THE POLARISATION OF EARNINGS AND HOURS IN AUSTRALIA UNDER A DECENTRALISED INDUSTRIAL RELATIONS SYSTEM: THE LESSONS FOR ECONOMIC POLICY

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In Australia centralised wage determination and collective arrangements prevailed over the period 1983-86, through an award system that specified minimum wages and working conditions across enterprises. Since then the industrial relations system has been significantly reformed by both state and federal governments. The federal Workplace Relations Act 1996 (Cwlth), in particular, has facilitated both non-union agreements and direct employment contracts. Using a technique developed by Morris, Bernhardt and Handcock (1994), we show that the period of labour market reform, 1986-98, has coincided with increasing hours and full-time weekly earnings dispersion that has typically taken the form of polarisation. We conclude that labour market reform in Australia has been a contributory factor in the polarisation of earnings, but that a polarised earnings distribution is not necessary for the achievement of full employment. Finally we briefly consider the implications of the Australian findings with respect to earnings and hours of employment for equity, employment opportunities and living standards.

INTRODUCTION

The Australian industrial relations system has been decentralised by both state and federal governments on an ongoing basis since the mid 1980s, when the federal system of automatic wage indexation was replaced by a two tier wage determination system that embodied a centralised and an enterprise component to wage adjustment.¹ This latter component was linked to efficiency changes at the enterprise. From 1987 to 1996 the federal Labor government, in consultation with
the trade union movement, increasingly shifted the locus of bargaining and wage determination to the enterprise level (Dabscheck, 1995).

This process of decentralisation was accelerated as a result of the election of the conservative Coalition to government in 1996. The *Workplace Relations Act 1996* (Cwlth), in particular, has facilitated both non-union agreements and direct employment contracts. Consequently the influence of the industrial tribunals, through the system of award coverage and protection that set minimum employment conditions across enterprises, has diminished.2 Wage and employment conditions are now increasingly determined at the enterprise level. These legislative changes have been predicated on the imperative of increasing the flexibility of the deployment of labour (Commonwealth of Australia, 1996).

In this article we trace out the institutional and legislative developments associated with the reform of the Australian industrial relations system over the past decade, with particular reference to their impact on the distributions of wages and hours. Utilising unpublished Australian Bureau of Statistics wage distribution data, we employ a technique developed by Morris, Bernhardt and Handcock (1994) to analyse the changes in adult full-time weekly and hourly earnings distributions. We use the term polarisation to mean the increase in the incidence of low and high wage employment, which is synonymous with the disappearing middle (Gregory, 1996a).

We find that there is strong evidence of the polarisation of private sector hourly and weekly wage distributions by adult full-time males and females in Australia over the period 1986-98. There is additionally a common pattern of downgrading of the lower half but convergence of the upper half of the corresponding public sector distributions. Changes in the distribution of hours do not appear to have a significant impact on the extent of polarisation,3 in contrast to the experience for Canadian male employees during the 1980s (Morissette, Myles and Picot, 1993).

The Australian outcomes are placed within the context of changes in wage distribution in the United States where labour markets are more flexible. Calculations for the period 1986-96 reveal that intra-occupational wage dispersion has been of increasing significance in Australia. The rise in intra-group dispersion has also been a significant factor in the increase in wage inequality in the United States (see Thurow, 1998). This observation is consistent with enterprise bargaining leading to diverse wage outcomes amongst relatively
homogeneous labour across different industries.\textsuperscript{4} We would anticipate that further reforms of the labour market would lead to the ongoing increase in the dispersion of both earnings and hours.

Three important economic and social policy issues are raised by the apparent relationship between the decentralisation of wage outcomes and wage inequality. First there is the question of whether significant wage inequality is a necessary condition for the achievement of sustained full employment. The Organisation for Economic Cooperation and Development (OECD) Jobs Study (1994) argues that the American labour market model has led to lower rates of unemployment. Second, if a polarised wage distribution is the price to be paid for achieving full employment (cf. Galbraith and Cantu, 1999), what welfare initiatives are required to reduce the dispersion of post tax income? Are such initiatives feasible, given the dogma that budget surpluses are essential for macroeconomic management? Third, how can the Australian evidence on earnings and hours of employment be reconciled with the social policy commitments towards family friendly working arrangements made by successive governments (Burgess and Strachan, 1999)?

\section*{INDUSTRIAL RELATIONS REFORM IN AUSTRALIA, 1983-98}

\textbf{The Accord}

In this section, we outline the major developments in the Australian industrial relations system that have impacted on workers' wages and conditions so that we can place the changes in the wage and hours distributions into an institutional perspective.

Under the previous Labor government the Prices and Incomes Accord was a centralised arrangement between the government and the peak trade union organisation, the Australian Council of Trade Unions (ACTU). The Accord embraced voluntary agreements on income restraint which were comprehensive in that they covered prices, wages, non-wage incomes, taxation and the social wage. The prime objective of the Accord was to secure a reduction in the unemployment rate through non-inflationary demand expansion.

The first phase (Accords Mark I-II) reintroduced wage indexation through the centralised system in 1983 with a no extra claims commitment on the part of unions in relation to both award and over-
award payments. It was designed to bring some order back into the wages system, after the rapid wage growth of the early 1980s. The dispersion of the wage distribution should have remained unchanged, assuming new jobs were distributed uniformly across the wage distribution. Employees with minimal bargaining power were protected through uniform percentage wage increases being distributed across the workforce.

In the mid 1980s the focus of the Accord shifted from macroeconomic policy, which had delivered relatively low inflation and record employment growth, to ‘microeconomic reform’. This shift was precipitated by a major current account crisis in 1985/86 following the collapse of Australia’s terms of trade and Australia’s rapid growth of GDP as compared to its trading partners. As a result, Australia’s system of centralised wage fixing has been gradually replaced by a decentralised system of enterprise bargaining in which employers enjoy increased powers to set wages and conditions. This was seen as a way to improve the country’s productivity performance (Green, Mitchell and Watts, 1997), by shifting wage determination from national productivity determination towards enterprise productivity determination, thereby achieving increased flexibility in wage determination. As ACIRRT (1998: 41) commented, this process captured what was already happening in many Australian enterprises through over-award bargaining and over-award payments. However this system was informal and without legal status. In contrast, the new system ‘extended and institutionalised decentralised bargaining to parts of the economy that were not experienced with this form of collective bargaining’ (ACIRRT, 1998: 42).

In March 1987, under Accord Mark III, a flat $10 a week increase was granted to all workers (the first tier) with the further increase of up to 4 percent (the second tier) contingent upon enterprise negotiations under the Restructuring and Efficiency Principle. The first tier flat increase would have tended to reduce polarisation of the wage distribution, whereas, if the second tier increase was paid to all workers, the measure of polarisation would have remained unchanged.

Under Accord Mark IV a 3 percent first tier increase was awarded in September 1988, with a second tier increase of $10 per week being available in March 1989, if real productivity increases had been achieved. In Accord Mark V, increases of $20-$30 were granted subject to the continuation of the process of award restructuring. Many workers had not received second tier increases under Marks III and IV.
Under Accord Mark VI, there was a preparedness to embrace enterprise bargaining while retaining awards as a safety net. Under the award restructuring process employers were given the opportunity to negotiate the adjustment of normal hours of work that had previously been specified within awards (Watts and Rich, 1991).

Australia entered an era of fully decentralised but regulated bargaining, following the October 1991 National Wage Case decision. The 1993 Accord Mark VII agreement led to the continued devolution of wage fixation and further development of productivity-based workplace bargaining. In addition, equitable outcomes were to be achieved by ‘access to arbitrated safety net award adjustments’, ‘increasing equity in pay and conditions of employment for women workers’, ‘measures designed to assist workers with family responsibilities’ and ‘further improvements in the social wage, including substantial tax cuts, child care improvements [and] education and training’.

A series of safety net adjustments were awarded by the Australian Industrial Relations Commission (AIRC) in October 1993 and September 1994 to workers who were unable to make agreements with employers. In November 1996 the Federal government supported 3 annual safety net increases of $8 per week for wage earners receiving less than average weekly ordinary time earnings, who were unable or unwilling to engage in enterprise bargaining.

**Workplace Relations Act**

The new Coalition government abandoned the Accord after it took office in 1996 and introduced the Workplace Relations Act (WRA), which formalised the process of decentralisation and encouraged non-union enterprise bargaining at a time when employee trade union density was already low, with around 30 percent of employees belonging to trade unions. In addition, the power of the AIRC was reduced. The WRA imposed extensive regulatory sanctions against trade union activity and paved the way for employers to reduce award coverage and to move towards non-union bargaining.

The Department of Industrial Relations (1996) supported the WRA because it was alleged to lead to a more direct and balanced relationship between employers and employees, with a reduced role for third party intervention. Further it was claimed that there would be genuine freedom of association and a greater choice of union
representation. On the other hand, the previous Accord system was considered to be too centralised, giving too much power to the AIRC and trade unions and causing an unbalanced relationship between the employer and employee in which the exercise of choice was limited. The award system was claimed to be too rigid, because there was insufficient scope for incorporating the different (economic) circumstances across enterprises. In summary, the previous system was considered to be incompatible with microeconomic reform and responsible for the major macroeconomic problems, including unemployment and inflation (Burgess, Mitchell and Watts, 1999).

Australian Workplace Agreements (AWAs) represent the central plank of the WRA. These agreements attempt to formalise and facilitate individual employment contracts. They embody direct bargaining, do not require trade unions, and awards do not underpin the agreements.\textsuperscript{10} Despite the centrality of AWAs to the new system, wage determination has become increasingly fragmented with three different processes in operation. Under the award system, minimum wage increases are established by the AIRC to apply across enterprises for the particular award classification. Through enterprise bargaining wage increases are negotiated for the specific enterprise and/or workplace. Individual contracts are largely informal and negotiated directly between each employee and management. Under the new system around 30-40 percent of employees have their wages and conditions determined through enterprise agreements, awards are still central to 35-40 percent of employees and 30-35 percent of employees are both award and agreement free. To date less than two percent of employees are covered by AWAs (ACIRRT, 1998: 43).

Working time arrangements are being determined at an enterprise level in Australia (Burgess, 1998; Heiler, 1998) with enterprise agreements being used to modify the award system, especially with respect to working hours and penalty rates (ADAM, No. 10, 1996: 16). New hours of work arrangements include: an increase in the span of the normal working day, the averaging of hours over the month or the year and the absorption of penalty rates into ordinary earnings (ADAM, No. 13, 1997).

To reduce the role of central regulation, the coverage of awards was reduced in mid-1998 to twenty matters specifying minimum wages and certain conditions. The AIRC argued that awards would act as a safety net of fair minimum conditions of employment, would suit the efficient performance of work, and encourage the making of enterprise-based agreements (AIRC, 1997). With this reduced coverage, the section of the
workforce reliant on awards will lose certain entitlements and safeguards. Regular part-time work (defined as less than full-time hours, reasonably predictable hours of work and providing the same award conditions as full time employees on a pro rata basis) cannot be restricted and any reference to quotas and minimum and maximum weekly hours provisions has to be removed. Thus those workers with little bargaining power will have fewer regulations to protect their minimum working conditions (Burgess, Strachan and Watts, 1999). On its re-election in 1998, the Coalition government indicated that it would introduce further legislation designed to reduce the core elements of awards even further, in addition to providing inducements for AWAs and further restraints on trade union activity. These initiatives will lead to further decentralisation and de-collectivisation of the system.

Living Wage Cases

Safety net adjustments by the AIRC should reduce wage inequality by ensuring wage increases for the low paid. The first Living Wage Case was conducted before the full bench of the AIRC in 1996. The ACTU claimed that a large group of workers within the federal award system was missing out on enterprise based wage increases. This exclusion had contributed to the stagnation of real award wages since 1993 and hence growing wage inequality. Accordingly the ACTU sought a $20 per week safety net wage increase, a minimum weekly wage of $380 per week and an award wage increase of 8.75 percent. In turn this would be further supplemented by $20 per week wage increases in the following two years.

The Reserve Bank was particularly influential in its opposition to the claim, suggesting that it would increase average wages growth to unacceptable levels, threaten the inflation target and ultimately delay interest rate cuts, thereby retarding economic growth and employment growth (Reserve Bank of Australia, 1996). The Reserve Bank also argued that excessive wage increases directly increased unemployment through the over-pricing of labour. The Federal government supported an $8 per week safety net increase.

In a split ruling in April 1997 the Full Bench of the AIRC granted a $10 a week safety net increase and increased the minimum weekly wage to $359.40. About two million employees had not received wage increases through enterprise bargaining, of whom around 200,000 were on
minimum wage rates. The impact of this increase on average wages growth was estimated to be less than 0.5 percent (Bellchamber, 1996).

In 1997 the ACTU made a second round living wage claim of $58.60 over two years together with a $20 per week safety net claim for those unable to negotiate wage increases under enterprise bargaining. Increases of $10 to $14 were granted. In a third decision handed down in April 1999, the Commission granted $12 to the lowest paid workers on awards earning up to $510 a week. Those covered by awards and on higher wages received $10. The new minimum wage was set at $385.40 a week. Up to 1.7 million low-paid workers are eligible for this pay increase. Only those workers earning under $400 a week will access a pay increase of 3 percent or more, the rate at which full-time wages are rising in the general workforce. Those workers on awards earning $900 or more will suffer a real wage decrease, with the nominal rise in pay not covering the current rate of inflation of 1.2 percent, a rate that is predicted to rise.11

Under the Accord, the macroeconomic wage outcome was considered to be of utmost importance in the quest for low inflation and an internationally competitive economy. With the increased decentralisation of the wages system, the timing and size of wage increases have become less predictable. There are no longer wage targets or co-ordinating mechanisms, characteristic of the Accord. Thus there is a potential conflict between the push for enterprise arrangements, that is agreements between employers and employees crafted for the individual circumstances of the industry and enterprise, and the Reserve Bank's insistence on using wage outcomes as its guide to interest rate policy.12 In short, there has been a de facto return to centralised wage targets in Australia for those workers still receiving awards.13

THE DISTRIBUTION OF HOURS WORKED

Australia has experienced a marked increase in part-time employment with the share of total employment rising from 14.8 percent in 1978 to 25 percent in 1998. One quarter of employees work under casual conditions, that is with no paid holidays or sickness benefits, no paid weekends of leisure, no notice of termination and very little control over working conditions, especially hours (Campbell and Burgess, 1997).14 Many part-time jobs are casual and/or low-paid, and tend to be dominated by youth and females, though the incidence has increased
across all age groups, occupations and industries (Campbell and Burgess, 1997).

The rise in importance of part-time work has often been interpreted as a reflection of workers' desire for more flexible work arrangements. The percentage of part-time workers who want to work more hours has risen from 13.5 percent in February 1978 to 25.5 percent in February 1999 (562,200 workers) after reaching a peak of 30.3 percent in 1993. This indicates that the demand constraint (lack of job generation) and the increased incidence of non-standard jobs have been in part forced upon the work force, so that much of the non-standard employment has been involuntary. One manifestation of this is the increase in multiple job holding from 260,000 in 1987 to 435,000 in 1997 - from 3.7 to 5.2 percent of the workforce (ABS, 6216.0). The percentage of unemployed workers who seek full-time employment is cyclically sensitive but has been in excess of 78 percent over the last 20 years.

Over half of the new jobs generated since 1996 has been casual, especially for job seekers (Burgess and Campbell, 1998). The Coalition government has done little to stem the tide of irregular and non-career path jobs, and at the same time job insecurity has increased (De Ruyter and Burgess, 1999).

On the other hand, there has been an increase in the proportion of full-time workers who are employed for very long hours (over 49 hours per week) from 20 percent in 1982 to 32 percent in 1998 - that is, around 2 million workers can be considered over-worked (ACIRRT, 1998: 103). Thus, as shown in Figure 1, the distribution of hours has become increasingly polarised, with the increased incidence of employment for less than 29 hours through the expansion of part-time and casual employment, but with more full-time workers tending to work more than 48 hours per week.

In 1996/7, 11 percent of agreements in the Australian Agreements and Database Monitor (ADAM) averaged hours over 26 weeks and 5 percent averaged them over a year (see also Heiler, 1998). The averaging of hours is highest in sectors of the economy associated with a focus on 'customer service' and increased hours of operation. Over 70 percent of ADAM federal agreements contain clauses that deal with changed working time arrangements, including the introduction of annualised salaries, 12 hour shifts, time off in lieu arrangements and the banking of hours provisions (ACIRRT, March 1998: 40). Overtime and penalty rates are being absorbed into the base rate of pay, thus
removing the economic disincentive for employers to utilise labour at anti-social times or in long shifts (ACIRRT, June 1997: 29-30).

**Figure 1: The Distribution of Working Hours, 1986 and 1996**

![Graph showing the distribution of working hours between 1986 and 1996.]

Source: ACIRRT, 1998

Those workers who operate under non-union enterprise agreements are likely to have working-time deregulation as the first issue on the bargaining agenda. ACIRRT (1998: 49) report that non-union agreements have extended standard hours of employment beyond 38 hours per week (24% of agreements), averaged hours over the week, month or year (38% of agreements), and removed overtime payments (14% of agreements).

About one quarter of employees surveyed in two studies reported that their working hours had increased (DIR, 1995: 213-14; Morehead, Steele, Alexander, Stephen and Duffin, 1997). Only 56 cent of this group had received increased wages (DIR, 1996: 149-150; see also Morehead *et al.*, 1997: 264; Campbell, 1996). Thirty four percent of workers reported that they had no influence over the times they started and finished work (Morehead *et al.*, 1997: 266). Extended trading/customer service hours combined with the averaging of hours and reductions in
minimum hours for part-time workers, while beneficial to the enterprise, can mean unpredictable work schedules that vary from week to week (Buchanan, Barneveld, O'Loughlin and Pagnell, 1997: 117; see also Probert, 1995). Workers may then find it difficult to plan their personal and leisure lives, when childcare arrangements are often inflexible (ACIRRT, June 1997: 28).

The capacity of workers to choose their hours is influenced by the distribution of power in the employment relationship that reflects both institutional and economic factors. Zartler (1998) distinguishes between time-sovereignty (flexibility for the employee) and flexible availability (flexibility for the employer). The evidence suggests that managerial prerogative is increasing, thereby limiting workers' capacity to combine work and family responsibilities (Burgess and Strachan, 1999) and causing work intensification and longer hours of employment (for full-timers), which signifies an increase in productivity per employee.

THE MEASUREMENT OF WAGE POLARISATION

It has been well documented that the Australian wage distribution has become more unequal since 1975 (see Gregory, 1996a; King et al., 1992; McGuire, 1994; Norris and McLean, 1999; Watts, 1997), but there is no unanimity over the appropriate measurement procedure.

Wage inequality can be identified with a non-zero variance of the wage distribution. A number of scalar measures have been adopted to identify changes in wage inequality, including the Gini coefficient and Theil index and various measures of variance, but movements in these scalar measures can be contradictory and insufficiently informative about the trends in the wage distribution. Recently the focus of research on the evolution of wage distributions has shifted from the measurement of changes in the extent of inequality, in general, to the measurement of changes in the extent of polarisation.

The imputation of trends in the distribution of wages through the incidence of arbitrarily defined low and high wage employment, as defined by a number of researchers including King, Rimmer and Rimmer (1992) and Norris and McLean (1999), as well as the use of percentile ratios (ACIRRT, 1998), carries a number of disadvantages. These include the absence of any tests of statistical significance and the potential inconsistency of the results. The latter results from the focus
on segments of the earnings distributions, rather than the identification of changes across the whole distribution (Wolfson, 1994).

Morris, Bernhardt and Handcock (1994) advocate the computation of the summary statistic, the median relative polarisation (MRP) index that has desirable asymptotic properties and is based on the comparison of complete wage distributions. This enables the researcher to establish whether the wage distribution has become more dispersed, as compared to the base year, and whether this increased dispersion takes the form of the downgrading of the bottom half of the distribution and/or upgrading of the top half of the distribution and possibly polarisation of the whole distribution (Morris, Bernhardt and Handcock, 1994: 207).

We use published and unpublished data from the ABS Distribution and Composition of Earnings and Hours (Cat. no. 6306.0) that yield estimates of frequencies across wage ranges of sizes from $50 to $200. The data include estimates of the deciles and the means of the earnings distributions. These 'decile wages' are then adjusted by the ratio of the respective medians of the target and base years. The frequencies with which different wages in the target year appear in these adjusted decile ranges are then calculated, using linear interpolation. Thus it is assumed that employment within a given wage range is distributed uniformly. The MRP statistic is computed using these frequencies (see Technical Appendix 1). If the wage distribution had maintained its same form, so that all wages appeared to have increased uniformly, then the decile frequencies associated with the target year wage distribution would all be 10 percent. The change in the wage distribution from one period to the next can be viewed as a combination of a change in levels (medians) and a change in shape, with the latter being identified with the MRP statistic.

We explore the changes in the adult weekly and hourly wage distributions by gender, public and private sector, occupation and full-time and part-time status over the period 1986-98, which coincides with the period of decentralisation and subsequent deregulation of the wage fixing system. The occupational classification system utilised by the ABS changed from the Australian Standard Classification of Occupations (ASCO) First Edition to the ASCO Second Edition in 1996, so that a disaggregated analysis by occupation after 1996 is not undertaken.
Median and Quartile Growth

Table 1: Median and Quartile Full-Time Earnings Growth, 1986-98

<table>
<thead>
<tr>
<th>Quartile</th>
<th>MALES</th>
<th>FEMALES</th>
<th>PERSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Private</td>
<td>Public</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>Average Weekly Earnings</td>
<td>Average Total Hourly Earnings</td>
<td>Average Total Hourly Earnings</td>
</tr>
<tr>
<td>25%</td>
<td>67.0</td>
<td>85.4</td>
<td>68.5</td>
</tr>
<tr>
<td>Median</td>
<td>75.2</td>
<td>88.4</td>
<td>77.2</td>
</tr>
<tr>
<td>75%</td>
<td>81.9</td>
<td>78.0</td>
<td>79.6</td>
</tr>
<tr>
<td></td>
<td>Average Total Hourly Earnings</td>
<td>Average Total Hourly Earnings</td>
<td>Average Total Hourly Earnings</td>
</tr>
<tr>
<td>25%</td>
<td>68.3</td>
<td>86.0</td>
<td>68.6</td>
</tr>
<tr>
<td>Median</td>
<td>73.0</td>
<td>87.0</td>
<td>74.3</td>
</tr>
<tr>
<td>75%</td>
<td>81.7</td>
<td>77.7</td>
<td>78.5</td>
</tr>
<tr>
<td></td>
<td>Average Weekly Earnings</td>
<td>Average Total Hourly Earnings</td>
<td>Average Total Hourly Earnings</td>
</tr>
<tr>
<td>25%</td>
<td>70.3</td>
<td>92.1</td>
<td>72.4</td>
</tr>
<tr>
<td>Median</td>
<td>78.8</td>
<td>98.1</td>
<td>81.2</td>
</tr>
<tr>
<td>75%</td>
<td>89.4</td>
<td>85.2</td>
<td>89.9</td>
</tr>
<tr>
<td></td>
<td>Average Total Hourly Earnings</td>
<td>Average Total Hourly Earnings</td>
<td>Average Total Hourly Earnings</td>
</tr>
<tr>
<td>25%</td>
<td>71.2</td>
<td>91.9</td>
<td>72.7</td>
</tr>
<tr>
<td>Median</td>
<td>76.3</td>
<td>99.0</td>
<td>82.0</td>
</tr>
<tr>
<td>75%</td>
<td>85.9</td>
<td>86.7</td>
<td>90.0</td>
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</table>


The computations in Table 1 suggest that polarisation is taking place across private sector and total wage distributions with growth of the 75 percentile being greater than median growth and in turn growth of the 25 percent percentile. Wage growth in the public sector was higher for the lower two percentiles than in the private sector and slower for the 75 percent percentile. Females enjoyed higher rates of wage growth than their male counterparts. The Consumer Price Index grew approximately
60 percent over this period, so that low wage employees in the private sector experienced a relatively low rate of real wage growth.

Adult Full-Time Wage Distributions

There is a relatively consistent pattern of change for adult males, females and persons across Average Weekly Earnings (AWE) and Average Total Hourly Earnings (ATHE) over the period 1986-98 (Table 2). The majority of the MRP statistics are significant at the 2.5 percent level with the negative values denoting convergence and the positive values denoting upgrading (downgrading) of the upper (lower) half of

Hourly and weekly private sector and total earnings exhibited statistically significant polarisation, through a downgrading of the bottom half of the distribution and an upgrading of the upper half of the distribution. The downgrading component was greater in magnitude. On the other hand, public sector hourly and weekly wages were characterised by the downgrading of the lower half of the distribution but convergence of the upper half of the distribution. Male and female public sector hourly and weekly earnings, except for female hourly earnings, converged over the period 1986-98

The hourly and weekly earnings distributions for adult persons have exhibited polarisation, although, despite the difference in respective medians and the dominance of private sector employment, there is evidence that the public sector has moderated the upgrading of the upper half of the distribution. There appears to be a slight weakening of the trend towards polarisation for the adult male, female and persons AWE distributions for the short period 1996-98.

The results demonstrate that there has been statistically significant polarisation of full-time adult male and female hourly and weekly earnings over the period of labour market deregulation, 1986-98, that has been largely driven by the downgrading of the lower half of the respective wage distribution. While there are some disparities for the MRP statistics between weekly and hourly earnings, it is not evident that changes in the distribution of hours for full-time employees have played a major role in the polarisation of earnings (see also Borland, 1999: 11). As noted, there is evidence of an increased incidence of unpaid overtime.\(^{21}\)

Earnings distributions were recalculated by imposing the ASCO major occupational structure and public/private sector split for 1986 on the 1996 data. The adjusted MRP statistics are shown in brackets.
Table 2: Polarisation Indexes for Male and Female Adult Full-Time Employees, 1986-98

<table>
<thead>
<tr>
<th></th>
<th>Average Weekly Earnings</th>
<th></th>
<th>Average Total Hourly Earnings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LMRP</td>
<td>UMRP</td>
<td>MRP</td>
<td>LMRP</td>
</tr>
<tr>
<td><strong>1986-96 MALE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRIVATE</td>
<td>0.120</td>
<td>0.094</td>
<td>0.107</td>
<td>0.066</td>
</tr>
<tr>
<td>(0.123)</td>
<td>(0.057)</td>
<td>(0.090)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUBLIC</td>
<td>0.063</td>
<td>-0.128</td>
<td>-0.033</td>
<td>0.088</td>
</tr>
<tr>
<td>(0.057)</td>
<td>(-0.086)</td>
<td>(-0.019)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.132</td>
<td>0.044</td>
<td>0.088</td>
<td>0.117</td>
</tr>
<tr>
<td>(0.112)</td>
<td>(0.006+)</td>
<td>(0.059)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FEMALE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRIVATE</td>
<td>0.140</td>
<td>0.119</td>
<td>0.130</td>
<td>0.143</td>
</tr>
<tr>
<td>(0.165)</td>
<td>(0.075)</td>
<td>(0.120)</td>
<td></td>
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</tr>
<tr>
<td>PUBLIC</td>
<td>0.121</td>
<td>-0.098</td>
<td>0.015+</td>
<td>0.174</td>
</tr>
<tr>
<td>(0.099)</td>
<td>(-0.057)</td>
<td>(0.021+)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.163</td>
<td>0.080</td>
<td>0.121</td>
<td>0.178</td>
</tr>
<tr>
<td>(0.178)</td>
<td>(0.032+)</td>
<td>(0.105)</td>
<td></td>
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</tr>
<tr>
<td><strong>PERSONS</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
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<td>0.023</td>
<td>0.082</td>
<td>0.129</td>
</tr>
<tr>
<td>(0.107)</td>
<td>(0.004+)</td>
<td>(0.055)</td>
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|                  |      |      |     |      |      |     |
| **1996-98 MALE** |      |      |     |      |      |     |
| PRIVATE          | 0.007+ | 0.047 | 0.027 | 0.045 | 0.039 | 0.042 |
| (0.026+)         | (0.054) | (0.017) |     |     |     |     |
| PUBLIC           | -0.020# | 0.025+ | -0.001+ | -0.021+ | 0.003+ | -0.009+ |
| TOTAL            | 0.073 | 0.035+ | 0.054 | 0.049 | 0.031 | 0.040 |
| PRIVATE          | 0.012+ | -0.131 | -0.059 | 0.027+ | 0.028+ | 0.027 |
| (0.017)          | (0.054) | (0.064+) |     |     |     |     |
| PUBLIC           | 0.025+ | 0.044 | 0.035 | 0.043 | 0.020+ | 0.032+ |
| TOTAL            | 0.003+ | 0.032 | 0.018 | 0.034 | 0.017 | 0.026 |
| **PERSONS**      |      |      |     |      |      |     |
| TOTAL            | 0.150 | 0.118 | 0.134 | 0.127 | 0.128 | 0.127 |
| (0.134)          | (0.087) | (0.111) |     |     |     |     |
| **1986-98 MALE** |      |      |     |      |      |     |
| PRIVATE          | 0.150 | 0.118 | 0.134 | 0.127 | 0.128 | 0.127 |
| (0.134)          | (0.087) | (0.111) |     |     |     |     |
| PUBLIC           | 0.209 | 0.172 | 0.191 | 0.154 | 0.134 | 0.144 |
| TOTAL            | 0.201 | 0.093 | 0.147 | 0.204 | 0.083 | 0.143 |
| **PERSONS**      |      |      |     |      |      |     |
| TOTAL            | 0.129 | 0.064 | 0.096 | 0.173 | 0.039 | 0.106 |


Notes: LMRP, UMRP and MRP denote the MRP statistics for the lower half, top half and overall wage distribution.
The bracketed terms are MRP statistics for 1996 based on the 1986 occupational structure and private sector/public sector split.
All the MRP statistics are significant at the 2.5% level, except those denoted by a # (5% significance) or + (insignificant at the 5% level). These statistics are shown in bold type.
Hours data was not collected for managerial employees so hourly earnings data for the occupation groups are unreliable. Accordingly the impact of structural shifts was not examined for hourly earnings.
Correction for structural change reduced the significance of the upgrading of the upper part of the private sector and total weekly earnings for males, females and persons. There was statistically significant polarisation, largely driven by the downgrading of the lower half of the wage distribution.

If enterprise bargains are strongly determined by industry then increased dispersion within the major occupations would be consistent with this. One approach would be to compute the MRP statistics and explore the extent of polarisation for each of the major occupations across the period 1986-96 for each occupation. Another approach that provides an overall picture of the extent of intra as opposed to inter-occupational wage inequality is an analysis of variance (see Technical Appendix 2).

The analysis shows that while the divisions of the male and female AWE distribution data by private and public sector into major occupations are still statistically significant at the 2.5 percent level (Table 2), the statistic is becoming less and less significant, except for male private sector and female public sector earning data. In other words, the inter-occupational variation of wage rates is a declining share of the weighted variance of intra-occupational wage rates. This means that the division of the wage distribution data according to occupation is becoming less and less relevant, thereby indicating that intra-occupational wages are becoming more heterogeneous. In an earlier study Watts (1997) found that different rates of wage increase across the major occupations also appeared to be a factor contributing to the observed polarisation.

Table 3: Analysis of Variance of Male and Female Average Weekly Earnings by Public and Private Sector (F Statistics)

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>3.40</td>
<td>10.82</td>
<td>6.15</td>
<td>3.43</td>
<td>10.21</td>
<td>4.81</td>
</tr>
<tr>
<td>FEMALE</td>
<td>8.32</td>
<td>13.50</td>
<td>12.29</td>
<td>5.42</td>
<td>15.30</td>
<td>9.15</td>
</tr>
</tbody>
</table>

Note: The above F statistics have 7 and 152 degrees of freedom with a critical value of 2.39 at the 2.5% level.
Adult Part-Time Wage Distributions

The analysis was also conducted for adult part-time workers but the large income range at the bottom of the distribution (0-$200) makes detailed analysis impossible. The results again reveal that for males and females employed in the public sector, average weekly and total hourly earnings converged in the upper half of the distribution. The results for the private sector are inconsistent.

AN INTERNATIONAL COMPARISON

Detailed unpublished wage distribution data of usual weekly earnings of adult full-time employees, by gender, across a consistent occupational classification and by private/public sector are available from the Bureau of Labor Statistics for the years since 1983. A simple cross-section comparison of the United States and Australia confirms that the Australian adult full-time distributions by gender and in aggregate remain more compressed than those in the USA.

Over the period 1986-96, the full-time earnings distributions by gender and in aggregate in the United States exhibited statistically significant polarisation. This was dominated by the upgrading of the upper half of the distributions for males and in aggregate, whereas females experienced both upgrading and downgrading. Female wage distribution which was previously more egalitarian than that apparent for male earnings is becoming more unequal. Thurow (1998) defines this trend as ‘equal opportunity inequality’. Over the 1980s and early 1990s, the low paid experienced cuts in real wages (Freeman, 1995).

Over the period 1996-98 there is evidence of convergence of the lower half of the three distributions, but modest upgrading for males and in aggregate. The convergence can be attributed in part to the minimum wage increase from $4.25 to $4.70 in 1996 and then to $5.15 per hour in 1997, after no increase in the minimum wage since 1991.84

Australia was more successful in generating low wage full-time jobs for both males and females and in aggregate than the USA over the period 1986-98. Thus in the context of the net increase in full-time employment for each country and their corresponding 1986 wage distributions (see Figure 2). This is revealed by the respective 1998 frequencies associated with the deciles of the 1986 full-time distributions, (see Gregory, 1996a, for similar computations for the
period 1976-91). Thus, in a relative sense, low wage employment in Australia has grown faster.

Figure 2: Comparison of Deflated Full-time Wage Distributions: Australia and USA, 1986 and 1998

USA data: Usual weekly earnings of employed full-time wage and salary workers by occupation sex, race and Hispanic origin (unpublished data), BLS (1986, 1998).

FLEXIBLE LABOUR MARKETS AND WAGE INEQUALITY

There is an increasing body of literature, particularly from the United States, that claims that institutional change, notably labour market reform, is an important factor contributing to the increase of wage inequality. For example, Thurow (1998) is critical of the emphasis on explanations for the increasing wage inequality in the United States that are based exclusively on technological change and trade. He notes some inconsistencies in the changes in wage relativities of skill groups and the rapid technological change during the 1970s, when the wage distribution was stable. Also the US experience has not been repeated
in Europe, so appeal to the common global factors of technological change and factor price equalisation through increased world trade is implausible. Accordingly he suggests that institutional differences should be carefully analysed (see also Fortin and Lemieux, 1997). He notes that a significant component of increased inequality lies in increased intra-group inequality that he attributes to better educated workers being forced to take lower paid jobs for which hiring standards have increased.

In principle, safety net adjustments through Living Wage Cases still provide some degree of equity for low wage workers in Australia, by maintaining consistency between the structure of awards and bargained outcomes. Burgess, Mitchell and Watts (1999) show however that the growth of the award index (both hourly and weekly) lagged appreciably behind the growth of average weekly earnings, even over the period of Labor Government, when the award system covered nearly all workers and was central to wages policy. In recent years the Reserve Bank has become more influential in limiting the adjustment of awards by being able to threaten increases in interest rates, if it deems the proposed award increase to be excessive. In a dissenting view at the 1997 Living Wage Case, one Commissioner noted the unfairness of imposing the burden of wage moderation on the low paid (Buchanan et al., 1998).

In Australia, the statistically significant polarisation of the male and female adult full-time wage distributions demonstrated in Table 3 represents the continuation of the trend that started in the 1970s. The major source of the polarisation over the period 1986-98 in Australia was the downgrading of the lower half of the wage distribution for both men and women. This is consistent with the view that, under the current fragmented bargaining arrangements, the Living Wage Cases have failed to provide adequate protection for the low paid. Thus the change in the underlying institutional arrangements in Australia has contributed to the increased polarisation of wages. In addition, Australia has been experiencing the rapid growth of non-standard employment and female participation, with the former reflecting, in part, the deregulation of the labour market.

WAGE INEQUALITY AND UNEMPLOYMENT

By providing a floor to the distribution of wages, the award system is alleged to frustrate the creation of low wage jobs in Australia, thereby
inhibiting the functioning of the labour market and sustaining a higher unemployment rate. The OECD Jobs Study (1994) points to the benefits of flexibility that are alleged to characterise the American labour market, in the form of stronger growth and increased employment opportunities for low skilled workers. The larger income gains for the overall economy are claimed to offset the social implications of wider wage differentials through the growth of low wage jobs. Freeman (1995: 68-69) shows that between the years 1980 and 1993 (years with similar official unemployment rates) falling real earnings for the lower skilled employees in the United States were accompanied by a larger decline in their employment/population ratio and an greater increase in their unemployment rate than for more highly skilled groups. Also, during the 1990s the increase in minimum wages had little impact on employment opportunities, with the elasticity of labour demand being relatively low.

In principle a lower rate of unemployment should be associated with reduced wage inequality, with market forces placing upward pressure on the more flexible wages of the low skilled (see Cornwall, 1983), but the use of the official unemployment rate ignores the growth of contingent work in the United States. Thurow notes that in 1995 the official unemployment level of 7.5 million was accompanied by hidden unemployment (not engaged in active search) of 5.6 million; 4.5 million part-time workers seeking full-time employment; 8 million workers in temporary jobs; 2 million workers on call, 8.5 million workers who were self employed and 6 million who appeared in the census but not in the labor force statistics (see also Mishel and Schmitt; 1995). In addition, women’s labour force participation has increased with well-educated women putting pressure on the wages of less well educated men.

Western and Beckett (1999) argue that taking account of the rate of male incarceration, the US male unemployment rate is increased by a minimum of 0.5 percentage points. The low official US unemployment rate tends to be sustained in the long run, due to the high rate of recidivism. By contrast, the corresponding adjustment of European unemployment rates is much smaller, due to the rate of incarceration in Europe being about a tenth of the US rate (Freeman, 1995: 70). Thus, after taking account of rates of incarceration, the differences in the labour market outcomes between the United States and Europe are significantly lower than are revealed by the official statistics. The authors argue that the expansion of the US penal system represents a
large and coercive intervention in the labour market that must be 
analysed in the wider context of prevailing institutions.

Thus the negative correlation between unemployment and wage 
dispersion does not appear to hold for the United States, when the extent 
of joblessness is correctly measured. Conceicao, Ferreira, and Galbraith 
(1999) argue that inequality and unemployment are related positively 
across the European continent, within countries, between countries and 
through time. They note that this contradicts the view that 
unemployment in Europe is attributable to rigid wage structures, high 
minimum wages and generous social welfare systems (see also Borland, 
1999). Thus a highly polarised wages system does not appear to be a 
necessary condition for the achievement of full employment.

Workplace arrangements that sanction low wages enable inefficient 
firms to survive the competitive struggle, thereby frustrating the 
efficient allocation of resources. In addition, such firms do not have the 
incentive to achieve increases in labour productivity, via high levels of 
investment, to accommodate growing real wages. Mitchell (1996) has 
pointed to the key role of investment in the achievement of a high level 
of economic activity.

The stance of macroeconomic policy also assumes importance. 
Mitchell (1998) argues that mass unemployment is ultimately 
attributable to inadequate use of government spending. He advocates 
that the government generate jobs for those who are made redundant 
by the private sector.

POLICY IMPLICATIONS

Whiteford (1995) argued that, despite the long run increase in the 
dispersion of the wage distribution, Australia was among the least 
unequal of developed countries with respect to economic well being. 
The relatively compressed distribution of earnings that accounted for 
nearly 75 percent of household income was buttressed by highly 
progressive taxation and social security systems (see also Harding, 
1997).

A number of commentators continue to argue that there is a trade- 
off between unemployment and wage inequality and suggest that the 
solution to the growth of low paid employment lies in the social welfare 
and/or tax system. Dawkins (1999) proposes a wage-tax tradeoff in the 
form of tax credits for the low paid in Australia in exchange for them
foregoing Living Wage increases. Again the low skilled are seen as inhibiting employment growth because they are pricing themselves out of employment. This policy proposal ignores the dynamic inefficiency of a low wage economy. Further, given the budgetary stance of government, significant outlays in the form of tax credits will not be appealing. The polarisation of male and female earnings shows no sign of relenting and the moderating influence of wage setting in the public sector continues to decline, with the ongoing program of privatisation and the contracting out of functions previous undertaken by the federal and state public services. Thus the fiscal burden is likely to continue to increase.

Some commentators even argue in favour of a reduction in benefits to restore the incentive to work (see, for example, Moore, 1997). These calls will increase in intensity if wages decline relative to benefits in a deregulated labour market. Finally the failure of some enterprise bargaining outcomes to reflect the growth in labour productivity raises the question of whether enterprise bargaining is an appropriate form of wage determination in this fragmented system.

CONCLUSION

In Australia the two major political parties supported the introduction of enterprise bargaining on the grounds that it would lead to increases in productivity and efficiency and hence international competitiveness, via improvements in work practices. Originally this appeared to imply a relationship between less regulated workplace arrangements and the expansion of high wage, high productivity jobs, but the nature of this link was never articulated.

Labour market reform in Australia has led to the numerical and functional flexibility of employment and wage flexibility. Yet this is not being matched by any appreciable reduction in the unemployment rate or with any significant increase in full-time job generation. The only consequence that we can observe is the growing polarisation of earnings that commenced in the 1970s, the continued growth in non-standard employment and the polarisation of hours between the involuntary under-employed and the involuntary over-employed. The growth of low paid employment could lead to the emergence of an underclass of working poor, as in the United States.
The growing earnings polarisation and the further deregulation of employment arrangements, especially working-time, will continue to undermine the capacity of the employment system to provide work on terms that are acceptable to workers with family responsibilities. The increased availability of paid work at an adequate income combined with sufficient time to care for dependents should be the objective of policy. The employer's agenda has become conveniently conflated with the work and family agenda, however, so that despite the rhetoric, the cursory evidence suggests declining satisfaction with the balance between work and family.

Finally, despite the US model of deregulation being trumpeted as the appropriate model for Australia to follow, closer scrutiny reveals that this model is seriously flawed with low wages contributing to high rates of crime and social dysfunction. Thus the capacity of a flexible labour market to facilitate sustained full employment with growing real wages and productivity is under challenge.

NOTES

1 We eschew the use of the term *deregulation*. While firms have been granted increased freedom to negotiate wages and conditions, the process of reform has required detailed legislation that defines rights and obligations, including the Workplace Relations Act. Rather than the term *deregulation*, *reregulation* is more appropriate terminology. I am indebted to Russell Lansbury for this point.

2 Awards covered a wide range of employment matters including minimum rates of pay, leave entitlements, overtime and shift rates, hours of work, meal breaks and travel allowances and stipulated whether employment was on a weekly, daily, permanent or casual basis (Deery, Plowman and Walsh, 1997: 9.23).

3 This implies that there is a low correlation between changes in hours and changes in earnings. This can be explained by the increased of unpaid overtime.

4 Borland (1999: 16) notes that changes in unobservable factors are overwhelmingly the main cause of increases in earnings dispersion in Australia between 1982 and 1994/5, as opposed to factors, such as education and experience.

5 Watts and Mitchell (1990) show that even over the period 1983-88 the non-managerial full-time adult male industry wage distribution became more
dispersed, which they attribute to incremental creep and intra-industry compositional change.

A significant devaluation of the $A in 1986 precipitated a Commission decision in which the increase in wages based on the indexation principal was discounted for the impact on the domestic cost structure of the devaluation. This heralded the demise of the indexation system.

Coalition State governments (including Victoria and Western Australia) had already implemented similar or more far-reaching reforms.

The Australian Industrial Relations Commission replaced the Commonwealth Conciliation and Arbitration Commission with the 1994 Industrial Relations Reform Act (see Dabscheck, 1995).

Some radical employers in the maritime (Melbourne’s Webb Dock) and coal (Rio Tinto’s, Hunter Valley no. 1 mine) industries used the WRA in an attempt to diminish award and union presence at the workplace.

Details about AWAs are kept secret. The Employment Advocate registers AWAs and has a duty to ensure that the AWAs were not enforced under duress and that the agreements do not seriously disadvantage employees.

It was subsequently noted that the net change in post tax income for some workers could be less than $4 per week, due to the clawback of family payments. Business groups have proposed a freeze on wages for low-income earners in exchange for tax credits (see below).

The Reserve Bank also became increasingly vocal about individual bargains - labelling some settlements as excessive (Reserve Bank, 1996).

With the advent of enterprise bargaining it is now very difficult to interpret aggregate wage data which the Reserve Bank concedes can be misleading and partial (Reserve Bank, 1996). The problem is that not everyone is covered by enterprise bargains, wage increases may be granted in exchange for trade-offs in other conditions and there are major compositional changes occurring in the workforce (Burgess, 1995).

Australia has one of the highest rates of workforce casualisation in the OECD (Campbell and Burgess, 1997).

The 1995 Workplace Industrial Relations Survey indicated that around one-third of the long hours employees were conscripts, that is, they were forced to work long hours.

One unambiguous procedure for comparing the extent of wage distributions inequality is the Lorenz criterion, but this requires detailed computations to establish whether the Lorenz curves for two wage distributions intersect.

In a later paper (Handcock, Morris and Bernhardt, 1996), the authors explore the decomposition of changes in wage distributions, through account being taken of changes in the distribution of weekly hours. The
data used in this article does not link the individual’s wages and hours worked, so this approach is not possible.

Using linear interpolation to calculate the deciles can lead to significant differences in decile computations in the tails of the distributions. This has a major impact on the MRP calculations.

Bellchamber (1996) is critical of Gregory’s adjustment of base year percentiles by the ratio of medians (Gregory, 1993) and advocates the use of an adjustment based on the award index. Gregory (1996) argues that calculations based on award adjustment ignore the significant wage drift.

The wage distribution associated with any net new jobs would have to be distributed in the same manner as the ‘inflated’ base year distribution.

Changes in the distribution of hours would increase polarisation if high hourly earnings were positively correlated with increases in hours worked.

The correction for structural change is a partial attempt to counteract the argument by Bellchamber (1996) that the median adjustment should reflect the impact of new jobs on the earnings distribution.

It is impossible to establish critical values of the MRP statistic by occupation because the sample counts by individual occupation and gender are not available.


The key issue becomes the frequency and size of the adjustment of awards. Cuts in nominal wages may be impossible, but growing inequality between awards and bargained wage outcomes, ie significant wage drift will make the award system redundant.

Freeman (1995: 7) suggests that low wages in the mainstream economy have encouraged low skilled workers to engage in criminal activity.

In 1992, 0.8% of US male workforce was out of work for more than a year, compared to a corresponding rate of 3.2% in the European Community. After taking account of the different rates of incarceration in Europe and the USA, the higher official average duration of unemployment in Europe has little meaning (Freeman, 1995: 70).

Thurow (1998) contrasts the low wage, low productivity growth service sector in the USA with the relatively high wage, high productivity growth sector in parts of Europe.

Rowthorn (1995: 32) argues that a shortage of capital investment manifests itself in the form of unemployment and/or wage inequality.

The OECD argues that the reform of benefit systems is worthy of detailed analysis, see for example OECD Observer (1997).
Technical Appendix 1

Define the decile ranges of the base year distribution as \( W_{00}, W_{01} W_{02} W_{03} \ldots W_{010} \) so that \( P(W_{0j} - 1 < w_0 < W_{0j}) = 0.10 \) (\( j = 1, 2, 3, \ldots 10 \)) where \( w_0 \) denotes an element of the base wage distribution. Then the frequencies for the later year distribution can be computed, which are based on the decile ranges of the base year distribution that have been inflated by the ratio of the medians for the two years.

Define \( x_j \) where

\[ x_j = P(\tilde{W}_{0j} - 1 < w_j < \tilde{W}_{0j}) \]

where \( \tilde{W}_{0j} \) denotes the revised upper bound of the \( j \)th decile and \( w_j \) denotes an element of the later year wage distribution. Then the median relative polarisation index, MRP can be defined as

\[ MRP = \sum_{j=1}^{10} 0.5 \left| (j - 0.5) / 10 - 0.5 \right| x_j / 0.1 - 1.25 \]

The deviation of the \( x_j \)'s from 0.10 signifies a disparity between the two distributions. This disparity is weighted by the absolute deviation of the decile in question from the median, thereby giving greater weight to deviations in the tails of the distribution (see Morris, Bernhardt and Handcock, 1994, 217). The other constants in the expression ensure that this statistic has a mean of zero.

For sample sizes of 1 000 or more, the Central Limit Theorem can be employed and the variance is approximately \( 0.5(1/N_0 + 1/N_1) \) where \( N_0, N_1 \) denote the sample sizes in years 0 and 1. Confidence intervals for the MRP statistic can be constructed to establish whether the change in the wage distribution from the base year is statistically significant. Sample counts for Australian persons are published, so the respective (fe)male full-time adult shares of total employment are used to obtain an approximate sample counts for full-time (fe)male employees.

Lower and upper statistics corresponding to the two halves of the distribution can be computed, which enables downgrading and upgrading to be examined. The upper (lower) statistic is defined as twice the summation term between 6 and 10 in the above calculation of MRP - 1.25. Under the null the variance of the upper (lower) index is \( 2.5(1/N_0 + 1/N_1) \).

In some of the ABS published and unpublished wage distribution data, the frequency distributions do not sum to 100, due to data not being available or having been confidentialised. A bias would be introduced in the MRP calculations if the estimated frequencies
associated with the inflated base year deciles were constrained to sum to 100. Accordingly, the frequencies of all distributions are uniformly adjusted to sum to 100 before calculations are undertaken.

Since the base year deciles are adjusted by the ratio of the medians, the cumulative frequency of the target wage distribution associated with the bottom 5 adjusted deciles should be 0.5. The ABS computation of the target year median does not equal that based on linear interpolation, so that the bottom 5 decile frequencies associated with the target distribution will generally not sum to 0.5. Accordingly, the bottom 5 decile frequencies of the target distribution are adjusted uniformly so that they sum to 0.5. Likewise the top 5 decile frequencies are adjusted in a similar manner.

Technical Appendix 2

Denote the wage ranges provided by the ABS as $W_0, W_1, \ldots, W_n$ where $W_0 = 0$. Then the mean wage of the $i$th occupation $\bar{W}_i$ can be written as

$$\bar{W}_i = \sum_{k=1}^{n} P_{ik}(W_{k-1} + W_k)/2$$

where $P_{ik}$ denotes the employment frequency of the $i$th occupation within the $k$th earnings range. Then the overall mean wage can be written as

$$\bar{W} = \sum_{i=1}^{p} d_i \bar{W}_i$$

where $d_i$ denotes the share of employment in the $i$th ($i=1, \ldots, p$) occupation.

Then the weighted variance of the distribution of wages can be written as

$$\sum_{i=1}^{p} \sum_{k=1}^{n} d_i P_{ik}(\bar{W} - (W_{i-1} + W_i)/2)^2 = \sum_{i=1}^{p} \sum_{k=1}^{n} d_i P_{ik}(\bar{W}_i - (W_{i-1} + W_i)/2)^2 + \sum_{i=1}^{p} d_i (\bar{W} - \bar{W}_i)^2$$

Then, denoting the second and third terms as SSW and SSB, then an $F$ test of whether the grouping of earnings by major occupation is statistically significant is given by

$$F_{(p-1, N-p)} = (SSB/(p-1))/(SSW/(N-p))$$

where $N$ is given by $pN$. 
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