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The labour market impacts of female internal migration: Evidence from the end of Apartheid

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Abstract

Women often migrate within developing countries for different reasons than men and female migrants tend to be very differently distributed across economic sectors as compared to male migrants. This paper provides some of the first evidence on the labour market impacts of female internal migration, examining effects in both the productive and household sectors. I merge large sample migration data from South African censuses with detailed labour force survey data, and exploit substantial time-variation in female migrant inflows into over 200 districts. To identify the causal effects of migration on labour market outcomes, I make use of the unique history of South Africa to construct a plausibly exogenous shift-share instrument for female migrant concentration based on earlier male migration flows from reserves during the Apartheid period. I firstly find that this migration increases the employment and hours worked of high-skilled women (but not men). I demonstrate that this effect is driven by substitution in household work as many female migrants find work as domestic helpers. I also find that female migration leads to a (short-term) reduction in the employment of low-skilled female non-migrants suggesting an increase in competition at the bottom of the economic ladder.

Keywords: internal migration, economics of gender, natural experiment

JEL Classification: R23, J16, J22

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1 Introduction

Most studies in the economics literature on international and internal migration, and their impacts, focus on male migrants and effects on male natives/non-migrants (Dustmann et al., 2016). However, a gendered focus on migration is important (Pfeiffer et al., 2007). Women may migrate for different reasons to men and the effects of migrant networks may be gender-specific (Enchautegui, 1997; Davis and Winters, 2001). Since women tend to be distributed differently across economic sectors as compared to men, their arrival in receiving regions would be expected to have different effects on the non-migrant population. For the same reason, female non-migrants are likely to be affected by in-migration differently to men. This paper focuses on measuring the labour market impacts of female internal migration in South Africa, examining the heterogeneous effects on non-migrants of different skill groups.

South Africa presents a particularly interesting case for the study of internal migration in developing countries. For over 80 years the mobility of South Africa's black population was strictly controlled and many were forced to live in native reserves in rural areas called 'homelands' (see Figure 1). This reflected the needs of the white-controlled government for cheap - predominantly male - migrant labour to support mining and industrial development but also political anxiety about permanent rural-to-urban migration of this disenfranchised population (Turok, 2012). After the Second World War, political considerations dominated and increasingly draconian controls were imposed to limit black urbanisation in order to sustain political domination. While the Apartheid regime officially ended in 1991 (with the first democratic national election in 1994), the most important migration restrictions were withdrawn in 1986. This constituted a large shock to the system, resulting in a spike in the rate of internal migration (Reed, 2013). Since women had very few opportunities to leave homelands during Apartheid, the female migrant supply shock was particularly large.

With the dramatic increase in the rate of urbanisation, policy-makers in South Africa, as in many other developing countries experiencing rapid urbanisation, have expressed concerns that cities have been unable to cope with the influx of migrants. There is a particular concern that rural migrants may undercut low-skilled non-migrants in the labour market. Despite its importance, there have been few studies of the labour market impacts of internal migration. No published studies have specifically examined the economic impacts of female internal migration.

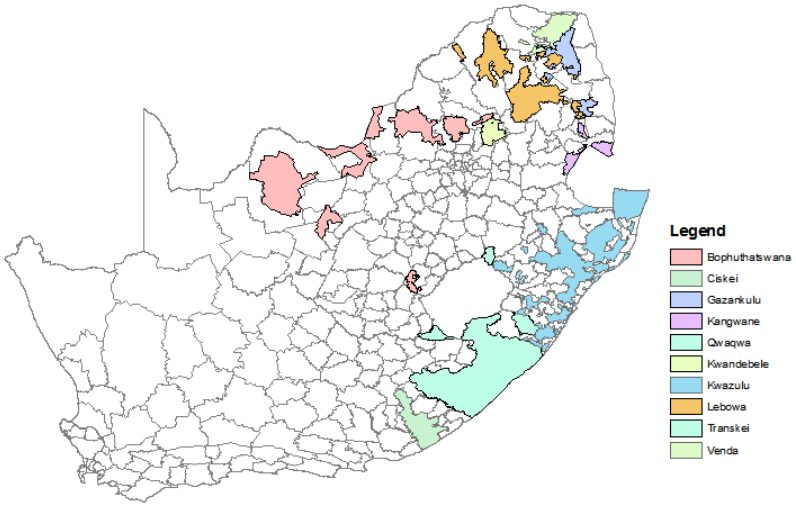

Figure 1: South African homelands and magisterial districts

I examine the changing nature of female migration and impacts thereof on the labour market outcomes of non-migrants in over 200 receiving districts in South Africa after Apartheid. Internal migration in South Africa has a strong gender dimension. Historically, the Apartheid-era migrant labour system meant that predominantly black African men moved to urban areas without their families. After the abolition of influx controls, many women relocated to join their male partners (Von Fintel and Moses, 2017). The share of women in the total migrant population grew at the same time as female participation in the labour market increased. I first document the surge of female migration that occurred after the end of migration restrictions and examine the characteristics of the migration population. I show that while female migrants had very little work experience, they were relatively well-educated as compared to the population in receiving districts. I then look at the impacts of migration on the non-migrant population in receiving districts between 1996 to 2001, a period during which there was considerable variation in district-level migration inflows. I use an empirical specification that includes district and time fixed effects and examine heterogeneous effects across gender and skill groups.

To identify the causal impact of migration flows, I exploit historical migration pathways - particularly between areas that were native reserves and receiving areas - to predict contemporary migration. I employ a shift-share 'past settlement instrument' that makes use of the tendency for female migrants to settle in places where earlier male migrants from the same sending region already reside. Crucially, given South Africa's peculiar history - including centrally-determined migrant allocation during the Apartheid era and dramatic changes in the spatial economic land-

scape after the end of Apartheid - there is a strong case to be made that the historical distribution of (black) migrants across geographical areas is unrelated to contemporary economic shocks in the same areas.

Overall, I find that female migration has a non-significant effect on the employment and wages of male and female non-migrants (in line with much of the migration impacts literature). However, decomposing these average effects by skill, I find that female migration results in an increase in the employment (and hours worked) of highly educated women and a reduction in the employment of low-skilled female non-migrants. I provide evidence that migrant women supply services that are close substitutes with housework thereby freeing up the labour of high-skilled women. On the other hand, female migrants seem to compete for low-skilled jobs with female non-migrants in receiving economies.

My paper contributes to the literature on internal migration in developing countries (Lall et al., 2006). Following on from work on the impacts of international migration in developed countries, several recent studies (Strobl and Valfort, 2015; Combes et al., 2015; Kleemans and Magruder, 2018) have looked at the economic impacts of internal migration in developing countries using spatial variation of migrant inflows for identification. None of these papers have tried to separate the effects of male and female migration nor have they examined in any detail differential effects on male and female non-migrants. Whereas all of these papers have had to make use of small sample migration data or census data for labour market outcomes, I combine large sample migration data with detailed labour force survey data on labour market outcomes. Only Kleemans and Magruder (2018) have had more than a single cross-section of labour market data to work with. Past studies have found mixed results. Some have found negative economic impacts of internal migration on wages and employment (Kleemans and Magruder, 2018; Strobl and Valfort, 2015) in line with basic theory (Borjas, 1999; Card, 2001). Others, however, have found positive effects, which have been attributed to complementarities in the production function and agglomeration economies (Combes et al., 2015).

A well-known challenge in the migration impact literature is overcoming the endogeneity of migration flows: the fact that migration is likely to be correlated with economic conditions in receiving regions, which will bias estimates of migration effects. Since Card (2001), past settlement instruments (otherwise known as 'enclave-' or 'network instruments') using the lagged geographic distribution of migrants have been employed extensively in the immigration literature,

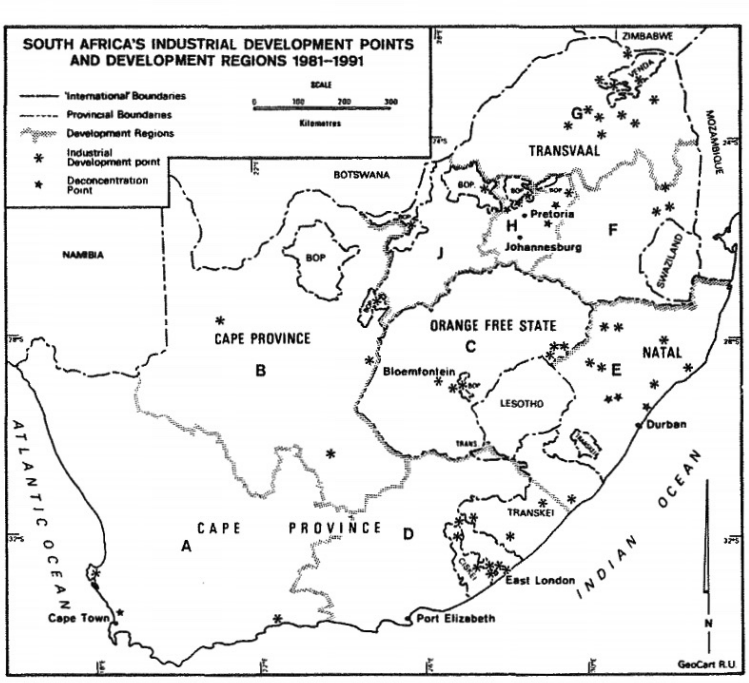

Figure 2: Location of the South African government's 'industrial development points' and 'deconcentration points' that were active during the period 1981-1991

Source: Nel (1994)

and also in the internal migration literature, albeit to a lesser extent. An important difficulty with this type of instrument is that it can only address the endogeneity of migrant location choices if local economic shocks that attracted the earlier migrants are not also at work during the contemporary period (Borjas, 1999). In recent years, this assumption has been increasingly questioned. Most papers do not even attempt to tell a story of why migration determinants should have changed, merely relying on significant time passing between the contemporary and lagged periods. In situations where migration pathways are highly stable over time (which is very often the case), historical migration pathway instruments may predict current migration flows well but it is highly unlikely that the exclusion restriction holds (Jaeger et al., 2018). In this paper, I make use of the fact that dramatic changes in South African government policy created a substantial shift in the area-of-origin composition of internal migrants in South African regions between the Apartheid and post-Apartheid periods.

My paper also adds to the growing literature that tries to exploit exogenous variation resulting from Apartheid to study the development of South Africa (Bakker et al., 2020; Biavaschi et al., 2018; Mariotti, 2015). One shortcoming of most of these papers is that they have assumed that all Apartheid era policies ended abruptly in 1994 with the first democratic elections. A

more careful appraisal of the historical record shows that the Apartheid regime was gradually dismantled from the mid-1980s to 1991. In the case of migration restrictions (which also applied for a time to black immigrants from other countries), the most important of these actually ended with the repeal of the Pass Laws Act in 1986 - and not with democratisation in 1994 - following which black people were free to move to cities (Ogura, 1996). A few recent papers have tried to measure the effects of international migration on labour market outcomes in South Africa (Broussard, 2017; Biavaschi et al., 2018). Biavaschi et al. (2018) use data from the 1991 Census while Broussard (2017) uses data from the 1996 Census to construct historical migration paths. They have also used census data for native labour outcomes, which may not be ideal for this purpose (cf. Ardington et al. (2006)), and have used larger geographical units, often containing several labour markets. These papers have found negative impacts of immigration on the employment and incomes of natives. There have been no nationally representative studies of internal migration in South Africa,[1] nor has there been any previous attempt to measure the economic impacts of internal migration in South Africa.

Lastly, my study contributes to the emerging literature on gender differences in local labour markets. Most studies just assume away gender. To date there have been a few studies examining the impacts of female immigration from low-income countries on native labour market outcomes in advanced countries (Cortes and Tessada, 2011; Barone and Mocetti, 2011). These studies have generally found that this immigration has increased the hours worked of high-skilled/high-income women and have highlighted the channel of substitution in household work. There are several reasons why the impacts of female *internal* migration in a *developing* country context may be different (cf. Kleemans and Magruder (2018)). First, labour markets in developing countries are structurally quite different from those in developed countries. There are typically much higher rates of informality and unemployment/underemployment, and the median worker is much less skilled. Second, the demographics of the internal migrant population may be different from those of the immigrant population given that it is much cheaper to move and migration drivers may be different. Thirdly, labour markets may be thinner in developing countries, which might result in larger labour market responses. My paper also differs from the papers mentioned above in that it not only focuses on the effects of migration on the labour supply of high-skilled/high-income women but also considers the labour market effects on low-skilled non-migrants. I also consider

[1]Several limited studies (Oosthuizen and Naidoo, 2004; Naidoo et al., 2008; Rogan et al., 2008) have focused on profiling internal migration to particular metropolitan areas (usually Cape Town or Gauteng) in South Africa and on trying to analyse push and pull factors contributing to migration.

a broader range of non-migrant labour market outcomes including employment and wages.

The paper is structured as follows. In Section 2, I describe the historical background. In Section 3, I present the data. I detail my estimation strategy in Section 4. In Section 5, I report my results. In Section 6, I present various robustness checks and in Section 7, I turn to an examination of channels. Section 8 concludes.

2 Historical background

The philosophy underlying separate development in South Africa can be traced back to the early days of its colonial history. Segregationist policies began in 1913, three years after the formation of the Union of South Africa, when the Natives Land Act was passed. This was designed to counter the flow of blacks to urban areas after the devastation caused by the Second Anglo-Boer War (1899-1902) and demarcated black reserves for black ownership and occupation while prohibiting the black population from owning land outside of them (Ogura, 1996). Further legislation in 1923 and 1937 compelled the black population to live in certain areas and prohibited the black population, born outside of cities, from spending more than 14 days (and, later, three days) in cities to seek work.[2] Despite these restrictions, the black population in cities grew, especially with the increased demand for labour from the rapidly developing manufacturing industry around the time of the Second World War (Christopher, 2001).

Restrictions on migration became much stricter after 1948 when the Afrikaner National Party (NP) came to power and implemented its programme of Grand Apartheid ('apart-ness' in Afrikaans), which aimed at compete social and spatial segregation and was supported by significant government resources. Grand Apartheid aimed at moving a large proportion of the black population - all who were not needed as labourers in white urban areas - to native reserves. To this effect, it has been estimated that 3.5 million black people (equivalent to a fifth of the black population in 1980) were forcibly relocated from 'white' areas. These reserves were overcrowded, had extremely high poverty rates, were reliant on meagre subsidies from the national government and had limited industry. Living conditions and the provision of public services in resettlement camps were dismal (Desmond, 1971; Horrell, 1973). Small-holder farming was one of the only activities that could be undertaken but even this was limited by the poor quality of

[2]The relevant laws were the Native (Urban Areas) Act (1923), the Native Laws Amendment Act 1937 and the Native (Urban Areas) Consolidation Act (1945).

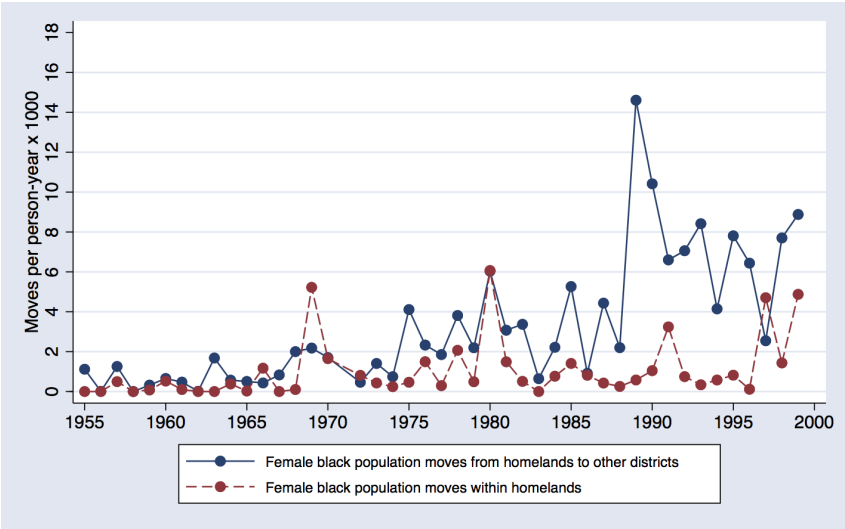

Figure 3: Historical migration rates of the female black (native) population in South Africa

Data from the 1999/2000 South Africa Migration and Health Survey, which recorded the migration histories of 2233 black South African households. Individual weights provided in the survey used. Focusing on the population in the 18-80 age range.

the agricultural land.

A number of important laws were passed. The Group Areas Act of 1950 established residential areas for black people (which would later become 'townships') in metropolitan areas and smaller cities and was meant to strengthen controls on the flows of blacks into cities (Ogura, 1996). The Population Registration Act (1950) assigned a population group to each citizen, which determined their political and social rights. The Pass Laws Act (1952) forced every black African to carry a passbook (similar to a passport) at all times documenting their permission to be in certain areas, without which they were subject to arrest. In 1959, the Promotion of Bantu Self-Government Act formalised the system of homelands, one for each 'ethnic' group.[3]

After 1948, the control of migrant labour became much extensive and bureaucratic (Hepple, 1969; Wilse-Samson, 2013). The employment of blacks was subject to the authority of the central labour bureau in Pretoria, which oversaw and controlled the numerous local bureaux. Blacks could not be employed in white areas without the permission of the local labour bureau. Furthermore, no black person could leave a homeland to work or seek work without the authority of the homeland bureaux, which would pool all workseekers in their respective areas. Since there was often a shortage of agricultural labour,[4] blacks were only allowed to leave rural areas

[3]By the time they were reincorporated in 1994, South Africa's homelands - their land mass constituting 13% of the country's land mass - were home to approximately 20 million black South Africans.

[4]As a share of the economically active black population in 1970, about 40% of blacks were employed in agriculture, forestry and fishing (2.26m people). Involvement in other sectors was as follows: 11% in mining

if labour supply in the agriculture industry was deemed sufficient (Wilse-Samson, 2013). It was also government policy that each reserve would send the majority of its workers to one specific industry (Leys, 1975; Mariotti, 2015). For example, the Chamber of Mines in South Africa recruited from four out of ten homelands, and predominantly from just one (Mariotti, 2015). This centralised allocation process was independent of the preferences and economic characteristics of the migrants (Mariotti, 2015). Mobility restrictions in South Africa were very strict, and hundreds of thousands of arrests were made every year under the pass laws.[5]

Also relevant were the significant efforts to decentralise industry from the late 1950s. These included policies both to promote industrialisation in selected white areas bordering homelands ('carrots') and to restrict industrial expansion in metropolitan centres ('sticks'). While ostensibly designed to alleviate diseconomies of scale in metropolitan areas, the main goal was to support the state's system of influx control by providing alternative employment opportunities in areas near Bantustans (Wellings and Black, 1986). Under one scheme, white industrialists were encouraged to locate their factories in white towns near homelands, with black labourers being housed either in satellite townships or in new towns within the reserves. Some 80 select 'growth points' - otherwise known as 'industrial development-' or 'deconcentration points'; see Figure 2 - were established where manufacturing enterprises benefited from infrastructural developments as well as some of the most generous location incentives available anywhere in the world - including subsidised transport, water and power; reduced taxation and controls on wages for black employees (Best, 1971; Rogerson, 1998). Most growth points were located where 'positional, infrastructural and agglomeration advantages were negligible' (Wellings and Black, 1986). Location decisions were instead driven by the need to allocate several to each of the homelands as well as a need to satisfy the demands of influential white constituencies eager to achieve growth point status (Dewar et al., 1984; MacCarthy, 1982). Under the Physical (later Environment) Planning Act, introduced in 1967, controls on the number of black labour intensive strategies were put in place in the metropolitan centers of Pretoria-Witwatersrand-Vereeniging (PWV), Port Elizabeth-Uitenhage, Bloemfontein and Cape Town. The expansion of industrial land and the establishment of industries with a higher than officially approved black-white employee ratio was prohibited in large swathes of these metropolitan areas (Geyer, 1989). This policy as well as

and quarrying (610,000 people); 9% manufacturing (514,000 people); 18% in the services sector (1.1m people) (Lombard and Stadler (1980); quoted in Wilse-Samson (2013)).

[5]One estimate suggests that between 1916 and 1984, some 17.7 million Blacks were arrested, prosecuted, and relocated from White areas under the pass laws (Savage, 1986).

the 'border industries' policy were widely criticised for being economically irrational (Wellings and Black, 1986).

As a consequence of all of the above, and importantly for the identification strategy in this paper, black migrants from homelands during Apartheid were not free to choose where to migrate to on the basis of market-based economic incentives (Feinstein et al., 2005; Mariotti, 2015). To a large extent, they could only move to areas where the government decided their labour was needed, and these decisions were usually made on political rather than economic grounds. While it was not the case then that workers were forced to migrate to particular areas in South Africa, their choice set was severely limited: they either had to accept an offer to work in a particular industry in a particular place or they could remain in homelands and try to get by on subsistence farming or remittances from family members. Those who decided to take up job offers would often have to relocate to specially demarcated areas on the periphery of white areas. Often these areas were more than a day's travel from their homeland of origin, and they might only have been able to visit their families on one or two occasions a year (Ogura, 1996). The result was the formation of migrant enclaves across the country.

Also important for this paper were the conditions around female black migration in the pre-1994 period. There were few employment opportunities for black women in cities and towns. Sometimes they could find work as domestic helpers or in factories but the Apartheid regime was mostly interested in employing male migrant labour. Furthermore, to a large extent, the Pass Laws prevented the spouses or children of pass book holders from accompanying them to the urban areas they were employed in (Von Fintel and Moses, 2017; Healy-Clancy, 2017). The majority of black migrant men lived in single sex compounds near the work-sites and were not allowed to have visitors of the opposite sex staying overnight. Following the end of migration restrictions, female migration from homelands dramatically increased (as I explore in the following section). Many women would have followed in the footsteps of their male partners who had been migrants while the migration restrictions were in place (Von Fintel and Moses, 2017). In support of this thesis, in the 2001-2002 HSRC National Migration Survey the main reason cited by female respondents for having migrated between magisterial districts was 'getting married or moving in with a partner' or 'getting separated or divorced' (13% together of respondents) (Wentzel et al., 2006). 'Moving closer to relatives' was ranked as the third most important reason for moving by (8% of) female respondents, and 'having to move with a spouse'

was another common reason cited by (7% of) female respondents (Wentzel et al., 2006).[6][7]

While the Apartheid regime officially ended in 1991, the most important migration restrictions were withdrawn in 1986 - with the Abolition of the Influx Control Act. With this act, the pass system was dropped and black people were allowed to purchase land and housing outside of the homelands. This resulted in a spike in the rate of internal, largely supply-driven migration (though based on data from a relatively small sample migration history survey,[8] Figure 3 illustrates the fact that female migration from homeland to non-homeland areas increased substantially after migration restrictions were lifted in 1986). Simultaneously, from the early 1990s, tough international sanctions were loosened and then repealed, and the economy was opened up with dramatic consequences in terms of the spatial distribution of economic activity (Imbs, 2013). While the South African economy experienced negative economic growth in the decade before 1994, in the following decade it experienced positive economic growth (Aron et al., 2009). Rapid regional economic divergence in the post-Apartheid period has also been documented (Bosker and Krugell, 2008). Relatedly, Imbs (2013) studies rapid structural transformation in the post-Apartheid period in South Africa, finding that as South Africa opened to international trade, manufacturing and extractive industries waned and services took over, substantially altering the spatial economic landscape of the country.

3 Data

3.1 Unit of geography

The main geographic unit of observation in this paper is the magisterial district. There are 354 magisterial districts in South Africa with an average territory of 3447.5 km^2.[9] In 1996, these had an average working age population size of approximately 100,000. Magisterial districts are administrative units but closely approximate labour markets and have been used as such in

[6] 'Looking for work' ranked second highest (11%) as the most important reason for moving for female migrants. For male migrants, on the other hand, this was by far the most important reason for moving (23%) (Wentzel et al., 2006, pg.189).

[7] In general migration networks seem to be an important determinant of internal migration in South Africa. In an econometric analysis based on the 2002 HSRC National Migration Study, it was found that the presence of a migrant network in a possible destination area was by far the most important predictor of whether a respondent chose to migrate in the five years before the survey (Wentzel et al., 2006, pg.195).

[8] The South Africa Migration and Health Survey was carried out in 1999-2000 and recorded the migration histories of 2233 black South African households. It was designed to be nationally representative and was stratified by urban/rural area and relative proportion of migrants. However, while its results compare favourably to those obtained from the 1996 Census (Reed, 2013), it is probably not directly comparable due to the limited number of districts visited by the administrators and the small size of the sample.

[9] While magisterial districts still exist, there were replaced by local municipalities as an administrative layer in the census and most surveys after 2001.

several recent well-published papers (e.g. Magruder (2010), Magruder (2012)). Each magisterial district corresponds to the jurisdiction of a magistrate's court, the lowest level of the South African court system, and contains at least one sizeable town or city. While regional boundaries in South Africa are known to change quite regularly in recent times, they were remarkably stable during and in the decade after Apartheid.

Since I am focusing on migration from areas classified as homelands during Apartheid (within which black people could move freely) to the rest of South Africa (where black people could not move freely when the pass laws were in place), I exclude magisterial districts from my sample of receiving districts that overlapped with homeland areas in the Apartheid period. This leaves a sample of over 200 receiving districts. In the case of most homelands, there was a clear continuation between former homeland boundaries and current magisterial districts. In the case of a few homelands (Kwazulu in particular), some work is required to determine which magisterial districts should be considered as part of former homeland areas. I have used EOG DMSP nighttime light data from 1991 and 2010 to identify population clusters and to determine whether roughly at least 20% of the population of a magisterial district in 1991 was settled on an area within a former homeland area - in which case, I consider this as a 'homeland magisterial district'.[10]

Contemporary migration data come from the 10% sample of the 1996 and 2001 censuses, which cover 3.6 million and 3.7 million individuals respectively. These censuses contain questions on the duration of time at current residence and the place of previous residence. Focusing only on migration from former homelands, I calculate migrant stocks in receiving districts in 1996 and 2001 (the latter may be imperfectly measured though the magnitude of the bias should be minimal).[11] The large size of the samples is useful for capturing internal migration at a relatively fine spatial scale. For the construction of the historical pathways instrument, I use data from

[10]The number of magisterial districts is higher in 1996 than in 1985 but this was mostly just due to some cases where adjacent magisterial districts were combined. Moreover, four homelands were considered independent in 1985 and only after 1994 were new magisterial districts boundaries drawn for these areas.

[11]The 1996 Census provides information on migration at any time during a person's life (the questions were 'What was your district of previous residence?' and 'Which year did you move?'). The 2001 Census only provides information on migration in the past five years (the questions were 'Did you move from another district in the last 5 years?' 'Where from?' 'Which year did you move?'). I calculate the (imperfect) migration stock in 2001 by adding together the 1996 stock and 1996-2001 flow. To the extent that people who migrated from homelands to non-homeland areas before 1996 migrated again between 1996 and 2001, the migration stock variable for 2001 may be biased upwards (leading to an underestimation of the effects of migration). However, as discussed in Dinkelman (2016), household surveys from South Africa suggest that the share of people who had moved internally more than once in their lives before the late 2000s is relatively low with multiple migration rates only around 5% (or 12% conditional on ever moving).

the full-count 1985 census, which provides information on the place of birth of individuals.[12]

3.2 Labour market outcomes & individual characteristics

For non-migrants in my main analysis, I use South African labour force surveys available (annually, biannually or quarterly, depending on the period) from 1996 to 2017 and including on average approximately 25,000 households per wave. These contain much more detailed and consistent information than the census on labour force characteristics. While most of these surveys do not provide data on migration, several waves spread throughout the series do include this information, which allows non-migrants to be distinguished from migrants. This is important so that I can exclude in-migrants from the sample. My estimates can then be interpreted as a treatment effect of migration on the non-migrant labour force instead of a compositional change in the labour force with a migrant influx. I pool data from LFS 1996 and LFS 1997[13] to merge with migration data from the 1996 Census and I merge the September 2003 wave of the LFS with the 2001 Census.

I restrict my analysis to individuals between 18 and 64 years old[14] and exclude retired and disabled individuals, and individuals in full-time education. I refer to this group as the 'working age population'. I convert all hours worked and earnings to a monthly amount. If a worker reports working more than 84 hours a week, I recode hours worked as missing. I drop 8 outliers[15] and workers earning less than the first percentile of the wage distribution as I am concerned about under-reporting. In terms of relevant controls, educational attainment is defined for the following five categories: No education, primary education, incomplete secondary education, complete secondary education and tertiary education. I also include controls for age, age squared and race. I define three skill groups for non-migrants: the low-skilled category includes individuals that have at most completed Grade 9 of high school; the middle-skilled category includes individuals who have completed Grade 10 or Grade 11; and the high-skilled category includes individuals that have completed at least Grade 12 (including those with tertiary education qualifications).

[12] In fact, information is only provided on whether people were born in a homeland (with the particular homeland listed) or whether they were born in (the rest of) South Africa. However, this is sufficient information for my identification strategy.

[13] Actually these survey waves were part of the October Household Survey series but they function as a labour force surveys since they contain detailed information on labour force characteristics, which is directly comparable to that in later surveys. I pool data from two waves here because earlier waves surveyed fewer people. In Section 6, I show that just using data from LFS 1997 does not substantially change my results.

[14] Results are substantially unchanged when I focus on a narrower age group only including individuals between the ages of 20 and 55.

[15] As suggested by the authors of the Post-Apartheid Labour Market Series, which standardises all waves of the labour force survey (including the October Household Survey).

Table 1: Summary statistics for recent migrants

	1985		**1996**		**2001**	
	MALE & FEMALE					
	MIGRANTS					
		SD		SD		SD
Age	33.5	12.0	31.4	9.4	30.1	9.1
Avg. years of educ.	4.8	3.8	7.5	4.1	9.0	3.8
Gr. 12 or higher (%)	3.3	17.7	19.1	39.3	37.2	48.3
Female (%)	32.7	46.9	41.6	49.3	46.8	49.9
Female/male employ.			0.68		0.74	
	NON-MIGRANTS					
		SD		SD		SD
Age	33.0	13.1	36.2	11.1	35.8	10.9
Avg. years of educ.	7.3	4.1	8.1	4.1	8.5	4.1
Gr. 12 or higher (%)	20.3	40.2	23.9	42.6	33.0	47.0
Female (%)	49.7	50.0	45.0	49.8	46.0	49.8
Female/male employ.			0.80		0.83	
	FEMALE ONLY					
	MIGRANTS					
		SD		SD		SD
Age	33.2	12.7	31.3	9.2	30.0	8.8
Avg. years of educ.	5.0	3.9	7.6	4.1	9.1	3.8
Gr. 12 or higher (%)	4.2	20.0	19.0	39.1	38.2	48.6
	NON-MIGRANTS					
		SD		SD		SD
Age	33.0	13.2	35.4	10.9	35.0	10.7
Avg. years of educ.	7.3	4.0	8.3	4.1	8.6	4.0
Gr. 12 or higher (%)	19.2	39.4	24.9	43.2	34.5	47.5

Data from Census 1985, Census 1996 & Census 2001

High school graduation rates are relatively poor in South Africa and completing Grade 12 (the final year of school) gives a substantial advantage in the labour force. Many high school students drop out in Grade 10 or Grade 11, after which they are still eligible to enter state-sponsored technical colleges.

For my summary statistics, I have used South African census data, which contain information on labour market outcomes and individual characteristics. I prefer not to use these data for my main analysis since employment is not defined consistently across waves and there is only information on income categories.

3.3 Summary statistics & discussion

Table 1 shows some summary statistics for (recent) migrants and non-migrants for 1985, 1996 and 2001. To illustrate dynamic changes in migrant characteristics over time, I focus on recent migrants in 1996 and 2001 i.e. migrants who have moved from homelands - or former homelands - to the rest of South Africa in the five years prior to the census.[16] Non-migrants are defined as working age individuals in migrant-receiving districts who did not move in the five years prior to the census. I have also included information from 1985 for comparative purposes, however since I do not have information on recent migration, here 'migrant' is defined as a working age individual who was born in a former homeland area but is now living in a non-homeland area and 'non-migrant' is defined as a working age individual who was born in a non-homeland area.[17]

The average age of the migrant population was 4-6 years lower than that of the non-migrant population in 1996 and 2001 with the gap seeming to widen over time. During Apartheid, migrants had much lower levels of education than non-migrants. However, by 1996, migrants had dramatically closed this gap. In 1996, for both men and women, the difference in average years of education between migrants and non-migrants was less than one year, even if the proportion of migrants that had completed at least high school (Grade 12) was still 4-5 p.p. lower than that for non-migrants. By 2001, however, migrants had on average an extra 0.5 years of education than non-migrants and a higher proportion of them had completed high school. Remarkably, the proportion of female migrants that had completed at least Grade 12 more than doubled between 1996 and 2001 (with a similar increase for males). While the fact that migrants from

[16] I also do it this way because, as discussed in Footnote 11, I am not able to identify people observed in 2001 who migrated before 1996 as having done so.

[17] The 1985 census data file only provides information on place of birth of respondents (with the options being 'South Africa', one of the homelands - which were not considered part of the country - or another country) not on recent migration.

rural homelands were more educated than non-migrants by 2001 may seem surprising at first, it is important to put this finding into context. The migrant population from homelands/former homelands was made up entirely of black people who were systematically provided with less (and poorer quality) education than their white counterparts during Apartheid. Education reform towards the end of Apartheid dramatically improved educational opportunities for black youth. Thus, the fact, as discussed above, that the migrant population is much younger than the non-migrant population goes a long way towards explaining how it could be that that migrating population from rural homelands in 2001 was more educated than the non-migrant population.[18]

In 1985, before the end of migration controls, the female share of migrants from homeland areas was low at 33%. By 1996, this share had gone up dramatically to 42% of the migrant population and by 2001 women made up 47% of the migrant population. Also interesting is that while the ratio of female to male employment increased marginally for non-migrants between 1996 and 2001, there was a much larger increase in this ratio (from a lower base) for migrants from former homelands over the same period.

Between 1996 and 2001, female migrant concentration - i.e. the share of the female labour force (migrant and non-migrant, employed and unemployed, foreign-born and nationals) in non-homeland districts who were black female migrants from homeland areas - went from 5.5% to 7.4% (an increase of 35%) (information not in Table 1). I am particularly interested in the nature and implications of this surge in female migration after the end of migration restrictions. If skill level is defined by level of education, then it appears that by 2001, female migrants from rural South Africa were relatively highly-skilled. However, one also needs to consider that these female migrants had little or no work experience before they migrated. According to data on previous work experience in the 1996 Census, of the female migrants in labour force in 1996, only 16% had ever worked before. Of those who had been employed before, 60% had been domestic workers.

Table 2 compares the occupational involvement of male and female migrants from homelands in 1996. A standout finding is that female migrants were twice as likely as male migrants to work in elementary occupations. This was driven by the fact that a large proportion (44.2%) of female migrants worked as domestic helpers. Women were also much more likely than men

[18] While not directly comparable because they have focused on migrants from both rural and urban areas, other studies on migration in developing countries have also found that migrants are slightly more educated than non-migrants (Strobl and Valfort, 2015; Kleemans and Magruder, 2018).

Table 2: Share of female and male migrant workers in select occupations in 1996

		Fem. migrants	Male migrants
Occ 1-digit			
3	Technicians and associate professionals	4.1	3.2
4	Clerks	7.0	3.1
5	Service workers and shop and market sales workers	7.9	12.9
9	Elementary occupations	58.6	29.1
Occ 2-digit			
23	Teaching professionals	7.0	2.1
24	Business and admin professionals	0.7	3.1
32	Health associate professionals	0.3	3.8
41	General and keyboard clerks	3.3	1.4
91	Cleaners and helpers	48.5	10.4
92	Agricultural, forestry and fishery labourers	6.3	7.9
93	Labourers in mining, construction, manufacturing	4.4	10.8
Occ 3-digit			
223	Nursing	3.0	0.2
913	Domestic and related helpers, cleaners	44.2	5.3

Data from Census 1996. Focusing on select occupation groups where there is a notable difference in rates of participation between male and female migrants.

to work as teaching professionals and as clerks. On the hand, men were much more likely than women to work as service workers and as labourers in mining, construction and manufacturing. The fact that female migrants were involved in a completely different set of occupations to their male counterparts suggests that the effects of their arrival on local labour markets were likely to have been very different too. The analysis above also suggests that there was some educational downgrading amongst the female migrant population.

4 Empirical strategy

4.1 Baseline estimation

My analysis focuses on the effects of female in-migration on the probability of employment and wages of non-migrants (where a non-migrant is defined as a respondent who has not moved from a different district in the five years before the survey) in destination districts. My analysis is run at the individual level using:

$$y_{idt} = \beta f_{dt} + \lambda X_{idt} + \gamma_t + \delta_d + \epsilon_{idt} \tag{1}$$

where y_{idt} is the outcome of interest for non-migrant i in district d at time t. Employment is a binary variable equal to 1 if a person is employed or equal to 0 if a person is unemployed, unable to find work or a house-wife/house-husband.[19] Monthly wages (adjusted for inflation with

[19]Rather than working with a narrow definition of unemployment, in many developing countries it makes

the base period being December 2017) are calculated for all workers. In some specifications, I examine effects on hours worked i.e. monthly hours.[20] I follow Card (2001) and Card (2007) in standardising female migration inflows by the population of receiving districts since the average and standard deviation of the change in migration may be proportional to the total population of the district, potentially inducing a spurious correlation between labour market outcomes and migration (cf. Peri and Sparber (2011)).[21] The natural logarithm of female migrant concentration is represented by f_{dt}, that is:

$$f_{dt} = \frac{m_{dt}^{fem}}{p_{dt}^{gen}} \tag{2}$$

where m_{dt}^{fem} is the working-age female migrant stock from former homeland areas at time t and p_{dt}^{gen} is the total working-age population of the gender group in question at time t. The vector X_{idt} includes individual controls for gender, age (and its square), education levels and race. I include district fixed effects and year fixed effects.[22] β is the parameter of interest, which estimates the impact of the share of female migrants at time $t-1$ on the outcome of interest at time t. This coefficient estimates the total effects of migration, taking into account the indirect effects of migration through complementarities across skill groups and across capital and labour (Dustmann et al., 2016).[23] Errors are clustered at the district level to allow for correlation between individuals within district-level labour markets. For all estimations, I have used the recommended Statistics South Africa cross-entropy weights, which make all waves within the Post-Apartheid Labour Market 1994-2017 Series directly comparable to one another

more sense to work with a broad definition of unemployment which also includes discouraged job-seekers, since official definitions of job-seeking may be inappropriate in contexts where there are high rates of informality (ILO, 1982). In the South African case, it has been argued that the Statistics South Africa definition of 'searching for employment' is too restrictive and it has been shown that there is very little to distinguish the 'searching unemployed' from the 'non-searching unemployed' (Posel et al., 2014).

[20] I suspect hours worked may be measured with some error so I do not include this outcome measure in my main estimations.

[21] I have also experimented with using migration levels as the variable of interest and adding district population size as a control. The results are substantially unchanged.

[22] My fixed effects estimation with two periods is equivalent to a first-differences estimation i.e.

$$\Delta y_d = \beta \Delta p_d + \lambda X_d + \gamma_t + \epsilon_d$$

with district weights equal to the number of observations in each district (multiplied by the cross entropy weights described in the text). Because I include regional and time fixed effects, changes in migrant share between 1996 and 2001 should be interpreted as flows of migrants in this period. My 'non-migrant population' includes some people who would have migrated at some point in their lives but not in the past five years. Using district fixed effects avoids any bias resulting from the fact that levels of migrant shares and levels of labour market outcomes may be spatially correlated because of common fixed influences, which could lead to a positive or negative statistical correlation between migration and economic outcomes, even if there are no real effects of migration.

[23] Note that the total but not the group-specific inflows of migrants can be considered quasi-random. My specification has the added advantage that identification of β does not require the pre-allocation of migrants to skill groups based on their observable characteristics, thus avoiding the problem of misclassification when that arises when such observable characteristics are used to assign migrants into skill groups in which they do not compete with natives because of migrant downgrading (Dustmann et al., 2016).

by producing a consistent set of totals for each wave (Branson and Wittenberg, 2011).[24]

4.2 IV approach

The number of migrants a receiving district receives may be correlated with the economic conditions of that district i.e. the number of internal migrants m_{dt} could be correlated with ϵ. OLS estimates may have an upward bias if female migrants choose to move to districts experiencing positive labour market shocks. However, if female migrants choose to stay away from cities with a high cost of living, OLS estimates may have a downward bias. Measurement error will also push OLS coefficients towards zero. I try to overcome these possible sources of bias by making use of a 2SLS approach.

My instrument uses the tendency of new female migrants to follow in the footsteps of earlier male migrants from the same sending region. As much research has shown, migrant networks are an important consideration in the location choices of prospective migrants since these networks assist with the job search process and assimilation into the new environment (Munshi, 2003). The instrument uses the 1985 distribution of migrants from a given reserve to allocate the new wave of female migrants from that same area in the post-Apartheid period. Formally, the instrument for the change in female migration in district d during time period t can be written as:

$$\sum_{r} \frac{M_{rd1985}^{male}}{M_{r1985}^{male}} \times M_{rt}^{fem} \tag{3}$$

where r are areas that were classified as reserves under Apartheid as in the 1985 census; $\frac{M_{rd1985}^{male}}{M_{r1985}^{male}}$ represents the proportion of all migrants from area r included in the 1985 census who were settled in receiving district d; and M_{rt}^{fem} represents the total number of female migrants from an area previously classified as a reserve r at time t in the contemporary period. The instrument is therefore a weighted average of the female migration rates from former homeland areas (the 'shift') with weights that depend on the distribution of earlier male migrants in 1985 (the 'shares').

The key identifying assumption is that unobserved factors determining the distribution of migrants before the end of migration restrictions are unrelated to contemporary economic shocks (e.g. Goldsmith-Pinkham et al. (2018)). This assumption is likely to hold for several reasons

[24] I have also run all my regressions without any weights and the results are substantially unchanged.

Table 3: First stage regression: impact of historical male migration on contemporary female migrant shares

	(1)	(2)
Instrument	0.512***	0.511***
	(0.070)	(0.071)
District FE	Y	Y
Year FE	Y	Y
Individual controls	N	Y
First stage K-P F-stat	52.1	52.4
Shea R^2	0.24	0.24
Clusters	216	216
Observations	71,867	71,867

Analysis at individual level using labour force survey data (1996 OHS, 1997 OHS & Sept 2003 LFS) and census data (1985, 1996, 2001) on migration. Standard errors clustered at the district level in parenthesis. Significance levels: *p<0.1, **p<0.05, ***p<0.01. With district and year fixed effects. Column 2 includes individual controls for age, education and race.

(for more information on these points, see Section 2):

1. *Black people who were born in homelands could not freely choose their migration paths to non-homeland areas.* During the Apartheid era, due to a centralised allocation process for black migrants and strict pass laws, black people in homelands could not choose where to move to. Their migration options were severely constrained: they could either accept jobs to work in specific industries in specific places or remain in homelands.

2. *Centralised migrant allocation decisions were to a large extent made on political grounds.* It was South African government policy that each reserve would send the majority of its workers to one specific industry. Furthermore, decentralisation efforts brought black migrants to white areas near homelands that, were it not for government incentives, would have had much less industry, and prevented many migrants from moving to metropolitan areas because of the restrictions placed on black labour intensive industries there.

3. *Many locations where there was substantial migrant labour demand during Apartheid did not have have substantial labour demand afterwards.* The end of Apartheid constituted a structural break in the economy of South Africa, and the distribution of economic activity changed substantially between the Apartheid and post-Apartheid periods. 'Border industries' that were established around homelands were dismantled towards the end of Apartheid. With the open-

ing up of the economy, extractive and manufacturing industries waned and so the economies of locations specialised in these industries suffered.

4. *Migration pull factors are/were substantially different for men and for women.* By instrumenting female migration with historical male migration, I also add another layer of exogeneity to my historical instrument and guard against the possibility of serial correlation in migration flows (Barone and Mocetti, 2011). Female migrants in the period under study were employed in a very different set of occupations and industries as compared to male migrants during Apartheid.

Table 4: The effects of female internal migration on the labour market outcomes of all non-migrants (male & female) in receiving areas: OLS & 2SLS

	Pr(emp)		Ln(wages)	
	(1)	(2)	(3)	(4)
	OLS	2SLS	OLS	2SLS
Ln(Migrant share)	-0.010	-0.037	0.125***	0.123
	(0.019)	(0.038)	(0.043)	(0.100)
Individual controls	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
K-P first stage F-stat		52.8		45.4
N	62,151	61,256	27,583	27,409

Analysis at individual level using labour force survey data (1996 OHS, 1997 OHS & Sept 2003 LFS) and census data (1985, 1996, 2001) on migration. Standard errors clustered at the district level in parenthesis. Significance levels: *p<0.1, **p<0.05, ***p<0.01. With district and year fixed effects, and individual controls for age, education, sex and race.

If migrant allocation during Apartheid were completely orthogonal to labour market conditions (at least those created by market forces) in receiving areas, then point (2) above would be sufficient to make the instrument valid. Of course, migrant allocation did respond to labour market conditions to some extent, and so (3) is important too. Share exogeneity is a sufficient condition for identification (Borusyak et al., 2018; Jaeger et al., 2018), so it is not necessary to demonstrate shift exogeneity in my setting. However, for the effects of female migration to be separately identified from the effects of male migration, it is important that pull/push factors behind migration differ for men and women in the post-Apartheid period. As shown in Section 3, the distribution of female migrants across economic sectors is very different from that of male migrants in South Africa. I also provided evidence from a nationally-representative migration study from 2001 showing that the ranking of possible reasons for moving across district borders in terms of importance was very different for men as compared to women.

The power of the instrument depends on how strong was the tendency of female migrants from reserves in the post-Apartheid era to cluster in the enclaves generated by Apartheid migration allocation processes. Table 3 reports first-stage regression results. Column 2 reports results including individual controls. The correlation of the change in the instrument with the actual change in female migrant share in the contemporary period exhibits a very significant coefficient and a large F-stat of 52.4, showing that the instrument is strong.

5 Results

I first examine the effects of female internal migration on the total population of non-migrants including both men and women. Table 4 shows the results of my analysis using labour force data for non-migrant characteristics and labour market outcomes.[25] The OLS results show that female migrant share has an almost-zero and non-significant association with the employment of non-migrants and a significant positive association with monthly wages. With the IV, the coefficient for the employment effect remains non-significant though the (negative) coefficient is slightly larger. Looking at the effect on wages, the positive coefficient on the female migrant share variable remains similar in magnitude but becomes non-significant with the inclusion of the instrument. For the estimations in this table, and for all those below, the first-stage F-statistics are always well above 10 (cf. Stock and Yogo (2005)). The non-significant effects on the overall non-migrant population in receiving districts are in line with much of the existing migration literature (e.g. Card (1990)).

In Table 5, I split the sample into men and women. With the IV, the employment effects of female migration are non-significant though the negative coefficient on the variable of interest is larger for male than female non-migrants. With the IV, the effect on wages of non-migrants is non-significant for both men and women.

Table 6 examines effects on female non-migrants of different skill groups.[26] While the hours worked variable is likely measured with some error, I include it here to make my analysis more comparable to the earlier international studies examining the effects of female migration. Turning to the 2SLS estimations in Panel 2, I find a strong positive and significant effect on the

[25] All South African LFSs seem to survey more women than men, which is why the number of observations for women is higher than those for men in the tables in this section (of course survey weights will correct for this).

[26] When replicating this table for male non-migrants I find no significant effects. I thus choose to focus the rest of my analysis on female non-migrants though in Section 7 I present results for high-skilled non-migrant men in a discussion on channels.

Table 5: The effects of female internal migration on the labour market outcomes of male & female non-migrants in receiving areas: OLS & 2SLS

	Male				**Female**			
	Pr(emp)		Ln(wages)		Pr(emp)		Ln(wages)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Ln(Migrant share)	-0.046**	-0.046	0.123***	0.143	0.017	-0.031	0.107*	-0.016
	(0.023)	(0.042)	(0.046)	(0.093)	(0.023)	(0.040)	(0.057)	(0.122)
Individual controls	Y	Y	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
K-P first stage F-stat		56.1		57.0		59.3		35.8
N	28,966	28,637	16,341	16,248	33,184	32,618	11,238	11,158

Analysis at individual level using labour force survey data (1996 OHS, 1997 OHS & Sept 2003 LFS) and census data (1985, 1996, 2001) on migration. Standard errors clustered at the district level in parenthesis. Significance levels: *p<0.1, **p<0.05, ***p<0.01. With district and year fixed effects, and individual controls for age, education and race.

employment of high-skilled women. A 10% increase in female migrant share is associated with a 1.75 p.p. increase in the employment of high-skilled women. I also find a strong effect on the intensive margin: a 10% increase in female migrant share is associated with a 1.63 pp increase in the hours worked of high-skilled women. Focusing on the effects on low-skilled female non-migrants, I find that a 10% increase in female migrant share is associated with a 1.6 p.p reduction in the employment of this subgroup. This suggests there is some competition at the bottom of the economic ladder (Card, 2001). In Panel 3, I run the same 2SLS regressions as above on the sample of black and coloured (i.e. historically disadvantaged) female non-migrants. The effect on employment for the high-skilled section of this sub-group is even larger than for high-skilled female non-migrants in general, though the effect on hours worked is non-significant and smaller. Clearly, the positive effects of female migration are not limited to the white population. Again all IV estimations in Table 6 yield non-significant wage effects with very large standard errors.

The main difference between the results here and the results from the earlier literature on low-skilled female international migration to high-income countries (Cortes and Tessada, 2011; Barone and Mocetti, 2011), is that in addition to finding a positive effect on the labour supply of high-skilled women on the intensive margin, I also find a sizeable effect on the extensive margin. The previous literature did not investigate effects on the labour supply of low-skilled native women but my results indicate that migrant women not only complement high-skilled non-migrant women but also substitute for low-skilled non-migrant women.

There are several possible reasons for why I do not find a significant negative effect on wages

Table 6: The effects of female internal migration on the labour market outcomes of female non-migrants of different skill groups in receiving areas: OLS & 2SLS

	High-skilled			Medium-skilled			Low-skilled		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Pr(emp)	Ln(wages)	Ln(hours)	Pr(emp)	Ln(wages)	Ln(hours)	Pr(emp)	Ln(wages)	Ln(hours)
Panel 1: OLS estimates									
Ln(migrant share)	0.113***	0.101	0.007	0.030	0.134	-0.024	-0.040	0.094	-0.038
	(0.040)	(0.066)	(0.042)	(0.046)	(0.155)	(0.047)	(0.027)	(0.077)	(0.032)
Individual controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	8,108	2,950	2,773	6,488	2,001	1,878	18,567	6,209	5,634
Panel 2: 2SLS estimates									
Ln(migrant share)	0.175***	-0.123	0.163**	0.012	0.180	-0.045	-0.160***	0.057	-0.103
	(0.056)	(0.177)	(0.069)	(0.074)	(0.241)	(0.115)	(0.053)	(0.166)	(0.078)
Individual controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
K-P first stage F-stat	30.4	20.2	20.9	41.3	26.9	26.8	70.4	38.8	39.9
N	8,030	2,947	2,771	6,420	1,996	1,874	18,148	6,147	5,581
Panel 3: 2SLS estimates for the black & coloured population									
Ln(migrant share)	0.253***	-0.233	0.070	-0.025	0.298	-0.059	-0.160***	0.067	-0.104
	(0.085)	(0.161)	(0.077)	(0.098)	(0.270)	(0.104)	(0.054)	(0.167)	(0.079)
Individual controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
K-P first stage F-stat	37.8	22.7	28.5	46.6	28.9	27.8	71.7	38.5	39.5
N	4,775	1,605	1,499	5,150	1,643	1,541	17,294	5,990	5,433

Analysis at individual level using labour force survey data (1996 OHS, 1997 OHS & Sept 2003 LFS) and census data (1985, 1996, 2001) on migration. Standard errors clustered at the district level in parenthesis. Significance levels: *p<0.1, **p<0.05, ***p<0.01. With district and year fixed effects, and individual controls for age, education and race.

in the results above. First, wages in South Africa may have been downwardly rigid due to high reservations wages (due in part to a generous social welfare system) and a powerful trade union movement which keeps wages relatively high in the formal sector.[27] Another possibility is that at the end of Apartheid, the South African economy had a high potential for growth. During the period of restricted migration, firms in cities were short of labour. An improved allocation of factors of production after Apartheid may have boosted productivity, thereby offsetting the effects of migration on wages.

6 Robustness checks

6.1 Province-year fixed effects

As a robustness check, Panel 1 of Table 7 looks at the effects of female migration on high-skilled and low-skilled female non-migrants but includes an additional set of fixed effects for province-years to capture possible unobserved time-varying factors at the provincial level that could potentially bias results. Results are similar in magnitude and retain statistical significance though the precision of the estimates is sometimes reduced as this specification sacrifices a lot

[27] Boustan et al. (2010) also find no effect on non-migrant wages of internal migration in the US in the early 1900s and put this down to wage rigidities.

of cross-province variation. The strength of the instrument is reduced with the additional fixed effects but is still well above conventional thresholds.

Table 7: The effects of female internal migration on the labour market outcomes of female non-migrants of different skill groups in receiving areas: robustness checks for 2SLS estimates

	High-skilled			**Low-skilled**		
	(1)	(2)	(3)	(4)	(5)	(6)
	Pr(emp)	Ln(wages)	Ln(hours)	Pr(emp)	Ln(wages)	Ln(hours)
Panel 1: 2SLS estimates with province-year FEs						
Ln(migrant share)	0.159**	-0.058	0.260***	-0.170***	-0.025	-0.099
	(0.074)	(0.181)	(0.091)	(0.064)	(0.199)	(0.090)
Individual controls	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
K-P first stage F-stat	20.3	16.6	16.4	41.3	28.3	27.0
N	8,030	2,947	2,771	18,148	6,147	5,581
Panel 2: 2SLS estimates with (instrumented) control for male migrant share						
Ln(migrant share)	0.339***	-0.597	0.190	-0.193*	0.333	-0.351*
	(0.114)	(0.509)	(0.260)	(0.112)	(0.307)	(0.192)
Ln(male migrant share)	-0.168	0.476	-0.026	0.039	-0.313	0.261*
	(0.109)	(0.441)	(0.218)	(0.105)	(0.259)	(0.154)
Individual controls	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
K-P first stage F-stat	22.7	19.8	12.7	15.5	22.0	18.2
A-P F-stat for add. instr.	14.8	26.9	16.2	43.5	57.5	50.0
N	8,029	2,947	2,771	18,104	6,122	5,557
Panel 3: 2SLS estimates using sample without data from 1996						
Ln(migrant share)	0.150**	-0.044	0.158**	-0.146***	0.168	-0.105
	(0.065)	(0.164)	(0.078)	(0.055)	(0.154)	(0.085)
Individual controls	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
K-P first stage F-stat	27.7	19.0	19.2	16.4	28.7	30.7
N	6,762	2,437	2,310	14,656	4,878	4,549

Analysis at individual level using labour force survey data (1996 OHS, 1997 OHS & Sept 2003 LFS) and census data (1985, 1996, 2001) on migration. Standard errors clustered at the district level in parenthesis. Significance levels: *p<0.1, **p<0.05, ***p<0.01. With district and year fixed effects, and individual controls for age, education and race.

6.2 Controlling for male migrant share

One concern could be that my results are driven by male migration from former homeland areas, which could be correlated with female migration.[28] Panel 2 of Table 7 replicates the main 2SLS regressions from Table 6 but includes an additional control for male migrant share from former

[28]A related concern raised by a referee is that my results might be affected by international migration from the rest of Africa. The instrument should address any potential omitted variable bias though. Moreover, while I cannot include a control for international migration since the 2001 Census only asked about place of previous residence within South Africa, it is also worth noting that the number of internal migrants from former homeland districts vastly outweighs the number of migrants coming from the rest of Africa. I calculate that the number of international migrants from other African countries observed in non-homeland districts in the 1996 Census is only equivalent to 1.3% of the number of internal migrants who moved from homeland districts.

homeland areas. This control is instrumented with a shift-share instrument analogous to the one used before but using male migration from former homeland areas as the shift part of the instrument. This control is non-significant in most regressions. For the employment regressions, the coefficients on female migrant share increase in magnitude. The significant effect on hours worked for high-skilled female non-migrants becomes non-significant though the coefficient on the variable of interest remains similar in magnitude.

Table 8: The effects of female migration on the size of the non-migrant labour force: OLS & 2SLS

	Ln(non-migrant LF share)			
	Male		**Female**	
	(1)	(2)	(3)	(4)
	OLS	2SLS	OLS	2SLS
Ln(migrant share)	0.001	-0.007	0.001	0.000
	(0.004)	(0.008)	(0.003)	(0.006)
District FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
K-P first stage F-stat		35.2		33.0
Observations	438	418	438	418

Analysis at district level using Census 1985, 1996 & 2001 data. Standard errors clustered at the district level in parenthesis. Significance levels: *p<0.1, **p<0.05, ***p<0.01. With district and year fixed effects.

6.3 Using different data

In my main analysis, I have combined LFS waves in 1996 and 1997 to merge with migration data from the 1996 census. In Panel 3 of Table 7, I check that my main results hold if I drop the LFS 1996 wave and use only the 1997 wave. The results for the employment and hours worked regressions are virtually unchanged, though, as to be expected, the effects are slightly less precisely estimated.

6.4 Potential serial correlation

In recent work, Jaeger et al. (2018) point out that if the spatial distribution of migrant inflows is stable over time, historical migration instruments are likely correlated with ongoing responses to previous shocks. Focusing on the United States in the post 1970s period, they show that the shift-share instrument might conflate the long and the short run effects of immigration because there is a very high serial correlation (between 0.95 and 0.99) in the sending-destination migration patterns over time. Directly investigating the correlation between historical and post-Apartheid migration shares for each district in my sample, I find that this number is in the order of 0.56-0.57. This correlation coefficient is very low for the literature (cf. Jaeger et al.

(2018)). It is suggested in Jaeger et al. (2018) that this value is sufficiently low for the shift-share instrument to be unlikely to conflate the long and the short run effects of migration.[29] These results also provide some evidence for the exclusion restriction for my instrument.[30]

6.5 Potential relocation

An important source of potential bias in my paper is that workers may relocate from high-migration to low-migration receiving districts in response to competition. If this would happen, it would lead to an underestimation of the labour market effects of female migration (Borjas, 1999).

To determine the size of the relocation response - if any - I follow Card (2007) and Peri and Sparber (2011) and estimate the following regression:

$$q_{dt} = \beta f_{dt} + \gamma_t + \delta_d + \epsilon_{dt} \tag{4}$$

The non-migrant share of the labour force is represented by q_{dt}, that is:

$$q_{dt} = \frac{N_{dt}^{tot}}{p_{dt}^{gen}} \tag{5}$$

where the share of non-migrants is the share among the labour force (also including migrants) who have not moved between districts in the last five years. Since this regression is estimated with district fixed effects, it is a very demanding in terms of controlling for pre-determined trends of non-migrant growth (Peri and Sparber, 2011). In this specification, the coefficient on female migrant share indicates the elasticity between female migrant concentration in districts and the size of the non-migrant labour force (i.e. a coefficient of zero on female migrant share indicates no spillovers between districts).

In Table 8, I show results of the effects of female migration on the size of the male and female labour force in receiving districts. The OLS results show that female migrant share has a non-significant almost-zero association with the non-migrant labour force for both men and women

[29] In another example, Tabellini (2020) constructs a shift-share instrument from immigration data in the US in 1900 to predict immigration between 1910 and 1930. He argues that since the correlation in immigration flows between sending and receiving regions in the two periods was 0.7, there is no reason to be concerned about serial correlation.

[30] Ideally, I would test to see whether pre-trends in employment and hours worked in the period before 1985 and the end of migrations restrictions were uncorrelated with female migration flows in the contemporary period but, unfortunately, I do not have good data on labour market outcomes prior to 1985.

Table 9: The effects of female internal migration on the labour market outcomes of high-skilled male non-migrants in receiving areas: OLS & 2SLS

	Pr(emp)		Ln(hours)	
	(1)	(2)	(3)	(4)
	OLS	2SLS	OLS	2SLS
Ln(migrant share)	-0.026	-0.039	-0.009	-0.033
	(0.024)	(0.045)	(0.033)	(0.044)
Individual controls	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
K-P first stage F-stat		30.5		45.5
N	7,847	7,797	3,658	3,643

Analysis at individual level using labour force survey data (1996 OHS, 1997 OHS & Sept 2003 LFS) and census data (1985, 1996, 2001) on migration. Standard errors clustered at the district level in parenthesis. Significance levels: *p<0.1, **p<0.05, ***p<0.01. With district and year fixed effects, and individual controls for age, education, sex and race.

with a point estimate of 0.001 in both regressions. With the inclusion of the IV, the point estimate becomes negative for male non-migrants but remains close to zero and non-significant. For non-migrant women, the point estimate is exactly zero but non-significant. In summary, I find no evidence that female migration led to the displacement of the labour force already present in receiving districts.

7 Channels

I have found that female migration results in an increase in the labour supply of high-skilled women. Given that many female migrants work as domestic helpers, one hypothesis is that migrants are substituting for high-skilled women in domestic activities (Cortes and Tessada, 2011; Barone and Mocetti, 2011), allowing the latter to work more and spend more time at work. However, the impact of female migration might also go through other channels. For example, migrants might be complementary to high-skilled non-migrant women in the productive sector, thus increasing the possibilities for employment for the latter. The increase in the number of migrant women might, for example, expand the need for coordination and management activities in offices and factories (Barone and Mocetti, 2011). To investigate this further I perform a couple of checks below.

In South Africa there is a very unequal distribution of domestic activities between men and

Table 10: The effects of female migration on the hourly wages of female domestic workers relative to female workers in other industries: OLS & 2SLS

	Ln(wages)		
	(1)	(2)	(3)
	OLS	2SLS	2SLS
Ln(migrant share)	0.102**	0.097	0.109
	(0.051)	(0.104)	(0.116)
Ln(migrant share)#domestic work	-0.015	-0.113*	-0.114*
	(0.027)	(0.065)	(0.066)
Domestic work	-0.744***	-1.103***	-1.106***
	(0.115)	(0.255)	(0.259)
Individual FE	Y	Y	Y
District FE	Y	Y	Y
Year FE	Y	Y	Y
Province-year FE	N	N	Y
K-P first stage F-stat		5.4	5.3
A-P F-stat for add. instr.		11.1	10.7
Observations	10,063	9,994	9,994

Analysis at individual level using labour force survey data (1996 OHS, 1997 OHS & Sept 2003 LFS) and census data (1985, 1996, 2001) on migration. Standard errors clustered at the district level in parenthesis. Significance levels: *p<0.1, **p<0.05, ***p<0.01. With district and year fixed effects, and individual controls for age, education and race.

women. According to the nationally-representative Time Use Survey in 2000, women spent on average three times as much time as men on housework (including cleaning, cooking, childcare, etc.) (Budlender et al., 2001). It is unlikely then that an increase in supply of domestic workers would affect high-skilled men as much high-skilled women. On the other hand, if the impact of female migration were operating through interactions in the productive sector, a positive effect on men's employment and hours worked would be expected. Table 9 examines the effects of female migration on the employment and hours worked of high-skilled male non-migrants. With the IV, I find non-significant effects on employment and hours worked which are negative in sign and small in magnitude. These results provide strong evidence for the channel involving substitution in domestic work.

To further test my hypothesis, in Table 10, I examine the effects of female migration on the wages of female domestic workers relative to female workers in other industries. Domestic workers are identified on the basis of industry and occupation codes and include workers employed to perform tasks including cleaning, cooking and childcare in a private household.[31] I include district fixed effects and year fixed effects. With the IV, I find that a 10% increase in female migrant share

[31]I use the 'domestic work' industry identifier in the Post-Apartheid Labour Market Series, which was created on the basis of detailed industry and occupation codes to ensure consistency across waves (PALMS, 2020).

reduces domestic worker wages by 1.1% relative to wages in other sectors (significant at the 10% level). The result is robust to the inclusion of region-year fixed effects.

8 Conclusion

This paper examines the effects of female internal migration on the labour market outcomes of non-migrants in South Africa, exploiting substantial variation in the number of female migrants received by districts in the post-Apartheid period. I argue that South Africa is one of the very few settings where an instrument using historical migration pathways can plausibly capture exogenous variation in migration flows. Using the natural experimental setting created by Apartheid era policies, I show that female internal migration in South Africa increased the employment and hours worked of highly-educated women in the post-Apartheid period. I demonstrate that this was due to the fact that female migrants found employment as domestic workers, particularly in well-educated households, thereby freeing women from household labour and allowing them to pursue employment or increase their work hours. However, it was not the case that all subsections of the non-migrant population benefited from this female in-migration and I have shown evidence that low-skilled women experienced reduced employment. This suggests that female migrants (who were relatively well-educated though lacking in experience) may have substituted for low-skilled non-migrants in production.

I do not find any evidence that labour reallocation biased my results. I also have shown that my results are robust to including region-year fixed effects and an instrumented control for male migration from homeland districts.

The results in this paper suggest that female internal migrants in South Africa are likely to improve the welfare of high-skilled non-migrant women in receiving districts by providing affordable and flexible substitutes to household production (my analysis also shows that historically disadvantaged groups also benefit from this). It is also important to note that the negative impacts I find on the employment of low-skilled women are short-term impacts. In the longer run, low-skilled labour demand may well adjust to the increased labour supply caused by migration, which may ameliorate short-term effects. With longitudinal data, future research could examine the medium-term employment trajectories of low-skilled non-migrants in the wake of internal migration shocks.

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