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by

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Anthony King
Editor

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An earlier version of this paper was presented at the 4th Australian Family Research Conference, held in Sydney on 17-19 February 1993. In revising the paper, I have benefited from comments made at the Conference and at a seminar held at the Social Policy Research Centre, as well as from specific comments provided by Bruce Bradbury, Jonathan Bradshaw, Anthony King and George Matheson, who also provided research assistance. None of these people are responsible for the views or any errors contained in the paper.

Abstract

Previous research has shown that the earnings of married woman contributes to a reduction in family income inequality. This paper explores whether this has remained the case during the 1980s for married couples aged between 24 and 54 in the face of the continued rise in the labour force participation rate of married women. The analysis begins by looking separately at the factors which determine the earnings of married women, specifically the decision to participate in the labour market, the length of time spent working and the average level of earnings received. This is followed by a more formal analysis of the factors contributing to family income inequality which indicates that wives' earnings have continued to contribute to reduced inequality of family incomes. The role played by this and the other components of family income in determining overall inequality are also investigated. The analysis shows the degree of inequality among the earnings of wives to have declined over the decade, unlike many other income components where inequality increased. Together, the results show that by the end of the decade wives' earnings not only contributed significantly to the level of family income, but also led to a more equal distribution than would have existed if married women's earnings were not contributing to family incomes at all.

1 Introduction

The study of income distribution has progressed enormously in the last two decades. Greater conceptual clarity and the availability of unit record data have made this possible, but interest in the subject has also been spurred by the perception that income inequality has been increasing. That perception has been borne out by the research, not only for Australia but also for many other countries. Yet it was not that long ago when the conventional wisdom to emerge from studies of income inequality in the post-war period was one of distributional stability. In contrast, the evidence for the eighties paints a picture of distributional change, of inequality increasing over a short period by a considerable degree in historical terms. Much has been made of this in the Australian context, where both income distribution studies (Saunders, 1992) and labour market research (Borland, 1992; Gregory, 1992) have highlighted a trend towards increasing inequality commencing sometime in the mid-seventies. Similar findings have emerged in recent research on the United Kingdom (Bradshaw, 1993; Jenkins, 1992) the United States (Danziger and Gottschalk, 1992a; Gottschalk and Joyce, 1992) and Sweden (Edin and Holmlund, 1992).

The impact of this research is neatly captured in the title to a recent book on American income inequality edited by two leaders in the field, Sheldon Danziger and Peter Gottschalk, *Uneven Tides: Rising Inequality in the 1980s*. In the Introduction to the volume, the editors summarise the US evidence during the long recovery phase between 1982 and 1989 in the following way:

> ... the old conventional wisdom that 'a rising tide lifts all boats' has been rejected. We now know that the 1980s was a decade of 'uneven tides'. Most small boats were docked where the tides were low, while the few large boats, docked in different harbours, rose with the uneven tides. (Danziger and Gottschalk, 1992a: 4-5)

This description would seem to apply equally well to Australia as to the United States. It is, if true, of concern because the 1980s was a period of relatively strong economic growth and rising living standards on average

(particularly between 1983 and 1989), in contrast to the 'stormy waters' which have accompanied the current recession over the last few years.

Establishing the facts inevitably leads to a search for their causes. In the context of increasing inequality, most of the Australian research has attempted to identify the proximate determinants of increasing inequality, rather than establish the more fundamental underlying causal mechanisms and factors. Considerable effort has gone into establishing which components of income explain the observed increase in inequality and the relative importance of changes in age and household structure, in patterns of employment and unemployment, and so on. Relatively little effort has gone so far into peeling back the statistics to search for a deeper layer of explanation, focusing on the effects of structural factors like the impact of technological change on the labour marker or the effects of increased liberalisation of capital and exchange markets.

The research which has taken place has, however, cleared the way for this second strand of effort to proceed by providing a very detailed descriptive account of how the various elements which combine to make up the overall income distribution have been changing. That research provides no simple answers. There is no single 'smoking gun' that can be identified as the guilty party underlying the trend increase in inequality (Danziger and Gottschalk, 1992b; Jenkins, 1992). Rather, there are a range of factors, each of which has played a part in increasing income inequality in the last two decades or so.

This paper focuses on one amongst the many factors which is worthy of consideration in the current context - the impact of the earnings of wives on the degree of income inequality amongst families. Previous research (reviewed briefly in Section 2) has confirmed that in the past, wives' earnings have had an equalising impact. Such a finding has emerged from research conducted in Australia (O'Loughlin and Cass, 1984; McNabb and Moss, 1990), the United States (Smith, 1979; Danziger, 1980), the Netherlands (Nelissen, 1990) and Sweden (Bjorklund, 1992). Yet there are at least two reasons why these earlier findings may no longer be applicable. The first relates to the possibility that inequality of female earnings may have increased over the last decade or so. There is already a good deal of evidence that wage inequality amongst Australian males increased sharply in the 1980s, not only in aggregate, but also across experience groups and

within experience-education sub-groups (Borland, 1992). In the US, where much the same has happened, this has been largely attributed to a very considerable increase in the returns to education (Levy and Murnane, 1992) whereas Borland attributes the change in Australia more to a widening of actual on-the-job experience differentials (Borland, 1992). If the same changes have occurred for females, then female earnings may no longer be having the equalising impact on family incomes that they had in earlier periods. The second reason is that the labour force participation rate of married women continued to rise through the eighties - from 42.8 per cent in July 1980 to 53.7 per cent in June 1990 - and this could tend to increase family income inequality if the new female labour market entrants have high income husbands and if husbands' and wives' earnings are positively correlated.

In studying these effects, it is important to distinguish impacts at a point in time from those which influence changes over time. Thus, it may for example be the case that the impact of wives' earnings at a point in time continues to be equalising, but that the size of this impact has declined over time. If so, this might explain why overall inequality has been increasing over time, even though the impact remains equalising at any particular point in time. Such a trend might eventually lead to a disequalising impact beyond some critical level, even though that level may not yet have been reached. Alternatively, married women's labour force participation may reduce family income inequality whatever its level. As there are no *a priori* arguments which support either view, it is necessary to resort to the empirical evidence. Even then, it will only be possible to identify directions of change, not to be definitive about the final outcomes. This will have to wait until married women's labour force participation reaches its maximum level, a situation which has not yet been attained.

In addressing these issues, the paper is organised as follows: Section 2 provides a brief review of the approaches adopted in previous Australian studies and summarises their main findings. In Section 3, the sample used here to study these issues is described and its main descriptive characteristics highlighted. Section 4 contains the main results in two parts; firstly, the distributional consequences of several dimensions of the changing labour force behaviour of married women in the sample over the 1980s are analysed separately. This is then followed by a more

comprehensive account of the combined impact of these changes on family income inequality between 1981-82 and 1989-90. Finally, the main findings are brought together and summarised in Section 5.

2 Previous Research

In reviewing Australian research on income distribution in the late 1970s, Richardson hypothesized that the increased labour force participation of married women, 'may generate a whole new aspect of income inequality dividing one-income from two-income households' (Richardson, 1979: 21). At about the same time, Lester Thurow hypothesised a similar trend in the United States in his influential book *The Zero-Sum Society* (Thurow, 1980). The evidence, however, does not appear to confirm these predictions of new distributional cleavages. In 1989-90, using the sample data described in more detail below, the lowest decile of married couple income units in Australia comprised almost equal numbers of one- and two-earner couples. At that time, whilst over 68 per cent of all single-earner couples were in the lower half of the distribution, so too were almost 38 per cent of two-earner couples. Not surprisingly, the predominance of two-earner couples increases in the higher deciles, rising to almost 70 per cent by deciles five and six, to 80 per cent by deciles seven and eight, and to 85 per cent by deciles nine and ten, but a clear split in the distribution of income between one- and two-earner couples is not evident in the data. It is, however, the case that the proportion of two-earner couples in the higher deciles was higher in 1989-90 than in 1981-82, when the top two deciles contained 73 per cent of two-earner couples and close to 26 per cent of one-earner couples. Thus a random selection from the highest decile of couples in 1981-82 would have had a three quarters probability of containing two earners; by 1989-90 that probability had increased to almost seven eighths.

Such summary statistics provide no indication of the **overall** impact of wives' earnings on family income inequality. In order to investigate this issue, a summary measure of inequality is required, along with all of the inevitable limitations implied for assessing changes in inequality. An early Australian study which adopted such an approach was undertaken using data for 1981-82 by O'Loughlin and Cass (1984). They compared the distribution of the combined earned incomes of husbands and wives with the

distribution of the earned incomes of husbands alone. Given that the Gini coefficient of the former distribution (0.202) was well below that of the latter (0.255), and that the Lorenz curve for the former distribution lay wholly inside that for the latter distribution (O'Loughlin and Cass, Figure 4: 336), the authors concluded that:

> ... our analysis does not provide support for the view that married women's labour force participation increased the inequality of family income distribution. Rather, the analysis suggests that married women's earned income contributes to greater equality in the distribution of earned incomes of married couple income units. (O'Loughlin and Cass, 1984: 336-37)

It needs to be emphasised that this conclusion is based on a comparison of the actual distribution of income among couples with an estimate of what it would be if all female earnings were reduced to zero. Such a comparison takes no account of the likelihood that husbands' labour force behaviour (and hence husband's earnings) would adjust if wives' earnings fell to zero. This 'zero earnings counterfactual' thus embodies a simplistic model of family labour supply which needs to be kept in mind when interpreting these results. Having said this, however, a similar counterfactual assumption is commonly used in distributional analysis when investigating the redistributive consequences of the tax and transfer systems. Its limitations are thus not specific to studies of the distributional consequences of married women's earnings, except in so far as labour supply (and other) adjustments are considered to be more likely and/or larger in this case.

In a subsequent study using the same basic data McNabb and Moss (1990) reach the same conclusion.[1] Measuring inequality by the square of the coefficient of variation, the authors show that female employment has an equalising effect on family income even though the variation in wives' earnings exceeds that of husbands' earnings alone and of husbands' and wives' earnings combined. Two reasons are advanced for this. First, as more wives join the labour force, the overall variation in hours worked falls and, since variations in the hours worked of wives is the main factor

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1 While O'Loughlin and Cass focus on couples where the husband was under age 55, McNabb and Moss included all couples with a (male) head aged between 20 and 64.

underlying the variation in their total earnings, so too does the variation in wives' earnings. Second, wives' employment is negatively correlated with husbands' income.

Another study of some relevance in the current context which also analysed data from the 1981-82 income survey is Brownlee's analysis of the distributional consequences of the dependent spouse rebate (Brownlee, 1985). In the course of this work, Brownlee provides cross-tabulations of the incomes of husbands and wives, grouped into income ranges. These indicate that for married couples with dependent children, there is a tendency for the wife's income to decline as the husband's income rises (Brownlee, Table 2), while the situation for couples with children is less clear-cut because the proportion of wives with very low and modest to high incomes both increase as the husband's income rises. These results reflect the tendency for the labour force participation behaviour of married women to be conditioned by the presence (and age) of dependent children, an issue explored at greater length by O'Loughlin and Cass but not pursued further here.

Another detailed study of income distribution in 1978-79 was undertaken by Meagher and Dixon (1986). While restricted to inequality among individual income recipients, Meagher and Dixon demonstrate that although female incomes (in total, not just from earnings) were on average well below male incomes in 1978-79, overall female income inequality was much higher than overall male income inequality (a reflection of the large number of females with very low incomes). A consequence of this was that inequality among females was a more significant contributor to overall inequality among individuals than inequality among males. (Both, incidentally, were more quantitatively important than income inequality between males and females.) Unfortunately, because Meagher and Dixon restrict themselves to the study of individual income recipients, no attempt was made to assess the relationship between individual and family income inequality. Despite this, their results are of interest because they highlight the importance of taking account of those married women who do not work (and hence have a low or no income) when linking individual incomes to family incomes in the study of inequality.

Although all somewhat dated, the evidence produced by these early Australian studies is clear. The incomes of working wives unambiguously

reduced inequality of family incomes in the early 1980s. One recent study, however, produces somewhat less clear-cut evidence for the impact of changes in married women's labour force behaviour between 1983-84 and 1989-90. The study, undertaken by Bradbury and Doyle (1992) uses microsimulation methods to investigate the nature and causes of changes in the level and distribution of family incomes over the period. The microsimulation framework allows estimates to be made of the impact on family incomes of changes in a range of economic factors and policy variables, including changes to unemployment, labour force participation rates, pension and benefit rates, wages and the income tax system. The effects of these changes on income distribution can then be assessed, either in isolation (i.e holding all other things constant) or in combination (i.e allowing all of them to change simultaneously), by comparing the outputs from alternative simulations. The specific questions posed by Bradbury and Doyle involve comparing what actually happened to the distribution of family income between 1983-84 and 1989-90 with their simulated outcome where each factor in turn is held constant at its level in 1983-84. The difference then measures the distributional impact of the changes over the period in each factor, assuming that all other factors followed their actual observed changes.

The results of specific interest relate to the impact of the changing labour force participation rates of wives on income distribution among non-aged couples.[2] Although their results show some differences according to whether or not dependent children are present, the distributional pattern is similar for both groups. In particular, the simulation results suggest that the increased labour force participation rates of wives increased the income shares of the three middle quintiles and reduced the income shares of the lowest and highest quintiles (Bradbury and Doyle, Table 5.4). In attempting to explain their results, the authors note that most married women in the top quintile were already in the labour force and were thus not affected by the further growth in participation in the 1980s. In contrast, the participation rates of wives in the lowest quintile, those with husbands unemployed or not in the labour force, hardly grew over the period. These explanations seem

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2 Bradbury and Doyle also estimate the effects of changes in the level and distribution of wages over the period. However, their results combine males and females and it is not possible to unravel the separate effects for each.

plausible, although they do not take account of variations in weeks worked for those women already in the labour force. If Bradbury and Doyle's simulations are accurate, they suggest that the distributional consequences of the increased labour force participation of wives in the 1980s may be less obviously equalising than the earlier studies have suggested.[3]

The issue has also been recently addressed using data for 1989-90 by Jordan (1993). His analysis reaches somewhat less definitive conclusions than the earlier research, showing that the impact of female earnings is to reduce family income inequality according to one measure, but to increase it on another. Even when an equalising effect is found, this is concentrated in the lowest and highest deciles, with only a modest equalising impact evident in the second to ninth deciles (Jordan, 1993, Table 1). Use of a different inequality indicator produces the opposite effect, although Jordan does not rely on formal measures of inequality, prefering instead to base his conclusions on the broad distributional patterns revealed by the data. Again, the finding that the effect is concentrated in the extremes of the distribution is consistent with that observed by Bradbury for 1985-86, and suggests that any conclusions may be sensitive to the inequality measure used in the analysis.

Whether the effects of wives' earnings identified in earlier periods still persist in the United States has recently been under investigation by Cancian, Danziger and Gottschalk (1992). Cancian et al. note that earlier US evidence, like that for Australia, is unambiguous in pointing to a clear equalising impact of wives' earnings on family incomes, at least for whites (Smith, 1979; Danziger, 1980). However, they note that this equalising impact may have changed during the 1980s as a result of two factors, the disproportionate increase in the labour force participation rate of the wives of husbands with the highest earnings over the period, and the substantial increase in the returns to education for both males and females in the Unites States which, if there is associative mating by level of education, would

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3 Bradbury (1990) estimates that wives' earnings had a slight disequalising effect on **net** family income inequality in 1985-86, the Gini coefficient increasing from 0.207 to 0.217 (Bradbury, 1990: 29-30). However, the impact was predominantly at the bottom of the income distribution and its estimated size, and even direction, is sensitive to the inequality measure used.

increase the correlation between husbands' and wives' earnings and thus lead to a larger disequalising impact.

In order to assess the impact of these trends, Cancian et al. undertook a range of tests designed to investigate the impact of wives' earnings on American family income inequality in the two decades up to 1988. Some of the tests they apply are reproduced using Australian data in the following section and will be described in more detail there. On the basis of this battery of tests, the authors reach the following conclusion:

> There has been concern that recent changes in the pattern of labour-force participation and wages of married women would cause wives' earnings to be less equalizing or even to increase inequality. We find no evidence for such concern. The data ... suggest that the equalizing impact of wives' earnings has grown slightly for whites and substantially for blacks. (Cancian, Danziger and Gottschalk, 1992: 216)

These findings emerge despite clear evidence of an increase in the correlation between the earnings of husbands and wives in the US. This increased correlation is largely the result of a disproportionate increase in the participation rate of the wives of high income husbands and will, of itself, lead to higher inequality. However, it has been more than offset by the general increase in wives' participation which has narrowed inequality of wives' earnings and raised the share of total family income earned by wives. Again, this highlights the importance of several factors in influencing the overall impact of wives' earnings on family income inequality. The most important of these are the pattern of participation among wives, variations in working time, the dispersion of earnings, the size of wives' earnings relative to other components of family income and the correlation between husbands' earnings and wives' earnings. The final impact will depend on how each of these factors interact with each other and with other components of family income, specifically the earnings of husbands.

Finally, the issue has been addressed in a comparative context using data from the Luxembourg Income Study (LIS) by Cancian and Schoeni (1992). The authors utilise data from the first wave of LIS data (circa 1980) for eight countries, and data from the second wave (circa 1985) for seven

countries, four of whom were also included in the first wave countries. Using the coefficient of variation to measure inequality the results show that female earnings reduce family income inequality in all fifteen cases studied, both amongst all married couples and among only those married couples where the wife is working (for earnings). Amongst the latter group, wives' earnings causes family income inequality to decline by between 25 per cent and 44 per cent (Cancian and Schoeni, 1992, Tables 3 and 4).[4] For three of the four countries with data in both the first and second waves (Australia, France, Sweden and the United States) the size of the equalising impact of wives' earnings increased somewhat during the first half of the 1980s. Australia was the sole exception, the estimated equalising impact in this case being identical in both 1981-82 and 1985-86.

3 The Sample

The data used here to investigate these issues are contained on the unit record files from the 1981-82 and 1989-90 income surveys released by the Australian Bureau of Statistics (ABS). Both surveys were conducted at broadly similar points in the economic cycle, which means that cyclical factors can, at least as a first approximation, be put to one side. Some adjustments to the basic data have been undertaken in order to improve data consistency, the most significant of which is that all negative incomes have been re-coded to zero. Because the main interest in this analysis is on the role of earnings in income inequality amongst married couple units, a sample was derived for each year which contained couples with the strongest attachment to the labour force. Thus only those couples where the husband was aged between 25 and 54 (inclusive) were included in the sample.[5]

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4 Australia falls within the middle range with an estimated reduction in inequality of 38 per cent.

5 The sample thus includes a small number of couples where the husband (and/or wife) may be prevented from labour market activity because of physical or intellectual disability.

Selected sample summary statistics are shown in Table 1. In each year, the sample contained over 6000 cases, corresponding to a weighted sample of 2.3 million couples in 1981-82 and over 2.6 million couples in 1989-90. The percentage with dependent children declined over the period from 78 per cent to 71 per cent. It should be noted, however, that no attempt has been made in the following analysis to distinguish between those with and without children. Nor has any adjustment been made to reflect the higher needs of couples with children. This is a study of income distribution, not of poverty or the distribution of economic well-being.[6]

Table 1 reveals the growing importance of wives' earnings in (gross) family income, its share increasing from below 23 per cent in 1981-82 to close to 26 per cent by 1989-90. The relative size of unearned non-benefit income (which includes income from self-employment) also rose considerably, while cash benefits remained stable in relative terms. A consequence of these changes was the declining share of husbands' earnings in family income from 70 per cent to 64 per cent. Over the period, average annual gross family income increased from $23604 to $47388. After adjusting for increases in the consumer price index (CPI), this corresponds to a real increase of 9.6 per cent, or an average annual increase of 1.15 per cent. For this group, the average earned income of wives increased in real terms by 23.5 per cent between 1981-82 and 1989-90. Had it remained constant in real terms, average family income in 1989-90 would have been 4.9 per cent lower, and the real increase in average family income between 1981-82 and 1989-90 would have been 4.2 per cent (or 0.51 per cent a year), less than half the actual increase. Thus whatever their impact on inequality, it is clear that wives' earnings played a major (and increasing) role in raising the level of family incomes in the 1980s.

Table 1 also shows that the labour force status of husbands was much the same in 1990 as in 1982, although there was a very substantial increase in the labour force participation rate of wives. The proportion of wives not in the labour force declined from close to a half in 1982 to just above a quarter by 1990. As a result of these changes, which occurred before the onset of

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6 It could, however, be the case that family labour supply decisions are determined by the level of earnings in relation to needs, in which case an adjustment for differing needs may be appropriate.

Table 1: Sample Descriptive Statistics[a]

	1981 - 82	1989 - 90
Number of cases	6414	6260
Weighted sample ('000)	2277.1	2661.4
Percentage of sample		
- without children	21.5	29.1
- with children	78.5	70.9
Percentage of income from:		
- husband's earnings	70.1	64.1
- wife's earnings	22.8	25.7
- other non-benefit income	4.0	7.3
- cash benefits	3.1	2.9
Labour force status of husbands		
- employed	92.6	92.5
- unemployed	3.8	4.0
- not in labour force	3.6	3.5
Labour force status of wives		
- employed	50.7	66.7
- unemployed	2.8	4.7
- not in labour force	46.5	28.6
Percentage of sample according to numbers in employment		
- 0 members	5.6	5.1
- 1 member	45.5	30.6
- 2 members	48.9	64.3

Note: a) The sample is restricted to married couple income units where the husband is aged between 25 and 54 years of age.

the current recession, there was a considerable increase in the proportion of the sample with both partners in employment, from 49 per cent in 1982 to 64 per cent in 1990. While the numbers of one- and two-earner couples were approximately the same in 1982, two-earner couples were more than twice as prevalent as one-earner couples only eight years later.

Details of the changes in the labour force status of wives classified by the labour force status of their husbands are shown in Table 2. Each cell in Table 2 contains three entries, the first providing the absolute figure (in thousands) in 1982, the second its value in 1990 and the third (in brackets) the average annual growth rate over the eight year period. The most significant entries in the table are those in the first cell, which indicate that growth in employment amongst wives whose husbands had jobs was close to 600,000, an overall rise of more than 50 per cent in just eight years.[7] Although the employment growth of wives with husbands unemployed is greater in percentage terms, the absolute numbers involved are far smaller: an increase of only 12,500 over the period. In contrast, the number of unemployed wives with employed husbands more than doubled from 52,000 to over 105,000, and the total number of unemployed wives rose by a similar order of magnitude.

4 Results

4.1 The Earnings of Wives and of Husbands

The total level of annual earnings of wives is the result of four separate elements. The first reflects the decision to join the labour force, the second the average number of weeks worked each year, the third the average number of hours worked each year and the fourth the average level of hourly earnings. In order to gain greater understanding of the mechanisms through which wives' earnings affect family income inequality, these four

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7 Almost all (94.3 per cent) of the increase in cases where both the husband and the wife were in employment occurred where the husband was in full-time employment. This increase can be broken down into those couples where the wife also worked full-time (51.8 per cent) and those where the wife worked part-time (42.5 per cent). The remaining 5.7 per cent reflects cases where the husband worked part-time.

Table 2: Cross-classification of the Labour Force Status of Husbands and Wives, 1982 and 1990[a]

Labour Force Status of Husbands	Labour Force Status of Wives: Employed	Unemployed	Not in the Labour Force	Total
	1113.0	52.2	943.7	2108.9
Employed	1711.0	105.2	644.9	2461.1
	(5.52)	(9.15)	(-4.65)	(1.95)
	18.7	8.0	60.3	86.9
Unemployed	31.2	14.7	61.6	107.5
	(6.61)	(7.90)	(0.27)	(2.69)
Not in	22.1	2.7	56.3	81.2
the Labour	32.3	5.4	55.1	92.8
Force	(4.86)	(9.05)	(-0.27)	(1.68)
	1153.8	62.9	1060.3	2277.1
Total	1774.5	125.3	761.6	2661.4
	(5.53)	(9.00)	(-4.05)	(1.97)

Note: a) The top entry in each cell refers to the absolute numbers (in thousands) in 1982, the middle entry refers to 1990 and the lower entry gives the average annual percentage change between 1982 and 1990.

elements should be treated separately. This allows identification of which of these elements - participation, weeks worked, hours worked, or average earnings - contributes most to the overall distributional impact. Such a decomposition can provide insights into possible future consequences of current trends. If, for example, the distributional impact of wives' earnings largely reflects differential participation rates, then past equalising effects are likely to be gradually weakened, other things constant, as the overall participation rate of wives increases. If, in contrast, it is the variation in average earnings which largely explains the pattern of past distributional impacts, then higher participation rates in future may further reinforce those effects.

In undertaking this part of the exercise the recent study by Cancian, Danziger and Gottschalk (1992) has provided the underlying framework. Following Cancian et al., the approach involves investigating how each of

the separate elements which determine the earnings of the wife vary according to the earnings of the husband. Unfortunately it is not possible to calculate the average number of hours worked each week over the year from the data described in Section 3. Information is only available on a consistent basis for the average number of hours worked at the time of each survey, not over the course of the previous year as a whole. Because of this, and because an annual time period is in any case preferable for current purposes, the four factors outlined above have been reduced to three, the participation decision, the average number of weeks worked each year and the level of average weekly earnings. An attempt is made to use the data to further separate the latter factor into average weekly hours worked currently and a measure of average hourly earnings and the results will be summarised and commented upon briefly.

In undertaking the analysis, the distribution of husbands' earnings is first derived and variations in the participation rate, weeks worked and average earnings of wives are then analysed according to the position of the husband in the earnings distribution. Table 3 focuses on the first part of this process, showing the percentage of wives who worked for some time during each year, classified by the earnings decile of their husbands and Figure 1 illustrates the pattern for each year.[8] After rising sharply in the second decile, the participation rate of wives in 1981-82 gradually declines as the earnings of husbands increased. By 1989-90, this decline was replaced by a slight overall increase, so that while the participation rate of wives with husbands in the first and second deciles of the earnings distribution increased by 8.7 and 9.6 percentage points, respectively, between 1981-82 and 1989-90, the corresponding increases in the ninth and tenth deciles of husbands' earnings were 16.5 and 20.3 percentage points, respectively (Table 3). This suggests that, other things constant, changes in the pattern of labour force participation amongst wives have contributed somewhat to increased family income inequality in the 1980s, a result consistent with the analysis of Bradbury and Doyle (1992) and a similar finding to that reported for the US by Cancian et al. At a point in time, the impact of variations in

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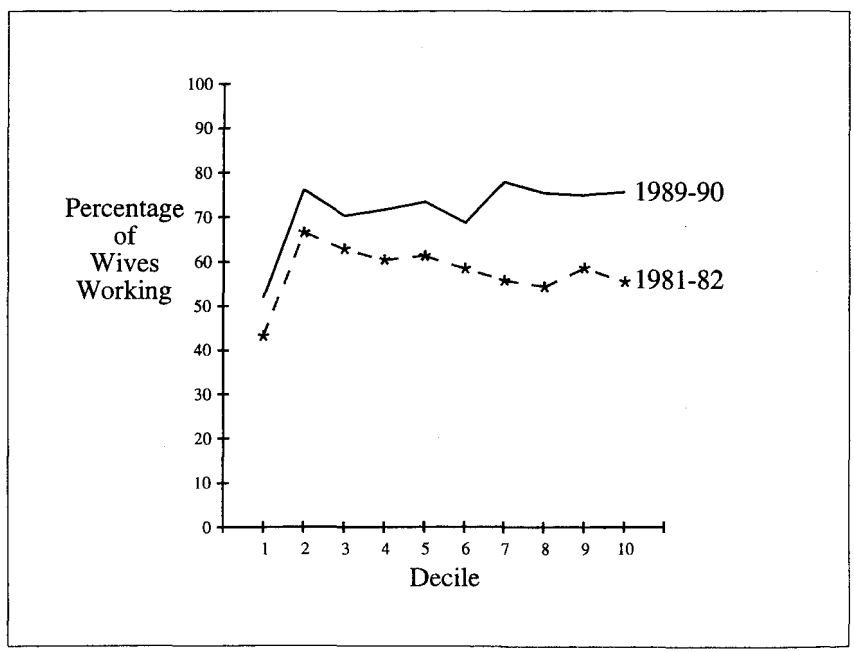
8 Husbands with zero earnings are included in this and all subsequent analysis, unless it is specifically indicated otherwise.

Table 3: Percentage of Wives Working Classified by the Earnings Decile of Husbands

Husband's Earnings Decile	Participation Rate of Wives 1981-82 (%)	1989-90 (%)	Increase (Percentage points)
1	43.2	51.9	8.7
2	66.6	76.2	9.6
3	62.9	70.4	7.5
4	60.4	71.8	11.4
5	61.3	73.5	12.2
6	58.4	68.7	10.3
7	55.7	78.0	22.3
8	54.3	75.5	21.2
9	58.5	75.0	16.5
10	55.4	75.7	20.3
Average	**57.7**	**71.7**	**14.0**

Figure 1: Percentage of Wives Working by Earnings Decile of Husband



participation are dominated by the low level of participation of the wives of husbands in the lowest decile of earnings. Beyond that, the effects are fairly constant and the effects on inequality are thus likely to be small.

Variations in the average number of weeks worked by wives classified by the earnings decile of husbands are presented in Table 4 and illustrated in Figure 2. In both years, there is relatively little variation in the average number of weeks worked each year by wives according to the earnings level of their husbands. There is a slight tendency for average weeks worked in the higher (eighth and ninth) deciles to have increased slightly more than in the lower deciles between 1981-82 and 1989-90 (Figure 2), which suggests that this factor alone may also have contributed to increasing inequality of family incomes. The effects, however, are unlikely to be large. The Australian evidence is again broadly in line with the US evidence in indicating that once the wife has decided to work, the number weeks she works has only minor distributional consequences.

Table 5 and Figure 3 show variations in the average weekly earnings of those wives who do work, classified by the earnings decile of their husbands. The earnings figures for 1981-82 have been expressed in 1989-90 dollars by inflating by the Consumer Price Index (CPI). It needs to be emphasised that these average earnings figures embody the impact of compositional changes as between part-time and full-time work and thus cannot be used to estimate changes in real earnings for particular categories over the period. Thus the fact that the real earnings of wives fell on average over the period is of little interest, given the compositional changes that have occurred.

It is clear from Figure 3 that in both years the average earnings of wives is positively related to the earnings of husbands. Thus, in 1989-90 the average earnings of the wives of husbands in the lowest decile of earnings was 17.1 per cent lower than the average earnings of all wives, while the wives of husbands in the top earnings decile had average earnings which exceeded the average earnings of all wives by 23.9 per cent. A similar pattern is evident for both years shown in Figure 3. The fact that the average earnings of wives increases with the earnings decile of their husbands confirms that there is a positive correlation between the earnings of each spouse. In fact, the correlation coefficient is 0.116 in 1981-82 and 0.172 in 1989-90. As

Table 4: Average Weeks Worked by Working Wives Classified by the Earnings Deciles of Husbands

Husband's Earnings Decile	Average Weeks Worked of Wives 1981-82	1989-90	Increase
1	43.8	44.4	0.6
2	44.4	46.7	2.3
3	44.2	47.1	2.9
4	42.4	46.2	3.8
5	43.6	47.2	3.6
6	41.9	46.3	4.4
7	42.1	45.1	3.0
8	41.6	46.8	5.2
9	41.1	46.8	5.7
10	42.1	45.2	3.1
Average	**42.7**	**46.2**	**3.5**

Figure 2: Average Weeks Worked by Working Wives Classified by Earnings Decile of Husband

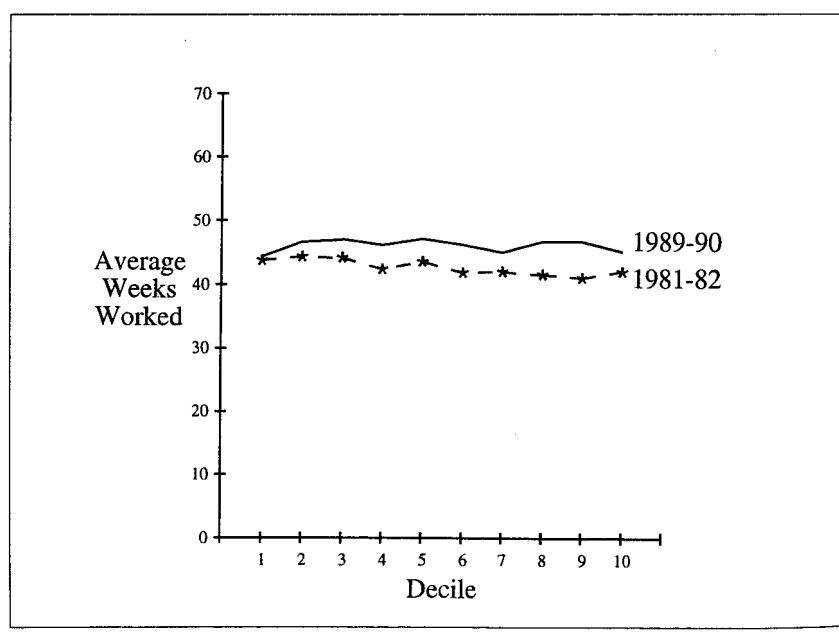
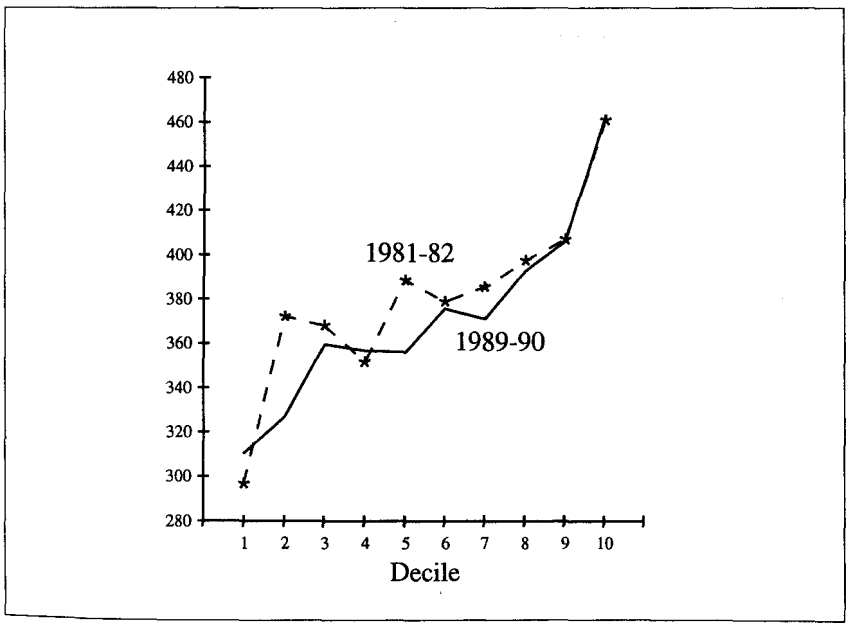


Table 5: Average Weekly Earnings of Working Wives Classified by the Earnings Decile of Husbands ($1989-90)

Husband's Earnings Decile	Average Weekly Earnings of Wives 1981-82	1989-90	Percentage Increase
1	296.9	310.3	4.51
2	372.2	326.8	-12.20
3	368.1	359.7	-2.28
4	351.6	356.7	1.45
5	388.7	356.0	-8.41
6	378.9	375.8	-0.82
7	385.5	371.1	-3.74
8	397.6	393.0	-1.16
9	407.3	406.5	-0.20
10	461.4	463.5	0.46
Average	**382.2**	**374.1**	**-2.12**

Figure 3: Average Weekly Earnings of Working Wives Classified by Earnings Decile of Husband ($1989-90)



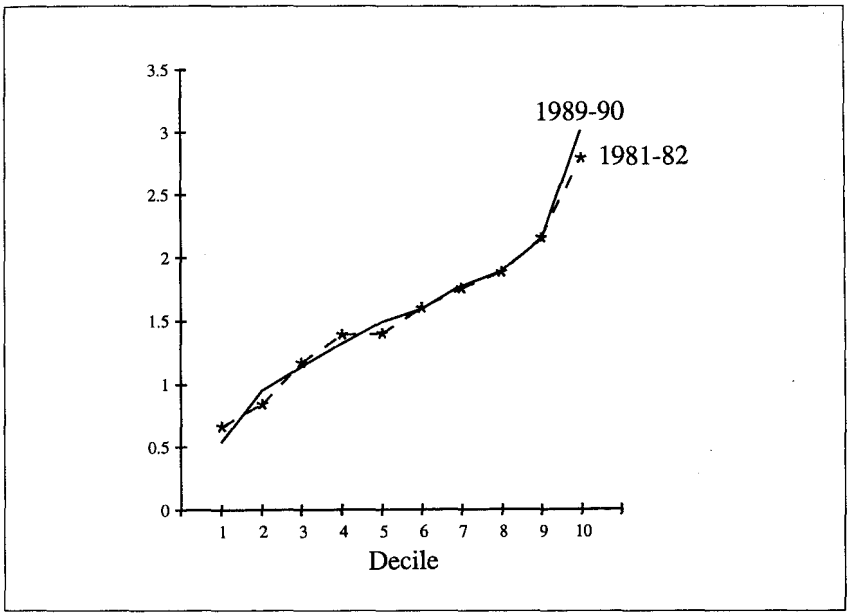
was observed earlier, and as is spelt out in more detail in the Appendix, the size of this correlation coefficient has an important, though not decisive, influence on the distributional impact of wives' earnings.

It is important to note at this stage, however, that the fact that the earnings of wives increases with the earnings of husbands is not a sufficient condition for the combined earnings of both partners to be more equally distributed than the earnings of husbands only. For this to happen, the rate at which wives' earnings increase across the deciles must be more pronounced than the rate at which husbands' earnings increase. That is, the ratio of husbands' earnings to wives' earnings should decline as the earnings decile of the husband increases. Figure 4 indicates that this did not occur in either year; the ratio of mean husbands' earnings to mean wives' earnings actually increases markedly with the earnings decile of the husband. Thus it would appear that the average earnings of wives would, other things constant, contribute to greater equality of family income. Figure 4 also reveals little change in the pattern of the husband-wife earnings ratio between 1981-82 and 1989-90. There is a slight tendency for the slope of the ratio to decline (mainly in the two extreme deciles) which suggests a change towards increasing inequality, although the size of the effect is very small.

As noted earlier, an attempt was made to explore what the data could reveal about the separate effects of wives' hours worked and hourly earnings on inequality, the two variables being combined in the weekly earnings variable already analysed. Variations across husbands' earnings deciles in the average number of hours worked each week by wives revealed a flat profile in both years, except in the highest decile where average hours declined sharply. The variation was certainly much less than the variation in average weekly earnings shown in Figure 3. From this, it appears that variations in the weekly earnings of wives primarily reflects variations in hourly earnings rather than variations in hours worked each week, in which case it seems reasonable to refer to the effects of variations in wives' earnings without the need to specify whether it is hourly earnings or weekly earnings that are under consideration.

Together, the results presented in Tables 3 to 5 and illustrated in Figures 1 to 4 suggest two initial conclusions. The first is that the main avenues

Figure 4: Ratio of Mean Earnings of Husbands to Mean Earnings of Wives by Earnings Decile of Husband



through which wives' earnings affect family income inequality (given the level of husbands earnings) is whether or not the wife works at all and, if she does, the strength of the the positive association between the earnings of the husband and the wife. Variations in the average number of weeks (and hours) worked amongst those wives who do work appear to have virtually no effects on inequality. The second finding relates to changes in inequality over the period, as opposed to effects on inequality in any single year. Here, it appears that the changing pattern of wives' participation and average earnings between 1981-82 and 1989-90 may have contributed to increased inequality of total earnings over the period, while the pattern of changes in weeks worked has had no clear impact on changes in income inequality among couples. In all three cases, however, the effects appear to be very small, at least on the basis of a visual inspection of Figures 1 to 4. In order to explore this matter further we turn now to a more thorough and rigorous assessment of the combined impact of these effects.

4.2 Wives' Earnings and Family Income Inequality

The first step in assessing the impact of wives' earnings on family income inequality is to choose a measure of inequality. The most common inequality measure used in the literature is the Gini coefficient (GC), but that has the disadvantage that because it is not readily decomposable into the contributions of within-group and between-group inequality to overall inequality, it is not convenient for assessing how changes in inequality among sub-categories of the population contribute to changes in overall inequality. It is also a measure which is more sensitive to income changes around the middle (more precisely, the mode) of the distribution than to changes at either extreme (Jenkins, 1991). This insensitivity to changes in the tails of the distribution is of concern in the Australian context because the estimated pattern of distributional change during the eighties has been most pronounced in the tails of the distribution, particularly the upper tail (Saunders, 1992). For these reasons, two additional inequality measures will be used in the following analysis in addition to the Gini coefficient. The first is the squared coefficient of variation (CV^2), a measure which lends itself readily to a simple decomposition analysis of the type already undertaken in the current context by McNabb and Moss (1990) and Cancian et al. (1992).[9] The other supplementary measure is the ratio of the ninetieth to the tenth percentile income levels (D_{90}/D_{10}). This measure has the advantage that it is sensitive to changes in the extremes of the distribution but is not influenced by extreme outlying observations, be they very high or very low incomes.

Table 6 presents the values of all three inequality measures in 1981-82 and 1989-90 for total gross family income and for its three main components, husbands' earnings, wives' earnings and other (unearned) income. Although the precise magnitudes vary according to which measure is used, the broad pattern of inequality and how it has changed is the same for all three measures. Each measure shows an increase in family income inequality over the period and the insensitivity of the Gini coefficient referred to earlier is apparent in the smaller changes in inequality using this

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9 Unlike the Gini coefficient, the squared coefficient of variation is equally sensitive to income transfers at all points in the distribution. See the Appendix for the formal decomposition formulae for the squared coefficient of variation.

Table 6: Alternative Measures of Income Inequality Among Couples

	1981-82	1989-90	Percentage Increase
Gini Coefficient:			
Family income	0.276	0.296	7.3
Husbands' earnings	0.308	0.327	6.2
Wives' earnings	0.628	0.551	-12.3
Other income	0.678	0.734	8.3
Squared Coefficient of Variation:			
Family income	0.305	0.397	30.2
Husbands' earnings	0.353	0.438	24.1
Wives' earnings	1.530	1.128	-26.3
Other income	4.499	8.312	84.8
Percentile Ratio[a]:			
Family income	3.656	3.759	2.8
Husbands' earnings	5.893	6.329	7.4
Wives' earnings	*(b)	*(b)	*(b)
Other income	46.589	67.301	44.4

Notes: a) The ratio of the ninetieth to the tenth percentile income level.
b) The percentile ratio is not defined because the tenth percentile is zero in both years.

measure. The changes in the percentile ratio for family income are smaller still, suggesting that both high and low incomes have experienced the largest increases, to some extent offsetting each other when the ratio measure is used. Both the GC and CV^2 measures indicate that there is considerably greater inequality in female earnings than in male earnings in both years, although the differential has narrowed over time. The fact that the CV^2 measure for female earnings is greater than for male earnings is important in determining the effect of wives' earnings on inequality (see the Appendix). What this indicates in particular is that the positive correlation between husbands' earnings and wives' earnings referred to earlier is not sufficient to guarantee that wives' earnings cause inequality of family income to increase.

In contrast to the overall increase in inequality, the distribution of wives' earnings became more equal according to the two measures (GC and CV^2) where the percentage change can be estimated, due mainly to the increase in

participation described earlier. Other income, which comprises private unearned income (rent, interest, dividends etc.) and government cash transfers in the form of pensions, benefits and allowances has been distinguished from earned incomes. Although the elements of other income are each subject to their own influences, inequality of other income in total increased substantially over the period according to all three inequality measures shown in Table 6. The distribution of wives' earnings is thus the only identified component of income which did not exhibit increasing inequality between 1981-82 and 1989-90.[10] In order to establish the overall consequences for inequality of the separate changes shown in Table 6, a more formal analysis is required which links together the various income elements and takes account of the relative size of each.

One way to approach this issue is to undertake on the decomposition of the CV^2 measure, following previous studies by McNabb and Moss (1990) for Australia and Cancian et al. (1992) for the United States. This allows the squared coefficient of variation of total family income (shown in the fifth row of Table 6) to be decomposed as shown in the Appendix into elements reflecting the squared coefficient of variation of three separate elements of gross income identified in Table 6, and three additional factors which depend upon the correlations between pairs of these income components and their shares of gross income. The size of the various elements which enter into this decomposition are provided in Table 7.

Table 7 indicates that inequality of husbands' earnings is the most important single factor contributing to family income inequality, explaining 56.9 per cent of the total variation in 1981-82 and 45.4 per cent in 1989-90.[11] The corresponding contributions of wives' earnings in the two years are 26.1 per cent and 18.8 per cent, respectively. Thus inequality of husbands' earnings is proportionately twice as important as inequality of wives' earnings, even

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10 The distribution of cash benefit income became more equal over the period, although this is offset in Table 6 by the increased inequality of non-benefit unearned income.

11 Equation (5) in the Appendix indicates that the contribution of inequality in husbands' earnings to family inequality is given by $a^2CV^2_h/CV^2$. The size of the other factors described in the text can be similarly derived using Table 7 and equation (5).

Table 7: Decomposition of the Squared Coefficient of Variation[a]

Factor	1981 - 82	1989 -90
CV^2	0.305	0.397
CV^2_h	0.353	0.438
CV^2_w	1.530	1.128
CV^2_u	4.499	8.312
ρ_{hw}	0.116	0.172
ρ_{hu}	0.011	0.067
ρ_{wu}	0.007	-0.007
a	0.701	0.641
b	0.228	0.257
c	0.071	0.103

Note: a) The formula underlying the decomposition is provided in equation (5) of the Appendix.

though overall inequality of wives' earnings is larger (Table 6), because the level of husbands' earnings is much higher on average (Table 1). The factor whose contribution increased most is the variation in other income, the figures in this case being 7.4 per cent and 22.2 per cent, respectively. The remaining element in the decomposition reflects the correlations between the three income components. Of interest here is the fact that the correlation between husbands' earnings and wives' earnings increased from 0.116 in 1981-82 to 0.172 in 1989-90. This factor alone explains around 10 per cent of the overall variation in family income in both years.

In order to illustrate more clearly the role of the various income components in the overall degree of inequality, an additional technique based on the procedure developed by Gottschalk (1992) will be utilised. The procedure begins with the distribution of the wages and salaries of full-year, full-time husbands, a measure of market-generated inequality, at least for this particular group, which is uncontaminated by variations in participation, hours worked, weeks worked or earned income from self-employment, and then involves combining successive income elements in order that the approximate contribution of each to overall income inequality can be identified.[12] The approach has been applied using the ratio of the ninetieth

12 Full-year, full-time workers are identified as those who worked more than 49 weeks during the survey year, less than half of which was worked part-time.

to the tenth percentile (D_{90}/D_{10}) inequality measure, although the same broad conclusions follow if the other inequality measures discussed earlier are used instead.

The percentile ratio inequality measure for this distribution is shown on the left hand side of the two upper panels of Figure 5 for 1981-82 and 1989-90, respectively. The lower panel shows the absolute change in the inequality measure between the two years. The second inequality estimate shown in Figure 5 refers to the distribution of the earned income of all husbands. It thus includes, in addition to the full-time wage distribution incorporated at the first stage, husbands' earnings from part-time and/or part-year employment and any self-employment income. Husbands with no income from any of these sources are also included at this stage. At the next stage, the total earned income of all wives is combined with the earned income of their husbands. All other non-benefit income is then included at the next stage, before government cash benefits are finally added to produce the distribution of gross family income.

What does this analysis reveal? The first point to note is that inequality among full-year, full time (male) workers is relatively low. Indeed, in both years, inequality of wage incomes amongst full-year, full-time males is considerably less than overall gross family income inequality.[13] Adding in the other components of husbands' earned incomes (and those husbands with no earned income) causes a marked increase in inequality in both years. The combined earned incomes of husbands and wives, however, exhibits less inequality than that of husbands alone. There is thus clear evidence here that wives' earnings reduce overall earnings inequality, in both 1981-82 and in 1989-90. The addition of other non-benefit income causes a further, though modest, decline in inequality. Finally, government cash benefits reduce inequality still further, by around 9 per cent in 1981-82 and by 12.2 per cent in 1989-90 (when many benefits were more highly targeted).

The bottom panel of Figure 5 indicates that inequality increased in all five distributions between 1981-82 and 1989-90. Wage inequality among full-

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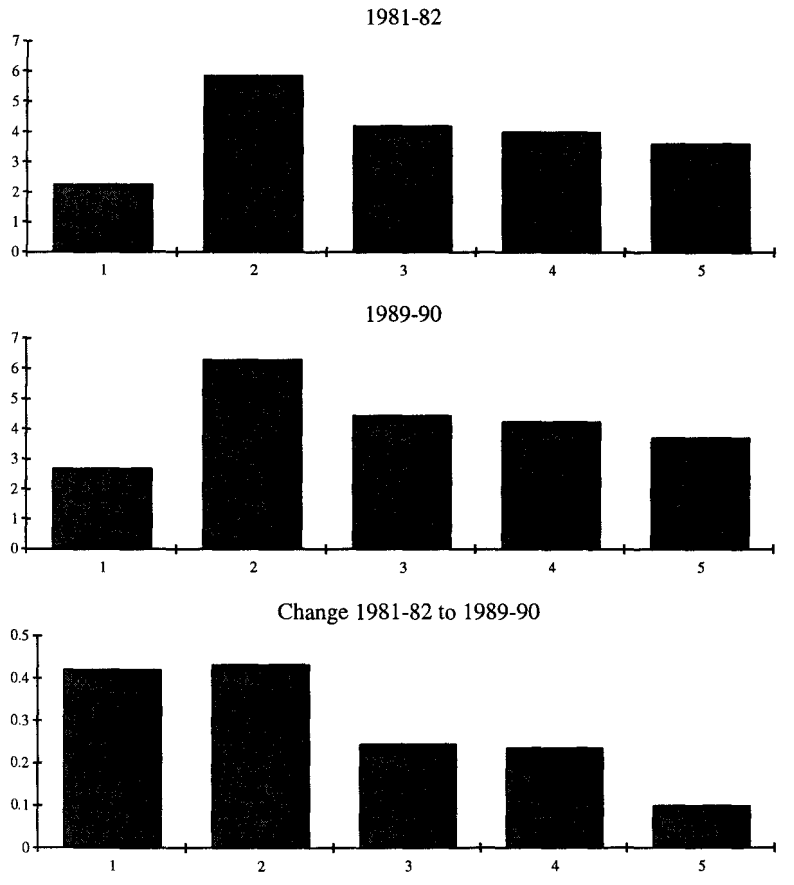
13 The Gini coefficients for the distribution of husbands' full-time earnings are 0.199 in 1981-82 and 0.240 in 1989-90.

Figure 5: Ratio of the Ninetieth to the Tenth Percentile Income Level of Alternative Distributions, 1981-82 to 1989-90



1 = Wages and Salary of FYFT Husbands

2 = Earned Income of All Husbands

3 = Earned Income of Husbands and Wives

4 = Total Non-benefit Income

5 = Total Gross Income

year, full-time husbands rose considerably over the period: by over 18 per cent according to the percentile ratio inequality measure used in Figure 4.[14] Taking account of other components of earnings (including the lack thereof) among husbands further exacerbates this effect, although only marginally in aggregate. Changes in the contribution of wives' earnings greatly moderated the trend towards increasing inequality of earnings in both years (by roughly the same proportion) but inequality of husbands' and wives' earnings combined still rose over the period. Total unearned non-benefit income caused an additional slight decline in inequality and government cash benefits further reduced the increase in inequality by more than half.

Overall, Figure 5 allows a picture to be built up of how labour market changes, including the level and distribution of earnings, participation rates, unemployment and self-employment, other market incomes and government cash benefits combined to determine the distribution of income among couple families. Compositional changes in the extent and availability of labour force participation, and hence of earnings, played a major role in influencing inequality of earned incomes, although an increase in earnings inequality among full-year, full-time husbands also took place between 1981-82 and 1989-90. The two main factors causing both the level and change in family income inequality to be moderated over the period were the earnings of wives and the receipt of government cash benefits. Without these, and subject to the same behavioural caveats discussed in the following paragraph, the trend towards increasing inequality would have been considerably greater than that actually experienced.

The final method used to estimate the impact of wives' earnings on family income inequality involves comparison of the actual distribution of family income with the 'zero earnings counterfactual' which is derived by calculating the distribution of family income on the assumption that wives' earnings are zero. In undertaking such a comparison, it should be emphasised that there is no presumption that the 'zero earnings counterfactual' is ever likely to exist or be observed in practice. Were wives' earnings to actually fall to zero, this would induce behavioural adjustments which would have their own distributional consequences. One

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14 The corresponding increase in the Gini coefficient over the period was 20.6 per cent (see footnote 13).

such adjustment could, where it was possible, be a compensating increase in the earnings of the husband. Another might be the rise in social security income if the couple became eligible to receive family allowance supplement (FAS). However, it is not possible to take these effects into account without a fully developed decision-making model of family labour supply and savings and other relevant dimensions of income determination. In its absence, the 'zero earnings counterfactual' is commonly used in distributional analysis of the sort being undertaken here and represents a first step towards addressing what is an extremely complex issue.

Table 8 presents the three inequality measures described earlier for two distributions in each year, the actual distribution of gross family income and the distribution of family income minus the earned income of wives, that is, the 'zero earnings counterfactual'. The implied impact of wives' earnings on family income inequality is shown in the final column of Table 8 as the percentage impact on each of the three inequality measures. Irrespective of which measure is used, it is apparent that wives' earnings are again shown to have had an equalising effect on family income in both years, and a larger equalising effect in 1989-90 than in 1981-82. In 1989-90, for example, it is estimated that the Gini coefficient, the most commonly used inequality measure, would have been 0.312, or 5.4 per cent greater, had all wives' earnings been zero. The corresponding effect in 1981-82 is somewhat smaller, at 2.9 per cent, although the impact is still equalising. These effects assume that all other family income components remain unchanged. In contrast, implicit in the construction of Figure 5 and the estimates derived therefrom was a somewhat different thought experiment, in which the impact of wives' earnings was assessed relative to a benchmark provided by the distribution of husbands' earnings. In this latter case, the estimated impact of wives' earnings is somewhat larger in both years, reflecting their increased size relative to the benchmark.

There is no obvious way of choosing which of these two approaches, each with its own benchmark distribution, is most appropriate. This depends upon the nature of decision-making within the family, and in particular upon which variables influence labour supply behaviour and the sequence in which these decisions are made. This is a greatly under-researched area in Australia, one which is worthy of considerably more effort in future. For

Table 8: Estimates of the Impact of Wives' Earnings on Family Income Inequality

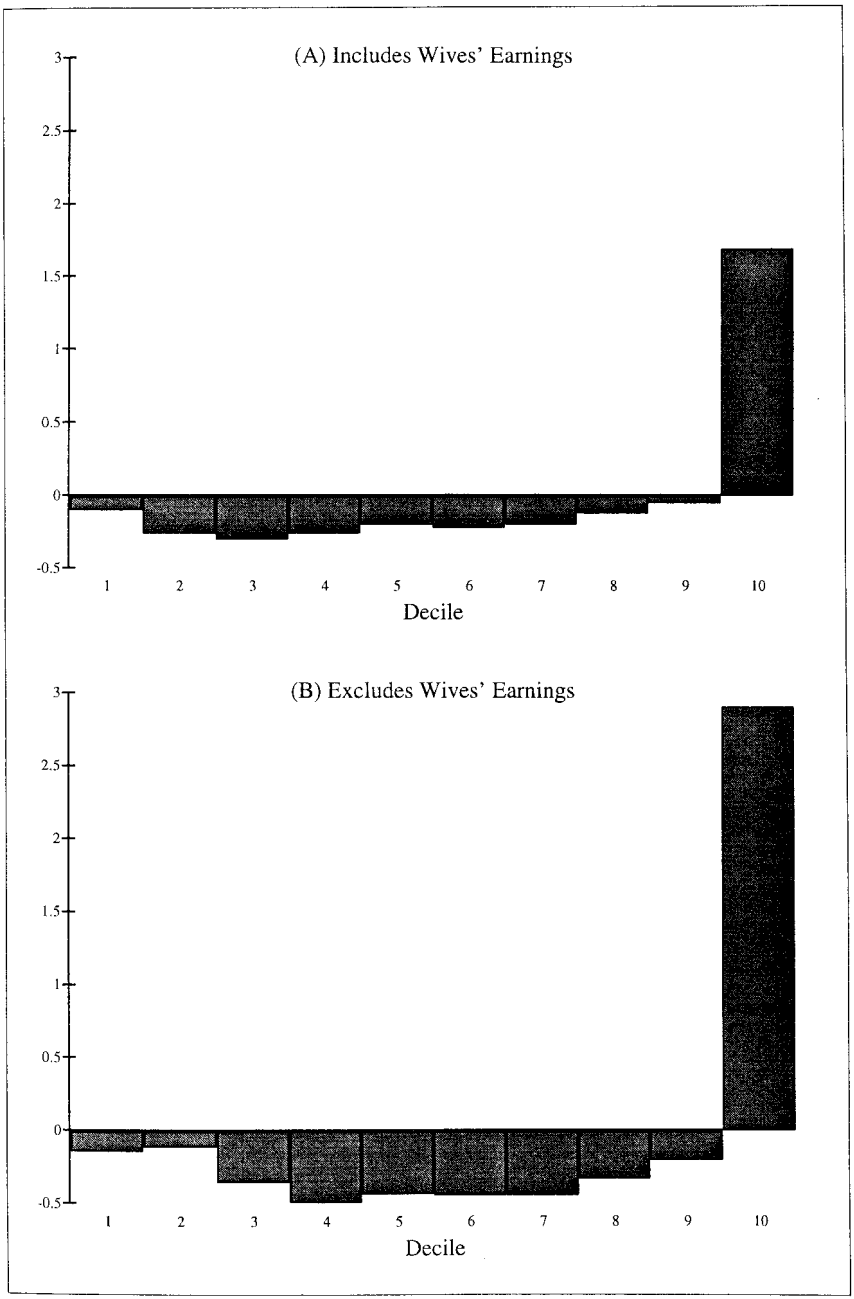
	1981-82	1989-90	Percentage Increase
Gini Coefficient:			
Family income	0.276	0.296	7.2
Family income less wives' earnings	0.284	0.312	9.9
Percentage difference	-2.8	-5.1	-
Coefficient of Variation:			
Family income	0.305	0.397	30.2
Family income less wives' earnings	0.311	0.515	65.6
Percentage difference	-1.9	-22.9	-
Percentile Ratio[a]:			
Family income	3.656	3.759	2.8
Family income less wives' earnings	4.021	4.149	3.2
Percentage difference	-9.1	-9.4	-

Note: a) The ratio of the ninetieth to the tenth percentile income level.

the moment, however, the two approaches both point to the conclusion that wives' earnings reduce family income inequality, by an amount which has increased during the 1980s. Because the size of this equalising impact has increased, the increase in family income inequality over the decade cannot be the result of the changing pattern of wives' earnings. Indeed, the results in Table 8 confirm those based on Figure 5 that wives' labour market behaviour between 1981-82 and 1989-90 served to moderate the effects of other factors which were causing inequality to increase.

This last point is further illustrated by Figure 6, which compares the changes in income distribution that actually occurred between 1981-82 and 1989-90 with an estimate of what would have happened if wives' earnings had been zero in both years and if all other factors had remained unaltered. The impact of wives' earnings does not change the pattern of distributional change at all. In both cases, there is a clear upwards redistribution of income towards the highest decile at the expense of all other deciles, a trend which has already been identified as applying more broadly across the entire

Figure 6: Changes in the Distribution of Gross Income, 1981-82 to 1989-90



population (Saunders, 1992). The pattern shown in the upper half of Figure 6, based on the actual changes in income distribution, dispels the view that increases in the incomes of rich and poor families in the 1980s were gained at the expense of those in the middle and were largely a consequence of the increased number of high income, two-earner couples. Not only does Figure 6 provide little support for the 'disappearing middle class' thesis - even though the third to seventh deciles tend to experience the largest declines in their income shares - it suggests that had married women's earnings been zero, the extent of income redistribution upwards to those with highest incomes would actually have been greater.

5 Summary

This paper has used a range of techniques to address the question of the impact of wives' earnings on family income inequality among prime-aged Australian couples during the 1980s. The results all point to the fact that although family income inequality increased between 1981-82 and 1989-90, the increased earnings of wives was not a factor causing this change. Indeed, it appears that wives' earnings have acted as a moderating influence on family income inequality in Australia during the 1980s and that the size of that effect has increased over the decade. Thus, had wives' earnings not evolved as they did over the period, family income inequality would almost certainly have increased by more and thus would have been greater in 1989-90 than it actually was, unless there had been large compensating adjustments in husbands earnings and other components of family income.

Some of the techniques utilised in this analysis are admittedly somewhat simplistic, specifically those which estimate the impact of wives' earnings on family income inequality. More sophisticated analyses would need to incorporate the interactions between the labour market behaviour of both partners, and the consequences of these for the level and distribution of family income. Another limitation of the analysis is that only prime-aged married couples have been included and thus other important dimensions of inequality are omitted. No account has been taken of the effects of income taxation, neither in relation to its effects on inequality, nor to the incentives and disincentives resulting from the tax system and how these impact upon the labour supply decisions of both husbands and wives.

There has also been no attempt to adjust for differences in family needs. Of critical importance here in the current context are not only differences which reflect more family members, but also those which reflect the work-related costs of family members in the labour force. At issue here is the distinction between income inequality and welfare inequality, the latter adjusting not only for differences in need, but also incorporating the value of lost leisure and home production associated with increased waged labour. Finally, although the focus of this analysis has been on the impact of wives' earnings on family income inequality, it needs to be emphasised that these earnings also contribute substantially to the incomes of increasing numbers of Australian families and have been important in determining how living standards changed over the decade.

Appendix: Decomposition of the Coefficient of Variation

The squared coefficient of variation ($CV^{2)}$ is equal to the squared value of the ratio of the standard deviation to the mean of a particular distribution. Its properties as a measure of inequality have been discussed by a number of writers, including Cowell (1977), Kakwani (1980) and Jenkins (1991). As a statistical measure of equality, the coefficient of variation (CV) has several advantages, including simplicity, familiarity and ease of computation. In addition, a closely related measure, one half of the squared coefficient of variation ($CV^2/2$) is additively decomposable, that is, total inequality can be expressed as a weighted sum of inequality within a number of mutually exclusive (and exhaustive) sub-groups of the population (e.g. defined according to family type, family size, or age) plus a between-group inequality term based on the mean incomes and the sizes of the sub-groups (Jenkins, 1991).

The coefficient of variation has a lower limit of zero (when all incomes are equal) and an upper limit equal to $(n-1)^{1/2}$ where n is the size of the sample (when all income is received by one person or family) (Kakwani, 1980). The fact that the upper limit depends upon the size of the sample has led to some criticism of the measure. Another feature of the coefficient of variation is that a transfer of $X from Person A to Person B with a lower initial (and final) income causes the measure to change by the same amount irrespective of the initial income levels of Persons A and B, as long as the absolute difference in their incomes is the same. Thus, for example, a $100 transfer from Person A with $1000 to Person B with $800 will cause CV to change to the same extent as a $100 transfer from Person A with $10,000 to Person B with $9,800. In relative terms the measure is thus more sensitive to transfers at high income levels than to transfers at low income levels, a feature which has also led to some criticism.

In explaining how the coefficient of variation has been used in the main text, consider first the case where the squared coefficient of variation is used to investigate the relationship between inequality in the combined income of both husband and wife and inequality in the separate incomes of husbands and wives. If CV^2, CV^2_H and CV^2_W refer to the squared coefficient of variations for the three distributions then, following Bjorklund (1992), it can be shown that:

$$CV^2 = \alpha^2 CV^2_M + (1-\alpha)^2 CV^2_W + 2\alpha(1-\alpha)\rho CV_M CV_W \quad (1)$$

where α = the husband's proportion of combined (husband's plus wife's) family income, $(1-\alpha)$ = the wife's proportion of combined family income and ρ = the correlation coefficient between the incomes of husbands and the incomes of wives. Then if

$$D = (CV^2_M - CV^2)/CV^2_M \quad (2)$$

it can be shown that:

$$D = (1-\alpha^2) - (1-\alpha)^2 CV^2_W/CV^2_M - 2\alpha(1-\alpha)\,\rho\, CV_W/CV_M \quad (3)$$

If there is a perfect correlation between husbands' income and wives' income (so that $\rho=1$) this by itself is not a sufficient condition for D to be negative, i.e. for combined income to be less equally distributed than husbands' income ($CV^2 > CV^2_M$). However, the likelihood that this will be the case increases as ρ increases, other things constant, but the relative variation in husbands' and wives' incomes ($CV^2_M = CV_W$) is also critical. If these exhibit the same variation, so that $CV^2_M = CV^2_W$, then when $\rho=1$, D=0 from equation (3). In this case, the addition of wives' income to husbands' income has no impact on inequality because it is equivalent to increasing all husband's incomes by the same proportion. This result follows because the inequality measure CV^2 is scale invariant.

Now consider the case where the total income of the couple can be disagregated into three elements, the earnings, of the husband (E^h), the earnings of the wife (E^w) and all other (unearned) family income (Y^u). Total family income (Y) is then equal to:

$$Y = E^h + E^w + Y^u \quad (4)$$

In this case, the following relationship holds between the squared coefficient of variation of total family income (CV^2_Y) and the squared coefficients of variation of husbands' earnings (CV^2_h), wives' earnings (CV^2_w) and unearned income (CV^2_u):

$$CV^2 = a^2CV^2_h + b^2CV^2_w + c^2CV^2_u + 2\rho_{hw}\, abCV_hCV_w + 2\rho_{hu}\, ac\, CV_hCV_u + 2\rho_{wu}bcCV_w\, CV_u \quad (5)$$

where a = the ratio of average husbands' earnings to average family income, b = the ratio of average wives' earnings to average family income, c = the ratio of average unearned income to average family income, ρ_{hw} = the correlation between husbands' earnings and wives' earnings, ρ_{hu} = the correlation between husbands' earnings and unearned income, and ρ_{wu} = the correlation between wives' earnings and unearned income.

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