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# Dundee Discussion Papers in Economics

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## A Multilateral Decomposition of Racial Wage Differentials in the 1994 South African Labour Market

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**A Multilateral Decomposition of Racial Wage Differentials in the 1994 South  
African Labour Market**

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**Abstract**

This paper develops a new multilateral decomposition procedure for the analysis of wage differentials and applies this to the racial wage hierarchy in the South African labour market. Using microdata on male workers from the 1994 October Household survey, it is found that whites received the highest wages followed by asians, then coloureds and finally blacks. Productivity differences are shown to explain approximately two thirds of the white and black wage differentials, with the unexplained residuals attributable to discriminatory overpayment of whites and underpayment of blacks, and virtually all of the asian and coloured differentials. The results provide the basis for a discussion of post-apartheid policy initiatives to tackle racial inequalities in the labour market.

*JEL Classification:* J71, J31

## I INTRODUCTION

The gradual erosion and final collapse of the apartheid regime has stimulated a large and still growing literature on the effects of racial discrimination on the labour market of the Republic of South Africa [see, for example, *Human and Greenacre, 1987; Knight and McGrath, 1987; Moll, 1992, 1995a; Rospabe, 1997*]. The particular contribution of this paper is to provide a multilateral decomposition analysis of racial wage differentials into discrimination and productivity components using evidence drawn from the 1994 October Household survey. Knight and McGrath [1987, p.245] define racial wage discrimination as ‘differences in earnings among people of different races but of equal productivity as determined by their endowments of such economic characteristics as ability and human capital’. Racial groups may also vary systematically in their productivity levels due to the practice of pre-labour market discrimination, most notably in the differential provision of and access to education and vocational training. The survey year is itself significant since 1994 marks the beginning of the post-apartheid era with the political succession of the African National Congress (ANC) over the white-dominated National Party government. In the light of subsequent reforms of both the labour market and the provision of education and training, the study establishes a baseline for the evaluation of post-apartheid policies to reduce racial wage differentials in the labour market.

The starting point for our study is the simple observation that South Africa is a multiracial society: the system of apartheid laws recognised whites, asians, coloureds and blacks as the four main racial groups. In the labour market, a racial wage hierarchy exists with whites at the top receiving the highest earnings on average, the asians and coloureds in the middle, and the blacks at the bottom. We seek to explore the basis for this hierarchy by means of a multilateral analysis of the pattern of racial wage differentials in contrast to previous studies which have been limited to binary comparisons of the wage position of whites with that of one or more of the non-white groups [*Human and Greenacre, 1987; Knight and McGrath, 1987; Moll, 1992, 1995a*]. Moreover, we do not assume that the non-discriminatory wage structure corresponds to the observed structure of any particular racial group but instead allow for the possibility that wage discrimination takes the form of over-payment of some races, as a result of either employee discrimination or employer nepotism, and under-payment of others due to employer discrimination.

We develop the basis for a multilateral analysis by generalising existing techniques for the decomposition of the logarithmic gross wage differential between two groups into

an explained component due to differences in productivity and an unexplained component attributed to wage discrimination [see *Oaxaca, 1973; Cotton, 1988; Neumark, 1988; Oaxaca and Ransom, 1988, 1994*]. First, in addition to the usual decomposition of the discrimination component in terms of the geometric mean wage that each group receives relative to that which it would receive in the absence of discrimination [*Oaxaca, 1973*], we also partition the gross wage differential and the productivity component. These further decompositions yield complementary measures of the geometric mean wage of each racial group relative to that of the workforce as a whole under both the (observed) discriminatory and (hypothetical) non-discriminatory wage structures. Second we extend the application of the employment share [*Cotton, 1988*] and pooled Ordinary Least Squares (OLS) [*Neumark, 1988; Oaxaca and Ransom, 1988, 1994*] estimators of the non-discriminatory wage structure in order to obtain estimators of a common non-discriminatory wage structure for the multiple group case.

We undertake our empirical analysis at both the aggregate and occupation specific level, both to provide a fuller analysis of discrimination and productivity differentials and to examine the sensitivity of the results to the choice of aggregation level. Like other decomposition techniques, our methodology measures discrimination indirectly as the residual component from an estimated wage function. Inevitably, errors in the specification of the wage determination model will lead to inaccurate estimates of discrimination. In addition, the results are sensitive to the specification and estimation of the non-discriminatory wage structure. However, data problems preclude a more direct approach to the measurement of racial wage discrimination.

The structure of the paper is as follows. In the following section we provide some background information on the nature of the South African labour market and briefly review previous work measuring the extent of racial wage discrimination. Section III develops our methodological framework for the multilateral decomposition of racial wage differentials into discrimination and productivity components. In Section IV we consider the nature of the sample data provided by the 1994 October Household survey and the specification of the wage determination equations. The main empirical findings of the paper are then given in Section V which presents the results of the wage function and decomposition analyses. Finally, the concluding section contains a summary of the findings and considers the implications of the results for policy in the post-apartheid era.

## II BACKGROUND

As is well documented, the various National Party governments were responsible for a wide range of measures to generate and maintain racial wage differentials [*see, for example, Truth and Reconciliation Commission, 1998: Volume 1, Chapter 2, Historical Context*]. Indeed, the ‘linchpin of the apartheid political, economic and social regime was the purposive control and manipulation of the labour market in a manner which privileged the white minority while disadvantaging and discriminating against the black majority’ [*Presidential Commission, 1996*]. While the apartheid system is associated with the period from the introduction in 1948 of the *Bantu Urban Areas Act 1945* until the political succession of the ANC in 1994, official labour market discrimination can be traced back as far as the *Mines and Regulation Act 1911* [*Lundahl and Wadensjo, 1984: 217*]. This act prohibited black workers from occupying specific jobs in the mining sector, and, over time, this colour barring policy was extended to other races and sectors. The *Pass Laws* which restricted the movement of non-whites, and particularly blacks, between localities reinforced this policy, as did legislation on job reservation for white workers implemented, for example, in the *Industrial Conciliation Act 1956*. Thus, the flexibility of the labour market was hindered by restricting competition in certain jobs [*Freund, 1988: 128*] so creating artificial wage rates. Non-white workers found themselves ‘crowded-down’ into unskilled occupations where, because of the artificially large labour supply, wages were lower than the competitive norm.<sup>1</sup> Alongside such legislation, racially segregated education was characterised by inferior non-white schooling which contributed to subsequent racial productivity differentials [*Lundahl and Wadensjo, 1984: 220*]. The *Bantu Education Act 1955*, which affected only native blacks, was an example of education legislation promoting only very basic non-white schooling.

Pressure for change emerged in the 1960s as economic expansion led to increasing difficulties in recruiting semi-skilled and skilled workers. Industrialists’ demands for the repeal of apartheid labour legislation [*Yudelman, 1975: 983*] led to some relaxation of job reservation and colour barring policies in the 1970s in spite of initial resistance from the National Party. Nevertheless, restrictions in the labour market continued to exist with, for example, skilled jobs in the mining industry still reserved for whites by law as recently as 1989 [*Presidential Commission, 1996*]. The 1970s also saw greater public expenditure on non-white schooling, with black education expenditure increasing by an average of 26 per cent per annum between 1973 and 1977 compared with 5.5 per cent per annum

between 1948 and 1960 [*Lundahl and Wadensjo, 1984: 225*], and the number of black children finishing school rising four-fold between 1970 and 1980. The decade ended with the appointment of the *de Lange Commission* in 1979 whose recommendations were for further racial equality in educational opportunities [*Knight and McGrath, 1987: 49*].

According to Hofmeyr [*1994: 211*] these structural and institutional changes in the labour market contributed to a reduction in white non-white wage differentials. Official labour statistics, summarised in Table 1, illustrate the gradual erosion of the racial wage hierarchy that is such a well-known characteristic of the South African labour market – with white workers receiving the highest earnings, followed by asian and then coloured workers who, in turn, command higher earnings than black workers.

TABLE 1  
AVERAGE EARNINGS PER MONTH AND PERCENTAGE EARNINGS DIFFERENCES FROM  
OVERALL AVERAGE EARNINGS FOR THE NON-PRIMARY SECTOR BY RACIAL GROUP,  
1975-1993 (CONSTANT 1990 PRICES)

Year	Racial group								
	All	White		Black		Coloured		Asian	
	<i>Rand</i>	<i>Rand</i>	%	<i>Rand</i>	%	<i>Rand</i>	%	<i>Rand</i>	%
1975	1,444	3,066	112	642	-56	1,008	-30	1,190	-18
1980	1,493	2,963	98	749	-50	1,000	-33	1,324	-11
1985	1,635	3,143	92	860	-47	1,135	-31	1,565	-4
1990	1,649	3,020	83	992	-40	1,214	-26	1,680	2
1992	1,791	3,104	73	1,128	-37	1,362	-24	1,872	5
1993	1,807	3,065	70	1,112	-38	1,377	-24	1,904	5

Source: Central Statistical Service [*1995*]

Yet it is also clear from Table 1 that, in spite of some convergence in earnings, large racial differentials have persisted into the 1990s. One reason for this persistence is the continuance of racial productivity differences due to continuing differences in the provision of and access to education and vocational training. Thus Standing et al [*1996*] argue that there was inadequate implementation of quality improvements in non-white education as recommended by the *de Lange Commission*. While non-white participation in education expanded at a rapid rate throughout the 1980s, with numbers rising from 93,258 to 588,842 between 1980 and 1991, non-white education remained inferior to white education [*see also Donaldson and Roux [1990: 446] and Case and Deaton [1997: 13]*]. Moreover, Case and Deaton [*1997*] find that non-white participation and

achievement in education was constrained by household income, leading to the perpetuation of disadvantage as those with poor education are often unable to secure sufficient income to provide for the education of their children. Finally there is evidence that work-place training provided by some firms was discriminatory with African trainees set up for failure and tests biased against non-whites [Franks, 1987: 37]. A second reason for the persistence of racial wage differentials is evidence of continuing labour market *discrimination* related to individual and group preferences: 'Numerous submissions to the Commission attest to the fact that discriminatory attitudes and behavioural tendencies are still dominant ... both discriminatory and non-discriminatory (skills-based) processes are at work in the current labour market' [Presidential Commission, 1996].

The technical literature measuring the extent of racial productivity differences and wage discrimination in South Africa is comparatively small and of recent date: a state of affairs attributed by Meth [1988] to data problems, specifically the initial lack of credibility of the *Current Population Survey* of 1970 and 1980 which were only revised and made consistent in 1986. Human and Greenacre [1987] using a Mincerian human capital regression model and the revised 1980 Current Population Census found that age (a proxy for experience) and education had a positive effect on the earnings of white, black and coloured workers with the strongest effects estimated on white worker earnings. Knight and McGrath [1987] using the Oaxaca [1973] residual difference methodology and the 1976 and 1985 cross-sectional *Surveys on Remuneration* found that discrimination against black workers accounted for 45 per cent of the mean wage difference between whites and blacks in 1976 declining to 21 per cent by 1985, though these are likely to be underestimates given the non-representative nature of the sample.<sup>2</sup> This decline was attributed to a change in tastes of employers, supply-side improvements in non-whites' education, training and skill acquisition and a more liberal policy framework. Moll [1992] using the multinomial logit technique of Banerjee and Knight [1985] with data drawn from the revised 1970 and 1980 Population Censuses found that coloured workers faced a wage discrimination term of 59 per cent of the total differential between white and coloured workers in 1970, with this declining to 57 per cent in 1980. The slight fall in racial wage discrimination was again attributed to a decline in discriminatory tastes on the behalf of employers and employees. Finally, Moll [1995a] using the same technique with the 1980 Population Census and the 1993 PSLSD household data-set,<sup>3</sup> found that total discrimination against black workers fell from 73 per cent in 1980 to 60 per cent in 1993.



While comparisons between the work of Knight and McGrath and that of Moll are problematic, particularly because of biases in the data set used by the former, these results suggest the persistence of racial wage discrimination into the 1990s, albeit to a lesser degree than before.

### III METHODOLOGICAL FRAMEWORK

The economic foundations for this paper are provided by neo-classical discrimination theory as developed in the seminal work of Becker [1957] and Arrow [1972, 1973].<sup>4</sup> Becker assumed individuals could hold tastes for discrimination which influenced their utility functions. Thus white employers might, for example, be able to increase their utility by underpaying non-white workers to compensate for their dislike of this group and/or overpaying white workers because of white nepotism. Similarly, white employees could command a wage overpayment, and thus utility improvement, to compensate them for working alongside non-whites. However, the methodologies previously adopted to measure discrimination in South Africa have not been designed to identify these various forms of discrimination which are known respectively as employer discrimination, employer nepotism and employee discrimination.<sup>5</sup>

In this section, we develop the methodology for a multilateral analysis of the racial wage hierarchy in South Africa by generalising existing techniques for the decomposition of the logarithmic gross wage differential between two groups [see Oaxaca, 1973; Cotton, 1988; Neumark, 1988; Oaxaca and Ransom, 1988, 1994]. Following Oaxaca and Ransom [1994] the difference in the mean of the natural logarithm of wages for groups  $j$  and  $k$  can be decomposed into an explained component which captures productivity differences between workers, and an unexplained component which includes racial wage discrimination:

$$\ln(G_{jk} + 1) = \ln(Q_{jk} + 1) + \ln(D_{jk} + 1); \quad j, k = \text{white, black, coloured, asian} \quad (1)$$

where:  $G_{jk}$  is the gross (unadjusted) wage differential defined as  $[(W_j / W_k) - 1]$  where  $W_j$  is the geometric mean wage of group  $j$  and  $W_k$  is the corresponding wage of group  $k$ ;  $Q_{jk}$  is the productivity differential  $[(W_j^o / W_k^o) - 1]$  where  $W_j^o$  and  $W_k^o$  denote the geometric mean wage rates of each group in the absence of labour market discrimination; and  $D_{jk}$  is

identified as the market discrimination coefficient  $[(W_j / W_k) - (W_j^o / W_k^o)] / (W_j^o / W_k^o)$ , that is the proportionate difference between  $(G_{jk} + 1)$  and  $(Q_{jk} + 1)$ .

Oaxaca [1973] shows that the discrimination coefficient can be further decomposed in terms of the wage that each group receives relative to that which it would receive in the absence of discrimination. This yields the familiar decomposition equation:

$$\ln(G_{jk} + 1) = \ln(Q_{jk} + 1) + \{\ln(\delta_j + 1) - \ln(\delta_k + 1)\} \quad (2)$$

where  $\delta_j$  is the differential between the geometric mean wage of group  $j$  and the wage that workers of group  $j$  would receive in the absence of discrimination  $[(W_j / W_j^o) - 1]$ , and  $\delta_k$  is similarly defined for group  $k$  workers.

We extend this standard decomposition equation by partitioning both the gross wage differential and the productivity component, to yield complementary measures of the geometric mean wage that each racial group receives relative to that of the workforce as a whole under both the (observed) discriminatory and (hypothetical) non-discriminatory wage structures. Thus (2) can be expanded to:

$$\{\ln(\gamma_j + 1) - \ln(\gamma_k + 1)\} = \{\ln(\theta_j + 1) - \ln(\theta_k + 1)\} + \{\ln(\delta_j + 1) - \ln(\delta_k + 1)\} \quad (3)$$

where  $\gamma_j$  is the differential between the geometric mean wage of group  $j$  and that of the entire workforce  $[(W_j / W) - 1]$ , where  $W$  is the overall geometric mean wage;  $\theta_j$  is the differential between the geometric mean wage of group  $j$  and that of the entire workforce in the absence of discrimination  $[(W_j^o / W^o) - 1]$ ; and  $\gamma_k$  and  $\theta_k$  are similarly defined for group  $k$ . The main advantage of (3) is that each component of the decomposition equation is expressed as the difference between two terms that are defined independently of the particular binary comparison which is being made. The complete set of  $\gamma$ ,  $\delta$  and  $\theta$  coefficients therefore constitute a set of sufficient statistics for the multilateral analysis of the racial wage hierarchy.

To operationalise the decomposition equation (3), we first estimate, by ordinary least squares, separate semi-logarithmic wage functions:

$$\ln W_{gi} = X'_{gi} \beta_i + u_{gi}; \quad g=1, \dots, n_i; \quad (4)$$

for each racial group  $i$  ( $i = \text{white, black, coloured, asian}$ ) using cross-sectional data, where  $\ln W_{gi}$  is the logarithmic wage of worker  $g$  in group  $i$ ,  $X_{gi}$  is a vector of worker characteristics,  $\beta_i$  is a vector of group-specific coefficients and  $n_i$  is the sample size. We also estimate a similar function for the workforce as a whole using the pooled sample of size  $n$ :

$$\ln W_h = X'_h \beta + u_h; \quad h=1, \dots, n; \quad n = \sum n_i \quad (5)$$

where  $\ln W_h$  is the logarithmic wage of worker  $h$ ,  $X_h$  is a vector of worker characteristics and  $\beta$  is a vector of coefficients. Given some estimate of the non-discriminatory wage structure  $\hat{\beta}^*$ , we are then able to derive estimates for each racial group  $i$  of the decomposition terms in equation (3) as:

$$\ln\{\hat{\gamma}_i + 1\} = \ln \hat{W}_i - \ln \hat{W} = \bar{X}'_i \hat{\beta}_i - \bar{X}' \hat{\beta}; \quad (6)$$

$$\ln\{\hat{\theta}_i + 1\} = \ln \hat{W}_i^o - \ln \hat{W}^o = (\bar{X}_i - \bar{X})' \hat{\beta}^*; \quad (7)$$

$$\ln\{\hat{\delta}_i + 1\} = \ln \hat{W}_i - \ln \hat{W}_i^o = \bar{X}'_i (\hat{\beta}_i - \hat{\beta}^*); \quad (8)$$

where  $\bar{X}_i$  is the vector of mean values of the regressors for group  $i$ ,  $\bar{X}$  is the corresponding mean vector for the whole workforce, and hats denote estimates. Hence,  $\theta_i$  may be interpreted as the wage differential between a typical worker in group  $i$ , with characteristics  $\bar{X}_i$ , and a typical worker in the entire workforce, with characteristics  $\bar{X}$ , under the hypothetical non-discriminatory wage structure; and  $\delta_i$  as the wage differential for a typical worker in group  $i$  between the discriminatory and non-discriminatory wage structures. In Section V we report the results of the decomposition analysis primarily in terms of (6)-(8), leaving it mostly to the reader to construct binary comparisons for particular pairs of racial groups using (3).

All that is now required is to obtain some estimate of the non-discriminatory wage structure  $\hat{\beta}^*$ . In our empirical analysis we focus on the pooled OLS estimator of Neumark [1988] and Oaxaca and Ransom [1988, 1994], which Neumark [1988] shows can be derived from a model of employer discrimination in which the utility function of the employer is homogeneous of degree zero within each category of labour, that is the

employer only cares about the proportion of each group employed in any particular labour category. Extending the application of this estimator to the multi-group case yields:

$$\hat{\beta}^* = \hat{\beta}_{NOR} = \sum_i \Omega_i \hat{\beta}_i; \quad (9)$$

where  $\Omega_i = (X'X)^{-1}(X'_iX_i)$  so that  $\sum \Omega_i = 1$ . Estimates of  $\hat{\beta}_{NOR}$  are simple to compute since  $\hat{\beta}_{NOR} = \hat{\beta}$ , the OLS estimator of  $\beta$  derived using the pooled sample in (5). It follows that  $\hat{\beta}_{NOR}$  depends on the characteristics of workers from all racial groups though individual elements of  $\hat{\beta}_{NOR}$  need not be bracketed by the corresponding elements of  $\hat{\beta}_i$  from the separately estimated racial wage structures since the weighting matrices  $\Omega_i$  are not positive definite, except in special cases [Oaxaca and Ransom, 1994]. However, the overall geometric mean wage will be the same under the discriminatory and non-discriminatory wage structures, that is  $\ln \hat{W} = \ln \hat{W}^o$ , so we obtain an exact decomposition of the gross wage differential term  $\ln\{\hat{\gamma}_i + 1\} = \ln\{\hat{\theta}_i + 1\} + \ln\{\hat{\delta}_i + 1\}$ . This makes the interpretation of the decomposition results particularly simple.

In addition, we examine the sensitivity of the results at the aggregate level to alternative assumptions about the non-discriminatory wage structure by reporting decomposition estimates based on a number of other estimators. Thus we also consider the employment share estimator which was proposed by Cotton [1988] on the grounds that the non-discriminatory structure should reflect the composition of the workforce and is generalisable to the multi-group case as:

$$\hat{\beta}^* = \hat{\beta}_{COT} = \sum_i S_i \hat{\beta}_i; \quad (10)$$

where  $S_i$  is a diagonal matrix with non-zero elements all equal to  $s_i$  where  $s_i = n_i/n$  so that  $\sum S_i = 1$ . The estimator  $\hat{\beta}_{COT}$  is a simple weighted average of the individual  $\hat{\beta}_i$ 's and is therefore bracketed by them. But the overall geometric mean wage will not generally be the same under the discriminatory and non-discriminatory wage structures [see Oaxaca and Ransom, 1994], so the gross wage differential term in (6) will not generally be the sum of the productivity and discrimination terms in (7) and (8), though the binary decomposition equation (3) still holds by definition.

Finally, we separately consider each of the group wage structures  $\hat{\beta}_i$  as estimators for  $\hat{\beta}^*$ , in keeping with the early contributions of Oaxaca [1973] and Blinder [1973] who assumed that one group would receive the non-discriminatory rate with wage discrimination taking the simple form of underpayment or overpayment of the other group(s).

#### **IV DATA, VARIABLES AND SAMPLE ATTRIBUTES**

The data for this study is derived from the *1994 October Household Survey*. This survey was undertaken by the South African Central Statistical Service as part of an annual survey which commenced in 1993. The 1994 survey used a complex sample design, with random selection of 1000 enumeration areas stratified by rural-urban domicile, by province and by population group. In each enumeration area 30 households were selected by systematic sampling. The household survey contains evidence relating to 103,747 individuals. With the objective of measuring and monitoring changes in the social, economic, developmental and demographic aspects of the country, observations were collected on a range of indicators including personal characteristics, education, and employment conditions. While the survey is not specific to any one gender, the limited female participation in the labour market has meant that the analysis reported here only addresses the experiences of male workers. However, the importance of gender issues has been reported elsewhere [*see for example Standing et al, 1996*] and should be the subject of future work. This analysis is based on observations of employees within the age range 16-65 years; the unemployed, informally employed or self employed and those outside this age range are excluded.<sup>6</sup> Those employed in the official armed services are also excluded owing to the specific characteristics of this sector. Finally, those individuals with 'Other Education' were omitted as there were no asians in this category and the decomposition methodology requires the specification of a common set of regressors. With these exclusions the sample was substantially reduced to 17,198 individuals, comprising 7,696 blacks, 3,865 coloureds, 3,772 whites and 1,865 asians.

Turning to the wage functions given by Equations (4) and (5), the dependent variable is specified as the natural logarithm of the wage rate  $\ln W$ . The survey provides individual observations on gross monthly earnings  $Y$  and on number of hours worked in the previous seven days  $H$ , from which the dependent variable is derived as

$\ln W = \ln((Y/4)/H)$ . Table 2 reports sample average hourly wage rates by racial group and occupation, which indicate the existence of substantial racial wage differentials both within the workforce as whole and within individual occupational categories. However, it should be noted that the earnings data from the 1994 survey are known to have shortcomings, notably that disposable instead of gross earnings were sometimes recorded and that not all non-pecuniary benefits were necessarily taken into account [Moll, *pers. comm.*]. These deficiencies may have implications for the robustness of the results, particularly in the aggregate analysis where the measurement of income is likely to be less consistent, though the effects are ambiguous.

TABLE 2  
SAMPLE AVERAGE WAGE RATES BY RACE AND OCCUPATIONAL GROUP

Occupation Class	Racial group				
	All	White	Black	Coloured	Asian
	<i>Rand/hr</i>				
All occupations	9.45	17.53	6.31	6.92	11.30
Managers	21.86	26.60	13.64	13.55	15.48
Professionals	20.86	26.28	15.73	15.70	19.63
Technicians and associate professionals	16.63	19.02	13.41	15.10	16.26
Clerks	11.18	14.12	9.38	9.84	11.10
Service and shop assistants	8.74	11.54	7.28	8.07	9.25
Skilled agriculture and fishery	7.16	13.60	3.41	6.55	4.73
Crafts and trade workers	10.74	14.44	7.23	9.50	11.71
Semi-skilled workers	7.55	12.62	6.73	7.14	7.59
Unskilled workers	3.70	12.28	3.32	3.64	7.05
Sample size	17198	3772	7696	3865	1865

Source: Central Statistical Service [1994]

On the right hand side of the wage functions, we include explanatory variables that reflect five basic characteristics of each individual worker: age, educational background, occupational class, employment sector and location by region. In addition, two dichotomous dummy variables were incorporated representing trade union membership and rural-urban locality. Table 3 reports mean attribute levels for the pooled sample and for each of the separate racial sub-samples in the aggregate data set.

TABLE 3  
MEAN AGGREGATE SAMPLE CHARACTERISTICS

Variable	Attribute	Racial group				
		All	White	Black	Coloured	Asian
AGE	Age (in years)	36.94	37.66	37.73	34.98	36.27
AGESQ	Age <sup>2</sup>	1488.02	1543.55	1543.21	1346.25	1441.76
EDNONE	No education	0.098	0.001	0.168	0.098	0.008
EDPRIM	Primary education	0.170	0.003	0.251	0.240	0.029
EDSECO	Secondary education	0.607	0.683	0.505	0.623	0.843
EDDIPL	Diploma	0.081	0.184	0.058	0.031	0.076
EDDEGR	Degree	0.043	0.129	0.018	0.008	0.044
OCCMAN	Managers	0.053	0.147	0.018	0.021	0.068
OCCPRO	Professionals	0.048	0.098	0.037	0.020	0.052
OCCTEC	Technicians & associate professionals	0.072	0.151	0.044	0.036	0.105
OCCCLE	Clerks	0.085	0.108	0.062	0.062	0.184
OCCSER	Service and sales	0.099	0.103	0.097	0.062	0.176
OCCSAG	Skilled agricultural and fishery	0.016	0.016	0.010	0.034	0.004
OCCC&T	Crafts and trade	0.176	0.271	0.118	0.198	0.181
OCCSSK	Semi-skilled	0.158	0.076	0.201	0.142	0.175
OCCUSK	Unskilled	0.293	0.030	0.414	0.425	0.055
INDAFF	Agriculture & Fishing	0.217	0.032	0.286	0.349	0.026
INDM&Q	Mining & Quarrying	0.050	0.100	0.055	0.012	0.009
INDMNF	Manufacturing	0.192	0.195	0.153	0.177	0.382
INDEGW	Electricity, Gas & Water	0.015	0.032	0.013	0.009	0.005
INDCON	Construction	0.061	0.042	0.060	0.094	0.036
INDWRT	Wholesale & Retail Trade	0.142	0.135	0.120	0.120	0.290
INDTSC	Transport, Storage & Communication	0.068	0.116	0.053	0.056	0.054
INDFIN	Financial	0.046	0.099	0.021	0.041	0.056
INDCSV	Community services	0.209	0.249	0.239	0.143	0.142
REGWC	Western Cape	0.183	0.118	0.072	0.522	0.072
REGEC	Eastern Cape	0.116	0.088	0.107	0.189	0.056
REGNC	Northern Cape	0.073	0.075	0.077	0.100	0.001
REGFS	Free State	0.065	0.089	0.092	0.020	0.001
REGKN	Kwazulu/Natal	0.200	0.161	0.197	0.049	0.602
REGNW	North-West	0.071	0.078	0.110	0.015	0.015
REGGA	Gauteng	0.162	0.222	0.157	0.091	0.208
REGET	Eastern Transvaal	0.068	0.099	0.091	0.008	0.034
REGNP	Northern Province	0.062	0.070	0.100	0.005	0.011
RURAL	Rural-urban: (Rural = 1)	0.388	0.110	0.560	0.410	0.198
TUMEM	Trade union membership (Member=1)	0.300	0.330	0.320	0.220	0.328
LNWAGE	<b>Logarithm of Wage</b>	<b>1.773</b>	<b>2.589</b>	<b>1.387</b>	<b>1.559</b>	<b>2.159</b>
	<b>Sample size</b>	<b>17198</b>	<b>3772</b>	<b>7696</b>	<b>3865</b>	<b>1865</b>

Source: Central Statistical Service [1994]

The average age of the workforce in the sample is 37 years with comparatively little variation between racial groups. This is the result both of demographic factors and of labour participation rates with high levels of youth unemployment, particularly amongst blacks [see *Standing et al, 1996*]. The educational background of the racial groups differs markedly with over 99 per cent of whites and 95 per cent of asians having received at least a secondary education in comparison to the nearly 10 per cent of coloureds and 17 per cent of blacks with no formal education at all. This is in part the outcome of the apartheid educational policies discussed in Section II and now subject to reform [*Moll, 1995b*].

The relatively low levels of education received by black and coloured workers is reflected in the occupational distributions. For example, 61 per cent of blacks and 57 per cent of coloureds work in either the semi-skilled or unskilled occupational groups compared to 11 per cent and 23 per cent of white and asian workers respectively. However, the evidence on the sectoral distribution of workers indicates members of all racial groups participating in all sectors within the (highly diversified) economy. It is notable that a large proportion of black and coloured workers are employed in the traditionally low paid agricultural sector, and that mining and quarrying remains a comparatively important sector for white employment. Trade union membership varies little between race with just over 30 per cent of black, white and asian sample being members, whilst 22 per cent of coloured workers are in a union. Traditionally, trade unionism in South Africa has been strongest in mining and quarrying, manufacturing, and the wholesale and retail trade sectors, and in crafts and trade and semi-skilled occupational categories [*Rospabe, 1997*].

Finally, the sample evidence reveals regional concentrations of asian and coloured workers, with far more uniform distributions of white and black workers. These distributions strongly reflect historic settlement patterns and the influence of legislation. Having arrived in South Africa in the early twentieth century, asian workers largely settled in Kwazulu/Natal and Gauteng [*Freund, 1988: 115*]; a settlement pattern reflected in the survey evidence. Coloureds are largely domiciled in the townships of Western Cape surrounding Cape Town, in part a result of the *Group Areas Act 1950*, and to a lesser extent surrounding Kimberley in Northern Cape. The *Group Areas Act* is also partly responsible for black and coloured workers being more likely to reside in areas designated as rural than are whites and asians.



## V EMPIRICAL ANALYSIS

The empirical analysis is presented in three parts. First, we report and discuss the aggregate wage function regressions estimated for each separate racial group and for the workforce as a whole. Second, we present the results of the multilateral decomposition analysis of racial wage differentials based on these estimated wage functions. Finally, we give selected results from the decomposition analysis of racial wage differentials for six of the occupational categories defined in the October Household Survey.

### *Aggregate Wage Function Analysis*

The aggregate wage function analysis is based on estimating separate wage functions (Equations 4 and 5) using cross-section data for each of the racial groups and for the sample as whole. Table 4 reports the estimated wage functions together with the associated heteroscedasticity-consistent standard errors [White, 1980]. The base case in each function is defined as a non-union worker with secondary education, employed within the technician and associate professional category in the agriculture and fisheries sector, and resident in an urban area of Kwazulu/Natal. The anti-logarithms of the estimated coefficients on the categorical and dichotomous variable may be interpreted as relative deviations from the base model wage rate.

In general, the explanatory power of the regressions was acceptable for a cross-sectional analysis of this nature though the fit of the white and asian wage functions was appreciably lower than that of the other regressions. The methodology stipulates that an identical set of variables should be included in all the wage functions and insignificant variables were therefore retained in some regressions. Nevertheless, the results show that most of the variables were significant at the 99 per cent level and conformed with expectations.

Beginning with the age variables, the results for all groups are consistent with human capital theory which argues that age-wage profiles are concave [Polachek and Siebert, 1993: 33]. To illustrate this result, Figure 1 plots the estimated age-wage profile from each regression model for a worker with base case characteristics. The vertical displacement of the different profiles is indicative of the presence of wage discrimination such that a white worker with base case characteristics receives higher wages than a similar asian worker who in turn receives more than similar black and coloured workers. The wages received by asian workers declines relative to those of other races beyond the

TABLE 4  
AGGREGATE WAGE FUNCTIONS

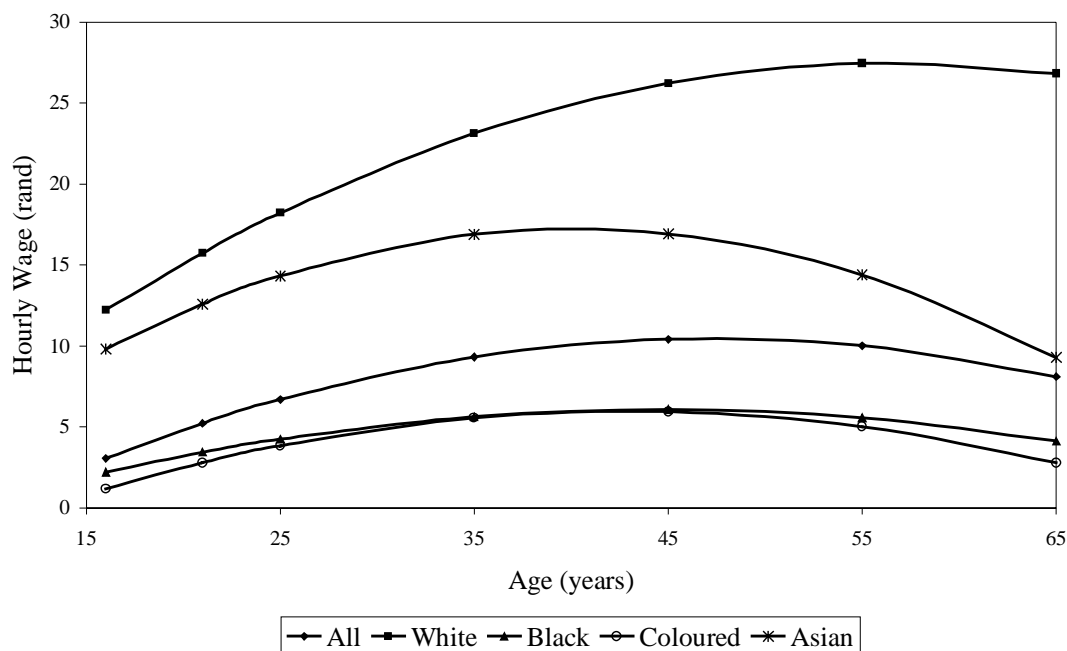
Variable	Racial group									
	All		White		Black		Coloured		Asian	
	Coeff.	<i>Std. Error</i>	Coeff.	<i>Std. Error</i>	Coeff.	<i>Std. Error</i>	Coeff.	<i>Std. Error</i>	Coeff.	<i>Std. Error</i>
AGE	0.044 <sup>#</sup>	0.003	0.074 <sup>#</sup>	0.007	0.040 <sup>#</sup>	0.005	0.051 <sup>#</sup>	0.006	0.054 <sup>#</sup>	0.009
AGESQ	-0.0004 <sup>#</sup>	0.0000	-0.0008 <sup>#</sup>	0.0001	-0.0004 <sup>#</sup>	0.0001	-0.0006 <sup>#</sup>	0.0001	-0.0006 <sup>#</sup>	0.0001
EDNONE	-0.474 <sup>#</sup>	0.022	-0.451	0.356	-0.286 <sup>#</sup>	0.026	-0.314 <sup>#</sup>	0.038	-0.487 <sup>#</sup>	0.181
EDPRIM	-0.335 <sup>#</sup>	0.017	-0.372	0.254	-0.201 <sup>#</sup>	0.021	-0.188 <sup>#</sup>	0.028	-0.195 <sup>*</sup>	0.077
EDDIPL	0.313 <sup>#</sup>	0.023	0.163 <sup>#</sup>	0.029	0.271 <sup>#</sup>	0.048	0.294 <sup>#</sup>	0.066	0.207 <sup>#</sup>	0.066
EDDEGR	0.558 <sup>#</sup>	0.034	0.370 <sup>#</sup>	0.043	0.529 <sup>#</sup>	0.065	0.261 <sup>*</sup>	0.123	0.523 <sup>#</sup>	0.113
OCCMAN	0.178 <sup>#</sup>	0.032	0.146 <sup>#</sup>	0.041	0.091	0.078	-0.070	0.095	0.057	0.076
OCCPRO	-0.058	0.035	-0.003	0.053	0.030	0.060	0.024	0.093	-0.103	0.112
OCCCLE	-0.248 <sup>#</sup>	0.027	-0.161 <sup>#</sup>	0.040	-0.205 <sup>#</sup>	0.051	-0.294 <sup>#</sup>	0.068	-0.200 <sup>#</sup>	0.057
OCCSER	-0.413 <sup>#</sup>	0.028	-0.255 <sup>#</sup>	0.045	-0.388 <sup>#</sup>	0.052	-0.489 <sup>#</sup>	0.074	-0.336 <sup>#</sup>	0.062
OCCSAG	-0.325 <sup>#</sup>	0.056	-0.134	0.116	-0.710 <sup>#</sup>	0.100	-0.383 <sup>#</sup>	0.087	-0.599 <sup>#</sup>	0.204
OCCC&T	-0.298 <sup>#</sup>	0.026	0.174 <sup>#</sup>	0.038	-0.371 <sup>#</sup>	0.053	-0.357 <sup>#</sup>	0.065	-0.262 <sup>#</sup>	0.061
OCCSSK	-0.509 <sup>#</sup>	0.026	-0.296 <sup>#</sup>	0.051	-0.377 <sup>#</sup>	0.049	-0.492 <sup>#</sup>	0.065	-0.411 <sup>#</sup>	0.059
OCCUSK	-0.781 <sup>#</sup>	0.027	-0.401 <sup>#</sup>	0.087	-0.674 <sup>#</sup>	0.048	-0.716 <sup>#</sup>	0.065	-0.497 <sup>#</sup>	0.074
INDM&Q	0.547 <sup>#</sup>	0.032	0.124	0.099	0.601 <sup>#</sup>	0.039	0.199	0.108	0.678 <sup>#</sup>	0.234
INDMNF	0.506 <sup>#</sup>	0.023	0.173	0.092	0.629 <sup>#</sup>	0.033	0.410 <sup>#</sup>	0.046	0.387 <sup>#</sup>	0.108
INDEGW	0.572 <sup>#</sup>	0.049	0.145	0.111	0.750 <sup>#</sup>	0.071	0.138	0.116	0.491 <sup>#</sup>	0.148
INDCON	0.400 <sup>#</sup>	0.029	0.135	0.104	0.532 <sup>#</sup>	0.041	0.341 <sup>#</sup>	0.050	0.563 <sup>#</sup>	0.147
INDWRT	0.350 <sup>#</sup>	0.024	0.029	0.095	0.490 <sup>#</sup>	0.033	0.260 <sup>#</sup>	0.048	0.277 <sup>*</sup>	0.110
INDTSC	0.506 <sup>#</sup>	0.029	0.060	0.096	0.637 <sup>#</sup>	0.046	0.290 <sup>#</sup>	0.053	0.457 <sup>#</sup>	0.123
INDFIN	0.608 <sup>#</sup>	0.033	0.209 <sup>*</sup>	0.096	0.704 <sup>#</sup>	0.067	0.407 <sup>#</sup>	0.065	0.564 <sup>#</sup>	0.128
INDCSV	0.402 <sup>#</sup>	0.023	0.008	0.092	0.610 <sup>#</sup>	0.029	0.282 <sup>#</sup>	0.051	0.344 <sup>#</sup>	0.115
REGWC	0.038 <sup>*</sup>	0.017	-0.248 <sup>#</sup>	0.043	0.005	0.031	-0.288 <sup>#</sup>	0.053	-0.014	0.059
REGEC	-0.066 <sup>#</sup>	0.020	-0.132 <sup>#</sup>	0.046	-0.072 <sup>*</sup>	0.031	-0.497 <sup>#</sup>	0.056	0.100	0.068
REGNC	-0.259 <sup>#</sup>	0.023	-0.181 <sup>#</sup>	0.044	-0.272 <sup>#</sup>	0.032	-0.770 <sup>#</sup>	0.063	-1.076 <sup>#</sup>	0.218
REGFS	-0.425 <sup>#</sup>	0.026	-0.259 <sup>#</sup>	0.046	-0.538 <sup>#</sup>	0.032	-0.551 <sup>#</sup>	0.090	0.228	0.124
REGNW	-0.133 <sup>#</sup>	0.024	-0.161 <sup>#</sup>	0.047	-0.103 <sup>#</sup>	0.031	-0.666 <sup>#</sup>	0.115	-0.121	0.113
REGGA	0.096 <sup>#</sup>	0.017	0.005	0.035	-0.015	0.026	-0.102	0.058	0.354 <sup>#</sup>	0.041
REGET	0.012	0.026	0.008	0.047	-0.167 <sup>#</sup>	0.032	0.037	0.159	0.682 <sup>#</sup>	0.087
REGNP	0.014	0.026	-0.007	0.051	0.014	0.032	0.189	0.145	0.098	0.143
RURAL	-0.256 <sup>#</sup>	0.015	-0.090 <sup>*</sup>	0.040	-0.179 <sup>#</sup>	0.021	-0.240 <sup>#</sup>	0.040	-0.180 <sup>#</sup>	0.039
TUMEM	0.100 <sup>#</sup>	0.012	-0.052 <sup>*</sup>	0.026	0.239 <sup>#</sup>	0.019	0.135 <sup>#</sup>	0.025	0.064 <sup>*</sup>	0.031
CONST	1.026 <sup>#</sup>	0.066	0.998 <sup>#</sup>	0.151	0.755 <sup>#</sup>	0.107	1.318 <sup>#</sup>	0.138	0.855 <sup>#</sup>	0.183
N <sup>o</sup> obs.	17198		3772		7696		3865		1865	
R-squared	0.543		0.256		0.525		0.525		0.309	
F-Test	638.0 <sup>#</sup>		39.5 <sup>#</sup>		264.9 <sup>#</sup>		132.3 <sup>#</sup>		25.6 <sup>#</sup>	

Notes. Standard errors are heteroscedasticity-consistent [White, 1980].

# Denotes significance at the 1% level. \* Denotes significance at the 5% level

age of 40, though this may be a reflection of cohort effects in the sample rather than of the experience facing an individual worker over the course of his working lifetime.

FIGURE 1  
AGE-WAGE EARNINGS PROFILES BY RACIAL GROUP FOR WORKERS WITH  
BASE CASE CHARACTERISTICS



The estimated coefficients on the education variables indicate that higher education levels are consistently associated with higher wages. For whites, the wage level of workers with no education was 64 per cent of that received by workers with secondary education, while workers with a degree were paid at 145 per cent of the secondary education wage rate. For blacks, coloureds and asians the comparable figures were 75 and 170 per cent, 73 and 130 per cent, and 61 and 169 per cent respectively. Thus there is little indication of smaller education-wage rate differentials for non-white workers, a finding consistent with similar expectations on the part of all races of significantly enhanced earning opportunities attainable through education.<sup>7</sup>

The estimated coefficients for occupational skill categories also correspond in general to *a priori* expectations of an association of higher skill levels and responsibilities with higher wages. Unskilled workers generally earn the lowest wages, along with black and asian skilled agriculture and fishery workers. The highest wages tend to be found in the financial sector, with manufacturing, and electricity, gas and water sectors also paying

relatively high wages to coloured and black workers. Trade union membership is found to raise wage rates for black, coloured and asian workers. However, the statistically significant negative coefficient on the trade union variable for whites is unexpected given the historical importance and power of white trade unions in South Africa [Lundahl and Wadensjo, 1984; Natrass, 1981]. One possible explanation is that trade unions can be highly influential in enhancing non-pecuniary employment benefits - shortcomings in the data preclude the analysis of these conditions of employment.

Regional variation in wage rates is also evident. The more remote Free State and Northern Cape tend to have the lowest relative wage rates in South Africa, *ceteris paribus*, while the regions offering the highest estimated wage rates are Gauteng (including Johannesburg, Pretoria and Vanderbijlpark), Kwazulu/Natal, and Eastern Transvaal, at least for most racial groups. The rural-urban variable measures a further dimension to wage patterns with rural wage rates, *ceteris paribus*, estimated to be lower than urban wage rates.

### ***Decomposition Analysis***

The results of the multilateral decomposition analysis based on the aggregate wage functions are presented in Table 5. The table presents estimates of the mean logarithmic gross wage differential  $\ln(\gamma_i+1)$  between each of the four racial groups and the overall geometric mean wage, and the constituent elements from the decomposition of these differentials - the explained racial productivity term  $\ln(\theta_i+1)$  and unexplained discrimination term  $\ln(\delta_i+1)$  - under the six alternative hypothetical non-discriminatory wage structures outlined in Section III. Both the productivity and discrimination terms can be either positive or negative. A positive (negative) productivity term implies that a given racial group receives a wage premium (discount) due to the group having higher (lower) productivity levels on average than the typical worker in the workforce as a whole. A positive (negative) discrimination term is indicative that the typical worker in a particular racial group is overpaid (underpaid) relative to what he would receive in the absence of discrimination. Note that the productivity and discrimination terms only sum to the mean logarithmic gross wage differential in the case of the pooled OLS estimator of the non-discriminatory wage structure.

TABLE 5  
MULTILATERAL DECOMPOSITION OF AGGREGATE WAGE DIFFERENTIALS

	Racial Group							
	White		Black		Coloured		Asian	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Non-discriminatory wage structure								
$\ln(\gamma_i+1)$	0.816 <sup>#</sup>	0.009	-0.386 <sup>#</sup>	0.006	-0.214 <sup>#</sup>	0.009	0.386 <sup>#</sup>	0.014
Pooled OLS estimator								
$\ln(\theta_i+1)$	0.582 <sup>#</sup>	0.005	-0.266 <sup>#</sup>	0.003	-0.229 <sup>#</sup>	0.005	0.394 <sup>#</sup>	0.007
$\ln(\delta_i+1)$	0.234 <sup>#</sup>	0.008	-0.120 <sup>#</sup>	0.005	0.015	0.008	-0.008	0.012
Employment share estimator								
$\ln(\theta_i+1)$	0.439 <sup>#</sup>	0.015	-0.177 <sup>#</sup>	0.009	-0.244 <sup>#</sup>	0.009	0.351 <sup>#</sup>	0.014
$\ln(\delta_i+1)$	0.327 <sup>#</sup>	0.013	-0.259 <sup>#</sup>	0.023	-0.020	0.021	-0.014	0.017
White structure								
$\ln(\theta_i+1)$	0.350 <sup>#</sup>	0.060	-0.123 <sup>#</sup>	0.035	-0.219 <sup>#</sup>	0.025	0.256 <sup>#</sup>	0.054
$\ln(\delta_i+1)$	0	0	-0.729 <sup>#</sup>	0.095	-0.462 <sup>#</sup>	0.081	-0.337 <sup>#</sup>	0.026
Black structure								
$\ln(\theta_i+1)$	0.478 <sup>#</sup>	0.011	-0.208 <sup>#</sup>	0.006	-0.230 <sup>#</sup>	0.011	0.369 <sup>#</sup>	0.011
$\ln(\delta_i+1)$	0.516 <sup>#</sup>	0.021	0	0	0.193 <sup>#</sup>	0.018	0.195 <sup>#</sup>	0.021
Coloured structure								
$\ln(\theta_i+1)$	0.432 <sup>#</sup>	0.017	-0.179 <sup>#</sup>	0.011	-0.279 <sup>#</sup>	0.018	0.445 <sup>#</sup>	0.025
$\ln(\delta_i+1)$	0.319 <sup>#</sup>	0.031	-0.272 <sup>#</sup>	0.030	0	0	-0.124 <sup>#</sup>	0.037
Asian structure								
$\ln(\theta_i+1)$	0.476 <sup>#</sup>	0.032	-0.156 <sup>#</sup>	0.019	-0.283 <sup>#</sup>	0.029	0.269 <sup>#</sup>	0.036
$\ln(\delta_i+1)$	0.223 <sup>#</sup>	0.027	-0.347 <sup>#</sup>	0.054	-0.049	0.057	0	0

Notes. # Denotes significance at the 1% level. \* Denotes significance at the 5% level

From Table 5, South Africa's well known *hierarchical wage structure* is evident from the estimates of  $\ln(\gamma_i+1)$ . These imply that whites have the highest geometric mean wage, followed by asians who also earn above the geometric mean wage of the entire workforce. In contrast, coloured and blacks wages are below this level, with blacks receiving the lowest geometric mean wage of any racial group. Our preferred decomposition of the mean logarithmic gross wage differentials is based on the pooled OLS estimator of the non-discriminatory wage structure. This set of decomposition results show that whites and asians would command a premium in the absence of discrimination due to above average productivity levels while the wages of coloureds and blacks would be subject to a discount because of below average productivity levels. Wage discrimination reinforces these productivity differentials in the case of white and black workers, with the results pointing to white overpayments associated with employer

nepotism and/or employee discrimination, and black underpayments due to employer discrimination. Given the reported standard errors, neither the asian nor coloured discrimination terms is significantly different from zero suggesting that these groups experience neither positive nor negative wage discrimination.

Table 5 also presents decomposition results based on the alternative non-discriminatory wage structures which broadly confirm the results based on the pooled estimator. Thus, all of the estimators yield a similar picture of the pattern of productivity differentials, with whites and asians attracting a premium under all hypothetical wage structures, and coloureds and blacks a discount due to below average productivity levels. Comparison of the discrimination terms is less straightforward as the numerical estimates are highly sensitive to the assumed non-discriminatory wage structure. But the estimates based on the employment share estimator of the wage structure again imply overpayment of whites, underpayment of blacks and no evidence of wage discrimination in the case of asian and coloured workers. And, as is to be expected, the results based on the white structure indicate that all other groups are underpaid due to discrimination, the results based on the black structure show exactly the opposite, and the results based on the coloured and asian structures lie in between with evidence of both white overpayments and black underpayments..

Table 6 restates the decomposition results based on the pooled estimator in a more readily intelligible form by expressing the gross wage, productivity and discrimination differentials as a percentage of the overall geometric mean wage of 5.89 rand per hour. Thus the typical white worker received 126 per cent more than the overall geometric mean wage, the typical asian 47 per cent more, the typical coloured 19 per cent less and the typical black 32 per cent less. However, these figures should not be taken simply to imply that workers of different races working side by side in identical jobs in the same establishment are paid differently. Rather the differentials likely reflect differences between jobs that fall within the same broad occupational categories of the survey, differences between establishments and so forth. As such, they reflect a combination of the effects of disadvantage and of discrimination in compensation and in hiring.

The decomposition of the gross wage differentials reveals that approximately two thirds of the white and black differentials can be explained by productivity differences while virtually all of the asian and coloured differentials can be so explained. Thus the white gross wage differential of plus 126 per cent of the overall geometric mean wage

TABLE 6  
AGGREGATE WAGE DIFFERENTIALS  
BASED ON THE POOLED ESTIMATOR OF THE NON-DISCRIMINATORY MARKET STRUCTURE

	Racial Group			
	White	Black	Coloured	Asian
	<i>Percentages</i>			
Gross wage differential: $(\hat{W}_i - \hat{W})/\hat{W} = \hat{\gamma}_i$ (relative to overall geometric mean wage of 5.89 rand/hr)	126.1	-32.0	-19.3	47.1
Of which:-				
Productivity differential: $(\hat{W}_i^o - \hat{W}^o)/\hat{W}^o = \hat{\theta}_i$	79.0	-23.4	-20.5	48.3
Discrimination differential: $(\hat{W}_i - \hat{W}_i^o)/\hat{W}^o = \hat{\delta}_i(\hat{\theta}_i + 1)$	47.2	-8.7	1.2	-1.2
Discrimination coefficient: $(\hat{W}_i - \hat{W}_i^o)/\hat{W}_i^o = \hat{\delta}_i$ (relative to non-discriminatory group geometric mean wage)	26.4	-11.3	1.5	-0.8

Notes:  $\hat{W} = \hat{W}^o$  (that is the overall geometric mean wage is identical under both the discriminatory and non-discriminatory structures) in the case of the pooled estimator. Productivity and discrimination differentials may not sum to the gross wage differential due to rounding errors.

comprises a productivity premium of 79 per cent and a further racial overpayment of 47 per cent. In contrast, the black gross wage differential of minus 32 per cent comprises a productivity discount of 23 per cent and a further racial underpayment of 9 per cent. The gross wage and productivity differentials are virtually identical to each other in the case of asian and coloured workers, reflecting the previously noted absence of wage discrimination faced by these two groups.

Table 6 also provides estimates of the discrimination coefficients  $\hat{\delta}_i$  which measure the amount by which a racial group is currently underpaid or overpaid relative to the wage that it would receive in a non-discriminatory labour market. Thus the wage of a typical white worker is 26 per cent higher than it would be in the absence of discrimination, that of a typical black is 13 per cent below what it would be in a non-discriminatory market, and the current wages of coloureds and asians are roughly equal to the non-discriminatory rates. Noting that the overall geometric mean wage rate would be identical in the absence of discrimination, these estimates suggest the scale of the wage adjustments faced by the various racial groups if wage discrimination was to be eradicated in the labour market. However, it is important to realise that the eradication of wage discrimination would not

by itself bring about total wage convergence since this also requires the elimination of racial productivity differentials.

Finally, we consider the binary decomposition of white/coloured and white/black gross wage differentials to allow comparison with existing estimates in the literature. From Table 6, the gross wage differential between white and coloured workers, measured relative to the overall geometric mean wage, is the difference between the wage differentials of the two groups, that is 145 per cent, and comprises a 99 per cent productivity differential and a 46 per cent discrimination differential attributable mainly to the overpayment of whites. This result is consistent with the slight downward trend in discrimination against coloureds identified by Moll [1992] over the period 1970 to 1980 having become more marked with the progressive dismantling of the apartheid system. In the case of the white/black gross wage differential, this is estimated to have been 158 per cent comprising a 102 per cent productivity differential and a 56 per cent discrimination differential attributable to both white overpayments and black underpayments. In comparison, Knight and McGrath [1987] found that discrimination against black workers accounted for 21 per cent of the mean wage difference between whites and blacks in 1985 (though this is probably an under-estimate: see note 2), while Moll [1995a] found that total discrimination against black workers was 60 per cent in 1993.

### ***Occupational Specific Analysis***

The occupational specific analysis allows an investigation of the way in which discrimination changes with occupational class. Decomposition results based on the pooled estimator of the non-discriminatory wage structure are presented for six of the nine occupational groups identified in the Household Survey: managers; professionals; technicians and associate professionals; crafts and trade workers; semi-skilled workers; and unskilled workers. Availability of space prohibits presentation of the six separate sets of estimated wage equations. On the estimation procedure, it is acknowledged that sample selection bias may occur when estimating occupation-specific regressions because the determinants of the individual's choice of occupation is not considered in the model. Others have sought to counteract this problem by adopting a multinomial logit approach, though this procedure does not entirely eliminate sample selection bias [Lanot and Walker, 1998: 329].



The results reported in Tables 7 and 8 support the existence of a racial wage hierarchy in all six of the occupational categories, with white workers receiving the highest wages, followed by asian and then coloured workers who, in turn, command higher wages than black workers. This finding is consistent with the occupational specific results of Moll [1992, 1995a]. As is to be expected, the differentials are smaller than those reported at the aggregate level except in the case of the unskilled workers category where they are of similar magnitudes.

TABLE 7  
MULTILATERAL DECOMPOSITION OF OCCUPATIONAL WAGE DIFFERENTIALS  
BASED ON THE POOLED ESTIMATOR OF THE NON-DISCRIMINATORY MARKET STRUCTURE

Occupational Group	Racial group							
	White		Black		Coloured		Asian	
	Coeff.	<i>Std. Error</i>	Coeff.	<i>Std. Error</i>	Coeff.	<i>Std. Error</i>	Coeff.	<i>Std. Error</i>
Managers								
$\ln(\gamma_i+1)$	0.260 <sup>#</sup>	0.023	-0.586 <sup>#</sup>	0.065	-0.327 <sup>#</sup>	0.066	-0.287 <sup>#</sup>	0.050
$\ln(\theta_i+1)$	0.162 <sup>#</sup>	0.011	-0.406 <sup>#</sup>	0.038	-0.251 <sup>#</sup>	0.025	-0.123 <sup>#</sup>	0.019
$\ln(\delta_i+1)$	0.098 <sup>#</sup>	0.018	-0.180 <sup>#</sup>	0.052	-0.076	0.059	-0.164 <sup>#</sup>	0.048
Professionals								
$\ln(\gamma_i+1)$	0.229 <sup>#</sup>	0.041	-0.247 <sup>#</sup>	0.042	-0.174 <sup>#</sup>	0.060	-0.041	0.063
$\ln(\theta_i+1)$	0.162 <sup>#</sup>	0.021	-0.175 <sup>#</sup>	0.029	-0.252 <sup>#</sup>	0.043	0.075 <sup>#</sup>	0.013
$\ln(\delta_i+1)$	0.067 <sup>*</sup>	0.033	-0.072	0.041	0.078	0.067	-0.116	0.064
Technicians & assoc. professionals								
$\ln(\gamma_i+1)$	0.180 <sup>#</sup>	0.025	-0.123 <sup>#</sup>	0.035	-0.069	0.049	-0.035	0.038
$\ln(\theta_i+1)$	0.054 <sup>#</sup>	0.010	-0.055 <sup>#</sup>	0.023	-0.074 <sup>#</sup>	0.022	0.008	0.016
$\ln(\delta_i+1)$	0.126 <sup>#</sup>	0.023	-0.168 <sup>#</sup>	0.026	0.005	0.047	-0.043	0.036
Crafts & Trade								
$\ln(\gamma_i+1)$	0.400 <sup>#</sup>	0.017	-0.428 <sup>#</sup>	0.020	-0.054 <sup>#</sup>	0.019	0.070 <sup>*</sup>	0.034
$\ln(\theta_i+1)$	0.167 <sup>#</sup>	0.009	-0.170 <sup>#</sup>	0.010	-0.046 <sup>#</sup>	0.011	0.061 <sup>#</sup>	0.017
$\ln(\delta_i+1)$	0.233 <sup>#</sup>	0.016	-0.258 <sup>#</sup>	0.018	-0.008	0.017	0.009	0.030
Semi-skilled								
$\ln(\gamma_i+1)$	0.471 <sup>#</sup>	0.039	-0.077 <sup>#</sup>	0.014	-0.051 <sup>*</sup>	0.025	0.042	0.033
$\ln(\theta_i+1)$	0.167 <sup>#</sup>	0.015	-0.018 <sup>#</sup>	0.006	-0.084 <sup>#</sup>	0.015	0.078 <sup>#</sup>	0.017
$\ln(\delta_i+1)$	0.304 <sup>#</sup>	0.039	-0.059 <sup>#</sup>	0.012	0.033	0.018	-0.036	0.024
Unskilled								
$\ln(\gamma_i+1)$	0.941 <sup>#</sup>	0.089	-0.097 <sup>#</sup>	0.010	0.038 <sup>#</sup>	0.013	0.669 <sup>#</sup>	0.051
$\ln(\theta_i+1)$	0.573 <sup>#</sup>	0.038	-0.046 <sup>#</sup>	0.006	0.003	0.009	0.448 <sup>#</sup>	0.022
$\ln(\delta_i+1)$	0.368 <sup>#</sup>	0.085	-0.051 <sup>#</sup>	0.008	0.035 <sup>#</sup>	0.009	0.221 <sup>#</sup>	0.049

Notes. # Denotes significance at the 1% level. \* Denotes significance at the 5% level

TABLE 8  
OCCUPATIONAL WAGE DIFFERENTIALS  
BASED ON THE POOLED ESTIMATOR OF THE NON-DISCRIMINATORY MARKET STRUCTURE

Occupational Group	Geometric mean wage	Racial group			
		White	Black	Coloured	Asian
	<i>Rand/hr</i>				
					<i>Percentages</i>
Managers	16.16				
Gross wage differential		29.7	-44.3	-27.9	-24.9
<i>Productivity differential</i>		17.6	-33.4	-22.2	-11.6
<i>Discrimination differential</i>		12.1	-11.0	-5.7	-13.4
Discrimination coefficient		10.3	-16.5	-7.3	-15.1
Professionals	16.56				
Gross wage differential		25.7	-21.9	-16.0	-4.0
<i>Productivity differential</i>		17.6	-16.1	-22.3	7.8
<i>Discrimination differential</i>		8.1	-5.8	6.3	-11.8
Discrimination coefficient		6.9	-6.9	8.1	-11.0
Technicians & assoc. professionals	13.20				
Gross wage differential		19.7	-20.0	-6.7	-3.4
<i>Productivity differential</i>		5.5	-5.4	-7.1	0.8
<i>Discrimination differential</i>		14.2	-14.6	0.5	-4.2
Discrimination coefficient		13.4	-15.5	0.5	-4.2
Crafts & Trade	7.97				
Gross wage differential		49.2	-34.8	-5.3	7.3
<i>Productivity differential</i>		18.2	-15.6	-4.5	6.3
<i>Discrimination differential</i>		31.0	-19.2	-0.8	1.0
Discrimination coefficient		26.2	-22.7	-0.8	0.9
Semi-skilled	6.36				
Gross wage differential		60.2	-7.4	-5.0	4.3
<i>Productivity differential</i>		18.2	-1.8	-8.1	8.1
<i>Discrimination differential</i>		42.0	-5.6	3.1	-3.8
Discrimination coefficient		35.5	-5.7	3.4	-3.5
Unskilled	2.82				
Gross wage differential		156.3	-9.2	3.9	95.2
<i>Productivity differential</i>		77.4	-4.5	0.3	56.5
<i>Discrimination differential</i>		78.9	-4.7	3.6	38.7
Discrimination coefficient		44.5	-5.0	3.6	24.7

Note: Productivity and discrimination differentials may not sum to the gross wage differential due to rounding errors.

The decomposition analysis shows that this four tiered wage structure partially reflects racial productivity differences in all six of the occupational categories. Productivity differences account for the largest proportion of the gross differentials in the managerial, professional and unskilled categories. Such large productivity differentials may be considered surprising in the case of the unskilled group but might in part be accounted for by the existence of racially motivated training and apprenticeship schemes in

the 1980s and 1990s. More generally, the operation of racially segregated internal labour markets working within a given occupational category, may help to explain the racial productivity differentials. However, intra-occupational discrimination cannot be directly tested for in this analysis.

The decomposition also provides evidence of wage discrimination in all six occupational categories, though in the case of professional workers only the white discrimination component in Table 7 is significantly different from zero and then only at the 5 per cent level. In general, we find that underpayment of blacks is dominant in the higher status occupations, that overpayment of whites is dominant in the lower skilled occupations and that in most occupational categories there is not significant evidence of either under or over payment of coloureds and asians (with the exception of managerial workers where asians are underpaid and unskilled workers where both asians and coloureds are overpaid). The former is consistent with discriminatory white employers who necessarily work alongside non-white workers employed in high-status jobs, but choose to underpay them because of their race. In the lower-status occupations, white employers are unlikely to have the same contact with non-white workers, the discriminatory taste is less relevant and underpayment relatively low; employee discrimination and employer nepotism represent a more appropriate explanation. That blacks suffer most from discrimination may be indicative of white employers and employees not merely protecting their economic position but undertaking deliberate discriminatory action, otherwise discrimination against all non-white racial groups might be expected to be similar.

Finally, we note that the relative scale of wage adjustments faced by workers of the same race but in different occupations will vary substantially if wage discrimination was to be eradicated in the labour market. In general, higher status white workers will face relatively smaller wage cuts than those in semi-skilled and unskilled occupations while blacks in higher status occupations will receive larger relative wage rises than those in semi-skilled and unskilled occupations. On the basis of these results the black middle class has the most to gain in relative terms and the white working class the most to lose from the eradication of labour market discrimination.

## VI. SUMMARY OF FINDINGS AND POLICY IMPLICATIONS

The particular contribution of this paper is to provide a multilateral decomposition analysis of racial wage differentials in the South African labour market using evidence drawn from the 1994 October Household survey. Methodologically, the paper adds to the discrimination literature by generalising existing binary decomposition techniques so as to facilitate the joint decomposition of the wage differentials between two or more groups into productivity and discrimination components. This approach provides the basis for a multilateral analysis of the racial wage hierarchy in South Africa which allows for the possibility that wage discrimination takes the form of over-payment of some races, as a result of either employee discrimination or employer nepotism, and under-payment of others due to employer discrimination. In this concluding section, we consider our results in the light of current policy initiatives to tackle racial inequalities in the post-apartheid labour market.

Our first finding based on the 1994 October Household survey data is of the continued existence of substantial gross wage differentials between racial groups in the South African labour market. The typical white male worker in the sample received 126 per cent more than the overall geometric mean wage, the typical asian 47 per cent more, the typical coloured 19 per cent less and the typical black 32 per cent less. This pattern is reproduced in the six occupational categories examined in the paper, though the differentials are smaller than those reported at the aggregate level except in the case of the unskilled category where they are of similar magnitudes. The persistence of the long-established racial wage hierarchy in the South African labour market is indicative both of the effective implementation of apartheid social and labour policies and of the strength and deep-rooted nature of social and business attitudes towards race, particularly towards black workers [*see, for example, Truth and Reconciliation Commission, 1998: Volume 4, Chapter 2, Institutional Hearing: Business and Labour*].

We further estimate that productivity differences can explain approximately two thirds of the white and black aggregate gross wage differentials, with the remainder attributable to discrimination, and virtually all of the asian and coloured differentials. This suggests that policies to eradicate labour market discrimination may serve to reduce gross wage differentials to some extent, but that policies to tackle racial productivity differences will be more important if the long-term aim is to eliminate the racial wage hierarchy. Indeed, to the extent that we fail to control adequately for the inferior quality of black and

coloured education, our estimates may actually understate the importance of racial productivity differences.

In the post-apartheid era, labour market legislation has been subject to fundamental reform with most employees now covered by a single set of labour laws, including those working in agriculture, domestic service and the state (Barker, 1999). The *Labour Relations Act 1995* codifies the limitations on discrimination set out in the *Bill of Rights* and the *Constitution* [Presidential Commission, 1996], while the *Employment Equity Bill 1998* and the *Basic Conditions of Employment Act 1998* seek to promote equity and efficiency within the labour market. In particular, the *Employment Equity Act* sanctions racial employment targets through the mechanism of affirmative action plans agreed between employers and employees on statutory *Workplace Fora*. The *Employment Equity Act* also formalises powerful rights provided by the Constitution for any employee or employment applicant to institute proceedings through the *Commission for Conciliation, Mediation and Arbitration* against an employer for alleged discrimination; the burden of proof falls on the employer to prove that there were fair reasons for differentiating between individuals [Barker: 1999].<sup>8</sup>

These labour market measures provide powerful instruments for use against the discriminatory practices and attitudes that have sustained white overpayment and black underpayment. Our findings suggest that the wage of a typical white worker was 26 per cent higher than it would be in the absence of discrimination, that of a typical black was 13 per cent below what it would be in a non-discriminatory market, and the wages of coloureds and asians were roughly equal to non-discriminatory rates. That white wages would fall and black wages rise with the eradication of discrimination is not of itself particularly surprising. But the occupational analysis suggests that the wages of white craft and trade, semi-skilled and unskilled workers might have to fall by between 30 and 80 per cent of the non-discriminatory rate. Wage adjustments on this scale seem likely to provoke opposition from adversely affected groups and will more readily be achieved in the context of a growing economy where opportunities for realignment are more frequent and more easily taken.<sup>9</sup>

Recent policy initiatives have also been taken to tackle the causes of labour market disadvantage faced by specific racial groups in a concerted manner. In particular, the *National Education Policy Act 1996*, *Further Education Training Bill 1998* and *Skills Development Bill 1998* have sought to address the qualitative differences within the

education system, in vocational training and skill acquisition opportunities faced by different groups [*Standing et al, 1996, Borat et al, 1998*]. Our results suggest that positive returns to education and training exist for all races, providing the incentives for the non-white groups to take advantage of these opportunities. Nevertheless, household financial constraints to participation in education [*Case and Deaton, 1997*] may frustrate attempts to narrow productivity differentials in the absence of significant income and wealth redistribution.

‘The overall consequences of the legacy of apartheid are deeply embedded in the polity, society and economy of the country and will not be resolved over night ... (*the legacy*) ... tends to be self-reproducing and self-reinforcing in the absence of concerted policy interventions to reverse this legacy’ [*Presidential Commission, 1996*]. Although much of the necessary labour market and broader social policies appear now to be in place to offer the opportunity of creating a non-discriminatory labour market, it seems likely that it will take a considerable time for this to become socially equitable with the benefits of employment broadly and equitably distributed. There is thus a continuing role for the regular measurement and decomposition of racial wage differentials to inform policy-makers of the effectiveness of policy interventions and to highlight need for further reforms.

## NOTES

1. See Bergmann [1971] for the seminal work on the crowding hypothesis.
2. The Surveys on Remuneration, carried out by the private market research organisation Peromnes, over-represent the proportion of workers from large companies which might be presumed to have had more enlightened and efficient managements. This suggests that Knight and McGrath's estimates of the extent of racial discrimination in the South African labour market will be too low.
3. The Project for Statistics on Living Standards and Development (PSLSD) data set is collected by the South African Labour and Development Research Unit based at the University of Cape Town. The data set is a national cross-sectional survey with a sample of 43,974 individuals in 1993.
4. See Atkins and Hinks [1999] for a discussion of alternative theories of discrimination.
5. Discrimination may also arise due to consumer discrimination. However, an investigation of this form of discrimination is beyond the scope of this paper.
6. There is a possibility of a selection bias in this analysis caused by different racial unemployment rates in South Africa. In 1994, black males faced a 34 per cent unemployment rate compared to a 5 per cent rate for white males. Black workers' wage rates might be negatively affected by this higher unemployment rate. Alternatively, black workers in employment might be considered to be more motivated than their white counterparts.
7. By way of contrast, see Neal and Johnson [1996] who draw the opposite conclusion for the USA.
8. The Government and CCMA uses the media, including the internet, to promote the activities of the CCMA and elicit reports of potential malpractice. According to the South African *Business Day* [28 December 1998] the CCMA has since its establishment in November 1996 had over 143,000 referrals, largely concerning cases of unfair dismissal.
9. Opposition to labour market reforms has been led by the South African Chamber of Business (SACOB) who successfully sought a review of policy on the grounds that it impeded employment growth. Subsequent opposition has come from black trade unions who see increased labour market flexibility as promoting dualism where "those who are better organised have one set of labour rights and those who are not organised...have little or no protection at all" [*Cape Times*, 10/6/99: 'National Union of Metalworkers of South Africa to resist labour law changes']

## REFERENCES

- Arrow, K., 1972, 'Some Mathematical Models of Race Discrimination in the Labor Market', in A.Pascal (ed), *Racial Discrimination in Economic Life*, Lexington: DC Heath.
- Arrow, K., 1973, 'The Theory of Discrimination', in O. Ashenfelter and A. Rees (eds) *Discrimination in Labor Markets*, New Jersey: Princeton University Press, pp. 3-33.
- Atkins, J. and Hinks, T., 1999, 'The Economics of Racial Discrimination in the Labour Market: Post-Beckerian Theory and Estimation Procedures with Applications to South Africa', in S. B. Dahiya, ed, *The Current State of Economic Science*, Vol. 4, pp. 2035-2064. Rohtak: Spellbound.
- Banerjee, B. and Knight, J., 1985, 'Caste Discrimination in the asian Urban Labour Market', *Journal of Development Economics*, 17, pp. 277-307.
- Barker, F. S., 1999, 'On South African Labour Policies', *South African Journal of Economics*, Vol.67, No.1, pp.1-32.
- Becker, G., 1957, *The Economics of Discrimination*. Chicago: University of Chicago Press.
- Bergmann, B., 1971, 'The Effects on White Incomes of Discrimination in Employment', *Journal of Political Economy*, 79, pp 294-313.
- Bhorat, H., Dieden, S., and Hodge, J., (1998), 'The Impact of Structural and Production Method Changes on Employment Growth of Occupational Groups in South Africa', *Trade and Industrial Policy Secretariat Annual Forum*, Muldersdrift.
- Blinder, A., 1973, 'Wage Discrimination: Reduced Form and Structural Estimates', *Journal of Human Resources*, Vol.18, pp 436-455.
- Case, A. and Deaton, A., 1997, 'School Quality and Educational Outcomes in South Africa', Discussion Paper, Research Programme in Development Studies, Princeton University.
- Central Statistical Service 1994, October Household Survey 1994, Pretoria.
- Central Statistical Service 1995, South African Labour Statistics 1995, Pretoria: Government Printers.
- Cotton, J., 1988, 'On the Decomposition of Wage Differentials', *Review of Economics and Statistics*, Vol.70, pp 236-243.
- Donaldson, A., and Roux, A., 1990, 'Education, Employment and Incomes of Black South Africans in 1985', Paper presented at Conference on Literacy and Basic Adult Education for Development, Pretoria: Human Sciences Research Council.
- Franks, P.E., 1987, 'White Resistance to Black Advancement', *South African Journal of Labour Relations*, Vol.11, pp 30-38.
- Freund, B., 1988, *The African Worker*, Cambridge: Cambridge University Press.
- Hofmeyr, J., 1994, 'The Rise in African Wages: 1975-1985', *South African Journal of Economics*, Vol.62, No.3, pp.198-215.
- Human, L. and Greenacre, M.J., 1987, 'Labour Market Discrimination in the Manufacturing Sector: The Impact of Race, Gender, Education and Age on Income', *South African Journal of Economics*, Vol.55, pp 150-164.
- Knight, J. and McGrath, M.D., 1987, 'The Erosion of Apartheid in the South African Labour Market: Measures and Mechanisms', *Applied Economic Discussion Paper, No. 35*, Institute of Economics and Statistics, University of Oxford.



- Lanot, G. and Walker, I., 1998, 'The Union/Non-union Wage Differential: An Application of Semi-Parametric Methods', *Journal of Econometrics*, Vol. 84, pp. 327-349.
- Lundahl, M. and Wadensjo, E., 1984, *Unequal Treatment: A Study in the Neo-Classical Theory of Discrimination*, New York: New York University Press.
- Meth, C., 1988, *Sorry Wrong Number*.
- Moll, P., 1992, 'The Decline of Discrimination Against Colored People in South Africa, 1970-1980', *Journal of Development Economics*, Vol.37, pp 289-307.
- Moll, P., 1995a, 'Discrimination is Declining in South Africa, But Inequality is Not', *mimeo.*, Chicago.
- Moll, P., 1995b, 'Primary Schooling, Cognitive Skills and Wages in South Africa', *mimeo.*, Chicago: June.
- Nattrass, J., 1981, *The South African Economy: Its Growth and Change*, Cape Town: Oxford University Press.
- Neal, D., and Johnson, W., 1996, 'The Role of Premarket Factors in Black-White Wage Differences,' *Journal of Political Economy*, Vol. 104, pp 869-895.
- Neumark, D., 1998, 'Employers' Discriminatory Behaviour and the Estimation of Wage Discrimination', *Journal of Human Resources*, Vo. 23, pp 279-295.
- Oaxaca, R., 1973, 'Male Female Wage Differentials in Urban Labour Markets', *International Economic Review*, Vol.14, pp 693-709.
- Oaxaca, R. and Ransom, M., 1988, 'Searching for the Effect of Unionism on the Wages of Union and Non-Union Workers', *Journal of Labor Research*, Vol.9, pp 139-148.
- Oaxaca, R. and Ransom, M., 1994, 'On Discrimination and the Decomposition of Wage Differentials', *Journal of Econometrics*, Vol.61, pp 5-21.
- Polachek, S.W. and Siebert, W.S., 1993, *The Economics of Earnings*, Cambridge: Cambridge University Press.
- Presidential Commission to Investigate Labour Market Policy, 1996, *Restructuring the South African Labour Market*, Pretoria: Republic of South Africa.
- Rospabe, S., 1997, 'The Influence of Unionization on the Racial Wage Gap in South Africa: A Microeconomic Study Using 1993 Data', *mimeo.*
- Standing, G., Sender, J. and Weeks, J., 1996, *Restructuring the Labour Market: The South African Challenge. An ILO Country Review*, Geneva: International Labour Organisation.
- Truth and Reconciliation Commission, 1998, *Final Report*, Pretoria: Republic of South Africa.
- White, H., 1980, 'A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity', *Econometrica*, Vol.48, pp 817-838.
- Yudelman, D., 1975, 'Industrialisation, Race Relations and Change in South Africa: An Ideological and Academic Debate', *African Affairs*, Vol.7, pp 82-96.