review*, 19: 431- 66.
- Massey, D., Arango, J., Hugo, G., Kouaouci, A., Pellegrino, A. and Taylor, E. 1994. An evaluation of international migration theory: the North American case. *Population and Development Review*, 20 (4): 699 – 751.
- Massey, D. and Espinosa, K. 1997. What's Driving Mexico-U.S. Migration? A Theoretical, Empirical, and Policy Analysis. *American Journal of Sociology*, 102 (4): 939 – 999.
- Mayne, A. 2017. *Slums: The History of a Global Injustice*. London: Reaktion.
- Mbatha, N. and Roodt, J. 2014. Recent internal migration and labour market outcomes: Exploring the 2008 and 2010 national income dynamics study (NIDS) panel data in

- South Africa. *South African Journal of Economic and Management Sciences*, 17 (5): 653 – 672.
- Molloy, R., Smith, C.L. and Wozniak, A. 2011. Internal migration in the United States. *Journal of Economic Perspectives*. 25 (3):173 – 196.
- Monsutti, A. 2007. Migration as a Rite of Passage: Young Afghans Building Masculinity and Adulthood in Iran. *Iranian Studies*, 40 (2): 167 – 185.
- Moses, E. & Yu, D. 2009. *Migration from the Northern Cape*. A Southern Africa Labour and Development Research Unit Working Paper Number 32. Cape Town: SALDRU, University of Cape Town.
- Mosoetsa, S. 2004. *The legacies of apartheid and implications of economic liberalization: A post-apartheid township*. Crisis States Research Centre Working Papers Series 1, 49. London, UK: Crisis States Research Centre, London School.
- Mukherji, S. 2001. *Low Quality Migration in India: The Phenomenon of Distress Migration and Acute Urban Decay*. Conference paper presented at the 24th IUSSP Conference, Salvador, Brazil.
- Muhwava, W., Hosegood, V., Nyirenda, M., Herbst, K., Newell, M. 2010. Levels and determinants of migration in rural Kwazulu-Natal. *African Population Studies*, 24 (3): 259 – 280.
- Munshi, K. 2003. Networks in the Modern Economy: Mexican Migrants in the U. S. Labor Market. *The Quarterly Journal of Economics*, 118 (2): 549 – 599.
- Namibia Statistics Agency. 2011. *Namibian Population and Housing Census 2011*. Windhoek: Namibia Statistics Agency.
- Namibia Statistics Agency. 2010. *Namibia Household Income and Expenditure Survey 2009/10*. Windhoek: Namibia Statistics Agency.
- Namibia Statistics Agency. 2013. *Namibia Labour Force Survey 2012 Report*. Windhoek: Namibia Statistics Agency.
- Namibia Statistics Agency. 2015. *Migration Report*. Windhoek: Namibia Statistics Agency.
- Namibia Statistics Agency. 2015. *Migration Report*. Windhoek: Namibia Statistics Agency.
- Niedomysl, T. 2011. How Migration Motives Change over Migration Distance: Evidence on Variation across Socio-economic and Demographic Groups. *Regional Studies*, 45 (6): 843 - 855.
- Omer-Cooper, J. 1994. *History of Southern Africa (2nd edition)*. Portsmouth: Heinemann Publishing.

- Owen, D. and Green, A. 1992. *Migration patterns and trends* in Champion, T. and Fielding T. (Eds) *Migration Processes and Patterns*, Vol. 1: Research Progress and Prospects: 17 – 38. London: Belhaven Press.
- Partridge, M. 2010. The duelling models: NEG vs amenity migration in explaining US engines of growth. *Papers in Regional Science*, 89 (3): 513 – 536.
- Partridge, M. and Rickman, D. 2006. An SVAR Model of Fluctuations in U.S. Migration Flows and State Labor Market Dynamics. *Southern Economic Journal*. 72: 958 - 980.
- Payne, G. 2005. Getting Ahead of the Game: A Twin-track Approach to Improving Existing Slums and Reducing the Need for Future Slums. *Environment & Urbanization*, 17: 135–45.
- Pendleton, W. 1996. *Katutura: a place where we stay*. Athens: Ohio University Press.
- Pendleton, W, Crush, J. and Nickanor, N. 2014. Migrant Windhoek: Rural-Urban Migration and Food Security in Namibia. *Urban Forum*, 25: 191 – 205.
- Picard, R. 2019. *GEODIST: Stata module to compute geodetic distances*. Statistical Software Components, Boston College Department of Economics: Boston.
- Posel D. 2001. Intra-family Transfers and Income-Pooling: A Study of Remittances in Kwazulu-Natal. *South African Journal of Economics*, 69 (3): 501 – 528.
- Posel, D. 2004. Have Migration Patterns in post-Apartheid South Africa Changed? *Journal of Interdisciplinary Economics Special Issue*, 15 (3–4): 277 – 292.
- Posel D. and Casale D. 2003. What has been happening to internal labour migration in South Africa, 1993–1999? *The South African Journal of Economics*, 71 (3): 455–479.
- Posel, D., Fairburn, J. and Lund, F. 2006. Labour migration and households: A reconsideration of the effects of the social pension on labour supply in South Africa. *Economic Modelling*, 23 (5): 836 – 853.
- Posel, D. and Marx, C. 2013. Circular Migration: A View from Destination Households in Two Urban Informal Settlements in South Africa. *Journal of Development Studies*, 49 (6): 819 – 831.
- Puhani, P.A. 2000. The Heckman Correction for Sample Selection and its Critique. *Journal of Economic Surveys*. 14 (1): 53 – 68.
- Quigley, J. M., and Raphael, S. 2005. Regulation and the High Cost of Housing in California. *American Economic Review*, 95 (2): 323 – 328.
- Ramos, R. 2016. *Gravity models: A tool for migration analysis*. IZA World of Labor, Institute of Labor Economics (IZA).
- Ranis, G. and Fei, JHC. 1961. A theory of economic development. *American Economic Review*, 51: 533 – 65.

- Rappaport J. 2007. Moving to nice weather. *Regional Science and Urban Economics*, 37: 375 – 398.
- Reed, H. 2013. Moving across Boundaries: Migration in South Africa, 1950 – 2000. *Demography*, 50 (1): 71 – 95.
- Republic of Namibia. 2017. *Namibia's 5th National Development Plan*. Windhoek: National Planning Commission.
- Republic of South Africa. 2012. *National Development Plan 2030. Our Future – Make it Work*. Pretoria: National Planning Commission.
- Ritchey, P. 1976. Explanations of Migration. *Annual Review of Sociology*, 2: 363 – 404.
- Ritsilä, J. and Ovaskainen, M. 2001. Migration and regional centralization of human capital, *Applied Economics*, 33(3): 317 – 325.
- Roseman, C. C. 1971. Migration as a spatial and temporal process. *Annals of the Association of American Geographers*, 61 (3): 589 – 98.
- Rubenstein H. 1992. Migration. Development and Remittances in Rural Mexico. *International Migration*, 30 (2): 127 – 53.
- Salon, D., and Gulyani, S. 2010. Mobility, Poverty, and Gender: Travel “Choices” of Informal settlement Residents in Nairobi, Kenya. *Transport Reviews*, 30 (5): 641 – 657.
- Sartori, A.E. 2003. An estimator for some binary-outcome selection models without exclusion restrictions. *Political Analysis* 11 (2): 111 – 138.
- Saunders, D. 2012. *Arrival City: How the Largest Migration in History is Reshaping our World*. New York: Vintage Books.
- Schacter, J. P. 2001. *Why People Move: Exploring the March 2000 Current Population Survey*. Current Population Reports Number P23-204. Washington, D.C.: US Census Bureau.
- Schwartz, A. 1973. Interpreting the effect of distance on migration. *The Journal of Political Economy*, 81 (5): 1153 – 69.
- Scholtz, L. 2006. The Namibian Border War: An Appraisal of the South African Strategy. *South African Journal of Military Studies*, 34 (1): 19 – 47.
- Shen, J. 1999. Modelling regional migration in China: estimation and decomposition. *Environment and Planning*, 31: 1223 – 1238.
- Shyrock, H.S. and Siegel, J.S. 1971. *The Methods and Materials of Demography*. Washington, D.C.: U.S. Government Printing Office.
- Sjaastad, L. A. 1962. The Costs and Returns of Human Migration. *Journal of Political Economy*, 70 (1): 80 – 93.

- Skeldon, 1997. *Migration and development: A global perspective*. Essex: Longman.
- South African Cities Network. 2011. *Towards Resilient Cities: A Reflection on the first decade of a democratic and transformed local government in South Africa 2001 – 2011*. Braamfontein: South Africa Cities Network.
- South African Labour and Development Research Unit. 2016. *National Income Dynamics Survey, waves 1 to 4*. Cape Town: University of Cape Town.
- Stark, O. 1991. *The Migration of Labour*. Cambridge: Basil Blackwell Inc.
- Statistics South Africa. 1998. *South African Census 1996* (10 percent sample). Pretoria: Statistics South Africa.
- Statistics South Africa. 2001. *South African Census 2001* (10 percent sample). Pretoria: Statistics South Africa.
- Statistics South Africa. 2003. *General Household Survey 2003*. Pretoria: Statistics South Africa.
- Statistics South Africa. 2003. *Census 2001: Concepts and definitions*. Pretoria: Statistics South Africa.
- Statistics South Africa. 2005. *General Household Survey 2005*. Pretoria: Statistics South Africa.
- Statistics South Africa. 2007. *General Household Survey 2007*. Pretoria: Statistics South Africa.
- Statistics South Africa. 2007. *Community Survey 2007* (10 percent sample). Pretoria: Statistics South Africa.
- Statistics South Africa. 2008. *General Household Survey 2008*. Pretoria: Statistics South Africa.
- Statistics South Africa. 2009. *General Household Survey 2009*. Pretoria: Statistics South Africa.
- Statistics South Africa. 2010. *GHS Series Volume II: Housing 2002–2009*. Report 03-18-01. Pretoria: Statistics South Africa.
- Statistics South Africa. 2014. *South African Census 2011* (10 percent sample). Pretoria: Statistics South Africa.
- Stilwell, J. and Thomas, M. 2015. How far do internal migrants really move? Demonstrating a new method for the estimation of intra-zonal distance, *Regional Studies, Regional Science*, 3(1): 28 – 47.
- Storper, M. and Scott, A. 2009. Rethinking human capital, creativity and urban growth, *Journal of Economic Geography*, 9 (2): 147 – 167.

- Stouffer, S. A. 1960. Intervening Opportunities and Competing Migrants. *Journal of Regional Science*, 2 (1): 1 – 26.
- Tobler, W. 1970. A Computer Movie Simulating Urban Growth in the Detroit Region. *Economic Geography*, 46: 234 – 240.
- Todaro, M. 1969. A model of labour migration and urban unemployment in less developed countries. *The American Economic Review*, 59: 138 – 148.
- Todaro, M. 1980. *Internal Migration in Developing Countries: A Survey*. Chapter in Easterlin, R (ed). *Population and Economic Change in Developing Countries*: 361-402. Chicago: National Bureau of Economic Research.
- Todes, A. 2011. Reinventing planning: Critical reflections. *Urban Forum*, 22: 115 – 133.
- Turner, J. 1967. Barriers and channels for housing development in modernising countries. *Journal of the American Institute of Planners*, 33 (3): 167–181.
- Turner, J. 1968. Housing priorities, settlement patterns, and urban development in modernising countries. *Journal of the American Institute of Planners*, 34 (6): 354 – 363.
- Turok, I. 2012. *Informal settlements. Urbanisation and Development in South Africa: Economic Imperatives, Spatial Distortions and Strategic Responses*. Urbanization and Emerging Population Issues Working Paper 8. London: International Institute for Environment and Development.
- Turok, I. and Borel-Saladin, J. 2016. The theory and reality of urban informal settlements: Pathways-out-of-poverty or cul-de-sacs? *Urban Studies*, 55 (4): 1 – 22.
- Tvedten, I. 2004. A Town Is Just a Town: Poverty and Social Relations of Migration in Namibia. *Canadian Journal of African Studies / Revue Canadienne Des Études Africaines*, 38(2): 393 – 423.
- UN-Habitat. 2003. *The Challenge of Informal settlements: Global Report on Human Settlements 2003*. London: Earthscan Publications Ltd.
- UN-Habitat. 2006. *The State of the World's Cities Report 2006/2007. 30 Years of Shaping the Habitat Agenda*. Nairobi: United Nations Human Settlements Programme.
- Van der Berg, S., Burger, R., Leibbrandt, M., and Mlatsheni, C. 2002. *Migration and the changing rural-urban interface in South Africa: What can we learn from census and survey data?* Paper to DPRU/FES Conference on Labour Markets and Poverty in South Africa, Johannesburg, 22 – 24th October 2002.
- Van Niekerk, W., 2013. Translating disaster resilience into spatial planning practice in South Africa: Challenges and champions. *Journal of Disaster Risk Studies*, 5 (1): 1 – 6.

- Venhorst, V., Van Dijk, J. and Van Wissen, L. 2011. An Analysis of Trends in Spatial Mobility of Dutch Graduates. *Spatial Economic Analysis*, 6 (1): 57 – 82.
- Von Fintel, D. and Moses, E. 2018. Migration and gender in South Africa: Following bright lights and the fortunes of others? *Regional Science Policy & Practice*, 9: 251 – 268.
- Wadycki, W.J. 1974. Alternative opportunities and interstate migration: Some additional results. *Review of Economics and Statistics*, 56: 254 – 257. Cited in Bouare, O. 2002. Determinants of internal migration in South Africa. *South African Journal of Demography*, 8 (1): 23 – 28.
- Wentzel, M., Viljoen, J. and Kok, P. 2006. Contemporary South African migration patterns and intentions. In: Kok, P., Gelderblom, D., Oucho, J., and van Zyl, J (eds). 2006. *Migration in South and Southern Africa: Dynamics and Determinants*. Cape Town: Human Sciences Research Council;.
- White, M. J. and Mueser P. R. 1988. Implications of boundary choice for the measurement of residential mobility. *Demography*, 25, 443 – 459.
- Wilson, F. 1972. *Labour in the South African Gold Mines, 1911 – 1969*. Cambridge: Cambridge University Press.
- Wong, D. 2009. The modifiable areal unit problem (MAUP). Fotheringham, A. and Rogerson, P (eds). In *The Sage handbook of spatial analysis*: 105– 124. Los Angeles: Sage.
- World Bank. 2009. *Reshaping Economic Geography: World Development Report*. Washington, DC: World Bank.
- World Bank. 2013. *Planning, Connecting and Financing Cities – Now*. Washington, DC: World Bank.
- World Bank. 2019. Population density (people per sq. km of land area). Available at: <https://data.worldbank.org/indicator/EN.POP.DNST?locations=NA> . Accessed on the 19th September 2019.
- World Bank, 2019. Urbanisation population data. Available at <https://data.worldbank.org/indicator/SP.URB.TOTL.in.zs> . Accessed on the 19th September 2019.