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EARNINGS INEQUALITY IN AUSTRALIA IN THE 1980s AND 1990s

Jeff Borland and Steven Kennedy

DISCUSSION PAPER NO. 389

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EARNINGS INEQUALITY IN AUSTRALIA

IN THE 1980s and 1990s

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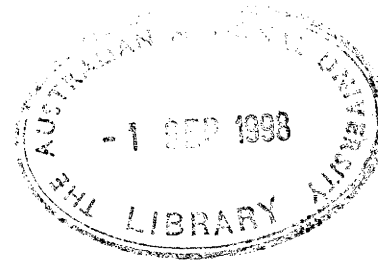
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CONTENTS

Summary

This study examines changes in earnings inequality for full-time employees in Australia between 1982 and 1994-95 using individual-level data from the ABS Income Distribution Survey. The main findings of the study are:

- Consistent with existing studies it is found that—using a weekly earnings measure and for a sample of full-time wage and salary earners aged 15-64 years - overall earnings inequality increased in Australia between 1982 and 1994-95 for both male and female employees. Analysis for disaggregated time periods reveals that most of the increase in inequality in the distribution of weekly earnings occurred between 1990 and 1994-95.
- Inequality in the distribution of weekly earnings increased by a far greater amount (particularly at the bottom of the earnings distribution) for a sample of employees aged 25-54 years than for employees aged 15-64 years. Changes in earnings inequality for samples of all employees and only full-time employees are shown to have been very similar.
- Inequality in the distribution of hourly wages changed by a similar amount to inequality in weekly earnings between 1982 and 1994-95. Changes in inequality in the distribution of annual earnings were much larger than changes in inequality of weekly earnings for male employees, but somewhat smaller for female employees.
- Disaggregated analysis of changes in inequality in the distribution of weekly earnings shows that changes in inequality have differed between workforce groups. Increases in earnings inequality have occurred for employees in the private sector but not in the public sector, and have been mainly concentrated in a subset of industry sectors - manufacturing, construction and transport/storage, wholesale/retail trade, and finance/property/business. Increases in earnings inequality have occured for both Australian-born and immigrant employees.
- Decomposition of the sources of changes in overall earnings inequality shows that increases in earnings inequality have primarily occurred due to increases in earnings inequality within groups of workers with the same educational attainment and potential years of labour market experience.

Earnings Inequality in Australia in the 1980s and 1990s

' "Part of me says maybe I should've gone for something higher..." These were the words of AMP Society chief executive George Trumbull on Thursday, after policyholders awarded him shares and salary worth $17.8 million over three years..."

('Australia: Business - Sultans of Salary' by Natalie Young, *The Sydney Morning Herald,* November 22, 1997)

1. Introduction

Together with increases in female labour force participation, growth in part-time employment, and a shift in the composition of employment from manufacturing to service sectors of the economy - an important development in the Australian labour market in the period since the mid-1970s has been an increase in inequality in the distribution of earnings. Following an international upsurge in interest in the topic of earnings inequality in the 1990s, a number of recent studies have documented how earnings inequality has increased in Australia, and have begun the task of explaining why those changes have occurred (for example, King et al., 1992, Gregory, 1993, McGuire, 1994, Borland and Wilkins, 1996, and Borland, 1997).

The motivation for seeking to understand how and why changes in earnings inequality occur is twofold. First, changes in earnings inequality can have important social consequences. Earnings from labour market activity constitute a large fraction of the total income of most families, and hence, changes in earnings inequality are likely to have implications for the distribution of income between families or households in a society. Second, developing an understanding of what factors have caused changes in the distribution of earnings can assist in understanding the evolution of other key labour market outcomes such as unemployment. For example, explaining why the relative earnings of low-skill workers have declined may also provide insights into why low-skill labour force participants have relatively high rates of unemployment.

The objective of this paper is to examine changes in earnings inequality in Australia between 1982 and 1994-95 using data from the ABS Income Distribution Survey (IDS) unit record files.[1] Its main original contributions are to:

- Extend analysis of earnings inequality using unit record data over a longer time period than previous studies.
- Examine changes in earnings inequality using alternative earnings measures - annual earnings, weekly earnings, and hourly wage.
- Examine changes in earnings inequality for alternative samples of employees - for example, full-time employees and both full-time and part-time employees.

- Analyse changes in earnings inequality for disaggregated workforce groups - By sector of employment, industry of employment, and country of birth.
- Apply a decomposition method to study the sources of changes in earnings inequality.

Section 2 of the paper provides further details on the data source for this study, and presents measures of changes in inequality in weekly earnings in Australia between 1982 and 1994-95. Section 3 extends the analysis of changes in earnings inequality to consider alternative earnings definitions, alternative samples of employees, and sub-periods between 1982 and 1994-95. Section 4 presents measures of changes in earnings inequality for disaggregated workforce groups. Section 5 provides a preliminary assessment of causes of changes in earnings inequality.

2. Data and Overview of Changes in Earnings Inequality

The data source used in this study is the unit-record files from the ABS IDS for 1982, 1986, 1990 and 1994-95. Data for the first three surveys were collected between October to December in the survey year; and data for the final survey were collected on a monthly basis throughout the 1994-95 financial year. Attention is restricted to a sample of workers aged 15-64 years who were employed full-time as wage and salary earners at the time of the survey. Over the four IDS periods the sample includes 22,844 male employees, and 10,998 female employees.[2]

The weekly earnings variable used in the study is current usual weekly earnings from main job. Employees with weekly earnings less than $60 per week in September 1982 dollars are excluded from the sample. Measures of real weekly earnings (and other earnings variables) are calculated using the Consumer Price Index. Benchmarking of the IDS against an alternative source of data on weekly earnings - the ABS Weekly Earnings of Employees Survey - reveals that estimates of changes in weekly earnings by decile position in distribution of earnings are highly correlated between the data sources. Further information on the benchmarking exercise, as well as on variable definitions and the approach followed for concording data from each IDS is presented in Appendix 1.

One problem with the weekly earnings variable from the IDS is that it excludes non-monetary compensation. Hence changes to the composition of employee compensation (monetary/non-monetary) may therefore affect the earnings measure even where there is no change in total employee compensaton. One circumstance where changes in the composition of compensation are likely to have occurred in Australia over the period examined in this study is following changes to taxation of

fringe benefits. Taxation of fringe benefits was introduced in the Commonwealth Budget of 1985 and in subsequent years a number of amendments to that legislation have been made. Each of these changes would be expected to have had the effect - predominantly for high-paid employees - of reducing the share of non-monetary payments in total employee compensation. Taxation of fringe benefits therefore means that measures of changes in weekly earnings inequality in Australia between 1982 and 1994-95 may over-estimate somewhat increases in inequality in total employee compensation.

In remainder of this section descriptive information on changes in earnings inequality between 1982 and 1994 is presented. Figure 1 shows the distribution of weekly earnings for full-time wage and salary earners in 1994-95 valued at December 1994 prices. Considerable dispersion is evident - for example, a male employee at the 10th percentile earns $371.75 per week whereas weekly earnings at the 90th percentile are $835.95; for females the comparable amounts are $325.72 and $786.78. For both groups dispersion is greater at the top of the distribution than the bottom - for example, for females the gap between the 10th percentile and the median is $166.44, whereas the gap between the median and the 90th percentile is $294.62. Finally, female employees can be seen to be disproportionately concentrated at earnings levels below about $400 per week, whereas males are disproportionately concentrated at earnings levels above $400 per week.

Figure 2 shows changes in log real weekly earnings between 1982 and 1994-95 by an employee's percentile in the distribution of earnings. Table 1 presents summary measures of changes in inequality in the distribution of log real weekly earnings. For example, the entry for '90-10 percentile difference' for males shows that the difference in log real weekly earnings between male employees at 10th and 90th percentiles increased by about 4.5 per cent between 1982 and 1994-95.

The results in Table 1 and Figure 2 confirm the findings of previous studies that overall earnings inequality (measured by changes in the standard deviation (SD), Gini coefficient, or coefficient of variation of log real weekly earnings) increased between 1982 and 1994-95. This increase in overall earnings dispersion is shown to have occurred for both male and female employeees, as well as for all employees.

For males it is evident that changes in log real weekly earnings are generally positively correlated with an employee's position in the distribution of earnings - although this positive correlation is stronger at the top than bottom of distribution of earnings. Hence, both the 90-10 and 75-25 percentile differences widen, and measures of overall dispersion - the SD and Gini coefficient - show increases in earnings inequality. For females changes in log real weekly earnings display a U-shaped pattern. The largest

Figure 1: Distribution of Real Weekly Earnings (Dec. 1994 dollars) - Full-Time Employees in Main Job - 1994-95

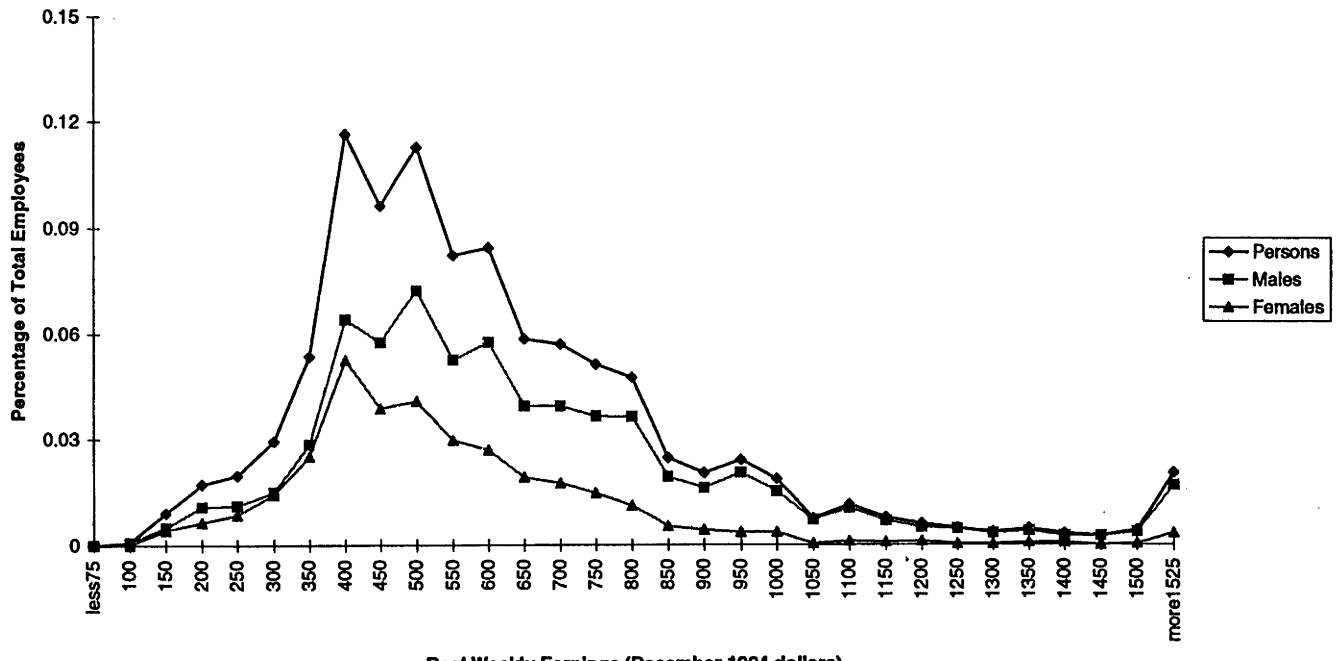

Figure 2: Change in Log Real Weekly Earnings by Percentile - Full-Time Employees in Main Job - 1982 to 1994-95

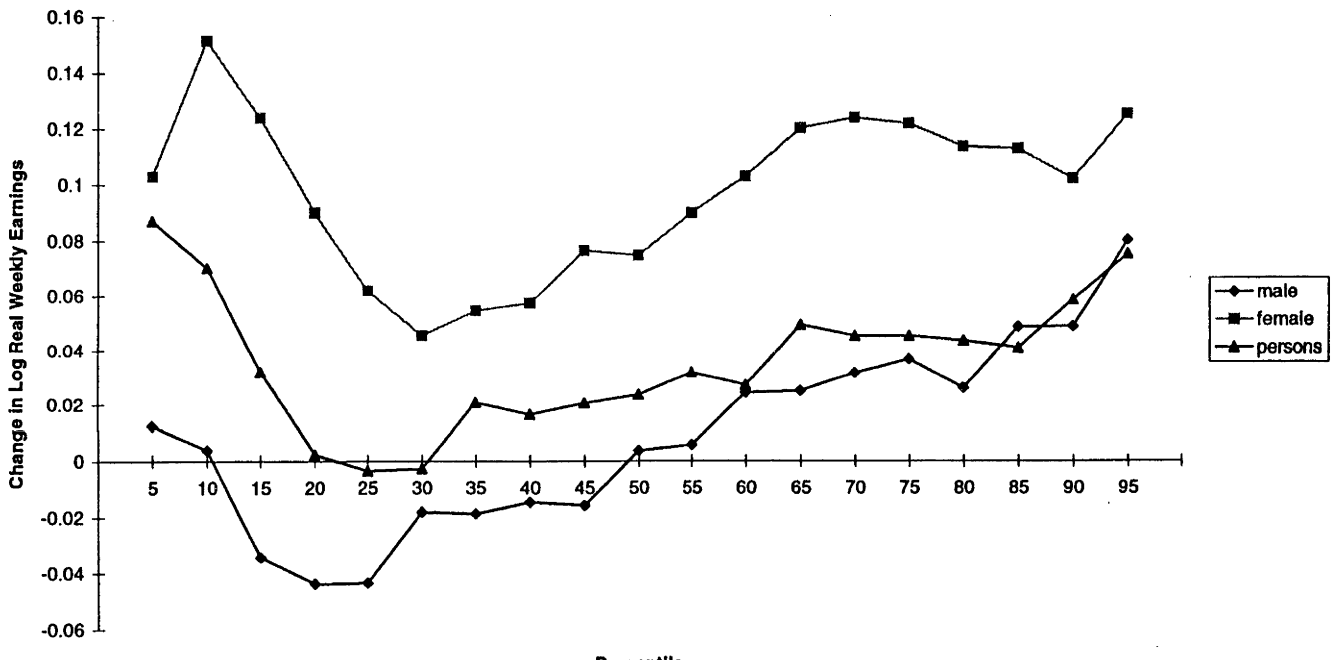

Table 1: Changes in Inequality in Log Weekly Earnings - Full-Time Employees in Main Job - 1982 to 1994-95

	Males	Females	Persons
Percentile Difference:			
90-10	0.0449	-0.0397	-0.0116
90-50	0.0449	0.0258	0.0343
50-10	0.0000	-0.0655	-0.0459
75-25	0.0804	0.0659	0.0487
75-50	0.0331	0.0492	0.0212
50-25	0.0473	0.0167	0.0275
Standard Deviation	0.0511	0.0372	0.0346
	(12.3%)	(10.3%)	(8.2%)
Gini Coefficient	0.0415	0.0253	0.0296
	(18.4%)	(13.1%)	(12.9%)
Coefficient of	0.0070	0.0042	0.0046
Variation	(25.9%)	(19.9%)	(16.6%)

growth in real weekly earnings occurred for females at the bottom and top of the distribution of earnings, with the smallest increase for employees at around the 30th percentile. Hence the 50-10 and 90-10 percentile differences in earnings for female employees narrow. However, increases in earnings dispersion occurred at other points of the distribution of earnings (90-50 and 75-25 percentile earnings differences) which explains why overall earnings dispersion increased. For persons little change occurred in the 90-10 percentile earnings difference, and the 75-25 percentile earnings difference and measures of overall earnings dispersion increased.

To conclude this section we provide a number of comments on how to interpret the evidence on changes in earnings inequality which has been presented in this section. A more general evaluation of issues in interpreting studies of changes in earnings inequality is provided in Borland (1997).

A first point concerns what inferences on the sources of changes in earnings inequality can be drawn from the findings. Changes in earnings inequality can occur either due to changes in relative earnings between existing jobs, or due to changes in the pattern of

net job creation at different points in the distribution of earnings. Distinguishing between these explanations is likely to be of some welfare significance. Unfortunately though, with a sequence of cross-section data sets of the type examined in this study, it is not possible to distinguish between these two possible causes of changes in earnings inequality.

A second point concerns whether inferences should be drawn from data on changes in earnings inequality for groups of male and female employees, or only for all employees. Previous studies of earnings inequality in Australia have examined outcomes for males and females separately, and generally have not aggregated those groups to consider whether earnings inequality has changed for all employees. However, recent research by Fortin and Lemieux (1996) has argued that since changes in earnings inequality for males and females may reflect redistribution of male and female employees between different types of jobs in the economy, as well as changes in earnings dispersion between those jobs, therefore it may be more appropriate to study changes in earnings inequality for persons rather than for males and females separately. For example, it is possible that even with an unchanged stock of jobs and wages - and hence unchanged distribution of earnings for the whole economy - redistribution of male and female employees between those jobs could cause an increase in earnings dispersion for each group of workers.

Information on changes in earnings inequality for all employees has been presented in Table 1. From this evidence it does not seem however that changes in earnings inequality for males and females can be attributed simply to redistribution of the existing stock of jobs. In the remainder of this paper we therefore follow the previous literature in examining changes in earnings inequality separately for males and females. This facilitates comparisons with previous research, and is most appropriate for analysis of the sources of changes in earnings inequality which requires earnings regressions to be estimated.

3. Changes in Earnings Inequality - Alternative Perspectives

This section provides a range of alternative perspectives on changes in earnings inequality which have occurred in Australia between 1982 and 1994-95. First, changes in earnings inequality are considered for the sub-group of workers aged 25-54 years. Second, changes in earnings inequality for sub-periods between 1982 and 1994-95 are examined. Third, alternative earnings measures - hourly wages and annual earnings - are used to calculate changes in earnings inequality. Fourth, inequality in earnings from all jobs, and for both full-time and part-time employees, is considered.

a. Alternative sample of employees

Studies of changes in earnings inequality often restrict attention to a group of workers regarded as 'permanent' or with a 'strong attachment' to employment (for example, Juhn et al., 1993). To examine the sensitivity of our findings to this type of restriction we examine changes in earnings inequality for the sub-group of workers aged 25-54 years. Focusing on this group of workers should remove any effects of selection bias on measures of changes in earnings inequality which might arise due to increases in school retention rates of young persons or in the rate of early retirement of older workers over the sample period.[3]

Table 2 presents summary measures of changes in inequality in log real weekly earnings for the full sample of employees and for a sub-sample of employees aged 25-54 years. Figures 3a and 3b show changes in log real weekly earnings by percentile position in the distribution of earnings for both samples of employees for male and female employees. Differences are evident in earnings outcomes between the alternative samples of employees. For both males and females changes in real weekly earnings are higher for the sample of all employees than for employees aged 25-54 years; most notably, for employees below the 30th percentile in the distribution of earnings. Differences in earnings outcomes between the alternative samples are also manifested in the summary measures of changes in overall earnings inequality. In particular, there is a much larger increase in the 50-10 percentile earnings difference for the sample of employees aged 25-54 years than for the sample of all employees. Changes in other percentile earnings differences are broadly similar between the alternative samples. The SD and Gini coefficient measures of overall earnings dispersion show larger increases for employees aged 25-54 years than for the whole sample of employees.

Why have earnings outcomes at the bottom of the distribution of earnings been worse for the sample of employees aged 25-54 years than for the whole sample of employees? To attempt to answer this question we study the age composition of the group of employees at the bottom of the distribution of earnings. Panel A of Table 3 presents information on the age distribution of employees in the bottom quintile of the distribution of earnings. It is evident that employees aged 15-24 years are the main age group in bottom quintile in both 1982 and 1994-95. But importantly, there has also been a significant decrease in the share of employment of that age group in the bottom quintile between those years - particularly for females. For example, between 1982 and 1994 the proportion of female employees aged 15-24 years in the bottom

Figure 3a: Change in Log Real Weekly Earnings by Percentile - Full-Time Employees in Main Job - Males - 1982 to 1994-95

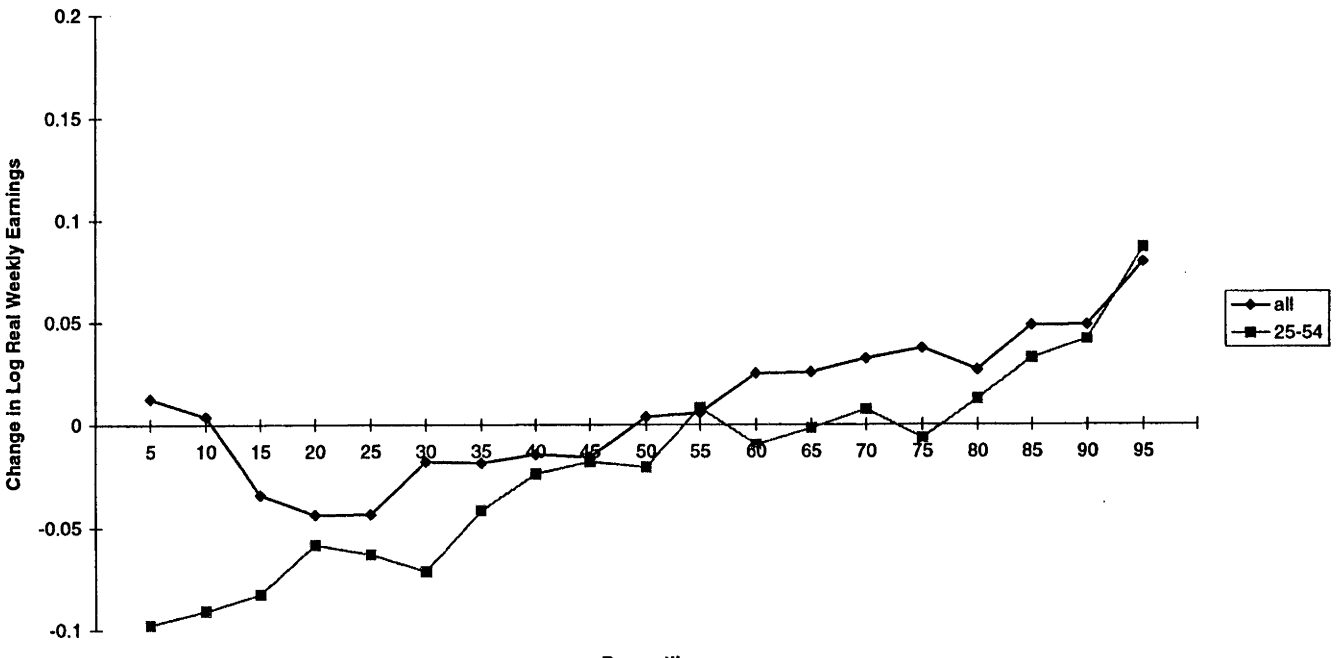

Figure 3b: Change in Log Real Weekly Earnings by Percentile - Full-Time Employees in Main Job - Females - 1982 to 1994-95

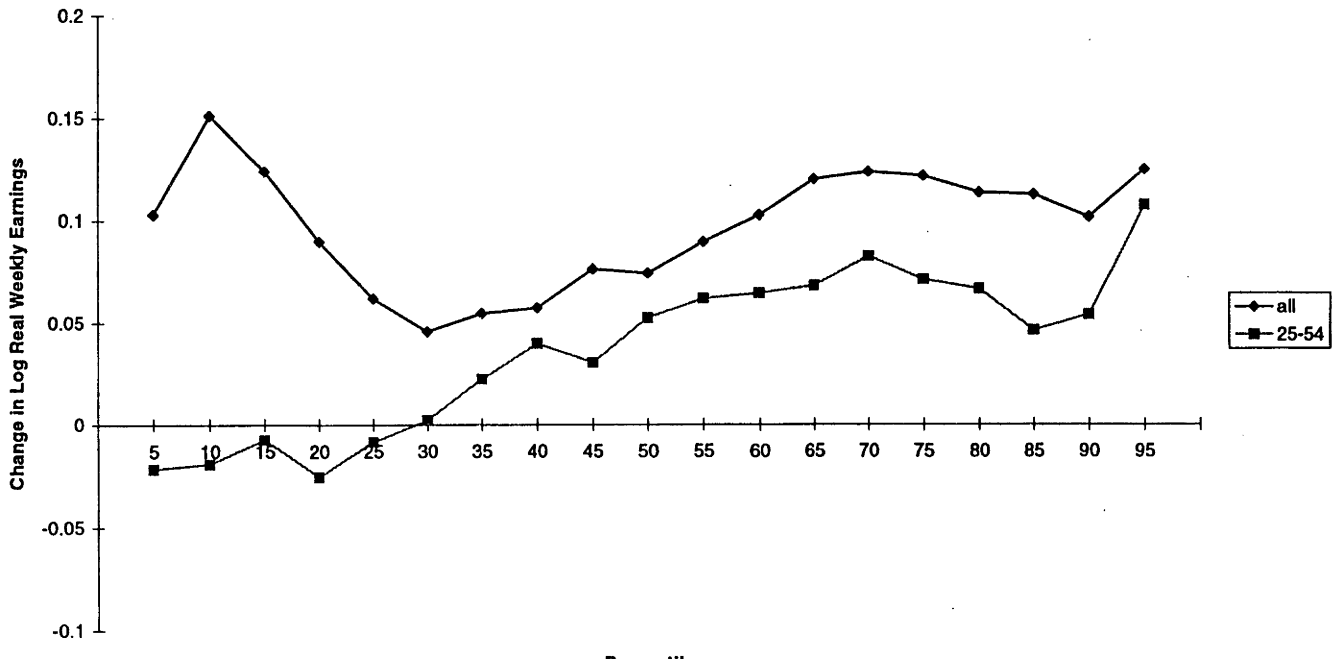

Table 2: Changes in Inequality in Log Weekly Earnings - Full-Time Employees in Main Job - Disaggregated Age Groups - 1982 to 1994-95

	Males:		Females:	
	All	25-54 years	All	25-54 years
Percentile Difference:				
90-10	0.0449	0.1324	-0.0397	0.0734
90-50	0.0449	0.0624	0.0258	0.0014
50-10	0.0000	0.0700	-0.0655	0.0720
75-25	0.0804	0.0566	0.0659	0.0799
75-50	0.0331	0.0143	0.0492	0.0187
50-25	0.0473	0.0423	0.0167	0.0612
Standard Deviation	0.0511	0.0623	0.0372	0.0603
	(12.3%)	(17.4%)	(10.3%)	(19.6%)
Gini Coefficient	0.0415	0.0518	0.0253	0.0359
	(18.4%)	(25.6%)	(13.1%)	(21.6%)

quintile of the distribution of earnings decreased from 78 per cent to 46 per cent. Part of the explanation for the decline in the proportion of younger employees at the bottom of the distribution of earnings is likely to be increases in school retention rates. Between 1982 and 1994 the apparent retention rate to year 12 in Australia increased from 32.9 per cent to 69.6 per cent for males, and from 39.9 per cent to 79.9 per cent for females.[4]

Decreases in the proportion of employees aged 15-24 years in the bottom quintile of the distribution of earnings suggest that compositional changes may explain why changes in the distribution of earnings differ for the alternative samples of employees. Panel B of Table 3 shows that employees aged 15-24 years in the bottom quintile of the distribution of earnings have lower average earnings than workers aged 25 years and above in the same quintile. Hence, the decline in share of employees aged 15-24 years in the bottom quintile of the distribution of earnings which occurred between 1982 and 1994-95 will have tended to increase the relative earnings of employees in that quintile. However, the same compositional effect will not be present for the sample of employees aged 25-54 years. Therefore, compositional effects which impact on relative weekly earnings outcomes for the whole sample of employees, but not to the same extent on the sample of employees aged 25-54 years, appear to

explain why changes in earnings inequality have differed between the alternative sample groups.[5]

Table 3: Age Composition and Average Weekly Earnings by Age - Bottom Quintile of Earnings Distribution - Full-Time Employees in Main Job - 1982 to 1994-95

A. Proportion of Employees in Bottom Quintile by Age:		
	1982	**1994-95**
Males		
15-24	0.57	0.39
25-34	0.15	0.21
35-44	0.10	0.18
45-54	0.10	0.14
55-64	0.08	0.08
Females		
15-24	0.78	0.46
25-34	0.06	0.20
35-44	0.07	0.19
45-54	0.06	0.13
55-64	0.01	0.02
B. Average Weekly Earnings of Employees in Bottom Quintile by Age (1994 $):		
	1982	**1994-5**
Males		
15-24	316.18	312.10
25-54	378.34	356.95
Females		
15-24	270.44	293.96
24-54	287.09	319.06

Table 4: Changes in Inequality in Log Weekly Earnings - Full-Time Employees in Main Job - Disaggregated Time Periods - 1982 to 1994-95

	1982 to 1986	1986 to 1990	1990 to 1994-95	1982 to 1994-95
Males - Percentile Difference:				
90-10	0.0405	-0.0396	0.0440	0.0449
90-50	0.0234	0.0060	0.0155	0.0449
50-10	0.0171	-0.0456	0.0285	0.0000
75-25	0.0187	0.0293	0.0324	0.0804
75-50	0.0107	0.0148	0.0076	0.0331
50-25	0.0080	0.0145	0.0248	0.0473
Standard Deviation	0.0022	0.0012	0.0477	0.0511
	(0.5%)	(0.2%)	(11.3%)	(12.3%)
Females - Percentile Difference:				
90-10	-0.0320	-0.0630	0.0553	-0.0397
90-50	0.0013	-0.0133	0.0378	0.0258
50-10	-0.0333	-0.0497	0.0175	-0.0655
75-25	0.0042	0.0311	0.0306	0.0659
75-50	0.0241	0.0055	0.0195	0.0491
50-25	-0.0199	0.0256	0.0111	0.0168
Standard Deviation	0.0045	-0.0149	0.0476	0.0372
	(1.2%)	(-4.0%)	(13.6%)	(10.3%)

The finding that measures of changes in earnings inequality differ for alternative samples of employees raises the issue of how to proceed in the remainder of the paper. Since we are interested in earnings outcomes for the whole workforce - and in order to enable comparisons with previous studies - it might be considered best to focus on results for the sample of employees aged 15-64 years. However, it is also the case that we would like our measures of changes in earnings inequality to capture situations where earnings inequality has changed due to changes in wage rates rather than due to changes in the composition of the workforce. For that reason it might be considered most appropriate to examine changes in earnings inequality for employees aged 25-54 years. In the remainder of the paper we adopt a combination of these approaches. Results for the full sample of workers are presented in the main text, but

as well, some results for the sample of employees aged 25-54 years are presented in Appendix 2.

b. Disaggregated time periods

Summary measures of changes in earnings inequality for 1982 to 1986, 1986 to 1990, and 1990 to 1994-95 are presented in Table 4. It is apparent that increases in overall earnings inequality are concentrated almost exclusively in the period between 1990 and 1994-95. Changes in earnings inequality in this sub-period appear to have occurred fairly evenly across the distribution of earnings. Between 1982 and 1990 there was little change in the measures of overall earnings inequality. However, examining the percentile difference measures it is evident that it was over this period that some narrowing of the gap between employees at the bottom and in higher ranges of the distribution of earnings occurred.[6]

Findings on changes in earnings inequality over the sub-periods for the sample of employees aged 25-54 years differ only slightly from the results for all employees (see Table A2.1). Analysis of the SD measure of overall inequality shows that changes in earnings inequality between 1982 and 1990 were slightly larger for the sample of employees aged 25-54 years than for the sample of all employees. However, similar changes in earnings inequality occurred for both samples between 1990 and 1994-95. Analysis of the percentile difference measures also shows little difference between the samples. For male employees the main difference is that there is a larger increase in the 50-10 and 90-10 percentile differences between 1986 and 1990 for the sample of employees aged 25-54 years compared to a decrease for all employees. For female employees the main difference between samples is similar. The 50-10 and 90-10 percentile differences widen between 1982 and 1990 for the sample of employees aged 25-54 years, whereas these differences narrow over that time for the sample of all employees.

c. Alternative earnings measures

Some criticisms can be made of using a weekly earnings measure to study changes in earnings inequality. First, a weekly earnings measure may not be sufficiently closely related to welfare considerations. For information on the distribution of earnings to be useful for welfare purposes it may be necessary to examine a longer-term measure such as annual earnings. Second, changes in inequality in weekly earnings need not be directly related to changes in the price of labour. Changes in inequality in weekly earnings can occur either due to changes in inequality in weekly hours of work or to changes in inequality in the hourly wage rate.

Changes in earnings inequality are therefore examined using these alternative earnings measures. Two approaches are adopted in this analysis. First, changes in the distribution of annual earnings and distribution of hourly wage rates are examined without reference to information on weekly earnings (unmatched). Second, changes in the distribution of annual earnings and distribution of hourly wages are examined where employees are classified according to their positions in the distribution of weekly earnings (matched). To implement this second method we calculate average annual earnings and average hourly wages in each sample year for employees in a ten percentile band around a specified percentile position in the distribution of weekly earnings. For example, for the 'matched' 10th percentile in hourly wages we take the average of hourly wages for employees in 5th to 15th percentiles of the distribution of weekly earnings in the respective sample year.

Summary measures for changes in earnings inequality using annual earnings and hourly wage measures - matched and unmatched to weekly earnings data - are presented in Table 5. It is only possible to calculate hourly wage measures for 1986 onwards, and hence changes in inequality in hourly wages are examined for the sub-period from 1986 to 1994-95. Information on annual earnings is for the financial year beginning in year preceding the IDS (for example, annual earnings data from the 1982 IDS is for the financial year of 1981/82). The sample of employees used to analyse changes in annual earnings is the same as for weekly earnings - that is, employees who worked full-time at the date of the IDS. Heterogeneity may therefore exist amongst this group of employees in the number of weeks and hours per week which they worked in the previous financial year.

From Panel A of Table 5 it is evident that there is a high degree of similarity between changes in inequality in hourly wages and weekly earnings. First, changes in the SD measure of overall earnings inequality for both males and females are almost identical using the weekly earnings or hourly wage measures. Second, the pattern of changes in percentile earnings differences is broadly similar between the earnings measures - although changes in inequality in hourly wages are generally smaller using the matched than unmatched data so that the latter approach gives estimates which are closer to changes in inequality weekly earnings than the former approach. On the basis of these findings it seems that changes in inequality in weekly earnings are primarily reflecting changes in the distribution of hourly wages rather than in the distribution of hours worked per week.

A rather different story emerges from analysis of annual earnings data in Panel B of Table 5. Changes in the SD of log real weekly earnings and log real annual earnings have differed substantially for both male and female employees. For males changes in

Table 5: Changes in Inequality - Full-Time Employees in Main Job - Alternative Earnings Measures

	Panel A: 1986-1994-95			Panel B: 1981/82-1993/94		
	Weekly Earnings	Hourly Wages Not Matched	Hourly Wage Matched	Weekly Earnings	Annual Earnings Not Matched	Annual Earnings Matched
Males - Percentile Difference						
90-10	0.0044	0.0292	-0.0157	0.0449	0.3655	0.0079
90-50	0.0215	0.0292	0.0100	0.0449	0.0575	0.0712
50-10	-0.171	0.0000	-0.0257	0.0000	0.3080	-0.0633
75-25	0.0617	0.0618	0.0213	0.0804	0.1111	0.0344
75-50	0.0224	0.0412	0.0237	0.0331	0.0350	-0.0171
50-25	0.0393	0.0206	-0.0024	0.0473	0.0761	0.0515
Standard Deviation	0.0489 (11.7%)	0.0428 (10.6%)		0.0511 (12.3%)	0.0860 (14.8%)	
Females - Percentile Difference:						
90-10	-0.077	0.0201	-0.0148	-0.0397	-0.0136	-0.0633
90-50	0.0245	0.0241	0.0161	0.0258	0.0326	0.0922
50-10	-0.0322	-0.0040	-0.0309	-0.0655	-0.0462	-0.1555
75-25	0.0617	0.0242	0.0129	0.0659	-0.0087	0.1030
75-50	0.0250	0.0242	0.0110	0.0492	0.0648	0.0947
50-25	0.0367	0.0000	0.0018	0.0167	-0.0735	0.0083
Standard Deviation	0.0327 (8.9%)	0.0327 (9.1%)		0.0372 (10.3%)	0.0318 (3.3%)	

dispersion in annual earnings have been larger than in weekly earnings, whereas for females dispersion in weekly earnings has increased by a greater amount than for annual earnings. Changes in percentile earnings differences in annual earnings display some - although not particularly strong - correspondence to changes in weekly earnings. Changes in annual earnings using the unmatched method are found to be larger than for the matched method.

Analysis of changes in earnings inequality for the sample of employees aged 25-54 years using alternative earnings measures provides very similar results to those for the sample of all employees (see Table A2.2). Measures of changes in earnings inequality using the hourly wage and weekly earnings variables are almost equivalent. Changes in earnings inequality for annual earnings and weekly earnings using the SD measure have the same pattern for males and females as for the sample of all employees. Once again though it is difficult to provide a clear interpretation of changes in percentile earnings differences.

The SD measure of changes in overall earnings dispersion suggests quite different patterns of change in annual earnings and weekly earnings for male and female employees. What might explain this difference? One possible explanation is that the pattern of differences found using the alternative variables is consistent with an increase over the sample period in dispersion in annual weeks of work for male employees, and with a decrease in dispersion in annual weeks of work for female employees. Unfortunately, the absence of data on annual weeks of work in the 1994-95 IDS means that it is not possible to investigate this issue in further detail.

d. Part-time employees and earnings from non-main job

In considering the robustness of the findings on changes in earnings inequality two further possibilities need to be taken into account. First, that changes in earnings inequality using total wage and salary earnings differ from changes using just wage and salary earnings from main job; or second, that changes in earnings inequality for full-time and part-time employees differ from changes for just full-time employees.

To examine these possibilities Table 6 presents information on changes in inequality in hourly wages between 1986 and 1994-95 - for the 'base case' of full-time employees in main job, as well as for full-time employees in all jobs, and full-time and part-time employees in main job. The results on changes in earnings inequality for these alternative cases are almost identical - perhaps the only difference is that the SD measure of changes in overall earnings dispersion has increased slightly more for full-time and part-time employees than for just full-time employees. However, it seems reasonable to conclude that changes in earnings inequality for full-time employees in main job are representative of changes which have occured in the distribution of total wage and salary earnings and for both full-time and part-time employees.

Table 6: Changes in Inequality in Real Hourly Earnings - Alternative Earnings Measures and Samples of Employees - 1986 to 1994-95

	Full-Time in Main Job	Full-Time in All Jobs	Full-Time and Part-Time in Main Job
Males			
Percentile Difference:			
90-10	0.0292	0.0268	0.0280
90-50	0.0292	0.0252	0.0331
50-10	0	0.0016	-0.0051
75-25	0.0618	0.0585	0.0637
75-50	0.0412	0.0404	0.0414
50-25	0.0206	0.0181	0.0223
Standard Deviation	0.0428 (10.6%)	0.0423 (10.5%)	0.0625 (15.5%)
Females			
Percentile Difference:			
90-10	0.0201	0.0205	0.0510
90-50	0.0241	0.0256	0.0506
50-10	-0.0040	-0.0051	0.0004
75-25	0.0242	0.0216	0.0282
75-50	0.0242	0.0240	0.0314
50-25	0	-0.0024	-0.0032
Standard Deviation	0.0327 (9.1%)	0.0312 (8.6%)	0.0514 (13.9%)

4. Changes in Earnings Inequality - Disaggregated Worforce Groups

In this section changes in earnings inequality are examined for disaggregated workforce groups. Disaggregation is undertaken by sector of employment, country of birth, and industry of employment. Two limitations on this analysis are that it is only possible to undertake the decomposition by sector for 1982 to 1990, and that is is necessary to aggregate some industry groups from the 1-digit ASIC level in order to have an adequate number of observations in each industry group.

Examining changes in earnings inequality for disaggregated workforce groups is a useful exercise as it provides one way of obtaining insights into the causes of changes in earnings inequality. For example, different conclusions might be reached about the causes of changes in earnings inequality where those increases in earnings inequality are concentrated amongst particular types of employees (for example, immigrants) rather than affecting all employees.

Two approaches are adopted in the analysis of changes in earnings inequality for disaggregated workforce groups. First, descriptive information on changes in earnings inequality within each disaggregated workforce group is presented. Second, the findings from decomposition analysis of sources of changes in the variance of log real weekly earnings is presented. Variance decomposition is a method for decomposing the total change in the variance of log real weekly earnings into components due to:

a) Changes in the composition of workforce; b) Changes in the average log real weekly earnings of each workforce group (between-group variance); and c) Changes in the variance of log real weekly earnings within each workforce group (within-group variance). Formally, the variance of log real weekly earnings in year t can be expressed as:

$$\sigma_t^2 = \sum_{i=1}^{n} s_{it} \cdot \sigma_{it}^2 + \sum_{i=1}^{n} s_{it} \cdot [w_{it} - \overline{w}_t]^2 \qquad (1)$$

where σ_t^2 is the variance of log real weekly earnings in year t, s_{it}, σ_{it}^2, and w_{it} are respectively the share of employment, the variance of log real weekly earnings and average log real weekly earnings in workforce group i in year t, and $\overline{w}_t$ is average log real weekly earnings in year t. By examining the effect of shifts in s_{it} across time it is possible to establish the effect of changes in the composition of the workforce on the variance of log real weekly earnings; and similarly, by allowing σ_{it}^2 and $[w_{it} - \overline{w}_t]^2$ to vary, the role of changes in within-group and between-group variance in earnings in explaining changes in the variance of log real weekly earnings can be ascertained.

Results for worforce groups disaggregated by sector of employment are presented in Table 7. From Panel A - which reports changes in earnings inequality - it is evident that public sector and private sector employees experienced quite different changes in earnings inequality between 1982 and 1990. The SD of log real weekly earnings narrowed for both male and female public sector employees; whereas the SD increased for private sector male employees and did not change for private sector female employees. Earnings inequality in public sector appears to have been reduced across all points in distribution of log real weekly earnings. One explanation for this finding

Table 7: Changes in Inequality and Variance Decomposition of Changes in Inequality in Log Real Weekly Earnings - Full-Time Employees in Main Job - Sector - 1982 to 1990

A. Changes in Inequality

	Private	Public
Males		
Percentile Differences:		
90-10	0.0250	-0.0539
90-50	0.0736	-0.0283
50-10	-0.0486	-0.0255
75-25	0.0445	-0.0351
Standard Deviation	0.0182 (4.1%)	-0.0264 (-7.5%)
Average Share of Employment	0.66	0.34
Females		
Percentile Differences:		
90-10	-0.0226	-0.1104
90-50	0.0811	-0.0707
50-10	-0.1037	-0.0397
75-25	0.0165	-0.0238
Standard Deviation	0.0036 (1.0%)	-0.0155 (-4.9%)
Average Share of Employment	0.63	0.37

B. Variance Decomposition

Total Change in Variance in Log Real Weekly Earnings	0.0079	-0.0073
Effect of Change in:		
1. Share of employment	0.0006	0
2. Average earnings	0.0010	0.0007
3. Within-group variance:		
Private sector	0.0107	0.0016
Public sector	-0.0044	-0.0096

would be changes to job structure in the Commonwealth public sector during the 1980s whereby the ASO1 classification was effectively removed. In the private sector narrowing at bottom of distribution of earnings has been offset by increases between other points in the distribution of log real weekly earnings.

Panel B of Table 7 shows that results from the variance decomposition are consistent with the findings on changes in earnings inequality for public sector and private sector employees. Changes in the variance of log real weekly earnings for public sector employees have reduced overall earnings inequality, whereas changes in the variance of log real weekly earnings for private sector employees have had a positive effect on overall earnings inequality.

Results from disaggregating the workforce by country of birth are presented in Table 8. Panel A shows that both Australian-born and immigrant employees have experienced increases in earnings inequality. The pattern of changes in percentile difference measures of changes in earnings inequality is similar between these groups although magnitude of changes is larger for immigrant than for Australian-born employees. Changes in the SD of log real weekly earnings also reveal a stronger increase in earnings inequality for immigrants than Australian-born employees - in particular for female employees. Further disaggregated analysis did not reveal any significant differences between immigrants according to the number of years since arrival in Australia, or by arrival cohort.

The results from the variance decomposition by country of birth in Panel B show that increases in within-group earnings inequality for Australian-born and immigrant employees have been the main factors causing an increase in overall earnings inequality. For males changes in earnings inequality amongst Australian-born employees have had the greatest effect, while for females changes in earnings inequality for immigrants have had a slightly larger effect than changes for Australian-born employees.

Results for disaggregated industry groups are presented in Table 9. Panel A shows that the findings on changes in earnings inequality for employees in disaggregated industry groups are somewhat mixed. For most industries earnings inequality has increased - although the magnitude varies greatly between industries. For males large increases in earnings inequality occurred in the finance/property/business and construction and transport/storage industries but earnings inequality declined in the agriculture and recreational/personal services industries. For females large increases in earnings inequality occurred in the wholesale/retail trade and finance/ property/business services industries, but there were smaller increases in the agriculture and recreational and personal services industries.

Table 8: Changes in Inequality and Variance Decomposition of Changes in Inequality in Log Real Weekly Earnings - Full-Time Employees in Main Job - Country of Birth - 1982 to 1994-95

A. Changes in Inequality

	Australian-born	Immigrants
Males		
Percentile Differences:		
90-10	0.0175	0.0979
90-50	0.0199	0.0872
50-10	-0.0024	0.0107
75-25	0.0696	0.0880
Standard Deviation	0.0452 (10.6%)	0.0668 (17.5%)
Average Share of Employment	0.73	0.27
Females		
Percentile Differences:		
90-10	-0.0711	0.0107
90-50	0.0118	0.0498
50-10	-0.0829	-0.0391
75-25	0.0482	0.0732
Standard Deviation	0.0218 (5.9%)	0.0901 (28.1%)
Average Share of Employment	0.76	0.24

B. Variance Decomposition

	Males	Females
Total Change in Variance in Log Real Weekly Earnings	0.0452	0.0282
Effect of Change in:		
1. Share of employment	0.0006	-0.0001
2. Average earnings	0	-0.0001
3. Within group variance:		
Australian born	0.0304	0.0127
Immigrants	0.0142	0.0157

Results of the variance decomposition by industry presented in Panel B show that increases in earnings inequality in a small subset of industries - manufacturing, construction and transport/storage, wholesale/retail trade, and finance/ property/business - have been primarily responsible for the increase in overall earnings dispersion.

Table 9: Changes in Inequality and Variance Decomposition of Changes in Inequality in Log Real Weekly Earnings - Full-Time Employees in Main Job - Industry - 1982 to 1994-95

A. Changes in Inequality

	Agric/ Mining	Manu-facturing	EGW and Comm-unications	Construction and Transport/ Storage	Wholesale/ Retail Trade	Finance/ Property/ Business	Public Admin. and Defence	Community Services	Recreation/ Personal Services
MALES: Percentile Differences:									
90-10	-0.0402	0.1104	-0.0374	-0.0263	-0.0192	0.1651	0.0466	0.0640	-0.0793
90-50	0.1250	0.1101	0.0012	-0.0152	0.1023	0.1581	0.0656	-0.0388	0.0959
50-10	-0.1652	0.0003	-0.0386	-0.0111	-0.1215	0.0070	-0.0190	0.1028	-0.1754
75-25	-0.0226	0.1351	-0.0260	0.0034	0.0712	0.1566	-0.0415	-0.0146	-0.1443
Standard Deviation	-0.0396 (-6.6%)	0.0401 (10.6%)	0.0042 (-1.2%)	0.0772 (19.2%)	0.0527 (12.9%)	0.1102 (27.8%)	0.0623 (25.6%)	0.0623 (15.7%)	-0.0232 (-5.9%)
Average Share of Employment	0.05	0.24	0.07	0.14	0.19	0.10	0.08	0.11	0.02
FEMALES: Percentile Differences:									
90-10	-0.4752	0.0232	-0.2629	0.1890	-0.0289	-0.0924	-0.0687	-0.0090	-0.0777
90-50	-0.2835	0.1207	-0.0111	0.1809	0.1369	0.0634	-0.0781	-0.0190	0.0041
50-10	-0.1917	-0.0975	-0.2518	0.0081	-0.1658	-0.1558	0.0094	0.0100	-0.0818
75-25	-0.0468	0.0475	-0.1315	0.0401	-0.1094	-0.0264	0.0592	0.0492	0.0949
Standard Deviation	0.0215 (4.0%)	0.0393 (13.9%)	-0.0009 (-3.1%)	0.1495 (50.4%)	0.0754 (23.1%)	0.0537 (16.2%)	0.0375 (11.2%)	0.0177 (11.3%)	0.0367 (9.6%)
Share of Employment	0.02	0.14	0.02	0.04	0.18	0.15	0.08	0.31	0.06

Table 9 continued

b. Variance Decomposition

	Males	Females
Total Change in Variance in Log Real Weekly Earnings:	0.0452	0.0282
Effect of Change in:		
(1) Share of employment	0.0014	0.0020
(2) Average earnings	-0.0005	-0.0050
(3) Within-group variance:		
Agriculture/mining	-0.0023	0.0004
Manufacturing	0.0067	0.0028
EGW/communications	-0.0001	-0.0001
Construction/transport/ storage	0.0107	0.0050
Wholesale/retail trade	0.0084	0.0085
Finance/property/business services	0.0122	0.0070
Public admin/defence	0.0030	0.0024
Community services	0.0064	0.0037
Recreation/personal services	-0.0007	0.0015

The findings from disaggregated analysis of changes in earnings inequality by industry suggest some topics for further research on causes of changes in earnings inequality. For example, it is of interest that a period of rapid growth in the average log real weekly earnings of finance industry employees, and of a large increase in earnings dispersion for employees in that industry, coincides with a period of deregulation of finance and banking industry. While it has sometimes been suggested that product market deregulation may have affected the distribution of earnings in the 1980s and 1990s thus far there has been little formal analysis of this issue (see Fortin and Lemieux, 1997).

5. Sources of Changes in Earnings Inequality

What have been main causes of changes in earnings inequality? One approach to begin to answer this question is to decompose changes in earnings inequality between the effects of changes in the distribution of worker skills, changes in the returns to those skills, and other factors. The findings from this type of decomposition analysis can then provide direction for subsequent detailed analysis of possible causes of changes in earnings inequality. In this study we undertake a decomposition analysis of

changes in earnings inequality, and based on the findings from this analysis, suggest possible directions for undertaking further research.

Alternative methods of decomposition are available. In this study the Juhn-Murphy-Pierce (JMP) (1993) method is applied. This approach decomposes sources of changes inearnings inequality between:

i) Changes in distribution of 'observable' skills amongst employees in the workforce;

ii Changes in the return to 'observable' skills; and

iii) Changes in the distribution of earnings within groups of workers with the same 'observable skills (sometimes referred to as changes in 'unobservables').

The 'human capital' theory of earnings determination identifies educational attinment and years of labour market experience as key determinants of earnings. Hence in the analysis in this paper it is these variables which are treated as measures of 'observable' worker skills.

The JMP decomposition method has the advantage over alternative decomposition methods that it allows analysis of how changes in workforce composition and education/experience earnings differentials have affected the overall distribution of earnings. To understand the JMP decomposition approach, consider the following earnings equation:

$$w_{it} = X_{it}\beta_{it} + \varepsilon_{it} \qquad (2)$$

where w_{it} is actual earnings of employee i in period t, and X_{it} is a vector of experience and education characteristics of individual employees. The first step in the JMP decomposition is to estimate regressions for log real weekly earnings in each sample period between 1982 and 1994. In this study separate earnings regressions were estimated for male and female employees in each sample year. Each regression included four education dummy variables (not completed high school/completed high school, trade qualification, diploma, and degree) and a quadratic in years of potential labour market experience. Years of potential labour market experience is defined as age minus years of schooling minus five.[7] The second step is to use results from the earnings regressions to calculate for each individual in each sample period:

$$w^1_{it} = X_{it}\overline{\beta} + \overline{F}^{-1}(\theta_{it}) \qquad (3)$$

where $\overline{\beta}$ represents the average coefficients on the education and experience variables for 1982 to 1994, and $F^{-1}(\theta_{it})$ is the inverse cumulative residual distribution where θ_{it} represents an individual's percentile in the residual distribution. A predicted residual for an individual in year t, $\overline{F}^{-1}(\theta_{it})$, is calculated from the aggregate distribution of

residuals over 1982 to 1994, and allocated according to the individual's actual percentile ranking in that year's residual distribution. Changes in the distribution of w_{it}^1 between 1982 and 1994 then represent the effect on the distribution of earnings of changes in the workforce composition of educational attainment and years of labour market experience.

The third step is to calculate:

$$w_{it}^2 = X_{it}\beta_t + \overline{F}^{-1}(\theta_{it}) \qquad (4)$$

which introduces the actual β_t for each year rather than the average, $\overline{\beta}$. The additional change in w_{it}^2 between 1982 and 1994 beyond that from w_{it}^1 is then due to changes in the returns to educational attainment and years of experience.

Finally, any changes in w_{it} between 1982 and 1994 - in addition to changes in w_{it}^2 - will be due to changes in the distribution of earnings within groups of employees with the same educational attainment and years of experience.

Findings from the JMP decomposition of changes in earnings inequality are reported in Table 10.[8] Analysis using the SD measure of overall dispersion provides quite striking findings. It is found - for both males and females - that changes in earnings dispersion within groups of employees with the same educational attainment and years of experience have been overwhelmingly the main factor causing increases in earnings dispersion. Changes in the distribution of education and experience have had little effect on earnings dispersion, whereas changes in the relative earnings of employees by education and experience have tended to reduce earnings dispersion. Examining the decompositions of changes in percentile earnings differences does not significantly alter this picture. For males - where increases in percentile earnings differences occurred throughout the distribution of earnings - the main factor causing those increases was changes in unobservable factors. For females the only exception is changes in the 50-10 percentile earnings difference; in this case, decreases in earnings dispersion within groups of employees with the same education and experience were the main factor causing narrowing of that earnings difference.

Table 10: Sources of Changes in Inequality in Log Weekly Earnings - Juhn-Murphy-Pierce Decomposition - Full-Time Employees in Main Job - 1982 to 1994-95

	Total Change	Effect of: Change in Observable Characteristics	Effect of: Change in Return to Observable Characteristics	Effect of: Change in Unobservable Factors
MALES: Percentile Differences:				
90-10	0.0449	-0.0181	-0.0282	0.0912
90-50	0.0449	0.0069	-0.0147	0.0526
50-10	0.0000	-0.0250	0.00135	0.0386
75-25	0.0804	-0.0001	-0.0153	0.0958
75-50	0.0331	0.0089	-0.0049	0.0291
50-25	0.0473	-0.0088	-0.0104	0.0667
Standard Deviation	0.0511	-0.0024	-0.0110	0.0645
FEMALES: Percentile Differences:				
90-10	-0.0397	0.0404	-0.0538	-0.0263
90-50	0.0258	0.0297	-0.0382	0.0343
50-10	-0.0655	0.0107	-0.0156	-0.0606
75-25	0.0659	0.0140	-0.0256	0.0775
75-50	0.0492	0.0078	-0.0234	0.0648
50-25	0.0167	0.0062	-0.0022	0.0127
Standard Deviation	0.0372	0.0075	-0.0172	0.0469

Application of the JMP decomposition procedure to the sample of employees aged 25-54 years gives very similar results to those for the sample of all employees (see Table A2.3). Most notably, it is still found that the dominant factor behind increases in earnings inequality is changes in the distribution of earnings within groups of employees with the same educational attainment and years of experience.

One notable finding from the JMP decomposition is that the independent effect of changes in the returns to educational attainment and years of experience has been to reduce the overall level of earnings inequality. This contrasts with the experience in other countries such as the United States and United Kingdom where changes in earnings relativities between employees with differen educational attainment and years of experience have been an important cause of increases in earnings inequality (for example, Davis, 1992, Juhn et al., 1993, and Machin, 1996). Hence, it seems worthwhile exploring this finding in some more detail.

Table 11: Relative Weekly Earnings by Education and Experience - Full-Time Employees in Main Job - 1982 to 1994-95

A. Educational Attainment

	1982	1994-95
Males		
NCHS/CHS	1.000	1.000
Trade Qualification	1.137	1.163
Diploma/Certificate	1.390	1.359
Degree	1.709	1.644
Females		
NCHS/CHS	1.000	1.000
Trade Qualification	1.072	1.180
Diploma/Certificate	1.324	1.229
Degree	1.753	1.672

B. Years of Potential Experience

	1982	1994-95
Males		
0-9	0.660	0.650
10-19	0.927	0.967
20-29	1.000	1.000
30-39	0.936	1.053
40+	0.800	0.846
Females		
0-9	0.820	0.767
10-19	1.017	1.009
20-29	1.000	1.000
30-39	0.942	0.949
40+	0.881	0.895

To undertake this analysis descriptive statistics on the relative average earnings of male and female employees in disaggregated education and experience groups are presented in Table 11. The construction of average earnings measure - which follows Katz and Murphy (1992) - involves a number of stages. First, average real weekly earnings and the share of total employment are calculated for 36 education/experience categories for male and female employees. The education categories are (not completed high school/completed high school, trade qualification, diploma, and degree). Experience categories are 0-4 years, 5-9 years,..., 40 or more years. Second, average employment shares across all sample years are calculated for each disaggregated

workforce group. Third, average earnings by education category and by experience category are calculated using the average employment shares. This method of calculating average earnings corrects for effects of compositional changes. For example, estimates of average real weekly earnings by education category for different sample years hold constant the proportion of employees in each experience group within each education category.

From Panel A of Table 11 - which presents relative average weekly earnings by education category - it is evident that for both male and female employees the main change has been a decline in the average weekly earnings of employees with a degree or above relative to employees who do not have a post-school qualification. For females there has also been a decrease in the relative average earnings of employees with diploma, and an increase in the relative average earnings of employees with a trade qualification. Panel B of Table 11 - which presents relative average weekly earnings by years of experience - shows that average weekly earnings of male employees with 10-19 years and 30 or more years of experience increased relative to employees with 20-29 years of experience; for females the main change was a decrease in average weekly earnings for employees with 0-9 years of experience relative to other employees.[9]

The findings from the JMP decomposition suggest strongly that further research on the causes of changes in earnings inequality in Australia should focus on the role of 'unobservables'; that is, on explaining what factors - which operate within groups of employees with similar levels of educational attainment and years of experience - could account for increases in earnings inequality.

A range of possible explanations which could be the subject of further investigation do exist. One possible 'competitive' explanation is that changes in earnings inequality have occurred due to changes in the distribution of, or returns to, other skill-related factors apart from educational attainment and years of experience in the workforce. For example, there is some evidence of increases in return to skills associated with computer knowledge in Australia (see Miller and Mulvey, 1997, and Borland et al., 1997). A second possible 'non-competitive' explanation is that increases in dispersion in industry or firm-level earnings premia have caused changes in earnings inequality (see Preston, 1997 on changes in the variance of inter-industry earnings premia between 1981 and 1991). As discussed in the previous section, one possibility is that deregulation of product markets in the finance sector has raised the non-competitive wage premium earnt by employees in that industry relative to other industries. A third possible explanation is that changes in labour market institutions have caused increases in earnings inequality (see for example, Borland, 1996 on the effects on earnings inequality of changes in union density).

Endnotes

1. The set of surveys which are commonly referred to as the Income Distribution Survey have in fact changed title several times. The current title is the Survey of Income and Housing Costs. For further information on the Income Distribution Survey see Appendix 1, and also Lambert (1996).
2. In the respective sample years there are 7926, 4403, 7142 and 3373 observations for male full-time employees; and 3564, 2074, 3665 and 1695 observations for female full-time employees.
3. To restrict attention to a sample of employees with 'strong attachment' to employment it might also be appropriate to include only employees who had worked more than some minimum number of weeks in the previous year. However, data on annual weeks of work are not available for the 1994-95 IDS.
4. ABS, Schools Australia, catalogue no.4221.0.
5. Another way of examining the role of compositional effects is to compare the actual change (between 1982 and 1994-95) in the difference in weekly earnings between an average employee in the bottom two deciles of the distribution and an employee at the median, with the predicted change in that difference had the age composition of employees in the bottom two deciles of the distribution remained constant over time. Undertaking this exercise for males it is found that the actual change is an increase in the difference of 1.7 per cent compared to a predicted increase of 4.1 per cent had the age composition remained constant; for females an actual decline of 5.5 per cent compared to a predicted decline of 0.8 per cent. This exercise further confirms the importance of composition effects.
6. Measures of changes in earnings inequality between 1982 and 1990 presented in Table 2 have a similar pattern to changes in earnings inequality over the same period found using IDS data in Borland and Wilkins (1996). Slight differences in sample definitions between these studies however mean that there are some small differences in the magnitude of changes in earnings inequality between the studies.
7. Including employees who had not completed high school and who had completed high school in a single category is necessary as this is how data on individuals' levels of educational attainment are reported in the 1994-95 IDS. Results of earnings regressions are available from authors on request.
8. Decompositions are reported in Table 10 for the whole sample period from 1982 to 1994-95. It would also be possible to undertake the same method of decomposition for sub-perods within the whole sample period.
9. The findings in Table 11 on changes in relative average earnings by years of experience contrast with those of Borland and Wilkins (1997) on changes in the age-earnings structure. In the Borland and Wilkins (1997) study it is found that large decreases in the earnings of younger and older workers relative to prime-age workers have occurred over a similar period to this study. The main explanations for the difference between the findings of the studies appears to be that age and experience measures are not equivalent, and that compositional effects differ between the studies. For example, suppose that length of schooling is positively correlated with an individual's ability. In this case increases in school retention rates which occurred during the 1980s would have had the effect of reducing the average ability and hence earnings of employees in the 15-19 year age group. On the other hand, measures of average earnings by years of experience in this study will not be affected by this type of composition effect.

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Appendix 1: Data Source - Income Distribution Surveys

a. Data description

Data was obtained from Income Distribution Surveys undertaken in 1982, 1986, 1990 and 1994-95. In 1982, 1986 and 1990 the IDS was conducted in the November quarter. These surveys were based on a multistage area sample of private and non-private Australian dwellings. The 1994-95 IDS - now called the Survey of Income and Housing Costs (SIHC) - contains data which has been collected on a continuous basis over the period July 1994 to June 1995. Earnings data for the August 1994, February 1995 and May 1995 quarters have been converted to November quarter 1994 using the Consumer Price Index. The SIHC is run in conjunction with Monthly Population Survey (MPS) where each month a sample of dwellings is selected from responding units in the MPS. See ABS, *Survey of Income and Housing Costs: User Guide*, catalogue no. 6553.0 for a full description of the SIHC.

The classifications for some variables in the IDS have changed between surveys - for those variables it has been necessary to match classifications across years:

- **Weekly Earnings** - Earnings variable in 1982 is current usual weekly earnings in main and second jobs and sample is restricted to employees with one job. Earnings variable in 1986, 1990 and 1994-95 is current usual weekly earnings in main job. Variables are not top-coded.

- **Highest Educational Qualification**

  Step 1: Data for 1986 and 1990 were regrouped into four classifications:

  1. Not completed high school and Completed high school - Includes No qualifications since school, Never went to school, Completed highest year of secondary qualifications, and Obtained secondary qualifications since leaving school.
  2. Trade certificate - Includes Trade certificate.
  3. Certificate/Diploma - Includes Other certificate/diploma, and Other qualification.
  4. Bachelor degree or higher - Bachelor degree of higher.

  Step 2: To match these classifications data for 1982 were grouped as follows:

  1. Not completed high school and Completed High School - Includes Left school at 14 or 15, Left School at 13 or less, Never went to school, Left school at 17, Left School at 18 or above, and Obtained secondary qualifications since leaving school.
  2. Trade certificate - Includes Trade certificate.
  3. Certificate/Diploma - Includes Certificate/diploma.
  4. Bachelor degree or higher - Bachelor degree of higher.

  Step 3: To match these classifications data for 1994 were grouped as follows:

  1. Not completed high school and Completed High School - Includes No qualifications.
  2. Trade certificate - Includes Skilled vocational qualifications.

3. Certificate/Diploma - Includes Associate diploma, Undergraduate diploma, and Basic vocational qualifications.
4. Bachelor degree or higher - Includes Higher degree, Postgraduate diploma, and Bachelor degree.

- **Industry**: Industry is classified in the IDS using the Australian Standard Industrial Classification (ASIC) in 1982, 1986 and 1990, and using the Australian and New Zealand Standard Industrial Classification (ANZSIC) in 1994. ANZSIC classifications in the 1994 IDS were re-classified to ASIC classifications using the concordance method in Australian Bureau of Statistics and Department of Statistics New Zealand (1993).

b. Benchmarking the IDS

Measures of changes in real weekly earnings for full-time male and female employees in main job using data from the IDS can be benchmarked against measures derived using data from the ABS Weekly Earnings of Employees Survey (WEES) (ABS, *Weekly Earnings of Employees (Distribution)*, catalogue no.6310.0). Table A1.1 shows changes in real weekly earnings by decile points in the distribution of weekly earnings for male and female full-time employees for each data source, and the correlation coefficient between the series from the alternative data sources. For both male and female employees it is evident that changes in real weekly earnings by decile are highly correlated between the data sources. For males the changes in real weekly earnings are slightly higher at all points in the distribution of earnings using the IDS data than WEES data; whereas for female employees the changes are of much the same magnitude throughout the distribution of earnings.

Table A1.1: Percentage Change in Real Weekly Earnings by Decile - Full-Time Employees in Main Job - IDS and WEES - 1982 to 1994-95

	Males:		Females:	
	WEES	IDS	WEES	IDS
Change in Log Real Weekly Earnings by Percentile:				
10	0.0263	0.0037	0.1632	0.1441
20	0.0087	-0.0437	0.1102	0.0998
30	0.0232	-0.0181	0.0709	0.0547
40	0.0367	-0.0146	0.0893	0.0654
50	0.0290	0.00037	0.1069	0.0785
60	0.0603	0.0247	0.1139	0.1026
70	0.0726	0.0319	0.1348	0.1307
80	0.0741	0.0265	0.1499	0.1280
90	0.1060	0.0486	0.1314	0.1044
Correlation Coefficient:		0.923		0.962

Appendix 2: Supplementary Tables - Employees Aged 25-54 Years

Table A2.1: Changes in Inequality in Log Weekly Earnings - Full-Time Employees in Main Job - Disaggregated Time Periods - 1982 to 1994-95

	1982 to 1986	1986 to 1990	1990 to 1994-95	1982 to 1994-95
Males				
Percentile Difference:				
90-10	0.0132	0.0416	0.0776	0.1324
90-50	0.0087	0.0185	0.0352	0.0624
50-10	0.0045	0.0231	0.0424	0.0700
75-25	-0.0079	0.0413	0.0232	0.0566
75-50	-0.0189	0.0281	0.0051	0.0143
50-25	0.0110	0.0132	0.0181	0.0423
Standard Deviation	0.0027	0.0152	0.0444	0.0623
	(0.7%)	(4.2%)	(11.8%)	(17.4%)
Females				
Percentile Difference:				
90-10	0.0491	-0.0175	0.0418	0.0734
90-50	0.0265	-0.0486	0.0235	0.0014
50-10	0.0226	0.0311	0.0183	0.0720
75-25	0.0405	-0.0171	0.0565	0.0799
75-50	0.0376	-0.0512	0.0323	0.0187
50-25	0.0029	0.0341	0.0242	0.0612
Standard Deviation	0.0185	-0.0084	0.0502	0.0603
	(6.0%)	(-2.5%)	(15.8%)	(19.6%)

Table A2.2: Changes in Inequality - Full-Time Employees in Main Job - Alternative Earnings Measures - 1982 to 1994-95

	Panel A: 1986-1994-95			Panel B: 1981/82-1993/94		
	Weekly Earnings	Hourly Wage - Not Matched	Hourly Wage - Matched	Weekly Earnings	Annual Earnings- Not Matched	Annual Earnings- Matched
Males						
Percentile Difference:						
90-10	0.1192	0.0994	0.1092	0.1324	0.2698	0.2017
90-50	0.0537	0.0092	0.0619	0.0624	0.0315	0.0755
50-10	0.0655	0.9002	0.0473	0.0700	0.2383	0.1263
75-25	0.0645	0.0616	0.0667	0.0566	0.1154	0.0337
75-50	0.0332	0.0340	0.0479	0.0143	0.0274	0.0285
50-25	0.0313	0.0276	0.0188	0.0423	0.0880	0.0052
Standard Deviation	0.0596	0.0686		0.0623	.1277	
	(16.5%)	(19.9%)		(17.4%)	(30.9%)	
Females						
Percentile Difference:						
90-10	0.0243	0.0569	0.0650	0.0734	-0.0484	0.1418
90-50	-0.0253	-0.0036	-0.0124	0.0014	0.0126	0.0846
50-10	0.0496	0.0605	0.0774	0.0720	-0.0610	0.0572
75-25	0.0394	0.0138	-0.0012	0.0799	0.0827	0.1847
75-50	-0.0191	-0.0164	-0.0452	0.0187	0.0327	0.1100
50-25	0.0583	0.0302	0.0440	0.0612	0.0500	0.0747
Standard Deviation	0.0418	0.0495		0.0603	-0.0120	
	(12.8%)	(15.6%)		(19.6%)	(-2.2%)	

Table A2.3: Sources of Changes in Inequality in Log Weekly Earnings - Juhn-Murphy-Pierce Decomposition - Full-Time Employees in Main Job - 1982 to 1994-95

	Total Change	Effect of: Change in Observable Characteristics	Change in Return to Observable Characteristics	Change in Unobservable Factors
Males				
Percentile Differences:				
90-10	0.1324	0.0210	-0.0218	0.1332
90-50	0.0624	-0.0067	-0.0086	0.0777
50-10	0.0700	0.0277	-0.0132	0.0555
75-25	0.0566	0.0336	-0.0237	0.0467
75-50	0.0143	0.0095	-0.0140	0.0188
50-25	0.0423	0.0241	-0.0097	0.0279
Standard Deviation	0.0623	0.0090	-0.0090	0.0623
Females				
Percentile Differences:				
90-10	0.0734	0.0282	-0.0375	0.0827
90-50	0.0014	0.0123	-0.0155	0.0046
50-10	0.0720	0.0159	-0.0220	0.0781
75-25	0.0799	0.0463	-0.0201	0.0537
75-50	0.0187	0.0389	-0.0192	-0.0010
50-25	0.0612	0.0074	-0.0009	0.0547
Standard Deviation	0.0603	0.0074	-0.0100	0.0629

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