Immigration and the Labour Market Outcomes of Natives in Developing Countries: A Case Study of South Africa

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Abstract

According to the 2009 Human Development Report most of the international migration takes place between countries with similar levels of development. Research on the impact of Mexican migration to the US or Africans/Eastern Europeans to Western European countries focus on only 37% of the international migration patterns. In this paper we focus on the other 63%. This research is interested in the effects that immigration has on the labour markets in developing countries. Using the 2001 census and the 2007 community survey from South Africa this paper examines the effect that immigration has on labour market outcomes of native-born South Africans. We estimate the impact of an increase in the number of workers with a particular set of skills on the labour market outcomes of native-born South Africans with the same set of skills. We also estimate the impact of an increase in skilled immigrants on the labour market outcomes of low-skilled native-born South Africans. Low-skilled immigrants increase the employment rates of low-skilled native-born South Africans while there appears to be no effect of skilled immigrants on the labour market outcomes of skilled natives. However, our results show that skilled immigrants have a crowding out effect on low-skilled black native-born workers while they stimulate the demand for low-skilled coloured native-born workers. The displacement effect appears to happen exclusively in wage-employment.

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1 Introduction

Research on the effects of immigration have shown little or no effect of immigration on native workers (Card, 1990; Altonji and Card, 1991; LaLonde and Topel, 1991; Schoeni, 1997).[1] But the bulk of the migration patterns have not been addressed by the existing literature. Most of these studies have focused on immigrants from less-developed countries into developed countries.[2] Few studies have investigated the effects of foreign labour in developing countries, in particular emerging markets. According to the 2009 Human Development Report, most of the international migration takes place between countries with similar levels of development. Research on the impact of Mexican migration to the US or Africans/Eastern Europeans to Western European countries focus on only 37% of the international migration patterns. In this paper we focus on the other 63%. Emerging market economies hold a special position because while they are classified as 'middle income' countries on the global distribution, they are often 'rich' relative to their neighbors. Examples of such countries are South Africa and Chile. Emerging markets provide a special case to study international migration because as skilled labourers leave these countries for developed countries, immigrants into these countries tend to be both skilled and unskilled workers from other developing countries looking for better opportunities than their home countries can offer. International labour migration thus affects the income distribution and the skill composition via the types of skills that immigrants bring and emigrants leave with.

Labour markets in developing countries possess interesting characteristics: 1) they have significantly high unemployment and underemployment, 2.) the informal sector employs a large share of the labour force and absorbs the surplus labour that the formal sector is unable or unwilling to hire (Dasgupta and Ray, 1986), 3.) they have a surplus of cheap labour, unlike in developed countries where there tends to be high demand for cheap labour to perform low-wage jobs, and 4.) in many middle income countries, the immigrant population tends to be relatively more skilled than the native population, receiving many of the skilled workers from neighboring countries, escaping adverse economic, social and political problems in their home countries. These characteristics of the labour markets in developing countries and the immigrants that cross international borders in search of better opportunities can have important implications for the welfare of native workers. Case studies and anecdotal evidence suggests that often times immigrants tend to take jobs which under-utilize their skills or become employed in the informal sector. The flow of immigrants and their ability to obtain employment often leads to immigrants being used as scapegoats against the

[1] Research which shows that there is a negative effect of immigration on the US labour market show that low-skilled native-born American workers and native-born American minorities are the primary groups most affected by immigrant flows (Borjas, Freeman and Katz, 1997; Camarota, 1997). Work by Borjas (2003) shows immigration adversely effects native wages at the national level.

[2] See Borjas (1994) and Longhi, Nijkamp and Poot (2005) for a review of this literature

adverse economic conditions faced by many native workers.

We focus our study on South Africa. A recent book from the World Bank (Ratha et al., 2011) shows that in 2010, South Africa was the third largest destination country for African emigrants (behind France and Cote d'Ivoire). At the same time, South Africa is also a sending country in terms of skilled labour; emigrants from South Africa leave to join the developed economies of Europe, North America and Australia. Recent immigration polices has attempted to address the outward flow of skilled labour by implementing policies which attract skilled labour. These policies may in turn benefit native-born South Africans due to the complementarity between newly arriving skilled immigrants and native-born workers. At the same time, labour market restrictions and regulations in South Africa often force skilled immigrants to search for unskilled employment. The flow of immigrants into the unskilled sector, may have significant displacement effects on low-skilled native-born South Africans.

We make use of South African Census data from 2001 and 2007 to estimate the impact of an increase in the number of workers with a particular set of skills on the labour market outcomes of native-born South Africans with the same set of skills. We exploit the variation in immigrant shares across skill groups, districts, and time. We are able to identify the full effect of immigrant flows on native-born South Africans as long as labour and capital are not mobile.[3] We find that increases in the supply of immigrants increases the labour force participation and employment rates of native-born black and white male South Africans, and has no statistically significant effect on earnings for any native-born male South African group. For women, we find that an increase in the share of the labour force foreign-born increases the labour force participation and the employment rates of native-born black South Africans.

The insignificant effect of immigration shares on earnings along with the positive and significant labour supply effect is consistent with the Lewis model of surplus labour (Lewis, 1954; Ranis and Fei, 1961). In labour markets with full employment, we would expect for the increases in labour force participation and employment rates to be driven by increases in earnings. However, if wages exceed the market clearing wage, forces outside of market forces drive wages, and there exist a surplus of labour at the available wage, increases in labour demand (due to an increase in the demand for goods from newly arriving immigrants, the creation of new firms by immigrants, or due to the complementarity between immigrants and natives in the production function) allows firms to hire more labour at the current wage rate.

[3]The 2001 South African census occurred right before the surge in immigrants from Zimbabwe, unfortunately the publicly available 2007 community survey does not provide information on country of birth. So we are unable to exploit the exogenous influx of migrants from Zimbabwe.

By stacking the data, we are assuming that the relationship between immigrant shares and native labour market outcomes are the same across skill groups. Given the shortage of skilled labour, the abundance of low-skilled labour, and the labour market frictions that exist in the formal sector (which employ a large share of the skilled labour) this assumption may not be true. Therefore, we estimate our regressions for skilled and low-skilled workers separately. We also investigate whether skilled immigrants and unskilled natives compete in the same labour market. We find that for low-skilled South African males, increases in the share of low-skilled immigrants increases their employment rates. However, increases in the share of skilled immigrants decreases the employment rate for low-skilled black South African males while increasing the labour force participation and employment rates of low-skilled coloured South African men. The pattern is similar for female South Africans. We still fail to find significant effects on earnings. These results are consistent with native-born South Africans and immigrants being imperfect substitutes in the production function, with low-skilled immigrants stimulating the demand for low-skilled natives, and with skilled immigrants crowding out low-skilled natives.

Lastly, we investigate how increases in the immigrant share affects employment and earnings of native-born black male South Africans by sector. The lack of consistency in how the survey question on informal employment was asked across surveys prevent us from exploring the impact of immigration on the formal and informal sector, so instead we explore the relationship between immigration and wage employment and self-employment. We find that increases in the supply of skilled immigrants, decreases the likelihood of being employed in wage employment for low-skilled male black South Africans.

The rest of the paper is structured as follows. Section 2 provides a brief overview of immigration in South Africa. Section 3 presents the theory. Section 4 describes the data and provides some descriptive statistics. Section 5 presents the empirical specification and the results. Section 6 concludes.

2 Immigration in South Africa

There are a number of determinants for South-South migration (migration flows between developing countries). As is the case for immigration flows from developing countries to developed countries, income, proximity, and social networks are the main reasons for South-South migration (Ratha and Shaw, 2007). There are also significant physical barriers which prevent migrants from developing countries access to developed economies (Ratha et al., 2011). Data from the World Bank estimates that in 2010 the stock of international emigrants from African countries was 30.6 million. Of these

migrants, more than 14 million remained in Africa (Ratha et al., 2011). As mentioned earlier, South Africa is one of the top destination countries for African migrants, with over 6 percent of the total stock of African migrants (Ratha et al., 2011). South Africa also attracts a significant share of overseas migrants, with India and the United Kingdom being the top source countries.

Figure 1 presents the total number of permanent residence permits issued annually in South Africa from 1945-2004 (the most recent period for which data is available), the figure shows that South Africa has had significant fluctuations in its immigrant flows.[4] The fluctuations in international migration primarily come from economic and political events affecting South Africa and other countries. Key events can easily be identified from the figure. The jump in the number of immigrants receiving residency in 1975 and 1976 can be attributed to the doubling of immigrants from the United Kingdom and follows Mozambique's independence and the start of their civil war where thousands of Mozambicans fled to South Africa. The fall in immigrants receiving residency in 1977 follows the Soweto uprising where students protested the introduction of Afrikaans to be used in schools as the language for instruction. Documented immigration flows were at its peak between 1963 and 1986, and falling drastically after 1986.

Table 1 provides summary statistics of the share of the labour force foreign-born. The most noticeable observation from table 1 and figure 1 is the magnitude of immigration volumes. Contrary to the perception of South Africa having a significantly high immigrant population, the immigrant stock for the country ranges between 3.5 to 4 percent. The share of South Africa's immigrant population has been slowly increasing since 1996 but not as drastically as the reported riots would suggest.[5] In 1996, the immigrant share of the labour force was 3.39 %, in 2001 it was 3.44 %, and in 2007 it increased marginally to 3.95 %. Table 1 also shows the regional concentration of the immigrant population, with high shares in Gueteng, a major industrial center, and increasing shares in Northern Cape, Free State, North West, and Mpumalanga provinces. The three largest immigrant groups in South Africa come from Mozambique, Zimbabwe, and the United Kingdom.[6]

Immigrant labour has always played an important role in South Africa's development.[7] The country's vast reserves of minerals, has meant that the mining industry is the country's most important industry. A significant fraction of African immigrants are contract workers working in the diamond and gold mines in South Africa. In fact, in the first half of the 1970s over 60% of the

[4]Data on temporary residence permits is not available to the authors.

[5]The scale of illegal migration is not known, and so the figures reported in the paper should be read with caution.

[6]In 1996, 25% of all immigrants were from Mozambique, 17% from the United Kingdom and 14% from Zimbabwe. By 2001, the share of immigrants from Mozambique and Zimbabwe had risen to 30% and 16% respectively while the share of immigrants from the United Kingdom had fallen to 11%. As the relative composition of immigrants in South Africa was changing post apartheid, so were the absolute numbers, the total number of immigrants from Mozambique and Zimbabwe were rising while immigrants from the United Kingdom were leaving South Africa.

[7]Refer to Peek (1998) for a discussion of labour migration into South Africa during the 1990s.

workers in South African mines were African foreigners (Simelane, 1999). By the end of the 1970's the apartheid government was putting pressure on the mines to hire more South African workers. Currently it is estimated that approximately 20% of the mining industry are African foreigners. 1986 brought about a number of changes for immigrants in South Africa, first, due to poor global conditions in the mining industry, employment dropped forcing many immigrants to return home and secondly, according to the United Nations (2010) the South African government began to view immigration as a problem and began advocating for policies to restrict access into the country.

With the fall of Apartheid, the composition of immigrants has been changing. Figure 2 reproduces the information from figure 1 for the years 1990-2004 and breaks up the immigrant flows by source country, overseas or Africa. Since 1994, the share of immigrants granted permanent residency in South Africa from other African countries has been steadily increasing. Between 2001 and 2004 (the most recent period for which data is available) the share of immigrants coming from Africa increased from 32.8 percent to 48.9 percent. As figure 2 shows, since 2001, not only have the shares of African immigrants, as a share of all permanent residence permits granted, been rising, but the absolute number of African immigrants have been rising. For overseas immigrants, since 2001 their total flows have also been increasing but their flows have not reached there pre-1990 levels.

The trend in immigration flows reflected in figures 1 and 2 reflect the government's perceptions about immigration and immigrants. Prior to 1991, African immigrants were only viewed as contract labour. Post 1991, African immigrants were viewed as immigrants who shared in the social and economic culture of the country. This has been both beneficial and detrimental to the country. Immigrants replace South African emigrants who leave for the developed economies of Europe and North America, taking their skills with them, but it also has led to tensions as the government and natives fear displacement effects and pressure on resources.[8] These frustrations manifested themselves in the xenophobic attacks of 2008.

The focus of this paper is to investigate the impact of immigration on native employment outcomes. The paper's aim is to identify the labour market consequences of immigrant labour.

3 Theory

An increase in the number of immigrants increases the supply of labour. Holding demand constant, the increase in the supply of labour reduces the return to labour. However, new immigrants

[8] In 2002/2003, a new Immigration Act was signed into law. The act focused on attracting skilled migrants. In 2004, the government introduced the Joint Initiative for Priority Skills Acquisition (JIPSA), which emphasized the need to acquire certain skills from outside the country.

can increase the demand for locally produced goods and services-and thus labour demand-which could offset the negative effects from the increase in labour supply (Altonji and Card, 1991). The theory above suggests that the only employment effects attributable to immigrant inflows are due to changes in wages. However, Peri (2011) shows that an integrated national labour market has predictions for the employment response to immigration as opposed to a wage response.[9] If natives are fully mobile, and can respond to local labour supply shocks by moving across labour markets, then in the long run local wage effects would be eliminated.

In developing countries, it is not clear that local labour markets are integrated, but due to strong unions, wages tend to exceed the market clearing wage and factors outside of market forces tend to drive wages Klein (2012). In the presence of binding minimum wage laws and strong trade unions, inflows of immigrants may have a weak effect on wages but large effects on employment.[10] Alternatively, if immigrants stimulate the demand for labour in the formal sector, firms would be able to hire more workers at the current wage, absorbing some of the surplus labour (Lewis, 1954; Ranis and Fei, 1961).

Many of the theories on the relationship between immigrant labour and natives' labour market outcomes rely on the assumption that immigrants and natives are perfect substitutes. Work by Peri and Sparber (2009) and Peri (2011, 2012) emphasize that the effects of immigration depend upon whether native- and foreign-born workers with similar observable characteristics are imperfect substitutes in production. Language barriers and legal status limit immigrants' job opportunities compared to natives which imply that immigrants and natives may in fact specialize in different tasks which could mitigate natives wage losses from immigration. Alternatively, workers with similar levels of observable characteristics may have high levels of substitutability (Borjas, 2003), while workers with different levels of education and experience may be complementary. In a developing country like South Africa, it is unclear who competes with who in the labour market.[11] Skilled immigrants are likely to displace low-skilled natives in the low-skilled or informal sector. However, there could be production complementarities across skill groups which could lead to increases in employment opportunities for native workers. The empirical section below tests these relationships.

[9] More of the recent literature which analyzes the effect of immigration on labour markets emphasizes that most of the effect is at the national level as opposed to the local level as natives are able to respond to increases in the supply of labour do to international migration by moving out of the area (Borjas, 2003).

[10] In fact, in developing countries, the informal sector, which employs a significant share of the surplus labour which is unable to obtain employment in the formal sector, could absorb the majority of the negative impact of immigration flows if immigrants are more likely to take up employment in the informal sector and if increased competition in the formal sector makes it more difficult to obtain formal sector employment (Harris and Todaro, 1970).

[11] Our measure of skill is determined entirely by years of schooling. We do not take into consideration the quality of the education.

4 Descriptive Statistics

Data comes from the 10-percent sample of the 2001 South African census of the population and the 2-percent sample of the 2007 community survey produced by Statistics South Africa and made publicly available by IPUMS international. These datasets provide information on immigration status (a weakness of the South African labour force surveys), years of schooling, labour market activities, demographics, and earnings. The sample is restricted to adults between the ages of 15 and 65, who are not enrolled in school or institutionalized. A person is defined to be an immigrant if they report being born outside of South Africa.[12]

The effects that immigration has on the labour market outcomes of native workers depend on whether immigrants and natives work in the same industries. If natives and immigrants work in the same industries, then immigrants can have significant impacts on native workers. However if immigrants and natives do not work in the same industries then the effects of new immigrants will primarily affect existing immigrants. Table 2 provides the industry distribution of the immigrant population. Column 2 and 3 reports the immigrant share of each industry for the years 2001 and 2007. The last row of table 2 shows that foreign-born workers made up approximately 5.5 percent of the employed labour force. The mining industry employs a disproportionate share of foreign-born workers and is the largest employer of migrant labour, approximately 22% of the mining industry labour force is foreign-born, down from 27 % in 1996. The concentration of foreign-born workers in the mining industry is primarily driven by South Africa's history with migrant labour as mentioned earlier and the bilateral labour agreements between South Africa and neighboring countries. The construction, hotels and restaurant, and real estate & business services industries also employ a disproportionate share of foreign-born workers (ranging between 6-7 percent).

Table 2 also presents the industry distribution of South Africa's labour force for 2007 by gender and racial groups. Black male South Africans have high employment shares in the mining, construction, and private household services industries. Coloured male South Africans have large shares in the agriculture and construction industries, while white male South Africans have large shares in the wholesale and retail, financial services, and real estate industries. Coloured female South Africans have large shares in agriculture, manufacturing, and wholesale and retail industries. Black female South Africans have large shares in hotel and restaurants and private household services industry with white female South Africans having the largest shares in the manufacturing, transportation, financial services, real estate, and education industries.

[12]The 2007 community survey did not have information on citizenship. However, we code all respondents who were born outside of South Africa but report their race as 'Coloured South African' as native South African. The results are not sensitive to this modification.

Table 3 provides some additional summary statistics on the sample. The white and immigrant sample is slightly older than the black and coloured population (column 2 and 3). This is true for both men and women. The white sample has on average 2 additional years of education over the other groups (column 4 and 5). This educational gap exists even though there has been an overall increase in educational attainment. Immigrant men and native-born black and coloured South Africans have similar years of schooling, whereas female immigrants on average have slightly more education than the black and coloured native-born population. The most dramatic differences across the samples are the labour force participation and unemployment rates (columns 6-9). Immigrants have the highest labour force participation rates, participation rates were 88 percent and 62 percent for male and female immigrants respectively. White's had the second highest participation rates, followed by coloureds. In 2007, the unemployment rate for South Africa stood at 32 percent.[13] White South Africans have the lowest unemployment rates at 5 percent for men and 7 percent for women. Foreign-born workers recorded the second lowest unemployment rates, with male unemployment rates well below the national average at 10 percent. Black and Coloured South Africans have the highest unemployment rates in the country.[14]

Columns 10 and 11 of table 3 report the share of employed workers employed in waged/salaried employment (the other classification of work status is self-employment and unpaid family worker). South Africa has relatively small self-employment shares compared to other African countries.[15] Columns 10 and 11 shows that wage employment (relative to self-employment and unpaid work) has been falling between 2001 and 2007. A similar trend exists with the data on formal sector employment (not shown). The foreign-born population has the highest self-employment rates.

[13]The unemployment rate is calculated as the share of the labour force which reports themselves as not working but report being available and willing to work. They do not have to be actively searching for work.

[14]A paper by Kingdon and Knight (2007) discusses the causes and consequences of South Africa's high unemployment.

[15]This is true of the informal sector as well. The 2001 census and the 2007 community survey both distinguish between formal and informal sector employment. Formal sector jobs are classified as employment in a business or institution which is registered (i.e. has a tax number) and informal sector employment are jobs in businesses or institutions which are not registered (Statistics South Africa, 2001, 2007). The definition of informal and formal employment is consistent across the two surveys, how the respondents were asked about their sector of employment was not consistent. Because of this we are unable to use the question on formal/informal sector of employment. Instead, we use the information on your class of worker, being wage/salaried vs. self-employment/unpaid family worker. While wage/salaried and formal sector employment overlap they do not match perfectly, the same for self-employment and informal labour. However the consistency with which the class of worker question was asked across the two surveys allows us to explore the relationship between immigration flows and employment by class of worker.

5 Native Labour Market Outcomes and Immigration

The paper is interested in the effects that immigration has on the labour markets of developing countries. In particular, we are interested in the effects that immigration may have on native workers' decision to participate in the labour market, their ability to be employed, and their earnings. To investigate the labour market effects of immigration on native workers we exploit the interdistrict variation in immigration shares by skill level. We define skilled labour as completing secondary education or higher. Low-skilled labour is someone who has not completed secondary education. The geographic areas we use to identify labour markets are the 47 district councils and 6 metropolitan areas for a total of 53 labour markets (DC).

5.1 Basic Specification and Results

We estimate skill-DC-level regressions for labour force participation rates, employment rates, and native earnings using a two-stage procedure.[16]

We first construct DC-specific means of the outcome variables that are purged of age effects for each year.

$$Y_{id} = X_{id}\beta + \alpha_d \tag{1}$$

where Y_{id} is the outcome variable for individual i, in district d, X_{id} is a vector of age dummy variables for if the individual is aged 15 to 24, 25 to 34, 35 to 44, 45 to 54, and 55 to 65, and α_d are a full set of DC fixed effects[17]. We do this separately for skilled and unskilled natives.

We then run a linear regression of the estimates of these age-adjusted fixed effects on the district level immigrant share of skill level j:

$$ln(\hat{\alpha_{djt}}) = ln(Z_{djt})\gamma + s_d + x_j + \pi_t + (s_d \cdot x_j) + (s_d \cdot \pi_t) + (x_j \cdot \pi_t) + \epsilon_{djt} \tag{2}$$

$\hat{\alpha_{djt}}$ is the age-adjusted labour market outcome for district d, of skill level j, at time t. Z_{djt} is the immigrant share of the labour force for the relevant skill group:

$$Z_{jd} = \frac{I_{jd}}{(I_{jd} + N_{jd})}$$

[16] A similar approach is used by Altonji and Card (1991) and citeborjas87.

[17] To construct the employment rate and the labour force participation rate, we run a linear probability regression at the first stage.

where I_{jd} is the foreign-born labour force and N_{jd} is the native-born South African labour force.

The regressions include district, skill, and time fixed effects, s_d, x_j, and π_t, which control for differences in labour market outcomes across districts, skill groups, and time. We also control for the possibility that the skill profile for a particular outcome differs across districts, captured by the $(s_d \cdot x_j)$ interaction, the possibility that the returns to skill changed over time, captured by $(x_j \cdot \pi_t)$ interaction, and the possibility that there may be time-varying district characteristics which impact natives' labour market outcomes, captured by $(s_d \cdot \pi_t)$. γ is thus estimated from immigration and labour market outcome changes within district-by-skill cells over time.[18] All regressions are run using weighted least squares. We use the square root of the number of observations for the skill group in the district as a weight.

Native-born black, white, and coloured South Africans tend to be concentrated in different industries and occupations. They also tend to possess skills and opportunities that differ across each group which may lead to the impact of immigrant labour differing across racial groups. Because of this we report results separately for each racial group. The dependent variables are the log of the mean labour force participation rate, the log of the mean employment to population ratio, and the mean of log real annual earnings.[19] Due to the relatively small sample of white and coloured South Africans in many districts, particularly in our 2007 sample, we restrict our analysis to the set of districts for which there are at least 10 members for each skill-district cell. This leaves us with 52 districts for the black male sample, 51 districts for the black female sample, 40 districts for the white male sample, 32 districts for the white female sample, 31 districts for the coloured male sample, and 25 districts for the coloured female sample.[20]

Table 4 presents the first set of results. Panel A presents the results for the male native-born sample and panel B presents the results for the female native-born sample. Column 1 presents the native group and each cell of column $2-4$ reports the coefficient from the immigrant share. Column 5 reports the number of observations. The results show that there is a positive relationship between the share of the labour force foreign-born and the labour force participation rates and employment rates of native-born male South Africans (panel A, columns 2 and 3). This positive relationship is statistically significant for the black and white male native group. A 10 percent increase in the share of the labour force foreign-born, increases the labour force participation rate by .4 and 1.2 percent for native-born black and white South Africans respectively and increases their employment

[18] This is a version of the specification used by Borjas (2003).

[19] Earnings are adjusted for inflation using 2008 prices.

[20] A shortcoming of this analysis is that due to the small samples within each cell, our measures of immigrant shares are less precise. Significant sampling error can induce attenuation bias in our estimated coefficient; with the inclusion of the fixed effects which control for permanent factors that determine labour market outcomes, there leaves little identifying variation remaining in the immigrant share (Aydemir and Borjas, 2011).

rates by 1.1 and 1.5 percent respectively. We find no statistically significant effect on earnings for any native-born male South African group.

For women, we find a positive relationship between the immigrant share and the labour force participation and the employment rates only for native-born black South Africans. For white and coloured native-born female South Africans, the relationship is negative. The impact of immigration on black female South Africans' labour force participation and employment rates are larger in magnitude than for black male South Africans, a 10 percent increase in the immigrant share increases black female South Africans' labour force participation rates and employment rates by 1.04 and 3.09 percent respectively.

For coloured female South Africans, an increase in the immigrant share decreases their labour force participation rates, but increases their average earnings. This somewhat contradictory relationship can be reconciled if there exists heterogeneity in skill within education classification (Borjas, 2003) where an initial decrease in wages due to the increase in immigration flows leads to the least skilled exiting the market and leaving the overall distribution of the wage profile for the remaining working natives higher.

An increase in Z_{djt} can be attributed to an increase in the number of immigrants or due to a decrease in the number of native-born workers in that skill group. The regressions were rerun including the log of the native labour force. The results were unchanged.

The insignificant effect of immigration shares on earnings along with the positive and significant labour supply effect is consistent with the Lewis model of surplus labour (Lewis, 1954; Ranis and Fei, 1961). In labour markets where wages are sticky and forces outside of market forces drive wages, as long as there exists a surplus in labour at the current wage, increases in labour demand can be matched by increases in participation and employment rates without an increase in wages. There are three things that can contribute to an increase in labour demand: 1.) immigrants increase the demand for goods (Altonji and Card, 1991), 2.) production complementarities between immigrants and natives (Peri and Sparber, 2009; Peri, 2011), and 3.) immigrants establish new businesses and hire native-born workers.

In this paper we do not directly investigate the different channels which lead to increases in native employment rates. However, in the next subsection we explore the possibility of production complementarities by running regressions separately for skilled and unskilled natives.

5.2 Effect on Unskilled and Skilled Workers

By stacking the data, we are assuming that the relationship between immigrant shares and native labour market outcomes are the same across skill groups. South Africa's history with Apartheid denied education and employment opportunities to many black and coloured South Africans which still persist today. White South Africans are concentrated in occupations which tend to employ many of the skilled immigrants while black and coloured South Africans tend to be concentrated in occupations and sectors which employ many of the unskilled immigrants or immigrants that may be in the country illegally. The degree of competition between native-born South Africans and immigrants may be different within skill category. In fact, given the shortage of skilled labour, there are more likely to be production complementarities between skilled native-born workers and foreign-born workers, while the the abundance of low-skilled labour would lead to labour competition with immigrant labour. There may also be competition between skilled immigrants and unskilled native-born workers if skilled immigrants are undocumented or if there exist quality differences in schooling across countries preventing a 'skilled' immigrant from obtaining skilled employment in South Africa.[21]

Table 9 in the Appendix presents the occupational distribution of the male South African labour force for the year 2007. Panel A provides the distributions for skilled men and panel B provides the distributions for unskilled men. Column 1 lists the occupations, column 2 presents the immigrant share of the occupation, columns 3-5 presents the occupational distributions for native-born workers by racial groups and columns 6-8 presents the occupational distributions for foreign-born workers. The occupational distribution of skilled immigrants (column 6) resemble the occupational distribution of skilled native-born white South Africans, while the occupational distribution of unskilled immigrants resemble the occupational distributions of unskilled native-born black and coloured South Africans. If we decompose the immigrant group by white and black immigrants[22] we notice that white immigrants tend to resemble white South Africans while black immigrants resemble black and coloured South Africans in terms of their occupational distributions. Table 9 demonstrates that their may be competition across skills, in particularly for black South Africans. In the low skilled occupations, crafts and trade, plant and machine operators, and elementary occupations, black skilled immigrants tend to have disproportionately high shares. For example, 13 percent of all black immigrants are employed in elementary occupations, whereas only 8.7 percent of black native-born skilled workers are employed in elementary occupations. Elementary occu-

[21] In this paper we do not have a measure of undocumented workers and it is unclear to which degree the censuses capture some of South Africa's undocumented migrants. A large share of South Africa's undocumented migrants are individuals who overstayed their temporary residence permits and it is believed that they will show up in the census numbers.

[22] Information on country of birth is not publicly available for the 2007 community survey but we do have information on the racial identity of the respondents.

pations consist of simple and routine tasks and often require no more than a primary education. These occupations account for a large number of informal sector jobs. The high share of skilled black immigrants in elementary occupations supports the claim that skilled immigrants may be competing with low-skilled natives.

We rerun the specification above separately for skilled and unskilled workers. Since now the variation is at the district level, as opposed to the skill-district level, the specification we run is as follows:

$$\hat{\alpha_{dpt}} = Z_{dpt}\gamma + D_{dpt} + \nu_{pt} + \pi_t + \eta_{dpt} \tag{3}$$

where t and p represent census year and province, respectively. ν_{pt} are province-year fixed effects and D_{dpt} controls for time-varying district characteristics which include the log population of the district, the fraction of the district black, the fraction of the district white, the fraction of the district asian, the proportion of dwellings with access to piped water, the group-specific average age of the labour force, and the group specific average education of the labour force.[23]

Table 5 reports the results for the male sub-samples and table 6 reports the results for the female sub-samples. Panel A provides the results for the unskilled samples and panel B produces the results for the skilled samples. The two panels provide different point estimates and different coefficient signs from the results reported in table 4 confirming the hypothesis that the effect of immigration may differ across skilled and unskilled natives.

We find that for low-skilled South African males, increases in the share of low-skilled immigrants increases their employment rates. The point estimates are statistically significant for the white and coloured samples.[24] We still fail to find significant effects on average earnings. We would expect that if the increases in employment were due to an expansion in labour demand allowing firms to hire more workers at the prevailing wage and absorb some of the surplus labour, then black and coloured workers would be the ones to benefit the most (the group whose unemployment is most likely to be involuntary). However, the coefficient for the black sample is insignificant while the coefficient on the white sample is significant. The results are consistent with native-born South Africans and immigrants being imperfect substitutes in the production function and suggests that immigrants and natives specialize in different tasks.

Results for the skilled sub-samples show that increases in the immigrant share increases the average

[23] We can no longer include district-year interactions to control for demand shocks that may influence immigrants' decisions to locate. So we include the province-year interactions to control for regional shocks.

[24] While the point estimate is not significant for the black native-born sample, the coefficient is still positive although noisy.

earnings of white male South Africans. Increases in the share of skilled immigrants has a positive effect on participation and employment rates for white South Africans, although we can not reject the hypothesis that the point estimates are different from zero. We find no other significant effects from increases in the share of skilled immigrants on male workers.

For low-skilled female South Africans we find no real significant effects of immigrants on their labour market outcomes. This is primarily due to the large standard errors. For skilled female South Africans we also fail to find significant effects however, we do find a positive and significant effect of immigration on the labour force participation of coloured female workers. The coefficient is also positive in the employment and earnings regressions, although insignificant.

Table 7 reports the results from the regression of labour market outcomes for low-skilled workers on the skilled immigrant share. Panel A presents the results for low-skilled men and panel B presents the results for low-skilled women. The results are similar for men and women. For low-skilled black native-born South Africans, increases in the share of the skilled labour force that is foreign-born decreases their employment rates. For Coloured South Africans, increases in the share of the skilled labour force that is foreign-born increases their participation and employment rates. The is no significant effect of skilled foreign labour on low-skilled native white labour market outcomes. These results suggest that skilled immigrants have a crowding out effect on low-skilled black native-born workers while they stimulate the demand for low-skilled coloured native-born workers.

Lastly, we investigate which sectors are most impacted by immigrant flows. Ideally we would like to investigate the formal and informal sectors separately. While there may be regulations in the formal sector which prevent firms from firing workers and adjusting their wages, the informal sector lacks such regulations. However, how respondents were asked about their sector of work in the 2001 census and the 2007 community survey differed such that we are unable to use the question on formal and informal employment. Instead we explore the relationship between immigration and wage employment and self-employment. Due to the small self-employment shares we restrict the analysis to black native-born South Africans. We also only investigate the impacts for low-skilled native-born South Africans.

Table 8 reports the results. We run two separate regressions, the first regression, results reported in row 1, regresses the labour market outcomes on the low-skilled immigrant share, and the second regression, results reported in row 2, regresses the labour market outcomes on the skilled-immigrant share. The labour market outcomes are the wage-employment rates (as a share of the adult population), the self-employment rates (as a share of the adult population), average earnings in wage-employment, and average earnings in self-employment.

Consistent with the results from panel A of table 5, increases in the share of the low-skilled labour force foreign born has a positive effect on wage-employment and self-employment. However, the point estimates are not statistically different from zero. Consistent with the results from panel A of table 7, increases in the share of the skilled labour force foreign-born has a negative effect on wage-employment and self-employment. The coefficient on the wage-employment regression is statistically significant, a 10 percent increase in the immigrant share cause the wage-employment rate to decrease by 5.9 percent for native-born black South Africans.

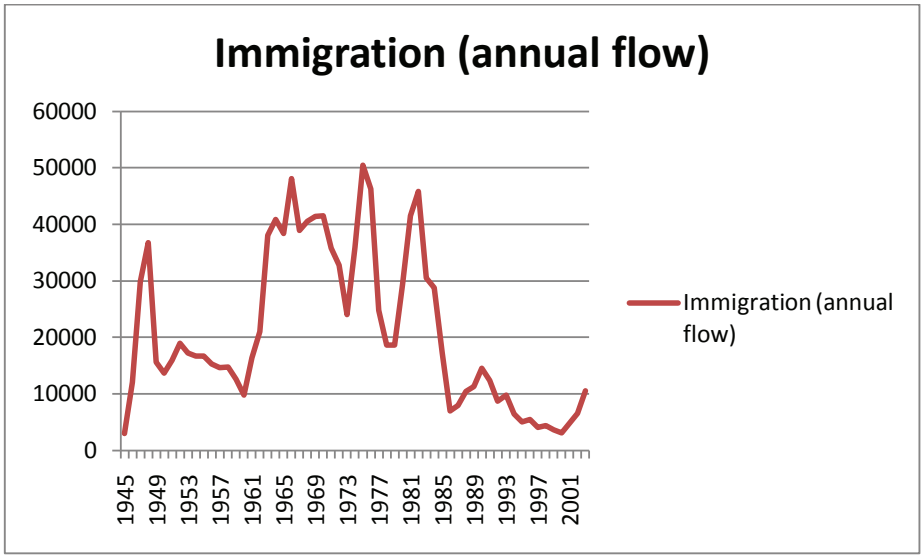
6 Conclusion

This paper investigated the effects of immigration in one of the most developed economies in Sub-Sahara Africa, South Africa. This paper differs from other papers in the literature in that the labour markets in developing countries and the skill composition of immigrants entering South African (and other middle income countries) differs from the labour markets and the skill composition of immigrants into the developed economies of America and Western European countries, implying potentially different results than what the existing literature has concluded.

Our results are consistent with native-born South Africans and immigrants being imperfect substitutes in the production function and suggests that immigrants and natives specialize in different tasks. Low-skilled immigrants increase the employment rates of low-skilled native-born South Africans while there appears to be no effect of skilled immigrants on the labour market outcomes of skilled natives. However, our results show that skilled immigrants have a crowding out effect on low-skilled black native-born workers while they stimulate the demand for low-skilled coloured native-born workers. The displacement effect appears to happen exclusively in wage-employment.

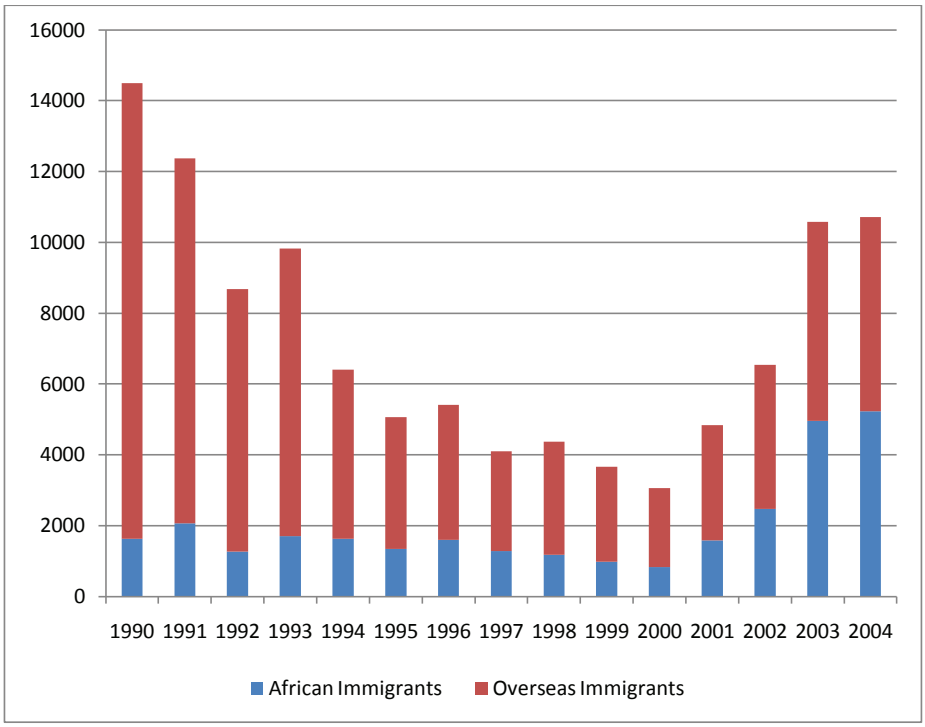
We find no significant effect on earnings suggesting that firms are able to make adjustments to labour without adjusting wages. This is consistent with the Lewis model of surplus labour (Lewis, 1954; Ranis and Fei, 1961)

Figure 1: Immigration Flows, 1945-2004



Source: Statistics South Africa, Documented Migration 2003

Figure 2: Immigration Flows By Location 1990-2004



Source: Statistics South Africa, Tourism and Migration Report P0351 (2004)

Table 1: Share of labour Force foreign-born

	1996		2001		2007	
Province	Immigrant Share of labour Force	Number of Observations	Immigrant Share of labour Force	Number of Observations	Immigrant Share of labour Force	Number of Observations
Western Cape	2.66	195,232	2.62	221,353	3.55	59,364
Eastern Cape	0.76	216,284	0.76	235,545	0.88	65,880
Northern Cape	0.91	35,817	1.24	37,384	2.73	21,849
Free State	5.35	112,503	2.62	114,519	4.49	27,636
KwaZulu-Natal	1.72	324,039	1.47	345,413	1.47	95,337
North West	3.23	139,200	3.50	155,766	4.03	39,569
Gauteng	6.80	369,175	7.06	436,392	7.83	105,582
Mpumalanga	3.32	103,272	3.92	145,745	3.94	36,830
Limpopo	2.75	140,238	3.34	153,467	2.71	35,218
Total	3.39	1,635,760	3.44	1,845,584	3.95	487,265

Source: 1996 and 2001 South African Census and 2007 Community Survey
Notes: Adults in the labour force between the ages of 15 and 65 who are not enrolled in school or institutionalized.

Table 2: Industry Distribution of labour Force (2007)

Industry	Percent Immigrant 2001	Percent Immigrant 2007	Percent of labour Force								
			White Male	Black Male	Coloured Male	Immigrant Male	White Female	Black Female	Coloured Female	Immigrant Female	Total
Agriculture, fishing, and forestry	6.04	4.24	5.54	7.53	12.03	5.03	2.77	6.50	9.25	5.18	6.76
Mining	21.26	22.59	3.88	5.90	1.43	19.20	1.11	0.57	0.31	0.91	3.59
Manufacturing	4.86	5.14	18.49	16.26	17.79	13.38	12.33	9.14	12.66	10.55	13.92
Electricity, gas and water	3.97	3.69	1.35	1.09	0.84	0.53	0.81	0.32	0.49	0.46	0.79
Construction	7.05	7.74	6.47	9.77	10.92	10.19	2.49	1.61	1.32	2.30	5.93
Wholesale and retail trade	5.91	5.89	10.87	9.17	9.83	10.59	8.94	10.17	13.65	10.58	10.18
Hotels and restaurants	5.79	6.71	2.43	2.57	1.65	3.50	3.03	4.93	3.73	5.35	3.38
Transportation and communications	4.08	4.59	5.32	5.18	4.36	3.14	3.98	1.84	2.32	2.97	3.82
Financial services and insurance	5.60	5.43	4.74	1.42	2.26	1.70	7.59	1.90	4.05	4.98	2.69
Public administration and defense	1.99	2.11	3.26	3.86	4.50	1.06	2.86	2.26	2.57	1.34	3.04
Real estate and business services	6.35	7.21	6.57	1.96	2.58	3.11	7.98	1.71	2.47	5.46	2.93
Education	2.98	3.28	3.38	3.60	2.95	2.00	9.97	8.26	5.86	6.52	5.52
Health and social work	3.88	3.95	2.92	2.10	1.79	1.91	8.79	6.60	7.61	6.17	4.37
Other services	7.43	5.99	8.35	9.00	7.30	7.86	8.74	6.23	6.35	9.23	7.78
Private household services	2.45	3.93	0.75	4.37	1.89	3.79	1.33	19.53	8.94	11.33	8.36
Unknown	4.75	4.69	15.68	16.23	17.88	13.01	17.26	18.43	18.42	16.69	16.93
Total	5.45	5.67	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: 2001 South African Census and 2007 Community Survey
Notes: The omitted group is Asian South Africans. Sample only consists of workers who report being employed.

Table 3: Descriptive Statistics of labour Force

	Age		Years of Schooling		LFP Rate		Unemp Rate		Wage Employment		Observations	
	2001	2007	2001	2007	2001	2007	2001	2007	2001	2007	2001	2007
Native Group												
White Male	37.02	38.12	11.23	11.48	75.27	78.75	8.04	4.55	75.90	73.06	102,268	21,931
Black Male	31.87	32.09	7.44	8.57	68.81	62.79	51.02	33.08	92.74	81.95	818,636	206,309
Coloured Male	33.52	34.41	8.36	8.92	75.56	73.29	30.17	21.05	93.95	87.76	105,936	29,600
Immigrant Male	36.75	38.00	8.22	8.71	88.88	88.44	17.40	10.44	80.19	74.25	41,209	10,662
White Female	37.72	38.92	11.16	11.46	57.41	65.29	9.00	7.02	85.40	80.57	109,222	22,819
Black Female	32.84	33.37	7.28	8.48	60.29	53.82	64.43	45.22	94.53	77.53	953,971	242,217
Coloured Female	34.38	35.44	8.33	8.92	60.54	59.88	33.23	25.66	97.20	90.24	117,683	33,837
Immigrant Female	37.53	37.78	9.00	9.34	64.04	62.35	33.64	27.21	80.27	69.81	26,328	6,745
Total	33.24	33.75	7.92	8.89	65.13	60.70	48.15	32.47	90.44	80.15	2,340,433	588,166

Source: 2001 South African Census and 2007 Community Survey
Notes: The omitted group is Asian South Africans. The unemployment rate is calculated as the share of the labour force unemployed, it includes discouraged workers. Wage employment is calculated as the share of the employed who's class of worker is wage or salaried worker.

Table 4: Effects of Immigration on Native Workers

Panel A: Male Native Workers				
	Dependent Variable			
Native Group	LFP	Rate	Wage	Obs.
Black South Africans	0.040**	0.110**	-0.003	208
	(0.018)	(0.042)	(0.054)	
White South Africans	0.122**	0.151***	0.048	160
	(0.052)	(0.047)	(0.060)	
Coloured South Africans	-0.000	0.043	-0.001	124
	(0.026)	(0.053)	(0.065)	
Panel B: Female Native Workers				
	Dependent Variable			
Native Group	LFP	Rate	Wage	Obs.
Black South Africans	0.104*	0.309**	-0.023	204
	(0.053)	(0.117)	(0.053)	
White South Africans	-0.022	-0.047	0.009	128
	(0.096)	(0.103)	(0.104)	
Coloured South Africans	-0.140*	-0.076	0.125*	100
	(0.068)	(0.103)	(0.065)	

Notes:

Table 5: Effects of Immigration on Male Native Workers by Skill

Panel A: low-skilled Male Native Workers				
	Dependent Variable			
Native Group	LFP	Rate	Wage	Obs.
Black South Africans	0.012	0.084	-0.002	104
	(0.026)	(0.052)	(0.043)	
White South Africans	0.094	0.127*	0.001	80
	(0.060)	(0.062)	(0.057)	
Coloured South Africans	-0.002	0.094***	-0.031	62
	(0.019)	(0.031)	(0.034)	
Panel B: Skilled Male Native Workers				
	Dependent Variable			
Native Group	LFP	Rate	Wage	Obs.
Black South Africans	0.026	-0.035	-0.051	104
	(0.021)	(0.031)	(0.048)	
White South Africans	0.011	0.013	0.169*	80
	(0.027)	(0.041)	(0.087)	
Coloured South Africans	-0.015	-0.111	0.170	62
	(0.067)	(0.086)	(0.160)	

Notes:

Table 6: Effects of Immigration on Female Native Workers by Skill

Panel A: low-skilled Female Native Workers				
	Dependent Variable			
Native Group	LFP	Rate	Wage	Obs.
Black South Africans	0.018	0.139	-0.039	102
	(0.072)	(0.105)	(0.051)	
White South Africans	-0.003	-0.008	-0.131	64
	(0.106)	(0.121)	(0.101)	
Coloured South Africans	-0.099	0.167	-0.012	50
	(0.102)	(0.115)	(0.035)	
Panel B: Skilled Female Native Workers				
	Dependent Variable			
Native Group	LFP	Rate	Wage	Obs.
Black South Africans	0.040	-0.004	-0.058	102
	(0.030)	(0.026)	(0.046)	
White South Africans	0.148	0.104	-0.094	64
	(0.091)	(0.090)	(0.072)	
Coloured South Africans	0.282**	0.119	0.039	50
	(0.119)	(0.154)	(0.170)	

Notes:

Table 7: Effects of Skilled Immigration on low-skilled Native Workers

Panel A: Low-skilled Male Native Workers				
	Dependent Variable			
Native Group	LFP	Rate	Wage	Obs.
Black South Africans	-0.022	-0.135***	0.032	104
	(0.015)	(0.028)	(0.038)	
White South Africans	-0.054	-0.014	0.032	80
	(0.043)	(0.048)	(0.082)	
Coloured South Africans	0.059*	0.278***	-0.001	62
	(0.033)	(0.065)	(0.057)	
Panel B: Low-skilled Female Native Workers				
Black South Africans	-0.062	-0.217***	0.016	102
	(0.037)	(0.065)	(0.054)	
White South Africans	0.148	0.106	-0.061	64
	(0.137)	(0.137)	(0.090)	
Coloured South Africans	0.172	0.556**	-0.040	50
	(0.120)	(0.258)	(0.088)	

Notes:

Table 8: Effects of Immigration on Black Male Native Workers by sector

	Dependent Variable			
Immigrant Skill Level	Wage/Salary Rate	Self-Emp Rate	Wage/Salary Earnings	Self-Emp Earnings
low-skilled Immigrants	0.036	0.115	0.009	0.038
	(0.032)	(0.089)	(0.039)	(0.071)
Skilled Immigrants	-0.059*	-0.047	0.055	-0.044
	(0.033)	(0.096)	(0.050)	(0.069)
Observations	102	98	102	98

Notes:

A Table Appendix

Table 9: Occupational Distribution by Skill Level

Panel A: Skilled Male Workers							
		Native Group			Immigrant Group		
Occupation	Immigrant Share	White	Black	Coloured	Total	Black	White
Legislators, senior officials and managers	10.78	26.71	9.03	12.62	24.88	13.07	32.87
Professionals	8.13	19.37	12.58	13.63	17.90	14.74	21.25
Technicians and associate professionals	6.55	12.21	7.33	9.63	8.85	7.53	10.40
Clerks	3.23	3.67	7.16	8.43	2.94	3.96	1.57
Service workers and shop and market sales	4.66	6.36	16.64	11.41	8.52	12.55	4.22
Skilled agricultural and fishery workers	5.77	2.45	1.81	1.09	1.53	1.96	1.47
Crafts and related trades workers	6.66	10.73	12.39	13.99	11.47	14.67	9.65
Plant and machine operators and assemblers	3.19	2.77	11.06	7.55	3.60	6.13	1.79
Elementary occupations	7.71	2.61	8.66	6.06	7.18	13.03	2.67
Unknown	6.72	13.13	13.35	15.59	13.11	12.37	14.10
Total	6.85	100	100	100	100	100	100
Panel B: Low-skilled Male Workers							
		Native Group			Immigrant Group		
Occupation	Immigrant Share	White	Black	Coloured	Total	Black	White
Legislators, senior officials and managers	11.54	13.14	3.31	4.19	6.09	4.58	27.43
Professionals	7.23	5.59	2.73	2.77	2.63	2.13	7.05
Technicians and associate professionals	7.34	7.18	2.82	3.01	2.87	2.56	10.15
Clerks	5.92	5.00	2.64	3.42	2.13	1.91	3.17
Service workers and shop and market sales	6.74	8.83	8.42	5.78	6.81	6.57	8.86
Skilled agricultural and fishery workers	5.54	2.67	7.48	7.60	4.84	5.12	1.50
Crafts and related trades workers	9.91	25.60	20.83	24.79	27.24	28.00	20.35
Plant and machine operators and assemblers	9.37	9.29	17.29	13.62	19.66	20.58	8.32
Elementary occupations	7.13	6.10	18.13	19.19	15.53	16.10	3.95
Unknown	6.15	16.60	16.35	15.62	12.22	12.47	9.23
Total	7.98	100	100	100	100	100	100

Notes:

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