

# Changes in the labour force status of lone and couple Australian mothers, 1983-2002

Matthew Gray, Lixia Qu,  
Jennifer Renda, David de Vaus

Research Paper No. 33, June 2003



Australian Institute of Family Studies

© Australian Institute of Family Studies – Commonwealth of Australia 2003

Australian Institute of Family Studies  
300 Queen Street, Melbourne 3000 Australia  
Phone (03) 9214 7888; Fax (03) 9214 7839  
Internet [www.aifs.org.au/](http://www.aifs.org.au/)

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced by any process without permission in writing from the Australian Institute of Family Studies.

The Australian Institute of Family Studies is committed to the creation and dissemination of research-based information on family functioning and wellbeing. Views expressed in its publications are those of individual authors and may not reflect Institute policy or the opinions of the Editor or the Institute's Board of Management.

National Library of Australia  
Cataloguing-in-Publication Data

Changes in the labour force status of lone and couple  
Australian mothers, 1983-2002.

Bibliography.  
ISBN 0 642 39503 9.

1. Mothers - Employment - Australia. 2. Single mothers -  
Employment - Australia. I. Gray, Matthew. II. Australian  
Institute of Family Studies. (Series: Research paper  
(Australian Institute of Family Studies); no. 33).

331.44

Designed by Double Jay Graphic Design  
Printed by XL Printing

ISSN 1446 - 9863 (Print)  
ISSN 1446 - 9871 (Online)

# Contents

List of tables	vi
List of figures	vi
List of appendices	vi
Acknowledgements	vii
About the authors	vii
Abstract	viii
<b>Introduction</b>	<b>1</b>
<b>Trends in labour force status of Australian mothers</b>	<b>2</b>
<b>Modelling the determinants of labour force status, 1986 to 1996</b>	<b>5</b>
Economic model	5
Econometric modelling and data	6
<b>Estimation results – changes in the determinants of labour force status</b>	<b>9</b>
Age and number of children	10
Educational attainment	12
Proficiency in spoken English	14
Decomposition of changes in probabilities of labour force status	14
<b>Concluding comments and policy implications</b>	<b>15</b>
<b>References</b>	<b>18</b>
<b>Appendices</b>	<b>19</b>
A. Variable definitions	19
B. Descriptive statistics	21
C. Coefficient estimates	22
D. Detailed description of the decomposition	24

## List of tables

Table	1. Predicted labour force status, couple mothers, 1986 and 1996	11
	2. Predicted labour force status, lone mothers, 1986 and 1996	11
	3. Decomposition of change in labour force status, 1986-1996	15

## List of figures

Figure	1. Employment rates, lone mothers, 1983-2002	3
	2. Employment rates, couple mothers, 1983-2002	4
	3. Unemployment to population ratio by family type, 1983-2002	4
	4. Not in the labour force to population ratio by family type, 1983-2002	5
	5. Change in predicted labour force status by number and age of children, couple mothers, 1986 to 1996	12
	6. Change in predicted labour force status by number and age of children, lone mothers, 1986 to 1996	12
	7. Change in predicted labour force status by educational attainment, couple mothers, 1986 to 1996	13
	8. Change in predicted labour force status by educational attainment, lone mothers, 1986 to 1996	13

## List of appendices

Appendix A. Variable definitions	19
B1. Descriptive statistics, 1986 Census	21
B2. Descriptive statistics, 1996 Census	21
C1. Logit estimates of probability of labour force status, couple mothers, 1986	22
C2. Logit estimates of probability of labour force status, lone mothers, 1986	22
C3. Logit estimates of probability of labour force status, couple mothers, 1996	23
C4. Logit estimates of probability of labour force status, lone mothers, 1996	23
D. Detailed description of the decomposition	24

## Acknowledgments

A previous version of this paper was presented at the Australian Institute of Family Studies Conference, 12-14 February 2003, Melbourne, Australia, and in the School of Economics and Marketing Workshop Series, University of Canberra, Canberra, Australia.

## About the authors

**Dr Matthew Gray** is a Principal Research Fellow at the Australian Institute of Family Studies. He has published on a range of topics including the impact of child rearing on mothers' subsequent earnings, access to family-friendly work-practices, Indigenous labour force status and health expenditure.

**Ms Lixia Qu** is a Research Fellow at the Australian Institute of Family Studies. She has undertaken research in the areas of family formation and analysis of demographic trends

**Ms Jennifer Renda** is a Research Officer at the Australian Institute of Family Studies. She has undertaken research in the areas of educational participation of Indigenous Australians and working patterns of Australian families.

**Associate Professor David de Vaus** is Senior Research Advisor at the Australian Institute of Family studies and Associate Professor at the Department of Sociology at La Trobe University. He has published widely on research methods and on a range of topics including intergenerational relationships, life course transitions, retirement, cohabitation and the links between family contexts and mental health.

## Abstract

Over the last twenty years there has been a substantial increase in the proportion of lone mothers employed part-time, while the proportion employed full-time is much the same in 2002 as it was in 1983. The experience of couple mothers is quite different, with both full-time and part-time employment increasing at similar rates. The net effect is that both lone and couple mothers have had similar increases in overall employment rates, but that the nature of the growth in employment has been different among the lone and couple mother populations. This paper uses data from the 1986 and 1996 Australian Censuses to explore the possible reasons for the differences in the labour market trends of lone and couple mothers.

# Changes in the labour force status of lone and couple Australian mothers, 1983-2002

## Introduction

There is currently a great deal of policy and community concern about the growth in the number of families with children in which no adult is employed. A substantial part of the increase in the number of job poor families is the result of the increase in the number of lone-parent families, which have a higher rate of joblessness than couple families (Gregory 1999). It seems that many lone mothers in Australia are spending long periods of time in receipt of government payments. Recent research suggests that when the movements from one payment type to another are taken into account, the total amount of time spent in receipt of welfare payments is much longer and that the potential for “welfare dependency” is greater than previously thought (Gregory 2002).<sup>1</sup>

The relatively low rates of employment of lone mothers have long been a policy concern. In the 1970s it was noted that lone mother families experienced high rates of poverty and the policy remedy was seen as adequate social security provision (Henderson, Harcourt and Harper 1970). By the 1990s the policy remedy had shifted to supplementing the pension with income from other sources, primarily income from employment (Shaver 1998). The most recent review of the social security system emphasised the importance of paid employment (McClure 2000).

As well as examining the lower rates of employment at a particular point in time it is important to consider trends in employment over the longer-term. Over the last twenty years the employment rate of lone mothers has increased from 32.1 per cent in 1983 to 47.8 per cent in 2002. The increase for couple mothers has been from 42.1 per cent in 1983 to 62.9 per cent in 2002. This means that, despite increasing employment levels among lone mothers, the size of the employment gap relative to couple mothers has slightly increased.

Although the growth in employment for lone and couple mothers has been of a similar magnitude over the last twenty years, the growth in part-time and full-time employment has been dramatically different. For lone mothers, the majority of the increase in employment has been in part-time employment, with the rate of full-time employment increasing between 1983 and 1988 and declining thereafter. In contrast, couple mothers have had similar rates of growth in part-time and full-time employment.

---

1. This finding is consistent with work by Chalmers (1999) that there is a high incidence of repeat use of the Sole Parent Pension (now called Parenting Payment) with 65 per cent of lone parents returning to some form of income support (43 per cent returned to Sole Parent Pension).

This rapid growth in part-time employment of lone mothers has occurred over a period in which the income support system has increasingly allowed mothers to combine part-time employment with the receipt of government income support. The result is an increase in the proportion of lone mothers who are both working part-time and receiving government income support.<sup>2</sup>

There are a number of possible explanations for the much higher rate of growth of part-time than full-time employment of lone mothers. One explanation relates to the financial incentives generated by the income support system. A second is that the characteristics of the lone mother population have changed in such a way as to explain the decline in full-time employment and increase in part-time employment. A third set of explanations relates to changes in the preferences for part-time versus full-time employment for lone and couple mothers.

The aim of this paper is to document the labour market experience of lone and couple mothers over the period 1983 to 2002. Models of the determinants of labour force status of lone and couple mothers are estimated using data from the 1986 and 1996 Censuses. The results of these models are used to explore the possible explanations for the changes in labour force status of Australian mothers.

The rest of the paper is structured as follows. The next section documents the labour market experience of lone and couple mothers over the period 1983 to 2002. The third section, discusses the conceptual model and empirical specification used to estimate the determinants of employment. In the fourth section, the results of the statistical modelling are discussed. The discussion focuses on how the determinants of labour force status have changed over time and whether this differs for lone and couple mothers. The fifth section presents the results of a decomposition of the sources of the changes in labour force status. The final section draws conclusions based on these analyses.

## **Trends in labour force status of Australian mothers**

In this section we document various dimensions of the recent labour market experience of Australian mothers. The trends are examined separately for lone and couple mothers. The data are taken from the Australian Bureau of Statistics (ABS) Labour Force Survey (ABS various years(a); ABS various years(b)).

Mothers are defined as women who form a parent-child relationship with at least one dependent child. A dependent child is defined as a child living in the household aged 15 years or younger or a child aged 16 to 24 years who is a full-time student.<sup>3</sup> The distinction between lone and couple mothers is that couple mothers have a spouse or partner usually present in the household, whereas lone mothers do not.

Figure 1 depicts the full-time and part-time employment rates of lone mothers over the period 1983 to 2002. During this period several changes occurred, the

- 
2. In June 2001, 26.2 per cent of lone parents receiving a pension payment (Parenting Payment Single) reported having earnings (Department of Family and Community Services 2001). The combination of relatively high minimum wages, relatively generous income test tapers, and the provision of in-work benefits means that many lone mothers in Australia combine part-time employment with continued receipt of government income support (Whiteford and Angenent 2001).
  3. In addition, to be regarded as a child the individual cannot have a partner or child of their own usually resident in the household. Prior to 1989 the ABS did not include children aged 20 to 24 years who were a full-time student as a dependent child.

most dramatic being the rapid increase in part-time employment. In 1983, 11.8 per cent of lone mothers were employed part-time. This increased to 26.8 per cent by 2002. While the proportion of lone mothers employed full-time fluctuated with the business cycle, there was an overall increase between 1983 and 1988, from 20.3 to 28.7, followed by a downward trend to 21.0 per cent by 2002. The rate of increase in part time employment meant that by 1998 more lone mothers were employed part-time than full-time.

The employment rates presented in this paper are derived from cross-sectional data which provide a snapshot of labour force status at the time of the survey. To the extent to which lone mothers are moving into and out of employment, this snapshot will underestimate the numbers who are employed over some period of time, say one year. Analysis of longitudinal survey data reveals that more than 60 per cent of lone mothers were employed at some stage during a given year, but this was likely to cover two or more work episodes (Whiteford 2001).<sup>4</sup>

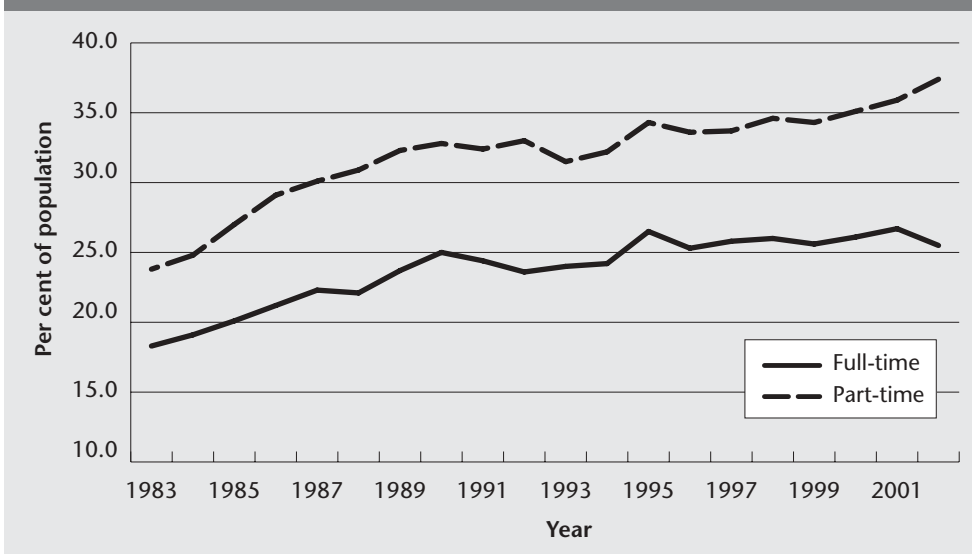


Figure 2 shows the full-time and part-time employment rates of couple mothers. In contrast to the patterns for lone mothers, couple mothers had substantial increases in their level of both full-time and part-time employment. In 1983, 18.3 per cent of couple mothers were employed full-time. This had increased to 25.5 per cent by 2002. Part-time employment increased from 23.8 per cent in 1983 to 37.4 per cent in 2002.

The unemployment to population ratio for lone and couple mothers is presented in Figure 3. There are three main points to note from this figure. First, lone mothers have a much higher unemployment to population ratio than do couple mothers. Second, for lone mothers the unemployment to population ratio is much more sensitive to the business cycle than for couple mothers. This is not surprising given that the majority of couple mothers have an employed partner and are thus more likely to withdraw from the labour force altogether (the so called discouraged work effect)

4. Figures derived from the Survey of Employment and Unemployment Patterns (SEUP), a longitudinal survey over the period 1995-1997. The SEUP survey reveals that, while 38 per cent of lone mothers worked the whole year from September 1995 to September 1996, a further 25 per cent worked for part of the years.

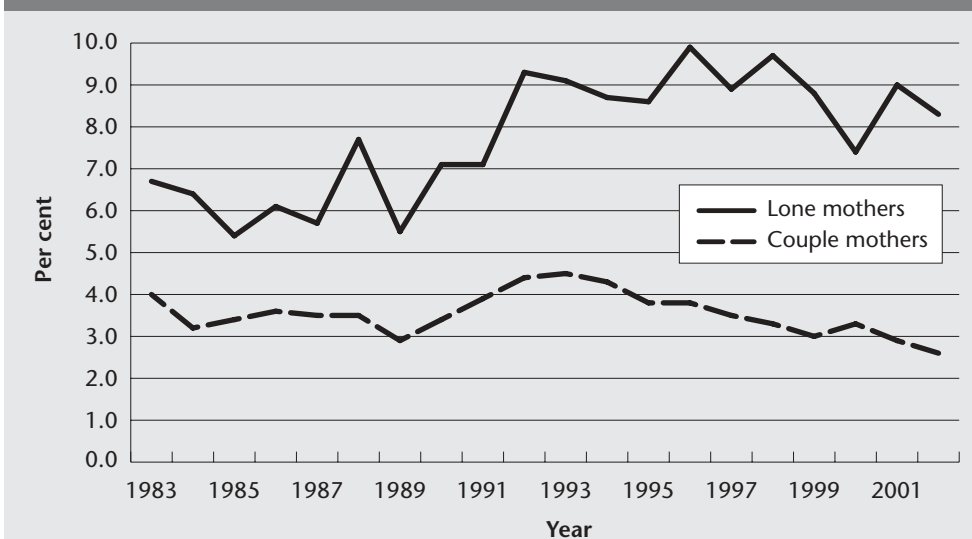
Figure 2. Employment rates, couple mothers, 1983-2002



Source: ABS (various years(a)) and ABS (various years(b)).

(Lenten 2001). Third, the unemployment to population ratio for lone mothers increased during the economic recession during the 1980s and early 1990s by much more than it decreased during the period of sustained economic growth which was experienced over much of the 1990s. This resulted in a ratcheting up of the unemployment to population ratio. In contrast, the unemployment to population ratio of couple mothers declined over the period 1983 to 2002.

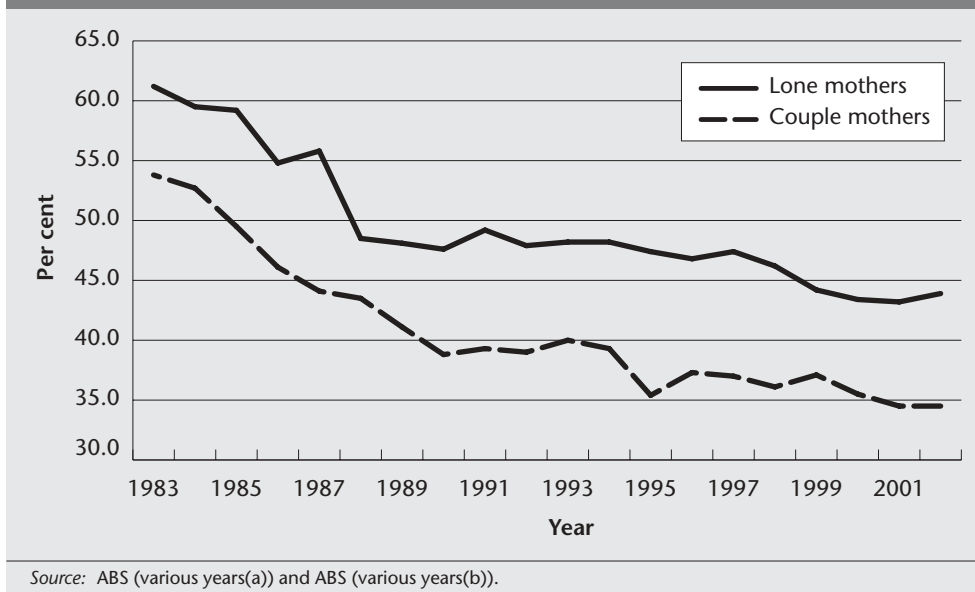
Figure 3. Unemployment to population ratio by family type, 1983-2002



Source: ABS (various years(a)) and ABS (various years(b)).

The proportion of lone and couple mothers not in the labour force are shown in Figure 4. As expected, given the substantial increases in employment, the proportion not in the labour force declined for both lone and couple mothers between 1983 and 2002. For lone mothers the proportion not in the labour force declined from 61.2 per cent in 1983 to 43.9 per cent in 2002 and for couple mothers the decline was from 53.8 per cent in 1983 to 34.5 per cent in 2002.

Figure 4. Not in the labour force to population ratio by family type, 1983-2002



## Modelling the determinants of labour force status, 1986 to 1996

In order to investigate the reasons for the differences in the trends in labour force status of lone and couple mothers, statistical models of the determinants of labour force status are estimated. The results of these models are used to identify reasons for the changes in the labour force status for lone and couple mothers. This section describes the conceptual framework utilised, the estimation method and the data used.

### *Economic model*

Labour force status is, according to the neo-classical analysis, determined in a two-stage process. In the first stage an individual decides whether or not to supply their labour to the market. In the second stage whether or not they are employed is determined by a combination of factors including labour demand, their incentives to search actively for work and to accept any job offers they receive.

In the neo-classical model an individual makes labour supply decisions by maximising a utility function subject to a wealth or budget constraint. An individual's decision to participate in the labour market (and work a desired number of hours) can be explained in terms of a trade-off between time spent at home on market-substitution activities, leisure, and paid work. The decision to work or not work depends on a comparison between the wage that can be obtained in the market and their reservation wage (the minimum wage at which they will accept a job) (Blundell and MaCurdy 1999).

The simple neo-classical model of labour supply described above is somewhat unsatisfying for the purposes of modelling the labour supply decisions of lone and couple mothers in that it only allows a limited role for family related factors. In order to address this limitation, a range of models of family labour supply have been developed. (See Blundell and MaCurdy (1999) for a detailed discussion of these models.) The standard approach to family labour supply modelling is to extend the consumption-leisure choice problem to include two leisure decisions (the "unitary model of family labour supply"). In this class of model, the family aims to maximise total family utility, which is assumed to depend on total family consumption and on the leisure of each family member.

The family is assumed to pool the total earnings and, implicitly, consumption spending so that utility is maximised subject to a family budget constraint.

A major limitation of this unitary model of family labour supply is that it implies that as far as the household's utility-maximising choice of family labour supplies are concerned, all sources of non-labour income can be combined into a single, unearned income measure. This has led to recent research seeking solutions from efficient bargaining theory (the "collective model" of family labour supply). These models set up a competitive "game" between family members.

These theoretical labour supply models have a number of implications for what factors determine labour supply. The wage that can be obtained in the labour market is a key factor. Another important factor is the amount of unearned income received. Clearly specialisation within the household between the production of home and market based goods is important. For women, the age of their children is likely to be important in the balance between paid work and child bearing, as child rearing responsibilities change over the lifecycle (Killingsworth 1983).

The models have differing implications for the way in which the factors affect labour supply. However, data constraints mean that the statistical model used is a reduced form model which cannot distinguish between the underlying models of labour supply. Notwithstanding, the empirical analysis will highlight the relative importance of such factors for the labour market outcomes of lone and couple mothers.

Given that a woman wants to be in paid employment, whether she is employed will be determined by whether she receives job offers with a wage greater than her reservation wage. This will depend, in part, upon her marketable skills and hence productivity. In addition, the number and quality of job offers will be affected by the extent to which there is discrimination in the labour market.

### ***Econometric modelling and data***

The labour force states considered in the statistical modelling are: full-time employment; part-time employment; unemployment; and not in the labour force.<sup>5</sup> Given that the dependent variable, labour force status, takes one of four possible values, an appropriate statistical technique is the multinomial logit model.<sup>6</sup> The multinomial logit model allows the dependent variable to take one of four mutually exclusive and exhaustive values,  $j=1, 2, 3$  and 4:

$$\begin{aligned} Y_i &= 1 \text{ if person } i \text{ is part-time employed} \\ Y_i &= 2 \text{ if person } i \text{ is full-time employed} \\ Y_i &= 3 \text{ if person } i \text{ is unemployed} \\ Y_i &= 4 \text{ if person } i \text{ is not employed,} \end{aligned}$$

5. The distinction between full time and part time employment is made based upon the conventional definition that full-time employment is working 35 hours or more. Mothers who were self-employed are classified as being part-time or full-time employed according to their working hours.
6. The multinomial model posits a unitary choice framework, where all four options are available at a given time. An alternative modeling strategy would be to model sequential decisions in labour supply. That is where labour force participation is modeled first, then the probability of employment conditional on participation and finally the choice between full-time and part-time employment is modeled conditional on employment. We adopt the multinomial logit model for two reasons. First, it allows the changes in labour force status over time to be decomposed into the part due to changes in characteristics and the part due to changes in coefficients. Second, mothers' labour supply decisions may be better described by all the labour force states are available at a given time rather than as a sequential decision process. For example, the choices may not be first whether to seek employment and then subsequently between part-time and full-time employment, but rather between part-time and being not in the labour force, with full-time employment not being a real option given the demands of balancing work and family demands.

The multinomial model is given by:

$$\text{Probability } (Y_i = j) = \frac{e^{\beta_j 'x_i}}{\sum_{m=1}^4 e^{\beta_m 'x_i}} \quad (1)$$

The estimates of the determinants of labour force status are based on the one percent sample file from the 1986 and 1996 Censuses. A major advantage of using Census data is that it contains a large number of lone mothers, which most survey data lack. Of crucial importance to this study is the comparability of the data for 1986 and 1996, which provide a consistent basis for estimating the determinants of labour force status. The census data provide detailed information on labour force status, educational and demographic characteristics (including the number and age of children) and household level data. Of particular importance for this study is the information on any partner who lives in the household.

Given the objective of exploring whether the changes in labour force status of lone and couple mothers are explained by changes in the determinants of employment, the models are estimated separately for lone and couple mothers for both 1986 and 1996. The specification includes a number of variables that the economic model described above suggests will be related to employment status, or which previous empirical studies have shown to be important determinants.<sup>7</sup> The remainder of this section provides a rationale for the empirical specification used. Details of the construction of the variables used in the estimation model are presented in Appendix A and summary statistics in Appendix B.

Age is included to identify life cycle effects and as a measure of potential labour market experience. Age squared ( $AGE^2$ ) is included to allow for a non-linear relationship between age and the probability of being in each labour force state. Human capital factors are captured by educational attainment (in addition to potential labour market experience). Level of educational attainment is measured by a set of dummy variables. For respondents with no post-secondary qualification the highest level of educational attainment is measured by the age at which they left school, and for those with a post-secondary qualification it is their highest level of qualification. Thus the variables included are dummy variables for having: left secondary school aged 14 years or younger; left secondary school aged 15 or 16 years; left secondary school aged 17 years or older; vocational qualification; or a degree or diploma level qualification. The omitted category is “a degree or diploma level qualification”.

The impact of child rearing on the probability of being in each labour force state is captured using a set of dummy variables. The first series of variables reflects whether the age of the youngest dependent child in the household is four years or younger, 5 to 11 years, 12 to 14 years, or 15 to 19 years.<sup>8</sup> The omitted category is “has a youngest child aged 15 to 19 years”. There is evidence that having more than one young child dramatically reduces the likelihood of a mother being employed (Chapman, Dunlop, Gray, Liu and Mitchell 2001). Therefore a

7. Relevant empirical studies include Beggs and Chapman (1990), Gray, Qu, de Vaus and Millward (2002) and Le and Miller (2000).

8. In the publicly available census data, the oldest group of dependent children were those aged 15 to 19 who were full-time students. For reasons of consistency we therefore restrict the definition of dependent children to those aged 15 to 19 years for both the 1986 and 1996 Censuses.

variable is included which captures the effects of having two or more children aged under five. In order to capture the effects of having additional children aged 5 to 11 years, a variable is included which takes the value of one if the respondent has two or more children aged 5 to 11 years or has a youngest child aged 0 to 4 years and one child aged 5 to 11 years. Finally, there is a dummy variable that captures the effects of having four or more children in total.

These age ranges of children have been chosen because they reflect institutional features of the Australian educational and income support systems. The age of four years or younger is chosen because five is around the age of starting school. The age of 12 years is chosen because it is the age by which most children have started secondary school. Parents lose eligibility for sole parent pension or parenting allowance when the youngest child is aged 16, however as discussed the closest age grouping available on the public release data set is 15 to 19 years.<sup>9</sup>

The motivation to seek employment and the intensity of job search is likely to be related to the family's financial commitments. The stronger the financial need, the stronger the motivation to seek work might be (see for example Scutella 2000-2001). Since housing costs are a major financial commitment a set of dummy variables indicating housing tenure (purchasing a house, owning house outright and renting accommodation) is included. The omitted category is "purchasing a house".

The level of labour demand varies across different geographic regions of Australia and is clearly an important determinant of job opportunities, so a variable for living in a capital city as compared to living outside of a capital city is included. A variable indicating Indigenous origin is also included since Indigenous Australians have a much lower employment rate and higher unemployment rate than do other groups (Hunter and Gray 1998).

Having poor spoken English is strongly inversely related to labour market opportunities and hence labour force status (Le and Miller 2000). Therefore variables for speaking English only, well, and poorly are included. The omitted category is "speaking only English at home". Being a migrant is strongly inversely related to labour market opportunities and amongst migrants there is a strong relationship between number of years since arrival in Australia and labour market status (Le and Miller 2000). Therefore variables measuring arrival in Australia more than ten years ago and within the last ten years are included. The omitted category is "born in Australia".<sup>10</sup>

As the discussion of family labour supply models suggests and empirical studies have found, the income of a partner is an important determinant of the labour supply decision.<sup>11</sup> Therefore, for couple mothers, partner's income is included as an explanatory variable. Partner's income squared is included to allow for any non-linear relationship.

---

9. While the payment system has undergone significant changes since 1996 with the Sole Parent Pension and Parenting Allowance being replaced with Parenting Payment, the eligibility criterion of having a dependent child aged less than 16 years has remained constant. In addition, the sole parent may be the primary carer for a Disability Allowance Child over 16 years of age.

10. The specification of the model for lone mothers estimated using the 1986 Census differs slightly. Due to a small number of migrants in the category having arrived five to ten years prior to the 1986 Census, length of time since arrival in Australia is captured by two dummy variables: having arrived more than ten years ago and having arrived within the last ten years.

11. Examples of Australian empirical studies include Apps, Killingsworth and Rees (1996) and Scutella (2000-2001).

An alternative approach to estimating separate models for lone and couple mothers is to estimate a combined model and include a variable for marital status with interactive terms. The advantage of this approach is that it would allow us to test whether the coefficient estimates for lone and couple mothers are statistically different from one another. However, this approach would require us to estimate an identical specification for lone and couple mothers, which would mean that partner's income could not be included as an explanatory variable. Given the importance of partner's income in influencing the labour supply decisions of mothers, this would result in a serious misspecification of the model.

The sample used in the estimation includes all women aged 15 to 64 years who had a dependent child aged less than 15 years of age or a dependent child aged 15 to 19 years who was a full-time student. The estimation sample for 1986 comprised data on 12,497 couple mothers and 1,706 lone mothers and for 1996 comprised data on 13,971 couple mothers and 2,960 lone mothers.<sup>12</sup>

## **Estimation results – changes in the determinants of labour force status**

This section presents the results of the estimates of the determinants of labour force status for lone and couple mothers for 1986 and 1996.<sup>13</sup> As the multinomial logit model coefficients themselves are not straightforward to interpret, particularly when considering changes over time in the effects of explanatory variables, the results are presented using the predicted probability of being in the respective labour force states. The predicted probabilities of being in the respective labour force states in 1996 for each set of explanatory variables are presented in Tables 1 and 2 for couple and lone mothers respectively. The estimated coefficients for each model are presented in Appendix C.

Given that the focus of this paper is on why the changes in labour market experiences of lone and couple mothers have differed so dramatically, the presentation of the results focuses on the change in the probability of being in the respective labour force states between 1986 and 1996 for mothers with a range of characteristics. Specifically the change in the predicted probability of being in each labour force states between 1986 and 1996 for each of the sets of explanatory variables is calculated. These probabilities are calculated holding constant the values taken by the other characteristics at the 1996 sample mean for lone and couple mothers respectively.<sup>14</sup> This method allows us to identify the extent to which the effects of individual variables on labour force status have changed between 1986 and 1996 and to isolate these from the effects of changes

---

12. Mothers living with a same sex partner are excluded, as are mothers for whom the age of youngest child in the family could not be identified due to the temporary absence of another dependent child on census night. The sample size is further reduced by excluding the "not stated" category in each of the variables included in the analysis. These restrictions resulted in the loss of 4,070 couple mothers and 409 lone mothers for 1986 and 3,362 couple mothers and 452 lone mothers for 1996.

13. The validity of the estimated multinomial logit model depends partly on whether the assumption of Independence of Irrelevant Alternatives (IIA) is acceptable. This can be tested using a Hausman test, which suggests that the following models are well specified, at least in terms of IIA (Greene 2000).

14. A consequence of using the average characteristics of the lone and couple mother populations in 1996 to estimate the probabilities of being in the respective labour force states in 1986 means that the changes in the probability of being in the respective labour force states may differ from the actual changes in the data. When using the average characteristics of couple mothers in 1996 to estimate the probability in each labour force state in 1986, partner's income is adjusted equivalent to 1986 dollar based on consumer price index for June 30 1996 and June 30 1986.

in the composition of the lone mother population. The changes in the probabilities of being in the respective labour force states are presented in Tables 1 and 2 for couple and lone mothers respectively.

### *Age and number of children*

As an example to the interpretation of the effects of each of the variables on labour force status in 1996, consider the effects of children. As expected, both the age and number of children has a strong and statistically significant impact upon the labour force status of both couple and lone mothers. In 1996 couple mothers with a youngest child aged 0-4 years have a predicted probability of full-time employment of 21.8 per cent, part-time employment of 36.3 per cent, unemployment of 1.5 per cent and being not in the labour force of 40.4 per cent. The predicted probability of being full-time and part-time employed increases as the age of the youngest child increases. There is a corresponding drop in the probability of not being in the labour force. Additional children under the age of four dramatically reduce the probability of being full-time employed and also reduce, by a smaller amount, the probability of being part-time employed. Similarly, having an additional child aged 5-11 years reduces the probability of being full-time or part-time employed as compared to having only one child aged 0-4 years or one child aged 5-11 years.

For lone mothers, the probability of being full-time employed in 1996 is lower for almost all of the variables relating to age and number of children. The only exception is for older children (aged 15 to 19 years) when lone mothers have a slightly higher rate of full-time employment than couple mothers (45.8 and 44.6 per cent respectively). The gap in full-time employment rates for couple and lone mothers narrows as the age of the youngest child increases. Young children, especially an additional child aged 0-4 years or 5-11 years, had a greater negative impact on lone mothers' probability of full-time employment as compared to couple mothers. Overall, there is a similar pattern for both groups of mothers, with the rate of full-time employment increasing as the age of the youngest child increases. Turning to part-time employment, lone mothers are less likely to be part-time employed than are couple mothers regardless of their family composition.

The predicted rate of unemployment is consistently higher for lone mothers than for couple mothers and increases slightly as the age of the youngest child increases. Overall, in 1996 the age and number of children had its greatest impact on the differences in full time employment of lone and couple mothers.

The change in the probability of being in the respective labour force states is shown in Tables 1 and 2. For the children variables, the change in labour force status between 1986 and 1996 is also shown graphically in Figures 5 and 6.

For couple mothers, the probability of being in full-time employment increased between 1986 and 1996 for all the family compositions considered (Figure 5). Similarly the probability of part-time employment increased for all the family compositions examined. The increases in employment are greater for couple mothers with younger children - primarily due to the increases in part-time employment. For couple mothers with older children, the increases in full-time employment have been slightly larger than for couple mothers with younger children.

For lone mother the pattern of changes in labour force status between 1986 and 1996 is quite different than for couple mothers. Lone mothers experienced a decrease in full-time employment for all the family compositions considered (Figure 6). In contrast, there was increase in the rate of part-time employment for all family compositions – especially among lone mothers with older children. The net effect is that there has been an increase in employment rates for all family compositions except for lone mothers with two or more children aged 0-4 years.

**Table 1. Predicted labour force status, couple mothers, 1986 and 1996**

	1996				Change 1986 to 1996			
	Full time	Part time	Unemployed	Not in labour force	Full time	Part time	Unemployed	Not in labour force
	Per cent				Percentage point change			
<b>Age and number of children</b>								
1 child 0-4 years	21.8	36.3	1.5	40.4	3.0	11.4	-0.5	-13.8
1 child 5-11 years	32.7	39.4	2.3	25.6	2.9	6.2	-0.4	-8.7
1 child 12-14 years	41.4	36.6	2.2	19.8	4.5	3.5	-0.2	-7.8
1 child 15-19 years	44.6	37.3	2.5	15.6	1.7	4.0	0.8	-6.6
2+ children 0-4 years	11.3	28.6	1.4	58.6	1.6	9.1	-0.3	-10.5
1 child 0-4 years, 1 child 5-11 years	16.0	37.9	1.8	44.2	3.0	12.4	-0.8	-14.6
2+ children 5-11 years	25.0	42.9	3.0	29.2	3.3	7.2	-0.7	-9.9
<b>Educational attainment</b>								
Degree or diploma level qualification	37	42	1.8	19.2	3.6	6.3	-0.5	-9.3
Vocational qualification	22.5	45.2	2.1	30.2	0.8	6.2	-0.4	-6.6
No post-secondary qualification and left school aged 17 years or older	24.4	36	2.1	37.4	-0.3	9.5	0.0	-9.3
No post-secondary qualification and left school aged 15 or 16 years	21	34.5	2.3	42.2	4.1	7.7	-0.5	-11.3
No post-secondary qualification and left school aged 14 years or younger	17	30	2.2	50.7	1.6	7.1	-0.7	-7.9
<b>Proficiency in spoken English</b>								
Speaks English only	24.7	40.4	2	33	3.1	8.2	-0.5	-10.8
Speaks English well	28.6	30.6	3.1	37.6	0.9	7.2	-0.1	-8.0
Speaks English poorly	20.9	16.5	5.8	56.8	-2.9	1.8	0.5	0.6
<b>Region of residence</b>								
Capital city	25.5	38.8	2	33.7	3.1	7.4	-0.6	-9.8
Outside a capital city	24.8	37.2	2.6	35.4	2.2	8.7	0.0	-10.9
<b>Housing tenure</b>								
Own house	22.5	39.2	1.8	36.5	1.5	9.3	0.1	-10.8
Purchasing house	28.5	41.1	1.9	28.6	4.4	7.4	-0.6	-11.2
Renting house	21.7	30.1	3.5	44.7	1.1	6.3	-1.2	-6.2

Notes: The predicted probabilities of being in the respective labour force states in 1996 are calculated using the mean values for 1996 and then changing the values of the set of variables being examined.

Source: Derived from Appendix Tables B1, C1 and C3.

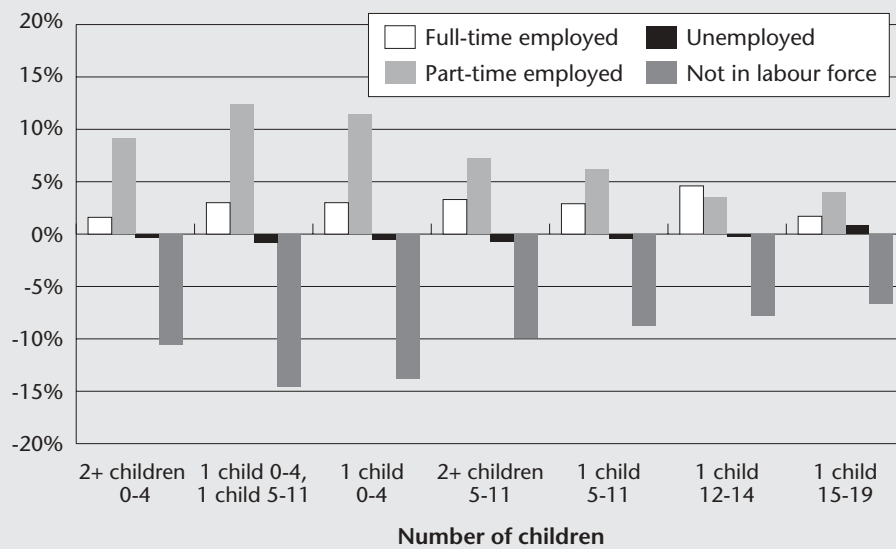
**Table 2. Predicted labour force status, lone mothers, 1986 and 1996**

	1996				Change 1986 to 1996			
	Full time	Part time	Unemployed	Not in labour force	Full time	Part time	Unemployed	Not in labour force
	Per cent				Percentage point change			
<b>Age and number of children</b>								
1 child 0-4 years	17.4	25.4	8.4	48.8	-1.3	2.0	3.2	-3.8
1 child 5-11 years	25.0	30.2	11.8	32.9	-2.9	11.1	4.4	-12.6
1 child 12-14 years	30.1	28.2	14.1	27.6	-8.5	13.0	6.7	-11.2
1 child 15-19 years	45.8	23.9	12.8	17.4	-7.9	11.3	6.8	-10.2
2+ children 0-4 years	1.7	15.3	7.2	75.7	-6.7	4.8	-1.0	2.9
1 child 0-4 years, 1 child 5-11 years	8.6	25.6	7.8	58.0	-4.0	5.0	2.5	-3.5
2+ children 5-11 years	13.4	32.8	11.7	42.1	-6.2	15.3	4.0	-13.1
<b>Educational attainment</b>								
Degree or diploma level qualification	30.1	36.9	9.4	23.7	-8.3	4.3	-0.3	4.3
Vocational qualification	23.4	35.7	10.7	30.2	-9.9	19.2	5.2	-14.5
No post-secondary qualification and left school aged 17 years or older	21.3	25.7	11.0	41.9	-9.9	12.3	4.3	-6.6
No post-secondary qualification and left school aged 15 or 16 years	14.1	26.2	11.6	48.0	-1.2	8.8	5.5	-13.2
No post-secondary qualification and left school aged 14 years or younger	10.2	14.9	11.3	63.5	-3.1	7.9	5.8	-10.6
<b>Proficiency in spoken English</b>								
Speaks English only	20.6	29.4	10.4	39.6	-3.5	10.1	3.7	-10.3
Speaks English well	13.6	17.3	19.7	49.5	-6.7	4.0	8.7	-6.0
Speaks English poorly	0.6	9.9	16.1	73.4	-13.1	4.9	3.0	5.2
<b>Region of residence</b>								
Capital city	21.5	27.2	10.6	40.7	-4.0	11.0	4.1	-11.2
Outside a capital city	14.5	29.0	12.5	44.0	-6.3	7.7	4.3	-5.8
<b>Housing tenure</b>								
Own house	16.8	29.9	8.5	44.8	-3.5	10.6	3.4	-10.5
Purchasing house	29.2	31.6	8.6	30.6	-1.6	6.1	3.6	-8.1
Renting house	15.4	25.6	13.3	45.7	-6.2	10.3	4.6	-8.7

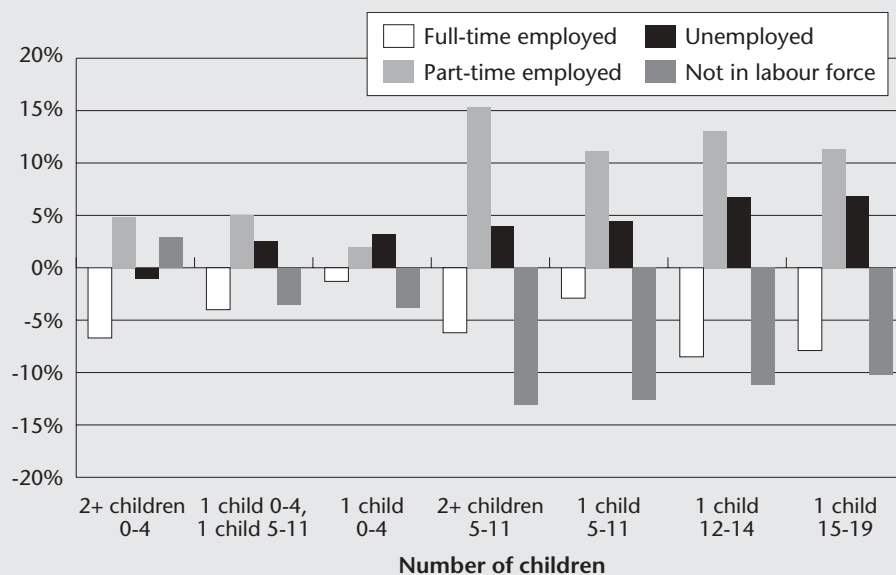
Notes: The predicted probabilities of being in the respective labour force states in 1996 are calculated using the mean values for 1996 and then changing the values of the set of variables being examined.

Source: Derived from Appendix Tables B2, C2 and C4.

**Figure 5. Change in predicted labour force status by number and age of children, couple mothers, 1986 to 1996**



**Figure 6. Change in predicted labour force status by number and age of children, lone mothers, 1986 to 1996**



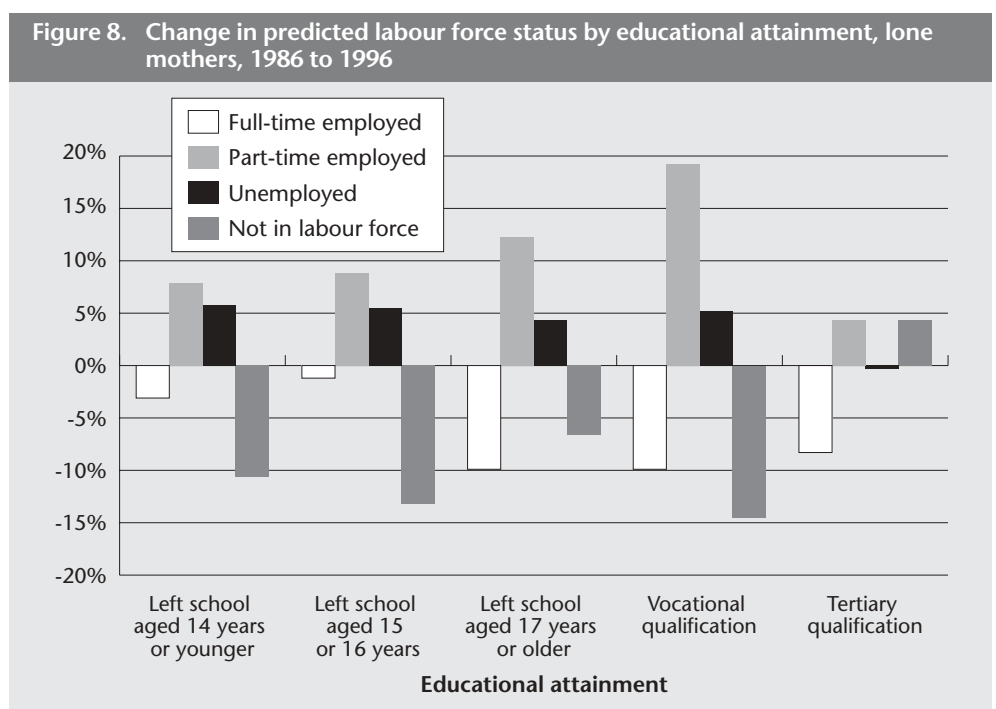
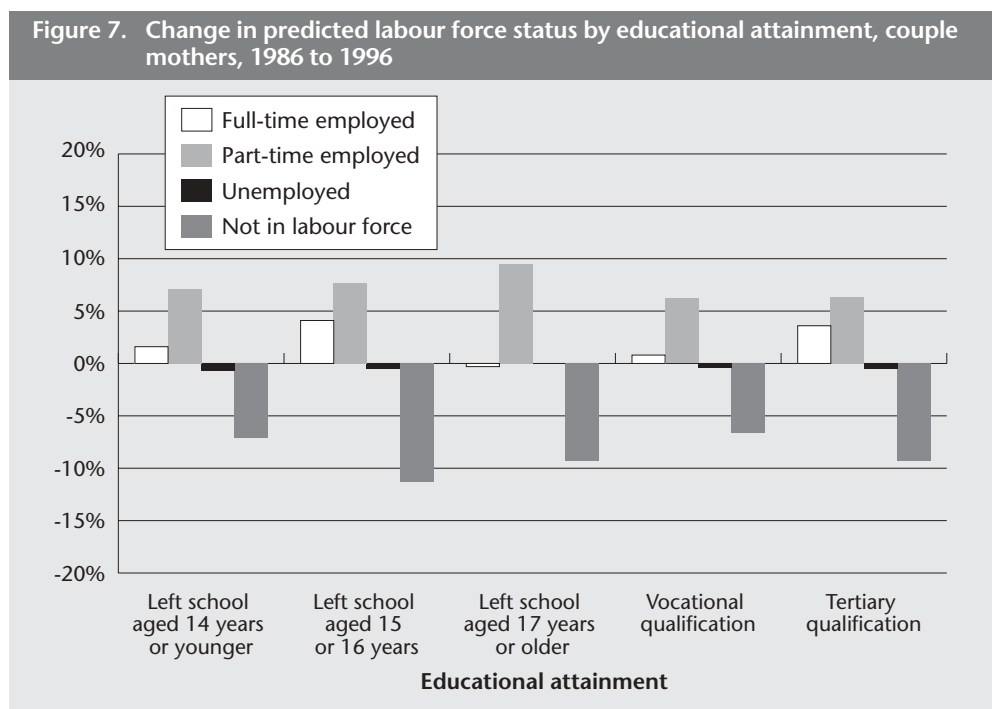
**Educational attainment**

For both lone and couple mothers, the rate of full-time employment increases as the level of educational attainment increases. Similarly, the rate of part-time employment for both lone and couple mothers is estimated to increase as the level of educational attainment increases. However the relationship with educational attainment is not as pronounced for part-time employment as for full-time employment.

The changes in labour force status by educational attainment between 1986 and 1996 are presented in Tables 1 and 2 and graphically in Figures 7 and 8. For couple mothers there is no clear pattern between educational attainment and changes in labour force status. The main point to make is that the increases in full-time employment have been larger amongst those with low levels of educational attainment (left school aged less than 14 years or aged 15 to 16

years) and those with higher level of educational attainment (tertiary qualification). In terms of part-time employment, there was a substantial increase in part-time employment across all levels of educational attainment. The increases range from 9.5 percentage points for couple mothers who have no post-secondary qualification and left school aged 17 years or older to 6.2 percentage points for couple mothers with a vocational qualification.

For lone mothers the pattern is very different. There were very substantial falls in full-time employment for lone mothers with higher levels of educational attainment. For example, between 1986 and 1996 the probability of a lone mother being employed full-time is estimated to have fallen by around 9 percentage points for those who left school aged 17 or older or had post school qualifications.



Interestingly, the increases in part-time employment are the highest for lone mothers with a vocational qualification (19.2 percentage points) and those who left school aged 17 years or older (12.3 percentage points). For lone mothers, almost all education groups had an increase in employment rates (part-time plus full-time employment). The only exception is lone mothers with a degree or diploma level qualification who had a fall in total employment of 4.3 percentage points. When interpreting the change for lone mothers with a degree or diploma level qualification it should be borne in mind that lone mothers with this level of education still have the highest employment rate.

### ***Proficiency in spoken English***

For couple mothers, those who speak English as a second language but speak it well had a predicted probability of full-time employment of 28.6 per cent. This is slightly higher than the rate of 24.7 per cent for couple mothers who speak only English. Couple mothers with poor spoken English have a probability of full-time employment of 20.9 percentage points. There is a stronger relationship between English proficiency and part-time employment with probabilities of part-time employment of 40.4 for couple mothers who speak English only, 30.6 per cent for those who speak English well and 16.5 per cent for those who speak English poorly.

For lone mothers the effect of English language proficiency on the probability of part-time and full-time employment in 1996 is more pronounced. Lone mothers with poor spoken English have predicted to have a rate of full-time employment which is very close to zero (0.6 per cent). However, the numbers of lone mothers with poor spoken English is relatively small and therefore these estimates should be treated with caution.

In terms of the changes in the effects of English language proficiency on labour force status between 1986 and 1996, the most notable change is that for lone mothers with poor English there was a fall in the probability of full-time employment of 13.1 percentage points. While there has been an increase in part-time employment of 4.9 percentage points, the total employment rate for lone mothers with poor English proficiency is estimated to have fallen by 5.2 percentage points.

### ***Decomposition of changes in probabilities of labour force status***

Within the statistical framework used in this paper, the change in the probability of being in any particular labour force status between 1986 and 1996 can be attributed to one of two sources. First, changes in the average characteristics of the lone or couple mother populations could be responsible for changes in their respective employment levels. For example, if the proportion of the lone mother population with children under four years has increased between 1986 and 1996, then the mix between part-time and full-time employment would be expected to change, with increases in part-time relative to full-time employment. Second, there may be changes between 1986 and 1996 in the determinants of labour force status. That is, the extent to which the different explanatory variables have an impact on employment status (measured by the estimated coefficients) may have changed.<sup>15</sup>

It is possible to use the estimates of the determinants of labour force status for 1986 and 1996 to decompose the changes in labour force status over that period into two components—the part due to changes in characteristics and the part due

---

15. It is also possible to decompose the causes of the differences in labour force status of lone and couple mothers at a given point in time. A decomposition of the differences in employment rates of lone and couple mothers for 1996 can be found in Gray, Qu, de Vaus and Millward (2002).

to changes in coefficients. This is achieved as follows. Taking lone mothers as an example, the probability of being in each labour force status is calculated using the coefficients and sample characteristics for lone mothers for 1986 and 1996. These are described as the 1986 and 1996 base case probabilities respectively. The difference in the 1996 base case probabilities and what the probability would have been in if lone mothers in 1996 had the same characteristics as lone mothers in 1986 indicates the extent to which changes in the probability of employment is due to changes in characteristics of couple mothers. The remainder of the change in the probability of being in the respective labour force states is due to changes in coefficients (also termed “determinants”).

This methodology is an extension of the Oaxaca decomposition to non-linear models and is similar to the decomposition method proposed by Even and Macpherson (1993) for the case of a binary choice model. A detailed description of how the decompositions were undertaken is provided in Appendix D. The results of the decompositions are presented in Table 3.

	<b>Full-time employed</b>	<b>Part-time employed</b>	<b>Unemployed</b>	<b>Not in labour force</b>
	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
<b>Couple mothers</b>				
1986 base case probabilities	20.9	26.1	4.0	49.0
1996 base case probabilities	24.3	33.1	3.7	38.9
Change in characteristics	1.5	2.8	-0.7	-3.6
Change in coefficients (determinants)	1.8	4.3	0.5	-6.6
<b>Lone mothers</b>				
1986 base case probabilities	21.6	14.4	7.7	56.9
1996 base case probabilities	21.2	24.3	10.1	44.5
Change in characteristics	1.1	0.5	-0.3	-1.3
Change in coefficients (determinants)	-1.5	9.4	3.2	-11.1

*Notes:* The base case employment probabilities for 1986 and 1996 are calculated using the respective coefficients and sample characteristics for 1986 and 1996. A detailed description of the decompositions is provided in Appendix D. The sum of the change in characteristics and change in coefficients may differ slightly from the change in the base case probabilities between 1986 and 1996 as a result of rounding.  
*Source:* Calculations based on Appendix Tables B1, B2, C1, C2, C3 and C4.

For couple mothers, the increase in full time employment between 1986 and 1996 of 3.4 percentage points was generated by a combination of changes in the characteristics (1.5 percentage points) and changes in the determinants of labour force status (1.8 percentage points). The increase in part time employment of 7.0 percentage points was also generated by changes in characteristics and changes in determinants (2.8 and 4.3 percentage points respectively). There was very little change in the proportion of couple mothers predicted to be unemployed between 1986 and 1996.

The results for lone mothers are very different, with very little change in each labour force status being due to changes in the characteristics of the lone mother population. Rather, the changes in labour force states were overwhelmingly the result of changes in the effects of determinants of each labour force status. For example, virtually none of the ten-percentage point increase in part-time employment for lone mothers was due to changes in characteristics — it was almost entirely due to changes in determinants.

## Concluding comments and policy implications

Over the last twenty years there has been a substantial increase in the proportion of lone mothers employed part-time, while the proportion employed full-time is much the same in 2002 as it was in 1983. The experience of couple mothers is quite different, with both full-time and part-time employment increasing at similar rates. The net effect is that both lone and couple mothers have had similar

increases in overall employment rates but that the nature of the growth in employment has been different among the lone and couple mother populations.

In order to explore the reasons for the different experiences of Australian lone and couple mothers, models of the determinants of labour force status in 1986 and 1996 have been estimated. These estimates have been used to isolate how the determinants of labour force status have changed. For lone mothers there was a fall in full-time employment across virtually all the family compositions (age and number of children) examined. In contrast, there was an increase in part-time employment across all family compositions, but especially among those with older children.

In terms of educational attainment, for lone mothers the biggest falls in full-time employment were for those with higher levels of educational attainment. Correspondingly, the more highly educated lone mothers also experienced the biggest increases in part-time employment. This differs from the results for couple mothers, for whom there was no clear relationship between level of educational attainment and change in labour force status between 1986 and 1996.

The estimates are used to decompose the sources of the changes in labour force status of lone and couple mothers, between 1986 and 1996, into the part due to changes in the characteristics of the lone mother population and the part due to changes in the determinants of labour force status. The results of this decomposition are striking. Virtually none of the increase in part-time employment of lone mothers can be explained by changes in the average characteristics of the lone mother population. This finding eliminates changes in characteristics as an explanation. The explanation must therefore lie in changes in the determinants of labour force status. For couple mothers the changes in labour force status between 1986 and 1996 are generated both by changes in the characteristics of the population and by changes in the determinants of labour force status.

While the analysis in this paper is not able to disentangle the exact reasons why the determinants of employment for lone mothers have changed, some explanations appear more likely than others. Between 1986 and 1996 there have been changes to the income support system that have made part-time employment more financially attractive. Changes include increases in the real value of the Sole Parent Pension and increases in earnings disregards of child related income support payments and availability of rent assistance and other concessions (Stanton and Feury 1995; Whiteford and Angenent 2001).<sup>16</sup>

However, these changes do not appear to have been of sufficient magnitude to fully explain the changes in lone mothers' labour force status over this period. Interestingly, the largest changes to the financial incentives of being in part-time employment occurred over the period 1996 to 2002 whereas there were increases in part-time employment over the whole period.<sup>17</sup>

---

16. Another factor which may have made part-time work more attractive was the introduction of the Child Support Scheme in 1988. This scheme regulates the payment of child maintenance payments by non-resident parents. The amount of child support payments received decreases once the mother's earnings cross a threshold amount (in the 1996-97 financial year this amount was \$36,130) (Child Support Agency 2003). This is likely to act as a further disincentive to working full-time. However, the disincentive to full-time work generated by the child-support scheme is likely to be relatively small, given that only about half of the mothers receiving an income support payment receive any child support from the non-resident parent (ABS 1997; Birrell and Rapson 1998).

17. Relevant changes over the period 1996 to 2002 include increases in the real value of income support payments and child related payments as well as increases in the earnings disregards and a reduction in the rate of withdrawal of benefits (the taper rate) (Whiteford and Angenent 2001).

Given that the changes to the income support system seem unlikely to explain all of the changes in labour force status other factors must also play a role. Another potential explanation for the rapid growth in part-time employment among lone mothers is that an increasing proportion of the additional jobs created between 1986 and 1996 have been part-time.<sup>18</sup> The growth in part-time employment has been particularly strong in industries and occupations which have a disproportionate number of female employees (ABS 2001; ABS 2002: 132). However, this explanation does not account for the fact that for couple mothers there was a similar rate of growth in both part-time and full-time employment. It appears that there is something about lone and couple mothers themselves or their access to jobs that is contributing to these different patterns of employment growth.

Given that mothers with higher levels of education will, on average, have more job opportunities, the finding that lone mothers with higher levels of educational attainment experienced the largest falls in full-time employment but the largest increases in part-time employment suggests that there may be an element of choice in reducing the hours of work. Further support of this hypothesis is provided by the fact that lone mothers with the highest level of educational attainment (tertiary qualification) had a fall in the total employment rate between 1986 and 1996.

The finding that the increase in employment for lone mothers is larger amongst women with school age children, whereas for couple mothers the increases is larger for women with pre-school age children suggests that the extra parenting demands placed upon lone mothers makes it more difficult for those with young children to be in paid employment. However, once the children are at school it becomes easier for lone mothers to move to part-time employment.

Another possible explanation that is consistent with the pattern of employment growth for lone mothers is that, on average, lone mothers have always been more likely than couple mothers to prefer full-time employment. This is plausible given that lone mothers usually rely on only one income (although many receive child support payments). If increasingly lone mothers have been unable to find full-time employment (that is they face a demand constraint), the rising levels of part-time employment will be reflecting in increasing rates of underemployment amongst lone mothers. Unfortunately the data necessary to test this hypothesis is not available. However, we can get some indications by examining the extent to which lone mothers who are working part-time would prefer to be working full-time. A suitable data set is the Household, Income and Labour Dynamics in Australia (HILDA) survey the first wave of which was collected in 2001. According to the HILDA data, of the lone mothers who are employed part-time, 19.7 per cent would prefer to be working full-time as compared to just 7.6 per cent of couple mothers.<sup>19</sup>

While this paper has provided some evidence on the reasons for the changes in employment patterns for lone and couple mothers, further research is needed to clarify why these changes have occurred. This information is important when considering ways in which the design of the income support system can be improved in a world in which part-time employment of lone mothers is becoming increasingly common.

---

18. The proportion of all new jobs which were part-time increased from 43 per cent in the 1980s to 75 per cent in the 1990s (Borland, Gregory and Sheehan 2001).

19. The HILDA question about preferred hours of work asks about the number of hours the respondent would choose to work taking into account how a change in hours of work would affect income.

## References

- ABS (various years (a)), *Labour Force Status and Other Characteristics of Families, Australia*, Catalogue No. 6224.0, Australian Bureau of Statistics, Canberra.
- ABS (various years (b)), *Labour Force, Australia, June*, Catalogue No. 6203.0, Australian Bureau of Statistics, Canberra.
- ABS (2002), *Year Book 2002*, Catalogue No. 1301.0, Australian Bureau of Statistics, Canberra.
- ABS (2001), "Special article - Full-time and part-time employment", *Labour Force Australia*, Catalogue No. 6203.0, Australian Bureau of Statistics, Canberra.
- ABS (1997), *Family Characteristics*, Catalogue No. 4442.0, Australian Bureau of Statistics, Canberra.
- Apps, P., Killingsworth, M. & Rees, R. (1996), "On the specification of labour supply and household production models", Working Paper in Economics and Econometrics No. 3000, Australian National University, Canberra.
- Beggs, J. & Chapman, B. (1990), "Search efficiency, skill transferability and immigrant unemployment rates in Australia", *Applied Economics*, 22(2), 249-60.
- Birrell, B. & Rapson, V. (1998), *A Not So Perfect Match: The Growing Male/Female Divide 1986-1996*, Centre for Population and Urban Research, Monash University, Melbourne.
- Blundell, R. & MaCurdy, T. (1999), "Labor supply: A review of alternative approaches", in O. Ashenfelter and D. Card (eds), *Handbook of Labor Economics*, Volume 3A, North Holland, Amsterdam.
- Borland, J., Gregory, B. & Sheehan, P. (2001), "Inequality and economic change", in J. Borland, R.G. Gregory & P. Sheehan (eds), *Work Rich and Work Poor: Inequality and Economic Change in Australia*, Centre for Strategic Economic Studies, Victoria University, Melbourne.
- Chalmers, J. (1999), *Sole Parent Exit Study: Final Report*, Report to the Department of Family and Community Services, Canberra.
- Chapman, B., Dunlop, Y., Gray, M., Liu, A. & Mitchell, D. (2001), "The impact of children on the lifetime earnings of Australian women: Evidence from the 1990s", *Australian Economic Review*, 34(4), 373-389.
- Child Support Agency (2003), *Child Support Scheme Facts and Figures 2000-2001*, Available online from <http://www.csa.gov.au/agency/plans/ff01.htm>
- Even, W. and Macpherson, D. (1993), "The decline of private-sector unionism and the gender wage gap", *Journal of Human Resources*, 28(2), 279-296.
- Gray, M, Qu, L., de Vaus, D. and Millward, C. (2002), "Determinants of Australians mothers' employment: An analysis of lone and couple mothers", Research Paper No. 26, Australian Institute of Family Studies, Melbourne.
- Greene, W. (2000), *Econometric Analysis* 4th edition, Prentice Hall, New Jersey.
- Gregory, R. (1999), "Children and the changing labour market: Joblessness in families with dependent children", Centre for Economic Policy Research Discussion Paper No. 406, Centre for Economic Policy Research, Australian National University, Canberra.
- Gregory, R. (2002), "Can this be the promised land? Work and welfare for the modern woman", Notes to accompany the National Institutes Public Lecture, 5 June 2002, Parliament House, Canberra.
- Henderson, R., Harcourt, A. & Harper, R. (1970), *People in Poverty: A Melbourne Survey*, Cheshire, for the Institute of Applied Economic and Social Research, University of Melbourne, Melbourne.
- Hunter, B. & Gray, M. (1998), "The relative labour force status of indigenous people, 1986-96: A cohort analysis", *Australian Bulletin of Labour*, 24(3), 220-40.
- Killingsworth, M. (1983), *Labor Supply*, Cambridge University Press, Cambridge.
- Le, A. & Miller, P. (2000), "An evaluation of inertia models of unemployment", *Australian Economic Review*, 33(3), 205-220.
- Lenten, L. (2001), "The profile of labour force discouragement in Australia", *Australian Journal of Labour Economics*, 4(1), 3-177.
- McClure, P. (2000), *Participation Support for a More Equitable Society. Final report of the Reference Group on Welfare Reform*, 2000.
- Scutella, R. (2000-2001), "Labour supply estimates for married women in Australia", *Australian Journal of Labour Economics*, 4(3), 152-172.
- Shaver, S. (1998), "Poverty, gender and sole parenthood", in R. Fincher & J. Nieuwenhuysen (eds), *Australian Poverty: Then and Now*, Melbourne University Press, Melbourne.
- Stanton, D. & Fuery, M. (1995) "Developments in family payments 1983-1996", *Social Security Journal*, December, 120-154.
- Whiteford, P. (2001), "Lone parents and employment in Australia", in Millar, J. & Rowlingson, K. (eds), *Lone Parents, Employment and Social Policy: Cross National Comparisons*, The Policy Press, Bristol.
- Whiteford, P. & Angenent, G. (2001), "The Australian system of social protection: An overview", Occasional Paper Number 6, Department of Family and Community Services, Canberra.

## Appendix A. Variable definitions

**Age** measures age of the mother in years. In the public release data set, age is grouped into five year age bands. A continuous measure of age is created by using the mid-point of the age bands.

**Lone mother** is defined as a woman who has no spouse or partner usually present in the household but who forms a parent-child relationship with at least one dependent child usually resident in the household.

**Couple mother** is defined as a woman who has a spouse or partner usually present in the household and who forms a parent-child relationship with at least one dependent child usually resident in the household. A couple relationship is based on a consensual union, and is defined as two persons residing in the same household who share a social, economic and emotional bond usually associated with marriage and who consider their relationship to be a marriage or marriage-like union.

**Dependent children** is defined as all children in the household aged under 15 years or a child in the household who is aged 15 to 19 years and is a full-time student. The Census data do not record the exact relationship between a dependent child and their 'mother'. Since we restrict our sample to women who have given birth to a child, we exclude a small number of mothers who have only step, adopted or fostered child(ren). However, the impact of this restriction will be very minimal because the number of women with only step, adopted or fostered child(ren) is quite small.

**Youngest child 0 to 4 years** is set to one if the age of the youngest dependent child is 0 to 4 years, and zero otherwise.

**Youngest child 5 to 11 years** is set to one if the age of the youngest dependent child is 5 to 11 years, and zero otherwise.

**Youngest child 12 to 14 years** is set to one if the age of the youngest dependent child is 12 to 14 years, and zero otherwise.

**Youngest child 15 to 19 years** is set to one if the age of the youngest dependent child is 15 to 19 years, and zero otherwise.

**Having one or more additional child aged 0 to 4 years** is set to one if has two or more children aged 0 to 4 years of age, and zero otherwise.

**Having one or more additional children aged 5 to 11 years** is set to one if the respondent has two or more children aged 5 to 11 years or has a youngest child aged 0 to 4 years and one child aged 5 to 11 years, and zero otherwise.

**Having 4 or more children** is set to one if has four or more children, and zero otherwise.

**Degree/diploma** is set to one if the respondent's highest educational qualification is a higher degree, a post-graduate diploma, bachelor degree, under-graduate diploma or an associate diploma, and zero otherwise.

**Vocational** is set to one if the respondent's highest educational qualification is a skilled vocational or basic vocational qualification, and zero otherwise. Respondents who reported having a post-secondary qualification but who "inadequately described" the qualification are coded as having a vocational qualification. Estimates of the model including "inadequately described" as a separate qualification revealed that there was no difference in the estimated effects of having a vocational and an "inadequately described" qualification meaning that they can legitimately be combined.

**No post-secondary qualification and left school aged 17 years or older** is set to one if the respondent has no post-secondary qualification and left school aged 17 years or older, and zero otherwise.

**No post-secondary qualification and left school aged 15 or 16 years** is set to one if the respondent has no post-secondary qualification and left school aged 15 or 16 years of age, and zero otherwise.

**No post-secondary qualification and left school aged 14 years or less** is set to one if the respondent has no post-secondary qualification and left school aged 14 years or less or never attended school, and zero otherwise.

**Capital city** is set to one if the respondent lived in a capital, and zero otherwise. The only exception is that Tasmania, Northern Territory and Australian Capital Territory are coded as being capital city. It is necessary to do this since the public release data set includes these States and Territories as single areas.

**Speak English only** is set to one if the respondent does not speak a language other than English at home and zero otherwise.

**Good spoken English** is set to one if the respondent speaks a language other than English at home and speaks English very well or well and zero otherwise.

**Poor spoken English** is set to one if the respondent speaks a language other than English at home and speaks English not well or not at all and zero otherwise.

**Partner's income:** is partner's weekly pre-tax income from all sources. In the census, income data are collected using income brackets. A continuous income variable is constructed using the mid-point of the income bracket. The value assigned to the highest income category is 1.5 times the lower bound of this category. For a small number of couple mothers, their partner's income was negative and coded as zero in the analysis. Also, there were a few couple mothers (3.1 per cent or 556 couple mothers) whose partners were temporarily absent at the census night.

## Appendix B. Descriptive Statistics

**Table B1. Descriptive statistics, 1986 Census**

	Couple mothers		Lone mothers	
	Mean	Std dev	Mean	Std dev
Full-time employed	0.21	0.41	0.22	0.41
Part-time employed	0.27	0.44	0.14	0.35
Unemployed	0.04	0.19	0.07	0.26
Not in the labour force	0.48	0.5	0.58	0.49
Age of youngest child 0-4 years	0.43	0.5	0.33	0.47
Age of youngest child 5-11 years	0.33	0.47	0.36	0.48
Age of youngest child 12-14 years	0.14	0.35	0.19	0.39
Age of youngest child 15-19 years	0.09	0.29	0.12	0.32
Two or more children aged 0-4 years	0.15	0.35	0.06	0.24
Additional children aged 5-11 years	0.36	0.48	0.24	0.43
Have 4 or more children	0.16	0.37	0.17	0.37
Age	36.01	7.81	35.48	8.49
Diploma or higher degree	0.11	0.32	0.08	0.28
Vocational qualification	0.17	0.38	0.14	0.35
No post-school qualification and left school at 17 years or older	0.13	0.34	0.11	0.32
No post-school qualification and left school at 15 or 16 years	0.46	0.5	0.54	0.5
No post-school qualification and left school at 14 years or younger	0.12	0.33	0.13	0.33
Speak English only	0.84	0.36	0.91	0.28
Speak English well	0.12	0.32	0.07	0.25
Speak English not well	0.04	0.19	0.02	0.14
Indigenous	0.01	0.09	0.02	0.16
Major urban	0.62	0.49	0.65	0.48
Born in Australia	0.72	0.45	0.77	0.42
Arrived in Australia more than 10 years ago	0.21	0.41	0.18	0.39
Arrived in Australia within previous 5 to 10 years	0.04	0.19	0.02	0.14
Arrived in Australia within previous 5 years	0.03	0.17	0.02	0.15
Fully own house	0.27	0.44	0.18	0.38
Purchasing house	0.53	0.5	0.24	0.43
Renting house	0.2	0.4	0.58	0.49
Partner's annual income (\$000)	22.88	12.75		

Source: 1986 Census one percent sample file.

**Table B2. Descriptive statistics, 1996 Census**

	Couple mothers		Lone mothers	
	Mean	Std dev	Mean	Std dev
Full-time employed	0.24	0.43	0.21	0.41
Part-time employed	0.33	0.47	0.24	0.43
Unemployed	0.04	0.19	0.1	0.3
Not in the labour force	0.39	0.49	0.45	0.5
Age of youngest child 0-4 years	0.43	0.49	0.35	0.48
Age of youngest child 5-11 years	0.33	0.47	0.37	0.48
Age of youngest child 12-14 years	0.13	0.34	0.14	0.35
Age of youngest child 15-19 years	0.12	0.32	0.14	0.34
Two or more children aged 0-4 years	0.13	0.34	0.07	0.26
Additional children 5-11 years	0.35	0.48	0.26	0.44
Have 4 or more children	0.13	0.34	0.13	0.34
Age	37.43	7.47	36.33	8.58
Diploma or higher degree	0.24	0.43	0.17	0.37
Vocational qualification	0.11	0.31	0.09	0.29
No post-school qualification and left school at 17 years or older	0.21	0.41	0.2	0.4
No post-school qualification and left school at 15 or 16 years	0.39	0.49	0.45	0.5
No post-school qualification and left school at 14 years or younger	0.06	0.23	0.09	0.28
Speak English only	0.84	0.37	0.89	0.31
Speak English well	0.13	0.34	0.08	0.27
Speak English not well	0.03	0.18	0.03	0.16
Indigenous	0.01	0.11	0.04	0.2
Major urban	0.61	0.49	0.59	0.49
Born in Australia	0.72	0.45	0.77	0.42
Arrived in Australia 10 or more years ago	0.18	0.39	0.17	0.37
Arrived in Australia within previous 5 to 10 years	0.05	0.22	0.03	0.17
Arrived in Australia within previous 5 years	0.04	0.2	0.03	0.17
Fully own house	0.31	0.46	0.15	0.36
Purchasing house	0.47	0.5	0.23	0.42
Renting house	0.22	0.41	0.61	0.49
Partner's weekly income (\$)	707	509.98		

Source: 1996 Census one percent sample file.

## Appendix C. Coefficient Estimates

Table C1. Logit estimates of probability of labour force status, couple mothers, 1986

	Part-time		Unemployment		Not in labour force	
	Coef	T-stat	Coef	T-stat	Coef	T-stat
Youngest dependent child 0-4 years	0.5372	4.38	1.0117	3.48	1.7166	14.72
Youngest dependent child aged 5-11 years	0.3651	3.64	0.8417	3.16	0.7969	8.16
Youngest dependent child aged 12-14 years	0.1465	1.47	0.5165	1.88	0.3697	3.81
Has two or more children aged 0-4 years	0.4089	3.58	0.4807	2.73	0.8975	8.94
Has additional children aged 5-11 years	0.3858	5.76	0.6382	5.4	0.4477	7.22
Has 4 or more children	-0.0533	-0.66	0.1559	1.03	0.1488	2.02
Age	-0.0123	-0.37	-0.2007	-3.68	-0.2339	-8.35
Age squared	0.0003	0.69	0.0023	3.02	0.0034	9.39
Vocational qualification	0.5209	5.61	0.5291	2.37	0.6881	7.19
No post-secondary qualification and left school at 17 or older	0.0083	0.08	0.2153	0.93	0.7982	8.01
No post-secondary qualification and left school at 15 or 16 years	0.3950	4.68	0.8924	4.47	1.3119	15.4
No post-secondary qualification and left school at 14 or younger	0.3307	2.84	1.0276	4.3	1.4926	13.68
Good spoken English	-0.5646	-5.8	0.0341	0.2	-0.2077	-2.4
Poor spoken English	-0.8803	-4.53	0.6841	2.95	0.1501	1.07
Indigenous	0.3270	0.68	1.1328	2.28	1.2169	3.14
Major urban	0.1029	1.74	0.0183	0.16	-0.0579	-1.05
Arrived in Australia more than 10 years ago	-0.1347	-1.82	-0.0279	-0.19	-0.2059	-2.95
Arrived in Australia 5 to 10 years ago	-0.3787	-2.57	0.2710	1.19	-0.4953	-3.75
Arrive in Australian within last 5 years	-0.1454	-0.79	0.8775	3.76	-0.0215	-0.14
Purchasing	-0.0196	-0.3	0.1997	1.32	-0.3085	-5.02
Renting	-0.2093	-2.3	0.9963	6.14	0.0968	1.21
Partner's weekly income	0.0563	7.72	-0.0111	-0.8	0.0667	9.79
Partner's weekly income squared	-0.0006	-5.39	0.0000	0.19	-0.0007	-6.83
Constant	-1.2940	-1.97	0.4213	0.4	1.5787	2.8
Number of observations		12,497				
Pseudo R-squared		0.0869				
Model chi-square		2,514				

Table C2. Logit estimates of probability of labour force status, lone mothers, 1986

	Part-time		Unemployment		Not in labour force	
	Coef	T-stat	Coef	T-stat	Coef	T-stat
Youngest dependent child aged 0-4 years	1.6769	4.47	0.9074	1.73	1.6980	5.58
Youngest dependent child aged 5-11 years	1.0768	3.55	0.8591	1.94	1.1527	4.76
Youngest dependent child aged 12-14 years	0.5225	1.75	0.5218	1.19	0.6678	2.86
Has two or more children aged 0-4 years	-0.0071	-0.01	1.2468	1.95	1.1223	2.05
Has additional children aged 5-11 years	0.2589	1.06	0.3924	1.31	0.5465	2.75
Has 4 or more children	0.5280	1.85	0.6877	1.91	0.8174	3.56
Age	0.0772	0.78	-0.2924	-2.82	-0.2612	-3.63
Age squared	-0.0006	-0.5	0.0034	2.46	0.0034	3.67
Vocational qualification	-0.5359	-1.81	-0.4103	-0.92	0.9772	3.3
No post-secondary qualification and left school at 17 or older	-0.6748	-1.96	-0.1452	-0.32	1.1248	3.58
No post-secondary qualification and left school at 15 or 16 years	0.2967	1.18	0.4700	1.25	2.0691	7.57
No post-secondary qualification and left school at 14 or younger	-0.4795	-1.17	0.5074	1.07	2.3999	7.23
Good spoken English	-0.2039	-0.52	0.6643	1.64	0.2750	0.9
Poor spoken English	-0.7839	-0.67	1.2364	1.57	0.8750	1.41
Indigenous	1.1492	1.6	0.9375	1.25	0.1184	0.18
Major urban	-0.4697	-2.5	-0.4242	-1.78	-0.1584	-1.04
Arrived in Australia more than 10 years ago	0.3502	1.51	0.8101	2.89	0.0162	0.08
Arrived in Australian within last 10 years	0.3993	0.83	0.5565	1.02	-0.1590	-0.4
Purchasing	-0.1368	-0.56	-0.4309	-1.09	-0.7685	-3.75
Renting	-0.2904	-1.19	0.4713	1.35	-0.0761	-0.39
Constant	-2.9385	-1.49	3.5307	1.71	3.1308	2.15
Number of observations		1,706				
Pseudo R-squared		0.1270				
Model chi-square		481				

**Table C3. Logit estimates of probability of labour force status, couple mothers, 1996**

	Part-time		Unemployment		Not in labour force	
	Coef	T-stat	Coef	T-stat	Coef	T-stat
Youngest dependent child 0-4 years	0.6878	6.67	0.1721	0.75	1.6627	15.14
Youngest dependent child aged 5-11 years	0.3638	4.3	0.2161	1.08	0.8006	8.56
Youngest dependent child aged 12-14 years	0.0562	0.66	-0.0617	-0.29	0.3125	3.28
Has two or more children aged 0-4 years	0.4155	4.04	0.6338	3.5	1.0257	10.56
Has additional children aged 5-11 years	0.3492	5.97	0.5290	4.51	0.3981	6.74
Has 4 or more children	-0.0533	-0.68	0.1713	1.1	0.4876	6.47
Age	-0.0211	-0.67	-0.2607	-5.12	-0.2105	-7.14
Age squared	0.0003	0.77	0.0029	4.22	0.0028	7.31
Vocational qualification	0.5710	6.87	0.6621	3.48	0.9492	10.39
No post-secondary qualification and left school at 17 or older	0.2635	3.78	0.6030	3.84	1.0836	14.66
No post-secondary qualification and left school at 15 or 16 years	0.3722	6.16	0.8396	5.78	1.3562	20.29
No post-secondary qualification and left school at 14 or younger	0.4419	3.44	1.0119	4.54	1.7475	14.62
Good spoken English	-0.4290	-5.25	0.3118	1.95	-0.0211	-0.26
Poor spoken English	-0.7410	-3.5	1.2236	5.22	0.6963	4.55
Indigenous	-0.0809	-0.31	0.0564	0.15	-0.1256	-0.52
Major urban	0.0124	0.24	-0.3106	-2.84	-0.0790	-1.51
Arrived in Australia more than 10 years ago	-0.2317	-3.57	-0.0287	-0.2	-0.1691	-2.5
Arrived in Australia 5 to 10 years ago	-0.5159	-4.44	0.0331	0.16	-0.2611	-2.33
Arrive in Australian within last 5 years	-0.2008	-1.25	0.9949	4.53	0.5367	3.82
Purchasing	-0.1901	-3.56	-0.1998	-1.53	-0.4815	-8.5
Renting	-0.2290	-2.93	0.6635	4.76	0.2387	3.24
Partner's weekly income	0.0006	4.26	-0.0026	-8.47	-0.0003	-1.95
Partner's weekly income squared	-1.16E-07	-1.87	1.06E-06	7.81	2.65E-07	4.14
Constant	-0.2102	-0.34	3.5953	3.64	2.2871	3.93
Number of observations	13,971					
Pseudo R-squared	0.1002					
Model chi-square	3,359					

**Table C4. Logit estimates of probability of labour force status, lone mothers, 1996**

	Part-time		Unemployment		Not in labour force	
	Coef	T-stat	Coef	T-stat	Coef	T-stat
Youngest dependent child 0-4 years	1.0282	4.21	0.5510	1.69	1.9833	8.03
Youngest dependent child aged 5-11 years	0.8363	4.57	0.5243	2.03	1.2281	6.23
Youngest dependent child aged 12-14 years	0.5786	3.07	0.5102	1.92	0.8620	4.21
Has two or more children aged 0-4 years	1.7913	2.37	2.1468	2.76	2.7414	3.75
Has additional children aged 5-11 years	0.7028	4.19	0.6136	2.92	0.8662	5.32
Has 4 or more children	0.0973	0.47	0.2088	0.77	0.7622	3.92
Age	-0.1796	-2.76	-0.2588	-3.3	-0.3338	-5.39
Age squared	0.0023	2.8	0.0029	2.81	0.0043	5.32
Vocational qualification	0.2235	1.13	0.3909	1.3	0.5044	2.24
No post-secondary qualification and left school at 17 or older	-0.0173	-0.1	0.5042	1.99	0.9132	4.84
No post-secondary qualification and left school at 15 or 16 years	0.4200	2.83	0.9722	4.32	1.4723	8.86
No post-secondary qualification and left school at 14 or younger	0.1776	0.58	1.2642	3.57	2.0807	7.46
Good spoken English	-0.1369	-0.55	1.0480	3.72	0.5793	2.51
Poor spoken English	2.4494	2.21	4.0039	3.69	4.0730	3.89
Indigenous	0.0496	0.14	-0.6427	-1.38	-0.0587	-0.18
Major urban	-0.4528	-3.7	-0.5493	-3.47	-0.4711	-3.88
Arrived in Australia more than 10 years ago	0.1944	1.24	-0.0071	-0.03	0.0102	0.06
Arrived in Australia 5 to 10 years ago	-0.1453	-0.38	-0.4187	-0.9	-0.3546	-0.98
Arrive in Australian within last 5 years	-0.6562	-1.37	-0.1468	-0.31	0.3497	0.93
Purchasing	-0.4933	-2.98	-0.5326	-2.05	-0.9228	-5.22
Renting	-0.0653	-0.39	0.5416	2.3	0.1086	0.65
Constant	2.9136	2.25	3.5551	2.33	4.7168	3.86
Number of observations	2,960					
Pseudo R-squared	0.1358					
Model chi-square	1,016					

## Appendix D. Detailed description of the decomposition

This appendix presents mathematically the decompositions presented in Section 4 of the paper. We present the decomposition in detail for lone mothers. The decomposition for couple mothers is very similar. Define the probability that lone mother  $i$  is in labour force state  $j$  in year  $k=\{1986,1996\}$  as:

$$Prob(LFS_i^k = j) = \frac{e^{\beta_j^k x_i^k}}{\sum_{m=1}^4 e^{\beta_m^k x_i^k}} \quad (1)$$

where  $\beta_j^k$  is a vector of estimated coefficients for labour force state  $j$  for lone mothers in year  $k$ ,  $x_i^k$  is a vector of characteristics of lone mothers in year  $k$ . The average probability of lone mothers being in labour force state  $j$  in year  $k$  is derived as:

$$\hat{LFS}(j)^k = \frac{1}{N_k} \sum_{i=1}^N Prob(LFS_i^k = j) \quad (2)$$

where  $\hat{LFS}(j)^k$  is the average probability of being in labour force state  $j$  for lone mothers in year  $k$  and  $N_k$  is the number of lone mothers in year  $k$ .

The probability of lone mother  $i$  being in labour force state  $j$  in 1986 if they had the lone mothers coefficients for 1996 as:

$$Prob(LFS_i^0 = j) = \frac{e^{\beta_j^{96} x_i^{86}}}{\sum_{m=1}^4 e^{\beta_m^{96} x_i^{86}}} \quad (3)$$

The average probability of lone mothers being in labour force state  $j$  in 1986 assuming they had the 1996 coefficients is derived as:

$$\hat{LFS}(j)^0 = \frac{1}{N_{86}} \sum_{i=1}^{86} Prob(LFS_i^0 = j) \quad (4)$$

The difference in the predicted probability of lone mothers being in labour force state  $j$  between 1986 and 1996 can be separated into the component due to difference in coefficients for the two years and the component due to changes in the characteristics of the lone mother population between 1986 and 1996. The following identity shows this decomposition:

$$\hat{LFS}(j)^{96} - \hat{LFS}(j)^{86} = \underbrace{(\hat{LFS}(j)^{96} - \hat{LFS}(j)^0)}_{\text{Characteristics}} + \underbrace{(\hat{LFS}(j)^0 - \hat{LFS}(j)^{86})}_{\text{Coefficients}} \quad (5)$$

An analogous procedure can be used to calculate the decomposition for couple mothers.