DPRU
WORKING PAPERS

Making Racial Wage Relations Fair in South Africa: A Focus on the Role of Trade Unions

Sandrine Rospabé

No 01/48 April 2001

Development Policy Research Unit
University of Cape Town

1. Introduction

One of the most important challenges facing post-apartheid South Africa is the deracialisation of its labour relations. For more than four decades, official laws and customary White behaviour prevented Africans from having the same access as Whites to employment opportunities, skilled occupations, and fair remunerations, to the detriment of economic efficiency and social equity. Today, making the South African economic system more competitive and more equitable under globalisation, requires the elimination of all racial segmentation in the labour market, one of its main features being wage inequalities. Achieving this goal will take time and involves several players notably, the government, the employers and the workers.

The aim of this working paper is to shed light on the role of South African trade unions in the reduction of wage inequalities and discrimination between White and African workers. A preliminary step is to analyse the union wage effect among these two population groups. An econometric study, based on a 1997 microeconomic data set, estimates the African and White union earnings premium.

The results are consistent with previous studies: only African workers get a wage benefit from their unionisation. This first observation already indicates that unions could influence racial wage differences. The African-White earnings gap is decomposed using the residual difference method (Oaxaca, 1973). The first interest of this specification is to take into account the endogeneity of the union status. Thus, the racial earnings gap depends not only on the union influence on the African and White wages but also on the explaining factors of the differences in the unionisation rates between the two population groups. Secondly, it allows one to measure the extent of racial inequalities (and more precisely discrimination) in union membership as well as in earnings in the unionised and non-unionised sectors. The main result of this study is that non-unionised African workers suffer from a higher earnings inequality (and discrimination) than unionised Africans.

The next section reviews the history of discrimination and trade unions in South Africa, and discusses some statistical evidence describing the differences between the African and the White workers, regarding their average wage levels, their earnings distributions and their involvement in the trade union movement. Section 3 presents some estimates of the African and White union earnings premium. Section 4 analyses the influence unions might have on racial wage inequalities and discrimination.

2. South African trade unions and racial discrimination: The historical and statistical background

2.1 Discrimination in the labour market: From legal to statistical discrimination

A particular feature of discrimination in the South African labour market has been, for a long time, its legalisation by the government. A set of laws and tacit agreements has influenced the functioning of the labour market by establishing a racial wage and job organisation[1]. Some important discriminatory steps were undertaken either before or during the apartheid regime. At first, in 1924, access to official collective bargaining was refused to African workers. Then, at the end of the 1940s, a policy of influx control limited the geographical mobility of African workers and thus the competition for Whites from workers accepting jobs with lower wages and working

[1] *For further details see Griffiths and Jones (1980).*

conditions. Another measure was the introduction, in 1956, of a system of job reservations, the aim of which was to allow an occupation to be legally reserved for a particular racial group.

For several decades, this legislation created a favourable environment for employers and White workers to discriminate against Africans, by limiting their access to the same wages and jobs as Whites. However, several factors progressively revealed to the government the economic and social misdeeds imposed by the apartheid policy. The rise in union demands certainly favoured this awareness. The labour market began to become very skill-deficient as a consequence of both the exclusion of Africans from a performing education system and the reservation of job training opportunities for White workers. Moreover, the impediments to geographical and professional mobility hindered the efficient allocation of labour between the different activities and job categories. It also became difficult for the government to justify the continuation of its policy amidst social unrest, especially the Soweto riots in 1976 and the mushrooming industrial strikes.

The international condemnation of the regime, through limiting foreign investment in the country, also contributed to the change that P.W. Botha's policy implemented at the end of the 1970s. Two commissions, the Wiehahn and Riekert Commissions, were appointed to work respectively on the areas of industrial relations and legislation for urban Africans and submitted their reports to the government in 1979. Following their recommendations, the government progressively liberalised racial policy by giving African unions, in 1979, the right to participate in collective bargaining and removing, in the course of the 1980s, the systems of influx control and job reservation. So, most of the openly discriminatory laws disappeared at the end of the 1980s, in favour of greater freedom in labour relations. However, nothing allows one to conclude that discrimination, deeply implanted in labour relations, has been totally removed with the progressive legislation.

Hence, several studies (Knight and McGrath (1987), Moll (1992, 1995), Hinks (1999), and Rospabe (2000)) were devoted to the estimation of wage discrimination between South African workers of different races. Using the method of the residual difference, they reach the conclusion that wage discrimination decreased over the period 1970 to 1990, despite a few differences in the figures mainly due to heterogeneous sampling. But their findings also show that there is still a large percentage of the wage gap that remains unexplained.

In the early 1990s, the persistence of racial wage discrimination was a result of not only labour legislation but also other factors. Of course, the legacy of the apartheid policy must not be neglected. The discrimination prior to the labour market, in the acquisition of human capital, seems to greatly influence wage discrimination too. But most of all, the origin of wage discrimination can be explained, in the South African case, in light of statistical discrimination theories (Azam and Rospabe, 1999). Indeed, these theories are able to rationalise unequal wages paid to equally productive workers when the employer faces a situation of imperfect information on the workers' characteristics and is then confronted with a problem of adverse selection.

2.2 A short history of trade unions

Since 1924, the official system of collective bargaining has mainly relied on the action of Industrial Councils[2] grouping one or several trade unions and employers, registered under the law. Until 1979, every union representing pass-bearing employers have been excluded from registration and hence from the statutory system. For several decades, using their voter power, White workers have contributed to the adoption of discriminatory labour legislation. And as only White unions were free to negotiate, they were in a strong position to protect the wage interests of their members and thus reinforced discrimination against African workers. However, in 1930, an amendment to the Industrial Conciliation Act stipulated that each Industrial Council agreement

[2] *Renamed Bargaining Councils in the new Labour Relations Act of 1995.*

could be extended, after a Labour Minister decision, to all workers in the industry, whether or not they belonged to a trade union participating in the negotiation.

In 1925, the Wage Act allowed for the establishment of minimum wage rates (referred to as wage determination) in industries or occupations not covered by statutory negotiation structures. It seems unlikely, however, that the apartheid regime used these tools to favour African workers. Despite the discouragement of African trade unions activity, several unions were created and took different forms:

- Parallel unions (working with liberal registered unions).
- Independent unions.
- Non-racial unions.
- Exclusively African unions, linked to the Africanist or the Black Consciousness movements.

These African trade unions attempted to make up for the lack of representation by making themselves recognised at the plant level. The first recognition agreement of a black union was signed in 1974. However, it does not seem that they really contributed to shifting the discriminatory trend until the 1980s.

In 1979, following the Wiehahn Commission recommendations, participation in statutory collective bargaining was opened to every trade union. This radical change was mainly due to the will of the government to improve control over African unions and to prevent the proliferation of plant-level recognition agreements. Nevertheless, it did not stop the development of a two-tier negotiation system. The 1980s witnessed an increase in African membership and bargaining power of emerging African and multi-racial trade unions, while White unions lost a lot of their influence.

2.3 Unionisation and wages, by population group

Table 1 shows that in 1997, the unionisation rate was approximately 34.4 percent, placing South Africa among the highest unionised developing countries. According to Salmon (1999), the average unionisation rate for developing countries is about 18 percent, which increases to 43 percent for the Organisation for Economic Co-operation and Development (OECD) countries. Table 1 shows that African workers have a higher unionisation rate than Whites, since 38 percent of African employees are unionised, whereas only 23 percent of Whites are union members.

Table 1: Unionisation According to Population Groups, 1997

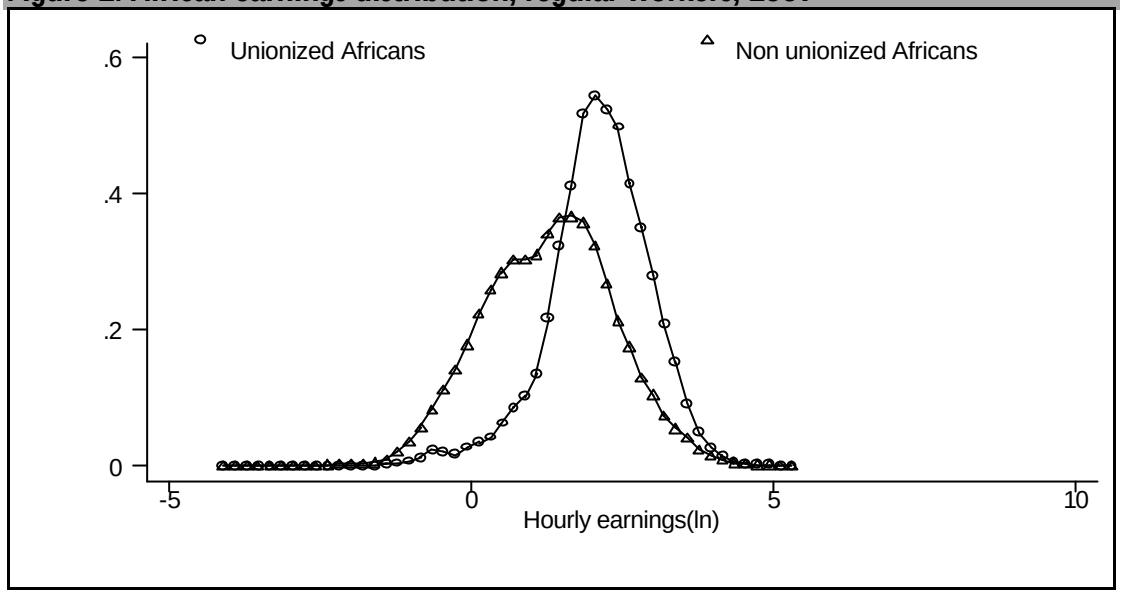
	Total sample[b]	African workers	White workers
Unionisation rate[a]	34.4%	38%	23.3%

Notes:
[a] Defined as the number of unionised / total employment (excluding self-employment).
[b] Representative sample of 24457 workers (15613 Africans and 3070 Whites).

Source: Computations using OHS 1997 data sets.

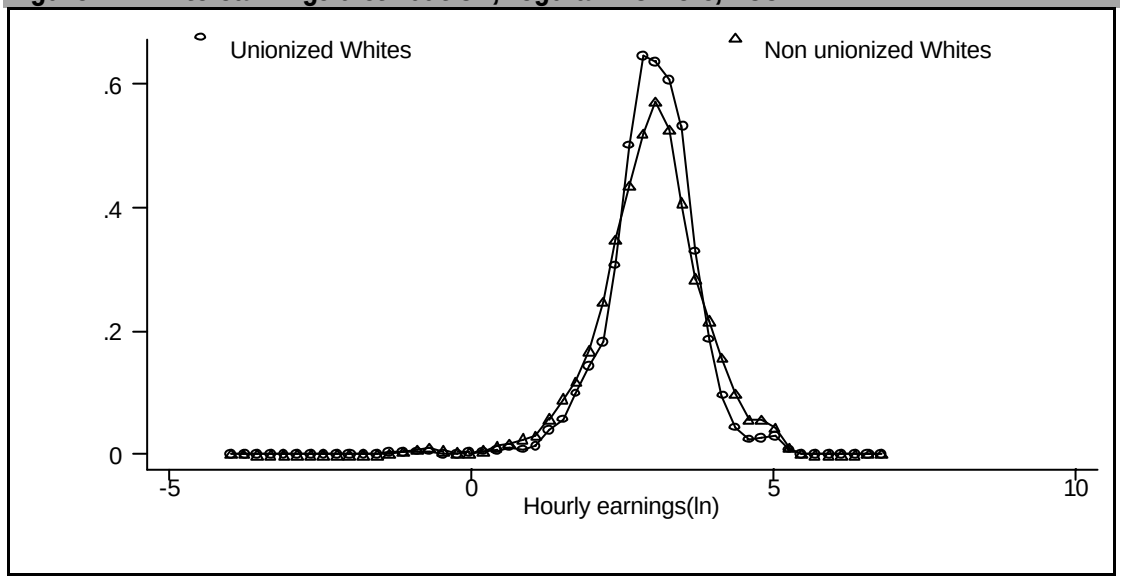
Figures 1 and 2 present histograms of the earnings of unionised and non-unionised African and White workers. It is clear that the earnings distribution for unionised African workers is higher than the earnings distribution for non-unionised African workers. Furthermore, the earnings distribution for unionised African workers is spread more narrowly than for non-unionised African workers, revealing higher rates of wage equality for unionised African workers. Earnings distributions for White workers are similar whether they are unionised or not. However, the pike of the distribution for unionised White workers is slightly higher than the one for non-unionised White workers.

Figure 1: African earnings distribution, regular workers, 1997



Source: OHS 1997.

Figure 2: White earnings distribution, regular workers, 1997



Source: OHS 1997.

Table 2: Average Hourly Net Earnings by Population Groups and Union Status, 1997

Earnings Union Status	African Workers	White Workers	Ratio of Earnings of Whites to Africans
Union members	11.6	25	2.24
Non-union members	6.2	27.4	4.4
Total sample	8.2	26.7	3.3
Ratio of Earnings of unionised to non-unionised	1.8	0.9	

Source: Computations using OHS 1997 data sets.

Table 2 displays earnings by union status for African and White workers. Not surprisingly, on average, African union members earn more than non-union members (about 46 percent more). On the other hand, the figures for White workers show the opposite: the average gross wage for unionised White workers is about 9 percent less than for non-unionised workers. Thus, the racial wage gap is larger in the non-union sector than in the union sector.

The following two sections estimate the real influence trade unions have on the wage differential among and between African and White workers. Section 3 evaluates the size of the union/non-union wage differential for African and for White workers respectively, taking into account their personal characteristics. Section 4 determines whether racial wage discrimination is lower among unionised workers or non-unionised workers.

3. The union earnings premium

3.1 Econometric specification

Among the several specifications of the union wage premium, we retain here the four most often used in the literature. They differ depending on whether they consider that the union status is endogenous, that there are different earnings regimes among union and non-union members and whether they take into account a sample selection problem.

- A single earnings equation with an exogenous union membership dummy variable.

$$\ln w_i = bX_i + gU_i + e_i \quad (1)$$

Where U_i is the union status of the worker *i* (=1 if is a union member, 0 otherwise) and X_i, a vector of exogenous characteristics[3]. It can be shown that this specification, which does not take into account the problem of self-selection, leads to an overestimate of unionisation on earnings.

- The single earnings equation with an exogenous union membership dummy variable, with adjustment for sample selection.

$$\ln w_i = bX_i + gU_i + d\,l_i + e_i \quad (2)$$

Where l_i is the inverse Mills ratio computed from the estimate of a probit model of union membership. The union earnings premium is: $[\exp(\hat{g}) - 1]$.

- Separate earnings regime among union and non-union members (OLS).

$$\ln w_i^u = b^u X_i^u + h_i^u \quad (3)$$

$$\ln w_i^n = b^n X_i^n + h_i^n \quad (4)$$

Where *u* denotes union sector and *n*, non-union sector.

- Separate earnings regime among union and non-union members, with endogenous switching between the two regimes (ES).

$$\ln w_i^u = b_1^u X_i^u + b_2^u l_i^u + h_i^u \quad (5)$$

$$\ln w_i^n = b_1^n X_i^n + b_2^n l_i^n + h_i^n \quad (6)$$

Where l_i^u et l_i^n are computed from the estimate of a probit model of union membership.

The union earnings premium is: ($\hat{m} = \exp\left[(b^u - b^n)\overline{X}\right] - 1$), where the vector $\overline{X}$ contains the means of the variables computed on the union, non union or the whole sample, depending on the economist's choice.

Comparing the two last methods, Lewis (1986), in his review of the American studies on the union wage premium, prefers the OLS specification even if it is biased. Indeed, ES estimates are much more spread than the OLS but not systematically higher or lower. Furthermore, ES results are highly sensitive to the variables introduced in the earnings equations and the union membership probit model, to the assumptions on the distribution of the disturbance etc.

Because none of these methods has proved its superiority, we test the sensitivity of our results to the different specifications.

3.2 Prior works

Previous studies on the South African union/non-union wage differential display heterogeneity of results depending on the specifications and the data used. Table 3 presents four of them, essentially devoted to the estimate of the African union wage premium. All of them conclude that, at the beginning of the 1990s, unionised African workers earn significantly more than non-unionised workers. Applying the first specification (equation (1)) to the determination of the premium for male Africans workers, Mwabu and Schultz (1998) and Hofmeyr and Lucas (1998) agree on a 20 percent result. However, when other methodologies are used, the extent of the union wage premium differs considerably, from 15 percent to 100 percent (*ibid*). Only Mwabu and Schultz estimate the White union wage premium, but do not find it significant.

The interest of this study is to continue this research with a more recent data set (OHS 1997) and to estimate the White union earnings premium as well as the African union earnings premium.

Table 3: Synthesis of a few prior works on the union earnings premium in South Africa

Authors	Methodology	Data	Union earnings premium
Moll (1993)	(1); (3)-(4); (5)-(6)	Household survey (1985) African blue-collar workers	Between 10% and 24%
Moll (1995)	(1)	OHS (1994) African workers	Between 26% and 43% depending on the skill and the economic sector.
Mwabu and Schultz (1998)	(1)	PSLSD (1993) African male workers: White male workers:	 21% Not significant
Hofmeyr and Lucas (1998)	(1); (3)-(4); (5)-(6) and other various assumptions	Household survey (1985): PSLSD (1993): African male workers	 Between -8% and 72% Between 15% and 100%

[3] *A variable that corrects for the bias linked to participation to the labour force is introduced in the vector X. This variable is computed from a multinomial logit model of employment status: unemployed and casual, independent, regular.*

3.3 Data and variables

The data are derived from the 1997 October Household Survey conducted by Statistics South Africa. The survey covers 30 000 households of all races.

Self-employed as well as workers with non-positive or unspecified wages are omitted from the sample. Observations with missing data on any variable included in the earnings functions were disregarded. The sample consists of 7984 African and 1474 White male wage earnings employees.

Two sets of equations require specification of variables: the union membership and the earnings equations[4].

3.3.1 Determinants of union membership

The independent variables in the probit include human capital variables. Educational qualifications are represented by four dummy variables, for primary schooling, secondary schooling, technical and university education. The expected signs of their coefficients are not clear. They can be negative if better-educated workers prefer individual strategies for promotion and for redress of grievances or positive if the union or the employer select individuals on the basis of education (Moll, 1993). Two variables of experience and tenure in the current job are introduced. They may reflect the worker's desire for union voice. Dummies of the degree of qualification of occupational categories are also included.

Industry dummies could indicate the degree of monopoly union power and its associated lower organising costs (Booth, 1986). They may also proxy for firm size. A dummy for formal sector is also introduced.

An urban dummy is included as a proxy for organising cost and social customs. A dummy for marriage is traditionally included because marriage is thought to increase the worker's desire for job security, which can be increased through union intervention. A dummy *Other union* indicates whether there are other persons in the household who are also union members. According to Moll (1993), this variable reflects household-specific tastes for unionisation, such as political orientation and the willingness to invest union dues for the sake of long security and wage gains. The probit also includes the ratio of young in the household to the number of earners (*dependence*). It is assumed that workers with great financial responsibilities at home are more likely than others to join a union, as a means of security. A dummy denoting the presence of unemployed persons in the household (*unemployed*) is also included for the same purpose. Finally the probit includes a dummy *migration* indicating whether the individual has left his/her birthplace. In the case of migration, unionisation can be a way of integrating a new social or political network.

3.3.2 Determinants of earnings

The explanatory variable in the earnings equation include some of the independent variables previously presented: the standard human capital measures (education, experience, seniority). To avoid an eventual problem of endogeneity, the dummies for being in highly skilled, skilled and semi-skilled occupations are replaced by the estimated probabilities that the individual will be in such kinds of occupations[5]. Other common variables to the two sets of equations are the marital status, the industry sectors, the nature of the sector (formal or not), the type of area (urban or

[4] *See Appendix 1 for further details on the variables.*

[5] *These probabilities are estimated by a logit multinomial model of occupational attainment. These estimates are available from the author.*

not). In addition, regional dummies are included to take into account the differences in the costs of living between the nine provinces.

The dependent variable is the natural log of hourly earnings, defined as the total salary (including overtime and bonus) before any deduction of taxes, insurance payments, pensions contribution etc. Introducing hourly earnings allows that differences in hours worked are controlled for.

3.4 Results of estimation

Results of the estimates of the union membership probit model and the earnings equations – (1) to (6) – for the two sub samples of African and White male workers are respectively given in Appendices 2 and 3. For the sake of simplicity, these results are not discussed here. Table 4 presents the union/non-union earnings differentials obtained from these various estimates.

Table 4: Union/non-union wage differential among African and White male workers, 1997

		Africans		Whites	
Methodology	Equations	Premium	(t) or (F) [a]	Premium	(t)
One equation	(1)	16.6***	8.02	-3.8	-0.81
One equation (with self-selection correction)	(2)	35.7***	2.80	-52.4***	-4.21
Two equations (OLS)[b]	(3)-(4)	13.1***	2.85	-0.6***	1.07
Switching equations [b, c]	(5)-(6)	19.6***	3.02	-57.9***	1.18

Notes

[a] Significance of the union wage premium is tested by a Student test when one equation is estimated (1) or (2). A Chow test (F test) tests the significance of the premium in the two last cases, by testing the constancy of the coefficients between the two equations. (See Appendix 4).

[b] $\overline{X}$ is determinate on the sample of the non-unionised workers.

[c] $\overline{X}$ does not include the variable correcting for self-selection. (See Lewis, 1986: 49).

***statistically significant at the 1% level.

It appears from these results that, whatever the methodology used, unionised African workers earn significantly more than non-unionised workers. If we retain the switching model as the most credible one (Moll, 1993), it seems that an individual, who has the average characteristics of the non-unionised workers, will earn, if he/she becomes a union member, 20 percent more than if he/she remains non-unionised. It should be noted that these results are similar to those found four years earlier, but not with the same methodology, by Mwabu and Schultz (1998) and Hofmeyr and Lucas (1998). Considering White workers, the union/non-union differential is much more sensitive to the specification used. In the four cases, the union premium is negative and clearly higher when it incorporates a correction for self-selection. According to the switching model, an individual, endowed with the average characteristics of the non-unionised workers, suffers a wage loss of 58 percent if he/she decides to unionise. However, the extent and the significance of this result is surprising compared to the conclusions of the previous studies and should thus be appreciated.

How can we explain firstly that a union/non-union wage differential appears within the South African bargaining system and secondly that only African workers benefit from such a premium? Indeed, the compulsory centralised bargaining system in South Africa is expected to reduce within industry union/non-union wage differentials. Moll (1995) sets out three arguments to explain that the premium remains substantial for Africans:

- *First*, the enforcement of the Industrial Council rulings is incomplete.
- *Second*, there is a wage differential between the formal sector where the Industrial Council rulings are applied and the informal sector where they are not.
- *Third*, additional union-management agreements within industries covered by Industrial Council rulings enable workers in specific firms to enjoy wage levels higher than those specified by the Industrial Councils.

It should be noted that this union earnings premium, usually treated as an indicator of wage bargaining power of unions, can also reflect some compensation for differences in working conditions or fringe benefits from union and non-union jobs (Duncan and Stafford, 1980). Union organisational efforts can also alter the productivity of the unionised labour force and hence the derived demand for union workers (Freeman, 1980).

The fact that only African workers receive this union wage premium can be accounted for by differences in employment opportunities for Africans and Whites in the non-union sector, along dimensions such as firm size and capital intensity, that we cannot measure (Mwabu and Schultz, 1998). African non-union employment may be concentrated in small, low-technology firms, whereas White non-union employment may occur more often in larger firms using relatively more advanced technologies. Moreover, though an increasing proportion of unionised White workers have joined multi-racial unions, many White workers retain their membership with declining White unions. The weak wage bargaining power of these unions could explain the value of the premium, while others compensations (job security for example) justify their membership.

As the wage influence of South African unions is significantly positive among African workers but negligible or unfavourable for Whites, one can deduce that the labour movement can play a role in the reduction of racial wage inequalities. In the next section, we estimate, other things being equal, whether racial wage differential is lower among unionised workers. Specifically, this study seeks to evaluate the union impact on wage discrimination between White and African workers.

4. The influence of unions on racial wage inequality and discrimination

Most of the studies on wage discrimination using the standard Oaxaca's decomposition of the earnings gap, whenever they consider the union influence, incorporate a dummy for the union membership in the earnings equations. The interest of the methodology used here is to take into account the factors affecting unionisation of White and African workers rather than simply treating the union status as exogenously determined[6].

4.1 The methodology

The simultaneous equations model retained is presented in Appendix 5. Decomposition of the earnings differential between White and African workers is as follows:

[6] *See Doiron and Riddell (1994) for the insufficiencies of an analysis based on the exogeneity of unionization.*

$$\ln(\overline{W}_w) - \ln(\overline{W}_a) = \underbrace{(w_a^u - w_a^n)\left[(m_w^* - m_a^*) + (m_w - m_w^*) + (m_a^* - m_a)\right]}_{U}$$
$$+ \underbrace{m_w\left[\left(w_w^{u*} - w_a^{u*}\right) + \left(w_w^u - w_w^{u*}\right) + \left(w_a^{u*} - w_a^u\right)\right]}_{WU} \quad (7)$$
$$+ \underbrace{(1 - m_w)\left[\left(w_w^{n*} - w_a^{n*}\right) + \left(w_w^n - w_w^{n*}\right) + \left(w_a^{n*} - w_a^n\right)\right]}_{WN}$$

Where,

u = union sector, *n* = non-union sector, *a* = Africans and *w* = Whites

$w_j^t = b_j^t \overline{X}_j$ with $t=(u,n)$ and $j=(a,w)$, is the current earnings.

$w_j^{t*} = b_j^{t*} \overline{X}_j$ with $t=(u,n)$ and $j=(a,w)$, is the non discriminatory earnings.

$m_j = \frac{1}{N_j}\sum_{i=1}^{N_j} \Phi\left(\hat{a}_{1j} Z_{ij} + \hat{a}_{2j}\left(\ln w_{ij}^u - \ln w_{ij}^n\right)\right)$ is the current average probability of unionisation, N_j is the sample size Z, a vector of exogenous determinants of union membership and Φ is the normal cumulative distribution function.

$m_j^* = \frac{1}{N_j}\sum_{i=1}^{N_j} \Phi\left(\hat{a}_{1j}^* Z_{ij} + \hat{a}_{2j}^*\left(\ln w_{ij}^u - \ln w_{ij}^n\right)\right)$ is the non-discriminatory average probability of unionisation.

Non-discriminatory coefficients b_j^{u*}, b_j^{n*}, a_{1j}^* et a_{2j}^* are estimated from the whole sample of African and White workers (Neumark, 1988).

The term *U* of equation (7) represents the portion of the earnings gap due to White-African differences in union membership. Its first component can be explained by differences between White and African workers in the observable determinants of the union status. The last two elements form the unexplained component of the gap in unionism and have various origins. It may result from unobserved racial differences in characteristics that affect the demand for unionism (such as labour market attachment, working conditions, employer size). It may also reflect the discriminatory behavior of unions or employers. A selective recruitment union policy or a discriminatory hiring process can reduce the unionisation rate of the discriminated against workers.

The terms *WU* and *WN* are associated with racial differences in earnings in the union and non-union sector respectively. In each of these terms, the first component represents the skill or productivity advantage of White workers over African workers in the absence of discrimination. It is the portion of the earnings gap explained by racial differences in productive characteristics. The following two elements are the part of the racial earnings differential that can be assimilated, subject to the usual precautions[7], to wage discrimination. This discrimination component is made up of two terms. The first one – the favoured group advantage – represents the amount by which White productive characteristics are overcompensated relative to a discrimination-free setting. The other one – the non-favoured group disadvantage – reflects the amount by which African productive characteristics are undervalued.

[7] *Estimates may actually overstate or understate the true level of discrimination owing to measurement errors in the data or omission of productive characteristics (job training, motivation), which can be hardly observable or measurable.*

4.2 The results

The estimation process includes three steps that have to be reproduced for each of the population group:

- Estimation of a reduced-form union membership probit. Computation of the inverse of Mill's ratio.
- Estimation of the earnings equations in the union and non-union sectors, correcting for the biases due to self-selection in unionisation.
- Estimation of a structural-form union membership probit, incorporating the estimated union/non-union wage differential.

Table 5 presents the results of the decomposition of the racial earnings gap:

Table 5: Decomposition of the earnings gap between White and African male workers, 1997

Estimated hourly earnings (ln)	
Whites	3.087
Africans	1.732
Earnings gap	***1.355***

	Decomposition of the earnings gap	
	Value	**% of the earnings gap**
Unionisation (*U*)	**-0.086**	**-6.3%**
Explained component	0.027	2%
Unexplained component	-0.113	-8.3%
• White advantage	-0.101	(-7.4%)
• African disadvantage	-0.012	(-0.9%)
Earnings (union sector) (*WU*)	**0.292**	**21.6%**
Explained component	0.198	14.6%
Unexplained component	0.095	7%
• White advantage	0.086	(6.3%)
• African disadvantage	0.009	(0.7%)
Earnings (non-union sector) (*WN*)	**1.149**	**84.8%**
Explained component	1	73.7%
Unexplained component	0.149	11%
• White advantage	0.115	(8.5%)
• African disadvantage	0.034	(2.5%)

Notes: Tests of significance of the racial differences in the unionisation probabilities and in average earnings in the union and non-union sectors are presented in Appendix 6.

Table 5 shows that the earnings advantage that White workers have over African workers can not be explained, even partially, by the gap in unionisation rates which is negative and thus reduces the earnings gap by 6 percent. On average, White workers have a lower unionisation rate than African workers. This situation results from unexplained differences not related to observable characteristics. We should be cautious in interpreting this White unionisation disadvantage only in terms of discrimination in default of controlling for all the unobserved variables that affect the union status. Whites' lower unionisation rate can also be explained by their reluctance to become members of unions that have traditionally defended African interests.

The White-African earnings gap in the union sector and in the non-union sector respectively account for 20 percent and 85 percent of the average differential. In both cases, the major portion of the gap is explained by the fact that Whites have higher observable productive endowments than Africans. However, these endowments are more evenly matched among White and African unionised workers than among non-unionised workers. If we consider, with the usual

reserves, that the unexplained portion of these gaps can be attributed to discrimination then, results indicate that discrimination is lower in the union sector. This remark shows that, other things being equal, South African unions could have an influence on the reduction of the earnings gap between White and African workers.

5. Conclusion

The *first* important result of this econometric study is that South African trade unions have significant wage bargaining power but that it only serves African workers' interests. The value of the African earnings union premium (approximately 20 percent) falls in the higher developing countries range. In Malaysia, Ghana, Mexico and Bangladesh the union/non-union wage differential exceeds 10 percent (Salmon, 1999). If we compare our result with those found in developed countries, it is closer to the higher American range than to the lower European range. Blanchflower and Freeman (1990) demonstrate a contrast between the United States, where the union effect is some 20 percent and West Germany, Austria, Australia and Switzerland, which have small union effects, between 4 percent and 8 percent. These authors stress that countries with centralised wage setting have relatively small premia. The union effect for African workers is consistent with this remark, because it is probably partly due to the decentralised plant-level activities of the unions.

The *second* important result of this paper is that the racial earnings gap, and more restrictively wage discrimination, originates mainly in the non-union sector. This would mean that unions have played a role in filling in the racial wage gap. We assume that the emerging unions have the most important influence in this reduction that began in the 1980s. This econometric study also finds that the largest portion of the earnings differential is due to racially unequal productive endowments. This is partly the result of discrimination prior the market which influences the workers' acquisition of human capital.

The econometric results presented in this paper thus points to the legal framework for industrial relations, insofar as it affects the political economy of trade unionism, and to the policy towards human capital development, as the two crucial elements of a policy aiming at making the South African labour market more equitable.

Reference

Azam, J.P. and Rospabe, S. (1999), *Trade unions and statistical discrimination. Theory with references to South Africa*, Paper presented to the European Economic Association Annual Congress, Santiago de Compostela.

Blanchflower, D. G. and Freeman R. B. (1990), *Going different ways: unionism in the U.S and other advanced OECD countries*, NBER Working Paper no 3342. Cambridge.

Booth, A. (1986), Estimating the probability of trade union membership: a study of men and women in Britain, *Economica*, 53, 41-64.

Chow, G. (1960), Tests of equality between sets of coefficients in two linear regressions, *Econometrica*, 28, 591-605.

Doiron D. J. and Riddell W. C. (1994), The impact of unionisation on male-female earnings differences in Canada, *Journal of Human Resources*, 29, 504-534.

Duncan G. J., and Stafford F. P. (1980), Do union members receive compensating wage differentials?, *The American Economic Review*, 70 (3), 355-371.

Freeman, R. (1980), Unionism and the dispersion of wages, *Industrial and Labour Relations Review*, 34, 3-23.

Griffiths H. R. and Jones R. A. (1980), *South African Labour Economics*, McGraw-Hill book company, Johannesburg.

Hinks, T. (1999), Racial Wage Discrimination and the end of Apartheid in South Africa: A Multilateral Approach, *Discussion Paper Series*, No 77, Middlesex University Business School.

Hofmeyr, Julian F. and Robert E. B. Lucas (1998), *The rise in union wage premia in South Africa*, IED Discussion Paper Series, no 83, Institute for Economic Development, Boston University.

Knight, J. B. et M. D. McGrath (1987), The erosion of apartheid in the South African labour market : measures and mechanisms, *Applied Economics Discussion Paper, no 35*, Institute of Economics and Statistics, Oxford.

Lee, Lung-Fei. (1978), Unionism and wage rates: a simultaneous equations model with qualitative and limited dependant variables, *International Economic Review*, 19 (2) 415-33.

Levy A. (2000), *Annual Report on Labour Relations in South Africa*, Andrew Levy & Associates (PTY), LTD.

Lewis, Gregg, H. (1986), *Union relative wage effects. A survey*, The University of Chicago Press, Chicago and London.

Moll, P. G (1992), The decline of discrimination against Colored people in South Africa, 1975-1985, *Journal of Development Economics*, 37, 289-307.

Moll, P. G. (1993), Black South African unions: relative wage effects in international perspective, *Industrial and Labour Relations Review*, 46 (2), 245-261.

Moll, P. G. (1995), *Wage Developments in South Africa in the 1990s*, mimeo.

Mwabu, G. and Schultz, P.T. (1998), Labour unions and the distribution of wages and employment in South Africa, *The Industrial Labour Relation Review*, 51 (4), 680-703.

Neumark, D. (1988), Employers' discrimination behavior and the estimation of wage discrimination, *The Journal of Human Resources*, 23 (3), 279-295.

Oaxaca, R. L., (1973), Male-female wage differentials in urban labour market, *International Economic Review*, 14 (3), 693-709.

Rospabe, S. (2000), *Inegalités, discriminations raciales et syndicalisme en Afrique du Sud : l'après apartheid,* Thèse de Doctorat en Sciences Economiques, CERDI, Université d'Auvergne, Clermont-Fd.

Salmon, C. (1999), Les syndicats dans les pays en développement : leur action sur le marché du travail, *Canadian Journal of Development Studies*, Special Issue, 20, 661-q2688.

Appendix 1

THE VARIABLES

Variable	Determination
Dependent :	
Union membership	= 1 if is a union member
Earnings (LNREVH)	Logarithm of the hourly earnings
Independent :	
Common variables (determination of the union status and the earnings)	
Primary schooling [a]	$\begin{cases} x, & 0 \le x \le 7 \\ 7, & x > 7 \end{cases}$ where x = years of schooling
Secondary schooling	$\begin{cases} 0, & x \le 7 \\ x-7, & 7 < x \le 12 \\ 5, & x > 12 \end{cases}$ where x = years of schooling
Technical diploma	=1 if holds a technical or professional diploma (artisan, teacher etc.)
University diploma	=1 if holds a university diploma (degree, honours, master's, doctor's)
Experience	= age - years of schooling - 6
Experience ²	= experience square
Seniority	= years of seniority within the present firm
Seniority ²	= seniority square
Married	=1 if married, civilly, traditionally
Formal sector	= 1 if works in the formal sector (fiscal registration of the employer)
Urban	=1 if lives in a urban area
Economic sector	= dummy variables : agriculture, mining, manufacturing, electricity, construction, trade, transport, finances, services, domestic.
Specific variables (determination of the union status)	
Migration	=1 if has left his area of birth
Occupational status	= dummy variables: highly skilled, skilled, no skill
Dependence ratio	= ratio of young people in the household to the number of earners (independent or regular)
Unemployed	= if people (other than the individual) in the household are unemployed
Other union	= if workers (other than the individual) in the household are unionised
Specific variables (determination of the earnings)	
Occupational status	= estimated probabilities that the individual, once taking into account his/her characteristics, be highly skilled, skilled or semi-skilled [b]
Regions	= dummy variables : Western Cape, Northern Cape, Eastern Cape, Free State, Kwazulu Natal, North West, Gauteng, Mpumalanga, Northern Province
l_p	= correcting variable for the selection bias of participation
l_s	= correcting variable for the selection bias of unionisation

[a] Cf. Moll (1995) for the same kind of process.

[b] These probabilities (estimated in a multinomial logit model) are introduced to correct for a potential endogeneity problem linked to the direct introduction of the occupational status.

Appendix 2

DETERMINANTS OF UNION MEMBERSHIP

- **The reduced form**

	Africans		Whites	
Dependent variable : Union status	Coefficient	t-student	Coefficient	t-student
Primary schooling	0.017*	1.85	0.062	1.19
Secondary schooling	0.054***	5.32	-0.154***	-3.50
Technical diploma	0.187**	2.49	-0.061	-0.62
Univ. diploma	0.078	0.63	-0.340**	-2.52
Experience	0.029***	4.97	0.025*	1.82
Experience ²	0.000***	-4.75	-0.001***	-2.71
Seniority	0.064***	10.12	0.042***	4.14
Seniority ²	-0.001***	-5.58	0.000*	-1.74
Skilled	0.012	0.22	0.242***	2.75
No skill	0.017	0.28	-0.022	-0.11
Married	0.105**	2.54	0.486***	3.56
Dependence ratio	0.031**	2.33	0.011	0.24
Unemployed	0.005	0.13	0.145	0.96
Other union	0.789***	11.46	1.441***	7.93
Formal sector	0.957***	13.36	0.605**	2.10
Urban	0.035	0.85	0.556***	2.68
Migration	0.114***	3.20	-0.216**	-2.38
Agriculture[a]	-1.184***	-16.10	0.299	1.09
Mining	0.525***	8.10	0.544***	3.49
Electricity	-0.319***	-3.00	0.385*	1.89
Construction	-0.771***	-11.25	-0.709***	-2.68
Trade	-0.493***	-9.05	-0.161	-1.22
Transport	-0.147**	-2.32	0.401***	2.92
Finances	-0.701***	-9.27	-0.272*	-1.81
Services	-0.019	-0.36	0.400***	3.55
Domestic	-0.695***	-6.44	-0.723	-1.35
Western Cape[b]	0.049	0.60	0.042	0.38
Northern Cape	0.267***	3.86	-0.002	-0.01
Eastern Cape	0.087	0.81	0.086	0.51
Orange Free State	0.138**	2.41	0.135	0.84
Natal	0.003	0.05	0.137	0.89
North West	-0.115**	-1.96	0.603***	3.71
Mpumalanga	0.107*	1.79	0.695***	4.97
Northern Province	0.109	1.55	0.367	1.34
Constant	-2.051***	-14.47	-2.307***	-4.95
Pseudo R^2	0.2375		0.2011	
% correctly predicted	73.8		76.6	
N	7984		1474	

Notes:
*** statistically significant at the 1% level, ** the 5% level and * the 10% level.
[a] Reference category : Manufacturing.
[b] Reference category : Gauteng.

- **The structural form**

Dependent variable : Union status	Africans		Whites	
	Coefficient	t-student	Coefficient	t-student
Primary schooling	0.018**	1.99	0.066	1.28
Secondary schooling	0.054***	5.28	-0.146***	-3.31
Technical diploma	0.196***	2.61	-0.082	-0.85
University diploma	0.100	0.78	-0.338**	-2.49
Experience	0.029***	4.97	0.023*	1.75
Experience ²	0.000***	-4.70	-0.001***	-2.58
Seniority	0.063***	9.90	0.041***	3.86
Seniority ²	-0.001***	-5.54	0.000*	-1.69
Skilled	0.013	0.24	0.263***	3.05
No skill	0.023	0.36	0.020	0.11
Married	0.107**	2.55	0.514***	3.88
Dependence ratio	0.034***	2.57	0.035	0.74
Unemployed	-0.002	-0.05	0.171	1.09
Other union	0.788***	10.64	1.437***	7.74
Formal sector	0.929***	11.04	0.615**	2.18
Urban	0.046	1.01	0.637***	2.92
Migration	0.106***	2.99	-0.190**	-2.12
Agriculture[a]	-1.145***	-14.45	0.324	1.18
Mining	0.520***	7.38	0.685***	4.79
Electricity	-0.291***	-2.74	0.533**	2.41
Construction	-0.747***	-10.89	-0.662***	-2.58
Trade	-0.489***	-8.79	-0.154	-1.17
Transport	-0.138**	-2.15	0.371***	2.72
Finances	-0.694***	-9.21	-0.320**	-2.14
Services	0.012	0.23	0.360***	3.19
Domestic	-0.695***	-6.38	-0.725	-1.38
Fitted wage differential	0.042	0.25	0.138	0.76
Constant	-2.009***	-14.39	-2.389***	-4.77
Pseudo R^2	0.2341		0.1824	
% correctly predicted	74.1		75.6	
N	7984		1474	

Notes :

*** statistically significant at the 1% level, ** the 5% level and * the 10% level.

[a] Reference category : Manufacturing.

Appendix 3

DETERMINANTS OF EARNINGS

- **Wage equations : with a union dummy**

  (1) without correcting for the selection bias of unionisation.

	Africans		Whites	
Dependent variable : ln (hourly earnings)	Coefficient	t-student	Coefficient	t-student
Primary schooling	0.022***	4.38	0.022	0.66
Secondary schooling	0.012	0.81	-0.002	-0.05
Technical diploma	0.225**	2.10	0.004	0.05
Univ. diploma	0.473***	3.31	-0.005	-0.04
Experience	-0.015***	-2.82	0.000	0.01
Experience ²	0.000***	2.86	0.000	0.60
Seniority	0.024***	8.84	0.020***	4.10
Seniority ²	-0.000***	-4.63	-0.000**	-2.30
Skilled	-0.245	-1.16	-1.089***	-3.06
No skill	-1.839***	-4.46	-2.138**	-2.48
Unionised	0.153***	8.03	-0.039	-0.81
Married	-0.047	-1.58	0.063	0.75
Formal sector	0.224***	6.69	-0.278*	-1.70
Urban	0.162***	6.85	-0.278*	-1.92
Agriculture[a]	-0.595***	-8.95	-0.462***	-3.15
Mining	-0.128***	-2.84	0.298***	2.75
Electricity	0.120*	1.79	0.170	1.30
Construction	-0.111**	-2.31	-0.162	-1.45
Trade	-0.271***	-7.01	-0.118	-1.50
Transport	-0.217***	-3.69	0.066	0.94
Finances	-0.260***	-4.61	-0.005	-0.05
Services	0.101***	2.77	-0.126**	-1.98
Domestic	-0.371***	-6.66	-0.199	-0.60
Western Cape[b]	-0.115***	-2.85	-0.085	-1.50
Northern Cape	-0.304***	-7.83	-0.056	-0.48
Eastern Cape	-0.333***	-5.97	-0.338***	-2.95
Orange Free State	-0.400***	-12.49	-0.356***	-5.06
Natal	-0.099***	-3.60	-0.113	-1.54
North West	-0.184***	-6.26	-0.571***	-4.57
Mpumalanga	-0.250***	-7.99	-0.139**	-1.97
Northern Province	-0.207***	-5.79	-0.319*	-1.85
l_p	0.413***	5.83	0.837***	2.81
Constant	2.397***	8.56	4.272***	7.10
Observations	7984		1474	
Adj R-squared	0.4449		0.2160	
F observed	180.72		14.43	

Notes:
*** statistically significant at the 1% level, ** the 5% level and * the 10% level.
[a] Reference category : Manufacturing.
[b] Reference category : Gauteng.

- **Wage equations : with a union dummy**

  (2) with a correction for the selection bias of unionisation.

	Africans		Whites	
Dependent variable : ln (hourly earnings)	Coefficient	t-student	Coefficient	t-student
Primary schooling	0.021***	4.22	0.034	1.00
Secondary schooling	0.011	0.74	-0.021	-0.44
Technical diploma	0.232**	2.16	0.011	0.14
Univ. diploma	0.490***	3.41	-0.020	-0.13
Experience	-0.016***	-2.95	0.003	0.37
Experience ²	0.000***	2.99	0.000	0.02
Seniority	0.021***	5.80	0.030***	5.31
Seniority ²	0.000***	-3.41	0.000***	-3.42
Skilled	-0.213	-1.00	-0.882***	-2.58
No skill	-1.794***	-4.34	-1.928**	-2.25
Unionised	0.305***	2.80	-0.743***	-4.21
Married	-0.049	-1.64	0.133	1.50
Formal sector	0.194***	4.81	-0.138	-0.87
Urban	0.157***	6.58	-0.187	-1.26
Agriculture[a]	-0.543***	-7.07	-0.415***	-2.81
Mining	-0.153***	-3.14	0.402***	3.58
Electricity	0.135**	2.00	0.231*	1.77
Construction	-0.071	-1.29	-0.274**	-2.38
Trade	-0.242***	-5.61	-0.161**	-2.04
Transport	-0.206***	-3.49	0.131*	1.84
Finances	-0.219***	-3.49	-0.051	-0.59
Services	0.107***	2.90	-0.065	-1.01
Domestic	-0.334***	-5.43	-0.300	-0.91
Western Cape[b]	-0.115***	-2.84	-0.076	-1.34
Northern Cape	-0.316***	-7.97	-0.050	-0.42
Eastern Cape	-0.337***	-6.03	-0.313	-2.80
Orange Free State	-0.405***	-12.58	-0.330***	-4.79
Natal	-0.100***	-3.61	-0.093	-1.27
North West	-0.180***	-6.11	-0.422***	-3.24
Mpumalanga	-0.256***	-8.05	0.026	0.33
Northern Province	-0.212***	-5.88	-0.244	-1.41
l_p	0.410***	5.80	0.877***	2.95
l_s	-0.093	-1.40	0.442***	4.10
Constant	2.345***	8.34	4.012***	6.80
Observations	7984		1474	
Adj R-squared	0.4451		0.2249	
F observed	175.36		14.28	

Notes:
*** statistically significant at the 1% level, ** the 5% level and * the 10% level.
[a] Reference category : Manufacturing.
[b] Reference category : Gauteng.

- **Wage equations : African and white samples**

  (3)-(4) without correcting for the selection bias of unionisation.

AFRICAN WORKERS SAMPLE

Dependent variable : ln (hourly earnings)	Unionised Africans		Non-unionised Africans	
	Coefficient	t-student	Coefficient	t-student
Primary schooling	0.010	1.28	0.025***	3.87
Secondary schooling	0.025	1.25	0.007	0.36
Technical diploma	0.427***	2.90	0.079	0.49
Univ. diploma	0.638***	3.38	0.402*	1.77
Experience	-0.022***	-2.82	-0.011	-1.54
Experience ²	0.000***	2.88	0.000	1.46
Seniority	0.021***	5.66	0.026***	7.06
Seniority ²	0.000***	-2.81	0.000***	-3.78
Skilled	0.180	0.59	-0.556*	-1.77
No skill	-1.358**	-2.39	-2.143***	-3.52
Married	-0.079**	-1.96	-0.021	-0.48
Formal sector	0.496***	5.62	0.168***	4.50
Urban	0.088***	2.77	0.214***	6.26
Agriculture[a]	-0.427***	-3.59	-0.576***	-6.39
Mining	-0.154***	-2.63	-0.015	-0.20
Electricity	0.090	0.89	0.160*	1.78
Construction	-0.152*	-1.73	-0.094	-1.47
Trade	-0.225***	-3.98	-0.292***	-5.35
Transport	-0.189**	-2.36	-0.243***	-2.80
Finances	-0.257***	-2.97	-0.262***	-3.39
Services	0.136***	2.80	0.087	1.54
Domestic	-0.320***	-2.85	-0.385***	-5.88
Western Cape[b]	-0.028	-0.43	-0.188***	-3.63
Northern Cape	-0.208***	-3.84	-0.388***	-7.03
Eastern Cape	-0.103	-1.33	-0.482***	-6.40
Orange Free State	-0.376***	-9.64	-0.433***	-8.80
Natal	-0.034	-0.89	-0.168***	-4.31
North West	-0.066	-1.58	-0.281***	-6.79
Mpumalanga	-0.238***	-5.31	-0.280***	-6.45
Northern Province	-0.110**	-2.23	-0.293***	-5.81
l_p	0.618***	5.28	0.311***	3.48
Constant	2.122***	5.20	2.629***	6.37
Observations	3479		4505	
Adj R-squared	0.3153		0.4194	
F observed	56.28		96.26	

Notes:
*** statistically significant at the 1% level, ** the 5% level and * the 10% level.
[a] Reference category : Manufacturing.
[b] Reference category : Gauteng.

WHITE WORKERS SAMPLE

Dependent variable : ln (hourly earnings)	Unionised Whites		Non-unionised Whites	
	Coefficient	t-student	Coefficient	t-student
Primary schooling	0.043	0.95	0.005	0.12
Secondary schooling	-0.083	-1.05	0.043	0.71
Technical diploma	-0.100	-0.67	0.056	0.62
Univ. diploma	-0.269	-1.01	0.108	0.60
Experience	-0.014	-0.80	0.007	0.58
Experience ^{2}	0.000	1.12	0.000	-0.02
Seniority	0.029***	3.50	0.017**	2.52
Seniority ^{2}	0.000**	-2.57	0.000	-1.20
Skilled	-1.738***	-2.98	-0.831*	-1.87
No skill	-2.112	-1.29	-1.749*	-1.82
Married	-0.043	-0.28	0.117	1.18
Formal sector	-0.690	-1.39	-0.183	-1.03
Urban	-1.007***	-3.52	-0.171	-1.02
Agriculture[a]	-0.361*	-1.78	-0.525***	-2.98
Mining	0.431**	2.34	0.206	1.41
Electricity	0.451***	2.71	-0.077	-0.40
Construction	-0.075	-0.26	-0.156	-1.27
Trade	-0.238	-1.38	-0.096	-1.08
Transport	0.117	1.28	0.062	0.63
Finances	0.098	0.56	-0.018	-0.18
Services	-0.019	-0.20	-0.157*	-1.91
Domestic	-1.126***	-3.81	-0.187	-0.54
Western Cape[b]	0.077	0.93	-0.163**	-2.31
Northern Cape	-0.067	-0.49	-0.085	-0.55
Eastern Cape	-0.346	-1.55	-0.360***	-2.78
Orange Free State	-0.393***	-3.28	-0.376***	-4.07
Natal	-0.364***	-3.02	-0.056	-0.63
North West	-0.405**	-2.35	-0.726***	-3.51
Mpumalanga	-0.158	-1.50	-0.151	-1.49
Northern Province	-0.052	-0.27	-0.505	-1.80
l_p	1.948***	3.18	0.587*	1.66
Constant	6.445***	5.38	3.645***	5.20
Observations	447		1027	
Adj R-squared	0.2516		0.2297	
F observed	241.28		12.47	

Notes:
*** statistically significant at the 1% level, ** the 5% level and * the 10% level.
[a] Reference category : Manufacturing.
[b] Reference category : Gauteng.

- **Wage equations : African and white samples**

  (5)-(6) with a correction for the selection bias of unionisation.

AFRICAN WORKERS SAMPLE

Dependent variable : ln (hourly earnings)	Unionised Africans		Non-unionised Africans	
	Coefficient	t-student	Coefficient	t-student
Primary schooling	0.011	1.42	0.022***	3.47
Secondary schooling	0.028	1.40	0.006	0.28
Technical diploma	0.447***	3.04	0.119	0.74
University diploma	0.655***	3.48	0.493**	2.11
Experience	-0.021***	-2.70	-0.013*	-1.91
Experience ²	0.000***	2.75	0.000*	1.86
Seniority	0.025***	5.09	0.018***	3.57
Seniority ²	0.000***	-3.10	0.000**	-2.28
Skilled	0.210	0.70	-0.390	-1.22
No skill	-1.353**	-2.39	-1.931***	-3.16
Married	-0.080**	-1.98	-0.028	-0.63
Formal sector	0.571***	5.73	0.086*	1.76
Urban	0.091***	2.86	0.198***	5.73
Agriculture[a]	-0.522***	-3.53	-0.437***	-4.19
Mining	-0.127**	-2.04	-0.112	-1.29
Electricity	0.067	0.65	0.203**	2.25
Construction	-0.210**	-2.17	0.016	0.21
Trade	-0.260***	-4.18	-0.210***	-3.40
Transport	-0.203**	-2.53	-0.209**	-2.39
Finances	-0.308***	-3.22	-0.145	-1.65
Services	0.136***	2.80	0.102*	1.80
Domestic	-0.379***	-3.07	-0.285***	-3.78
Western Cape[b]	-0.024	-0.37	-0.189***	-3.63
Northern Cape	-0.191***	-3.42	-0.419***	-7.51
Eastern Cape	-0.094	-1.20	-0.490***	-6.48
Orange Free State	-0.370***	-9.37	-0.447***	-9.04
Natal	-0.033	-0.86	-0.169***	-4.33
North West	-0.072*	-1.73	-0.268***	-6.43
Mpumalanga	-0.229***	-5.00	-0.296***	-6.73
Northern Province	-0.105**	-2.12	-0.308***	-6.07
l_p	0.630***	5.37	0.315***	3.53
l_s	0.114	1.24	-0.285***	-2.65
Constant	1.900***	4.37	2.415***	5.76
Observations	3479		4505	
Adj R-squared	0.316		0.420	
F observed	55.4		93.5	

Notes:
*** statistically significant at the 1% level, ** the 5% level and * the 10% level.
[a] Reference category : Manufacturing.
[b] Reference category : Gauteng.

WHITE WORKERS SAMPLE

Dependent variable : ln (hourly earnings)	Unionised whites		Non-unionised whites	
	Coefficient	t-student	Coefficient	t-student
Primary schooling	0.060	1.34	0.018	0.39
Secondary schooling	-0.111	-1.43	0.020	0.33
Technical diploma	-0.108	-0.74	0.072	0.81
University diploma	-0.348	-1.32	0.101	0.56
Experience	-0.017	-0.97	0.014	1.31
Experience ²	0.000	1.20	0.000	-0.91
Seniority	0.041***	4.85	0.030***	3.64
Seniority ²	0.000***	-3.66	0.000**	-2.21
Skilled	-1.588***	-2.78	-0.538	-1.30
No skill	-2.163	-1.35	-1.412	-1.47
Married	-0.002	-0.02	0.224**	1.98
Formal sector	-0.468	-1.02	0.010	0.05
Urban	-0.990***	-3.48	-0.025	-0.14
Agriculture[a]	-0.368*	-1.75	-0.440**	-2.45
Mining	0.542***	2.94	0.356**	2.27
Electricity	0.513***	3.08	0.013	0.07
Construction	-0.350	-1.19	-0.279	-2.16
Trade	-0.298*	-1.73	-0.147**	-1.65
Transport	0.171*	1.87	0.166	1.59
Finances	-0.053	-0.30	-0.055	-0.55
Services	0.040	0.41	-0.060	-0.68
Domestic	-1.133***	-3.93	-0.349	-0.99
Western Cape[b]	0.055	0.67	-0.140**	-1.96
Northern Cape	-0.053	-0.36	-0.087	-0.57
Eastern Cape	-0.340	-1.53	-0.319***	-2.65
Orange Free State	-0.391***	-3.30	-0.308***	-3.35
Natal	-0.336***	-2.83	-0.023	-0.26
North West	-0.274	-1.57	-0.529**	-2.53
Mpumalanga	0.016	0.14	0.077	0.65
Northern Province	0.021	0.11	-0.382	-1.34
l_p	2.185***	3.61	0.595*	1.69
l_s	0.417***	3.52	0.667***	3.05
Constant	5.720***	4.89	3.225***	4.74
Observations	447		1027	
Adj R-squared	0.271		0.239	
F observed	230.7		12.07	

Notes:
*** statistically significant at the 1% level, ** the 5% level and * the 10% level.
[a] Reference category : Manufacturing.
[b] Reference category : Gauteng.

Appendix 4

TEST OF COEFFICIENTS CONSTANCY (CHOW TEST[8])

Test statistic:

$$\frac{(SCR_0 - SCR_1 - SCR_2)(n_1 + n_2 - 2k)}{(SCR_1 + SCR_2)k} \sim F(k, n_1 + n_2 - 2k)$$

where SCR_0 : Sum of squares of residuals (whole sample)

SCR_1 : Sum of squares of residuals (unionised sub sample)

SCR_1 : Sum of squares of residuals (non-unionised sub sample)

k : number of explanatory variables

n_1 : size of the unionised sub sample

n_2 : size of the unionised sub sample

H0 : Constancy of coefficients	Africans		Whites	
	OLS equations (3)-(4)	Simultaneous equations (5)-(6)	OLS equations (3)-(4)	Simultaneous equations (5)-(6)
SCR_0	4372.4	4371.2	873.0	863.1
SCR_1	1548.6	1547.9	178.1	173.5
SCR_2	2774.1	2768.9	674.1	666.3
k	32	33	32	33
n_1	3479	3479	447	447
n_2	4505	4505	1027	1027
$F_{computed}$	2.85	3.02	1.07	1.19
F_{read}	1	1	1	1
Rejected assumption	H0	H0	H0	H0

Appendix 5

THE MODEL

Earnings of individual *i* depends on the worker's union status and are determined according to:

$$W_{ij}^{u}=X_{ij}\,b_{j}^{u}+e_{ij}^{u} \quad (j = w,a) \quad \text{if } i \text{ is in the union sector} \tag{1}$$

and

$$W_{ij}^{n} = X_{ij}b_{j}^{n} + e_{ij}^{n} \quad (j = w,a) \quad \text{if } i \text{ is in the nonunion sector} \tag{2}$$

Where, W_{ij} is the logarithm of worker earnings and X_{ij} is a vector of observable individual characteristics, determinants of the earnings.

The union status is determined by the characteristics of individual workers, the selectivity of the union and employer's recruitment policy and the relative wage in the union and the non-union sectors.

Let y_{ij} be an unobservable variable which measures the net utility gain of union coverage for an individual *i* of race *j*.

$$y_{ij} = Z_{ij}a_{1j} + e_{ij} \qquad (j = w,a) \tag{3}$$

Where, Z_{ij} is a vector of exogeneous variables.

The worker compares this net utility gain to the relative wage in the union sector. The wage ratio between union and non-union sectors is approximated by the difference in the logarithms of these wages $W_{ij}^{u} - W_{ij}^{n}$ (Lee (1978)).

Then, the worker chooses to become a union member (US_i = 1) only if the total benefit of unionisation is positive.

$$US_{ij} = \begin{cases} 1, & \text{if } (W_{ij}^{u} - W_{ij}^{n}) - y_{ij} > 0 \\ 0, & \text{otherwise} \qquad (j = w,a) \end{cases} \tag{4}$$

Under the assumption that the disturbance terms in equations (1), (2) and (3) are jointly normally distributed, equation (4) can be estimated by a probit model.

Wage equations (1) and (2) are conditional on the union status choice and their estimation by ordinary least squares would produce inconsistent estimates of β since workers are not randomly assigned to the union and non-union sectors. Applying the Heckman's two-step estimation procedure, we finally estimate the following wage equations :

$$W_{ij}^{u} = X_{ij}b_{j}^{u} + s_{j}^{u}\left(\frac{f(l_{ij})}{\Phi(l_{ij})}\right) + h_{ij}^{u} \qquad (j = w,a) \quad \text{if i is in the union sector} \tag{5}$$

and

[8] *Chow (1960).*

$$W_{ij}^{n}=X_{ij}b_{j}^{n}+s_{j}^{n}\left(-\frac{f(l_{ij})}{1-\Phi(l_{ij})}\right)+h_{ij}^{n} \qquad (j=w,a) \quad \text{if } i \text{ is in the nonunion sector} \qquad (6)$$

Where $\hat{l}_{ij}=\hat{g}_{j}Z_{ij}$

Φ and f are respectively the normal cumulative distribution and probability density functions.

Based on the consistently estimated wage equations, we determinate the fitted wage differential $\hat{W}_{ij}^{u}-\hat{W}_{ij}^{n}$ and substitute this expression for $W_{ij}^{u}-W_{ij}^{n}$ in equation (4).

Finally, we obtain the structural probit for the union status choice equation:

$$US_{ij}=\begin{cases}1, & \text{if } (\hat{W}_{ij}^{u}-\hat{W}_{ij}^{n})a_{2j}-Z_{ij}a_{1j}-e_{ij}>0\\ 0, & \text{otherwise} \qquad (j=w,a)\end{cases} \qquad (7)$$

The estimated probability that individual *i* of race *j* be unionised is :

$$m_{ij}=\Phi\left(\hat{a}_{1j}Z_{ij}+\hat{a}_{2j}\left(\ln w_{ij}^{u}-\ln w_{ij}^{n}\right)\right) \qquad (8)$$

where $\hat{\Phi}$ denotes the probit estimate of the parameter vector Φ.

Appendix 6

COMPARISON TESTS

Test Statistics

- **Between two samples:**

The test for $m_x = m_y$, when $s_x^2 \neq s_y^2$ is given by $t = \dfrac{\bar{x} - \bar{y}}{\sqrt{s_x^2 / n_x + s_y^2 / n_y}}$.

The result is distributed Student's t with n degrees of freedom, where n is given by:

$$n = -2 + \frac{\left(s_x^2 / n_x + s_y^2 / n_y\right)^2}{\dfrac{\left(s_x^2 / n_x\right)^2}{n_x + 1} + \dfrac{\left(s_y^2 / n_y\right)^2}{n_y + 1}}$$

- **For one sample:**

The test for $m_x = m_y$, when $s_x^2 = s_y^2$ is given by $t = \dfrac{\bar{x} - \bar{y}}{\sqrt{\dfrac{(n_x - 1)s_x^2 + (n_y - 1)s_y^2}{n_x + n_y - 2}}\sqrt{\dfrac{1}{n_x} + \dfrac{1}{n_y}}}$.

The result is distributed Student's t with *n*-2 degrees of freedom.

Source: STATA 6 reference manual

- **Average means of unionisation**

	Africans	Whites	Test of significance [b]
Observed Probability	0.435	0.303	21.13***
Predicted Probability	0.416	0.457	-6.35***
Test of significance [a]	33.59***	-43.87***	
Observations	7984	1474	

Notes:

[a] H0 : $m_a^* - m_a = 0$ for Africans and $m_b - m_b^* = 0$ for Whites.

[b] H0 : $m_a^* - m_b^{'} = 0$ for observed probability and $m_b - m_b = 0$ for predicted probabilities.

*** statistically significant at the 1% level.

- **Average earnings**.

Observed and predicted earnings:

	Unionised	Non-unionised
Africans		
Observed earnings	2.101	1.447
Predicted earnings	2.131	1.497
Observations.	3479	4505
Whites		
Observed earnings	3.064	3.097
Predicted earnings	2.782	2.932
Observations.	447	1027

Test:

Between African and White samples:

HO	Unionised	Non-unionised
Observed earnings $w_{oa} - w_{ob} = 0$	-49.22***	-95.70***
Predicted earnings $w^*_{oa} - w^*_{ob} = 0$	-34.11***	-73.38***

Note: *** statistically significant at the 1% level.

Among African and White samples:

HO	Unionised	Non-unionised
African sample $w^*_{oa} - w_{oa} = 0$	24.84***	29.47***
White sample $w_{ob} - w^*_{ob} = 0$	19.12***	21.64***

Note: *** statistically significant at the 1% level.