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Labor Markets in South Africa During Apartheid

Mariotti, Martine

Australian National University

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LABOR MARKETS DURING APARTHEID IN SOUTH AFRICA

Martine Mariotti[1] [2]

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Abstract: Conventional wisdom holds that international political pressure and domestic civil unrest in the mid-1970s and 1980s brought an end to apartheid in South Africa. I show that, prior to these events, labor market pressure in the late 1960s/early 1970s caused a dramatic unraveling of apartheid in the workplace. Increased educational attainment among whites reduced resistance to opening semi-skilled jobs to Africans. This institutional change reflected white economic preferences rather than a relaxation of attitudes toward apartheid. I show that whites benefited from the relaxation of job reservation rules and that this is the primary cause of black occupational advancement.

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Introduction

South Africa's remarkable transition from apartheid to democracy in 1994 is often attributed to have resulted from an increase in international and domestic political opposition from the mid-1970s onwards.[3] Apartheid, in place from 1950 until 1994, imposed a series of social and economic measures that separated South Africa's four racial groups (namely Africans, Coloureds, Indians and whites). As a matter of fact, one important liberalization, the

[1]School of Economics and RSSS, Australian National University, H W Ardnt Building 25a, Canberra 0200, Australia martine.mariotti@anu.edu.au
[3] Lipton 1985, Thompson 1990, Davenport and Saunders 2000, Terreblanche 2002, Worger 2004, and Feinstein 2005

desegregation of the labor market, occurred at the height of apartheid suggesting that its causes were different from those resulting in the final dismantling of apartheid. Labor markets had already begun to desegregate by the late 1960s.

I provide empirical evidence that by the 1970s, labor market restrictions were already loosening at the behest – and to the benefit – of white workers. Using extensive micro data from the 1970 and 1980 population censuses, I document the marked improvements in the educational and occupational attainment of whites, particularly the historically less well-educated Afrikaans speakers. As long as the majority white Afrikaans speakers were poorly educated, they and the equally poorly educated Africans were substitutable, thus competing for the same low-skilled occupations. However, as whites moved into the more skilled occupations, an increase in African employment in semi-skilled jobs was needed to maintain skilled incomes as the supply of white skilled workers increased.

Aggregate employment data from the South African manufacturing censuses and manpower surveys indicate a consequent liberalization in the racial allocation of jobs (job reservation) demonstrated by an increase in the employment of African workers in semi-skilled occupations by the late 1960s. Skilled whites, in contrast, continued to be protected from African competition because of their educational advantage. The result was that desegregation was limited to semi-skilled occupations.

During the 1960s and 1970s, economic literature claimed that apartheid, particularly labor market apartheid, could not survive due to the constraints it placed on the economy (Steenkamp, 1971), yet the government continued to state its commitment to the system. This commitment is worth noting since it demonstrates the government's support of white workers in white worker decision making regarding job reservation, despite acknowledged economic costs.

The commitment also provides evidence that it could only have been white workers who initiated the transformation that took place in the labor market and not political pressure, capitalist pressure or state intervention as is commonly believed.

This paper contributes to the literature on labor market discrimination by showing that despite a government's support of segregation, consideration should be given to the economic interests of the workers. The conventional belief espoused by Becker (1954) is that segregation is costly and will ultimately be competed away in the long run due to its inefficiency, unless the government props it up by law or in practice. However, Heckman (1989) shows that labor market rigidities such as collective action (for example, through the use of violence) may prevent firms from desegregating even though the government doesn't explicitly support discrimination. The South African environment during apartheid shows that white workers did act collectively but their preference for segregation was overshadowed by their preference for higher incomes and this occurred despite explicit government support for segregation.

The paper proceeds as follows: in the next section I provide detail on the institutional arrangement that enabled white determination of the racial job allocation process in South Africa during apartheid. In Section 2 I propose a model showing how changes in white educational outcomes might lead to changes in job allocation. Section 3 describes the data. In section 4 I present facts that support the proposed theory (inconsistent with accepted explanations of desegregation). I detail the large increase in white educational attainment, the consequent improved white employment outcomes and the resultant desegregation of semi-skilled occupations. I show that desegregation did not coincide with economic growth, economic downturns, employment growth or any changes in African educational attainment. Section 5 concludes.

1. Institutional Framework

At the beginning of the twentieth century racial policy in South Africa affected three major groups. The first group was the non-white, predominantly African, population, which, by 1969, constituted 80.7 % of the population (Ballinger 1969). Due to discrimination during the colonial period as well as a lack of economic development, by the turn of the century, the African population (68.3 % of the population of South Africa) was for the most part poorly educated (Table 3). The much smaller Coloured and Indian groups (12.4 % of the population) were only slightly better educated.[4] The second major group was the Afrikaans component of the white population. Afrikaans speakers made up around 60 % of the white population, some 19.3 % of South Africa's total population at the time. Due to its wide yet thin geographic dispersal throughout the interior of South Africa, this group had limited access to education during the nineteenth century and therefore was on average poorly educated (Table 2). At the turn of the century, war and agricultural hardship forced both groups to migrate to urban areas in search of employment. In contrast to the non-whites and white Afrikaans speakers, the English speaking whites had the highest level of educational attainment (Table 2). Differences in the level of education between the two white groups led to differences in economic opportunities (such as type of employment and income). These differences determined the direction of South African politics throughout the twentieth century.

By virtue of its size, the Afrikaans speaking component of the white population came to dominate South African politics upon unification in 1910, since non-whites had very limited political representation and English speaking whites constituted only a small component of the

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[4] Coloureds and Indians were also subject to discrimination and apartheid but additional consideration of these race groups does not change the story.

white community (Lipton 1985, Thompson 1995, Feinstein 2005). When the Afrikaans worker-supported National Party came to power and implemented apartheid in 1948, it legalized the practice of reserving certain occupations in the manufacturing sector for whites (Horrell 1969, Horrell 1978, Omond 1986). The government did this by handing the right to determine the racial allocation of jobs to whites through the Industrial Conciliation (IC) Act of 1956. The IC Act established an industrial relations framework that enabled trade unions and employers' organizations to negotiate industrial labor contracts that specified which jobs went to the different race groups. Furthermore, the Act required unions to be racially segregated and excluded Africans from formal trade union representation. The consequence of this trade union segregation was that white unions were able to negotiate the exclusion of Africans from occupations that attracted large numbers of whites, a process known as job reservation. Negotiators created a skill classification for every occupation in an industry, then ranked the occupations by skill level, and finally, allocated the lowest skilled jobs to non-whites and the higher skilled jobs to whites. Evidence from the negotiation process indicates that decisions on the skill requirement were fairly arbitrary and depended more on which whites found those jobs to be attractive than on skills *per se*.

The practical outcome of this policy was to provide the labor market with a certain amount of flexibility in terms of job reservation determinations. The ultimate determinant of job reservation was the relative quantity of white workers available for employment in a particular occupation. Depending on the supply of white workers at each labor agreement, trade unions and employers would renegotiate the jobs to be reserved. via Section 77 of the IC Act which allowed

the government to declare an occupation reserved on behalf of whites forced firms to comply with the unions under threat of state intervention.[5]

The apartheid era education policy promoted white education, while forcing African education to stagnate, resulting in a decreasing supply of low-skilled white workers in semi-skilled manufacturing jobs as whites (specifically Afrikaans speakers) moved to higher-paying, higher-skill jobs and industries. At the same time, the demand for semi-skilled workers in manufacturing was increasing, both to replace the departing white workers and as a result of industry growth. With the renegotiation of each labor agreement, white trade unions were relinquishing some of the less popular semi-skilled occupations. The 1967 labor agreement between the metal and engineering industry and the relevant trade unions demonstrates the process of renegotiation.[6] The industry had been experiencing declining numbers of whites in certain occupations by the mid-1960s. In 1967 the trade unions agreed to classify some of the high demand occupations as lower-skilled so that they could be opened up to non-whites (Horrell 1969). Other industries experiencing similar changes by the late 1960s were the motor vehicle, clothing, footwear and leather, and furniture industries and the meat trade (Horrell, 1969). The resultant new industry agreements which first appeared in the late 1960s provide evidence of the desegregation of semi-skilled occupations.

2. Theoretical Framework

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[5] A formal declaration of job reservation was more difficult to undo than a voluntary agreement suggesting that it was in the firm's interest to comply with the voluntary agreement.

[6] The unions party to this agreement were the Amalgamated Engineering Union, the Amalgamated Society of Woodworkers, the Iron Moulder's Society of South Africa, the South African Boilermaker's, Iron and Steelworker's, Shipbuilder's and Welder's Society, the South African Electrical Worker's Association, The South African Engine Driver's, Firemen's, and Operators' Association and the Suid Afrikaanse Yster-, Staal-, en Verwante Nywerhedeunie.

In this section, I discuss the economic incentives encouraging whites to open up semi-skilled jobs to Africans. Consider a two sector economy, one employing only unskilled workers, and another employing both semi-skilled and skilled workers. Call these sectors mining and manufacturing. I assume that the difference in skill level between unskilled and semi-skilled occupations is only that semi-skilled workers receive on-the-job training. There is no difference in the formal education requirements for semi-skilled and unskilled jobs. Let whites have complete control over the allocation of occupations and let the majority of white workers be poorly educated as was the case in South African manufacturing at the advent of apartheid (see section 4).

I assume that workers care only about their wage and abstract from preferences for segregation among members of the workforce.[7] Poorly skilled white workers will compete with poorly skilled African workers unless they can reserve occupations for themselves. To protect themselves from competition with Africans, whites therefore employ the mechanism provided in the IC Act to reserve the best occupations. I assume that the semi-skilled manufacturing jobs are more pleasant than mining jobs and that therefore white workers choose to work in manufacturing and African workers are forced into mining (with skilled whites working in the skilled manufacturing occupations).

Let each industry consist of one representative firm operating with a constant-returns-to-scale CES production function. The production technology of the mining industry is given by:

$$Y = (aK_u^{\lambda} + (1-a)U^{\lambda})^{1/\lambda} \text{ , } 0 < \lambda < 1$$

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[7] This is a realistic assumption by the 1970s when labor agreements show white workers were predominantly concerned about being underbid by African workers. Furthermore, I show that preferences for segregation were implemented in the education system and because of the effect of education on segregation I do not need to introduce further preferences for segregation.

where *U* denotes unskilled workers who are African and K_u denotes capital employed in the mining industry. Unskilled labor and capital are complements. *a* is a parameter governing income shares and λ is a parameter governing the elasticity of substitution between unskilled labor and capital equipment. The production technology of the manufacturing sector is represented by:

$$Y = \left(bK_m^\alpha + (1-b)\left(cM^\gamma + (1-c)S^\gamma \right)^{\frac{\alpha}{\gamma}} \right)^{\frac{1}{\alpha}}, \ 0 < \alpha, \gamma < 1$$

where *M* denotes semi-skilled workers, *S* denotes skilled workers, both of whom are white at this stage, and K_m denotes capital employed in the manufacturing industry. S and M are complements in the production process. *b* and *c* are parameters governing income shares and α and γ are parameters governing the elasticity of substitution between semi-skilled and skilled labor and capital equipment.[8] Since the firms are operating in a competitive environment under constant-returns-to-scale, the factor prices are given by the marginal products and because $\mathrm{MP_s} \geq \mathrm{MP_m} \geq \mathrm{MP_u}$ it follows that $\mathrm{W_s} \geq \mathrm{W_m} \geq \mathrm{W_u}$.

The ratio of the two marginal products of labor in manufacturing gives the skill premium:

$$\frac{W_s}{W_m} = \frac{1-c}{c}\left(\frac{M}{S} \right)^{1-\gamma} \tag{1}$$

which is positively related to increases in the ratio of semi-skilled to skilled workers and negatively related to decreases in the ratio.

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[8] There are two other ways for nesting the factors, for the purposes of this study, which is to show a declining marginal product, all three possibilities yield the same result.

Figure 1 demonstrates the role of the skill premium in determining the supply of semi-skilled workers. The horizontal axis represents the total number of semi-skilled workers employed in manufacturing while the vertical axis represents the total number of skilled workers in manufacturing. I assume that the total availability of white workers remains constant. A white worker can either be a skilled worker or a semi-skilled worker. Line AA, with slope = 1, represents the total number of white semi-skilled and skilled workers. At point A_0 all white workers are skilled and at point A_1 all white workers are semi-skilled, any other point along the line represents a combination of semi-skilled and skilled in the industry. Ray W_1 from the origin is a level curve representing a constant skill premium. A steeper line to the left of W_1 indicates a lower skill premium, while a flatter line to the right indicates a higher skill premium. Assume that in period 1 there are few skilled workers and many white semi-skilled workers such that the skill premium is given by line W_1, with S_1 skilled workers and M_1 semi-skilled workers. The high number of white semi-skilled workers means semi-skilled workers have the power to prevent the skill premium from increasing any further. They do this by reserving semi-skilled jobs for whites.[9] At the same time, the high skill premium provides workers with an incentive to become educated and become skilled workers. The increase in skilled workers leads to S_2 skilled workers and M_2 semi-skilled workers with a decrease in the skill premium to W_2. However now there are sufficient skilled workers to override the preferences of white semi-skilled workers and to prevent the skill premium from declining. As a result, the skilled workers force the opening up of semi-skilled jobs to Africans. The increase in the supply of semi-skilled workers leads to an drives the skill premium back up to W_1 with an increase in the number of semi-skilled workers from M_2 to M_3, all of whom are African. In this way skilled workers are able to keep the skill premium at W_1. This exposition can be extended to an industry with many occupation levels - as

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[9] I assume that whites are always at fill employment.

long as whites move up the occupation scale, they have an incentive to open up the lower skilled occupations in order to maintain their skill premium.[10]

3. Data

To determine the effect of white control of segregation on African employment I use both individual census data from the South African population censuses of 1970 and 1980 and aggregate data from the South African manufacturing census and South African manpower surveys. The 1970 population census is the earliest possible dataset showing the effects of apartheid education and labor policies on individual outcomes. Two censuses were undertaken, one for whites, Coloureds and Indians and the second, with far less questions, for Africans. The census data contain information on race, gender, age, income (not for Africans in 1970), education, employment status, occupation, industry of employment, class of worker and region.
[11]

I supplement the occupation information in the census data with an index linking education to income through occupation type, developed by Ganzeboom, De Graaf and Treiman (1992), which I call a Socio-Economic Occupation (SEO) index. The rank ranges from a low of 17 for agricultural workers to a high of 90 for judges.[12] The occupations listed in the South African population census correspond to the 2-digit International Occupation Standard (IOS) classification. I assign each occupation its corresponding SEO index number such that the SEO

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[10] A consideration of the cost to capital of segregation suggests that political power did not rest with the capitalists. The return to capital is lower under segregation than under integration as the number of semi-skilled workers increases. If capital held any political power then it would have forced transformation onto the economy much earlier than actually happened.
[11] See the appendix for notes on the data.
[12] See the appendix for notes on the data.

index number gives an indication of an occupation's skill level where higher ranked occupations demonstrate a higher skill requirement.

The South African Manpower Surveys conducted by the Department of Labor (biennially from 1969 to 1985, except for 1979) record the number of employees by race and gender for 271 skilled, semi-skilled and unskilled occupations of laborers ranging across all industries (it excludes agricultural workers and domestic servants). The survey groups the occupations into 16 categories, ranging from highly skilled professionals (such as doctors and accountants) to semi-skilled workers (such as machine operators) and unskilled laborers. I use the SEO index to rank the occupations in the manpower surveys by their skill requirement. The white collar occupational breakdown corresponds to the IOS classification. However, in the manpower surveys, the occupations in the semi-skilled categories are idiosyncratic to the job restriction policies within the South African labor market and as a result, differ from the IOS classification.[13]

The final data set, the manufacturing census, conducted by the Central Statistical Service (yearly from 1950 to 1960 and then every two or three years until 1985 at which point the surveys no longer provide a racial breakdown of wages), consists of employment figures for each of the four race groups for both production workers and salaried administrators in 23 3-digit Standard Industrial Classification manufacturing industries. In addition, the census reports the total wage bill for each industry for each of the four racial groups as well as the capital stock and gross output. By the 1970s, manufacturing was the largest industry in the economy both in terms of employment and output (Feinstein 2005). It was the industry the National Party targeted to

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[13] In cases where South African blue collar occupations differ from those in the IOS classification, I use the rank of the IOS occupation that most closely approximates the occupations in the Survey. For example I assign to rodent exterminators, plant propagators and drillers the rank of handymen from the SEO index.

solve the poor white unemployment problem and as such was the industry most influenced by the IC Act.

4. Evidence

The model in section 2 suggests that desegregation could only occur after a certain level of white educational attainment and a corresponding shift of white employment to skilled occupations had taken place. If these conditions are satisfied, we should see some desegregation in semi-skilled occupations in order to maintain the skill premium. Furthermore, under the constraint that only white workers could determine job reservation, changes in economic conditions, such as industry output growth, should have had no impact on desegregation. Neither should any potential changes in African characteristics, such as an increase in African education, have played any role in desegregation. Finally, the model suggests that while desegregation could take place in semi-skilled jobs, segregation would have remained between skilled and semi-skilled jobs.

The first step toward testing the theory is to determine whether white workers did indeed experience increased educational attainment, as one might expect under the apartheid education policy. The next step is to determine whether an increase in the employment of whites in higher skilled occupations followed the increase in white educational attainment. The third step is to determine whether the white shift in employment was followed by desegregation of the semi-skilled occupations.

Education

By 1970 the majorities of both white language groups were completing their education in the important last three years of high school (completion of the last three years entitled a person

to a school leaving certificate making it easier to find employment), whereas 85% of Africans had never been enrolled in high school (see Table 1). Although, Afrikaans speakers were on average less educated than English speakers, with a higher proportion of the latter obtaining the matriculation (high school completion) certificate.

Breaking education into attainment by birth cohort, Table 2 shows that the major shift in white English speakers' attainment was from the earliest two years to the last three years of high school. In contrast, Afrikaans educational attainment rose rapidly during the twentieth century, consistent with the policies of the National Party. While the oldest cohort had obtained predominantly primary school education, by 1970 around 60% of the sample had attained at least the third year of high school and over 20% received a matriculation certificate. The percentage obtaining tertiary education also increased yet the most significant improvements were in the number of students remaining in high school beyond the first two years.

During the twentieth century, the gap between whites and Africans had widened (see Table 3). There were minor improvements in African education - for those born between 1871-1884, 80% had obtained no education, this number had decreased to 37% for those born between 1945 and 1954. However, a full 43% of the youngest cohort received no more than some primary school education by 1970. Furthermore, the percentage of high school attendees never rose above 20%. This finding is consistent with Fedderke, De Kadt and Luiz (2000) and Knight and McGrath (1977).

These findings suggest that while both white and African educational attainment had been increasing throughout the twentieth century, improvements in educational attainment were much higher for whites. Furthermore, the rate of increase was higher for Afrikaans speakers than for English speakers, suggesting convergence of Afrikaans to English speakers by 1970.

White Occupations

Did whites, particularly Afrikaans speakers, move to higher ranked occupations as white education improved over time? I divide whites into English and Afrikaans speaking males to demonstrate occupational rank convergence between the two groups. Using the SEO rank index, I find that the weighted average rank for white males was 46 in 1970 and 49 in 1980, demonstrating an increase in the skill level of employment (see Table 4). Breaking this down into a cohort from 26-45 year-olds and one from 46-65 year-olds, I find that the weighted occupational rank for Afrikaans speakers was higher for the 26-45 year-olds than for the 46-65 year-olds in 1970 (45 vs. 41). The increase in skill rank indicates that the younger cohorts, who I have shown to be more educated, were more densely located in the higher skill occupations and also converging toward the English speakers (whose rank was 53).

Evidence of Desegregation in South African manufacturing

The model suggests that the shift of whites into higher skilled occupations should have resulted in the desegregation of semi-skilled occupations. Although Africans constituted over 70% of the total population by the 1970s, the proportion of Africans employed was substantially below this figure in most occupations as shown in table 5. Column 1 of table 5 shows that in 1969 only 12.5 % of the occupations listed in the industry-wide Manpower survey employed Africans and whites in a proportion equivalent to that in the population. The remaining occupations comprised a (sometimes substantially) lower proportion of African workers. This proportion grew to 27.7 % by 1985; still suggesting significant segregation in the labor market. Nevertheless, the growth from 12.5 % to 27.7 % shows that African access to occupations rose during the 1970s. Column 2 shows that the increase in African employment included increased

access to higher skilled occupations as demonstrated by the increase in the weighted average African SEO skill rank from 27.22 in 1969 to 34.07 in 1985.[14]

White incomes

The primary incentive whites had to support desegregation was to maintain their skill premium. I now estimate whether skilled whites were able to maintain do so between 1970 and 1980. I stack the 1970 and 1980 census data for white working men and estimate

$$lnwage_i = \alpha + \beta_1(white\ collar) + \beta_2(educat_i) + \beta_3 t + \beta_4(white\ collar)*t + \Gamma'X + \varepsilon_i \qquad (2)$$

where $lnwage_i$ is the log of white income, $white\ collar_i$ is a categorical variable which is zero for blue-collar occupations and 1 for white-collar jobs and $educat_i$ is a categorical variable representing the highest level of education a person has obtained.[15] I include a year and occupation type interaction term to determine whether the return to white-collar workers increased after some desegregation had taken place. X_i is a vector of control variables such as age, home language, region and industry. The null hypothesis is that there was no decline in the skill premium between 1970 and 1980, that is, that $\beta_4 \geq 0$.

Column 1 of table 6 shows the relationship between white-collar workers and incomes in 1970 and 1980 for whites in manufacturing while column 2 reports the results for whites across all industries. Columns 3 and 4 include education as a control variable. The table shows that white collar workers in manufacturing did earn more than semi-skilled workers in 1970. I find that the difference between white and blue-collar declined by 1980; however, the result is significant for manufacturing workers only when I exclude education. The skill premium

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[14] A comparison of the change in African and white skill rank is complicated by the fact that increases at the higher end of the index might be more difficult and require a greater investment in skill acquisition. Therefore while it appears that the African skill rank increased faster than the white, it is not clear that this is indeed the case.
[15] See the appendix for data details

therefore remained constant in the ten year period, consistent with the claim that skilled whites enabled desegregation in order to maintain the skill premium.

Desegregation not related to industry economic conditions

To remove any lingering doubt about the causes of desegregation, I test whether desegregation may nevertheless have been associated with industry specific economic conditions. I investigate the role of macroeconomic factors such as output, employment, and wage growth in contributing to desegregation. Using manufacturing industry data I estimate

$$
\begin{aligned}
\%\Delta \frac{L_{AP}}{L_{P}}_{i,t} &= \beta_0 + \beta_1 \frac{L_{AP}}{L_{P}}_{i,t-1} + \beta_2 K/L_{i,t-1} + \beta_3 \%\Delta K/L_{i,t} \\
&+ \beta_4 Y_{i,t-1} + \beta_5 \%\Delta Y_{i,t} + \beta_6 \overline{W}_{A,t-1} + \beta_7 \%\Delta \overline{W}_{A,t} \\
&+ \beta_8 t + \beta_9 1959 + \beta_{10} 1970 + \sum \gamma_i \upsilon_i + \sum \delta_i \upsilon_i * 1959 + \sum \lambda_i \upsilon_i * 1970 + \varepsilon_i
\end{aligned}
\tag{3}
$$

where $\%\Delta$ indicates the growth rate of a variable, $\dfrac{L_{AP}}{L_{P}}_{i,t}$ represents the proportion of production

workers who are African in time t, $\dfrac{L_{AP}}{L_{P}}_{i,t-1}$ represents the proportion of African production

workers in the previous survey period, $K/L_{i,t}$ is the capital labor ratio, and $Y_{i,t}$ represents output. $\overline{W}_{A,t-1}$ represents average African wages in time t-1. t is a time trend, 1959 is an indicator variable that takes the value 0 from 1950 – 1958 and is one thereafter and 1970 is an indicator variable that takes the value 0 from 1959 – 1967 and is one thereafter (there were no censuses between 1967 and 1970). The selection of the time dummies is consistent with the implementation of Section 77 of the IC Act in 1959 (after a legal dispute regarding the validity of Section 77) and the end of the period of the influence of Section 77. The last four terms are industry fixed effects, industry fixed effects interacted with the time indicators, as well as an error term.

In a competitive labor market we expect industry output growth to be positively correlated with an increase in African employment since any increasing demand would have to be met by African workers. However, since whites constrained labor supply regardless of developments in labor demand, we expect to find no relationship between output growth and African employment growth. If the growth in African employment is unrelated to industry conditions we also expect to see no relationship of African employment to the capital labor ratio and the wage rate.

Table 7 reports the results of the OLS regression. Although manufacturing economic conditions are significant, the size of the coefficients is small, indicating that a 1 % increase in the explanatory variables leads to a miniscule change in the growth rate of the proportion of African production workers. Only the percentage of African production workers in the previous period has any notable effect on the growth rate with a 1 % increase in the percent of African workers in the previous period leading to a decline in the growth rate of between 1.1 and 1.2 %. The capital labor ratio, output and wage bill all have a negligible impact on the growth rate of the proportion of African production workers.

In contrast, the coefficient on the dummy variable for 1970 suggests an increase in the growth rate of 6 % from 1970. This result is consistent with the period of increasing desegregation in South African manufacturing and consistent with the idea that the increase in the employment of African workers was not a result of industry economic conditions. The result also indicates that the growth rate in the proportion of African workers increased some years prior to the increase in domestic and international opposition seen by 1973.

Desegregation not related to changes in African characteristics

Equation 4 tests whether an increase in African education could be associated with improvements in African occupational attainment. For the determinants of African occupation rank I use census data to estimate:

$$SEO_i = \beta_0 + \beta_1 educat_i + \Gamma' X_i + \varepsilon_i \qquad (4)$$

for each of the two census years, where SEO_i denotes an individual's occupation rank and $educat_i$ is an indicator variable for the highest level of education obtained. I run the regression on economically active males. The census data show that the weighted average occupation rank for African workers increased four points, from 27 in 1970 to 31 in 1980. Changes in African education explain only a small part of the increasing African occupation rank. Substituting the difference in education between 1970 and 1980 (column 5 of Table 8) into regression equation 4 whose coefficients are given in columns 2 and 3 of Table 8, I find that education is responsible for only 22% of the change in African occupation rank using the 1970 coefficients. Repeating this calculation for the 1980 coefficients, I find that educational improvements account for 24% of the increase in occupation rank. This implies that around 77% of the increase in African occupation rank remains unexplained.

An Oaxaca-Blinder (1973) decomposition of the causes of the gap between African and white occupational outcomes suggests that discrimination accounted for only 15.8 % of the gap in 1980, down from 26.5 % in 1970. Note, however, that the large *explained* gap in occupational attainment points to the extreme effect of pre-labor market discrimination in the form of differences in the provision of African and white education.

5. Conclusion

The desegregation of semi-skilled occupations in South African industries by the early 1970s is remarkable in that it occurred in an environment where white workers had total control of the racial occupation distribution, at a time when white support for apartheid was high and before large scale increases in domestic and international opposition. This paper argues that as whites accumulated education they moved into more skilled occupations, and in order to maintain their skill premium, skilled workers forced a transition from racial segregation to integration in several complementary semi-skilled occupations. Such a transition was feasible due to the relative flexibility afforded white workers in the labor market through the IC Act of 1956 that allowed whites to determine the level of job reservation. After desegregation, skilled whites would have remained protected from competition with Africans by the gap between African and white educational attainments. Changes in white characteristics *do not* imply a change in racial ideology; rather, white workers began to be affected by the economic constraints imposed by apartheid.

The paper also demonstrates that it is unlikely that any other factors such as economic conditions, international and domestic politics or changes in black characteristics could have been the causes of the desegregation that was taking place by the 1970s. These findings are consistent with the argument that the relaxation of job reservation was an adjustment in response to changing white socio-economic characteristics as noted in Lowenberg (1998).

With respect to the eventual dismantling of apartheid, it seems plausible that desegregating the semi-skilled occupations resulted in unexpected repercussions. In January 1973, several industrial regions experienced a marked increase in labor unrest. It may well be that this unrest resulted from increased African awareness of their importance in the South African economy. Although the desegregation was driven purely by white economic incentives,

it may have set in motion the unintended and irreversible unraveling of apartheid as Africans began to play an ever more important role in South African economics that finally culminated in the advent of democracy in 1994.

The paper offers a broad explanation of the labor agreement process that led to desegregation. Future analysis of individual labor contracts will provide detailed information on the pace and extent of desegregation. Furthermore, the analysis will provide a more complete characterization of the white progression from semi-skilled work to skill work than the census data is able to do.

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Tables and Figures

Table 1

Educational attainment of Africans and Whites over the age of 16 (Afrikaans and English speaking) in percent, 1970

Education	African	Afrikaans	English
None	51.96	1.48	0.76
Primary	35.90	6.07	1.73
Std 6/7	8.66	31.31	17.37
Std 8/9	2.61	31.19	32.73
Matriculation	0.38	18.95	30.88
Diploma	0.47	7.14	10.88
Bachelor	0.02	2.54	4.20
Diploma and degree	0.93	0.80	
Graduate		0.40	0.65

Notes: None denotes no education, Primary means some primary school education was attained ranging from 1 year to 7 years, Std 6/7 implies either the first or the first two years of high school or obtained. Std 8/9 means either the third or fourth years of high school are obtained. Matriculation implies all five years of high school were completed. Bachelor refers to a Bachelors degree being attained, Graduate implies either a masters or PhD, a diploma may be earned by a person completing Standards 7, 8, 9 or matriculation. Some diplomas, mostly those that require matriculation may be converted into degrees with the addition of an extra year. While being a form of tertiary education, it is less prestigious than a degree.
South African Central Statistical Service, 1970 Census Data

Table 2

Highest level of education attained in percent, Whites 1970

	Year of birth (age): English speakers in 1970							
Education	**1945 -1954 (16-25)**	**1935 -1944 (26-35)**	**1925 -1934 (36-45)**	**1915 -1924 (46-55)**	**1905 -1914 (56-65)**	**1895 -1904 (66-75)**	**1885 -1894 (76-85)**	**1871 -1884 (86-99)**
None	0.39	0.48	0.57	0.72	1.02	1.6	2.35	6.94
Primary	0.79	0.91	0.57	1.28	2.53	5.28	8.82	15.28
Std 6/7	11.15	9.77	15.83	18.93	**26.76**	**32.52**	**34.71**	**36.11**
Std 8/9	**37.72**	**33.42**	**32.23**	**31.51**	30.5	26.38	25	20.83
Matriculation	**39.01**	**30.91**	**31.6**	**30.01**	24.17	21.72	22.94	11.11
Diploma	7.22	16.21	12.71	11.25	9.16	9.08	6.18	5.56
Bachelor	3.18	6.36	4.77	4.62	3.68	2.21	0	2.78
Diploma and degree	0.5	1.17	0.78	0.95	0.9	0.74	0	0
Graduate	0.04	0.78	0.93	0.72	1.27	0.49	0	1.39
	Year of birth (age): Afrikaans speakers in 1970							
Education	**1945 -1954 (16-25)**	**1935 -1944 (26-35)**	**1925 -1934 (36-45)**	**1915 -1924 (46-55)**	**1905 -1914 (56-65)**	**1895 -1904 (66-75)**	**1885 -1894 (76-85)**	**1871 -1884 (86-99)**
None	0.72	0.76	0.94	1.12	1.4	4.77	11.01	27.54
Primary	2.05	1.35	2.82	5.39	14.99	**26.13**	**33.94**	**40.58**
Std 6/7	17.49	23.91	33.4	**47.45**	**51.26**	**44.27**	**38.99**	**20.29**
Std 8/9	**42.97**	**35.76**	**32.13**	22.91	16.07	10.5	8.03	5.8
Matriculation	**28.92**	**20.73**	17.91	13.2	8.6	5.01	4.36	4.35
Diploma	5.55	10.82	7.58	6.73	5.21	6.56	2.98	1.45
Bachelor	1.74	4.56	3.12	2.16	1.07	1.79	0.46	0
Diploma and degree	0.5	1.51	1.41	0.65	0.86	0.6	0.23	0
Graduate	0.06	0.59	0.7	0.39	0.54	0.36	0	0

Notes: None denotes no education, Primary means some primary school education was attained ranging from 1 year to 7 years, Std 6/7 implies either the first or the first two years of high school or obtained. Std 8/9 means either the third or fourth years of high school are obtained. Matriculation implies all five years of high school were completed. Bachelor refers to a Bachelors degree being attained, Graduate implies either a masters or PhD, a diploma may be earned by a person completing Standards 7, 8, 9 or matriculation. Some diplomas, mostly those that require matriculation may be converted into degrees with the addition of an extra year. While being a form of tertiary education, it is less prestigious than a degree.

South African Central Statistical Service, 1970 Census Data

Table 3

Highest level of education attained in percent, Africans 1970

Year of birth (age): **Africans 1970**								
Education	**1945 -1954 (16-25)**	**1935 -1944 (26-35)**	**1925 -1934 (36-45)**	**1915 -1924 (46-55)**	**1905 -1914 (56-65)**	**1895 -1904 (66-75)**	**1885 -1894 (76-85)**	**1871 -1884 (86-99)**
None	36.72	47.67	55.90	63.67	71.44	77.63	83.50	88.01
Primary	43.83	36.85	32.92	28.65	23.53	18.90	13.45	10.12
Std 6/7	14.35	10.68	7.87	5.63	3.86	2.69	2.47	1.45
Std 8/9	4.30	3.65	2.29	1.24	0.68	0.45	0.30	0.26
Matriculation	0.47	0.43	0.33	0.23	0.09	0.06	0.06	0.04
Diploma	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bachelor	0.02	0.03	0.04	0.03	0.02	0.01	0.02	0.00

Notes: None denotes no education, Primary means some primary school education was attained ranging from 1 year to 7 years, Std 6/7 implies either the first or the first two years of high school or obtained. Std 8/9 means either the third or fourth years of high school are obtained. Matriculation implies all five years of high school were completed. Bachelor refers to a Bachelors degree being attained, Graduate implies either a masters or PhD, a diploma may be earned by a person completing Standards 7, 8, 9 or matriculation. Some diplomas, mostly those that require matriculation may be converted into degrees with the addition of an extra year. While being a form of tertiary education, it is less prestigious than a degree.
South African Central Statistical Service, 1970 Census Data

Table 4

White weighted average occupation rank (SEO index) by skill in 1970 and 1980

Weighted average SEO rank	**1970**	**1980**
26-45 years: Afrikaans	45	47
English	53	54
All	**49**	**51**
46-65 years: Afrikaans	41	45
English	52	53
All	**46**	**49**

Notes and Sources: I am weighting the average rank by the number of people employed in each occupation so that the rank not only gives an average for the occupations available but also takes into account the distribution of employment.
South African Central Statistical Service, 1970 and 1980 Census Data

Table 5

Increasing African Access to jobs and weighted average occupation skill rank for White and African workers, 1969-1985 (excluding agriculture and domestic service)

Year	Proportion of jobs >70% African	Weighted average occupation skill rank	
		White	African
1969	0.125	50.83	27.22
1971	0.130	51.78	28.68
1973	0.136	52.09	29.28
1975	0.170	52.06	29.90
1977	0.199	52.60	29.99
1981	0.185	54.01	30.57
1983	0.258	54.43	31.78
1985	0.277	54.78	34.07

Notes and Source: Africans made up around 70% of the South African population over this period.
Occupation skill ranks are weighted by the employment in each occupation
South African Central Statistical Service, Manpower Survey

Table 6

OLS Relationship between skill and incomes, white males 1970 and 1980

Dependent variable: *lnwage*	Coef. Std. Err.	Coef. Std. Err.	Coef. Std. Err.	Coef. Std. Err.
White collar	0.345*	0.275*	0.174*	0.115*
	(0.02)	(0.01)	(0.02)	(0.01)
White collar*1980	-0.062*	-0.02	-0.028	-0.030
	(0.03)	(0.02)	(0.03)	(0.02)
Age	0.145*	0.166*	0.144*	0.157*
	(0.00)	(0.00)	(0.00)	(0.00)
Age^2	-0.002*	-0.002*	-0.002*	-0.002*
	(0.00)	(0.00)	(0.00)	(0.00)
Primary			-0.200	0.161**
			(0.18)	(0.09)
Standard 6 or 7			0.097	0.424*
			(0.16)	(0.08)
Standard 8 or 9			0.281**	0.607*
			(0.16)	(0.08)
Matriculation			0.455*	0.686*
			(0.16)	(0.08)
Tertiary			0.670*	1.064*
			(0.16)	(0.08)
Primary*1980			0.313	-0.225*
			(0.22)	(0.11)
Standard 6 or 7*1980			-0.061	-0.230*
			(0.19)	(0.10)
Standard 8 or 9*1980			-0.021	-0.175**
			(0.19)	(0.10)
Matriculation*1980			-0.100	-0.137
			(0.19)	(0.10)
Tertiary*1980			-0.058	-0.216*
			(0.19)	(0.10)
1980	1.07*	1.33*	1.049*	1.420*
	(0.03)	(0.03)	(0.19)	(0.10)
Constant	4.924*	4.405*	4.676*	3.947*
	(0.07)	(0.04)	(0.17)	(0.09)
Industry effects	Manf.	All	Manf.	All
R^2	0.59	0.52	0.63	0.56
N	6635	29073	6516	28756

Notes: Primary means some primary school education was attained ranging from 1 year to 7 years, Std 6/7 implies either the first or the first two years of high school or obtained. Std 8/9 means either the third or fourth years of high school are obtained. Matriculation implies all five years of high school were completed. Tertiary refers to a Bachelors degree being attained, a masters or PhD, and/or a diploma. The white collar variable was constructed from the occupation data in the census. * denotes significance at 5%, ** denotes significance at 10%.
Source: Central Statistical Service of South Africa, 1970 and 1980 Population Census

Table 7

Determinants of the growth of the proportion of African production workers

Dependent variable: growth proportion African production	Coefficient Standard Error	Coefficient Standard Error
Proportion African$_{t-1}$	-1.19*	-1.11*
	(0.112)	(0.1)
Capital labor ratio$_{t-1}$	-0.002*	-0.002*
	(0.00)	(0.00)
Capital labor ratio growth$_t$	-0.01*	-0.01*
	(0.00)	(0.00)
Real net output$_{t-1}$	0.00	0.00
	(0.00)	(0.00)
Real net output growth$_t$	-0.02**	-0.02*
	(0.01)	(0.01)
African wage bill/total wage bill$_{t-1}$	0.13	
	(0.13)	
African wage bill/total wage bill growth$_t$	0.01*	
	(0.00)	
Average African wages$_{t-1}$		-1.44
		(1.52)
Average African wage growth$_t$		-0.004**
		(0.00)
Time	0.13	0.17*
	(0.08)	(0.08)
1959	1.32	1.4
	(2.34)	(2.34)
1970	5.96*	6.88*
	(2.49)	(2.43)
Constant	71.86*	70.9*
	(6.09)	(6.58)
R^2	0.52	0.51
Observations	327	327

Notes: Interpret the continuous variables as a percentage increase in the RHS leads to an x percentage change in the LHS. The regression excludes 1958 as a result of a data discontinuity in the census. * denotes significance at 5%, ** denotes significance at 10%.
Source: Central Statistical Service, Manufacturing Census

Table 8

Effect of African Education on Occupation Rank, 1970 and 1980

Dependent variable: SEO Rank	1970	1980	African education % 1970	African education % 1980	Difference
None	-	-	51.96	35.58	-16.38
Primary	0.962*	0.855*	35.90	41.34	5.44
	(0.11)	(0.15)			
Std 6/7	2.84*	3.739*	8.66	14.21	5.55
	(0.19)	(0.21)			
Std 8/9	8.669*	8.49*	2.61	5.97	3.35
	(0.32)	(0.28)			
Matriculation	14.365*	15.621*	0.38	1.77	1.39
	(0.78)	(0.49)			
Tertiary	29.552*	28.654*	0.49	1.13	0.64
	(0.74)	(0.62)			
R2	0.59	0.59			
N	15759	12888			
Industry and Employer Effects	Yes	Yes			

Notes: None denotes no education, Primary means some primary school education was attained ranging from 1 year to 7 years, Std 6/7 implies either the first or the first two years of high school or obtained. Std 8/9 means either the third or fourth years of high school are obtained. Matriculation implies all five years of high school were completed. Tertiary refers to a Bachelors degree being attained, a masters or PhD, and/or a diploma. * denotes significance at 5%, ** denotes significance at 10%.

Source: Central Statistical Service of South Africa, 1970 and 1980 Population Census

Figure 1
Effect of increasing number of skilled workers on the skill premium under a fixed white population
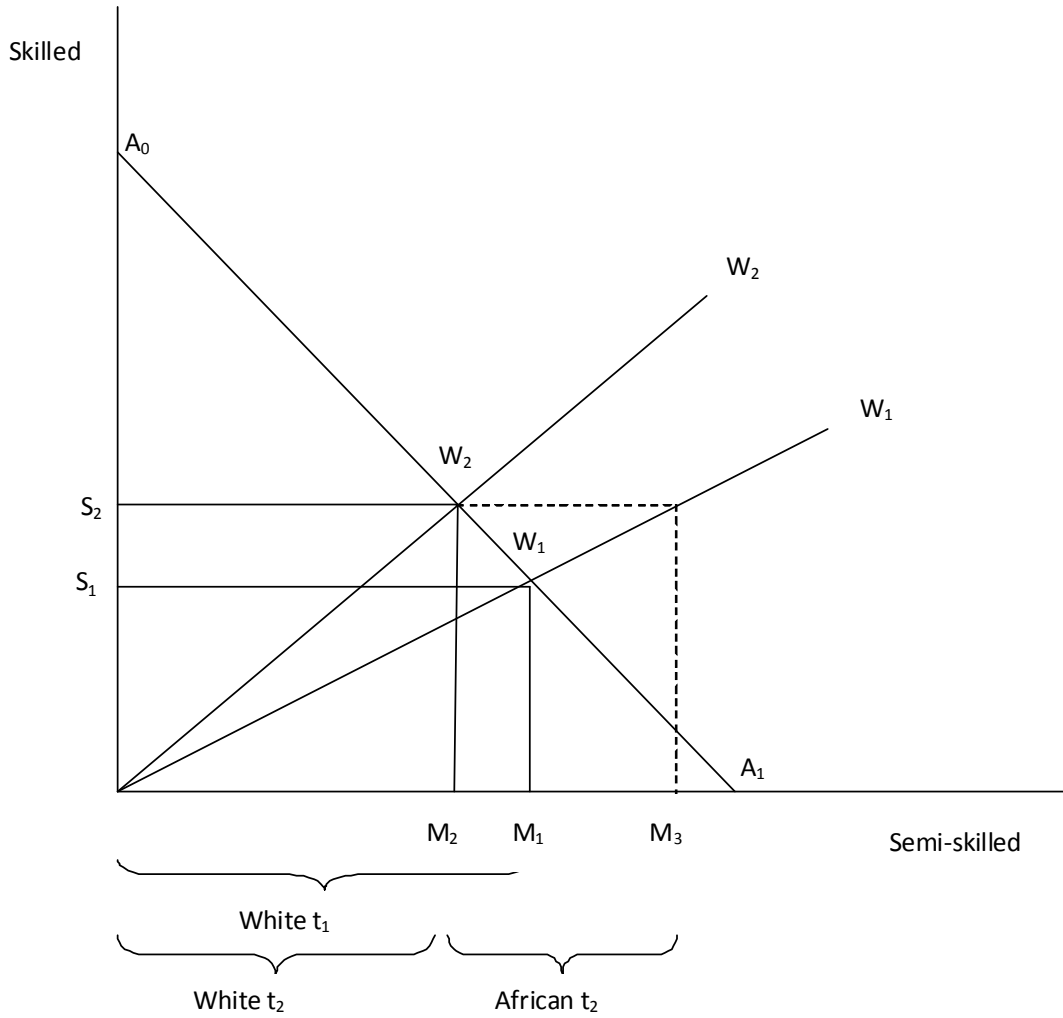
Data Appendix

Census data adjustments

For comparability across the ten year period and between whites and Africans in 1970 I have had to make some adjustments to the census data. The occupation data for whites in 1970 and all races in 1980 are compatible with the international standard occupation classification which consists of 284 unit level occupations grouped into 82 minor level occupations. In 1980 the data for both races is given at the minor level. The 1970 data for whites is at the unit level, so I group the occupations into the minor categories to make the two years comparable.[16] The African occupation data in 1970 is consistent with the minor level classification except that some unit level occupations are reported separately and several minor level occupations are grouped together. I reclassify occupations so that the data are consistent with those for whites and 1980. This procedure requires that I also make some adjustments to the SEO skill classification.[17]

There were similar problems with the industry data. The 1970 white data is at the 4 digit SIC level while the 1980 is at the 3 digit level. As with the occupation data the 1970 African industry data is slightly different from the white, including some industries at the 4 digit level and others at the 2-digit level. Regrouping to improve comparability, I end up with 73 industry classifications for both race groups. The adjustments were somewhat easier than for the occupation data as they did not involve assigning a skill rank.

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[16] I also correct for mistakes in the coding manual in the 1980 occupation data. (For the interested reader, working proprietors in catering and accommodation are omitted from the coding manual but are included in the electronic data.)

[17] Where several unit level occupations are listed, I group them together to form their minor level equivalent and create the SEO rank from the weighted average of the unit level ranks. For occupations that are at a more aggregate level than the minor level I choose the lowest minor level ranking since it is safe to assume that Africans were more likely to be employed in the lower ranking occupation.

I correct for errors in the 1970 African education coding classification. I use the census questionnaire to recode the education data since the electronic coded data clearly are incorrect.[18] I then recode the data on highest level of educational attainment into six groups. The groups are no education, some amount of primary education (ranging from Grade 1 to Standard 5), Standards 6 or 7 (the first two years of high school), Standards 8 or 9 (the next two years of high school), matriculation (high school completion),[19] and tertiary education.

Finally, the income data for both 1970 and 1980 are in categories rather than income levels for each observation. I convert the categories to incomes by taking the midpoint of each category to be a person's income. I adjust the 1980 data for inflation so that incomes are in real 1970 Rand. However, I find that the nominal and real results do not differ significantly.

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[18] For the interested reader, the data should be coded exactly as labeled in the questionnaire. That is for primary and secondary school 1 is no education, 2 is Sub A, 3 is Sub B, 4 – 8 are Standards 1-5 (primary school), 9 is Standards 6-7, 10 is Standards 8-9, 11 is matriculation and 12 is unknown. Tertiary education also corresponds to the questionnaire, 0 is no tertiary, 1 is a diploma with Standard 9 or less, 2 is a diploma with matriculation, 3 and 4 or bachelors degrees, 5 is a masters degree and 6 is a PhD.

[19] There are 12 years of school altogether – Grades 1 and 2 followed by Standard 1-9 and then matriculation, also called Standard 10.

SEO Index Construction

Ganzeboom, De Graaf and Treiman (1992) present a standard international Socio-Economic index of Occupational Status (henceforth SEO index) that they derive for the International Standard Occupation classification. They use data on education, occupation and income for 73,901 full-time employed men from 16 countries to assign scores to the 284 standard occupational unit groups from the IOS classification to maximize the role of occupation in explaining the link between education and income. By assigning a score to the return a worker earns from his level of education when he is employed in an occupation they are able to rank occupations by their return to education. From the scores assigned to the 284 three digit occupations they construct an aggregated index for the 82 two digit occupation groups also listed in the IOS classification. Their rank ranges from a low of 17 for agricultural workers to a high of 90 for judges. The occupations listed in the South African population census correspond to the 2-digit IOS classification and I assign each occupation its corresponding SEO index number. I assume that an occupation's SEO number gives an indication of its skill level such that higher ranked occupations require workers to have a higher skill attainment.

Table A1
SEO Ranks as listed in Ganzeboom, De Graaf and Treiman (1992)

SEO rank	Occupation (classified according to IOS minor groups)	SEO rank	Occupation (classified according to IOS minor groups)	SEO rank	Occupation (classified according to IOS minor groups)
85	jurist	53	working proprietors (wholesale and retail)	35	plumber welder etc
80	economist, dip bachelor	51	computer operator	34	metal processor
72	legislative official	49	transport supervisor	34	spinner weaver etc
71	medical dental	48	clerical not elsewhere classified	34	paper & board

71	teacher	48	working proprietor (catering and accommodation)	33	housekeeping
69	accountant	48	police etc	33	shoemaker
67	statistician	46	farm manager	33	rubber & plastic
67	manager (not wholesale and retail)	46	broadcasting operator	33	stationary engine
66	writer	44	production supervisor	32	hairdresser etc
65	life scientist	43	telephone telegraph operator	32	miner quarrymen
65	professional not elsewhere classified	43	jewelry worker	32	food & beverage
64	architect engineer	42	salesman	32	painter
62	physical scientist	42	printer	32	construction not elsewhere classified
60	clerical supervisor	41	manager (catering and accommodation)	31	material handling
59	aircraft ships	41	electrical fitter	30	fisherman hunter
59	composer	40	service worker not elsewhere classified	29	stone cutter
59	insurance etc	40	tailor etc	29	glass clay etc
58	government executive official	40	toolmaker etc	29	production not elsewhere classified
58	technical salesman	37	transport conductor	28	cook etc
55	religious	37	tobacco preparer	26	farmer
55	artist	36	mail clerk	26	wood & paper
55	athlete	36	chemical processor	25	building caretaker
54	stenographer	36	transport equipment	25	forestry worker
54	bookkeeper	35	sales not elsewhere classified	24	launderer
54	manager (wholesale and retail)	35	cabinet maker	24	laborers not elsewhere classified
54	sales supervisor	35	machinery fitter	17	agricultural worker