The effect of trade unions on the inequality of wage earnings in South Africa

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Abstract

The paper begins with an introduction of trade unions in South Africa, focusing on the union membership trend in the last two decades of the twentieth century. This is followed by a review of work on earnings functions and modelling South African trade unions in chapter 2. The aim of this chapter is to show what work has been done in the area of earnings functions and trade unions. It also highlights the contribution of this paper as analysing the role of trade unions in determining earnings inequality and not just earnings levels. Chapter 3 analyses the variables in a trade union model, such as education, location, gender, experience, sector and occupation. Chapter 4 exams the decomposition of the effect of trade unions on the inequality of wage earnings. We find that the result of effect of trade unions on earnings inequality is higher than in comparable international work. The effect is much higher in the general earnings equation with union interactive variables than the equation with a single union dummy. We also find that, for the overall contribution to earnings inequality, education, sector and location have higher contributions in the non-unionised group than the unionised group. This indicates that trade unions have significant effect in dampening the effect of other variables on earnings inequality.

Chapter 1. An Introduction to Trade Unions in South Africa

In the 1970s and 1980s, the union movement in South Africa raised the struggle against apartheid and exploitation. The union movement and the number of union members grew rapidly in many sectors of the economy. During these two decades, unions developed not only their capacity to fight racial discrimination, but also the power of bargaining for better wages and working conditions for union members, especially for black workers (Nadidoo, 1999).

Strong unions have a strong bargaining position. This applies to all kinds of union engagement, which includes plant, industry, national and even international level. Nadidoo has presented the crucial determinants of union bargaining power as number of union members, union strategies and structures (Nadidoo, 1999).

1.1 Unions in South Africa

In 1970s and 1980s, unions developed rapidly in some large sectors of the economy. In the mid 1980s, about 20% of workers were unionised in the whole country. They were mainly from the manufacturing sector. While unions developed their capacity against the former apartheid-system, they became more crucial to the South African economy during the social and political transformation. Union membership has increased from 18% in 1985 to around 50% in 1998 in the major formal sectors, as a proportion of all employed labour force. A study by Nadidoo from the National Labour and Economic Development Institute (NALEDI) has shown that South Africa's union movement is the fastest growing union movement in the world (Nadidoo, 1999). Despite hundreds of unions, which have a range of members from 100 to 20,000, there are five main union federations in South Africa.

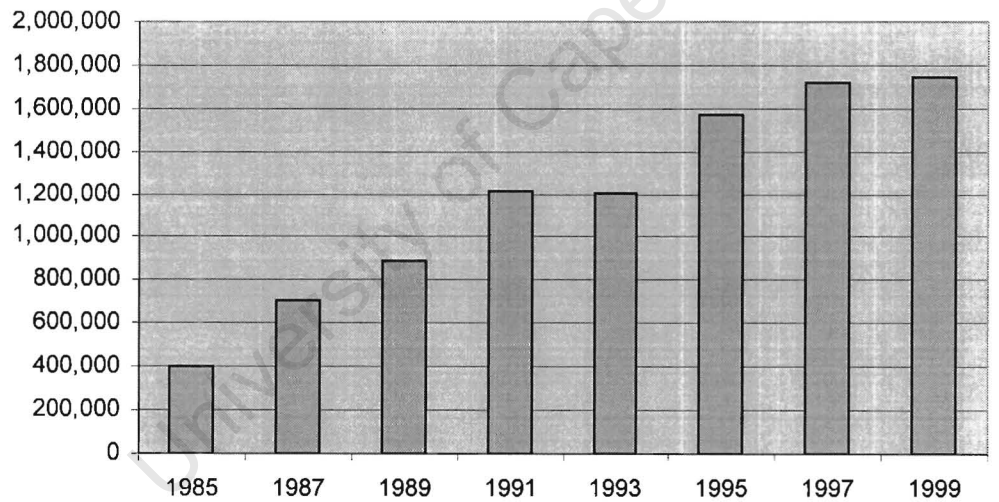
These unionfederations are the following:

- Congress of South African Trade Unions (COSATU)
- National Council of Trade Unions (NACTU)
- Federation of Independent Trade Unions (FITU)
- United Workers' Union of South Africa (UWUSA)

- Federation of South African Labour Unions (FEDSAL)

Of the above five major trade union federations, COSATU is the biggest. In 1999, it represented 1.7 million of the approximately 3.8 million union members in South Africa (Nadidoo, 1999). It is undoubtedly the dominant union grouping, in terms of size, power and influence. Before analysing the effects of unions on the labour market, it is useful to briefly review the growth of COSATU as the dominant union federation in South Africa. According to the data given in that study, about 400,000 workers had joined COSATU by late 1985. In the following five years, the number of members reached over 1,2 million. COSATU's total membership increased to over 1,3 million in mid-90s, and 1.7 million today. This is a 330% increase compared to the number in 1985. Graph 1 shows the growth of COSATU's membership from 1985 to 1999.

Graph 1. COSATU's membership 1985-1999

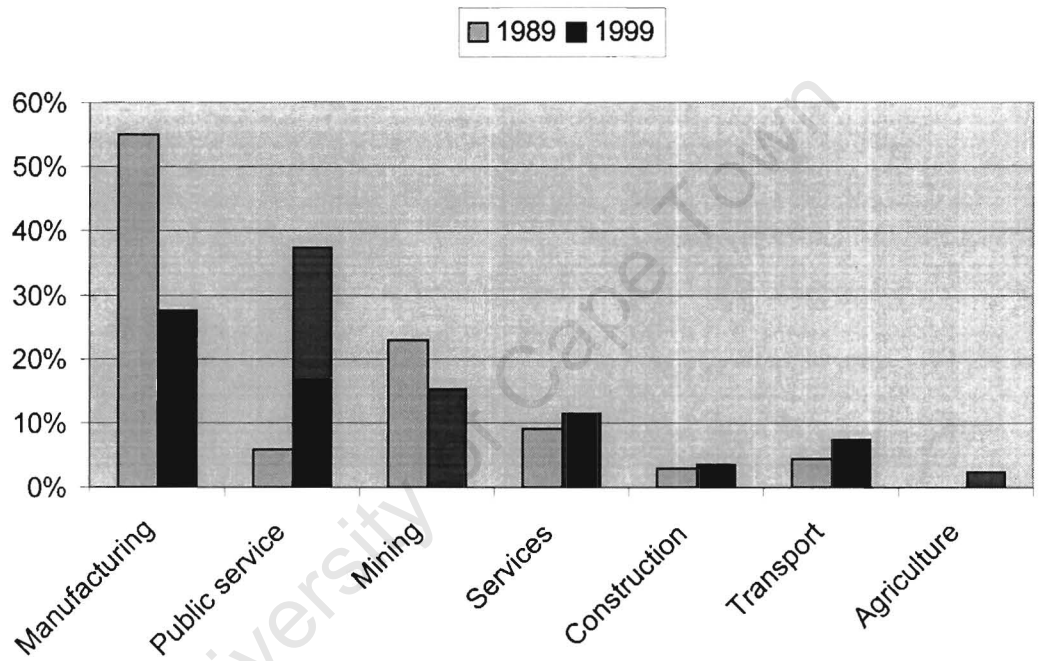


Source: Nadidoo, 1999.

Retrenchments and job losses in many sectors have caused a slow down in membership, since 1996. Despite this, there are nineteen COSATU affiliates today compared to fifteen in late 1994.

A sectoral membership breakdown is another indicator of the growth of unions. Ten years ago, manufacturing was the biggest sector in COSATU, with over 55% of members in 1989. Mining and services were the second and third biggest sectors, with approximately 24% and 7%, respectively. However, the public-service sector has become the largest within COSATU today, with 37.5% of all the members. Other important sectors are manufacturing, mining, service, transport, agriculture and construction, with 27.7%, 15.2%, 10.6%, 5.7%, 1.7% and 1.6%, respectively. Graph 2 shows the change of membership in each sector from 1989 to 1999 (Nadidoo, 1999).

Graph 2. Changes in sectoral membership, 1989-1999



Source: Nadidoo, 1999.

As shown in graph 2, typically, the public service sector had grown dramatically from the early 1990s. This implies a growing number of skilled, salaried and "white-collar" employees. Against this, COSATU's manufacturing unions have declined in the 1990s. In addition, there are still a lot of low-paid employees who are non-unionised, especially in the security and cleaning sectors.

As mentioned above, in 1998, the union density, as a proportion of the employed labour force, was approximately 50%. If one excludes the agricultural, domestic

service and informal sectors, union density was almost 78%. However, factoring in the high unemployment rate and total economically active population of 12.1 million, union density drops to about 31% (Nadidoo, 1999). This is almost the same as the result derived from the OHS95 data, with 30.62%.

1.2 Unions and the distribution of wages

There are two methods for empirical studies addressing the influence of unions on wages. The first method studies different enterprises within an industry. This method normally emphasises a single industry and compares wages for different enterprises under varying degrees of unionisation in that industry. The weakness of this approach is that it cannot correct for the interaction between unionised and non-unionised enterprises. The second method is inter-industry study. It generally compares different industries with varying degrees of unionisation to find out the effect of unions on wages. The problem with such a method is that, the skill levels, occupation groups, labour supply and other conditions for each industry are not the same. There are difficulties with comparing two industries having different characteristics. According to international evidence, the wages of unionised employees were on average between 10% to 30% higher than those of non-unionised employees (Nadidoo, 1999). In South Africa, there is a possibility that unions have caused a higher wage difference than in other countries and strike activities in South Africa seem to have had a higher influence.

Moll (1993) studied the effect of emergent unions on wages in 1985. According to the results of his measurement, the black union-nonunion wage differential was 19% for men, 31% for women, and 24% overall. Relative to this, union effects in United States and Canada were 10.5% to 20% respectively. However, Austria, Australia, Switzerland and former West Germany presented lower union effects of between 4% and 8% (Moll, 1993: p 255).

Another part of the union's effect that needs to be mentioned is that unions might be able to increase productivity, which could also reduce union labour costs. McConell and Brue (1999) list seven studies on productivity, in which four show higher productivity in unionised industries and the rest show the opposite. According to their

discussion, productivity growth was slower on average in unionised enterprises than in non-unionised ones in the late 1970s. In the early 1980s, faster growth of productivity was found in the unionised enterprises and the opposite position was found in the late 1980s. Thus, there appears to be evidence of both positive and negative effects of unions on productivity. This most likely depends on the industrial relations between management and unions. In South Africa, wage negotiations since the early 1990s have often involved agreements to improve productivity.

Despite the effect of unions on wage bargaining, wage inequality in South Africa is very high. This is not only reflected within different sectors, but also within the races. This is mainly due to the differences in years of education, work experience, location, sector and other relevant factors. However, in the South African labour market, the unemployment rate is substantially higher for African workers but remains low for whites. The unions' role in fixing minimum wages may have contributed negatively to employment creation.

The traditional target of trade unions is to raise the incomes of workers, and this activity causes a higher level of inequality in wage income between union and non-union workers. However, if unions can really improve earnings of low-paid workers relative to high-paid workers, then overall earnings inequality could be narrowed.

This paper first reviews the work on earnings equations and unions, contained in Moll (1995), Mwabu and Schulz (1997), Fields (1998) and Hofmeyr (2000). There are a number of papers comparing the wage differences between union and non-union members. However, there is very little work on the impact of unions on wage inequality. The primary focus of this paper is on this issue. Many studies, such as Moll (1993) and Mwabu and Schulz (1997), have shown that there is still an inequality of earnings in the South African labour market. None of these papers offers a formal inequality decomposition or explicitly looks at the impact of trade unions on earnings inequality. This paper seeks to address this using a decomposition methodology introduced by Fields (1998) to derive the results. Firstly, a simple earnings function is estimated to show the general effects of unions on inequality along with some crucial factors, such as education, location, sectors, experience and occupation. In this function, 'union' will be treated as a dummy variable. Secondly,

this decomposition will be repeated but the influence of unions will be assessed by a dummy variable and a set of interactive dummy variables. Thirdly, two data groups, union and non-union groups are set up respectively in two equations. This is to compare the different effects of the explanatory factors on earnings inequality between union and non-union workers through a formal decomposition. The data used in the earnings models are mainly from October Household Survey of 1995 (OHS95).

Chapter 2. Review of empirical work on trade unions in South Africa

A lot of work has been done on earnings function models and union effects on average wages (Moll (1993), Mwabu and Schulz (1997), Fallon and Lucas (1998), Jensen (1998), Hofmeyr and Lucas (1998), Azam and Rospabe (1999), Hofmeyr (2000) and Michaud and Vencatachellum (2001)). This chapter will firstly provide a broad review of this work. Secondly, more specific attention will be given to the way that unions are modelled. Finally, the model used in this study will be specified.

2.1 Work on earnings functions

Fallon and Lucas (1998) presented an overview of adjustment and inequality in South African labour markets. They flagged the high unemployment rate, wage inequality and the massive disparity in the incidence of unemployment by race as the most serious labour market problems in South Africa. They also argued that labour market imperfections were a more major source of wage inequality in South Africa than is common in other countries. For them, wage differentials are still heavily determined by influences associated with labour market discrimination, institutional forces and low mobility (Fallon & Lucas, 1998).

Productive characteristics, such as education and experience, are shown to be crucial factors in determining earnings. On the other hand, union membership is also associated with large wage differentials. Estimated African union/non-union earnings differentials were between 25 and 35 percent in 1980-1993. Based on an analysis of African real wage rates between 1975 and 1985, Fallon and Lucas concluded that the most important determinant of African real wage growth was the growth in African trade unionism (Fallon & Lucas, 1998).

The large wage differentials by non-productive and institutional characteristics is shown in the table below.

Table 1. Wage differentials (percent)

Characteristics	Africans	White	Others
Mean Weekly Wage by Race	145	773	265
Base wage (African=100)	100	218	175
Percentage Changes in Mean Wages associated with			
Education			
5 years	73.5	127.3	94.8
8 years	144.3	108.8	281.1
10 years	284.6	285.7	527.8
12 years	559.3	475.5	1031.4
14 years	1061.2	890.5	1338.2
Gender			
Male	78.1	88.5	80.2
Location			
Urban Areas	49.6	7.3	38.0
Metropolitan Areas	66.4	23.9	77.7
Work			
Public Sector	46.8	2.1	37.7
Part Time	-39.8	-48.2	-55.2
Casual	-51.8	-69.9	-63.4
Self-employed	13.9	85.9	-14.8
Union	71.1	0.7	18.4

Source: Fallon and Lucas, 1998, using LSDS (1993)

In table 1, males earned relatively more than females as a whole in each racial group. Workers from urban and metropolitan areas earn more than the ones from rural areas. In addition, on average, education improved the earnings of all racial groups. Unions have much more influence on the earnings of Africans than Whites, with 71.1 percent

and 0.7 percent higher earnings respectively, compared to the non-union workers. Based on the above observations, Fallon and Lucas (1998) suggested some policy directions, such as increasing human capital and creating a more competitive environment, in order to reduce unemployment and eliminate labour market inequalities.

Jensen (1998) did a semiparametric analysis of African-White wage differences in the South African public and private sectors. He used the data from the 1994 October Household Survey for his analysis. He focused on four major factors that were considered as the specific sources of earnings differences: education, location, occupation and all other observable productivity-related characteristics.

Firstly, Africans have much lower levels of education than Whites. Therefore, Africans receive lower earnings in the labour market. Secondly, the analysis of residential status shows that Africans tend to stay in rural areas with low levels of economic activity. The former political dispensation restricted the mobility of African labours from rural to urban areas, for Africans. As a result, many Africans were unable to compete for the higher-earning jobs in urban areas. Thirdly, differential access to occupations also caused earnings differences between African and White workers. This is due to the lack of access of many African workers to higher-paying jobs. Finally, in order to measure how much of the earnings differentials cannot be accounted for by differences in observable characteristics, Jensen considers all other observable productivity-related factors (Jensen, 1998). By using the method of semiparametric regression for decomposing differences in log wage densities, Jensen explored how much of the observed differences in densities could be attributed to racial differences in the factors mentioned above. He also compared the wage differentials between different racial groups in private and public sectors. He found that the earnings differentials across race are lower in the public sector, compared to the private sector. Education is found to be the most important factor, explaining twenty-five to fifty percent of the total difference in the private sector and forty to sixty percent in the public sector. When Jensen worked on the wage differentials between private and public sectors for each racial group, Africans had a more equalised wage distribution in the public sector than

in the private sector. However, in both sectors, there is no clear sign of differences in wage densities for Whites.

Hofmeyr (2000) examined wage trends from 1940s to early 1990s, with a comparison between Africans and Whites. Table 2 shows the growth rates of average real wages of Whites and Africans from 1945 to 1993. Whites had higher growth rates of wages until the 1970s, but stagnated after that period. In contrast, African wages have increased sharply since the 1970s, mainly in mining sector. Therefore, within the above period, Whites and Africans had exactly opposite trends.

Hofmeyr (2000) explained the satisfactory wage growth as the result of economic growth. Poor economic performance after the mid-1970s caused a stagnation of wage growth. Besides the influence of economic growth on earnings, he also found that workers, who have identical skills, are earning different wages in the segmented labour market. Therefore, Hofmeyr (2000) raised the issue that wage differentials between segments are not totally due to the skill differences. To understand this, he then segmented the formal sector between unionised and non-unionised workers. Hofmeyr's discussion of segmentation in the formal sector, which explains the impact of trade unions on earnings will be discussed in next section.

Table 2. Growth rates of average real wages, 1945-1993 (% p.a.)

Sector	Race	1945-60	1960-72	1972-75	1975-80	1980-85	1985-93
Manufacturing	Whites	3.05	3.35	0.92	1.16	0.08	-0.80
	Africans	0.44	2.57	7.57	3.62	1.59	1.21
Construction	Whites	1.89	4.18	-1,63	1.42	-0.56	-2.68
	Africans	0.07	3.38	6.07	-0.38	2.16	-2.67
Mining	Whites	2.35	2.48	4.44	-1.59	0.36	
	Africans	0.31	1.32	29.59	5.44	3.12	
	All Races	1.57	1.51	15.74	2.51	1.65	1.17
Formal Sector	Whites			0.83	-0.79	1.79	
	Africans			10.47	3.29	2.88	
	All Races			2.42	0.75	1.75	1.38
Non-Primary Sector	Whites				-0.74	1.22	-0.28
	Africans				2.85	2.28	3.12
	All Races				0.58	1.76	1.26

Source: Hofmeyr (2000).

Similarly, Schulz and Mwabu (1997) explored whether differences in earnings were associated with workers' union membership status. The most important question was whether non-union workers earn more if they were union members. They specified an earnings function and estimated union wage effects in South Africa among Africans and Whites. Further discussion of Schulz and Mwabu's study is explored in the next section along with all other studies that have attempted modelling unions.

Table 3 presents the econometric specification of earnings functions from all of the above researchers.

Table 3. Three works on earnings functions

Study	Data	Specification	Sample	Results
Fallon &Lucas (1998)	LSDS (1993)	Earnings function *Earnings equations for African, White and other population groups *Gender, location and work are generated as dummy variables	Formal sector, casual and self-employed workers	Average African wage differentials *1061.2% changes in mean wage with 14 years education *78.1% for gender *46.8% for public sector *71.1% for union status
Jensen (1998)	October Household Survey (1994)	Earnings function *Using decomposition of log wage densities *Education is measured in years	Public and private sectors	*Significant occupational and wage differentials by race in both sectors *Education explains a large share of wage differences in both sectors *Urbanisation plays a crucial role in determining observed racial wage differences
Hofmeyr (2000)	PSLSD (1993)	Earnings function *Separate earnings functions for each segment *Segmentation is exogenous *Variables are generated as dummies, includes education	Males in formal and informal sectors	*Substantial earnings differences between unionised and non-unionised workers in formal sector *Large earnings differences between non-unionised and casual parts and self-employed informal sector workers

2.2 Modelling South African trade unions

Moll (1993) reviewed the impact of unions on the black South African wages. In his paper, Moll tested two hypotheses: Firstly, the effect of the emergent unions on wages in 1985 and secondly wage compression across skill levels. Moll (1993) argued that wage differences by skill in the union sector are smaller than in the non-union sector.

In order to test his expectations, Moll (1993) used the 1985 survey data from the Bureau of Market Research (BMR) for the Blacks, and 1985 survey data from Central Statistics service (CSS) for Whites. Blacks included Africans, Coloureds and Asians. Moll used three ways to estimate the union-nonunion wage differentials. Firstly, log wages were treated as the dependent variable and regressed on productive and personal characteristics, such as education, experience, skills and sectors. Union was included as a dummy variable in this regression model, with its own coefficient to represent the union differential. Secondly, the samples were separated into two groups, unionised and non-unionised. Log wages were regressed on personal characteristics. The union differential, was counted as the differences between the coefficients of two equations, as shown in the following equation:

$$d = (\beta_u - \beta_n)' \bar{X}_n \tag{1}$$

The union differential is represented as d, βs are the vectors of estimated coefficients, X is the matrix of characteristics, the bar denotes the mean, u and n denote union and non-union, respectively. Thirdly, the second step is refined by taking account of self-selection into union membership using the methodology employed by Lee (1978). This methodology employs a probit model of union membership. It then adds the inverse Mill's ratio calculated from the estimated probit coefficients, as an extra variable, into the union and non-union regressions. For each individual, a fitted union-nonunion differential is created and added to the probit. Therefore, the revised union differential equation is shown as follows:

$$d = \left[\left(\frac{\beta_u}{\sigma_{1e^*}}\right) - \left(\frac{\beta_n}{\sigma_{2e^*}}\right)\right]' \times \left(-\frac{\bar{X}_n}{\bar{W}_{2n}}\right) \tag{2}$$

Compared to equation 1, the σs in equation 2 are the coefficients on the inverse Mill's ratio and $\bar{W}_{2n}$ is the inverse Mill's ratio in the non-union sample (Moll, 1993).

Moll (1993) focused on the black urban full-time blue-collar workers using the methodology described above. The results are shown in table 4.

Table 4. Union-nonunion wage differentials (percentage) among Black urban blue-collar workers in 1985

		Male		Female		Male & female	
Method	Equation Number	Diff.	(t)	Diff.	(t)	Diff.	(t)
1. One equation	---	---	---	---	---	10	(6.5)
2. Two equation	(1)	12	(5.0)	25	(8.1)	18	(9.0)
3. Same, with sel. Correction	(2)	19	(3.1)	31	(4.6)	24	(3.9)

Source: Moll, 1993, p256.

From Table 4, it can be seen that the union and non-union wage differential of black workers was 19 percent for men, 31 percent for women, and 24 percent as a whole (Moll, 1993).

Moll (1993) also found that skills had more influence on wages in the non-union sector than in the union sector. This suggests that unions tend to compress wages by skill levels. According to the 1985 BMR data, unskilled African workers benefited significantly from their union membership and semi-skilled workers received some benefits from their union membership. Over all sectors, for semi-skilled African workers, the benefits from union membership were 5 % and 15 % for men and women respectively. The benefits were higher in unskilled groups, for men and women, with 19 % and 35 %, respectively (Moll, 1993: p256). Moll (1993) also tested some personal factors, such as education, experience, marital status and sectors, to examine their influences on union membership. The findings were that education, marital

status and race did not influence union membership. However, sectors, experience and location seemed to influence union membership.

Schultz and Mwabu (1997) also tested union effects on wage distribution in South Africa. They argued that inequality in wage rates in South Africa was among the largest in the world. They found that, although wage gaps between races could be partly explained by the differences in years of education and location by races, the important role of unions in closing and creating wage gaps had not been assessed (Schultz and Mwabu, 1997). They also assumed that unions might help by narrowing the inequality among union members, if they could increase wages by a greater proportion among low-wage union members than that among high-wage members. However, on the other hand, unions may cause increased wage inequality between unionised and non-unionised workers. Thus, the net outcome on wage inequality is an empirical matter.

They used the method of quantile regression to test how wages differ depending on union membership. To measure the union effects on the entire distribution of wages among union members compared to that among non-union workers, the union conditional effects on the expected log wage are estimated by ordinary least squares, and this effect on the mean wage is supplemented by quantile regression, for the median wage earner and other deciles in the distribution of wage residuals (Schultz and Mwabu, 1997).

Schultz and Mwabu (1997) evaluated the net effect of the union status dummy across deciles. They found that the coefficient on union status is 0.468 for African males and –0.051 for white males.

It is also necessary to mention that, for the White male workers, a white union worker earns a wage that is five percent less than the comparable non-union worker. The result also showed that White males in the top 70 percent of the distribution of wage residuals received a lower wage if they were union members. But for African males, in all deciles, a union job implies significantly higher wages than for non-union workers. This finding is mainly due to the distribution of union members in different

sectors. Most union workers are from the "blue-collar" sectors of mining, public service and manufacturing, but only a few are from sectors such as finance.

Another crucial indicator is that, within the union sector, the log wage gain for African males from a union job is eight times larger for workers in the lowest decile than for African male workers in the highest decile. The inverse relationship between union membership and wage residuals shows that, in both white and African males, union membership is associated with reduced wage inequality among union workers as noted by Freeman (1980) and others such as Schulz & Mwabu (1997). Therefore, on the whole, the wage inequality is less within unionised sectors than within non-unionised sectors of each industry. The result also showed that the union log wage advantage (for African males and controlling for industry) ranges from 0.35 for the lowest decile to 0.01 for the top decile, and from 0.14 to –0.25 for white males at the bottom and top deciles, respectively. They also tested a model that interacted union status with the industry dummies in the wage model. The conclusion from the results is that wage inequality is generally less within the union than within non-union sectors of each industry. Furthermore, African union-nonunion wage differentials are substantial at all quantiles of the wage residual distribution, compared to the Whites. This is mainly due to the different work opportunities for Africans and Whites in the non-union sector (Schultz & Mwabu, 1997).

In contrast to the above studies on unions, Azam and Rospabe (1999) focused on the relationship between unions and discrimination. They suggested that, in South Africa, discrimination is much less pronounced in the unionised sectors than in the non-unionised sectors. Although wage discrimination has been decreasing over 1970s and 1980s, there is still a large gap in wages between different races.

Azam and Rospabe (1999) assumed that unions have contributed to the reduction of earnings differentials. They used PSLSD data to test the assumptions.

Firstly, the unionisation rates for each racial group were shown as follows:

Table 5. Unionisation rates in different groups

Union Status	Total sample	African workers	White workers
Union members	31.4%	35.2%	21.2%
Non-union members	68.6%	64.8%	78.8%

Source: Azam and Rospabe, (1999: p7).

Table 5 shows that more than 35 percent of African workers are unionised, compared to 21.2 percent for White workers. The overall unionisation rate is above 31 percent. Furthermore, the comparison of average hourly net earnings between African and White workers may show a more precise picture of wage differentials.

Table 6. Average Hourly net earnings by population groups and union status (1993)

Gross wages Union status	African workers	White workers	Ratio of earnings of Whites to Africans
Union members	6.01	14.50	2.4 : 1
Nonunion members	4.45	19.62	4.4 : 1
Total sample	5.0	18.51	3.7 : 1

Source: Azam and Rospabe, (1999: p7)

Table 6 shows a large wage differential between African and White workers with union status. African union members earn more than non-union workers, and white workers have the inverse situation. In the union sector, the wage ratio of Whites to Africans is 2.4, as compared to 4.4 in non-union sector. The wage gap between different racial groups is higher in the non-union sector than in the union sector. It proves the assumption that unions have contributed to the decrease of wage differentials in the union sector.

Hofmeyr and Lucas (1998) have also examined the rise in union wage premia in South Africa. They used four approaches to explore the robustness of their results. Firstly, a simple earnings equation is set and includes a union dummy as an

exogenous variable. In this method, casual and self-employed workers are excluded. Secondly, from the earnings equation in the first method, two earnings equations are regressed for union and non-union workers respectively. Causal and self-employed workers are still excluded from the data. The third method includes endogenous switching between union and non-union earnings regimes. The inverse Mill's ratio is also included as an explanatory variable to both equations from second method. The last method specifies the problems of switching between formal and informal sectors and the sample selection for employment and non-employment (Hofmeyr and Lucas, 1998).

The data that they used included survey data from the BMR in 1985 and the 1993 household survey from South African Labour and Development Research Unit (SALDRU). BMR data includes four categories of employment status, i.e. not employed, informal self-employed, regular employment with union membership and without union membership. SALDRU has one more category, i.e. casual wage employment. Hofmeyr and Lucas (1998) focused on African males in urban areas. By comparing the 1985 and 1993 data sets, Hofmeyr and Lucas (1998) estimated the change in union earnings premia. They firstly used OLS tests to estimate the union dummies in a simple earnings function. They found that earnings were not significantly different from union to non-union workers in 1985, however, significant differences appeared in 1993.

The results from the estimations of union premia show that, for urban African males in the formal sector, average earnings of union members are higher than those of non-union workers. The percentage of earnings differentials between union and non-union workers increased from 8 % in 1985 to 26.5 % in 1993. This may be partly due to the sharp increase of union membership rate from 1985 to 1993, which was 27 % and 46.7 %, respectively. Table 7 shows the comparison of union membership between 1985 and 1993 in the formal sector.

In table 7, the changes in union membership rates vary across the whole formal sector. Employees with incomplete primary education, and in unskilled occupations seem to have had higher incentives to join unions. There were also sharp increases in union membership rates among employees from professional, mining and manufacturing

jobs. Union membership increased in most sectors besides a slight decrease in construction sector by 1.8 percent.

Table 7. Union membership rates among formal sector workers

(African urban males, percent)

	1985	1993
Primary Education Incomplete	25.0	53.1
Primary Education	29.4	52.0
Secondary Education	26.4	45.8
Tertiary Education	11.4	39.3
Unskilled Occupations	22.6	41.5
Mid-Occupations	30.9	54.0
Clerical and Sales	25.0	46.3
Professional	13.8	52.6
Manufacturing	36.7	61.5
Mining	9.2	85.4
Electricity, Gas and Water	43.8	47.6
Construction	26.5	24.7
Trade	30.8	34.2
Transport	27.5	44.6
Services	15.2	37.2
Overall	**27.0**	**46.7**

Source: Hofmeyr and Lucas, 1998, p15.

As noted in the last section, Hofmeyr (2000) discussed the wage differences between Whites and Africans in the formal sector. Further segmentation between unionised and non-unionised workers in formal sector is explored in this section. Hofmeyr (2000) used 1993 PSLSD data set to analyse the earnings patterns. He also estimated the relationship between wage differentials and union membership. He argued that, in the formal sector, unionised workers earned higher wages than non-unionised workers.

In order to estimate the wage differences between different segments of the labour market, Hofmeyr (2000) applied a two-step estimation procedure. The first step was to set up a multinomial logit model (MNL), which could predict employment segments of individuals. The second step was to estimate an earnings equation for each category of worker.

The results from Hofmeyr (2000) earnings function showed substantial earnings differentials between the segments. In the formal sector, the average earnings for the unionised workers was about 35 % higher than that for non-unionised workers. Individual characteristics were not as important as union membership in formal sector, since the average non-unionised worker would have obtained 42 % more if he was unionised, but only 4 % more if he had the average characteristics of a unionised worker. The average self-employed worker in the informal sector earned 87% less than the average non-unionised workers in the formal sector. The former would have earned 134% more if they were in formal unionised jobs (Hofmeyr, 2000: p123).

Michaud and Vencatachellum (2001) estimated female and male union wage premium South Africa. They found that, in general, unionised workers earn more than non-unionised workers both for males and females. Wage differences between unionised and non-unionised black workers are 65% and 127% for males and females, respectively. They calculated the union wage premium as the wage gains if a representive non-unionised worker were to join a union. These union wage premiums were 123 % and 96 % for males and females, respectively. Using bootstrapping techniques they concluded that male and female union premium are not statistically different. However they did not include other factors such as firm size and worker's productivity. This requires further research focusing on these issues. Table 8 presents the summary of studies on modelling trade unions.

Table 8. A general summary of recent work on earnings function and the effect of unions on earnings.

Study	Data	Specification	Sample	Results
Moll (1993)	Bureau of Market Research (1985)	Wage equation and union model ● Union-nonunion wage differential is estimated in three ways: single equation, two equations (union and non-union), self-selection is included. ● Test the determinants of union membership, such as education, location, sector and gender	Urban black full-time blue-collar workers, skilled, semi-skilled and unskilled	● Union wage effect for black male and female blue-collar workers is 24% ● Education, marital status and race don't influence union membership, but other factors do, such as sectors, experience and location. ● Black union-nonunion wage differential is 19% for men, 31 % for women and 24% overall
Mwabu & Schulz (1997)	SALDRU (1993)	Unions and wages ● Union status is estimated in earnings function ● Education is measured in years of education ● Industry and region are added to earnings function to estimate the union power ● Interactions are introduced between union and other variables ● Quantile regression is used to estimate the wage differentials	Formal sector African and White workers	● Union membership among African workers increases their wages by 145 percent at the bottom 10 percentile and 19 percent at the top 90 percentile, with 21 percent and 24 percent for Whites
Hofmeyr & Lucas (1998)	BMR (1985) & SALDRU (1993)	Change in union wage premia ● Different earnings regimes between union and non-union members ● Union and non-union earnings regimes are treated endogenously ● Probit model of union membership is estimated with Mill's ratio ● Sample selection correction in MNL model	Urban African males in formal sector	● Significant difference in earnings between union and non-union workers in 1993, but no evidence shown the same result in 1985 ● Union membership rate increased sharply from 27 percent in 1985 to 46.7 percent in 1993 ● Union membership rates of most occupations in the formal sector increased sharply ● Union premia increased by 1993 from the estimation
Azam & Rospabe (1999)	SALDRU (1993)	Earnings and union ● Measure wage differentials between African and white workers ● Population groups are separated as unionised and non-unionised, and African and White groups ● Discrimination decomposition	Formal sector African and White workers	● The racial wage gap is larger in non-union sector than union sector ● Impact of unionisation on wages is higher for black worker than for white workers
Hofmeyr (2000)	SALDRU (1993)	Earnings function ● Separate earnings functions for each segment ● Segmentation is exogenous ● Variables are generated as dummies, includes education	Males in formal and informal sectors	● Substantial earnings differences between unionised and non-unionised workers in formal sector ● Large earnings differences between non-unionised and causal parts and self-employed informal sector workers
Michaud & Vencatachellum (2001)	SALDRU (1993)	Wage Premium and unions ● Estimate the hourly union wage premium in South Africa with sample selection ● Compute the union wage premiums as the benefits of a hypothetical average non unionised worker who would join union	Black Males and Females	● The expected wage premium for males at 123 percent and for females at 96 percent ● With the consideration of hourly wage, union premium increased to 65 percent for males and 127 percent for females ● By using bootstrapping techniques, male and female union premium are shown to be not statistically different

This chapter has reviewed the studies using earnings function to estimate the effects of unions on wage earnings. Fallon & Lucas (1998), Jensen (1998) and Hofmeyr (2000) have worked on the estimation of a general earnings function. Moll (1993), Schulz and Mwabu (1997), Hofmeyr and Lucas (1998), Azam and Rospabe (1999) and Hofmeyr (2000), Michaud & Vencatachellum (2001) have focused on the effects of unions on wage earnings and compared wage earnings between African and White workers with union status.

All of these studies show significant positive earnings differentials for African unionised workers compared to comparable non-unionised workers. This study will focus on the African male workers in South Africa using October Household Survey data (1995). The focus is on earnings inequality rather than differences in levels. The method of measuring union inequality effects follows a decomposition technique introduced by Fields (1998).

Chapter 3. Preliminary data analysis in a trade union model

The dominant empirical effect of trade unions that has been studied by economists is their effect on average wages differentials. In this section, major sources of wage differences, such as education, location, gender and occupation will be discussed. It is worth doing this because no analysis of trade unions can be undertaken without including and controlling for the effect of these variables on earnings. The review highlights union and non-union differences in these variables. A comparison of the differences in the above variables between African unionised and African non-unionised workers will be presented. There are 5385 and 10098 observations in the union data set and non-union data sets, respectively.

3.1 Education

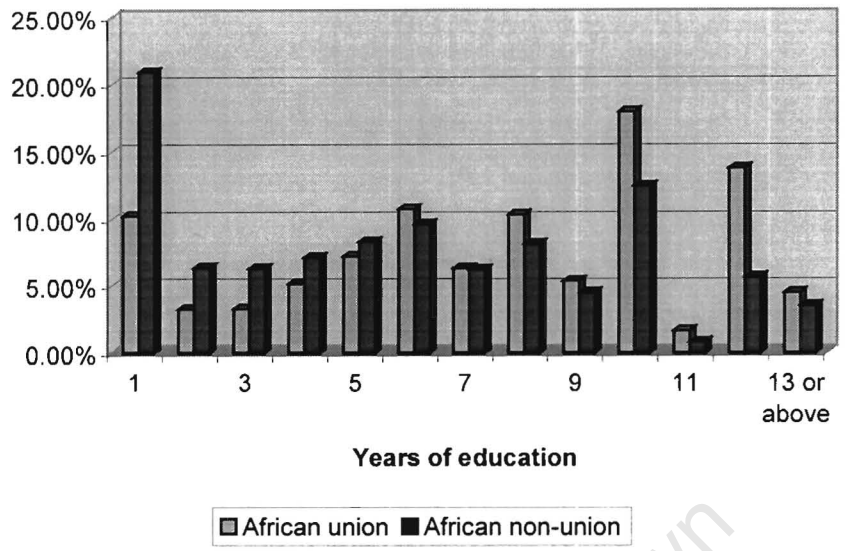
Education is always regarded as a significant determinant of earnings. If we simply set up an earnings function with education and experience as independent variables, then the relative rates of return on investment in formal schooling are as follows:

$$LnY = a + bS + cEx + dEx^2$$

In this function, Y refers to the gross monthly labour market earnings, S represents the number of years of schooling of individuals, and Ex stands for actual experiences. The Ex^2 term allows for a geometric age-earnings profile. The coefficient of years of schooling, b, is considered as the private rate of return to one year of schooling.

Racial differences in education levels are believed to have played a crucial role in the determination of occupations and wage levels in South Africa. Due to the former apartheid system, a large number of African people were unable to access higher education. This has caused big earnings and occupational gaps between different races. Even so, within the African group, the differences in education are still high between unionised and non-unionised workers. Graph 3 shows the above difference.

Graph 3. Years of education for African union and non-union workers



Source: OHS95 data

From the above graph, generally, from 1 to 5 years of education, the percentage of completed years of education for African non-union workers is more than union workers. However, since 6 years of education, the percentage of completed years of education for African union workers is more than non-union workers. On average, African union workers have higher educational level than non-union workers.

Since education is a major human capital investment that will determine people's future earnings, the shortcomings in South Africa's education system have therefore contributed to the earnings inequality in this country.

3.2 Location

Location is considered as another potential cause of wage inequality. Due to the former racist system, most Africans were restricted to stay in rural areas with limited economic possibilities. It will take a number of years to rectify this situation. The following table compares the different locations for African union and non-union workers using OHS95 data.

Table 9. Locational differences between African union and non-union workers

Type of areas	Unions			Non- unions		
	Number of observations	%	Cumulative %	Number of observations	%	Cumulative %
Urban town	2698	50.10	50.10	3438	34.05	34.05
Urban inf	232	4.31	54.41	414	4.10	38.15
Urban hostel	335	6.22	60.63	82	0.81	38.96
Urban institution	19	0.35	60.98	19	0.19	39.15
Suburb town	83	1.54	62.53	97	0.96	40.11
Suburb inf	82	0.59	63.12	101	1.00	41.11
Suburb hostel	57	1.06	64.18	23	0.23	41.33
Suburb institution	0	0	64.18	8	0.08	41.41
Rural town	111	2.06	66.24	185	1.83	43.25
Rural village	119	2.21	68.45	294	2.91	46.16
Rural tribal	1127	20.93	89.38	2223	22.01	68.17
Rural inf	20	0.37	89.75	35	0.35	68.52
Rural hostel	269	5.00	94.75	161	1.59	70.11
Rural institution	2	0.04	94.78	15	0.15	70.26
Rural farms	275	5.11	99.89	2995	29.66	99.92
Tribal	6	0.11	100	8	0.08	100
Total	5385	100	100	10098	100	100

Source: OHS, 1995

According to table 9, the percentage of African union members that live in urban areas is much higher than non-union workers at 60.98 and 39.15, respectively. In rural areas, there is about 58.5 % of non-unionised workers compared to 35.71 % for unionised workers.

3.3 Gender

Most societies have large differences between males and females in terms of social and economic roles. Women have spent a greater proportion of their time taking care of children and doing housework. This has generally entailed a sacrifice in terms of the accumulation of human capital and the development of their careers.

The issue of gender discrimination is also unavoidable in the South African labour market. Although such discrimination has reduced during the restructions of labour market, it still exist at some levels.

According to OHS95 data, men make up 67% of union membership, and women 33%. This is because of the fact that men hold most of the formal sector jobs, and women are in most of the non-unionized and informal sector jobs.

Table 10. Male and female participation in major sectors by union and non-union groups.

Major Sectors	**Male**		**Female**	
	Union Members	Non-union Members	Union Members	Non-union Members
Agriculture, hunting, forest and fishing	186 (5.09%)	2567 (37.66%)	60 (3.46%)	578 (17.62%)
Mining and Quarrying	700 (19.16%)	248 (3.64%)	14 (0.81%)	23 (0.70%)
Manufacturing	745 (20.39%)	629 (9.23%)	294 (16.97%)	341 (10.39%)
Electricity, gas and water supply	59 (1.62%)	76 (1.11%)	2 (0.12%)	10 (0.30%)
Construction	136 (3.72%)	518 (7.60%)	5 (0.29%)	24 (0.75%)
Wholesale and retail trade, repair of motor vehicle, hotel and restaurants	333 (9.12%)	816 (11.97%)	265 (15.30%)	747 (22.77%)
Transport, storage and communication	256	320	25	41

	(7.01%)	(4.69%)	(1.44%)	(1.25%)
Financial intermediation, insurance real estate and business services	92 (2.52%)	228 (3.34%)	20 (1.73%)	135 (4.11%)
Community, social and personal service	1145 (31.37%)	1415 (20.76%)	1037 (59.87%)	1882 (42.12%)
Total	3653 (100%)	6817 (100%)	1732 (100%)	3281 (100%)

Source: OHS, 1995.

Table 10 shows a comparison of sectoral occupations between union and non-union workers for males and females. For males, unionized workers are mainly distributed in the sectors of community, social and personal service (31.37%), manufacturing (20.39%) and mining and quarrying (19.16%), compared to the first three major sectors of non-unionised workers in agriculture, hunting and fishing (37.66%), community, social and personal service (20.76%) and wholesale and retail trade (11.97%). For females, the first major sector is community, social and personal service sector in both union group (59.87%) and non-union group (42.12%). The second and third major sectors are manufacturing (16.97%) and wholesale and retail trade (15.30%) for the unionised group, and wholesale and retail trade (22.77%) and agriculture, hunting, foresting and fishing (17.62%) sectors for the non-unionised group.

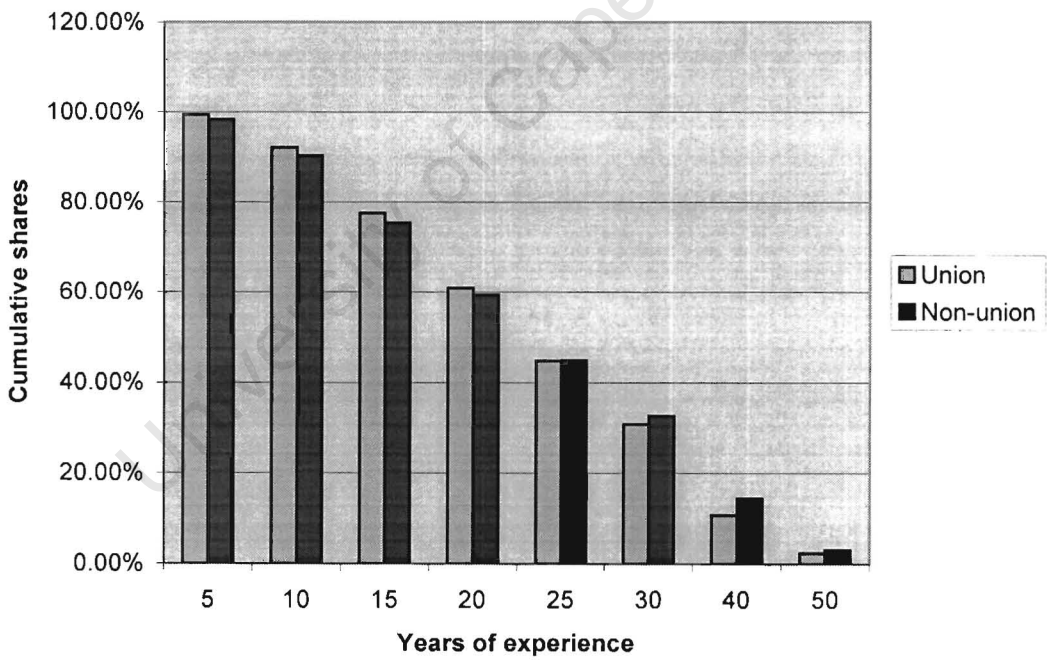
3.4 Experience

Some studies have worked on the relationship between unionism, wages and worker skills. Freeman (1980) argued that, for union members, lower-skilled workers receive a larger premium relative to their alternative nonunion wage, since unions can standardize wages by reducing wage differences across and within job positions.

The conventional view on the relationship between union status and skills is that the existence of a union premium encourages skill upgrading as employers select high-ability workers from the union queue, as argued by Freeman (1984), Robinson (1989) and Lemieux (1993). However, recently, some economists argued that the above view

could be wrong. For example, Wessels (1994) showed that a union wage premium could decrease, increase or leave worker skills unchanged. In Wessels' model, union employers may choose to hire lower skilled workers, since unions would respond to better-quality workers by raising wages even more. Furthermore, Hirch and Schumacher (1998) also argued that union wage effects do not necessarily cause skill upgrading. It seems that, according to the empirical literature, union wage effects are highest for workers with low levels of measured skills, and lowest among workers with high measured skills (Wessels, 1994). Within unions, a uniform union tax on wages may cause an upgrade of ability among lower-skill workers but not necessarily among high-skill workers. Hirsch and Schumacher (1998) have also proved that unions both seek and acquire larger proportional wage increases for low-skill than high-skill members. If skill homogeneity appears within unions, union wage premiums are highly similar for workers with different skill levels.

Graph 4. Proportional years of experience for union and non-union workers



Source: OHS, 1995

Graph 4 compares the level of years of experience between union and non-union groups. It seems that, for the workers with less than 20 years, the percentage is higher in union sector than in the non-union sector, with 60.89% and 59.41%. The inverse

situation happens to the workers that have more than 20 years experience. For example, approximately 32 percent of non-unionised workers have more than 30 years experience, compared to 30.86 percent in the union sector.

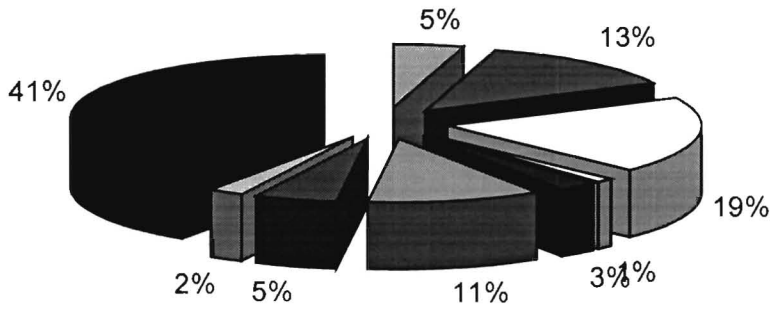
Some studies also suggested that unions tend to reduce the overall dispersion of wages in the economy (Lemieux, 1998). The overall effect of unions on wages depends both on the effect of unions on wages of different types of workers and on which types of workers tend to be unionized. Therefore, we may expect that union jobs are particularly desirable in the union sector. On the contrary, high-skill workers have a comparative advantage in the nonunion sector (Lemieux, 1998).

3.5 Sector

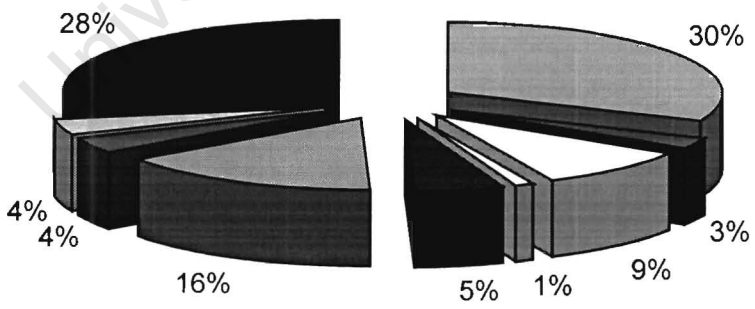
As mentioned above, African workers are more unionised in the public sector. In the union group, social services, manufacturing and mining are the top three sectors with 40.54%, 19.29% and 13.26% respectively. On the contrary, non-union workers are mainly allocated in agricultural and fishing, social services, wholesale and retail trade, construction and manufacturing sectors. The highest division in the non-union group is agricultural, hunting and fishing sector, with a share of 31.14%. The second and third largest divisions are social services and wholesale sectors, with 27.7% and 15.48% respectively. The comparison of divisions in sectors between African union and non-union workers is shown in graph 5.

Graph 5. Sectoral distribution between union and non-union groups.

Union sector



Non-union sector



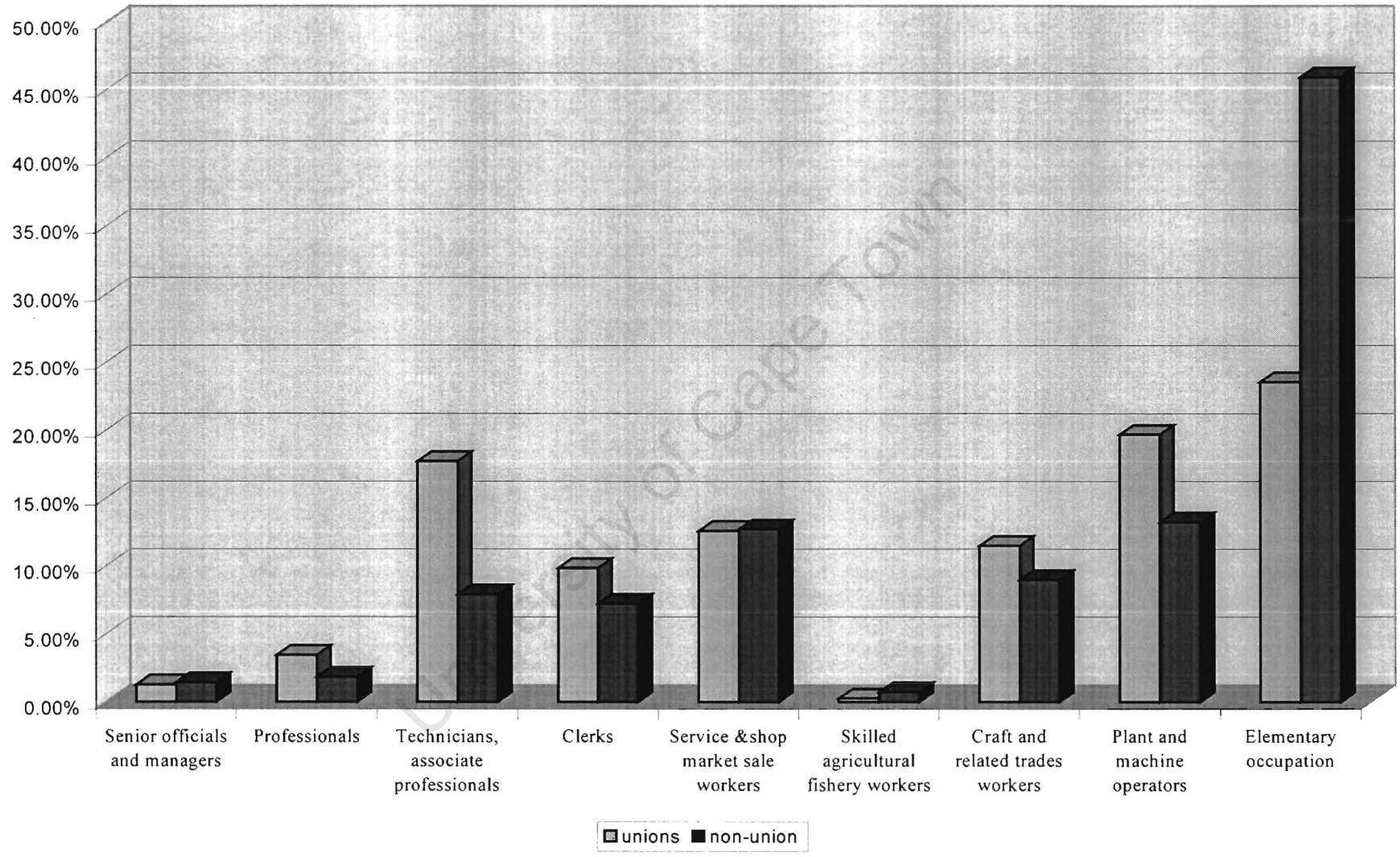
Source: OHS, 1995.

The above information proves that the unionisation rate is high in the public sector and in manufacturing. Within non-union sector, agricultural, forest and fishing sectors are the least occupied sectors.

3.6 Occupation

Occupation is also a significant determinant of earnings. Workers get different earnings returns from participation in different occupations. In OHS95, there are nine major occupational groups. The distributions of workers in these occupational groups are presented in graph 6. In the union sector, the largest occupation is elementary occupations, with 23.57%. It has the same position in the non-union sector, with 45.94%. The second and third major occupations are plant and machine operators, technicians and associate professionals in union sector; and plant and machine operators, service & shop market sale markets in non-union sector, respectively. The details are shown in graph 6.

Graph 6 Occupational distribution between union and non-union sectors



This chapter has presented the significant factors that may influence earnings and highlighted the differences across these factors between unionised and non-unionised workers. While there is no absolute divide between unionised and non-unionised members by gender, it is clear that certain occupations, skills and sectors have more union members and the impact of unions on earnings can also differ across these groups.

The next chapter tries to control for a number of these possibilities in a multivariate analysis of the influence of unions on earnings inequality.

Chapter 4. The decomposition of the effect of trade unions on the inequality of wage earnings

Chapter 3 introduced the variables that are regularly included in a general earnings function model for the formal sector. It also briefly compared the differences between union and non-union sectors for these variables. This chapter presents an empirical analysis of union's effects on inequality of wage earnings. The following steps will be followed:

- Estimating a general earnings function with a union dummy and assessing the contribution of the union dummy to inequality of earnings.
- Estimating earnings with a union dummy variable and union interactive dummy variables for education, experience, hours and gender and then assessing the joint contribution of all of these union variables to inequality.
- Estimating two equations for union and non-union sectors, with the comparison of the contribution to inequality from different variables between union and non-union sectors.

Before estimating the earnings function, a priori expectation would be that unions would have a significant role in the reduction of the inequality between their members. Much literature has shown that unions can achieve their goal by raising the wages of workers at the bottom, or by equalizing the wages of their members (Fields, 1998). The method of decomposition that we will use has been used by Fields (1998) to test the effect of union on inequality in Korea between 1986 and 1993. He found that the union contribution was 0.2% in 1986 and 1.4% in 1993. He used this to conclude that unions contributed just a little to the level of labour income in Korea and to the reduction in labour income inequality in Korea between 1986 and 1993. On the other hand, education, potential experience, industry and occupation made more important contributions. Among them, education was found as the variable that had the largest share of the decrease in labour income inequality (Fields, 1998). The following sections of this chapter conduct this same decomposition on South African data and analyse the results.

4.1 A general earnings equation with a union dummy

Economists have done a fair amount of work on the inequality of wage-income using different regression models (Fields, 1998). Most often, the log-form of earnings has been used as the dependent variable. This is due to the fact that the variance of the log of earnings is an established inequality index.

Fields (1998) builds on this body to derive a new methodology of accounting for income inequality and its change. "It can exactly compare how much is the difference in income inequality between one country and another, between one group and another within a country, or between one date and another that is accounted for by those explanatory factors". (Fields, 1998, 2). He starts with an earnings function as shown in equation 3.

$$\ln(Y_i) = \alpha_1 + \Sigma\beta_j X_{ij} + \varepsilon \qquad (3)$$

In the above equations, $\ln(Y_i)$ denotes the log form of wage earnings, α_1 is the constant term, ε is the error term. β_j is the coefficient of each variable, X_{ij} is the variable, such as education, location and race groups. The term, $\Sigma\beta_j X_{ij}$, explains the sum of the effects of all explanatory variables on log wage earnings.

Fields describes (3) as an earnings generating function and rewrites it as

$$\ln Y_i = \Sigma a_j z_{ij} = a' Z \qquad (4)$$

(Where z now includes the unexplained residual along with the constant and all of the explanatory variables.)

Fields goes on to show that the variance of log earnings can be written as

$$\mathrm{Cov}\left[\sum_{j=1}^{j+2} a_j Z_j, \ln Y\right] = \sum_{j=1}^{j+2} \mathrm{cov}\left[a_j Z_j, \ln Y\right] \qquad (5)$$

Using equation 5, Fields goes on to show that if $s_j(\ln Y)$ is defined as the share of the log-variance of earnings, which is attributable to the j'th independent variable, the decomposition of the log-variance of earnings could be explained as (Fields, 1998)

$$S_j=\text{cov}[a_j Z_j, \ln Y] / \sigma^2 (\ln Y) = \frac{\alpha_j * \sigma (Z_j) * \text{cor}[Z_j, \ln Y]}{\sigma (\ln Y)} \quad (6)$$

(Where σ^2 equals the variance of log earnings.)

As the log variance is a well known measure of inequality, from equation 4, we can find the percentage contribution of the j'th variable to total earnings inequality. For the explanatory variables that enter the earnings-generating functions as simple variables, for example, years of education and a dummy variable for gender or union membership, each of the components on the right hand side of equation 7 has this straightforward interpretation.

The starting point for the decomposition in equation (4) is to estimate an earnings function. This function includes the variables discussed in chapter 3, such as education, experience, experience-squared, hours of work, gender, sector and occupation and province. Union is treated as a dummy variable in this earnings equation. Education, experience, experience-squared and hours are present as continuous variables. Gender, province, occupation and sector are generated as sets of dummy variables. The default variables for the dummy variables are female for gender, Northern Cape for province, skilled agricultural and fishery workers for occupation and construction for sector, respectively. For union dummy, non-unionised worker is set as the default. The general equation is shown as follows:

lnY= f (Union, Education, Experience, Experience(square), Hours of work,
Gender (set of dummies), Province (set of dummies),
Occupation (set of dummies), Sector (set of dummies))

The results from the regression are shown in table 11. The contribution of each variable to inequality is calculated by using the decomposition methodology of equation 6.

Table 11. Estimation results for a general earnings equation with union dummy.

Variables	All African workers Standard deviation σ(lnY)= 1.146			
	Coefficient	**Correlation (lnY, variable)**	**Standard Deviation of factor**	**Contribution to earnings inequality**
Unionised sector	0.1128873*	0.252	0.586	0.023
Education	0.1208006*	0.422	3.89	0.108
Experience	0.0294955*	-0.079	11.73	-0.008
Experience-square	-0.0002878*	-0.086	667.592	
Hours	0.0045327*	-0.104	11.531	0.000
Gender *(Female default)*	0.2696163*	0.002	0.360	0.000
Province *(Northern Cape default)*				
Western Cape	0.1914717*			0.024
Eastern Cape	-0.128097			
Free State	-0.1571619*			
Kwazulu-Natal	0.3049573*			
North West	0.0396258			
Gauteng	0.282698*			
Mpumalanga	0.1905683*			
Nothern Province	0.2571335*			
Occupation ***(Skilled agricultural and fishery workers default)***				
Legislators, senior officials and managers	0.4200351*			0.088
Professionals	0.1765441**			
Technicians and associate professionals	0.022717			
Clerks	-0.1540001			
Service workers and shop market sales workers	-0.3635185*			
Craft and related trades workers	-0.2418547*			
Plant and machine operators and assemblers	-0.4427048*			
Elementary occupations	-0.5530092*			
Sector ***(Construction default)***				
Agriculture, Hunting, Forestry and fishing	-0.4272183*			0.098
Mining and Quarrying	0.2460644*			
Manufacturing	0.155706*			
Electricity, Gas and Water supply	0.4350356*			
Wholesale and retail trade	-0.0227482			
Transport, storage and communication	0.28453*			
Financial, intermediation, insurance, real estate and business services	0.2622661*			
Community, social and personal service	0.174477*			
Residual	5.691655*			0.672

*Note: *significant at 1% level, **significant at 5% level.*

Table 11 shows that, among the variables in the general earnings equation, education, sector and occupation have the highest contribution to inequality, with 10.8%, 9.8% and 8.8%, respectively. The joint contribution of experience and experience squared is –0.8%, which means that experience helps to reduce inequality by 0.8 %. Union's contribution is 2.3%. This means that 2.3 % of overall earnings inequality is due to the earnings inequality between unionised and non-unionised workers. This represents a larger effect of unions on earnings inequality than the result found by Fields at 0.2% and 1.4% in 1986 and 1993 respectively. But it is still a small contribution compared to other variables.

Table 11 also shows that the composite effect of union membership on earnings inequality is made up of:

- An average premium of about 11 percent for union members over non-union as reflected in the coefficient estimate.
- A fairly low correlation (0.252) between union status and the distribution of log earnings. In other words, it is not simply the case that all non-unionised workers are the lowest earners and unionised are the highest.
- A low standard deviation of the union variable. This is due to the fact that the variable is dummy.

This can be contrasted to the high overall contribution of education (10.8%). This is due to a high coefficient (12.8 percent), a high correlation (0.422) between levels of education and levels of log earnings and a high standard deviation of education (3.89).

4.2 A general earnings equation with a set of union interactive variables

The same inequality decomposition is now repeated but the impact of unions is broadened in the earnings function by including a single union dummy variable and some interactive variables to show the interactive effects of unions and other variables. In the following equation, the interactive dummy variables are generated between union and some variables. For example, the interactive variable union*education denotes the interactive effect of union and years of education. Based

on the earnings equation in 4.1, the interactive variables that are included in this model are presented as follows:

lnY= f (Union, Education and union, Experience and union,
experience (square) and union, Hours of work and union, Gender and union,
Education, Experience, Experience(square), Hours of work,
Gender (set of dummies), Province (set of dummies),
Occupation (set of dummies), Sector (set of dummies))

The results of the regression are shown in the following table 12.

Table 12. Estimation of results for a general earnings equation with union interactive variables.

Variables		All African workers Standard deviation σ(lnY)= 1.146			
		Coefficient	Correlation (lnY, variable)	Standard Deviation of factor	Contribution to earnings inequality
Unionised sector		0.4350663*	0.353	0.487	0.078
Union interactive variables	**Union*Education**	0.0229782*	0.288	6.966	0.054
	Union*Experience	0.0147469*	-0.193	23.415	-0.035
	Union*Experience square	-0.0002166**	-0.53	1212.863	
	Union*Hours	0.0002319	-0.247	29.803	-0.016
	Union*Gender	-0.0473144	-0.154	1.018	0.011
Education		0.0299088	0.422	3.89	0.035
Experience		-0.0046853	-0.079	11.73	-0.003
Experience-square		0.0001789	-0.086	667.592	
Hours		-0.0013539	-0.104	11.531	0.005
Gender ***(Female default)***		0.151315*	0.003	0.367	0.000
Province ***(Northern Province default)***					
Western Cape		0.790331			0.024
Eastern Cape		-0.340246*			
Northern Cape		-0.3755486*			
Free State		-0.4814196*			
Kwazulu-Natal		-0.108878			
North West		-0.2499614*			
Gauteng		-0.0901502**			
Mpumalanga		-0.1777916*			
Occupation ***(Legislators, senior officials and managers)***					
Professionals		0.445454			0.083
Technicians and associate professionals		-0.1051232			
Clerks		-0.371212*			
Service workers and shop market sales workers		-0.5344603*			
Skilled agricultural and fishery workers default		-0.6083908*			
Craft and related trades workers		-0.4959233*			
Plant and machine operators and assemblers		-0.5079256*			
Elementary occupations		-0.7025432*			
Sector ***(Financial, intermediation, insurance, real estate and business services)***					
Agriculture, Hunting, Forestry and fishing		-0.7737473*			0.095
Mining and Quarrying		-0.0995438			
Manufacturing		-0.1493492**			
Electricity, Gas and Water supply		0.2564938*			
Construction default		-0.2345915*			
Wholesale and retail trade		-0.3107333*			
Transport, storage and communication		0.0231886			
Community, social and personal service		0.525536			
Residual		8.031191*	0.819	0.938	0.67

*Note: *significant at 1% level, **significant at 5% level.*

According to the results in table 12, the contribution of most variables to earnings inequality has changed. With the inclusion of interactive variables, the contribution from education decreases from 10% to 3.5%. The contribution from the joint effect of experience and experience (square) decreases in the absolute value by -0.3%. Hours has increased its contribution from zero in table 12 to 0.5%. The contribution of the union dummy variable has increased significantly from 2.3% to 7.8%. This is due to the fact that the union coefficient has jumped to 0.435 in this estimation. The effect of gender and Province remain the same. Occupation and Sector both decreased by 0.5% and 0.3%. Among the interactive variables, union with education, union with experience square and union with gender have positive contribution to earnings inequality, while union with experience and with experience (square) and union with hours have negative contribution. 'Union and education' has the highest contribution among the interactive variables, with a 5.4% contribution to earnings inequality. This implies that, with the inclusion of union interactive variables, the union's contribution to inequality has increased significantly. If we add the contributions of all union interactive variables and union variable, the total contribution is 9.2 %. This contribution is almost 4 times the contribution without union interactive variables, which is 2.3 %. This result is also much higher than Fields's result.

The general regression equation approach does not show the difference of the share of each variable to the inequality of earnings between unionised and non-unionised sectors. In order to get this effect, it is necessary to specify separate union and non-union equations and then to compare the contributions of the individual variables to inequality. Fields (1998) has derived such a "difference decomposition". The next section goes on to apply this.

4.3 The theory of the difference decomposition

According to Fields's "differences equation" theory, equation 4 in section 4.1 can be rewritten as earnings equations for two groups; in this case union and non-union groups.

$$\ln(Y_{iu}) = \alpha_1 + \Sigma\beta_{ju} \; Z_{i\,ju} + \varepsilon_u \quad (7)$$

$$\ln(Y_{in-u}) = \alpha_1 + \Sigma\beta_{j\,n-u} \; Z_{i\,j\,n-u} + \varepsilon_{n-u} \quad (8)$$

If earnings inequality is assessed using equation 6, then further decomposition work can go on to compare the differences in income inequality between these union and non-union groups. This will answer the question of how much of the difference in inequality between one group and another is attributable to each earnings determinant.

One starts with the share of inequality formula of equation 6 for both the union and non-union groups. Then, to find out the sources of changing contributions of the various factors explaining earnings inequality, one looks at the percentage change in a variable's factor weight explained by the decomposition:

$$1 \approx \text{pctchng}(a_j)/\text{pctchng}(s_j(\ln Y)) + \text{pctchng}\,[\sigma\,(Z_j)]/\text{pctchng}(s_j(\ln Y)) + \text{pctchng}\,[\,\text{cor}[Z_j,\ln Y]/\text{pctchng}(s_j(\ln Y)) - \text{pctchng}[\sigma\,(\ln Y)]/ - \text{pctchng}\,[\sigma\,(\ln Y)] \quad (9)$$

or

$$1 \approx 2*\text{pctchng}(a_j)/\text{pctchng}(s_j) + 2*\,\text{pctchng}\,[\sigma\,(Z_j)]\,/\,\text{pctchng}(s_j) - 2*\,\text{pctchng}\,[\sigma\,(\ln Y)]/\text{pctchng}(s_j) \quad (10)$$

The above two equations are the results of the expressions for the change in jth explanatory factor's relative factor inequality weight (Fields, 1998). Fields argued that, in the case of falling inequality, the " j'th regressor contributes more to the decrease in inequality (a) the larger is the decrease in the regression coefficient on that factor and (b) the larger is the decrease in the standard deviation of that factor" (Fields, 1997, p20).

This section will emphasise the test of the different effects of some crucial variables on income inequality in two groups, union and non-union, using this method of decomposition.

4.4 The results of the differences decomposition

I start with two separate earnings-generating functions, for union and for non-union workers. Union is no longer a dummy variable. Therefore, in the following results, there will be two data groups, for union and non-union respectively as shown in the following equations.

lnY(u)= f (Education, Hours of work, Experience, Experience(square),
Sector (set of dummies), Occupation (set of dummdummies),
Gender (set of dummies), Province (set of dummies), $e_{i,u}$)

lnY(n-u)= f (Education, Hours of work, Experience, Experience(square),
Sector (set of dummies), Occupation (set of dummies),
Gender (set of dummies), Province (set of dummies), $e_{i,n-u}$)

There are 15483 observations from OHS95 data, among them 5385 observations belong to union group, and the rest 10098 belong to non-union group. Table 13 shows the results of the decomposition.

Table 13. Decomposition of earnings function between union and non-union groups (African workers).

Variables	Unionised workers (Gini 09736) (Log-variance 0.8483) Standard deviation σ(lnY)= 0.921				Non-unionised workers (Gini 0.9839) (Log-variance 1.4634) Standard deviation σ(lnY)= 1.146			
	Coefficient	**Standard Deviation of factor**	**Correlation of factor with lnY**	**Contribution to earnings inequality**	**Coefficient**	**Standard Deviation of factor**	**Correlation of factor with lnY**	**Contribution to earnings inequality**
Education	.0551403*	3.631	0.338	7.3%	0.0845615*	3.941	0.423	11.7%
Experience	0.0069427	11.103	-0.110	-0.9%	0.0279646*	12.095	-0.075	-0.8%
Experience-square	-0.0000020	626.885	-0.104		-0.0002791*	691.189	-0.081	
Hours	-0.0017838	9.753	-0.102	0.2%	0.0007117	12.484	-0.100	-0.1%
Male	0.1698544*			-0.1%	0.2539349*			-0.1%
Province								
Eastern Cape	0.1264709**			2.1%	0.361547*			2.9%
Northern Cape	0.0230556				0.0007882			
Free State	-0.0134487				-0.1893001**			
Kwazulu-Natal	0.2228087				0.2289206*			
North West	0.1946174				0.0575769			
Gauteng	0.2599406**				0.2535238*			
Mpumalanga	0.0379821				0.186886			
Nothern Province	0.4574892*				0.2894535*			

Table 13 (Continued)

Occupation								
Legislators, senior officials and managers	0.6426758*				0.727507*			
Professionals	0.6073808*				0.7980895*			
Technicians and associate professionals	0.447353				0.6602229*			
Clerks	0.141772				0.370883*			
Service workers and shop market sales workers	0.0843434			8.6%	0.1819677			7.9%
Craft and related trades workers	0.0638991				0.2160135			
Plant and machine operators and assemblers	0.1439276				0.143077			
Elementary occupations	-0.1459301				-0.0195959			
Sector								
Agriculture, Hunting, Forestry and fishing	-0.583526*				-0.7326231*			
Mining and Quarrying	-0.1759073*				-0.1027654			
Manufacturing	-0.0991863				0.0691981			
Electricity, Gas and Water supply	0.4074094*				-0.3023781*			
Construction	-0.1409405			4.2%	-0.3377947*			9.9%
Wholesale and retail trade	-0.2308448*				-0.0542138			
Transport, storage and communication	0.0886555				-0.1179033			
Community, social and personal service	0.0107583				-0.0795687			
Residuals	6.542186	0.817	0.887	78.6%	5.601606	1.002	0.828	68.6%

*Note: *significant at 1% level, **significant at 5% level.*

Table 13 shows the comparison of the static inequality decomposition results for the union and non-union groups. The standard deviation of the single variables, such as education, experience, experience (square) and hours are higher in the non-union group. Experience (square) has the highest standard deviation in both the union and non-union groups. The correlations of log earnings and single variables are mostly negative both in the union and non-union groups, for experience, experience (square) and hours, but positive for education. Education has a higher correlation with log earnings in non-union group than union group. This implies that union membership has dampened the impact of education in setting earnings levels. For experience, experience (square) and hours of work, the absolute values are higher in the union group than the non-union group. In both groups, education has the highest correlation with log earnings.

For the overall contribution to earnings inequality, education, province, sector have higher contributions in the non-unionised group than the unionised group. The joint effect of experience and experience (square), hours of work and occupation have higher contributions in unionised group than non-unionised group. Gender has the same contribution in both union and non-union groups.

The Gini coefficient is extremely high at 0.9736 and 0.9839, in both unionised and non-unionised groups, respectively. This could be due to the fact that we are using log earnings in the decomposition.

Table 14 shows the changes of the share of each variable to inequality.

Table 14. Relative inequality factor shares levels and changes.

Variables	Union Group sj	Non-Union Group sj	Change in sj Non-union - Union
Education	0.073	0.117	0.043
Experience	-0.009	-0.021	-0.012
Experience (Square)	0.000	0.013	0.013
Hours	0.002	-0.001	-0.033
Gender	-0.001	-0.001	0.000
Province	0.021	0.029	0.009
Occupation	0.086	0.079	-0.007
Sector	0.042	0.099	0.057
Residual	0.786	0.686	-0.100
Total	100%	100%	

Source: OHS, 1995

In table 14, the second and third columns refer to union and non-union data sets respectively. As mentioned earlier, $S_j(\ln Y)$ is known as the share of log-variance of income, then S_j denotes the decomposed log-variance of income.

The fourth column is the difference between union and nonunion groups, i.e. non-union minus union. It shows that, most of the variables have more effect on inequality in the non-union group than the union group. This is important as it implies that union membership is blocking inequalising impacts and, therefore, narrowing distribution of earnings.

The dummy variable block, such as occupation, seems to have very high share in both groups. It has nearly 8.6 % share in the union sector and 7.9 % in non-union group, which shows that occupation plays an important role in earnings inequality in both unionised and non-unionised groups, but plays a slightly higher role in the unionized sector. Economic sector almost doubles its contribution in non-union sector relative to

the union sector, with 9.9% and 4.2 % respectively. Experience, which is the composite of experience and experience squared, reduces inequality in both groups; by 2.1 % in nonunion group and 0.9 % in union group. Education has increased its contribution from 7.3% in union group to 11.7% in non-union group. The first three variables that have the largest shares of inequality are occupation, education, and sector, for the union group, and education, sector and occupation, for the non-union group.

Besides the general comparison of the share level of all the factors in the equation, the decomposition test also includes a series of tables that explain the decomposed contribution of each factor separately and more precisely using equation 10 (see more details in the appendix).

Since education has the highest contribution in both the union and non-union groups, it is necessary to analyze the results in detail. These results are presented in table 15.

Table 15. Decomposing the contribution of education to changing inequality.

	Union group	Non-union group
Factor Inequality weight (s_j)	0.073	0.117
Coefficient (a_j)	0.055	0.085
Standard deviation of education (σ_j)	3.631	3.941
Correlation of log(earnings) and education	0.338	0.423
Standard deviation of log (earnings)	0.921	1.210

Source: OHS 95

Table 15 shows that the values of the factor inequality weight in both years are 7.3% and 11.7%. This means that education's share in inequality is 7.3 % and 11.7 % in union and non-union sectors respectively. The standard deviations of log-income in those two sectors are 0.921 and 1.210, respectively.

However, the variables in the earnings model do not explain the inequality fully. We must recognize in both equations, a large proportion of the earnings inequality is not explained by the specified factors. For union sector and nonunion sectors, approximately 78.6 % and 68.6 % could not be explained by the above explanatory variables. Therefore, there is a lot that we do not know about earnings inequality.

Generally, this section has used a methodology of difference decomposition to test the hypothesis that most explanatory variables of income have more effects in the non-union sector. This also helps us to explain the fact that unions reduced the inequality of labour incomes for the union members.

Chapter 5. Conclusion.

In this paper, the effects of unions on workers' earnings and earnings inequality in the South African labour market have been discussed. It reviews available empirical work on earnings functions and unions. Many papers have estimated the earnings functions in order to ascertain the impact of unions on average earnings. This paper uses Fields' methodology to undertake an empirical decomposition of the unions' effect on earnings inequality in South Africa and to show the different effects between union and non-union sectors.

Education, experience, experience-square, hours of work, gender, province, occupation and sector are included in the earnings equation in this paper. The effect of trade unions on earnings inequality is analysed in three equations. The critical finding of this paper is that unions generally have a positive effect on the reduction of earnings inequality in the union sector.

The first equation is a general equation with a union dummy. The result from this equation shows that 2.3 percent of overall earnings inequality is due to the earnings inequality between unionised and non-unionised workers. Compared to the results found by Fields for Korea, with 0.2% in 1986 and 1.4% in 1993, our result is higher. With the inclusion of union interactive dummy variables in the second equation, 7.8 percent of overall earnings inequality is due to the earnings inequality between unionised and non-unionised workers. This result is much higher than the Fields' results. The union coefficient has increased from 0.113 in equation with only the union dummy to 0.435 in equation with union interactive variables. In the differences decomposition, two separate earnings functions are set for union and non-union groups, respectively. Among the independent variables, education, experience, experience-square, province and sector have more effect in the non-union group. In contrast, hours of work and occupation have slightly more effect in union group. Gender is found to have the same effect in both groups.

In addition, among the variables, occupation, education and sector have the most effect on earnings inequality. In non-union group, education, sector and occupation

have the most effect on earnings inequality. This shows that educational, occupational and sectoral status of workers has significant effect on their earnings and earnings inequality, for both unionised and non-unionised workers. Experience and gender have negative effects on earnings inequality for both the union and non-union groups. This means that experience and gender reduce earnings inequality.

International literature suggests that unions, in the long term, do not seem to have the power to increase the wages of union members relative to otherwise similar non-union workers unless they are highly organized in most firms or they are the monopoly in that industry. Unions also have direct (positive or negative) influences on workers' productivity. Unionism might be able to change the wage structure in an economy by skill type, worker mobility and employer selection, but not in the long run. However, although the effect of unions on wage differentials between unionised and non-unionised workers could be found, the wage gain from the unionism on the wage structure is still difficult to measure (Hirsch & Addison, 1986). In addition, people still need to be cautious in estimating union effects because of difficulties arising from the techniques of measurement, specification issues and data issues.

This paper showed much larger result than what Fields found. However, this does not imply that trade unions are the main cause of earnings inequality. Instead, there is a large unexplained residual in each empirical decomposition. The issues that have been discussed above show that, in the foreseeable future, we believe trade unions will continue to play an important role in South African economy.

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Appendix

The Differences decomposition log file from STATA output.

1) Variables that are included in the differences decomposition:

Dependent variable:
Log-earnings (lear)

Simple factors used in both groups:
Education (educ_c), Experience (exp), Experience squared (exp2),
Hours of work (hours).

Composite factors used in both groups:
Gender (gen), province (pro), Occupation (occup), Sector (sec).

2) Regression results.

Results for union group

Source	SS	df	MS	Number of obs = 5384
				F(29, 5354) = 50.17
Model	975.789409	29	33.6479107	Prob > F = 0.0000
Residual	3590.51672	5354	.67062322	R-squared = 0.2137
				Adj R-squared = 0.2094
Total	4566.30613	5383	.848282766	Root MSE = .81892

lear	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
educ_c	.0551403	.0048053	11.475	0.000	.04572	.0645607
exp	.0069427	.0045229	1.535	0.125	-.0019241	.0158095
exp2	-2.02e-06	.0000789	-0.026	0.980	-.0001567	.0001527
hours	-.0017838	.001191	-1.498	0.134	-.0041187	.0005511
gen1	.1698544	.0274136	6.196	0.000	.1161126	.2235962
gen2	(dropped)					
pro1	.1264709	.1441864	0.877	0.380	-.1561932	.409135
pro2	.0230556	.1363762	0.169	0.866	-.2442972	.2904084
pro3	(dropped)					
pro4	-.0134487	.1386285	-0.097	0.923	-.285217	.2583195
pro5	.2228087	.1352996	1.647	0.100	-.0424336	.488051
pro6	.1946174	.1366956	1.424	0.155	-.0733616	.4625964
pro7	.2599406	.1331118	1.953	0.051	-.0010127	.5208939
pro8	.0379821	.1386911	0.274	0.784	-.2339089	.3098731
pro9	.4574892	.1382067	3.310	0.001	.1865477	.7284306
occup1	.6426758	.2601983	2.470	0.014	.1325811	1.15277
occup2	.6073808	.2530823	2.400	0.016	.1112365	1.103525
occup3	.447353	.2456732	1.821	0.069	-.0342665	.9289725
occup4	.141772	.2451563	0.578	0.563	-.3388341	.6223781

occup5	.0843434	.2447442	0.345	0.730	-.3954549	.5641417
occup6	(dropped)					
occup7	.0638991	.2447482	0.261	0.794	-.415907	.5437052
occup8	.1439276	.2437502	0.590	0.555	-.3339219	.6217772
occup9	-.1459301	.2428456	-0.601	0.548	-.6220062	.3301461
sec1	-.583526	.0955274	-6.108	0.000	-.7707986	-.3962534
sec2	-.1759073	.0789557	-2.228	0.026	-.3306927	-.0211219
sec3	-.0991863	.0761709	-1.302	0.193	-.2485123	.0501397
sec4	.4074094	.1300958	3.132	0.002	.1523686	.6624502
sec5	-.1409405	.10058	-1.401	0.161	-.3381182	. 0562373
sec6	-.2308448	.0774045	-2.982	0.003	-.3825892	-.0791004
sec7	.0086555	.0850404	0.102	0.919	-.1580584	.1753693
sec8	(dropped)					
sec9	.0107583	.0733764	0.147	0.883	-.1330892	.1546058
_cons	6.542186	.2995394	21.841	0.000	5.954967	7.129406

Results for non-union group.

Source	SS	df	MS	Number of obs = 10090
				F(29, 10060) = 158.66
Model	4633.54768	29	159.777506	Prob > F = 0.0000
Residual	10130.9492	10060	1.0070526	R-squared = 0.3138
				Adj R-squared = 0.3119
Total	14764.4969	10089	1.4634252	Root MSE = 1.0035

lear	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
educ_c	.0845615	.0038941	21.715	0.000	.0769283	.0921948
exp	.0279646	.0035717	7.829	0.000	.0209634	.0349659
exp2	-.0002791	.0000614	-4.547	0.000	-.0003994	-.0001588
hours	.0007117	.0008477	0.840	0.401	-.00095	.0023735
gen1	.2539349	.0235757	10.771	0.000	.2077218	.300148
gen2	(dropped)					
pro1	.361547	.1058349	3.416	0.001	.1540894	.5690047
pro2	.0007882	.0983342	0.008	0.994	-.1919665	.1935428
pro3	(dropped)					
pro4	-.1893001	.0987543	-1.917	0.055	-.3828784	.0042781
pro5	.2289206	.0962059	2.379	0.017	.0403379	.4175033
pro6	.0575769	.0980792	0.587	0.557	-.134678	.2498318
pro7	.2535238	.0969626	2.615	0.009	.0634576	.4435899
pro8	.186886	.0992676	1.883	0.060	-.0076983	.3814703
pro9	.2894535	.0990788	2.921	0.003	.0952393	.4836677
occup1	.727507	.1406403	5.173	0.000	.4518238	1.00319
occup2	.7980895	.1398967	5.705	0.000	.523864	1.072315
occup3	.6602229	.1242494	5.314	0.000	.4166692	.9037766
occup4	.370883	.1229108	3.017	0.003	.1299533	.6118127
occup5	.1819677	.1207753	1.507	0.132	-.054776	.4187114
occup6	(dropped)					
occup7	.2160135	.1225039	1.763	0.078	-.0241186	.4561456

occup8	.143077	.1194766	1.198	0.231	-.091121	.3772751
occup9	-.0195959	.1166189	-0.168	0.867	-.2481922	.2090003
sec1	-.7326231	.0656197	-11.165	0.000	-.8612508	-.6039954
sec2	(dropped)					
sec3	-.1027654	.0677067	-1.518	0.129	-.235484	.0299532
sec4	.0691981	.1254154	0.552	0.581	-.1766411	.3150373
sec5	-.3023781	.0743029	-4.070	0.000	-.4480267	-.1567295
sec6	-.3377947	.0669492	-5.046	0.000	-.4690284	-.2065609
sec7	-.0542138	.0787944	-0.688	0.491	-.2086665	.1002388
sec8	-.1179033	.0789507	-1.493	0.135	-.2726624	.0368559
sec9	-.0795687	.0659951	-1.206	0.228	-.2089322	.0497948
_cons	5.601606	.174557	32.090	0.000	5.259439	5.943773

Income Variable: lear Base Year Comparison Year

Gini coefficient:	0.9736	0.9839
log-variance:	0.8483	1.4634

3) Relative factor shares (levels and changes).

	Base Year Sj	Comparison Year Sj	Change in Sj	Percentage Change in Inequality of lear Explained by Variable: Gini	Log-Variance
Variable					
educ_c	0.073	0.117	0.043	418	18
exp	-0.009	-0.021	-0.012	-112	-4
exp2	0.000	0.013	0.013	121	3
hours	0.002	-0.001	-0.003	-25	0
gender	-0.001	-0.001	0.000	4	0
province	0.021	0.029	0.009	84	4
occupation	0.086	0.079	-0.007	-60	7
sector	0.042	0.099	0.057	546	18
Residual	0.786	0.686	-0.100	-876	55

4) Decomposing contribution of each variable.

Decomposing Contribution of Education (educ_c)
to Changing Inequality of Log-earnings (lear)

	Value in : Base Year	Value in : Comparison Year	Percentage Change in educ_c's Factor Inequality Weight Explained By Decomposition: Eq. (8.f)	Eq. (8.h)
Factor Inequality Weight:	0.073	0.117		
coeff	0.055	0.085	93	186
stddev(educ_c)	3.631	3.941	18	36
corr(loginc,educ_c)	0.338	0 423	49	na
stddev(lear)	0.921	1.210	-60	-119
Total:			101	102

Decomposing Contribution of Experience (exp)
to Changing Inequality of Log-earnings (lear)

	Value in : Base Year	Value in : Comparison Year	Percentage Change in exp's Factor Inequality Weight Explained By Decomposition: Eq. (8.f)	Eq. (8.h)
Factor Inequality Weight:	-0.009	-0.021		
coeff	0.007	0.028	155	310
stddev(exp)	11.103	12.095	11	22
corr(loginc,exp)	-0.110	-0.075	-49	na
stddev(lear)	0.921	1.210	-35	-70
Total:			82	262

Decomposing Contribution of Experience-square (exp2)
to Changing Inequality of Log-earnings (lear)

	Value in : Base Year	Value in : Comparison Year	Percentage Change in exp2's Factor Inequality Weight Explained By Decomposition: Eq. (8.f)	Eq. (8.h)
Factor Inequality Weight:	0.000	0.013		
coeff	0.000	0.000	101	202
stddev(exp2)	626.885	691.189	5	10
corr(loginc,exp2)	-0.104	-0.081	-13	na
stddev(lear)	0.921	1.210	-14	-28
Total:			79	184

Decomposing Contribution of Hours of work (hours)
to Changing Inequality of Log-earnings (lear)

	Value in :		Percentage Change in hours's Factor Inequality Weight Explained By Decomposition:	
	Base Year	Comparison Year	Eq. (8.f)	Eq. (8.h)
Factor Inequality Weight:	0.002	-0.001		
coeff	-0.002	0.001	103	207
stddev(hours)	9.753	12.484	-5	-11
corr(loginc,hours)	-0.102	-0.100	0	na
stddev(lear)	0.921	1.210	6	12
Total:			104	208

Decomposing Contribution of Residual
to Changing Inequality of Log-earnings (lear)

	Value in :		Percentage Change in Residual's Factor Inequality Weight Explained By Decomposition:	
	Base Year	Comparison Year	Eq. (8.f)	Eq. (8.h)
Factor Inequality Weight:	0.786	0.686		
coeff	1.000	1.000	0	0
stddev(Residual)	0.817	1.002	-150	-300
corr(loginc,Residual)	0.887	0.828	50	na
stddev(lear)	0.921	1.210	199	398
Total:			99	99