

# South–South migration and the labor market: Evidence from South Africa

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February 9, 2011

## Abstract

Using census data for 1996, 2001 and 2007 we study the labor market effect of immigration in South Africa. Over this period, the number of foreign born residents in the country has grown by almost fifty percent, and both the characteristics and geographical distribution of immigrants show substantial variation over time. We exploit this feature of the data to carry out an analysis that combines both the “spatial correlation” approach pioneered by Card (1990) and the variation across schooling and experience groups pursued by Borjas (2003). We find that increased immigration has a negative effect on natives’ employment outcomes, but not on total income. Furthermore, we argue that skilled South Africans appear to be the most negatively affected subgroup of the population.

*JEL classification numbers:* F22, J61

*Keywords:* Immigration, Labor market effects, South Africa.

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“...They come from all over, and they are of all sorts, the new African migrants. There are the professionals – the doctors and academics, highly educated and hoping that in this country their skills can at last earn them a living wage. There are the traders, buying up what the shopping malls have to offer, and traveling home twice a month with bulging suitcases... There are the hawkers and the hustlers, who travel south out of desperation... And then there are the criminals; the drug dealers, the pimps and fraudsters.” (Phillips 2002)

## 1 Introduction

Following the demise of the Apartheid regime, important political changes have swept South Africa, leading to the 1994 democratic election of a majority government. At the same time, the country’s position as a regional economic superpower has made it a very attractive destination for migrant workers from the surrounding areas in search of new job opportunities. Until 2002, migration was disciplined by the “Aliens Control Act” of 1991, a piece of legislation which was rooted in the “control and expulsion” mentality of the Apartheid era, inspired by a fundamentally racist and anti-semitic perspective (Peberdy and Crush 1998). After 2002, with the introduction of the new Immigration Act (Act 13), and its subsequent amendment in 2004, the policy stance changed substantially. Today South Africa sees the inflow of foreign workers (and especially of skilled ones) as a tool of economic growth, and this is a significant break from the control-oriented framework of the past.

Still, xenophobic episodes against immigrants are common place (McDonald 2000 and Friebel, Gallego, and Mendola 2010) and suggest that natives’ often perceive immigrants as a threat. While several studies have provided a

qualitative assessment of recent migration to South Africa, remarkably little evidence exist on the labor market effect of foreign immigration to the country. The purpose of this paper is to help fill this gap and to provide what is – to the best of our knowledge – the first systematic study of the labor market effects of immigration to this country.

In carrying out our analysis, we use census data from 1996, 2001 and 2007. We start by documenting the patterns of immigration to South Africa. First, we find that the inflow of immigrants has increased substantially over the period we are considering. In 1996, about 2 percent of the population was made up by foreigners, and that share had increased to almost 3 percent of the population (and 4.7 percent of the male labor force) in 2007. Second, and contrary to widespread beliefs in the country (Crush and Williams 2010), foreign workers in South Africa are relatively highly educated. In particular, as of 2007, they are approximately two times more likely than native workers to have a college degree. The importance of foreign workers is even higher when we look at individuals at the very top of our skill classification, i.e. individuals who are not only highly educated, but also have a long labor market experience. Third, we find that other African countries are becoming more and more an important source of immigrants (even if we are able to observe this information only for the first two years of our sample). Thus, the overall picture that emerges is that South Africa has been able to turn itself into a very attractive destination for highly skilled workers coming from the surrounding regions.

We turn then to the analysis of natives' labor market outcomes. Given that we only have three years of data, much of our analysis is carried out exploiting the variation in the distribution of immigrants across regions within the country. Our rich dataset allows us to identify 56 districts, and we follow Borjas (2003) to define a skill level as being characterized by both educational achievement and labor market experience, thus identifying 32 skill

levels. We find that immigration had a large and negative impact on natives employment status. In our benchmark specification, a ten percent increase in the labor supply of a skill group brought about by immigration leads to a 9.6 percent decrease in natives' total employment. At the same time, we do not find a significant effect of immigration on our monetary compensation measure. One important caveat in interpreting the latter finding is that the census only provides information on individual total income and, as a result, it is not possible for us to disentangle changes in wages from changes in the number of hours worked.

As immigration to South Africa is very heterogeneous, we repeat our analysis focusing on four separate education groups (less than primary, less than secondary completed, secondary completed and college graduates). Interestingly, we find that the negative average employment effect we have documented is driven by the medium and highly skilled. Thus, our analysis suggest that there is little direct evidence that the adverse labor market effects of immigration might be behind the recent, widespread xenophobic feelings against unskilled migration which have been registered in the country.

The remainder of the paper is organized as follows. Section 2 provides an overview of the related literature, whereas section 3 discusses the South African migration history. Section 4 introduces the data, whereas section 5 contains our empirical analysis. Section 6 concludes the paper.

## **2 Related literature**

Our paper is related to two strands of the literature. First, it is a contribution to the long and distinguished tradition which has studied the labor market effect of immigration. Second, it represents one of the first systematic studies of the effects of South-South migration, and thus of the challenges and

prospects faced by developing and medium income countries which might act as local attractors for international labor flows.

Two approaches have been traditionally followed to understand the labor market effect of immigration. The first, which is also known as the “spatial correlation” methodology, exploits the variation in the distribution of immigrants across different geographic areas in the destination country. Among the early contributions to this literature, Card (1990) studied the effect of the 1982 Mariel boatlift on the Miami labor market. Notwithstanding the large immigration shock – the inflow of Cuban immigrants led to an increase in the labor force in the Miami metropolitan area of approximately 7% – he found very little effect in terms of natives labor market outcomes. Studies following a similar strategy have then been carried out on a variety of other destination countries. They include the analysis of the effect of the forced repatriation of “pieds noirs” from the North African colonies to France (Hunt 1992), the analysis of the impact of Russian immigration to Israel in the 1990’s (Friedberg 2001), the study of the effect of recent immigration to Germany by Pischke and Velling (1997), etc. Similarly to Card (1990), all these studies have found only a very limited impact of immigration on the local labor market.<sup>1</sup>

A second approach has been instead pioneered by Borjas (2003), and has focused on a national-level analysis. The main idea behind this methodology is that the findings of spatial correlation studies might be biased for two main reasons. First, immigrants do not distribute themselves randomly across geographical regions in the destination country: they tend to cluster in regions in which the economy is stronger and where the demand for the services they can provide in the labor market is more sustained. In addition, the inflow of immigrants in a certain region of the country might lead to a reaction by natives, who could decide to relocate themselves elsewhere, where

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<sup>1</sup>See Friedberg and Hunt (1995) for an excellent review of this literature.

the demographic pressure is lower. Both these potential sources of bias would lead to underestimate the true labor market effect of immigration in spatial correlation studies. For this reason, Borjas (2003) argues that a more appropriate setup to carry out the analysis is the national one. By focusing on this framework, the analysis picks up average national labor market effects and, under the assumption that migration out of the destination country's labor market is limited, this strategy will minimize the bias brought about by natives' reaction to migration. Borjas (2003) exploits the variation in the distribution of migrants across 32 different skill levels, each one of them characterized by a given educational attainment and extent of labor market experience. Differently from the studies based on the spatial correlation approach, he finds a substantial negative impact of immigration on the wages of native workers. Aydemir and Borjas (2007) use the same methodology to compare the experience of two destination countries, i.e. Canada and the United States, with that of Mexico, an important source of migrants, and find that the changes in the supply of workers brought about by migration do have an impact on the labor market outcomes of the individuals which have not moved.<sup>2</sup> A more recent study by Ottaviano and Peri (2011) has called into question some of the results by Borjas (2003), arguing that even within the same skill cell, migrants and native workers are not perfect substitutes. Using this methodology the authors find a much smaller effect of immigration on native workers wages, which is actually positive on average.

The two approaches we have discussed can be linked, as has been suggested by Borjas (2006) in a recent study which uses US census data covering the period 1960–2000. Interestingly, he finds that inflows of foreign workers in a US subnational geographic unit (state or metropolitan area) are associated with lower in-migration rates, higher out-migration rates, and a decline in the growth rate of the native workforce. Importantly, he also finds that

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<sup>2</sup>Mishra (2007) has obtained similar results for the case of Mexico.

the native migration response attenuates the measured impact of immigration on wages in the local labor market, suggesting that taking into account this dimension is important to estimate the true effect of immigration.

The analysis we carry out in this paper is related to both strands of the literature. Given that our data includes only three time periods, we mainly exploit the variation in the distribution of migrants across geographical areas in South Africa. Still, we can take advantage of our rich dataset to exploit the variation in the skill distribution of foreign workers across localities, and we follow Borjas's (2006) methodology and control for the pre-existing stock of natives in the area to address the endogeneity of the migration decision, i.e. the non-random allocation of migrants across space.

This paper is also related to the small literature which has analyzed labor flows to South Africa. Several contributions in this tradition have investigated the main features of migration to this country. Crush and Williams (2010) contains a broad overview of the phenomenon, with some interesting insights on the evolution of the recent migration policy. McDonald (2000) is instead a collection of essays looking at the evolution of the phenomenon in the early post-Apartheid era, drawing on a series of original individual level surveys. Borhat, Meyer, and Mlatsheni (2002) focus finally on the emigration of skilled workers from the Southern Africa region. To the best of our knowledge, to this date there has been no systematic study of the effect of labor migration on natives' labor market outcomes, and the purpose of this paper is to help fill this important gap in our understanding of the phenomenon.

### **3 Migration to South Africa**

South Africa has been the destination of large cross border labor flows at least since the mid of the nineteenth century, when migrants from Lesotho, Malawi, Mozambique and Zimbabwe came to work in the sugar cane fields of Natal

and the recently opened diamond mines in Kimberly (Crush 2000). Ever since, migration and the debate around migration have been a mainstay of the public policy arena in the country. Systematic, reliable data on the size of the immigrant population for the pre-Apartheid period are difficult to obtain, but we can distinguish four main channels through which workers have entered the country: as contract laborers, especially in the mining sector; as informal migrants, to work mainly in the construction and service sectors; as refugees, following the eruption of civil conflicts in neighbouring states and, finally, as the result of a “white flight”, brought about by the creation of new post-colonial governments starting in the sixties.

Public policies towards immigrants and immigration have greatly varied over time. Contract migration in the mining sector has been introduced right after the discovery of the gold fields in the Witwaterstrand area in the 1880s, and has long been perceived as a critical input in the industry. Fierce competition among employers has prevailed up until the 1920s, when a central recruiting agency (the Mine Labour Organisation) became the only gate into the mining industry for migrants. Recruitment offices were established in the countries surrounding South Africa, and modern transportation networks were also introduced to ferry migrant workers to the mining regions. This type of migration was mainly temporary, and agreements were reached with the neighbouring nations to insure that workers will return home.

As a result of these efforts, the number of contract workers employed in the sector rose quickly. By the 1920s, approximately 100 thousand foreign workers were employed in the South African gold mines (Crush 2000). By 1940, the figure had reached 170 thousand and, by 1960, 233 thousand. Immigrant contract employment peaked in 1970 at approximately 265 thousand workers. Similarly, informal immigrants employed in the agricultural and construction sectors have also been welcomed throughout this period.

In the last two decades of the Apartheid regime, growing racial tensions,



coupled with a more active role played by labor unions in the domestic labor market, led the South African government to perceive black migration as the source of a political threat. As a result, starting from the early seventies, immigration – both legal and illegal – decreased substantially, thanks both to a reduction in the demand for foreign workers by domestic businesses and also to the stricter border enforcement policies, which were put in place by the government (Crush 2000). At the same time, up until the end of Apartheid, white immigrants have been welcomed to the country, and policies have even been put in place to facilitate their arrival (free passage was offered to European immigrants during the sixties and seventies). Finally, the general stance towards refugees has been one of limited tolerance, especially in the case of the Mozambicans, who fled their country in large numbers following the civil conflict which saw South Africa as one of the main players.

In the post 1994 period, census data show that migration to South Africa has been characterized by a steady increase in the number of foreigners residing in the country. Interestingly, the flow of foreign workers has been remarkably less volatile than in other parts of the continent (Lucas 2006), even though in many cases it has remained temporary in nature. Over the period 1996-2007 the overall number of foreign born in South Africa has grown from approximately seven hundred thousand to one million two hundred thousand,<sup>3</sup> i.e. an increase of approximately 74 percentage points. As a result, in 1996 migrants represented 2.1 percent of the total population, whereas in 2007 they made up 2.94 percent of the total (see Figure 1). The importance of foreign workers is even greater. If we focus on males in the labor force (i.e. those who are either working or seeking work), the share

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<sup>3</sup>These figures suggest that the South African census data, as it is true also for the US census, includes information not only on “legal” migrants, but also on individuals which are in the country illegally. In fact, recent estimates by Crush and Williams (2010) suggest that between 1990 and 2004 only approximately 110 thousand legal immigrants have arrived in South Africa, i.e. a much smaller figure than the one reported in our data.

over the period grew from 4.6 percent in 1996 to 6.1 percent in 2007 (see Figure 2).

Notwithstanding this sizable favorable dynamics, many observers have argued that even in the aftermath of Apartheid's demise, the South African migration policy stance has remained overall rather restrictive (Peberdy 2001). Some authors have suggested that the overtly racist immigration policy followed once has been replaced by strong xenophobic feelings in the population (see for instance Klotz 2000), which appear particularly virulent vis a vis migrants originating from outside the Southern Africa region.

Table 1 uses information on country of birth of migrants, which was collected in the 1996 and 2001 censuses (unfortunately the same information is not available for 2007), to produce a picture of the evolution of the sources of South African migrants. What is immediately apparent is the growing importance of Africa. Between 1996 and 2001 the share of foreigners originating in the continent increased by 3.1 percentage points, from 67.6 to 70.7 percent of the total. Particularly significant is the role played by Mozambique: by 2001, well over a quarter of the total stock of migrants to South Africa came from that country, the result of years of civil wars and persisting economic difficulties which the transition to democracy did not completely solve. The second most important country of origin is Zimbabwe and, in the five years included in our sample, the number of migrants originating from this country has increased by over twenty five percent.

The second element which emerges from Table 1 is the slight decline in the importance of Europe as a source of foreign workers. In 1996, individuals born in the continent represented approximately 23 percent of the total migrants, whereas by 2001 that share had declined to 22.3 percent. Interestingly, there has been a significant decline in the relative importance of the UK as a source country. This trend, and the sustained outflow of skilled workers from South Africa, has been the subject of much concern both in the

academic debate (see Borhat, Meyer, and Mlatsheni 2002 and Waller 2006) and among the public. As we will argue though, even if skill shortages have been important in some sectors of the economy (in particular in healthcare, see Bhargava and Docquier 2008), the brain drain problem in the case of South Africa is likely to have been blown out of proportion. In fact, as of 2000, only 7.5% of the tertiary educated South African were living outside their country of origin (Docquier and Marfouk 2006). This figure is very low by developing country standards, but it is just “average” even in comparison to advanced economies.<sup>4</sup>

## 4 Data

For our analysis we use three surveys carried out by the Statistical Office of the Republic of South Africa, which have been made available through the International IPUMS website (<https://international.ipums.org/international/>). The 1996 and 2001 data are a ten percent sample from the population census, and cover approximately 3.6 and 3.7 million individuals respectively. The 2007 data are instead taken from the South African Community Survey, and cover approximately 2.2 percent of the population or 1.1 million individuals. A wealth of information is collected, including both labor market outcomes and important individual level-characteristics. Our analysis will be restricted to individuals in the 16-65 age group, who participate in the civilian labor force (i.e., are either working or seeking work). Furthermore, the large size of the samples allows us to fully exploit the spatial dimension of migration, taking advantage of the heterogeneity in the distribution of foreign workers across localities. In particular, we will be able to use information at the district level (there are 56 districts in South Africa). An individual is defined

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<sup>4</sup>The corresponding figure for Italy in 2000 is 10%, for the Netherlands 9.6%, for Germany 5.2% etc.

to be an immigrant if he/she is foreign born.

As for measures of labor market outcomes, we have information on individual's employment status (i.e. whether he/she is working or seeking work), type of employment (that is, whether a person is self-employed, or worked for someone else, either for pay or as an unpaid family worker), sector of employment, and on an individual's total income. Total income is defined as the total personal income in local currency (rand) from all sources in the previous twelve months, and in all three samples the data are recoded to the midpoints of the broad intervals given in the original data. The data suffer from the standard "top coding" problem, as the top interval is coded to its lowest possible value (e.g, code 360,001 for 360,001+), and unfortunately the data does not allow us to measure more precisely labor income.

Among the individual level characteristics we consider, in our data educational attainment is measured using the number of years of schooling completed, and to make our results broadly comparable with the existing literature and appropriate to the context at the same time, we have grouped this continuous variable in four categories: less than primary (the individual has completed less than 5 years of primary education), less than secondary completed (the individual has between 6 and 11 years of education), secondary completed (the individual has completed 12 years of education) and university (the individual has at least some tertiary education).

Figure 3 reports histograms for the three years in our sample, where we compare native and immigrant men in the labor force. Several interesting patterns emerge. First, the share of individuals which have not completed a primary education has fallen for both groups: for natives, from 26.8 percent in 1996 to 15.4 percent in 2007, whereas for immigrants the decline has been from 30.3 percent in 1996 to 26 percent in 2007. Second, highly skilled workers are becoming more common both among foreign born and natives. Among natives, between 1996 and 2007 the share of males in the working

population with at least some university education has increased from 2.8 percent to 5.3 percent. Among the foreign born, the increase has been even more substantial: from 6.1 percent to 10 percent. In other words, in 2007 one out of ten foreign born males had a college education, compared to one out of twenty natives. Considering also the intermediate categories, the pattern that emerges from the data is one in which on average today's South African immigrants are at least as educated as their domestic counterparts, and their presence is particularly strong at the very top of the educational attainment scale.

As has been forcefully argued by Borjas (2003) and Borjas (2006), skills are acquired both before and after an individual enters the labor market and, as a result, workers who have the same level of education, but different levels of experience, are imperfect substitutes in production.<sup>5</sup> For this reason, to be able to assess the impact of a foreign worker on a native's labor market opportunities, we need not only to take into account the formal schooling received by them, but also how long the individual has been active in the labor market.

To do this, we follow Borjas (2003) and define a skill group in terms of both schooling and labor market experience. The latter is identified as the number of years that have elapsed since the individual has completed school. So, we assume that the age of entry into the labor force for the typical worker in South Africa is 17 for the typical person with less than secondary education, 19 for the typical high school graduate, 21 for the typical person with some college or above. This definition reflects the assumption that individuals enter the South Africa labor force at the legal working age of 17 years old and there is no lag between the end of school and the entry into the labor force. Our measure is necessarily rough, though, as individuals might take for instance longer than the statutory number of years (we use four) to

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<sup>5</sup>See also Ottaviano and Peri (2011) for an even finer distinction.

complete a college education or might decide not to immediately enter the labor market (this is particularly true in the case of women). Furthermore, this measure is particularly problematic for immigrants as it does not distinguish between experience which has been acquired working in the destination country, and experience which has been acquired elsewhere.

To carry out our analysis, we assume that the maximum number of years of labor market experience is 40, and we follow the literature and create eight broad categories of labor market experience, based on five-year intervals.

Table 2 and Table 3 report summary statistics on the distribution of natives and immigrants by skill group. What is immediately apparent is that in all the three years in our sample, immigrants are particularly numerous at the very top of the skill distribution. For instance, in 1996, an immigrant is more than four times as likely as a native to be university educated with 36-40 years of labor market experience. In 2007, this likelihood has further increased to well over five times. Immigrants are only slightly more likely than natives to be at the bottom of the skill distribution, i.e. not to have completed a primary education and have very limited labor market experience. These results reinforce our initial findings that today educated immigrants are an important component of South Africa's foreign workers population, and that immigrants play a particularly important role in the supply of the very high skills.

Our rich dataset also allows us to capture the distribution of immigrants across different localities within South Africa. Figure 4 illustrates the dynamic of immigration in three districts which have been particularly affected by the phenomenon in the period we are considering: the City of Johannesburg metropolitan municipality in the Gauteng province, the district of Lejweleputsa in the Free State province, and the district of Ehlanzeni in the Mpumalanga province. The Johannesburg metropolitan area has seen the number of foreign born more almost treble between 1996 and 2007 from 107

thousand to 303 thousand and as of 2007, immigrants made up 8.5% of the total population. The immigration dynamic in the Lejweleputsa district has been instead more volatile, mirroring the fortunes and the demand for foreign workers of the dominant mining sector. In 1996 there were slightly less than 48 thousand foreign born in the province, representing about 8% of the total population. The number had decreased to approximately 21 thousand in 2001, whereas by 2007 it had edged back to approximately 31 thousand, or 5.6% of the total population. Finally, the Ehlanzeni district, at the border with Mozambique's Limpopo province, has seen its immigrant population peak in 2001 at approximately 52 thousand (6.2% of the total), whereas by 2007 it had slightly declined to 47 thousand or 5.5% of the total population.

We will exploit this rich variation in the data to carry out our empirical analysis. Our main measure of the impact of immigration on local labor markets is given by  $p_{ijt}$ , i.e. the share of foreign born in the labor force of a particular skill group  $i$  in district  $j$  at time  $t$ , which is defined as:

$$p_{ijt} = M_{ijt} / (M_{ijt} + N_{ijt})$$

where  $M_{ijt}$  is the number of foreign born workers in skill group  $i$  in district  $j$  at time  $t$  and  $N_{ijt}$  represents the corresponding number of natives.

Before proceeding with our regression analysis, in Figure 5 we present two scatter plots linking the inter-censal change in the immigrant share, and the changes in native individual's (log) employment level and (log) income. Both pictures suggest that native's labor market outcomes in a given cell (defined as a skill profile in a given district) are negatively correlated with changes in the immigrant share in that cell. In other words the raw data suggest that inflows of foreign workers do affect the labor market outcomes of the natives (the coefficients of the fitted lines are -1.99 and -3.14 respectively, both significant at the one percent level). However, the figures also show that not all

districts characterized by a large inflows of immigrants saw a deterioration of the natives' labor market outcomes. This highlights the importance of controlling for additional observable and non-observable characteristics, and we will do so in the analysis carried out in the next section.

## 5 Empirical specifications

To assess the labor market effects of immigration in South Africa, we exploit both the variation in the distribution of foreign workers across different skill levels and local labor markets within South Africa. Following the literature (Borjas 2003) we estimate the following specification:

$$L_{ijt} = s_i + r_j + q_t + (s_i * r_j) + (s_i * q_t) + (q_t * r_j) + \beta_p p_{ijt} + \beta_x X_{ijt} + \varepsilon_{ijt} \quad (1)$$

where the dependent variable  $L_{ijt}$  is a labor market outcome for native workers in skill group  $j$  (32 education by experience group), district  $i$  (56 districts), and Census year  $t$  (3 years), and  $p_{ijt}$  is the main variable of interest. Controls include a vector of fixed effects  $s_i$ , indicating the group's skill level; a vector of fixed effects  $r_j$  indicating the district of residence, and a vector of fixed effects  $q_t$  indicating the time of the observation. These fixed effects control for differences in labor market outcomes across skill groups, local labor markets and over time. The interaction terms  $s_i * q_t$  and  $q_t * r_j$  control respectively for secular changes in the return to skill and in the district wage structure over the period we are considering in our sample, i.e. 1996-2007. The interaction  $s_i * r_j$  indicates instead that we are identifying the coefficient of interest,  $\beta_p$  from changes in natives' labor market outcomes and immigration rates that occur within a region/skill cell.

We carry out two set of regressions, focusing on men in the working age



group (16-65) in the labor force. The first focuses on the effects of immigration on native workers' employment status, and the results are reported in Table 4. The second considers instead the effects of immigration on native workers' total income, and is reported in Table 5. In all our specifications, standard errors are clustered at skill-district level.

In the first three columns of Table 4, we consider the effect of immigration on natives' employment levels. All specifications suggest that immigration has a negative impact on natives' employment level, both as employees and as self employed individuals. In column 1, we present the basic estimates of the adjustment brought about by immigration on total employment, defined as the total number of native workers employed. The estimated coefficient  $\beta_p$  is -1.085, with a standard error of 0.207. It is easier to interpret the coefficient as an elasticity, which gives the percentage change in total employment due to a percent change in labor supply. To calculate this effect, we need to construct the following derivative:

$$\frac{\partial \log Empl}{\partial \bar{m}} = \frac{\beta_p}{(1 + \bar{m})^2} \quad (2)$$

By 2007, immigration has increased the total male labor supply in South Africa by 6.1 percentage points. Equation 2 allows then to calculate the employment elasticity at the average value of the relative number of immigrants by multiplying  $\beta_p$  by 0.889. The employment elasticity is then given by -0.9645 (or -1.085 x 0.889). In other words, an increase by 10 percent in labor supply in a skill group brought about by immigration leads to a 9.6 percent decrease in natives' total employment.

Columns (2) and (3) respectively illustrate that this effect is slightly larger when we look at the total number of employees<sup>6</sup> (the elasticity is -1.042) and is instead smaller for self employed individuals (the elasticity is -0.729).

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<sup>6</sup>They include salary and wage workers.

Much of the literature which has exploited the regional variation in the distribution of immigrants to assess the labor market effects of the phenomenon has been criticized because it ignores the possibility that domestic workers might react to the inflow of migrants in a particular region by relocating in other regions of the destination country. Borjas (2006) has recently proposed a simple theoretical model suggesting that to account for the possible endogeneity of the migration decision, the lagged number of employed native workers should be included in the specification (??). In columns 4, 5, and 6 of Table 4 we thus include this additional control. Given that only three censuses are available for South Africa, to carry out this estimation we need to restrict our analysis to 2001 and 2007, and as a result we lose about one third of our observations. Notwithstanding this, the size of our estimated coefficients is remarkably similar to what we have found in the first panel of the table, and also the overall significance level of our result is unaffected.

In Table 5 we turn to consider the effect of immigration on natives' income levels. In particular, we start by considering the impact on the total income earned by male individuals in the labor force (column 1), whereas in columns 2-4 we consider different subgroups of individuals, i.e. all those in employment (column 2), the employees (column 3), and the self employed (column 4). As it can be seen from columns 1 and 2, the effect of immigration on the total income of individuals in the labor force and on employed individuals is negative. The same holds when we consider only employees in column 3, whereas from column 4 we can see that the impact on the income of the self employed is positive. However, none of these coefficients is statistically significant. In the remaining four columns of the Table (4-8), as we did in Table 4, we control also for the lagged number of employed native workers. Once again, even though the sample size decreases substantially in this case, our findings are broadly comparable to those we obtain without adding this control.

Our analysis thus suggests that the immigration shock in the South African labor market has been absorbed mainly through an adjustment in the number of domestic workers employed, rather than through a change in income earned. These results should be interpreted though with due caution, as our “price” measure of labor market outcomes is far from ideal, as it combines both adjustments in unit wages, as well as in the number of hours worked. Thus, it could well hide a decline in unit wages, which has been compensated by an increase in the number of hours worked by the native. Unfortunately, our data do not allow us to disentangle these two effects.

As we have discussed in section 4, there is substantial heterogeneity in the composition of the immigrant population in South Africa. In particular, the immigration shock over the period included in our study has been particularly strong among the highly skilled: in 2007, one out of ten foreign born individuals had a college education, about twice as much as in 1996. At the same time, also among the natives the share of highly skilled increased substantially, but it reached only 5.3 percent of the total population in 2007. For this reason, it is interesting to separately analyze the labor market effect of immigration, by looking at different skill groups. This is done in the four panels of Table 6, where we consider the impact of immigration on those individuals with less than primary education (Table 6a), on those which have less than secondary education (Table 6b), those with a secondary education (Table 6c) and those with a college education (Table 6d). The structure of the analysis is similar to the one carried out for the overall immigrant population in Tables 4 and 5, i.e. we look both at employment and income outcomes. For brevity, we do not separately report here the results including lagged native employment, as they are broadly comparable to those without this additional control.

The analysis provides some interesting insights. First, there is little evidence of a negative systematic impact of immigration on the low-skilled end

of the labor market. Table 6a and 6b in fact suggest that only self-employed natives have seen their occupational levels negatively affected by the presence of immigrants. There is instead no evidence of an effect on aggregate employment levels, on the occupational levels of employees or on the income earned by the various groups (reported in columns 4 through 7 of the table). Second, and more importantly, we find that the negative average results obtained in Table 4 are instead driven by the negative impact of immigration on the employment levels of more highly skilled natives, and in particular, of individuals who have completed a secondary education and, even more strongly so, of individuals who have completed a college education. The findings of column 1 and 2 of Table 6c suggest in particular that both total employment and native employees have been negatively affected, whereas the impact of immigration on the self employed is not significant. We find little evidence of an effect on income—with the exception of a mildly significant, positive impact for the self employed. Turning to college graduates, we find instead a strong, negative effect of immigration on natives' total employment level and on the number of native employees, whereas the effect is smaller for the self employed. Using once again equation 2, we can calculate the elasticity of highly skilled natives' employment level to immigration, and we find that a 10% increase in the supply of foreign workers is correlated with an 8.9% decline in native's employment. Also in the case of the highly skilled though, there is no evidence of an adverse effect of immigration on native income levels.

## 6 Conclusions

In this paper we have carried out what is, to the best of our knowledge, the first systematic study of the labor market effects of immigration to South Africa in the post-Apartheid era. We have obtained several interesting re-

sults. First, we have argued that migration has increased by about 50% over the period included in the sample. Second, we have shown immigrants to South Africa are at least as educated as natives, and that highly educated foreign individuals are especially important at the very top of the skill distribution. Third, our analysis of the labor market outcomes has shown that immigration has had a negative effect on natives' employment outcomes, but not on total income. Interestingly, skilled South Africans appear to be the most negatively affected subgroup of the population.

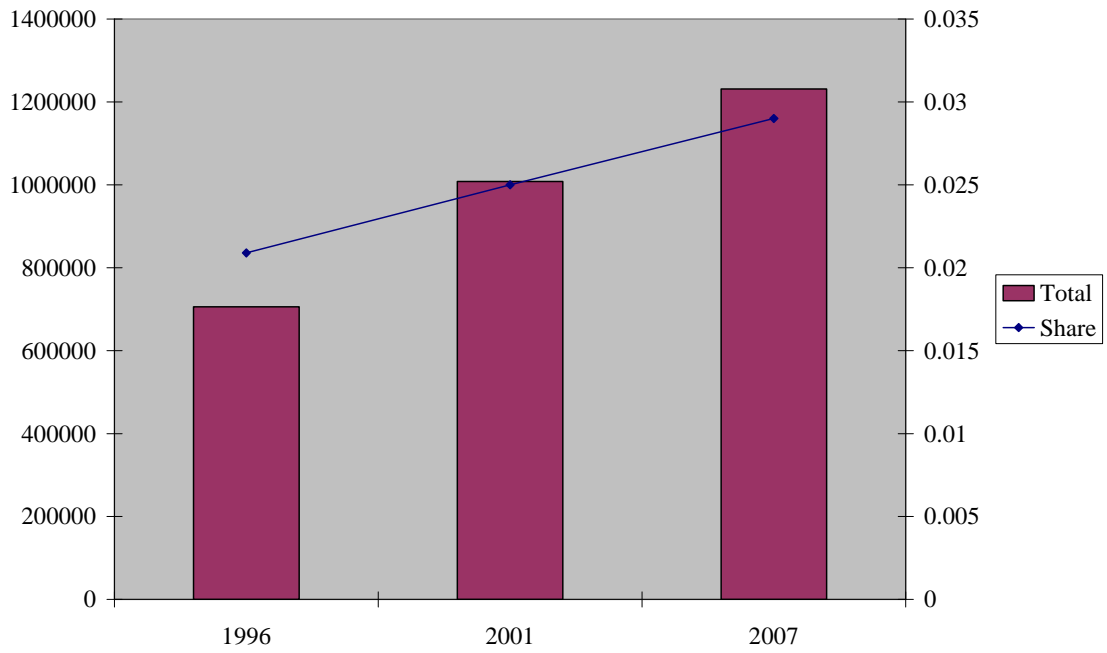
## References

- Aydemir, A. and G. J. Borjas (2007). Cross-country variation in the impact of international migration: Canada, Mexico, and the United States. *Journal of the European Economic Association* 5, 663–708.
- Bhargava, A. and F. Docquier (2008). HIV prevalence and migration of healthcare staff in Africa. *World Bank Economic Review* 22, 345–366.
- Bhorat, H., J.-B. Meyer, and C. Mlatsheni (2002). Skilled labor migration from developing countries: Study on South and Southern Africa. International Migration Papers 52.
- Borjas, G. J. (2003). The labor demand curve is downward sloping: Reexamining the impact of immigration on the labor market. *The Quarterly Journal of Economics* 40, 1335–1374.
- Borjas, G. J. (2006). Native international migration and the labor market impact of immigration. *Journal of Human Resources* 41, 221–258.
- Card, D. (1990). The impact of the Mariel boatlift on the Miami labor market. *Industrial and Labor Relations Review* 43, 245–257.
- Crush, J. (2000). Migrations past: An historical overview of cross-border movement in Southern Africa. In D. McDonald (Ed.), *On borders: Perspectives on international migration in southern Africa*, pp. 12–24. New York: St. Martin's Press.
- Crush, J. and V. Williams (2010). Labor immigration trends and policies in southern Africa. Policy Brief 23.

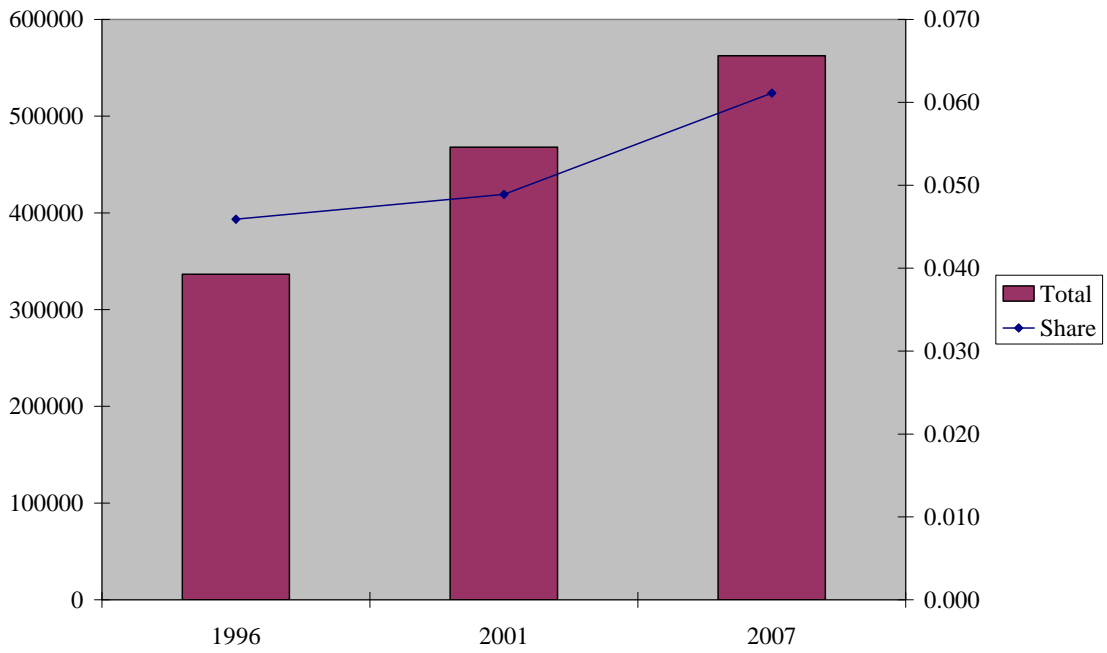
- Docquier, F. and A. Marfouk (2006). International migration by educational attainment (1990-2000) - release 1.1. In C. Ozden and M. Schiff (Eds.), *International Migration, Remittances and Development*, pp. 151–199. New York: Palgrave Macmillan.
- Friebel, G., J. Gallego, and M. Mendola (2010). Xenophobic attacks, migration intentions and networks: Evidence from the South of Africa. mimeo.
- Friedberg, R. and J. Hunt (1995). The impact of immigrants on host country wages, employment and growth. *Journal of Economic Perspectives* 9, 23–44.
- Friedberg, R. M. (2001). The impact of mass migration on the Israel labor market. *Quarterly Journal of Economics* 116, 1373–1408.
- Hunt, J. (1992). The impact of the 1962 repatriates from Algeria on the French labor market. *Industrial and Labor Relations Review* 45, 556–572.
- Klotz, A. (2000). migration after apartheid: deracializing South African foreign policy. *Third World Quarterly* 21, 831–847.
- Lucas, R. E. B. (2006). Migration and economic development in Africa: A review of evidence. *Journal of African Economies* 15, 337–395.
- McDonald, D. A. (2000). *On borders*. New York: St. Martin’s Press.
- Mishra, P. (2007). Emigration and wages in source countries: Evidence from Mexico. *Journal of Development Economics* 82, 180–199.
- Ottaviano, G. I. and G. Peri (2011). Rethinking the effects of immigration on wages. *Journal of the European Economic Association*. forthcoming.
- Peberdy, S. (2001). Imagining immigration: Inclusive identities and exclusive policies in post-1994 South Africa. *Africa Today* 48, 15–32.
- Peberdy, S. and J. Crush (1998). Rooted in racism: The origin of the Aliens Control Act. In J. Crush (Ed.), *Beyond control: Immigration and human rights in a democratic South Africa*, pp. 18–36. Cape Town: Idasa.
- Phillips, B. (2002). Out of Lagos. In H. Holland and A. Roberts (Eds.), *From Jo’burg to Jozi, Stories about Africa’s Infamous City*, pp. 203–206. London: Penguin Books.

- Pischke, J. S. and J. Velling (1997). Employment effects of immigration to germany: An analysis based on local labor markets. *Review of Economics and Statistics* 79, 594–604.
- Waller, L. (2006). Migration of skilled in south africa: patterns, trends and challenges. Migration Policy Brief 20.

**Figure 1: Stock of foreign born in the total population, 1996-2007**

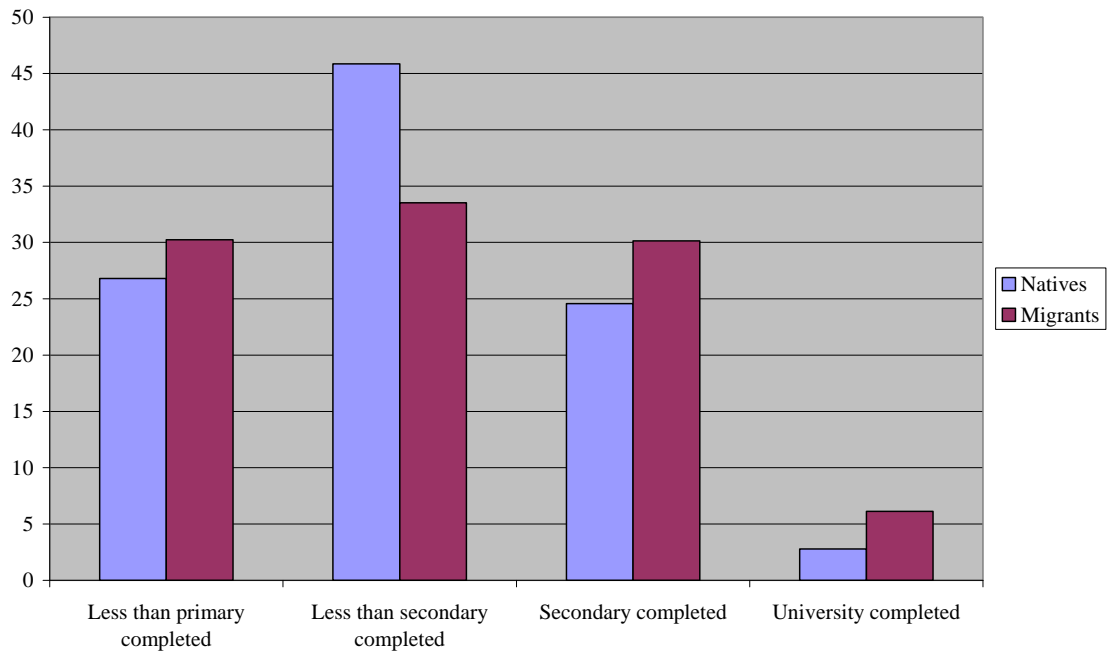


**Figure 2: Stock of foreign born in the male labor force**

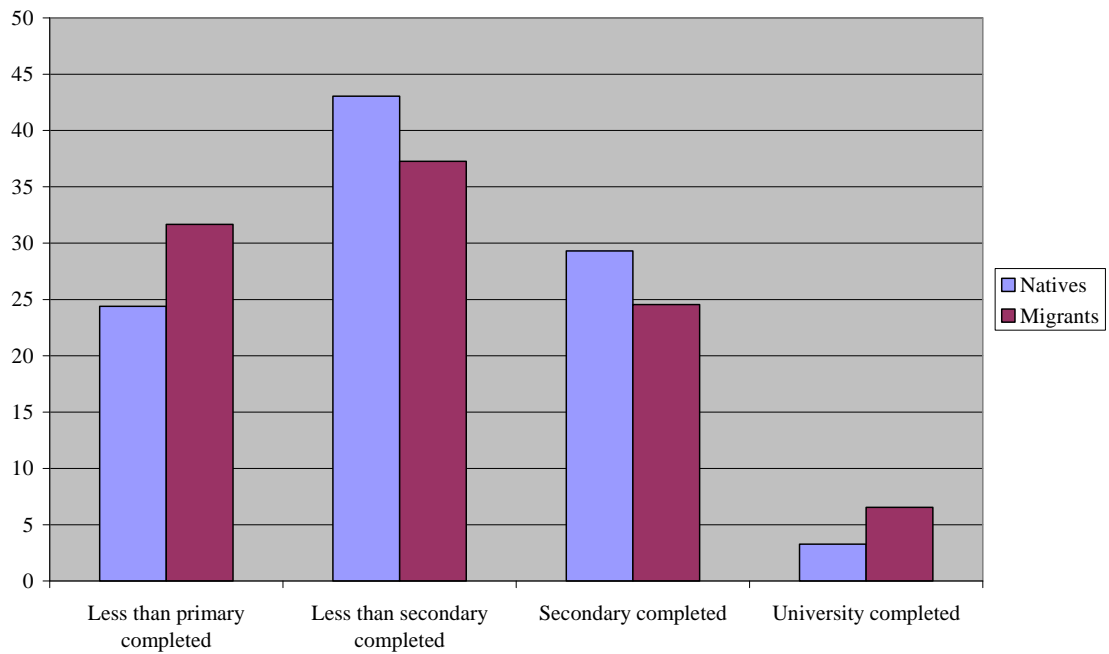




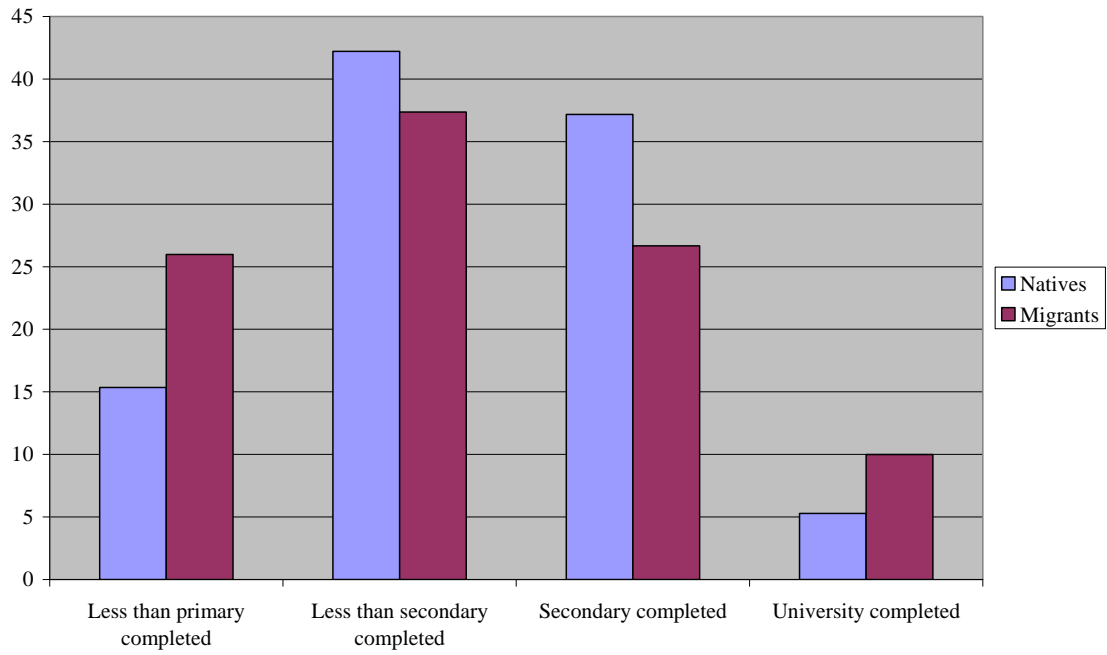
**Figure 3a: Educational attainment of natives and foreign born, 1996**



**Figure 3b: Educational attainment of natives and foreign born, 2001**

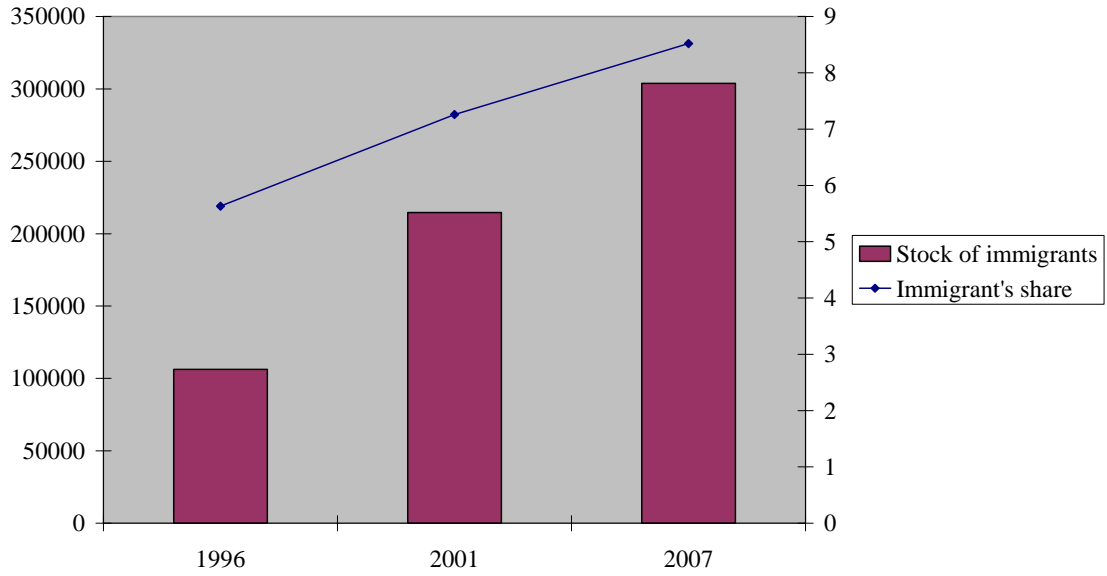


**Figure 3c: Educational attainment of natives and foreign born, 2007**

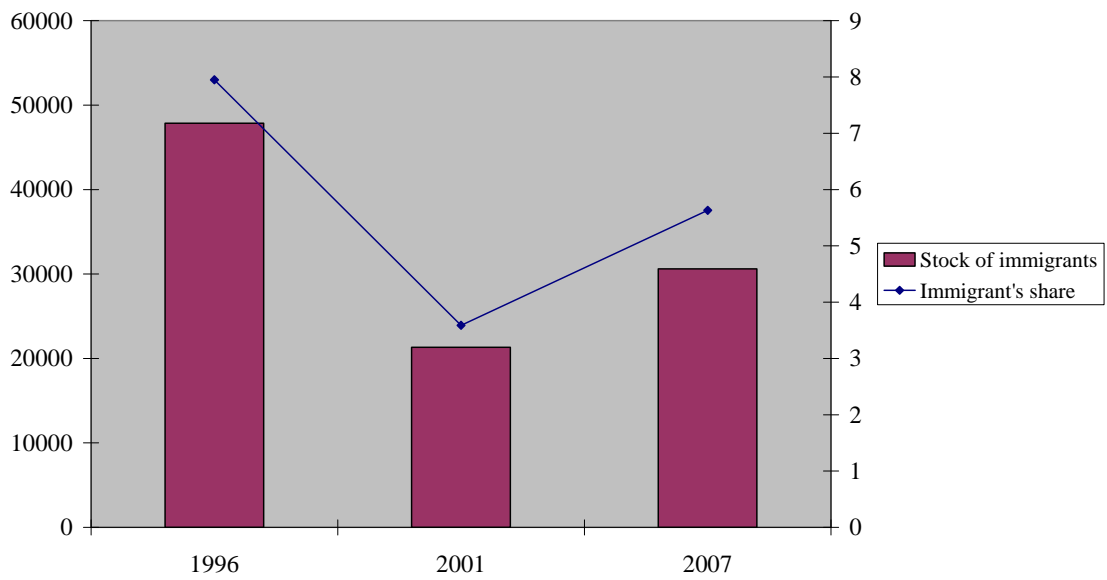


**Figure 4: Main immigrant receiving districts**

**City of Johannesburg**



**Lejweleputswa District**



### Ehlanzeni District

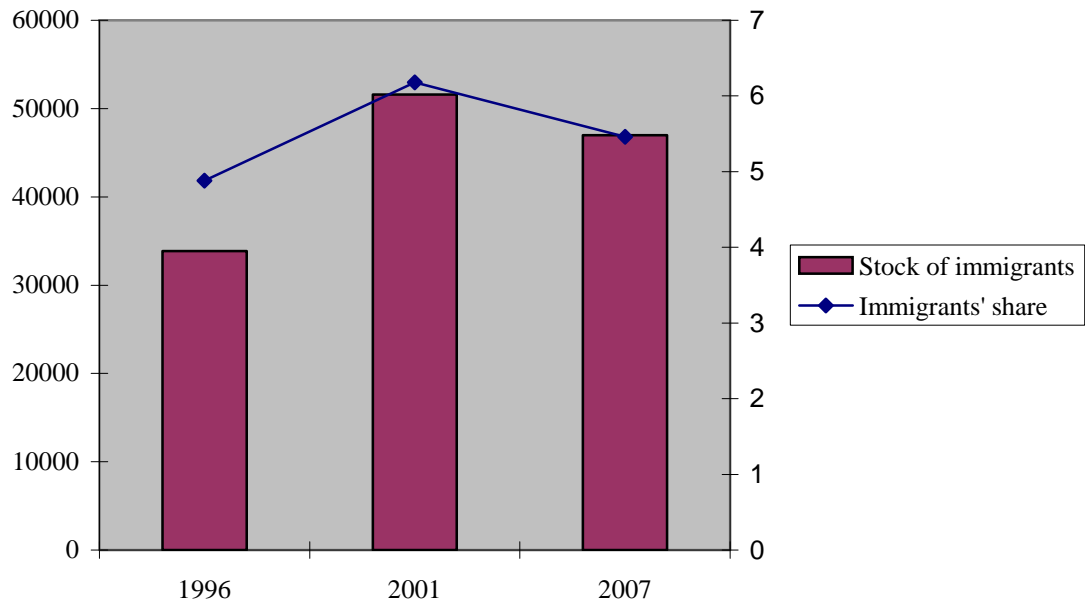
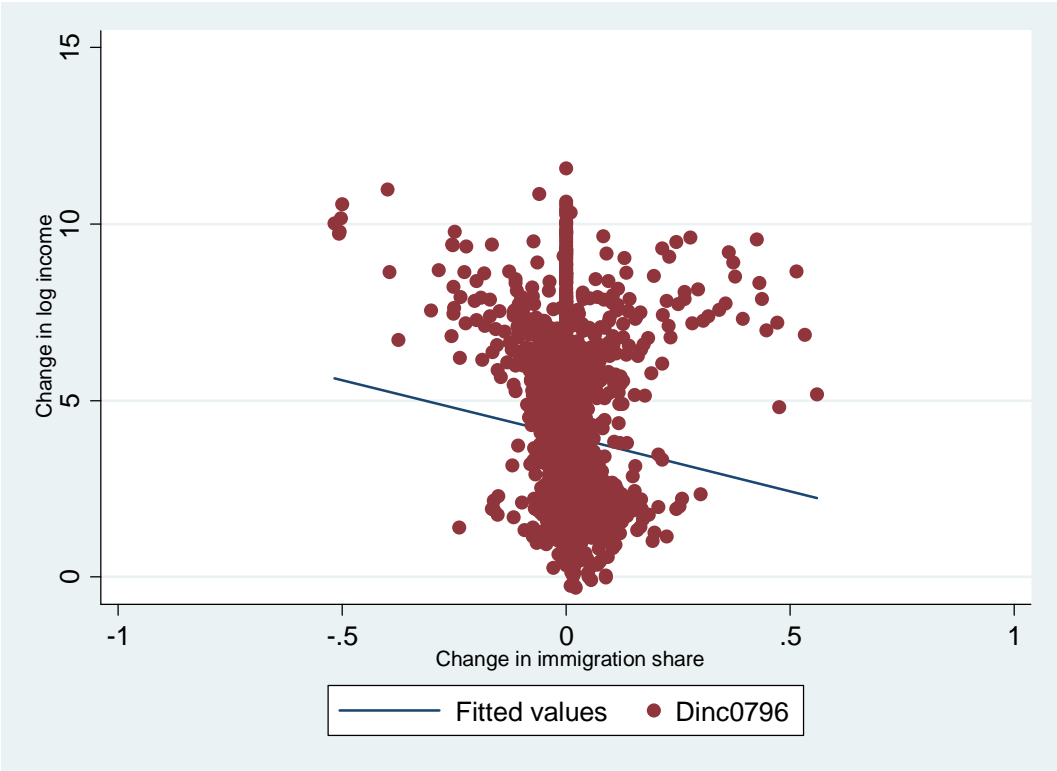
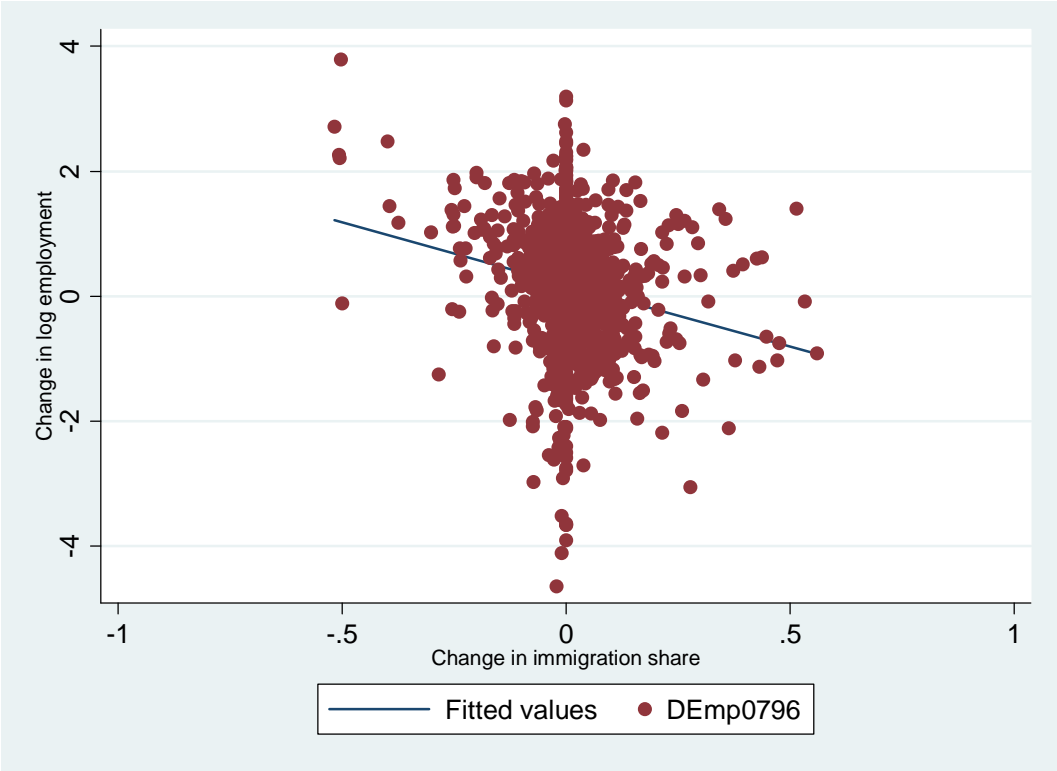


Figure 5: Scatter plots relating immigration and natives' labor market outcomes



**Table 1: Immigrants by country of origin**

	1996		2001	
	stock	rates	stock	rates
<b>AFRICA</b>	<b>466935</b>	<b>0.676</b>	<b>713298</b>	<b>0.707</b>
Eastern Africa	290302	0.411	466640	0.463
<i>Malawi</i>	10152	0.014	26054	0.026
<i>Mozambique</i>	183597	0.260	265176	0.263
<i>Zambia</i>	12990	0.018	23493	0.023
<i>Zimbabwe</i>	73042	0.103	130090	0.129
Middle Africa	10377	0.015	23974	0.024
Nothern Africa	1652	0.002	3853	0.004
Southern Africa	154692	0.219	206760	0.205
<i>Botswana</i>	10480	0.015	17518	0.017
<i>Lesotho</i>	95062	0.135	113020	0.112
<i>Nambia</i>	28850	0.041	44798	0.044
<i>Swaziland</i>	20300	0.029	31425	0.031
Western Afrcia	9911	0.014	12070	0.012
<b>AMERICA</b>	<b>11606</b>	<b>0.016</b>	<b>21938</b>	<b>0.022</b>
<b>ASIA</b>	<b>23807</b>	<b>0.034</b>	<b>43540</b>	<b>0.043</b>
<b>EUROPE</b>	<b>173345</b>	<b>0.230</b>	<b>225223</b>	<b>0.223</b>
<i>United Kingdom</i>	97290	0.138	127820	0.127
<i>Germany</i>	14427	0.020	24216	0.024
<i>Portugal</i>	12667	0.018	19490	0.019
<b>OCEANIA</b>	<b>3586</b>	<b>0.005</b>	<b>4403</b>	<b>0.004</b>
<b>NS/NR</b>	<b>26522</b>	<b>0.038</b>	<b>0</b>	<b>0.000</b>

**Table 2: Immigrants' share by skill group (men in the labor force)**

<b>Education</b>	<b>Years of experience</b>	<b>1996</b>	<b>2001</b>	<b>2007</b>
<b>Less than primary</b>	<b>1 - 5</b>	0.055	0.068	0.072
	<b>6 - 10</b>	0.057	0.078	0.115
	<b>11 - 15</b>	0.055	0.066	0.123
	<b>16 - 20</b>	0.054	0.051	0.097
	<b>21 - 25</b>	0.062	0.047	0.078
	<b>26 - 30</b>	0.061	0.046	0.074
	<b>31 - 35</b>	0.053	0.044	0.079
	<b>36 - 40</b>	0.044	0.035	0.076
<b>Primary completed</b>	<b>1 - 5</b>	0.046	0.039	0.038
	<b>6 - 10</b>	0.038	0.053	0.057
	<b>11 - 15</b>	0.041	0.050	0.070
	<b>16 - 20</b>	0.037	0.045	0.069
	<b>21 - 25</b>	0.035	0.039	0.065
	<b>26 - 30</b>	0.035	0.036	0.054
	<b>31 - 35</b>	0.034	0.031	0.050
	<b>36 - 40</b>	0.031	0.034	0.049
<b>Secondary completed</b>	<b>1 - 5</b>	0.022	0.020	0.019
	<b>6 - 10</b>	0.026	0.028	0.038
	<b>11 - 15</b>	0.038	0.037	0.044
	<b>16 - 20</b>	0.048	0.048	0.044
	<b>21 - 25</b>	0.059	0.060	0.058
	<b>26 - 30</b>	0.084	0.073	0.065
	<b>31 - 35</b>	0.116	0.115	0.084
	<b>36 - 40</b>	0.140	0.165	0.105
<b>University completed</b>	<b>1 - 5</b>	0.069	0.073	0.098
	<b>6 - 10</b>	0.087	0.090	0.099
	<b>11 - 15</b>	0.092	0.124	0.109
	<b>16 - 20</b>	0.106	0.136	0.122
	<b>21 - 25</b>	0.118	0.163	0.138
	<b>26 - 30</b>	0.141	0.185	0.160
	<b>31 - 35</b>	0.140	0.241	0.181
	<b>36 - 40</b>	0.176	0.261	0.254

**Table 3: Natives' share by skill group (men in the labor force)**

<b>Education</b>	<b>Years of experience</b>	<b>1996</b>	<b>2001</b>	<b>2007</b>
<b>Less than primary</b>	<b>1 - 5</b>	0.9454	0.9323	0.9282
	<b>6 - 10</b>	0.9432	0.9221	0.8847
	<b>11 - 15</b>	0.9452	0.9342	0.8767
	<b>16 - 20</b>	0.9465	0.9487	0.9033
	<b>21 - 25</b>	0.9384	0.9529	0.9217
	<b>26 - 30</b>	0.9389	0.9543	0.9258
	<b>31 - 35</b>	0.9474	0.9559	0.921
	<b>36 - 40</b>	0.9557	0.9653	0.9243
<b>Primary completed</b>	<b>1 - 5</b>	0.9539	0.961	0.9616
	<b>6 - 10</b>	0.9621	0.9468	0.9432
	<b>11 - 15</b>	0.9595	0.9503	0.93
	<b>16 - 20</b>	0.9635	0.9555	0.9312
	<b>21 - 25</b>	0.9653	0.9608	0.9353
	<b>26 - 30</b>	0.9654	0.9644	0.9461
	<b>31 - 35</b>	0.9664	0.9689	0.9502
	<b>36 - 40</b>	0.9695	0.9658	0.9514
<b>Secondary completed</b>	<b>1 - 5</b>	0.9784	0.9804	0.9809
	<b>6 - 10</b>	0.9739	0.9717	0.9622
	<b>11 - 15</b>	0.9619	0.9632	0.9558
	<b>16 - 20</b>	0.9516	0.9518	0.9562
	<b>21 - 25</b>	0.9415	0.9396	0.9425
	<b>26 - 30</b>	0.9161	0.9273	0.9355
	<b>31 - 35</b>	0.8843	0.8851	0.9156
	<b>36 - 40</b>	0.8602	0.8349	0.8946
<b>University completed</b>	<b>1 - 5</b>	0.9311	0.9269	0.9023
	<b>6 - 10</b>	0.9128	0.9098	0.901
	<b>11 - 15</b>	0.9082	0.8762	0.8908
	<b>16 - 20</b>	0.8944	0.8642	0.8782
	<b>21 - 25</b>	0.8818	0.8371	0.8622
	<b>26 - 30</b>	0.8593	0.8148	0.8403
	<b>31 - 35</b>	0.8602	0.7587	0.8187
	<b>36 - 40</b>	0.824	0.7387	0.7457



**Table 4: The labor market effect of immigration on natives' employment**

	(1)	(2)	(3)	(4)	(5)	(6)
	<b>Log tot. Employment</b>	<b>Log tot. employees</b>	<b>Log tot. Self- employed</b>	<b>Log tot. Employment</b>	<b>Log tot. employees</b>	<b>Log tot. Self- employed</b>
Migration share	-1.085*** (0.207)	-1.172*** (0.228)	-0.820*** (0.278)	-0.975*** (0.284)	-1.017*** (0.351)	-0.977** (0.462)
<i>Skill, district, year and any two-way interactions</i>						
<i>FE</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
<i>Lagged native empl.</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
Constant	-0.383* (0.217)	-1.510*** (0.282)	-2.532*** (0.598)	7.141*** (0.371)	4.557*** (0.381)	0.278 (0.893)
Observations	5327	5271	4860	3532	3499	3166
R-squared	0.979	0.977	0.925	0.983	0.981	0.936

Robust standard errors clustered within skill-district cells in parentheses

\*\*\* p<0.01, \*\* p<0.05, \*

p<0.1

**Table 5: The labor market effect of immigration on natives' income**

	(1) Log tot income (lab force)	(2) Log tot income (employed)	(3) Log tot income (employees)	(4) Log tot income (self- employed)	(5) Log tot income (labor force)	(6) Log tot income (employed)	(7) Log tot income (employees)	(8) Log tot income (self- employed)
Migration share	-0.010 (0.282)	-0.123 (0.279)	-0.050 (0.273)	0.084 (0.478)	0.283 (0.402)	0.134 (0.400)	-0.202 (0.404)	0.451 (0.703)
<i>Skill, district, year and any two-way interactions</i>								
<i>FE</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
<i>Lagged native empl.</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
Constant	14.057*** (0.327)	14.019*** (0.334)	11.547*** (0.486)	10.427*** (0.799)	9.242*** (0.853)	8.864*** (0.780)	14.470*** (0.435)	9.570*** (1.350)
Observations	5322	5322	5270	4841	3530	3530	3499	3155
R-squared	0.960	0.950	0.951	0.857	0.960	0.949	0.949	0.867

Robust standard errors clustered within skill-district cells in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 6a: The labor market effect of immigration by skill group – less than primary**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	<b>Log tot. Employment</b>	<b>Log tot. employees</b>	<b>Log tot. Self- employed</b>	<b>Log tot income (lab force)</b>	<b>Log tot income (employed)</b>	<b>Log tot income of employees</b>	<b>Log tot income of self-employed</b>
Migration share	-0.399 (0.532)	-0.277 (0.564)	-1.817* (0.931)	0.505 (0.608)	0.331 (0.489)	0.631 (0.453)	-0.235 (1.506)
<i>Skill, district, year and any two-way interactions FE</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
<i>Lagged native empl.</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>
Constant	5.103*** (0.247)	5.707*** (0.135)	1.839*** (0.704)	7.808*** (0.388)	8.389*** (0.366)	9.455*** (0.173)	5.285*** (0.922)
Observations	1342	1341	1190	1342	1342	1341	1186
R-squared	0.978	0.972	0.904	0.874	0.839	0.835	0.685

Robust standard errors clustered within skill-district cells in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 6b: The labor market effect of immigration by skill group – less than secondary completed**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	<b>Log tot. Employment</b>	<b>Log tot. employees</b>	<b>Log tot. Self- employed</b>	<b>Log tot income (lab force)</b>	<b>Log tot income (employed)</b>	<b>Log tot income of employees</b>	<b>Log tot income of self-employed</b>
Migration share	-0.516 (0.417)	-0.532 (0.441)	-1.953* (1.004)	-0.085 (0.848)	-0.219 (0.667)	0.290 (0.585)	-1.341 (1.765)
<i>Skill, district, year and any two-way interactions FE</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
<i>Lagged native empl.</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>
Constant	8.233*** (0.070)	7.939*** (0.080)	2.775*** (0.441)	12.413*** (0.210)	12.769*** (0.190)	12.564*** (0.121)	7.764*** (0.900)
Observations	1344	1344	1302	1344	1344	1344	1298
R-squared	0.987	0.986	0.941	0.930	0.906	0.908	0.760

Robust standard errors clustered within skill-district cells in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 6c: The labor market effect of immigration by skill group – secondary completed**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	<b>Log tot. Employment</b>	<b>Log tot. employees</b>	<b>Log tot. Self- employed</b>	<b>Log tot income (lab force)</b>	<b>Log tot income (employed)</b>	<b>Log tot income of employees</b>	<b>Log tot income of self-employed</b>
Migration share	-1.086** (0.511)	-0.856* (0.475)	-0.758 (0.723)	0.230 (0.908)	0.158 (0.898)	-0.671 (0.799)	2.359* (1.413)
<i>Skill, district, year and any two-way interactions FE</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
<i>Lagged native empl.</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>
Constant	8.980*** (0.114)	3.627*** (0.159)	3.682*** (0.623)	14.049*** (0.139)	13.976*** (0.139)	11.921*** (0.186)	10.309*** (0.468)
Observations	1344	1340	1318	1344	1344	1340	1316
R-squared	0.989	0.986	0.939	0.953	0.938	0.930	0.805

Robust standard errors clustered within skill-district cells in parentheses

\*\*\* p<0.01, \*\* p<0.05, \*

p<0.1

**Table 6d: The labor market effect of immigration by skill group – university and above**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	<b>Log tot. Employment</b>	<b>Log tot. employees</b>	<b>Log tot. Self- employed</b>	<b>Log tot income (lab force)</b>	<b>Log tot income (employed)</b>	<b>Log tot income of employees</b>	<b>Log tot income of self- employed</b>
Migration share	-1.121*** (0.288)	-1.364*** (0.326)	-0.605* (0.367)	-0.231 (0.364)	-0.240 (0.368)	-0.120 (0.363)	-0.079 (0.668)
<i>Skill, district, year and any two-way interactions</i>							
<i>FE</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
<i>Lagged native empl.</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>
Constant	1.055 (0.684)	-0.551 (0.631)	3.828*** (0.485)	12.027*** (0.822)	11.942*** (0.809)	10.838*** (0.801)	6.909*** (0.742)
Observations	1297	1246	1050	1292	1292	1245	1041
R-squared	0.955	0.949	0.909	0.845	0.833	0.833	0.799

Robust standard errors clustered within skill-district cells in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1