The Influence of Children on Female Wages: Better or Worse in Australia?

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No jointly-authored works.

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Professor Mark Western as primary advisor contributed to the development of my research questions and scope of my empirical contribution. Mark also introduced me to the strengths and weaknesses of the various modelling strategies used to analyse panel survey data and provided advice on the interpretation of regression coefficients derived from these estimation methods. He also helped develop an outline of the thesis and provided editorial feedback to improve the quality of my writing.

Professors Janeen Baxter and Gillian Whitehouse, as associate advisors, guided the development of the research questions, directed me to literature on women's employment and wages, offered suggestions on the organisation of arguments in each chapter and provided editorial feedback on my writing.

The statistical analysis was undertaken independently and I take full responsibility for any errors or omissions.

Statement of Parts of the Thesis Submitted to Qualify for the Award of Another Degree

None.

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Western, M., Baxter, J. Pakulski, J., Tranter, B., Western, J., van Egmond, M., Chesters, J., Hosking, A., O'Flaherty, M., & van Gellecum, Y. (2007). Neoliberalism, inequality and politics: The changing face of Australia. *Australian Journal of Social Issues*, *42*, 401 - 408.

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Abstract

Australian women's participation in paid work has been and continues to be strongly influenced by gendered patterns of parental care. This thesis examines how children structure another dimension of economic stratification in Australia, hourly wages. Previous studies from the United States and Great Britain show women who care for children have lower wages than their childless counterparts and that this motherhood gap in pay is partly explained by mothers' interruptions to employment and movement into part-time jobs. Outside the US and Britain fewer studies of the motherhood gap in pay have been undertaken. Compared to these two countries, Australia has lower maternal employment rates and higher rates of part-time work. These features may increase wage disparities between mothers and childless women in the Australian labour market. Australia, unlike Britain and the United States, has a history of centralised wage regulation, leading to a comparatively narrower wage distribution and a higher minimum wage. These institutional features may offer protection against downward wage mobility.

This thesis investigates how motherhood influences the hourly wages of Australian women using panel data. Previous Australian research has documented static wage disparities, relying on cross-sectional data. My analysis draws on the first six waves of the Household, Income and Labour Dynamics in Australia (HILDA) survey (2001-2006), a large, nationally representative panel survey. The thesis is comprised of three studies.

First, I investigate the overall motherhood gap in pay in Australia in 2001. In aggregate, the mean wage of women with children is equal to that of childless women. After imputing a potential wage for mothers who are not employed, I show that the overall motherhood gap in pay would be considerably wider in Australia were fewer mothers to exit the labour force. This is because mothers without tertiary qualifications are less likely to be employed than mothers with a certificate, diploma or degree.

Second, I use the panel design of HILDA to estimate female wage equations using fixed-effects regression. Controlling for differences in observed human capital, part-time work and unobserved heterogeneity, I find each child lowers wages by 6%. The analysis also reveals that mothers' propensity to work part-time does not explain any of the Australian motherhood gap in pay. After incorporating detailed controls for time-varying job characteristics, I find that part-time wages are 14% higher than full-

time wages. On average, the pay premium for part-time work more than offsets the pay penalty associated with one or two children.

Third, I narrow my focus to Australian women experiencing a birth between 2001 and 2006, assessing whether the wage premium for part-time work extends to transitions at this point in the lifecourse. I investigate patterns of wage growth among mothers returning to employment within 3 years of a birth. My results reveal that Australian mothers who transition from full-time to part-time hours have significantly higher wage growth than mothers who remain in full-time employment.

Taken together, my results suggest women's part-time employment has a distinctive form in Australia. I find no evidence Australian mothers' part-time employment constitutes a low-paid segment of the labour force. Isolating a causal explanation for the comparatively high wages of Australian women's part-time employment is difficult, though two factors are likely to be important. First, Australian mothers' participation in part-time employment rapidly increased during the 1970s and 1980s, a period when wages were largely regulated through collective agreements. Although wage determination has become more deregulated since the mid-1980s, the principle that part-time employees should receive pro rata wages does not appear to have been contested by Australian employers. This could be because demand for labour in feminised industries has remained strong. Second, decisions to remain attached to employment around childbirth could possibly be structured by the availability of part-time work. Rather than transition into a lower waged part-time job, Australian mothers may exit the labour force drawing on supports for stay-at-home mothers in the Australian family payment and taxation system. In the longer term, mothers who continue in part-time work may have fewer opportunities for upward mobility and flatter wage trajectories. As additional waves of HILDA become available, such divergences in wage trajectories will be able to be empirically investigated.

This study examines female wages in a period of strong economic growth and low unemployment. Part-time employment may not be positively associated with wages in a macroeconomic context of lower demand for labour and rising unemployment. An interesting avenue for future research would be to compare how transitions into part-time work influence female wages across periods of strong and weak labour market growth.

Keywords

motherhood wage penalty, female wages, mothers' employment, part-time work, Australian labour market, HILDA

Australian and New Zealand Standard Research Classifications (ANZSRC)

160301 Family and Household Studies 60%, 140211 Labour Economics 20%, 160805 Social Change 20%

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List of abbreviations

ABS	Australian Bureau of Statistics
AFQT	Armed Forces Qualification Test
AIFS	Australian Institute of Family Studies
AIHW	Australian Institute of Health and Welfare
ASCO	Australian Standard Classification of Occupations
ANZSIC	Australian and New Zealand Standard Industrial Classification
AWIRS	Australian Workplace Industrial Relations Survey
BHPS	British Household Panel Survey
CI	Confidence interval
ECHP	European Community Household Panel Survey
FHCSIA	Department of Families, Housing, Community Services and Indigenous Affairs, Australian Government
FMLA	Family and Medical Leave Act
HILDA	Household, Income and Labour Dynamics in Australia Survey
HREOC	Human Rights and Equal Opportunities Commission
IMR	Inverse Mill's Ratio
LIS	Luxembourg Income Survey
LSAC	Longitudinal Survey of Australian Children
MIAESR	Melbourne Institute of Applied Economic and Social Research
NCDS	National Child Development Survey
NESPD	New Earnings Survey Panel Dataset
NILF	Not in Labour Force (neither employed nor unemployed)
NSFH	National Survey of Families and Households
NSHD	National Survey of Health and Development
NLSY	National Longitudinal Survey of Youth (1979)

NLSYW	National Longitudinal Survey of Young Women (1969)
NZ	New Zealand
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Squares
PC	Productivity Commission, Australian Government
PSID	Panel Survey of Income Dynamics
SLID	Survey of Labour and Income Dynamics
SCQ	Self-complete questionnaire (HILDA survey instrument)
UK	United Kingdom
US	United States
WERS	British Workplace Employee Relations Survey

Chapter 1: Introduction

Over the last half-century women's involvement in paid employment has risen dramatically, both deriving from and contributing to larger social transformations in gender-role values, family dynamics, labour markets and public institutions. Arguably, the most remarkable aspect of this shift has been the massive increase in mothers' participation in paid employment. In Australia, the employment rate of coupled mothers with a dependent child aged less than 5 years increased from 28% in 1983 to 52% in 2009[1] (Australian Bureau of Statistics (ABS), 1983, 2009a). Mothers' employment has also increased in many other developed countries, including the US (Boushey, 2008; Rindfuss, Brewster & Kavee, 1996), Britain (Gregg, Gutiérrez-Domènech & Waldfogel, 2007; Harrop & Moss, 1995), Canada (Organisation for Economic Cooperation and Development (OECD) 2005a, p. 70) and New Zealand (OECD, 2004a, p. 77).

Legislative reform facilitated growth in the labour force participation of mothers in many countries, including Australia (Mitchell, 1998). From the 1960s, explicit restrictions limiting married women's employment were repealed and laws prohibiting many overt and covert forms of discrimination on the basis of sex were instituted. In turn, state provisions enabling women to continue in paid employment after a birth were established (Gregg et al., 2007). Although the design of and rationale underlying work-family policies varies, most industrialised countries now support mothers' employment through a combination of job-protected maternity and parental leave and state subsidised child care (see OECD, 2007).

Underscoring the development of these legal and policy initiatives has been the diffusion of egalitarian social values and the transformation of social norms governing sexual behaviour and the family as an institution. The belief that women's principal social role is to rear children through specialisation in unpaid domestic work has diminished over time (Brooks & Bolzendahl, 2004; Scott, Alwin & Braun, 1996). In terms of the institution of the family, social norms have become more accepting of the dual-earner family and mothers' employment (Blunsdon & Reed, 2005; Brewster & Rindfuss, 2000; Inglehart & Norris, 2003; Scott et al., 1996). Contemporary sociological theorists connect these trends in men's and women's gender-role attitudes to the larger

[1] The employment rate of lone mothers with a child aged less than 5 years has remained steady. In 1989 (the earliest year these data are available), the employment rate of lone mothers with a child aged less than 5 years was 28% and in 2008 the employment rate of this same group of mothers was 27% (ABS, 1989, 2009a).

social transformation of modernisation, which has seen a rise in the significance of individual self-expression and a concomitant decline in the authority of traditional belief systems and institutions (Beck-Gernsheim, 2002; Inglehart & Norris, 2003).

Alongside these cultural and normative transformations has been fundamental change in the structure of labour markets with the transition from an industrial to a post-industrial, globally connected economy. Expansion of the service sector has created strong demand for skilled and unskilled labour across a range of jobs historically viewed as more appropriate for women (Goldin, 1990). Organisations have also turned to reduced hours and flexible forms of employment to improve efficiency and reduce labour costs in competitive environments where market transactions, communication and organisational movement increasingly take place across national borders (Hofmeister, Blossfeld & Mills, 2006). The increased availability of part-time work is likely to have attracted many mothers back into the labour force given the time and scheduling constraints women face when combining family care with paid work outside the home (Blossfeld, 1997; Goldin, 1990; Joshi, Layard & Owen, 1985). However, consensus has not yet been reached on the question of whether the growth in women's (and men's) non-standard employment has largely been driven by altered employer demand for part-time and flexible forms of work, or alternatively has been caused by changes in mothers' labour supply (Blau, Brinton & Grusky, 2006; Hosking & Western, 2008).

Structural change in the labour market, women's rising educational attainment and the enactment of anti-discrimination legislation have together greatly increased women's real wages over the latter part of the twentieth century[2] (Goldin, 1990; Gregory, Anstie, Daly & Ho, 1989). Rises in women's wages have also increased the financial costs of interruptions and this is likely to have encouraged more mothers to combine paid work with parental care (Juhn & Murphy, 1996; Leibowitz & Klerman, 1995; Mincer, 1962). Social expectations of household consumption have also changed over time as the dual-earner family has grown more prevalent (England, 2006) and as markets have increasingly supplied goods and services traditionally

[2] Throughout this thesis, the term wage is used to describe an hourly pay rate, while the term earnings is used to describe total income received in exchange for labour over a week, month or year. To avoid confusion, I apply this general rule when I summarise findings from previous studies, rather than adopt the terminology chosen by the author/s of a research paper. For example, I described findings from an analysis of weekly or monthly "wages" as an analysis of earnings and describe findings from an analysis of hourly "earnings" as an analysis of wages.

produced by women in the home (Greenwood, Seshadri & Yorukoglu, 2005)[3]. This too is likely to have encouraged more recent cohorts of women to remain in employment after they have their first child. Growth in mothers' employment, alongside increases in women's educational attainment and the greater control of fertility through reliable contraception and access to abortion, has seen women's employment come to more closely resemble that of men across the lifecourse (England, 2006).

The aim of this thesis is to contribute to debates about how women fare in the labour market at the beginning of the 21st century. Specifically, I empirically investigate how children influence female wages in Australia using recent longitudinal survey data. This is important because wage inequalities arising from women's role as primary caregiver have cumulative, long-term effects on women's individual income, women's economic autonomy within the family and the economic resources available to children in lone mother families.

Within the institution of the family, the pace of gender convergence appears to be fairly slow (England, 2006). Despite modest increases in men's time in unpaid work in the home (Bianchi, Milkie, Sayer & Robinson, 2000; Chesters, Baxter & Western, 2009) and the care of children (Bianchi, Robinson & Milkie, 2006; Bittman, 2004; Gauthier, Smeeding & Furstenberg, 2004), substantial gender differences remain in women's and men's relative contribution to unpaid work (see previous) and in the quality of mothers' and fathers' time with their families (Craig, 2006; Yeung, Sandberg, Davis-Kean & Hofferth, 2001). In Australia, men's time in unpaid domestic work, including gardening and home maintenance, remained stable from 1992 to 2006, averaging 1.6 hours per day (ABS, 2006a). Women's time in domestic work decreased by an average of 10 minutes per day to 2.9 hours per day over this same 14 year period (ABS, 2006a)[4]. On relationship breakdown mothers are still far more likely to be the primary custodian of children (de Vaus, 2004), though arguably there is now greater

[3] Another argument put forward is that rises in mothers' employment were driven by declines in men's wages throughout the 1970s and 1980s, which meant more families required two income earners (Pusey, Wilson, Turnball & Fatorre, 2003). Analysis of trends in mothers' employment by education casts doubt on this thesis. Employment grew most rapidly for mothers with high levels of education (Cotter, Hermsen & England, 2008; Harrop & Moss, 1995) and because of monogamous partner selection most of these women had highly educated spouses. Hence, mothers' employment grew most rapidly in high, not low, income households (England & Folbre, 2005; Juhn & Murphy, 1996).

[4] Domestic work excludes child care and average time in domestic work is reported for all men and women. Estimates are not reported separately for mothers and fathers. From 1992 and 2006, time spent caring for children (as a primary activity) increased by around 8 minutes per day for both men and women (ABS, 2006a). In 2006, women spent around 1 hour per day caring for children, whereas men spent 22 minutes in this activity (ABS, 2006a).

emphasis in Australian family policy on shared custody as the ideal arrangement (Chisholm, 2007). Explanations for the persistence of traditional gender-role specialisation in the family highlight ongoing gender wage disparities prior to family formation that make it more efficient for women to specialise in household production (Becker, 1981) or place women in a weaker bargaining position in negotiations over the division of unpaid work (Brines, 1994). Sociologists also argue that attitudes on gender-role specialisation appear to have changed largely in terms of the social acceptability of women's movement into the public sphere and less in terms of the social acceptability of men taking on social roles and activities traditionally assigned to women (England, 2006). In summary, the organisation of unpaid work within the home and parental care continues to be structured by gender.

Gender divisions in family care in turn influence three labour force outcomes. First, mothers are more likely than fathers to take extended family leaves or to interrupt employment to care for young children (Boushey, 2008; Callister, 2007; Han, Ruhm & Waldfogel, 2008; Moss & Korintus, 2008; Whitehouse, Diamond & Baird, 2007). Second, mothers are more likely to move into part-time employment in response to the demands of child-rearing, whereas fathers working hours largely remain unchanged or increase slightly after a child enters a family (Dermott, 2006; Kaufman & Uhlenberg, 2000; Lundberg & Rose, 2000; Paull, 2008; Sanchez & Thomson, 1997). Third, employment breaks and reduced working hours, in turn, negatively affect wages (Anderson, Binder & Krause, 2002; Avallar & Smock, 2003; Budig & England, 2001; Joshi, Paci & Waldfogel, 1999; Waldfogel, 1997a, 1998a). Other reasons motherhood might negatively affect wages is through employer discrimination, movement into a lower-paid family-friendly job and lower job productivity (Budig & England, 2001). The overall wage disparity between women with and without children is often described as the "motherhood wage gap", "motherhood wage penalty" and "family gap in pay"[5]. Previous research shows that men's wages are not negatively affected by fatherhood and this is mainly because men's employment does not change following the arrival of a new child into a household (Glauber, 2008; Lundberg & Rose, 2002).

[5] Following convention, I use the term motherhood wage gap to describe differences in the wage of childless women and mothers reported in cross-sectional analysis and the term motherhood wage penalty to describe the how wages differ between periods of childlessness and motherhood in longitudinal analysis with panel data. This recognises that the wage gap between mothers and childless women may partly arise from lower waged women's selection into motherhood.

This thesis investigates how children influence one economic outcome, the motherhood wage gap. Motherhood has been found to negatively affect female wages in several countries, including the US, Britain, Germany, Denmark and Spain (Amuedo-Dorantes & Kimmel, 2005; Anderson et al., 2002; Anderson, Binder & Krause, 2003; Avallar & Smock, 2003; Budig & England, 2001; Ellwood, Wilde & Batchelder, 2004; Felfe, 2008; Gangl & Ziefle, 2009; Molina & Montuenga, 2008; Simonsen & Skipper, 2006; Waldfogel, 1997a, 1998a). The magnitude of the overall wage penalty does appear to vary between countries. For example, Gangl and Ziefle (2009) found an overall motherhood wage penalty of 16 - 18% per child in Germany, 13% per child in Britain and 9 - 16% per child in the US[6]. Gangl and Ziefle (2009) suggest that differences in parental leave provisions might account for the wider wage penalty in Germany. Parental leave can be taken for a much longer period in Germany than the US and Britain and this could have the effect of increasing mothers' employment interruptions and heightening discrimination. In contrast, other comparative research suggests that the overall wage gap between mothers and childless women tends to be narrower in countries with longer statutory parental leave and publically provided child care (Dupuy & Fernández-Kranz, forthcoming; Gash, 2009). Hence, it is not clear how the configuration of work-family policies and labour market regulations might reduce or exacerbate the wage penalty for motherhood. The aim of this thesis is to contribute to this debate through an in-depth study of the motherhood wage penalty in Australia.

Following convention, in this thesis I use the term motherhood wage gap to describe differences in the wage of childless women and mothers reported in cross-sectional analysis and the term motherhood wage penalty to describe the how wages differ between periods of childlessness and motherhood in longitudinal analysis with panel data. This recognises that the wage gap between mothers and childless women may partly arise from lower waged women's selection into motherhood.

[6] The reason the US and German estimates are given as a range is because the overall motherhood wage penalty is derived separately for two birth cohorts.

1.1 The purpose of this thesis

The purpose of this thesis is to investigate how children influence female wages in the Australian labour market. A large volume of research on wage outcomes in Australia has decomposed the overall gender wage gap into a portion attributable to differences in observed characteristics and a portion attributable to gender differences in returns to these characteristics (Barón & Cobb-Clark, 2008; Chapman & Mulvey, 1986; Daly, Kawaguchi, Meng & Mumford, 2006; Eastough & Miller, 2004; Kee, 2006; Kidd & Shannon, 2002; Langford, 1995; Pocock & Alexander, 1999; Preston & Crockett, 1999b; Rummery, 1992; Wooden, 1999). Discussion of the causes of the gender wage gap across this literature tends to emphasise the role of occupational sex segregation together with the comparatively lower remuneration of feminised occupations. Few Australian studies have explored how the gendered division of domestic work and family care might negatively affect female wages and, in turn, contribute to the persistence of gender wage disparities. Though much of the overall gender wage gap in industrialised countries appears to be a result of occupational sex segregation (England, 2005), part of the unexplained statistical residual might be due to differences in job productivity, non-wage job amenities or employer discrimination that arises from the gendered division of family carer (Blau & Kahn, 2006). Moreover, some compositional differences between men and women, especially accrued work experience, are an outcome of women's role as primary carer. Empirical studies that focus more closely on the causes of wage inequalities among women therefore provide an important supplement to the established research strategy of the decomposition of the overall gender wage gap.

A search of the research literature produced two published studies of the motherhood wage gap in Australia (Harkness & Waldfogel, 2003; Whitehouse, 2002). Findings presented in these studies are markedly different. The first study by Whitehouse (2002) found no overall motherhood wage gap in Australia. Regression results also showed children were not negatively associated with female wages after controlling for age, education, occupation, tenure and union membership. Descriptive comparisons in the second study by Harkness and Waldfogel (2003) found that Australian mothers' wages were actually higher than childless women's. Yet after controlling for age, education, marital status and region, mothers were found to have lower wages than childless women. In subsequent chapters, I return to discuss why findings in these two earlier studies differed.

This thesis builds on these two earlier studies of the motherhood wage gap in Australia with the broad aim of adding to knowledge of the structural determinants of female wages in the Australian labour market. Three specific research questions are addressed. First, is there a motherhood wage gap in Australia in 2001? Second, can employment interruptions and part-time working hours explain the negative effect of children on female wages? Third, among Australian mothers who return to paid employment within 3 years of a birth, do transitions into part-time work result in lower wage growth?

The contribution of this thesis to knowledge of the structural determinants of female wages in Australia is fourfold. First, I publish an updated, baseline estimate of the overall motherhood wage gap in Australia using high quality labour earnings data collected in HILDA, a nationally representative survey. Detailed data on recent and usual earnings are collected in a face-to-face interview and respondents are provided with financial rewards for survey participation. The large sample and panel design of HILDA also enables analytic comparisons not possible in other Australian social science surveys. I return to describe the design of HILDA in the next section.

Second, my study moves the international research forward by considering the influence of mothers' selection out of employment when deriving national summary indicators of the overall wage disadvantage associated with childrearing. According to neoclassical economic theory, mothers' employment decisions will be influenced by the opportunity costs of an interruption. If mothers' selection out of employment is negatively correlated with wage offers, the observed motherhood wage gap will be biased towards zero (or towards a premium). By imputing the wages of mothers who are not employed, I am able to assess whether the overall motherhood wage gap is likely to widen as motherhood gaps in employment narrow.

Third, my analysis improves on two earlier Australian studies by incorporating better measures of human capital in female wage models and by utilising longitudinal methods of analysis to control for unobserved heterogeneity. Using fixed-effects regression, I examine whether there is indeed a motherhood wage penalty in Australia after accounting for the possibility that mothers and childless women differ on stable unobserved attributes that affect both fertility decisions and wages. Economic theory suggests cross-sectional estimates of the residual correlation between children and wages, such as those produced for Australian women by Harkness and Waldfogel (2003) and Whitehouse (2002), might be upwardly biased because of the omission of

controls for stable unobserved characteristics that both increase wages and decrease fertility. Examples of the characteristics thought to structure both fertility and wages include cognitive ability, career ambition and family preferences. The modelling approach I adopt mirrors that of Budig and England (2001), though the Australian panel data I have available spans a much shorter period. Like Budig and England (2001), I am not able to identify whether a significant residual association between children and female wages is caused by employer discrimination, differences in job productivity or preferences for unobserved non-pecuniary job benefits.

Fourth, through an in-depth examination of the structural correlates associated with female wage outcomes, I contribute to ongoing debates about the quality of part-time employment in Australia. From 1980 to 2000, the proportion of employed mothers with a dependent child aged up to 16 years who worked part-time has remained steady at around 60% in Australia (OECD, 2002a, p. 58). Throughout the 1980s and 1990s Australian studies showed that women who were employed part-time had lower wages than women who were employed full-time[7] (Gornick & Jacobs, 1996; Grimshaw, Whitehouse & Zetlin, 2001; Harley & Whitehouse, 2001). However, recent descriptive research reveals the wages of part-time women reached parity with full-time women at the beginning of the 21st century (Abhayaratna, Andrews, Nuch & Podbury, 2008; Preston, 2003; Rodgers, 2004). Furthermore, statistical modelling shows part-time employment now attracts significantly higher wages than full-time employment, after adjusting for differences in other job characteristics (Booth & Wood, 2008). These recent Australian findings are unusual given research from the US and Britain, also liberal welfare states with deregulated labour markets, commonly shows that part-time wages are significantly lower than full-time wages after controlling for other job characteristics (Bardasi & Gornick, 2008; Connolly & Gregory, 2008; Ermisch & Wright, 1993; Ferber & Waldfogel, 1998; Gornick & Jacobs, 1996; Hirsch, 2005; Manning & Petrongolo, 2008; McGinnity & McManus, 2007; Mumford & Smith, 2009; Waldfogel, 1997a).

This study builds on the earlier Australia research by more closely examining the immediate effects of a transition into part-time work at a key stage of the lifecourse when reduced working hours are sought to balance employment with parental care. Previous Australian research on the wage gap between part-time and full-time

[7] Grimshaw et al. (2001, p. 214), however, found that the mean wage of female part-time employees was about equal to the mean wage of female full-time employees in 1990 (Grimshaw et al., 2001, p. 214).

employment has taken a broad perspective, looking at wage disparities across the entire female workforce (Booth & Wood, 2008; Gornick & Jacobs, 1996; Grimshaw et al., 2001; Harley & Whitehouse, 2001; Preston, 2003; Rodgers, 2004) [8]. This encompasses young women who combine part-time employment with tertiary study, women who work part-time when caring for children and women who work part-time leading up to retirement. Yet part-time wages may not remain high for women at all stages of the lifecourse given that both constraints on women's labour supply and employer discrimination plausibly will change as women age.

The focus of this thesis is on female wages, which is defined as "the amount of money an individual earns for each hour he or she works" (Blau et al., 2006, pp. 97, 99). For women, measures of weekly or annual earnings conflate differences in wages, weekly work hours and annual weeks worked. This is particularly problematic when a given structural correlate is associated with wages and working hours to differing degrees. For instance, mothers with three children might have lower weekly earnings than mothers with a single child because their wages are lower (perhaps because of a more discontinuous employment history) or because working hours are shorter (perhaps because there are greater time pressures on mothers caring for more children). There are, however, concerns about the accuracy of derived wage rates given the expansion of very long full-time hours among salaried professions and managers over the past decade (Whitehouse, 2003). Long working hours might depress wage rates calculated by dividing weekly labour earnings by weekly hours worked. Yet it remains unclear whether employers' salary offers in these parts of the labour market are made with the expectation that an employee will work long hours, meaning that salaries are tied to expected productivity. An alternative argument is that long hours are a response on the part of employees who see this as a means of increasing their prospects of upward career mobility, as a form of protection against being laid off or to attract other financial rewards (e.g. irregular performance bonuses)

[8] Booth and Wood (2008, p. 119) examine wages using a sample of male and female employees aged 18 to 60 years, excluding full-time students, owner-managers and employees in the farming or fishery industries. Gornick and Jacobs (1996, p. 8) use a sample of male and female employees aged 18 to 64 years. Grimshaw et al. (2001, pp. 228 - 229) examine wages using a sample of all male and female non-managerial employees. Harley and Whitehouse (2001, p. 40) examine wages using a sample of female employees working in a business with 20 or more employees. Preston (2003) examines wages using a sample of male and female non-managerial employees, excluding those who have more than one job. Rogers (2004, pp. 237 - 238) examines wages using a sample of male and female employees aged up to 70 years, excluding persons still in school and owner-managers.

(Kuhn & Lozano, 2008). I describe how I deal with this issue in the method sections of chapters 3 and 4.

Understanding how motherhood structures women's economic outcomes is an important area of inquiry given that the rearing of the next generation of Australian children continues to be performed by women, though many of the benefits of this work accrue to society as a whole (Folbre, 1994). Gender differences in the effect of children on wages, employment and hours in paid work together contribute to inequalities in economic livelihood. In the longer term, the gendered division of care has compounding effects on women's and men's individual wealth acquisition (Warren, Rowlingson & Whyley, 2001) and retirement income (Davies, Joshi & Peronaci, 2000; Evandrou & Glaser, 2003; Rake, 2000). According to bargaining models of family organisation, wage disadvantage stemming from mothers' role as primary caregiver affects patterns of negotiation within couple relationships when partners' have conflicting preferences (Breen & Cooke, 2005) and ultimately, women's dependence on a spouse (England & Farkas, 1986). Individual and family consumption patterns are also structured by female earnings, especially in families headed by a lone mother.

This thesis does not investigate the influence of fatherhood on the wages of Australian men. Family composition has been found to influence men's wages, though the focus of much of this research is on the male wage premium for marriage. The key question in this literature is whether the marriage wage premium for men is caused by household specialisation, the more favourable treatment of married men by employers or is a consequence of partner selection (Ahituv & Lerman, 2007; Bardasi & Taylor, 2008; Birch & Miller, 2006; Cohen, 2002; Dougherty, 2006; Lincoln, 2008; Western, Hewitt & Baxter, 2005). Mixed support has been found for arguments that children have a further additive, positive effect on men's wages through household specialisation or "positive" employer discrimination (see previous and Glauber, 2008; Lundberg & Rose, 2002). Given aspects of family composition that affect the wage rates of men and women appear to differ, this thesis focuses on the influence of children on female wages.

1.2 Analytic approach

In this thesis I investigate the effect of children on women's wage in the Australian context through an empirical analysis using the HILDA survey. HILDA is an ongoing, nationally representative household panel survey funded by the Federal Government

and managed by Melbourne Institute of Applied Economic and Social Research (MIAESR), the University of Melbourne[9].

The initial HILDA sampling frame comprised all members of private dwellings in Australia in 2001, excluding those who lived in remote and sparsely populated areas (Wooden & Watson, 2007). Households were defined as "a group of people who usually reside and eat together" and were selected using a multi-stage sampling design (Wooden & Watson, 2007, p. 209). The first stage involved randomly selecting Census Collection Districts within 13 strata[10]. The second stage involved randomly selecting 22 to 34 dwellings within each Census Collection District. The third stage involved randomly selecting households within dwellings (Wooden & Watson, 2007). In dwellings where there were four or more households, three households were randomly selected to participate. All households were sampled in dwellings that contained three or fewer households (Watson & Wooden, 2002a, p. 9). Within each sampled household HILDA collected both household-level data and individual-level data from each consenting household member aged 15 years and over. Households were recontacted annually, with fieldwork occurring from August to December. Following household dissolution, HILDA continued to follow those individuals who were part of the wave 1 sample to their new household (for exceptions to this rule see Wooden & Watson, 2007).

HILDA collected most individual-level data from household members through a face-to-face personal interview. After the personal interview, individuals were given a short self-complete questionnaire (SCQ), which was collected by the interviewer at a later date or returned in the mail (Watson, 2008). Most earnings, employment and family questions were collected in the personal interview.

HILDA has a number of advantages for this study of female wages. First, the longitudinal design allows for the estimation of wage models that control for unobserved heterogeneity. Second, response rates are high in comparison to other recent Australian social surveys. At wave 1 the household response rate was 66%, with 7,682 participating households in total (Wooden & Watson, 2007). Individual interviews

[9] The HILDA Project was initiated and is funded by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (MIAESR). The findings and views reported in this thesis, however, are those of the author and should not be attributed to either FaHCSIA or the MIAESR.

[10] The strata are metropolitan and non-metropolitan regions in the five largest states and entire state in the remaining three states / territories.

were conducted with all eligible members in 88.2 % of these households. Financial incentives were provided to responding individuals and households so rates of attrition are moderately low. Wave-on-wave response rates ranged from 86.8% (wave 2) to 94.8% (wave 6) (MIAESR, 2008). Yet initial non-response and attrition did not occur at random. I evaluate the sample biases in the method sections of chapter 3 and 4.

Third, HILDA collects information on current labour market earnings in a main job as a continuous measure. Most Australian social science surveys (and the Population Census) ask for information on current gross weekly income from all sources, including earnings, investments, government benefits, pensions and business income. For mothers, wage rates derived from total weekly income will be inaccurate because many Australian women with dependent children in low to medium income families would receive some government payments (e.g. Parenting Payment, Child Care Benefit, Child Care Rebate, Baby Bonus) and taxation offsets (e.g. Family Tax Benefit A and B). Item non-response on weekly earnings is also low in HILDA. Among responding persons participating in waged or salaried employment, rates of missing data on labour earnings in a main job fell from 4.6% at wave 1 to 2.2% by wave 6 (Watson, 2008, p. 104).

Fourth, HILDA collects detailed information on family formation and current job characteristics. Large general population surveys undertaken by the ABS collect information on wages, employment characteristics and family structure in different surveys. Nevertheless, gaps remain in the content of the HILDA questionnaires, most notably the absence of a retrospective employment chronicle detailing the timing and length of each career break. Also, HILDA is a relatively young panel survey and, therefore, does not allow for an analysis of long-term wage trajectories. Despite these limitations, HILDA supports a more detailed analysis of the determinants of female wages than has been possible with previous surveys of the Australian population.

1.3 Thesis structure

This thesis comprises three separate empirical studies. Linking the three studies is a common focus on how children structure female wages in the Australian labour market. In the next chapter, chapter 2, theoretical explanations proposing how children affect female wages are evaluated. I then describe the three research questions addressed in this thesis.

The first empirical study, presented in chapter 3, examines whether there is a motherhood wage gap in Australia in 2001. To contextualise this analysis, I review published estimates of the size of the overall motherhood wage gap and describe findings from cross-national comparative research. I then describe the method, sample and measure of parental status. Next I present the descriptive findings using cross-sectional data from the first wave of HILDA. In the discussion, estimates of the Australian motherhood wage gap I produce for 2001 are compared to two Australian estimates from the mid 1990s, as well as estimates of the overall motherhood wage gap in the US and Britain.

Chapter 4 presents findings from my second empirical study. This study has three aims. First, I check whether there is indeed a motherhood wage penalty after accounting for differences in stable unobserved characteristics, such as cognition and career orientation. Second, I examine whether employment interruptions and part-time working hours explain the negative effect of children on female wages. Third, I assess whether children have a negative impact on wages after controlling for the influence of children on work experience and part-time work hours. This chapter commences with a review of findings from studies examining the causes of the motherhood wage penalty. The review leads to the formulation of four hypotheses around how children might negatively affect female wages in the Australian context. In the method section I describe the female wage model, statistical method, sample and variables included in the regression analysis. In the results section of this chapter I compare the duration of work experience, tenure and employment interruptions of mothers and childless women. I then present findings from a regression analysis of the determinants of female wages. Explanatory variables are added to the wage model sequentially and equations are estimated using both fixed-effects and pooled cross-sectional Ordinary Least Squares (OLS) regression. In the discussion, I contrast findings from my analysis of the motherhood wage penalty in Australia with findings from similar US and British studies. The role of human capital appears to be less important in Australia and I develop explanations for this finding. I also evaluate several explanations for the distinctive quality of women's part-time employment in Australia.

The third empirical study, presented in chapter 5, looks more closely at the wages of mothers who transition into part-time work after a birth. A review of previous research on the immediate direct and indirect effect of work hours' transitions on wages informs the development of three hypotheses. The method section of chapter 5 details the construction of a sub-sample of female respondents with at least one birth over the

course of the first six waves of HILDA. Results are presented in two sections. First, I investigate whether transitions into part-time work after a birth are associated with other types of job mobility potentially linked to lower wage growth. Second, I compare the wages of mothers' undertaking different work hours transitions and then use first-difference regression to analyse how job mobility affects mothers' wage growth around a birth event. In the discussion, I compare my findings with similar studies of the influence of job transitions on wages in Britain and the US.

Finally, in chapter 6, I bring together my empirical findings to evaluate how children structure female wages in the Australian labour market. I contrast my Australian findings with a series of US and British studies that have empirically assessed the causes of the motherhood wage gap. I highlight the distinctiveness of mothers' part-time employment in the Australian labour market. Next, I draw attention to constraints on the scope of this study and offer suggestions for future research. I also consider the implications of my findings in terms of recent and prospective changes to industrial relations and social policy.

Chapter 2: Explanations of the motherhood wage penalty

2.1 Introduction

Several theoretical frameworks have been used to understand the causes of wage disparities in market-based economies. With respect to wage disparities among women, key theoretical frameworks have included human capital, compensating differentials, job effort, discrimination and the structure of the labour market. In this chapter, I describe how theories of human capital, compensating differentials, job effort and discrimination can explain how children affect female wages and evaluate the empirical evidence supporting each explanation. In the final section of this chapter I describe how the institutional context in Australia differs from the US and Britain and set out how this could affect the wages of Australian mothers. I compare Australia to the US and Britain because much research investigating the motherhood wage penalty has been undertaken in these two countries.

A prominent concern in empirical studies of the motherhood wage penalty is that the decision to have children is influenced by factors that also affect wage outcomes. Some of potential determinants of both fertility and wages are difficult to observe, such as cognitive ability and values developed through childhood socialisation. Observed wage disparities between mothers and childless women taken from cross-sectional surveys might be biased by the omission of common unobserved factors that affect both fertility and wages. With a panel survey, comparisons can be designed that minimise this form of bias, most commonly through fixed-effects and first-difference regression. In effect, the wage penalty for children is examined by comparing how female wages change with the transition from childlessness to motherhood[11]. In general, observational research examining correlations between changes in an outcome with changes in an explanatory variable (i.e. within-person variation) provides stronger evidence of a causal relationship than cross-sectional research examining differences between individuals[12]. For this reason, I give prominence to panel studies in the following review.

[11] A detailed description of fixed-effects regression will be provided in Chapter 4.
[12] Of course, this logic does not apply to research that examines time invariant outcomes (e.g. aptitude) or explanatory variables (e.g. gender).

2.2 Explanations of the motherhood wage gap

Human capital

Human capital theory suggests the wage an individual attracts will be determined by the stock of human capital they hold. Neoclassical economic theory suggests the human capital an individual acquires will affect their job productivity and this will, in turn, structure wage offers. Human capital is broadly defined as the stock of knowledge and skills held by an individual. Individuals can acquire human capital in various ways, though two key mechanisms are formal education and on the job learning. According to human capital theory, formal education imparts knowledge and skills and this directly increases job productivity. Formal education, however, is costly for individuals. In addition to the direct financial costs (e.g. tuition fees), time directed to formal education detracts from time that could otherwise be spent earning income. This is an opportunity cost. So a rational individual will only invest in productivity raising activities if there is a net financial benefit for doing so. Human capital theory similarly suggests individuals are motivated to learn new skills and knowledge on the job because this will improve their job productivity and subsequent wage growth. More generally, individuals with longer work experience are expected to be more productive, all else being equal, because they have had more “practice” applying the skills required to perform a job. Conversely, human capital is expected to depreciate if skills and knowledge are not applied regularly, for instance through spells of unemployment or parental leave. Skills and knowledge can also become outdated when individuals are neither working in a job nor studying and this explains why individuals will often return to lower paid job when re-entering the labour force. Some knowledge and skills that are learnt on the job may only raise job productivity in a specific organisation, so individuals with longer tenure are expected to be more productive than individuals with shorter tenure. Employers make job offers with the expectation that a new employee will initially be less productive than a current employee with identical education and work experience because of differences in organisation-specific human capital. For this reason, human capital theory suggests that individuals who move to a new employer will forego wage rises linked to lengthening tenure and may initially be appointed at a lower level.

Human capital theory predicts that women who intend to have children will invest less in formal education as a teenager and young adult because they expect to interrupt employment to care for children or to work in “family-friendly” jobs (Becker,

1985; Mincer & Polachek, 1974). Women who interrupt employment to care for children will spend less time in the labour market and this will lower the lifetime returns to an investment in formal education, relative to women who remain childless. Alternatively, women who plan to have children might train for an occupation that penalises interruptions less or provides more family-friendly conditions. This would optimise lifetime earnings. Yet there is limited evidence that female-dominated occupations are still sought by women who intend to have children (Hakim, 2002) or that female-dominated occupations do indeed provide an optimal solution in terms of lifetime earnings for women who seek to combine paid work with parental care (England, 2005).

With panel data any differences between women that are time invariant, including investments in formal education as a young adult, can be controlled for using fixed-effects or first-difference regression. Numerous studies have demonstrated that children have a negative effect on mothers' wages after controlling for unobserved heterogeneity (Anderson et al., 2002, 2003; Avallar & Smock, 2003; Budig & England, 2001; Ellwood et al., 2004; Gangl & Ziefle, 2009; Lundberg & Rose, 2000; Taniguchi, 1999; Waldfogel, 1995, 1997a, 1998a). This implies that women who do actually go on to have children attract a wage penalty for motherhood, regardless of whether they invested less in formal education. Nevertheless, the overall motherhood wage gap does appear to be narrower after unobserved heterogeneity between women is taken into account (Anderson et al., 2002; Budig & England, 2001; Waldfogel, 1995, 1998a). Human capital theory suggests this could be due to differences in educational investments, though women who remain childless might vary from mothers on other time invariant attributes. For example, a negative correlation between motherhood and wages may arise if cognitive ability affects both fertility decisions and wages, independent of childhood socialisation and formal education.

Human capital theory argues that children will also have a direct causal effect on female wages through employment interruptions, spells of part-time employment and higher rates of employer mobility. During an interruption mothers forego human capital they otherwise would have accumulated on the job and the stock of human capital they held can decline through skill atrophy. Mothers employed in part-time jobs will also accumulate human capital at a lower rate than they would in full-time employment because they spend less time on the job. Interruptions to employment can entail a separation from an employer and mothers who return to a new employer will have low levels of firm-specific human capital (Anderson et al., 2002; Baum, 2002). Statutory

maternity and parental leave offers protection against an involuntary separation from an employer (Waldfogel, 1998a). Mothers who are eligible for leave may still resign from an employer if the period of job-protected leave is considered too short or if employment is constrained by access to formal child care and suitable working hours.

Studies of female wages in the US, Britain, Germany and Denmark suggest the motherhood wage penalty is partly or fully explained by the negative effects of children on human capital (Anderson et al., 2002; Budig & Hodges, 2008; Budig & England, 2001; Datta Gupta & Smith, 2002; Gangl & Ziefle, 2009; Korenman & Neumark, 1992; Neumark & Korenman, 1994). The widely cited US study by Budig and England (2001) found that around one-third of the overall motherhood wage penalty could be explained by the comparatively lower human capital women accumulate after they have children (Budig & England, 2001). In a more recent panel study, Gangl and Ziefle (2009) found that around 75% of the overall motherhood wage penalty in the US could be accounted for by the effects of motherhood on human capital accumulation. Human capital has also been found to explain around 90% of the overall motherhood wage penalty in Britain and around 33% in Germany (Gangl & Ziefle, 2009; see also Joshi & Paci, 1998). Using propensity score matching, a recent study of Danish women found that the motherhood wage penalty declined from 6.5% to 1.5% after accounting for differences in experience, interruptions, education and occupation (Simonsen & Skipper, 2006). Another Danish study, which used panel data, found that children solely affect female wages though employment interruptions (Datta Gupta & Smith, 2002). Other empirical research has focused directly on the wages of mothers just after they complete their parental leave or on re-entering the labour force after an interruption associated with a birth. Findings from these studies suggest returning to a new employer after a birth has a negative effect on mothers' wages after controlling for work experience (Baum, 2002; Hofferth & Curtin, 2006) and that maternity leave provides some protection against the wage losses associated with motherhood (Waldfogel, 1997b, 1998a). Finally, some US and British research suggests that those mothers who interrupt employment for less than a year while their children are young do not attract a wage penalty for motherhood (Joshi & Paci, 1998; Joshi et al., 1999; Lundberg & Rose, 2000).

Work experience and tenure may affect mothers' wages through mechanisms other than rises and falls in job productivity. Signalling theories argue employers view interruptions to employment as an indicator of lower commitment and on this assumption will offer lower wages to women who have a discontinuous employment

history (Albrecht, Edin, Sundstrom & Vroman, 1999). Few empirical studies collect reliable data on job productivity, so it is unclear whether skill atrophy does indeed occur during interruptions or whether employers discriminate against labour market entrants (England & Folbre, 2005). Moreover, discrimination might affect on the job human capital accumulation if employers provide less training or career support to mothers. I return to describe why employers may discriminate against mothers later in this chapter.

Compensating wage differentials

In economics, wage disparities between individuals with equivalent human capital are often explained using the theory of compensating differentials or equalizing differences. Distinguishing the theory of compensating differentials from human capital theory is the observation that attributes other than human capital affect the matching of individuals to jobs and that job rewards can consist of non-pecuniary benefits. According to the theory of compensating differentials, jobs comprise a package of financial rewards and pleasant or disagreeable conditions (Rosen, 1986). Employers offer higher wages for jobs that have disagreeable conditions, such as a higher risk of serious injury or geographic isolation, as compensation for the disutility that is (potentially) incurred through employment. Conversely, individuals may trade financial remuneration to gain amenable conditions (e.g. work from home). Wages are predicted to decline as agreeable conditions rise because the provision of agreeable conditions can be costly for employers and because the supply of workers desiring amenable conditions can exceed market demand. For a given job, the degree wages decline as non-pecuniary benefits rise will depend on the willingness of the marginal worker (not necessarily the average worker) to trade wages to access a more amenable job.

The theory of compensating differentials suggests the motherhood wage penalty might be caused by differences in women's willingness to trade wages for amenable working conditions. Given mothers remain the primary care-giver in most families, it is anticipated that some mothers move between jobs or employers to gain "family-friendly" conditions, such as flexible start and finishing hours, more generous sick or family leave, a job that can be performed in the home or on-site child care (Budig & England, 2001). Women may also leave jobs that attract a wage premium for disagreeable conditions, such as a hazardous worksite, once they have dependent children (Felfe, 2008). In several countries, a key family-friendly job condition is part-time working hours. Part-time working hours has been viewed as a job amenity on the

assumption that there is a fixed cost associated with each individual employee (e.g. payroll, training, insurance) and so organisations with a large part-time workforce will face higher staffing costs. Rigidities in the labour market may also reduce the number of jobs available on a part-time basis and this leads to a situation where the marginal woman with children would trade a substantial portion of their wage for part-time hours (Ermisch & Wright, 1993).

Part-time employment has been shown to attract lower wages than full-time employment in the US, Britain, Canada and Germany (Bardasi & Gornick, 2008; Gornick & Jacobs, 1996; McGinnity & McManus, 2007). Women are more likely to work part-time when they are caring for dependent children, so it follows part-time work would contribute to the motherhood wage penalty. In the US and Britain, mothers' participation in lower paid part-time jobs has been found to explain part of the motherhood wage penalty. Waldfogel (1997a) found that the US motherhood wage penalty declined from 5.6% to 3.9% for one child and 14.7% to 11.7% for two or more children after controlling for part-time employment (both fixed-effects models included controls for work experience, education, age and marital status). In this study, part-time work was found to significantly lower female wages by 11.1%. In Britain, Joshi and Paci (1998) found that part-time work explained one-third of the motherhood wage gap in 1977 - 1978 and around one-half of the wage gap in 1991. British research suggests one reason mothers' movement into part-time employment might negatively affect wages is through downward occupation mobility and movement to a new employer (Connolly & Gregory, 2008, 2009; Manning & Petrongolo, 2008). It is not clear whether the correlation between different forms of job mobility reflect women's preferences for a job that is both less demanding and offers shorter work hours or alternatively are caused by an unwillingness on the part of employers to accommodate women's requests for part-time working hours.

Evidence that mothers are more likely to trade wages to access other family-friendly job conditions, after accounting for differences in human capital, remains mixed. Studies examining access to flexible working hours (e.g. flexible start and finishing hours, time-of-in-lieu) show mothers are no more likely than childless women to have access to this form of flexibility (Gray & Tudball, 2002). Moreover, previous research suggests there is no relationship or a positive, not negative, association

between flexible hours and wages[13] (Estes & Glass, 1996; Gariety & Shaffer, 2001; Glass, 2004; Joshi & Paci, 1998; Weeden, 2005; c.f. Heywood, Siebery & Wei, 2007). Some studies find that working from home, maternity leave and receipt of child care assistance from an employer is negatively associated with female wages (Edwards, 2006; Glass, 2004), whereas other studies find no significant association (Boushey, 2005; Heywood et al., 2007; Johnson & Provan, 1995). A recent US study suggests that a portion of the motherhood wage penalty is caused by mothers trading wages for better health insurance benefits (Amuedo-Dorantes & Kimmel, 2008). Yet among women with health insurance, the wages of mothers were still 3.3% lower than childless women after controlling for differences in human capital, part-time work and occupation (Amuedo-Dorantes & Kimmel, 2008). Another German study found that the transition to motherhood was associated with a higher likelihood of moving into a less stressful job (based on self-reports), though this still explained less than one-tenth of the overall 19.4% wage penalty for motherhood (Felfe, 2008).

Finally, some research has found that mothers tend to live closer to their workplace than do childless women (Felfe, 2008). Although commuting time or distance is not per se an amenable job condition, geographic considerations may impact on wages if mothers search more narrowly for employment (i.e. have lower elasticity of supply). Although research shows commuting time or distance is positively associated with wages (Joshi & Paci, 1998), this has been found to explain only a small portion (Felfe, 2008) or no portion of the wage penalty for motherhood (Budig & England, 2001).

Job effort and job productivity

In addition to human capital, neoclassical economic theory predicts the effort an individual directs to paid employment will affect job productivity. Hence, individuals who direct more effort into a given job will have a higher wage, all else being equal. According to Becker (1985), individuals allocate time and “energy” between paid work, leisure and domestic work. Each individual has a limited stock of energy, so an increase in effort on one activity will be associated with a decline in effort on another activity. Becker (1985, p. S33) argues that “child care and housework are more effort intensive than leisure and other household activities”. Job productivity is therefore

[13] These findings can be explained by efficiency wage theory, which suggests employers will provide higher wages and flexibility in occupations where direct supervision of outputs is difficult to induce higher productivity (Weeden, 2005).

expected to decline with the transition from childlessness to motherhood because of a redirection of effort into household production.

Work effort is difficult to measure, so there is no conclusive evidence that mothers are indeed less productive than childless women with similar human capital. In the US and Germany, children have been found to have a negative effect on female wages even after controlling for differences in human capital loss, part-time working hours and unobserved heterogeneity (Amuedo-Dorantes & Kimmel, 2005; Anderson et al., 2002, 2003; Avallar & Smock, 2003; Budig & England, 2001; Gangl & Ziefle, 2009; Taniguchi, 1999; Waldfogel, 1997a, 1998a). A potential reason for this “residual” wage penalty is that work effort declines with the transition from childlessness to motherhood. Yet an equally plausible explanation is that the residual wage penalty arises from discrimination (I return to this explanation later). Other studies have explored Becker’s (1985) theories about the allocation of effort using self-reported data on work effort and using time in routine housework as a proxy for effort directed to domestic labour.

In the US, Bielby and Bielby (1988) tested Becker’s theory using self-reported measures of work effort collected in a random survey of employed men and women (who worked at least 20 hours per week). Findings from this study showed that mothers with at least one child under 6 years of age reported less work effort than childless women (controlling for education, work experience, part-time hours, occupation and hours spent caring for children and undertaking housework). Yet childless women reported greater work effort than childless men and fathers, so mothers tended to report the same level of work effort as men. Work effort did not significantly vary between childless women and mothers with a youngest child aged 6 years or older. Surprisingly, hours spent caring for children and performing housework was not significantly correlated with work effort for women. More recent studies have investigated how women’s work commitment and work orientation changes with the transition from childlessness to motherhood (Evertsson & Breen, 2008; Johnson, 2005). Findings from these studies vary and it is plausible that work effort could still have an effect on wages above and beyond that of work commitment or orientation.

A larger number of studies have examined whether time in routine housework, a proxy for effort directed towards unpaid work, affects wages. Findings from both cross-sectional studies (Baxter, 1992; Hersch, 1991, 2009) and panel studies (Bryan & Sevilla Sanz, 2008; Hersch & Stratton, 2002; Noonan, 2001) have found a significant

negative correlation between time in routine housework and female wages after accounting for variation on basic demographic and job characteristics (though Bonke, Datta Gupta & Smith, 2005, find no association). Time performing domestic work rises with the transition from childlessness to parenthood for women even after controlling for paid working hours (Baxter, Hewitt & Haynes, 2008; Sanchez & Thomson, 1997), so changes in women's domestic workload could possibly explain the residual motherhood wage penalty. Two recent panel studies do investigate how children affect female wages after controlling for housework hours, work experience and unobserved heterogeneity (Bryan & Sevilla Sanz, 2008; Noonan, 2001). A British study by Bryan and Sevilla Sanz (2008) found that dependent children lowered married women's wages by 4% per child while an extra hour of housework per week lowered wages by 1.2% (controlling for work experience and unobserved heterogeneity). In contrast, a US study by Noonan (2001) found children did not significantly lower married women's wages, though wages declined by around 0.3% for each extra hour of housework per week. Although these panel studies provide stronger evidence of a causal relationship between housework hours and wage than earlier cross-sectional studies, the direction of the causal pathway is still not resolved. Rather than changes in housework hours affecting wages via job productivity, an increase (decline) in wages may prompt women to reduce (increase) time in housework (Bryan & Sevilla Sanz, 2008; Noonan, 2001). For example, a wage increase may allow women to outsource some routine household tasks, such as ironing. In summary, there is only limited evidence that motherhood negatively effects female wage through the redirection of effort away from paid work into domestic work.

Discrimination

Labour market discrimination occurs when employers and human resource managers treat individuals with equal productivity differently (Blau, Ferber & Winkler, 1998). Discrimination can take the form of lower starting wages and lower incremental wage rises with experience, as well as lower employer investment in human capital development (e.g. training, mentoring). Two theories have been put forward to explain why employers may discriminate against mothers. These are statistical discrimination from economics and status-based discrimination from social psychology (Budig & England, 2001). The theory of statistical discrimination argues that employers will allocate an individual to a job and choose a starting wage using uncertain knowledge about future productivity. Employers may therefore evaluate the productivity of a

potential employee using information on the average productivity of other employees who are similar on a given attribute (e.g. sex, race, disability, etc). If mothers as a group are on average less productive than childless women, employers may offer all mothers the wage of the average mother. Statistical discrimination will therefore lead to a wage penalty for highly productive mothers, but not mothers who have average or low productivity (all else being equal). Statistical discrimination might also arise if variance in job productivity is wider for mothers than childless women because the degree of uncertainty about future productivity will be greater for mothers. Finally, mothers may face statistical discrimination at the point of hire and promotion if mothers on average resign more frequently than childless women. For statistical discrimination to contribute to the motherhood wage penalty, employers must have information on potential or current employees' parental status. If employers assume all women are likely to be or to become mothers, then statistical discrimination would negatively affect female wages relative to equally productive men, but would not lower mother's wages relative to childless women.

The theory of status-based discrimination argues that evaluations of productivity and commitment are subtlety affected by cultural norms and this will in turn impact on employment outcomes (Correll, Benard & Paik, 2007). Status-based discrimination is thought to affect mothers' employment outcomes because of the persistence of gendered cultural norms around the prioritisation of time. Correll et al. (2007, p. 1306) argue:

> Contemporary cultural beliefs about the mother role include a normative expectation that mothers will and should engage in "intensive" mothering that prioritizes meeting the needs of dependent children above all other activities (Blair-Loy, 2003; Hays, 1996; Kobrynowicz & Biernat, 1997). The cultural norm that mothers should always be on call for their children coexists in tension with another widely held normative belief in our society that the "ideal worker" be unencumbered by competing demands and be "always there" for his or her employer (Acker, 1990; Blair-Loy, 2003; Hays, 1996; Williams, 2001).

The ideal worker norm developed at the time the traditional breadwinner family was in ascendancy when a substantial share of men specialised in paid work and women in domestic work (Williams, 2001). Status-based discrimination will affect mothers specifically, rather than all women, if employers have information on women's parental

status. Yet in the absence of information on motherhood, the ideal worker norm may still disadvantage mothers who transition into part-time employment. Women who work on a part-time basis do not conform to the ideal worker norm and are more likely to be evaluated as less committed than a similar full-time colleague. The theory of workplace segmentation suggests that the perception that part-time employees are less committed has become institutionalised in many organisations and that human resource practices often vary markedly between full-time and part-time segments (Pocock, 2003). Accordingly, part-time employees will tend to have lower starting wages, flatter wage growth, less training and fewer opportunities for upward career mobility. Mothers are more likely to seek part-time working hours than childless women, which is why this form of discrimination will disproportionately influence the wages of mothers.

As noted earlier in this review, employer discrimination might explain why children negatively affect female wages after adjusting for human capital and part-time working hours. Regression analysis, however, will only pick up forms of discrimination that affect wage offers net of human capital. Discrimination may also affect human capital accumulation directly if mothers tend to receive less on the job training than childless employees who are similar in all other respects. A recent audit study by Correll et al. (2007) observed that mothers were around half as likely as childless women to receive a call-back for an advertised business or marketing position. Mothers and childless women were assigned identical levels of work experience, so the call-back rate was not a function of human capital differences. A laboratory experiment associated with this audit study also suggested that discrimination partly arises through status-based evaluations whereby mothers are rated as less competent and less committed to paid work than childless women (Correll et al., 2007). The authors of this study argue that their findings might explain part of the residual motherhood wage penalty observed in earlier US studies (e.g. Budig & England, 201).

Summary

In summary, four mechanisms have been put forward to explain why motherhood negatively affects female wages. First, human capital theory suggests foregone work experience during employment interruptions and spells of part-time work negatively affects wage growth. Skill atrophy during interruptions and separation from a former employer will also depress wages when mothers re-enter the labour force. Second, the theory of compensating differentials suggests mothers will accept a lower wage when

moving into a job that is perceived to be more compatible with mothering. Third, the physical demands of motherhood may negatively affect job productivity through the redirection of effort into parental care. Fourth, theories of statistical and status-based discrimination suggest employers will offer a lower wage to a woman who has children than an equally productive woman without children on the assumption that motherhood tends to negatively affect productivity or staff retention.

Previous research has shown that the overall motherhood wage penalty is partly or fully explained by the effect of children on human capital accumulation and employment interruptions (Anderson et al., 2002; Budig & Hodges, 2008; Budig & England, 2001; Datta Gupta & Smith, 2002; Gangl & Ziefle, 2009; Korenman & Neumark, 1992; Neumark & Korenman, 1994). Several US studies have also shown that mothers' participation in part-time work explains part of the motherhood wage penalty (Budig & England, 2001; Waldfogel, 1997a). Two British studies similarly found that the low wage associated with part-time employment partly explains the wage penalty for children (controlling for differences in education and experience) (Joshi & Paci, 1998; Joshi et al., 1999). A third British study, however, found that part-time employment does not explain any of the motherhood wage penalty (Gangl & Ziefle, 2009). The wage penalty for children was found to be fully explained by foregone work experience, career interruptions and transitions between employers. Among British women, the transition from full-time to part-time appears to be correlated with separation from an employer and a more discontinuous pattern of employment. Measures of human capital differ between studies and this might explain why the importance of part-time employment has been found to be of varying importance.

2.3 What makes Australia an interesting case study?

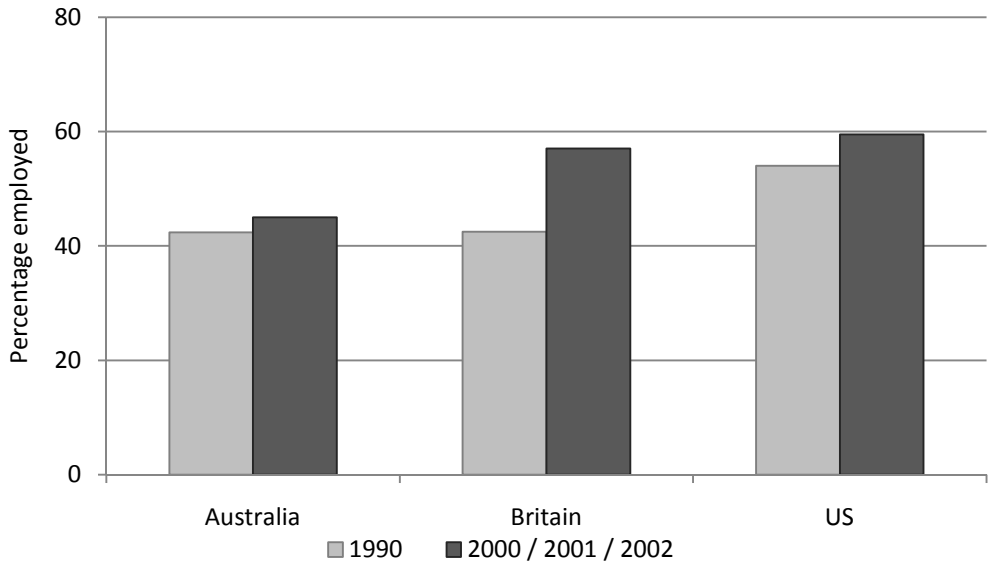
Much research examining the causes of the motherhood wage penalty has focused on the experience of employed mothers in the US and British[14] labour markets. This thesis aims to add to this body of research through a complementary study of the motherhood wage penalty in Australia. The deregulation of the Australian economy throughout the late 1980s and 1990s has seen the Australian labour market come to be more like markets in Britain and the US. Yet substantial institutional differences remain between these three countries. There are also significant differences in the design of both work-family policies and income supports for low income families. The regulation of the

[14] Some descriptive statistics presented in this section are only available for the UK as a whole, rather than Britain.

labour market and social policy context potentially mediate the magnitude of the motherhood wage penalty in Australia. In this thesis I examine the motherhood wage penalty across the period 2001 to 2006. Most published studies of the motherhood wage penalty in the US and Britain have drawn on survey data from older cohorts of women and examined the penalty in the 1980s and 1990s[15]. The following discussion therefore focuses on general differences in labour market conditions and work-family policies between Australia, the US and Britain.

Maternal employment rates in Australia have tended to be lower than rates in the US and Britain. In the early 2000s, 57% of mothers with a youngest child aged less than 3 years were employed in the US and Britain compared to 45% of mothers with a young child in Australia (OECD, 2005b, p. 41, see Figure 2.1). Maternal employment rates across these countries become more similar once children have entered school. In the early 2000s, the employment rate of mothers with a youngest aged 6 to 14 years was 67% in Australia, 67% in Britain and 69% in the US (OECD, 2005b, StatLink table). The comparatively low employment rate of mothers with young children in Australia implies that more mothers might interrupt employment after a birth or that mothers who do interrupt employment return to paid work more slowly in Australia. Either of these processes might have the effect of increasing the magnitude of the overall wage penalty for motherhood in Australia. Human capital theory suggests the length of an interruption is negatively associated with wages because work experience will be foregone for a longer period and the likelihood of skill atrophy rises as interruptions lengthen. Alternatively, if more mothers exit employment in Australia, then the overall motherhood wage gap may widen because fewer mothers are able to maintain an attachment with their former employer. More Australian mothers may return to a lower paid job in Australia if the rate of movement between employers is higher.

[15] Some studies of the motherhood wage penalty in the US draw on the National Longitudinal Survey of Young Women (NLS-YW69) and examine wage outcomes in the 1970s and 1980s (e.g. Anderson et al., 2003; Taniguchi, 1999).

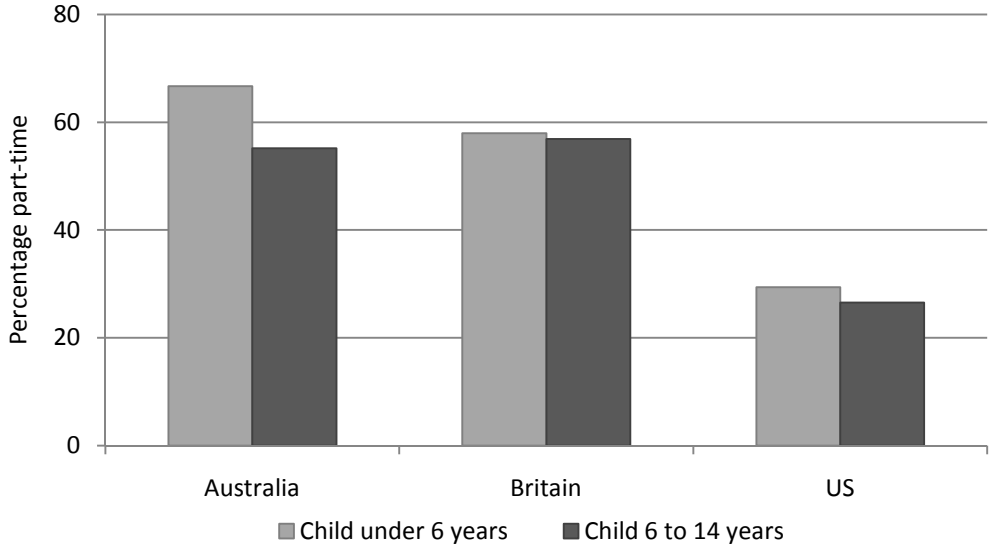


Source: OECD (2005b, StatLink table)

Figure 2.1: Employment rates of mothers with a youngest child aged less than 6 years in Australia (1990 and 2000), Britain (1990 and 2002) and the US (1990 and 2001) [16]

Rates of part-time employment are high among employed mothers in Australia relative to the US and to a lesser extent Britain. In the early 2000s, around 67% of employed mothers with a youngest child aged less than 5 years worked part-time in Australia, whereas 29% of employed mothers with a youngest child aged less than 6 years worked part-time in the US (OECD, 2005b, p. 41, see Figure 2.2). In Britain, 58% of employed mothers with a youngest child aged less than 6 years worked part-time (OECD, 2005b, p. 41). British research suggests that the transition into part-time work is associated with downward occupational mobility and movement to a new employer, which in turn negatively affects wages (Connolly & Gregory, 2009). This may also occur in Australia as the right for parents to request family-friendly work conditions, including part-time hours, was only established as a statutory right in 2010. In summary, the high rates of part-time employment and low rates of maternal employment in Australia might suggest that the motherhood wage gap will be as pronounced in Australia as it is in Britain.

[16] The OECD describes mothers' employment according to age of youngest child (i.e. less than 6 years), rather than whether the youngest child has commenced compulsory schooling. Unfortunately, the Australian labour force survey does not collect comprehensive data on resident and non-resident children. For this reason, the employment rate in Australia refers to mothers who have a youngest child aged less than 5 years (rather than a youngest child aged less than 6 years).



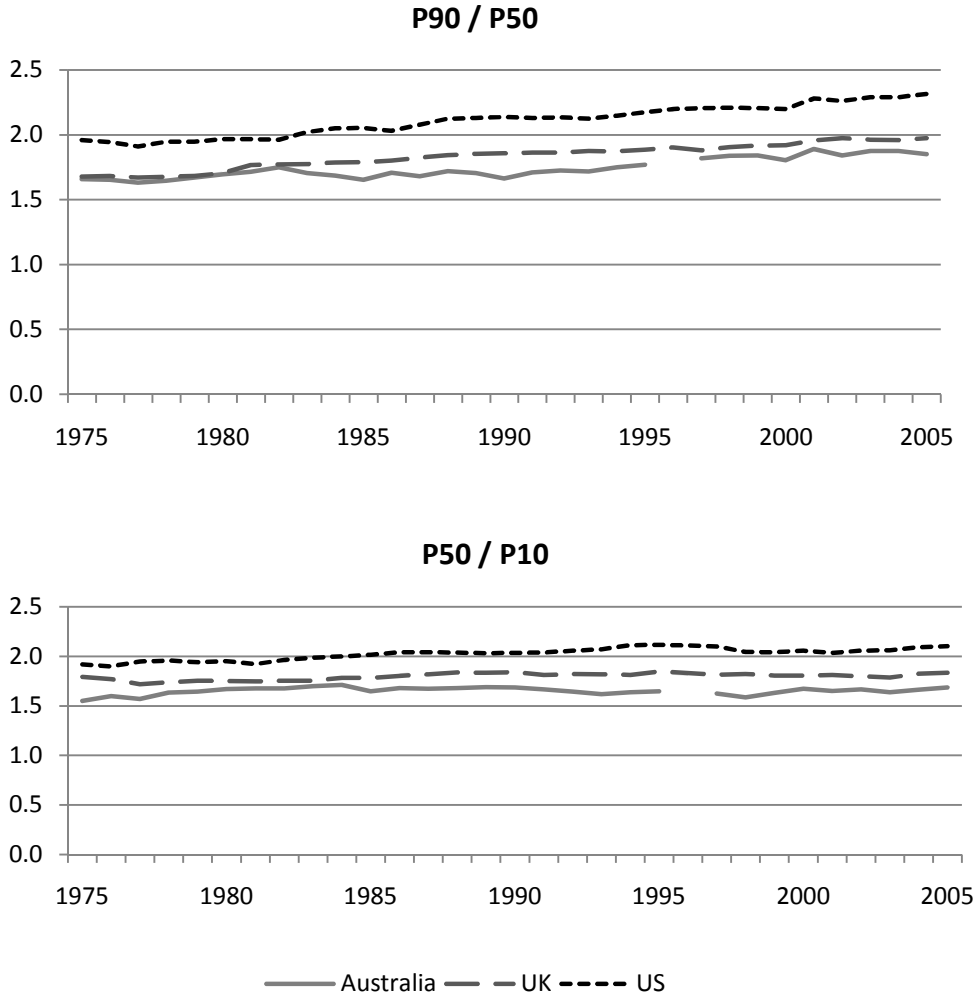
Source: OECD (2005b, p. 41)

Figure 2.2: Rates of part-time work among employed mothers with a youngest child aged less than 6 years and 6 to 14 years in Australia (2000), Britain (2002) and the US[17] (2001)

Yet the more centralised system of wage determination in Australia may pull the motherhood wage gap in the other direction by reducing the level of wage inequality in the labour market as a whole. Although wage determination in Australia became far less centralised over the late 1980s and 1990s, a larger share of Australian employees are likely to be covered by a collective agreement than US or British employees (Drago, Pirretti & Scutella, 2007; Walsh, 1997). This is partly because collective agreements cover much of the non-union workforce in Australia, principally through "industry awards". Overall, the wage distribution in Australia has remained slightly more compressed than that in the US and UK over the past three decades. Figure 2.3 describes the broad trend in the overall earnings dispersion for full-time employees in Australia, the UK and US based on the ratio of the ninetieth to fiftieth earnings percentile (P90 / P50) and the ratio of fiftieth to tenth percentile (P50 / P10). In 2005, the P50 / P10 ratio was 2.1 in the US, 1.8 in the UK and 1.7 in Australia (OECD, 2010a). Minimum wages have consistently been set at a higher rate in Australia and this would also have compressed the Australian wage distribution. In Australia, the federal minimum full-time wage declined from around 61% to 57% of median full-time

[17] For US, percentages are reported for employed mothers with a youngest child aged less than 6 years and a youngest child aged 6 to 13 years (and children aged 14 years are excluded). For Australia, percentages are reported for mothers with a youngest child aged less than 5 year and a youngest child aged 5 to 14 years. Part-time is defined as less than 30 hours in Britain and less than 35 hours in Australia and the US.

earnings between 1995 and 2005, whereas the minimum full-time wage in the US over this same period remained around 35% to 31% of median full-time earnings (OECD, 2010b). A minimum wage was established in the UK in 1999 and was set around 42% to 46% of median full-time earnings between 2000 and 2005 (OECD, 2010b). According to Blau and Kahn (2003) returns to human capital, including education and work experience, will tend to be higher in countries where wage inequalities are wider. A more compressed wage distribution might therefore reduce the costs incurred by foregone work experience. However, wage dispersion may not influence the overall motherhood wage gap if centralised wage-setting institutions primarily reduce the extent of inter-industry wage inequality (rather than the degree of inequality within an industry). This is because the transition from childlessness to motherhood is not associated with movement between industries.



Source: OECD (2010a)

Figure 2.3: Trends in the dispersion of full-time weekly earnings of men and women in Australia, the UK and the US, 1975 - 2005

Compared to the US, Australia has tended to provide longer periods of unpaid parental leave to mothers. The development of statutory parental leave provisions in Australia, Britain and the US are described in Table 2.1. Since 1979, Australian mothers have been eligible for 52 weeks leave where they had at least 12 months continuous service with their employer and were employed on a permanent contract. In the US, periods of job-protected parental leave have consistently been shorter. Under the Family and Medical Leave Act 1993, employees have been eligible for up to 12 weeks leave if they had at least 12 months continuous service and worked in an organisation with 50 or more employees. In Britain, the period of job-protected leave has been lengthened over the past decade. Prior to 2000 British mothers meeting tenure requirements were entitled to return to their former job up to 29 weeks after a birth, though for some mothers the period of job-protected leave was only available for up to 14 weeks (see Table 2.1). Eligibility criteria for job-protected leave also vary between Australia, Britain and the US, though in Australia and Britain the general trend has been for eligibility to be widened over time. The parental leave provisions available to Australian mothers could potentially heighten the overall motherhood wage penalty in Australia if longer spells of leave negatively affect wages through foregone experience or skill atrophy.

Finally, there are noteworthy differences in the regulations protecting employees from dismissal between Australia, the US and Britain. Since 1993, it has been illegal for Australian employers to dismiss an employee on the basis of their family responsibilities under the *Sex Discrimination Act 1984*. This may protect mothers (and fathers) against some forms of direct discrimination on the basis of their role as a primary carer, though the onus is on individuals to report experiences of discrimination to the Australian Human Rights Commission (formally the Human Rights and Equal Opportunities Commission). In neither the US nor Britain is direct discrimination on the basis of family responsibilities explicitly prohibited under sex discrimination laws. In the US, however, responsibility for family care has been deemed a form of disparate treatment on the basis of sex in some court cases (Williams & Segal, 2003). It is plausible that Australian mothers experience involuntary job separations less frequently than their US and British counterparts. Yet it is not clear how successful this component of the *Sex Discrimination Act 1984* has been at discouraging direct discrimination on the basis of family responsibilities, though there have been instances where direct discrimination on the grounds of family care has been recognised in the

Table 2.1: Development of parental / maternity leave provisions in Australia, Britain and the US, 1970s to 2006

Australia	Britain	US
1979 onwards *Job protection* - Mothers with permanent employment contract (full-time or part-time) and with at least 12 months continuous service have right to return after up to 52 weeks unpaid leave (this includes leave taken before an expected birth).	**1976 - 1993** *Job protection* - Mothers working full-time or long part-time hours (at least 16 hours per week) and with at least 2 years continuous service have right to return up to 29 weeks leave following a birth (and could take up to 14 weeks leave before an expected birth). - Mothers working short part-time hours (8 to 16 hours per week) and with at least 5 years continuous service have right to return up to 29 weeks leave following a birth (and could take up to 14 weeks leave before an expected birth). **1977 - 1986** *Paid leave* - Mothers working full-time or long part-time hours and with at least 2 years continuous service were entitled to 6 weeks paid leave at 90% of previous earnings. - Mothers working short part-time hours and with at least 5 years continuous service were entitled to 6 weeks paid leave at 90% of previous earnings. **1987 - 1993** - Assessment of continuous service for job protection and paid leave moved from 11th week to 15th week before expected birth. *Paid leave* - Introduction of flat-rate maternity pay. Mothers who were eligible for 6 weeks leave at 90% of their previous earnings could access a further 12 weeks paid maternity leave at a flat-rate. - Mothers not eligible for 6 weeks paid leave at 90% of their previous earnings were eligible for 18 weeks paid leave at the flat-rate if they has been with their employer at least 26 weeks and had earnings above the limit for national insurance. - Maternity allowance increased from 13 to 18 weeks for mothers who made insurance contributions, but who were not eligible for flat-rate paid maternity leave.	**1972 onwards** *Job protection* - Selected US states introduced unpaid maternity leave for some mothers. **1987 onwards** *Paid leave* - Paid leave was available to some mothers in some states (Rhode Island, California, New Jersey, New York and Hawaii) through temporary disability insurance (TDI) programs. Paid leave was typically available for 6 weeks.

Table 2.1: Development of parental / maternity leave provisions in Australia, Britain and the US, 1970s to 2006, continued

Australia	Britain	US
	1994 - 1999 *Job protection* - Mothers with less than 2 years continuous service have a right to return up to 14 weeks after a birth. - Mothers with at least 2 years continuous service (irrespective of workings hours) have right to return up to 29 weeks after a birth. *Paid leave* - Mothers with at least 26 weeks insured employment with same employer in the previous 12 months were eligible for 6 weeks paid leave at 90% of previous earnings.	**1993 onwards** *Job protection* - Mothers with at least 12 months continuous service and working for an employer with 50 or more employees have right to return after up to 12 weeks unpaid leave.
2001 onwards *Job protection* - Mothers with casual employment contract (full-time or part-time) and with at least 12 months continuous service have right to return after up to 52 weeks unpaid leave.	**2000 - 2002** *Job protection* - Mothers with less than 1 year continuous service have a right to return up to 18 weeks after a birth. - Mothers with at least 1 year continuous service have right to return up to 29 weeks after a birth. *Paid leave* - Employed mothers who did not make insurance contributions, but earned at least £30 per week, became eligible for maternity allowance. Tenure conditions continued to apply. **2003 - 2006** *Job protection* - Mothers with less than 26 weeks continuous service have a right to return up to 26 weeks after a birth. - Mothers with at least 26 weeks continuous service had right to return up to 52 weeks after a birth. *Paid leave* - Duration of flat-rate maternity pay increased to 20 weeks. Eligibility conditions unchanged. - Duration of maternity allowance increased to 26 weeks. Eligibility conditions unchanged.	

Source: Earnshaw (1998), Gregg et al. (2007, pp.844 - 845), Han et al. (2008, p.33), Zabel (2009, pp. 253 - 254).

courts. Across the labour market more broadly, job protection tends to be slightly stronger in Australia than the US. Information on the strictness of employment protection legislation is regularly compiled by the OECD into an index summarising the regulation of individual and collective dismissal, as well as the conditions of temporary employment. Based on this index, the overall strictness of employment protection has consistently been slightly greater in Australia than the UK and US (OECD, 2010c, see Table 2.2). Again, these regulations might offer Australian mothers greater protection against job dismissal.

In summary, the centralised system of wage determination and protections against job dismissal might have the effect of narrowing the overall motherhood wage gap. On the other hand, the longer period of job-protected leave and lower maternal employment implies interruptions to care for children may be longer in Australia and this would heighten wage disparities. Therefore, it is not clear whether the overall motherhood wage gap would be as large as or narrower than the gap observed in the US and Britain. I now turn to describe findings from two previous analyses of the overall motherhood wage gap in Australia.

Table 2.2: Trends in the overall strictness of employment protection legislation in Australia, the UK and the US, 1990 - 2005

	1990	1995	2000	2005
Australia	0.94	0.94	1.19	1.19
United Kingdom	0.60	0.60	0.68	0.75
United States	0.21	0.21	0.21	0.21

Note: Lower values on this index denote less strict employment protection legislation. Data taken from series “Overall Employment Version 1”.
Source: OECD (2010c).

Previous Australian research

Two cross-national comparative studies of the motherhood wage gap present findings for Australia from the mid 1990s[18]. These research papers, by Harkness and Waldfogel (2003) and Whitehouse (2002), draw on cross-sectional survey data. A search of the literature revealed no longitudinal analyses of the motherhood wage gap in Australia.

[18] Australian studies examining personal income and weekly earnings of mothers and childless women include Arun, Arun and Boorah (2004) and Western et al. (2005). I do not review these studies in this chapter because the determinants of gross personal income and weekly earnings differ from the determinants of hourly wages.

This gap in the research literature is undoubtedly due to the absence of a panel survey with measures of hourly wages before the establishment of HILDA[19].

Harkness and Waldfogel (2003) empirically investigate cross-national differences in the motherhood gap in pay and conclude that wage gaps are wider in liberal welfare states, including Australia, than corporatist or social democratic welfare states (represented by Germany, and Finland and Sweden respectively). Data used in this study comes from the Luxembourg Income Survey (LIS) and covers the period 1991 to 1995. The absence of comparable data on work history in the harmonised LIS dataset means the study is not able to explain whether higher penalties in countries with de-regulated labour markets are due to steeper penalties for interruptions or other mechanisms. Descriptive comparisons of the mean wages of mothers and childless women show that Australian mothers' wages are around 6% higher than that of childless women (relative to the average male wages). Yet the regression analysis reveals a significant wage gap between mothers and childless women. After controlling for differences in age, education, race and region, mothers with one dependent child have 7.8% lower wages, mothers with two children 10.6% lower wages and mothers with three or more children 5.3% lower wages relative to childless women (differences are not statistically significant between childless women and mothers with one child and with three or more children). The wage model does not control for actual work experience or tenure, so the negative association between children and wages could be accounted for by a variety of factors, including differences in human capital, compensating differentials, discrimination or differences in work effort.

Similarly, the study by Whitehouse (2002) focuses on comparing motherhood gaps in pay between Australia and Britain, rather than explaining how children affect female wages. Whitehouse (2002) draws on data from the Australian Workplace Industrial Relations Survey (AWIRS), which collected information from around 20,000 employees in private sector organisations that had a workforce of at least 20 employees. In contrast to Harkness and Waldfogel (2003), descriptive comparisons in the study by Whitehouse (2002) suggest the mean wage of mothers is slightly lower than the mean wage of childless women, though the 0.3% gap is not statistically significant. After controlling for differences in age, education, ethnicity, tenure and

[19] The Negotiating the Lifecourse Survey (NLC), which commenced in 1997, focused on family and household characteristics and did not initially collect data that would allow for the calculation of hourly wage rates.

occupation, mothers' wages are found to be around equal to that of childless women. Whitehouse (2002) does observe a significant motherhood wage gap in Britain.

There are four main reasons regression findings differ in these two earlier analyses of the motherhood wage gap in Australia. First, the wage model estimated by Whitehouse (2002) controls for potential experience and tenure, whereas the model estimated by Harkness and Waldfogel (2003) only controls for potential experience. To the extent that tenure is a good proxy for human capital, the absence of a negative association between children and wages in the study by Whitehouse (2002) could be accounted for by the inclusion of a control for human capital. Of course, this would only arise if children principally lower female wages through employment interruptions.

Second, Whitehouse (2002) uses data from a survey of medium and large businesses in Australia. Although private sector employees were directly surveyed about their current wages, private sector employees working in businesses with fewer than 20 staff and public sector employees are not represented. In contrast, Harkness and Waldfogel (2003) use secondary data from a general population survey. Hence, the disparate findings might be due to differences in the employee population being studied.

Third, the two studies have different age bounds around the sample of women of child-bearing age. Harkness and Waldfogel (2003) examine the motherhood gap in pay among women aged 24 to 44 years, whereas Whitehouse (2002) widens the sample to include women aged 25 to 49 years. Both studies define motherhood according to the presence of dependent children in the household. Compared to women who have never had children, mothers with adult children are likely to have lower wages because of both employment interruptions and spells of part-time work. Given Whitehouse (2002) retains more older women, the childless reference group in this study is likely to have a higher proportion of women with adult, non-resident children than the childless group in the study by Harkness and Waldfogel (2003). With more mothers who have adult children classified as childless, estimates of average wage disparities by Whitehouse (2002) should be narrower than the estimates published by Harkness and Waldfogel (2003).

Finally, although the conclusions reached in these two previous analyses of the motherhood gap in pay in Australia differ markedly, inspection of the standard errors associated with coefficient estimates highlights the possibility that findings vary simply due to sampling. In the study by Harkness and Waldfogel (2003), standard errors

associated with coefficient estimates are large[20]. It is plausible, therefore, that findings would converge if the same measure of motherhood were specified.

Several cross-sectional studies of the gender gap in pay in Australia also include measures of parental status in estimated wage models. Findings from these studies suggest children are negatively associated with female wages, after controlling for potential experience, education, marital status and an assortment of other job characteristics (Eastough & Miller, 2004; Langford, 1995; Preston & Crockett, 1999a; Preston, 2000). A shortcoming with this research is that the focus has been on the determinants of men's and women's full-time wages. This analysis has excluded a substantial share of Australian mothers' who are employed in part-time jobs.

Both Harkness and Waldfogel (2003) and Whitehouse (2002) note that mothers concentration in part-time jobs may contribute to the overall motherhood gap in pay, though neither study empirically summarises the wage disadvantage associated with part-time employment. Whitehouse (2002, pp. 390 - 391) reports that part-time mothers have neither significantly higher nor lower wages than childless women who work part-time. Yet, it is unclear whether part-time employment is associated with higher or lower wages because this measure is not included in the main wage model, which is estimated for all female employees. Other recent cross-sectional studies of Australian wages show that women who work part-time have wages on par with their full-time counterparts, after controlling for detailed job characteristics (Preston, 2003; Rodgers, 2004)[21]. Moreover, longitudinal analysis using the first four waves of HILDA, reveals that part-time wages are significantly higher than full-time wages among Australian women, after controlling for a detailed series of job characteristics and unobserved heterogeneity (Booth & Wood, 2008). Together, these analyses of female wages suggest that the determinants of wage outcomes in Australia are not identical to the determinants of female wages in the US and British labour markets. In this thesis, I contribute to ongoing debates over whether motherhood does indeed negatively affect female wages in Australia. I also add to the research literature on how contemporary, de-regulated labour markets differ through a detailed investigation of how human capital and part-time work affect female wages in the Australian context.

[20] Whitehouse (2002, p. 390) does not publish standard errors, instead flagging coefficients that are significantly different from zero at the 5%, 1% and 0.1% level.

[21] An earlier study by Gornick and Jacobs (1996), however, showed that Australian women employed part-time received an hourly wage 11% lower than those employed full-time, controlling for education, age, occupation and industry. This study used survey data collected in 1986.

Aims of this thesis

The thesis aims to build on the two earlier studies of the motherhood wage gap in Australia. Three specific research questions are addressed. The first question I address is whether there is a motherhood wage gap in Australia in 2001[22]. My goal here is to present an updated estimate of the motherhood wage gap in Australia and to consider how mothers' selection out of employment might affect this summary indicator. The second question I address is whether employment interruptions and part-time working hours explain the negative effect of children on female wages. Previous research suggests mothers' participation in part-time employment may not explain the motherhood wage gap in Australia. I return to look at whether this remains the case and build on earlier research by considering the influence of the loss of human capital during employment interruptions. I also use longitudinal methods of analysis to control for unobserved differences between mothers and childless women. The third question I address is whether transitions into part-time work directly or indirectly lead to lower wage growth among mothers returning to paid work within 3 years of a birth. In this section of the thesis, I aim to contribute to ongoing debates about the quality of part-time work in Australia.

[22] The HILDA survey commenced in 2001 and it is for this reason I present a baseline estimate of the overall wage gap between mothers and childless women in Australia for the year 2001. Over time panel surveys tend to become less representative of the general population due to attrition.

Chapter 3: The overall motherhood wage gap in Australia

3.1 Introduction

The aim of this first results chapter is to provide baseline comparisons of the wages of mothers, childless women, fathers and childless men in Australia in 2001. I broadly contextualise these overall descriptive findings by comparing the wage gap between mothers and childless women in Australia with the gap reported for other industrialised countries, particularly the US and Britain. Unlike much previous research that summarises the overall wage gap between mothers and childless women, I explore whether mothers' selection out of employment affects estimates of the motherhood wage gap. Also, I compare my findings for the year 2001 with two earlier estimates of the overall motherhood wage gap in Australia from the mid 1990s.

This chapter is organised as follows. Section 3.2 summarises the findings of previous research examining the overall motherhood wage gap. I observe that estimates of the overall gap are sensitive to both research design and survey characteristics. In section 3.3, I describe the three samples from which I derive estimates of the overall parental wage gap and then explain how I measure parenthood. I also describe the demographic characteristics of the sample. Section 3.4 presents my results, where I summarise the mean wage of Australian mothers, childless women, fathers and childless men. Section 3.5 discusses how my Australian findings compare to other estimates of the overall motherhood wage gap.

3.2 Estimates of the overall motherhood wage gap

Most empirical research examining the influence of motherhood on female wages has been undertaken in the US. This body of research consistently shows that mothers' wages are lower than childless women's wages, though estimates of the magnitude of the overall wage disparity vary substantially. Various methods have been used to summarise the overall motherhood wage gap and this tends to impede the synthesis of research findings. In some studies, the overall motherhood wage gap is expressed as the absolute dollar difference calculated by subtracting the mean wage of mothers from the mean wage of childless women (e.g. Amuedo-Dorantes & Kimmel, 2005; Avallar & Smock, 2003). Often the wage gap between mothers and childless women is expressed as a percentage of childless women's mean wage (e.g. Anderson et al.,

2003; Korenman & Neumark, 1992). Alternatively, when panel data are available mothers' average wage is expressed as a function of the average wage received before having children (Budig & England, 2001; Gangl & Ziefle, 2009). In other studies, the mean wage of mothers and non-mothers is expressed as a percentage of the average male wage and the motherhood wage gap is defined as the wage difference relative to the average male wage (e.g. Harkness & Waldfogel, 2003; Waldfogel, 1998a).

Varied estimates of the overall motherhood wage gap in the US have been produced even for studies using a similar method. Estimates of the overall gap, expressed as a percentage of childless women's mean wage, have been put at around -22% by Avallar and Smock (2003) and Waldfogel (1998)[23]. Using panel data, Gangl and Ziefle (2009) observe an overall gap of -16% per child (2009). Other studies have reported a far narrower overall wage gap. Amuedo-Dorantes and Kimmel (2005) and Anderson et al. (2003) both report an overall motherhood gap of -6%. Yet Budig and England (2001) observe a gap of -6% per child using panel data. Estimates of the overall motherhood wage gap appear to be sensitive to research design. Methodological differences in terms of the breadth of the female population across which inferences apply and the specification of motherhood vary quite substantially across this body of research (I return to discuss these issues again in a subsequent section). Table 3.9 in Appendix 3A summarises the various methods, samples and measures of parenthood in eight US studies.

Fewer studies of the motherhood wage gap are available for countries other than the US. In Britain, the wages of mothers do appear to be significantly lower than the wages of childless women. Estimates of the overall motherhood wage gap in Britain are typically reported as the difference in mothers' and childless women's wages, expressed relative to mean male wage. Drawing on survey data from 1995, Harkness and Waldfogel (2003) report that mothers' mean wage is around 12.7% lower than that of childless women. Another British study observed a motherhood wage gap of -20% in the early 1990s (Waldfogel, 1998). Using panel data for the period 1991 to 2001, Gangl and Ziefle (2009) find that each biological child lowers female wages by 13% among a

[23] In both of these studies I derive this percentage estimate of the motherhood wage gap. Avallar and Smock (2003) publish absolute wage gaps by subtracting the mean wage of childless women from the mean wage of mothers. Here I report this difference as a percentage of the mean wage of childless women. Waldfogel (1998a) publishes an estimate the US motherhood gap as a raw dollar difference ($1997) and as a percentage of the mean male wage.

cohort of women born 1965 to 1969. In this same paper, the overall motherhood wage gap for German women is found to be -18% per child for women born 1960 to 1964 and -16% per child for women born 1965 to 1969. These studies are described in detail in Table 3.10 in Appendix 3A.

Other recent country-specific studies are notable for the absence of a motherhood wage gap. Drolet (2002) and Datta Gupta and Smith (2002) report that mothers' wages are, on average, equivalent to the wages of childless women in Canada and Denmark respectively (for Denmark see also Simonsen & Skipper, 2006). Taken together, these country-specific research findings point to the possibility that the motherhood wage gap is a distinctive feature of some, but not necessarily all, industrialised labour markets.

Cross-national comparisons

Cross-national comparisons of mothers' relative wages enable a more rigorous investigation of whether the motherhood wage gap is a feature common to all developed countries, or alternately is unique to particular types of labour markets. Here I review findings from four recent studies (Davies & Pierre, 2005; Dupuy & Fernández-Kranz, forthcoming; Gash, 2009; Harkness & Waldfogel, 2003). To the extent children negatively affect wages through employment interruptions, cross-national variation in the overall motherhood wage gap is likely to be influenced by work-family policies that encourage mothers' employment, including maternity and parental leave and publically provided child-child (Gash, 2009). Comparing the overall motherhood gap across seven countries, Harkness and Waldfogel (2003) found that the overall gap tends to be narrower in states with more generous work-family provisions, represented by Sweden, Finland and Germany, than in states that provide less assistance to employed mothers, represented by the UK, US, Canada and Australia (see Table 3.11 in Appendix 3A for a summary of the overall wage gap in each country). In another study by Gash (2009), a significant motherhood wage gap is observed in the United Kingdom and West Germany, but not Finland, Denmark and France. This pattern is attributed to differences in parental leave and public child care.

Another recent cross-national study by Dupuy and Ferdández-Kranz (forthcoming) investigates how parental leave provisions and other job protections affect the size of the motherhood wage gap. The study examines the motherhood wage gap in 35 countries over the period 1998 to 2004. Results show that the motherhood

wage gap is significantly narrower in countries that provide a longer duration of parental leave. Countries that have stronger protections against job dismissal also tend to have narrower motherhood wage gaps. Dupuy and Ferdández-Kranz (forthcoming) suggest both parental leave and general protections against job dismissal allow more mothers to continue working for an employer and this reduces the likelihood of downward wage mobility associated with moving between organisations.

Another set of policies discussed in the cross-national comparative research on gender inequality are wage setting institutions, particularly the extent of collective bargaining and state mandated minimum wages. Research has shown that the gender wage gap tends to be widest in countries with deregulated wage setting systems where coverage of collective bargaining agreements and minimum wages are lower (Blau & Kahn, 1996, 2003; Mandel & Semyonov, 2005; OECD, 2002b). Countries with more centralised systems of wage determination have lower gender wage gaps because of the compression of wage inequalities between high paid jobs, which are more likely to be filled by men, and low paid jobs, which are more likely to be filled by women. For a similar reason, centralised wage setting institutions might also reduce the magnitude of the overall motherhood wage gap. Dupuy and Ferdández-Kranz (forthcoming), however, found no significant correlation between the motherhood wage gap and the relative value of the minimum wage (measured as the ratio of the minimum wage to the average wage). This study also found that countries with narrow gender wage gaps do not necessarily have narrow motherhood wage gaps. This finding implies that wage setting institutions, which have been found to explain cross-national variation in the gender wage gap (Blau & Kahn, 1996, 2003; Mandel & Semyonov, 2005), may be less important when it comes to understanding the size of the overall motherhood wage gap.

The motherhood wage gap in Australia

Cross-national comparative research suggests that countries with reasonably long periods of paid maternity and direct public funding for child care tend to have a narrower motherhood wage gap (Gash, 2009; Harkness & Waldfogel, 2003). Given Australia has neither a statutory paid maternity leave scheme nor an extensive system of public child care centres, it might be expected that the motherhood wage gap would be as wide in Australia as it is in the US and UK. Yet findings from two previous cross-national comparative studies suggest this is not the case. A study by Whitehouse (2002) shows mothers and childless women's wages are about equal in Australia,

whereas in Britain there is a motherhood wage gap of -6.3%. A second study by Harkness and Waldfogel (2003) investigates the motherhood wage gap in Australia alongside the US, UK, Canada, Germany, Finland and Sweden. Descriptive comparisons in this study show that Australian mothers' wages are actually higher than the wages of childless women. On average, mothers' wages are 6% higher than childless women's wages. For Australian mothers who work full-time, however, there is a motherhood wage gap of -3.5%. This study finds a markedly wider motherhood wage gap in the UK (-13%) and US (-8%), but not Canada (+1%).

In summary, previous research suggests the overall motherhood wage gap in Australia is not as wide as the gap in the US and Britain. In these studies the absence of a negative association between children and wages at the aggregate level is explained with reference to variation in the wage distribution. Whitehouse (2002) observes that the median wage of Australian mothers is higher in the male wage distribution than the median wage of British mothers. This arises from differences in the position of part-time employees, most of whom are mothers, in the Australian and British wage distributions. In turn, Whitehouse (2002) argues that the regulation of part-time employment in Australia, rather than the wage distribution per se, explains why mothers' wages are equal to that of childless women. Analysis by Harkness and Waldfogel (2003), however, suggests that the more compressed wage distribution may partly account for the narrower motherhood wage gap observed for full-time women in Australia[24]. Among full-time employees, the positions of childless women and mothers in the male wage distribution are closer in Australia than they are in the UK and US, though this is partly because childless women are located in a slightly lower position in the male wage distribution in Australia (see Table 3.1). Previous studies find the motherhood wage gap in Australia is narrower than the overall gap in the US and Britain and that this is at least partly attributable to differences in wage setting institutions and the extent of wage dispersion.

[24] However, Harkness and Waldfogel (2003) do argue that cross-national variation in the overall wage distribution does not account for differences between the motherhood wage gap in liberal welfare states and the gap in Scandinavian and Corporatist welfare states.

Table 3.1: Location of mothers and childless women in the male wage distribution, Australia, the UK and the US

Mean percentile ranking in male wage distribution	Australia	United Kingdom	United States
All employees			
Childless women	41.1	40.3	42.8
Mothers	40.2	29.0	36.9
Childless - mothers	0.9	11.4	5.9
Full-time employees			
Childless women	40.6	41.3	44.3
Mothers	37.1	36.1	38.6
Childless - mothers	3.5	5.2	5.7

Note: Mean rankings have been rounded and so differences may not be vary due to rounding.
Source: Harkness and Waldfogel (2003).

Research question

The aim of this chapter is to present baseline estimates of the overall motherhood wage gap, reproducing an estimate for 2001 that is broadly comparable to estimates previously reported by Whitehouse (2002) and Harkness and Waldfogel (2003). In 2001, I expect that mothers' mean wage will be roughly equal to the mean wage of childless women. Although deregulation of the Australian labour market has continued throughout this period, research suggests changes have proceeded unevenly across different industries and occupational groups (Whitehouse, 2001). In particular, wages and conditions in feminised industries, which have historically had low levels of unionisation and weak bargaining power, may not have been affected to the same degree as masculinised industries that had a strong union presence.

In addition, I build on the two earlier analyses of the overall motherhood wage gap in Australia through an analysis of the characteristics of mothers who are not employed. My descriptive analysis considers whether the potential wages of mothers who are not employed are low relative to the observed wages of mothers who are currently employed. I impute the potential wage of mothers not currently employed using information on earnings and working hours in a previous job. Using last wage to approximate women's potential wage rate enables me to see how the overall motherhood wage gap would change if the gap in employment between Australian mothers and childless women closed. In focusing on a single country, I am able to draw on detailed micro-data to investigate how mothers' selection out of employment influences efforts to summarise mothers' relative disadvantage in the labour market.

In this chapter, I do not present comparative research on the potential wage of mothers who are not employed in the US and Britain. Harmonised cross-national

datasets sacrifice detail for consistency and lack information on past employment from which a potential wage can be derived. Instead, I use detailed information from a large survey to explore whether mothers' selection out of employment does bias a summary indicator of the motherhood wage gap in Australia. I leave a comprehensive assessment of the affect of mothers' selection of out employment in the US and Britain to future research[25].

Method to summarise the overall motherhood wage gap

Across studies documenting the overall motherhood wage gap there is marked variation in research approach. In particular, studies vary in terms of: (a) the equation used to calculate the overall motherhood wage gap; (b) the specific population to which inferences apply; and (c) the definition of motherhood. I discuss the influence of each of these factors in turn.

Summary estimates of the overall motherhood wage gap have been reported in two different ways[26]. The first approach is to report the wage gap between mothers and childless women as a percentage of childless women's mean wage. Percentages can be derived using either raw wages or wages transformed to the natural log. Motherhood wage gaps with untransformed wages are calculated using the equation:

$$\frac{\left(\bar{x}_{mot} - \bar{x}_{cl}\right) * 100}{\bar{x}_{cl}}$$

where mot references women with children and cl references childless women. With logged wage data, the motherhood wage gap equates to the mean log wage of mothers minus the mean log wage of childless women. In the framework of linear regression, the percentage gap is also approximated by the coefficient value for the motherhood dummy variable. Where wages are transformed to a natural log the resulting percentage gap may diverge slightly from the percentage observed with untransformed wage data[27]. The second approach is to report the overall wage gap

[25] Using panel survey data and fixed-effects regression, Gangl and Ziefle (2009) did find evidence of sample selection bias when estimating the overall motherhood wage penalty in the US, Britain and Germany.

[26] Another approach, when panel data are available, is to express mothers' average wage as a function of the average wage received before having children. This is achieved using fixed-effects regression. I return to describe this method in detail in the next chapter. I do not apply fixed-effects regression in this chapter, which is why I do not describe this method here.

[27] The reason for this is that the average wage gap derived from untransformed wage data is based on the arithmetic mean of mothers' and childless women's raw wages, whereas the

between mothers and childless women in terms of the average male wage. The equation is:

$$\frac{\left(\bar{x}_{mot} - \bar{x}_{cl}\right)*100}{\bar{x}_{men}}$$

The estimate of the overall motherhood wage gap will vary depending on the denominator used to convert a dollar difference into a percentage. Where the average male wage is higher than the average wage of childless women, estimates of the overall motherhood wage gap using the second method will tend to be narrower than that produced using the first method because the denominator is larger.

Estimates of the overall motherhood wage gap are also derived for quite varied populations of women. Analysis diverges on the age bounds of the sample and the treatment of women who are not currently employed. In terms of the age bounds, a distinction can be drawn between general individual or household surveys and cohort surveys, the latter representing a much narrower segment of the female population. The main disadvantage of general population surveys is that the wage comparison between childless women and mothers tends to be obscured by the inclusion of young women who have recently entered the labour market on a full-time basis. Entrance into the labour market after the completion of secondary or tertiary education is often via a job located in the lowest strata of an occupation where wages are low due to the absence of firm-specific or job-specific human capital. Although some women do give birth to their first child shortly after the completion of their education, this is increasingly the experience of a minority. Most Australian women delay the birth of their first child until their late 20s or early 30s and care for children throughout their 30s and into their early 40s (Lattimore & Pobke, 2008). Hence, estimates of the overall motherhood wage gap from general population surveys tend to contrast the wages of mothers, most of whom are aged 30 to 40 years, with the wages of childless women, a large proportion of whom are young women who intend to commence child-rearing at a later age[28].

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average wage gap derived from logged wage data is based on the geometric mean of mothers' and childless women's raw wages. The difference between the mean log wage of childless women and the mean log wage of mothers is equivalent to the log of the ratio of geometric means of untransformed wages. Arithmetic mean wages are always greater than geometric mean wages (except where all observations are identical in which case the arithmetic mean is equal to the geometric mean), though how this transformation would affect a ratio cannot be deduced a priori.

[28] In other words, the mean wage of mothers is elevated because relatively more older women and fewer younger women fall in the category of mother than the category never had any children.

Most estimates of the overall motherhood wage gap are based on a sample of currently employed women. To the extent that mothers with a low potential wage remain outside of the labour force, the observed wage differential between currently employed mothers and childless women will be less marked than would hypothetically be the case were all mothers in paid employment. This means the sample becomes truncated as a disproportionate share of low-waged mothers are absent from the observed wage distribution and the observed mean wage of mothers shifts upwards. One approach for estimating a motherhood wage gap for the hypothetical scenario of no selection out of employment is to impute a potential wage for those women who are not employed. Anderson et al. (2003) and Waldfogel (1998) take female respondents last reported wage as a proxy for their potential wage. Interestingly, in these two studies estimates of the motherhood wage gap are no wider than estimates published in other studies that ignore selection. This suggests that US mothers' selection out of employment is not linked to potential wage. The same may not be true in Australia where mothers' employment rates are lower and where remaining in employment may be more selective.

Another point of different across the research literature is in the definition of motherhood. Two slightly different definitions of motherhood are used. Several studies define mothers in terms of fertility history, with the category of mother including all women who have had at least one biological (or adopted) child. Alternatively, motherhood has been defined by the presence of a least one resident, dependent child (and in most cases this includes step children). This second measure is problematic where the "childless" reference category includes women with adult children. On the one hand, mothers with non-dependent children could be conceived as childless because they do not care for a dependent child on a daily basis. On the other hand, mothers with adult children are likely to have interrupted employment to care for children and to have worked part-time for an extended period and this may have a long-term negative effect on wages. Theories of human capital imply that the classification of mothers with adult children as childless would narrow estimates of the overall wage gap. There does not appear to be agreement in the research literature on how to treat mothers with adult, non-dependent children. This partly reflects differences in opinion on the degree human capital structures wage outcomes. Also, most social and economic surveys collect data on resident children, meaning many researchers have had no option but to rely on a measure of dependent children.

In summary, differences in research method will influence the calculation of an overall motherhood wage gap. It is difficult to isolate factors that consistently produce a relatively high or low estimate of the overall motherhood gap in pay. This is partly because studies vary along several dimensions, namely the calculation method, target population, treatment of selection into employment and definition of motherhood. Cohort and period effects are also likely to explain some variation in estimates of the overall motherhood gap in pay for a given country, but it is unclear whether this is more or less important than the method applied[29]. In this chapter, I calculate an overall motherhood wage gap using a variety of techniques to check the robustness of my descriptive findings.

3.3 Method

Samples

In this chapter, summary estimates of the overall motherhood wage gap in Australia in 2001 are derived for three different populations. These are:

- all men and women who are self-employed or an employee and who receive a wage or salary, 2001 (Sample A)
- all male and female employees who receive a wage or salary, 2001 (Sample B)
- all females who have worked as a waged or salaried employee for a period between 1996 and 2001 (Sample C)

Data for all three samples come from HILDA wave 1.

Sample A includes all men and women aged 22 to 45 years who currently receive a wage or salary either from an employer or through self-employment. The age range captures women in the prime child-bearing years and has been used in many previous analyses of the motherhood gap in pay. Following convention, the sample excludes respondents enrolled in full-time study (151 female and 129 male respondents). I also exclude employed persons who only have adult or non-resident children (162 female

[29] Most US analyses of the motherhood wage gap draw on data from the National Longitudinal Survey of Youth (NLSY79), an ongoing panel survey. Data available through the panel survey varies temporally as subsequent waves of data are collected, so studies undertaken at different times will be using quite varied samples for analysis. I summarise these sample differences in the appendix to this chapter. The aging of the cohort, which is linked to the availability of additional waves of data, undoubtedly explains some heterogeneity in the overall motherhood wage gap across research papers drawing on NLSY79. Differing estimates of the overall pay gap could also plausibly be linked to changes in earnings imputation and/or changes in survey weights as the panel progressed.

and 278 male respondents) because there are conflicting theoretical views on whether these women should be categorised as childless women or as mothers. Respondents whose first child was born before they reached 18 years of age are also excluded because they typically commenced child-rearing before entering the labour market on a full-time basis (108 female and 101 male respondents). Finally, I exclude employed persons working fewer than 6 hours per week or more than 60 hours per week because these respondents often had extremely low or high wages, as well as remaining cases where wages were especially low (less than $2 per hour) or high (more than $120 per hour) [30].

In Australia, self-employed persons may choose to transfer business income to personal accounts through regular wage or salary "payments". This is by no means universal and some self-employed persons do not receive a wage or salary. In this chapter, sample A only includes self-employed men and women who receive a regular wage or salary. This decision was made because of the difficulty of estimating a monetary return per hour of labour using data on net business income (which was only collected with reference to the previous financial year in HILDA). Although not all self-employed persons are represented in Sample A, estimates of the overall motherhood wage gap using this sample are broadly comparable to an earlier estimate published by Harkness and Waldfogel (2002). Harkness and Waldfogel's (2002) estimate of the motherhood wage gap Australia is derived using the LIS and a sample of employed women aged 24 to 44 years who were receiving cash income for labour provided to an employer or for labour provided to their own incorporated business[31].

Sample B is restricted to employees. Due to the relatively high levels of non-response on current labour income for self-employed females, all subsequent analysis in this thesis is confined to the population of female employees. This decision is also informed by substantive arguments. Many of the theoretical models explaining the potential causes of the motherhood wage gap highlight workplace processes and

[30] My definition of an outlying wage observation is somewhat arbitrary. I chose lower and upper bounds by visually inspecting the wage distribution for male and female employees separately.
[31] Harkness and Waldfogel (2003) state that their sample excludes those persons they identify as self-employed. However, the ABS (2007b, see section 4.4), which supplies Australian data to the LIS, classifies employees as "a person who works for a public or private employer and receives remuneration in wages, salary, a retainer fee from their employer while working on a commission basis, tips, piece-rates, or payment in kind; or a person who operates his or her own incorporated enterprise with or without hiring employees". In contrast, I define all persons working in their own incorporated enterprise as self-employed. My definition of self-employment also includes persons the ABS classifies as self-employed, that being "a person who operates his or her own unincorporated economic enterprise or engages independently in a profession or trade, and hires one or more employees."

employer behaviours with respect to the wages of employees. The overall parental wage gap for sample B constitutes the key baseline estimate underlying the regression modelling developed in later chapters of this thesis. For reasons noted above, I exclude respondents who are enrolled in full-time study, have non-dependent children and had their first child as a teenager from sample B. After removing employees working fewer than 6 hours or more than 60 hour per week and those who have missing or invalid wage data, I am left with a sample of 1,775 female employees and 1,697 male employees aged 22 to 45 years. Missing, invalid or outlying data on work hours or weekly earnings contributes to the loss of 4% of all female employees and 6% of all male employees.

Sample C is again restricted to employees, but I include women who are not currently employed and for whom I can derive a potential wage rate. Potential wages are viewed here as an approximation of the hourly wage a given woman would have received had she been working for an employer in 2001. Sample C is only constructed for women because few men aged 22 to 45 years are outside paid employment in 2001. Unfortunately, the HILDA questionnaire only allows for the construction of a potential wage for those who were last employed between 1996 and 2001[32]. This means sample C excludes 265 female respondents who were last employed 6 or more years prior to 2001. This constitutes around 32% of female respondents not currently in paid employment. In addition, 55 female respondents are excluded because they have never worked for pay and another 33 because they were not a waged or salaried employee in their last job (where this was in the previous 5 years). After excluding all cases with item non-response on previous earnings or previous hours worked (115 female respondents), I have a potential wage for 50% of female respondents who are not employed in 2001 (see Table 3.2).

[32] Although earnings in last job is available for respondents who have been outside in the labour force for more than 5 years, the year the respondent's last job finished is collected in the categories 6 to 10 years, 11 to 15 years, 16 to 20 years and 21 years or more. I am not able to precisely adjust a previous wage to 2001 prices for women who marked one of these four categories. Of the 265 women aged 22 to 45 years who did not work in the last 5 years, only 46% last worked 6 to 10 years prior to 2001 (these figures exclude women with non-dependent children). Given the spread of each category (5 year groupings) and the likelihood of wage depreciation during such an extended interruption to employment, I decided not to impute wages for these 265 female respondents.

Table 3.2: Male and female respondents in analytic sample as percent of male and female respondents at wave 1

	Females, 22 - 45 years		Males, 22 - 45 years	
	Percent	**Total n**	**Percent**	**Total n**
Employed	72.0	2,116	90.5	2,264
Self-employed and employees who receive wage / salary (Sample A)	65.2	1,915	76.2	1,908
Employees who receive wage / salary (Sample B)	60.4	1,775	67.8	1,697
Self-employed who receive wage / salary	4.8	140	8.4	211
Current or recent employees who received wage / salary between 1996 - 2001 (Sample C)	74.3	2,183	-	
Not employed currently and did not work as an employee for a wage / salary between 1996 - 2001	13.9	408	-	
All respondents	100%	2,939	100%	2,502

Note: Excludes respondents in full-time education, respondents who have never been employed since leaving full-time education, respondents who had their first child at age 17 years or younger and respondents with missing or invalid information at age first biological child was born.
Percentages are not weighted.
Source: HILDA wave 1 (2001)

Estimates of the motherhood wage gap derived for sample C only partially adjust for mothers' selection out of employment and may be positively biased if mothers with low wages are more likely to exit employment for more than 5 years. Also, the potential wages I derive for mothers who are not employed may overestimate potential returns to labour if human capital depreciates during career interruptions. Despite these two limitations, the comparison of the actual motherhood wage gap for current employees and the simulated scenario of higher levels of maternal employment still provides a rough indication on whether selection out of employment occurs at random with respect to wages. (Shortly, I compare the characteristics of mothers who have been outside paid employment for more than 5 years from mothers who have worked as an employee within the previous 5 years.)

As noted earlier, young women who have recently exited full-time education tend to attract comparatively lower wages than older women, as the latter group typically have greater job-specific and firm-specific human capital. Yet as women increasingly delay fertility, the question arises whether the mean wage of all childless women, many still in their early to mid 20s, still constitutes a substantively meaningful counterfactual. I partly respond to this issue by deriving a motherhood wage gap for samples B and C broken down into 5 year age groupings. The age groups are: 22 to 25 (spanning only 4 years), 26 to 30, 31 to 35, 36 to 40 and 41 to 45 years. This allows me to compare

wages among sub-populations of women who are more alike in terms of potential work experience. (In the next chapter, I estimate the overall motherhood wage gap using regression techniques to control for differences in women's potential experience.)

Given existing research on mothers' wages draws on quite varied samples, I assess whether my Australian estimate of the overall motherhood wage gap is sensitive to the sample exclusions I apply. These analyses are presented in Appendix 3B. For the most part, estimates of the overall motherhood wage gap change only slightly as the sample bounds and the operationalisation of motherhood are varied.

Comparisons of the HILDA wave 1 respondent sample with Australian population benchmarks in 2001 shows that women, persons aged 35 to 44 years, persons living in a household with a partner and with children (aged less than 15 years or dependent aged 15 years and over) and persons born in Australia are slightly over-represented in the wave 1 sample (Watson & Wooden, 2002b). Lone parents with a child less than 15 years are also slightly overrepresented, while young adults (20 to 24 years) are underrepresented (Watson & Wooden, 2002b). To take account of these patterns of response, all descriptive statistics are adjusted using the person weights provided with HILDA[33].

Variance estimates take account of sample clustering and stratification using the first-order Taylor linearization (Stata Press, 2008). Wald tests, using an *F*-statistic, are used to test the null hypothesis that the mean wage of mothers is equal to the mean wage of childless women. Tests within each of the five age groups are conducted jointly with a Bonferroni correction.

Dependent variable

In this chapter, I calculate the overall motherhood wage gap using the two summary methods described in the literature review[34]. I calculate a percentage gap as a function

[33] The cross-sectional respondent weights provided with wave 1 adjust for the probability of household selection into the initial sample, which was stratified by state and metropolitan / non-metropolitan region and clustered within geographic units (Census Collection Districts). The weights are further adjusted using population benchmarks for sex, age, labour force status, marital status and occupation (Watson, 2008).

[34] This is necessary because Harkness and Waldfogel (2003) do not publish mean wages separately in each national currency. This means I am not able to derive a comparable percentage in terms of the mean wage of childless women.

of the mean wage of childless women and men using untransformed wage data[35]. Hourly wages are derived using data on labour income from of a wage or salary and weekly work hours in the respondent's current main job. For respondents with two jobs, hourly earnings are derived using weekly earnings and hours in the job where the greatest income is received each week. Weekly earnings was collected in the survey using the question "what was the total gross amount of your most recent pay *before* tax or anything else was taken out", followed by "and what period does that cover" (Wooden, 2006, pp. 19 - 20). Estimates of usual weekly earnings were requested in place of most recent weekly earnings for those employees whose most recent wage or salary payment was not typical of their usual wage or salary. Two strategies were used to derive weekly earnings for those respondents who are unable to estimate their gross weekly earnings. First, where respondents were unable to estimate their most recent (or usual) gross earnings, the interviewer probed for an estimate of net earnings. An estimate of gross weekly earnings was derived from this information, together with data on pay deductions and the relevant tax schedule. Second, weekly earnings were imputed for a small number of respondents who were not able or willing to answer the follow-up question on net earnings. The conversion of net weekly earnings to gross weekly earnings, using current tax schedules, and the imputation of missing earnings data using the Little and Su and Nearest Neighbour methods was undertaken by statisticians at MIAESR (Hayes & Watson, 2009).

Total working hours includes paid and unpaid overtime, as well as work done both at the workplace and at home. This information is asked using the question, "including any paid or unpaid overtime, how many hours per week do you usually work in your main job?" (Wooden, 2006). For respondents reporting that their hours vary a follow-up question asks, "including any paid or unpaid overtime, how many hours per week do you work on average over a usual 4-week period in your main job?" (Wooden, 2006). I use responses on this second question to derive a wage rate for respondents who have varying work hours. Table 3.3**Error! Reference source not found.** describes the frequency of each type of response on the earnings and work hours questions in HILDA.

[35] The descriptive analysis was replicated with hourly wages transformed to a natural log and the percentage motherhood gap in pay computed using OLS regression with a single predictor variable for having had children. Results vary slightly with the transformed data but do not alter the main findings. These results are not presented in this chapter.

Potential wages are derived for female respondents who are not currently employed and who have worked for an employer in the previous 5 years. Respondents could provide an estimate of earnings in their last job in terms of an hourly rate or the

Table 3.3: Response pattern on weekly earnings and work hours questions by gender and mean wages by response pattern and gender, wave 1

Earnings response	Work hours response	Percent	Hourly wage, main job		
			Mean	(SE)	Total n
Women - self-employed and employees					
Gross earnings last pay period	Usual work hours	72.3	$18.66	(0.24)	1,385
	Average hours	6.7	$19.49	(0.74)	128
Net earnings last pay period	Usual work hours	3.6	$19.04	(0.97)	68
	Average hours	0.4	$17.66	(3.27)	8
Usual gross earnings per pay period	Usual work hours	9.9	$16.75	(0.57)	189
	Average hours	2.8	$14.24	(0.67)	53
Usual net earnings per pay period	Usual work hours	0.4	$14.28	(1.75)	7
	Average hours	0.2	$12.24	(3.08)	3
Impute gross earnings per week	Usual work hours	3.3	$20.71	(1.64)	64
	Average hours	0.5	$23.91	(3.47)	10
Men - self-employed and employees					
Gross earnings last pay period	Usual work hours	73.6	$21.70	(0.36)	1,405
	Average hours	7.5	$20.84	(0.98)	143
Net earnings last pay period	Usual work hours	3.1	$18.60	(0.95)	59
	Average hours	0.5	$25.45	(3.93)	9
Usual gross earnings per pay period	Usual work hours	10.4	$18.42	(0.64)	199
	Average hours	2.1	$15.98	(1.01)	40
Usual net earnings per pay period	Usual work hours	0.5	$18.47	(1.38)	9
	Average hours	0.1	$13.67	-	1
Impute gross earnings per week	Usual work hours	2.1	$23.71	(2.18)	41
	Average hours	0.1	$13.20	(1.33)	2

Note: Percentages and means are not weighted. Standard errors are adjusted for sample design.
Source: HILDA, wave 1 (2001).

payment they received per week, fortnight or month[36]. Hourly wages are derived using information on working hours in last job. The potential wage is adjusted to 2001 dollars using the Consumer Price Index (CPI, ABS, 2007a). I remove observations where the hourly wage is implausibly low, which I define as less than $2 per hour. After inspecting

[36] I am not able to derive an hourly rate of pay for respondents (n = 75) providing an annual estimate of the earnings received in their last job as the survey does not include a question item on weeks worked.

the wage distribution, I exclude isolated cases where the derived wage rate is above $120 per hour and potentially very influential.

Another important analytic issue is how to classify women who have adult children. In this thesis, I exclude parents who only have non-dependent children from the sample because there are conflicting theoretical views on how to classify this group[37]. Throughout the thesis, motherhood (and fatherhood) is operationalised as women (and men) who have responsibility for at least one resident biological or adopted child aged 17 years or less[38]. Childless persons are defined as persons who have not given birth to or fathered any biological or adoptive child and who currently do not have parental responsibility for a resident child aged 17 years or younger. In supplementary analysis, published in Appendix 3B, I explore the sensitivity of estimates of the overall motherhood wage gap by including mothers who have adult or non-resident children.

Sample characteristics

Table 3.4 presents the percentage of male and female respondents with children for the three analytic samples. To investigate how mothers' selection out of employment influences the composition of the three samples, I also report a percentage for all female respondents, excluding only those who have never worked in a job or those still enrolled in full-time education. Column 2 shows that 56% of all waged or salaried female respondents and 52% of waged or salaried male respondents have dependent children. A similar percentage of male and female respondents have children when the sample is restricted to waged or salaried employees (column 3). Hence, there is no evidence that parents are more likely to be self-employed than those without children.

The comparisons confirm that the percentage of female respondents with children is lower among the currently employed than among the wider sample of respondents. Sixty-seven percent of female wave 1 respondents have dependent children, compared to 56% of employed females and 55% of female employees. With the inclusion of women for whom I can derive a potential wage (sample C, column 4), the percentage of mothers rises to 62%. However, the percentage of mothers in

[37] Non-dependent children include resident children aged 18 years or older and biological or adopted children living in a different household more than 50% of the time.
[38] The HILDA survey defines a resident child as a child who spends at least 50% of their time residing in a given household, or a child who spends less than 50% in a given residence because they usually live in a non-private dwelling, such as a boarding school. I follow this convention.

sample C still does not equal the percentage observed in the larger sample of female wave 1 respondents. This implies mothers are more likely than childless women to have not worked for an employer in the last 5 years.

Table 3.4: Percentage of male and female respondents with children in analytic sample and all wave 1 respondents, male and female respondents aged 22 - 45 years

Parental status	Self-employed and employees, waged (sample A)	Employee, waged (sample B)	Current / recent employee, waged (sample C)	All 22 - 45 years
Women				
Childless	43.7	44.8	38.5	32.6
Mothers	56.3	55.2	61.5	67.4
Total n	1,915	1,775	2,183	2,939
Men				
Childless	48.2	49.9	-	47.1
Fathers	51.8	50.1	-	52.9
Total n	1,908	1,697	-	2,502

Note: Excludes respondents in full-time education, respondents who have never been employed since leaving full-time education, respondents who had their first child at age 17 years or younger and respondents with missing or invalid information at age first biological child was born. Percentages are not weighted.
Source: HILDA wave 1 (2001).

Table 3.5 describes the characteristics of mothers across the three analytic samples. Again, I also present corresponding figures for mothers responding at wave 1, with the exception of those who have never worked in a job or are still in full-time education (see column 5 to the far right of Table 3.5). As expected, mothers with a youngest child aged less than 6 years are underrepresented in both the sample of current employees (sample B) and all employed (sample A), in comparison to all mothers with a pre-school child. Comparing columns 5 and 2 shows 54% of all women have a youngest child aged 5 years or less while the figure for women currently working as an employee is 42%. In sample C, current and past employees, the share of mothers with a child aged 5 years or younger rises to 52%. Therefore, sample C does appear to capture the potential wages of a substantial portion of mothers who have young children and are not currently employed.

The lower panel of Table 3.5 describes the distribution on number of children ever given birth to in the three samples. Among mothers who currently work as an employee, 25% have had one child, 44% have had two children and 31% have had three or more children. The distribution is remarkably similar for sample C (column 4),

where I include additional mothers who are not currently employed but have worked as an employee in the previous 5 years. Yet for the full sample of female respondents, both employed and not employed, the percentage of mothers with three or more children rises by around six percentage points to 36%. This implies that mothers with three or more children are more likely to be outside of paid employment for extended periods of time than mothers with fewer than three children.

Table 3.5: Distribution on number of children in each analytic sample and all wave 1 respondents, mothers aged 22 - 45 years

	Self-employed and employees, waged (sample A)	Employee, waged (sample B)	Current / recent employee (sample C)	All 22 - 45 years
Age youngest child				
Less than 6 years	43.0	42.2	51.8	53.8
6 - 12 years	41.7	42.1	34.7	34.0
13 - 17 years	15.3	15.7	13.5	12.3
Number of children				
One child	23.8	24.9	25.9	22.7
Two children	43.8	44.0	43.6	41.0
Three or more	32.4	31.1	30.5	36.2
Total n	1,078	979	1,342	1,981

Note: Excludes respondents in full-time education, respondents who have never been employed since leaving full-time education, respondents who had their first child at age 17 years or younger, mothers with non-dependent children and respondents with missing or invalid information at age first biological child was born. Percentages are not weighted.
Source: HILDA wave 1 (2001).

Table 3.6 explores how women's exits from employment might influence the composition of the sample of female employees (sample B). The tabular analysis examines whether women's employment status in 2001 (and over the 5 years prior) varies by occupational and education class, as well as by several demographic characteristics found to be important in previous studies (Baxter, 2005b; Gray, Qu, De Vaus & Millward, 2003). I present these figures for mothers and childless women combined because most women who are not currently employed have children. I present figures for the sample, though percentages are similar when population weights are applied (results not shown). The descriptive analysis confirms that Australian women of higher socio-economic class, as indicated by current highest level of education and current or last occupation, are more likely to be employed in 2001 than women of lower socio-economic class. Around 84% of women with a degree or higher qualification are working as an employee (and 6.3% in self-employment), whereas only 59.4% of women without any post-school qualifications are working as an

employee (and 5% in self-employment) in 2001. Turning to look at non-employment, I find that women without a tertiary qualification are the most likely to have not worked as a waged employee between 1996 and 2001 (15%), followed by women who have a diploma or certificate (7.8%). These figures suggest selection out of employment for a prolonged period is associated with individual characteristics correlated with lower

Table 3.6: Employment status by labour market location and demographic characteristics, women aged 22 - 45 years, 2001

	Employee (sample B)	Self-employed	Not employed		Total n
			Employee in last 5 years	Not employee in last 5 years	
Labour market location					
Occupation [a] ***					
Manager / professional	80.9	7.4	7.9	3.8	
Clerical	64.5	4.1	19.3	12.1	1,037
Manual	48.5	3.9	25.9	21.7	1,145
Education ***					
High school or less	59.4	5.0	20.5	15.1	1,293
Diploma / certificate	71.0	5.2	16.0	7.8	601
Degree or higher	83.6	6.3	6.8	3.3	694
Demographics					
Age of youngest child ***					
No children	89.0	4.6	5.0	1.3	894
Less than 6 years	47.6	5.8	32.5	14.2	868
6 - 12 years	68.2	6.3	8.9	16.6	604
13 - 17 years	69.4	5.0	12.2	13.5	222
Relationship status ***					
Partnered	65.8	6.4	16.5	11.2	1,868
Single	75.7	2.8	13.8	7.8	719
Partner's employment ***					
Employed	68.5	6.4	15.7	9.4	1,567
Not employed	44.6	2.3	23.9	29.2	130
Country of birth ***					
Australia	69.3	5.5	15.3	9.9	1,994
Other English-speaking country	71.5	4.7	17.0	6.8	235
Non-English-speaking country	62.7	5.6	17.3	14.5	359
Region ***					
Major city	70.9	5.0	14.5	9.6	1,705
Inner regional	64.8	6.0	18.1	11.0	5562
Outer regional / remote	62.9	6.5	18.4	12.1	321
All	69.6	5.4	15.8	10.2	2,558

Note: Excludes respondents in full-time education, respondents who have never been employed since leaving full-time education, respondents who had their first child at age 17 years or younger and respondents with missing or invalid information at age first biological child was born. Percentages and variance estimates are not weighted. Variance estimates are adjusted for sample design. Significance testing uses *F*-statistics from a multiple Wald test of the null hypothesis that the proportions are equal.
[a] Occupation refers to occupation in current main job for those who are employed and occupation in last job for female respondents who are not employed. *** $p < 0.000$.
Source: HILDA, wave 1 (2001).

wages, namely low educational attainment[39]. Hence, the estimates I publish only partially correct for non-random selection out of employment. I now turn to describe how much mothers' mean wage diverge from the mean wage of childless women in Australia.

3.4 Results

Table 3.7 presents the mean wage of Australian mothers and childless women, with comparable statistics for fathers and childless men. The wage gap is summarised as an absolute dollar difference and a percentage difference, expressed relative to the mean wage of childless women and the mean wage of men. Results show that the overall wage gap between employed mothers and childless women is very narrow (see panel 1). On average, employed mothers earn $0.13 cents less per hour than childless women, which equates to a gap of -0.7%. Statistical testing shows that the null hypothesis of no difference is not rejected. Among employed men, the pattern is reversed and the wages of fathers are around 15% higher than childless men.

Unlike Harkness and Waldfogel (2003), I find no evidence Australian mothers' wages are higher than the wages of childless women. The 6% pay premium observed by Harkness and Waldfogel (2003) for Australian mothers in 1994 - 1995 is expressed as a percentage of the average male wage. Harkness and Waldfogel (2003) observed that mothers' earn 8.3% less per hour than men, whereas childless women earn 14.3% less per hour than men. Expressing the motherhood wage gap as a percent of the mean male wage shows that there is a narrow motherhood wage gap of -0.5% in Australia. In 2001, the mean wage of childless women, relative to employed men, was 88%. This figure for 2001 is close to the estimate of childless women's relative wage reported by Harkness and Waldfogel (2003). In 2001, I observe mothers' wages to be around 88% of the male average, whereas the corresponding estimate from 1994 - 1995 is 91.7%. Unfortunately, there is no means of determining whether real change in mothers' wages, relative to childless women and employed men, has occurred over the 7 years elapsing between 1994 - 1995 and 2001[40]. Disagreement could plausibly be explained by minor differences in the bounds of the samples and subtle differences in

[39] Economic theory suggests this would arise either if reservation wages are higher than wage offers for those women who have low wage offers. Yet the association may not be causal where observed or unobserved characteristics affecting women's employment decisions also affect potential wage offers.

[40] Harkness and Waldfogel (2003) do not present standard errors or confidence intervals with their point estimate of the overall motherhood gap in pay. Hence, it is unclear whether the 6% premium is significantly different from the null hypothesis of no difference.

the source of earnings' data[41]. In supplementary analysis published in Appendix 3B, I investigate whether the mean wages of both mothers and childless women are sensitive to variation in sample constraints. The findings show that under alternative sample specifications the motherhood wage gap tends to remain close to zero.

Table 3.7: Parental wage gap by gender and employment type, employed men and women aged 22 - 45 years, 2001

	Women			Men	
	Mean wage (95% CI)	**Mean wage as % male wage[a]**	**Total n**	**Mean wage**	**Total n**
Self-employed and employees, waged (sample A)					
Childless	$18.25	88.3%	837	$19.34	919
Mothers / Fathers	$18.13	87.8%	1,078	$22.27	989
Wage gap	-$0.13 (-$0.86, $0.61)	-0.5		$2.93*** ($1.76, $4.11)	
Percent wage gap[b]	-0.7%			15.1%	
Employee, waged (sample B)					
Childless	$18.42	89.5%	796	$18.96	846
Mothers / Fathers	$17.75	86.2%	979	$22.70	851
Wage gap[c]	-$0.67 (-$1.38, $0.04)	-3.3		$3.74*** ($2.62, $4.86)	
Percent wage gap[b]	-3.6%			19.7%	
Self-employed, Waged					
Childless	$14.74	69.0%	41	$24.14	73
Mothers / Fathers	$21.94	102.7%	73	$19.61	138
Wage gap	$7.20*** ($3.51, $10.89)	33.7		-$4.53 (-$9.62, $0.86)	
Percent wage gap[b]	48.8%			-18.8%	

Note: Means are estimated using HILDA responding person weights. Variance estimates are also adjusted for survey design. Significance testing uses *F*-statistic from Wald test of null hypothesis that the mean wage of mothers equals the mean wage of childless women.
[a] Relative wages are calculated with the mean male wage as the denominator and the wage gap is the mean wage of mothers' minus the mean wage of childless women divided by the mean wage of men. The mean male wage is calculated separately for all employed men, male employees and self-employed men.
[b] Percent wage gaps are calculated with childless women's mean wage as the denominator.
[c] A Wald test of the null hypothesis that the mean wage of mothers equals the mean wage of childless women produced an *F*-statistic of -1.87 with an associated probability of 0.062. This is just outside conventional levels of statistical significance
*** $p < 0.000$.
Source: HILDA, wave 1 (2001).

[41] Most notably, Harkness and Waldfogel (2003) derive an hourly rate of pay for gross labour income received from all jobs, whereas the figures I report for 2001 are derived from gross earnings in main job. The latter are typically assumed to have less measurement error.

When the focus narrows to female employees, findings show mothers' mean wage is 3.6% lower than the mean wage of childless women. This small difference does not reach conventional levels of statistical significance (panel 2). Interestingly, self-employed mothers have significantly higher wages than mothers who are working for an employer, whereas self-employed women without children have significantly lower wages than childless employees[42]. A closer examination of the distribution of hourly wages and hours worked by parental status shows that self-employed women without any children are more likely to work long full-time hours and this, in turn, tends to depress wage rates (results not shown).

The motherhood wage gap of -3.6% does not take into account mothers' selection out of employment. If mothers with low potential wages are disproportionately more likely to leave labour force, the overall motherhood wage gap among those who are currently employed will shift towards zero, assuming the gap corrected for employment selection is negative. Table 3.8 reports the overall motherhood wage gap after partly adjusting for selection out of employment using wages in last job as a potential wage for not employed women. Estimates in the bottom panel show the overall wage gap between mothers and childless women would increase in magnitude to around -11% if mothers' employment rates were closer to the rates observed for childless women. This finding implies that non-random selection out of employment does indeed affect the calculation of a summary indicator of the overall wage gap between mothers and childless women.

Next I consider whether the overall motherhood wage gap varies by years of potential work experience. To the extent the overall motherhood wage gap is caused by foregone work experience, sample heterogeneity on years of potential work experience is likely to confound overall comparisons of the mean wages of mothers and childless women. Potential work experience refers to years of total work experience that would notionally be acquired by an individual who remained employed continuously and is derived by subtracting age commenced paid employment from current age. I address sample heterogeneity on potential work experience by estimating the motherhood wage gap after disaggregating the two samples of female

[42] These significance tests are not reported in Table 3.7. For mothers, Wald tests of the null hypothesis that the wages of self-employed women are equal to the wages of female employees yields an *F*-statistic of 5.32 with a probability of 0.024. For childless women, Wald tests of the null hypothesis that the wages of self-employed women are equal to the wages of female employees yields an *F*-statistic of 8.85 with a probability of 0.009.

employees into 5 year age groupings (except for the youngest age group which spans 4 years).

Table 3.8: Motherhood wage gap by age, women aged 22 - 45 years, 2001

	Employees, waged (sample B)		Current & recent employees, waged (sample C)	
	Mean wage	**Total n**	**Mean wage**	**Total n**
22 - 25 years				
Childless women	$16.32	234	$16.26	241
Mothers	$14.15	19	$12.16	61
Motherhood wage gap	-$2.17*		-$4.10***	
(95% CI)	(-$3.67, -$0.66)		(-$5.31, -$2.89)	
Percent motherhood wage gap	-13.3%		-25.1%	
26 - 30 years				
Childless women	$17.88	264	$17.86	281
Mothers	$16.17	116	$14.25	216
Motherhood wage gap	-$1.71		-$3.60***	
(95% CI)	(-$3.17, -$0.24)		(-$4.81, -$2.40)	
Percent motherhood wage gap	-12.3%		-22.6%	
31 - 35 years				
Childless women	$21.25	144	$20.88	152
Mothers	$18.06	223	$16.38	332
Motherhood wage gap	-$3.18**		-$4.50***	
(95% CI)	(-$4.96, -$1.41)		(-$6.10, -$2.90)	
Percent motherhood wage gap	-15.0%		-20.5%	
36 - 40 years				
Childless women	$20.22	84	$19.63	90
Mothers	$18.10	321	$17.29	394
Motherhood wage gap	-$2.12		-$2.34	
(95% CI)	(-$4.37, $0.14)		(-$4.54, -$0.14)	
Percent motherhood wage gap	-12.7%		-11.6%	
41 - 45 years				
Childless women	$20.95	70	$20.41	77
Mothers	$18.01	300	$17.47	339
Motherhood wage gap	-$2.94*		-$2.94*	
(95% CI)	(-$5.05, -$0.83)		(-$4.96, -$0.91)	
Percent motherhood wage gap	-9.5%		-9.7%	
All women 22 - 45 years				
Childless women	$18.42	764	$18.26	811
Mothers	$17.75	960	$16.31	1,323
Motherhood wage gap	-$0.67		-$1.95***	
(95% CI)	(-$1.47, $0.04)		(-$2.65, -$1.26)	
Percent motherhood wage gap	-3.6%		-10.7%	

Note: Means are estimated using HILDA responding person weights. Variance estimates are also adjusted for survey design. Wald tests of the null hypothesis that the mean wage of mothers equals the mean wage of childless women in each age group are conducted jointly with a Bonferroni adjustment.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Source: HILDA, wave 1 (2001).

For current employees, results show that there is a significant motherhood wage gap among women aged 22 to 25 years, 31 to 35 years and 41 to 45 years. Although the summary figures in Table 3.8 only crudely adjust for differences in potential experience, not actual experience, the magnitude of the overall motherhood wage gap in these three age groups is greater than the -3.6% gap observed in the aggregate population of female employees. The overall motherhood wage gap is highest among female employees aged 31 to 35 years; on average mothers earn 15% less per hour ($3.18 less per hour) relative to childless women. For female employees aged 22 to 25 years the motherhood wage gap is -13% ($2.17 less per hour) and for female employees aged 41 to 45 years the wage gap is -9.5% ($2.94 less per hour).

Across the three youngest age groups the overall motherhood wage gap widens when estimates are adjusted for mothers' selection out of paid employment. These figures are displayed in the column to the far right of Table 3.8. Among women aged 26 to 30 years, the motherhood wage gap is around -12% when selection is ignored but increases (in size) to around -23% when potential wages are included. Inspection of the mean values across the three younger age groups confirms that selection out of employment largely influences the calculation of mothers' mean hourly wage; childless women's mean wage is stable. Estimates of the overall motherhood wage gap are largely unchanged for the simulated scenario of no selection out of employment for age groups 36 to 40 years and 41 to 45 years. This is likely to be because a higher proportion of these mothers are employed, with their children attending school.

3.5 Discussion

The aim of this chapter has been to summarise the overall motherhood wage gap in Australia using recent wage data from a large, nationally representative survey of Australian households. Descriptive analysis of employed women shows that mothers' wages are not significantly lower than childless women's wages in Australia in 2001. On average, the mean wage of Australian mothers is only 0.7% lower than the mean wage of childless women. These Australian findings for 2001 disagree with previous findings by Harkness and Waldfogel (2003). In 1994 - 1995, Harkness and Waldfogel observed that the average wage of Australian mothers was higher than the wage of childless women. As noted earlier, I am not able to determine with certainty whether

the absence of a motherhood wage premium in 2001 reflects a real deterioration (improvement) in the relative wages of mothers (childless women) over the latter part of the 1990s or whether the difference is an artefact of technical differences between the two surveys.

My findings do, however, agree with results from a second Australian study of the motherhood gap in pay by Whitehouse (2002). Among female employees working in a business with 20 or more employees, Whitehouse (2002) observed that the wages of mothers were only 0.3% lower than that of childless women in Australia in 1995. Although my descriptive analysis of female employees' shows an overall motherhood wage gap of -3.6%, this wage difference does not represent a statistically significant difference.

The calculation of overall motherhood wage gaps separately by age group does provide stronger evidence that there is a negative association between children and wages among women in Australia. These wage comparisons take account of differences in childless women's and mothers' potential years of work experience. Yet, in only three of the five age groups are mothers' wages significantly lower than childless women. These are the age groups 22 to 25 years, 31 to 35 years and 41 to 45 years for current employees and all age groups, except women 36 to 40 years, for the current and recent employees. It is not entirely clear why this pattern is arising. One possibility is that there is a recovery in mothers' wages as children become more independent, but that this has not been experienced by mothers currently aged 41 to 45 years because of cohort differences in women's education and employment opportunities.

Descriptive comparisons of the wages of self-employed women by motherhood status reveal some unexpected findings. In 2001, self-employed mothers have wages 49% higher than that of childless women ($7.62 more per hour). The different wage gap for self-employed women, in comparison to employees, partly arises from differences in the remuneration of childless women. Self-employed women without children have the lowest mean wage overall. Distinguishing this small group of childless women is their relatively long working hours. Such long hours may translate into increased net business revenue through an increase in business output or a reduction in hired labour costs. These gains will not be detected with a measure of remuneration derived from usual salary and work hours. In contrast to childless women, mothers who are self-employed tend to work part-time or short full-time hours.

Self-employed mothers possibly have less scope to increase the hours they spend working in their own business because of their child care responsibilities. An alternative possibility is that self-employed women without children tend to be younger and may not yet have the means to divert funds towards a regular salary when their business is being established.

For mothers currently employed, I find that self-employment is associated with significantly higher wages than work as an employee. This result does not support the theory that mothers who move into self-employment will sacrifice pay to obtain greater control over their working hours. The findings, however, could be taken as evidence that self-employed mothers are not subject to the discriminatory practices of employers, who preferentially offer more highly paid jobs to women without child care responsibilities or men. Linked to this argument is the possibility that mothers' selection into self-employment is a response to discrimination; self-employment is possibly an attractive alternative for professional mothers who find statistical discrimination reduces opportunities for upward wage mobility[43]. Alternatively, where self-employed mothers work in a business alongside their spouse it is possible that salaried income is evenly split to minimise taxation which, in turn, would inflate the wage rates of self-employed mothers. Given the small number of self-employed women with a salary[44], I leave an assessment of why self-employment is linked to relatively better wage outcomes for mothers and relatively worse wage outcomes for childless women to future research.

The absence of an overall motherhood wage gap among female employees in Australia contrasts with cross-sectional estimates of the motherhood wage gap of -8% to -20% in the US (Harkness & Waldfogel, 2003; Waldfogel, 1998a) and -15% to -30% in Britain (Davies & Pierre, 2005; Harkness & Waldfogel; Joshi et al., 1999; Waldfogel, 1995, 1998). The motherhood wage gap may be narrower in my analysis of female employees in Australia than studies of the gap in the US and Britain because of variation in research design. High estimates of the overall motherhood wage gap tend to be published for studies drawing on survey data from a narrower cohort of women who are in their 30s (Davies & Pierre, 2005; Joshi et al., 1999; Waldfogel, 1995, 1998a). For example, Waldfogel (1995) observes an overall motherhood wage gap of

[43] This argument comes from the class mobility literature, where self-employment is seen as a means for improving one's class position, and was initially described for men only (Budig, 2006).
[44] The sample remains small even after incorporating observations for all persons at all years employed. The rate of transitions into and out of waged / salaried self-employment over the 5 year period is very low. This means I am not able to assess whether mothers' select into self-employment where they are highly educated and have knowledge / skills currently in high demand.

-25% and -22% in Britain and the US respectively in a study of employed women aged around 30 years (and who were born in 1958 and 1957 - 1964 respectively). While I cannot replicate these studies with the data currently available in Australia, I am able to narrow the sample of Australian women in their early 30s. Focusing on this age group, albeit for employees from a more recent cohort of women (born 1966 to 1970), I observe a significant motherhood wage gap of -15%, an estimate somewhat short of the -20% to -35% gap previously reported for US and British mothers in their early to mid 30s (Joshi et al., 1999; Waldfogel, 1998a). Taken together, the absence of a significant motherhood wage gap in the wider population of employed females of child-bearing age and the lower gap in the narrower cohort of women aged 31 to 35 years in 2001, does suggest that the negative association between children and female wages is less pronounced in Australia than it is in Britain and the US.

This finding may be interpreted as evidence that the Australian labour market offers greater protection against wage depreciation or discrimination against mothers than the US and British labour markets. In a comparison of the motherhood wage gap in Australia and Britain, Whitehouse (2002, p. 392) concludes the absence of a motherhood gap in pay in Australia is due to differences in the relative wages of part-time employees. Only British mothers are found to attract a wage penalty for working part-time hours. Whitehouse (2002) argues that absence of a wage penalty for part-time employment in Australia is likely to be due to the historically stronger wage regulatory system in Australia. In the next chapter, I return to examine whether Australian women who work part-time do continue to avoid a wage penalty.

Yet another plausible explanation for the absence of a motherhood wage gap in Australia is that mothers' selection out of employment is more pronounced in Australia than in Britain or the US. In 2005, the employment rate of mothers with a child aged less than 17 years was 63.1% in Australia, slightly lower than the maternal employment rate of 66.7% in the US and slightly higher than the rate of 61.7% in the United Kingdom (OECD, 2007, p. 46). Nevertheless, the positive correlation between mothers' education and employment participation may be greater in Australia than the US and UK because of the presence of parenting payments and taxation benefits targeted at low and medium income families with a single income earner in Australia. These government benefits are designed to support traditional families. This type of employment selection would lead to a comparatively high observed mean wage of Australian mothers relative to the mean wage of mothers in the US and Britain. In contrast, the institutional argument regarding the labour market protection for women

and mothers implies that the mean wages of both mothers and childless women in Australia will be high relative to the wages of both comparative groups in the US and Britain. My analysis focuses solely on Australian data and, therefore, does not allow me to fully adjudicate between these two competing explanations.

Selection, however, appears to be of some importance when measuring Australian mothers' relative wage disadvantage. The overall motherhood wage gap widens from -3.6% to -10.7% after I include a potential wage for many mothers who are not employed in 2001. Descriptive comparisons also reveal that women who are not employed are more likely to have lower levels of education and, therefore, would be expected to receive lower wage offers. Taken together, I argue my results provide evidence that the overall wage gap between mothers and childless women would widen if the employment rates of mothers were at the same level of childless women.

The method I use to adjust for mothers' selection out of employment has two key limitations. First, the mean potential wage of women who are not employed in 2001 is likely to be positively biased where mothers who have particularly low wages exit the labour force for extended periods. Second, taking the last reported wage as a potential wage assumes that wages do not depreciate over the course of an interruption to employment, an assumption that is not likely to be supported. The direction of bias introduced by these two processes is identical. In both cases, the mean wage of mothers is expected to be biased upwards and the overall motherhood wage gap would still be somewhat underestimated.

Nevertheless, it remains unclear how much prominence should be afforded to selection alone. Other countries with higher rates of maternal employment than Australia, including Canada (Drolet, 2002) and Denmark (Datta Gupta & Smith, 2002; Simonsen & Skipper, 2006), similarly have been observed to have no significant motherhood wage gap. This suggests selection out of employment may not provide a complete explanation of the absence of a motherhood gap in pay in Australia. Disentangling the relative importance of employment selection and institutional differences is a formidable challenge, but I argue that this is an essential component to any future cross-national comparative research on the motherhood wage gap.

In the next two chapters, I turn to examine the motherhood gap in pay in Australia using a different analytic methodology. I take advantage of the panel design of HILDA and utilise a modelling approach that treats the substantive counterfactual as the wage

rate a woman who currently has dependent children would otherwise attract were she to have remained childless.

Appendix 3A Published estimates of the overall motherhood wage gap

Table 3.9: Estimates of the overall motherhood wage gap in the US

Survey	Source	Sample	Research approach: method and specification of motherhood	Motherhood wage gap (as percent of childless) [a]
NLS-YW69 [b]	Avallar & Smock (2003)	Female wage-earners aged 31 - 42 years, 1985	Difference between mean wages of childless women and mothers (in 1993 dollars). Mothers are specified as women who have at least one resident child, including step and adopted children.	**-23% any resident children**
	Anderson et al. (2003)	*Cross-sectional sample*: Women aged 14 - 21 years in 1968, excluding Hispanics. Sample includes last wage observation for each female up to 1988 (aged 33 - 41 years).	Difference between mean wages of childless women and mothers, as percentage of childless women's wage (in 1997 dollars). Mothers are specified as women who have ever had a resident child aged 17 years or younger.	**-6% any resident children**
		Panel sample: Women aged 14 - 24 years in 1968 and in paid work at least twice 1968 - 1988. Sample includes all employment observations for each female from waves 1 to 15 (aged 34 - 44 years). Exclude if <$1/hr & >$150/hr.	Percentage wage difference, taken from pooled OLS regression coefficients for children, controlling for race and marital status. Number of children specified as number of resident children aged 17 years or younger.	**-7% one child** **-13% two or more children**
	Korenman & Neumark (1992)	White female wage-earners aged 28 - 38 years, 1982	Difference between mean log wages of childless women and mothers. Unclear how motherhood was specified.	**-11% one child** **-27% two or more children**
	Taniguchi (1999)	Female wage-earners aged 33 - 41 years, 1988	Difference between mean log wages of childless women and mothers. Unclear how motherhood was specified. Mothers are categorised according to age at first birth (less than 20, 21 - 27 and 28 or older).	**-32% mothers who had first child 20 years or younger (s)** **-21% mothers who had first child 21 - 27 years (s)** **-2% mothers who had first child 28 years or older (ns)**
	Waldfogel (1997)	Female wage-earners aged 33 - 41 years, 1988	Difference between mean wages of childless women and mothers (in 1988 dollars). Mothers are specified as women who have had a biological child. Mothers are categorised according to marital status.	**-4.6% married mothers** **-11% previously married mothers** **-17.8% never married mothers**

Survey	Source	Sample	Research approach: method and specification of motherhood	Motherhood wage gap (as percent of childless) [a]
NLCY79 [c]	Avallar & Smock (2003)	Female wage-earners aged 33 - 41 years, 1998	Difference between mean wages of childless women and mothers (in 1993 dollars). Mothers are specified as women who have at least one resident child, including step or adopted child.	**-22% any resident child**
	Amuedo-Dorantes & Kimmel (2003)	Women 14 - 21 years in 1979 and in paid work at least once before wave 19. Sample includes all employment observations for each female from waves 1 to 19 (age 35 - 43 years), 1979 - 2000	Difference between mean wages of childless women and mothers (in 1982 - 1984 dollars). Mothers are specified as women who have given birth to at least one child.	**-6% any child**
	Budig & England (2001)	Women 14 - 21 years in 1979 and in paid work at least twice 1982 - 1993. Sample includes all employment observations for each female from wave 4 (18 - 25 years) to 15 (29 - 36 years). Exclude if <$1/hr & >$200/hr.	Percentage each child lowers female wages, taken from the fixed-effects regression coefficient for number of children, controlling for age, year and unobserved heterogeneity. Unclear how motherhood was specified.	**-7% per child**
	Gangl & Ziefle (2009)	Women born from 1955 - 1959, employed or not employed 1979 - 1996	Percentage each child lowers female wages, taken from fixed-effects regression coefficient for number of children, controlling for age, year, unobserved heterogeneity and non-random selection into employment. Motherhood specified as number of children born and excludes step-children.	**-9% per child**
		Women born from 1960 -1964, employed or not employed 1979 - 1996		**-16% per child**

Note: [a] Where the overall motherhood wage gap is presented as a dollar difference, I calculate the percentage wage gaps by dividing the difference by the mean wage of childless women.
[b] NLS-YW69 sampled females aged 14 to 24 years as at 1967 and who were born from 1943 to 1953. Data collection took place annually 1968 to 1993 and every second year 1995 to 2003 (DOL, 2005).
[c] NLSY79 sampled females aged 14 to 21 years as at 1979 and who were born from 1957 to 1964. Data collection took place annually 1979 to 1994 and every second year from 1996 (Power & Elliott, 2005).

Table 3.10: Estimates of the overall motherhood wage gap in Britain, Canada, Denmark and Germany

Country	Survey	Source	Sample	Research approach: method and specification of motherhood	Motherhood wage gap (as percent of childless) [a]
Britain	**NCDS**	Waldfogel (1995)	Female wage-earners aged 33 years, 1991	Difference between mean wages of childless women and mothers (in £1991). Unclear how motherhood was specified.	**-25% any children**
		Joshi et al. (1999)	Female wage-earners aged 33 years, 1991	Difference between mean log wages of childless women and mothers. Mothers are specified as women who have a resident child.	**-33% any children**
	NSHD	Joshi et al. (1999)	Female wage-earners aged 32 years, 1978	Difference between mean log wages of childless women and mothers. Mothers are specified as women who have a resident child.	**-33% any children**
	BHPS	Gangl & Ziefle (2009)	Women born 1965 - 1969, employed or not employed 1991 - 2002	Percentage each child lowers female wages, taken from fixed-effects regression coefficient for number of children, controlling for age, year, unobserved heterogeneity and non-random selection into employment. Motherhood specified as number of children born and excludes step-children.	**-13% per child**
Canada	**SLID**	Drolet (2002)	Female employees with wage, aged 18 - 64 years, 1998. Exclude full-time students and self-employed.	Difference between mean wages of childless women and mothers (in 1998 Canadian dollars). Mothers are specified as women who have given birth to at least one child.	**-1.6% any children**
			As above, but limited to employees aged 18 - 37 years, 1998	As above	**No motherhood wage gap**
			As above, but limited to employees aged 38 - 50 years, 1998	As above	**-14% any children**
Denmark	**Admin registers, Statistics Denmark**	Datta Gupta & Smith (2002)	Full-time female wage-earners aged 18 - 40 years, 1980. Excludes self-employed.	Difference between mean wages of childless women and mothers (in 1980DKK). Mothers are specified as women who have had at least one biological child.	**+3.8% one child** **No gap two or more children**
			Full-time female wage-earners aged 18 - 40 years, 1995. Excludes self-employed.	As above	**+7.8% one child** **+5.8% two or more children**

Country	Survey	Source	Sample	Research approach: method and specification of motherhood	Motherhood wage gap (as percent of childless) [a]
		Nielsen et al. (2004)	Women 20 - 40 years working more than 200 hours per year, 1997. Excludes self-employed and those enrolled in education.	Difference between mean wages of childless women and mothers by sector (in 1997 DKK). Motherhood specified as number of biological children a woman has had.	**Public sector:** **-0.1% one child** **-1.2%two children** **-1.2% three or more children** **Private sector:** **+3.3% one child** **+3.0% two children** **+1.1% three or more children**
		Simonsen & Skipper (2006)	Females 20 - 40 years working more than 200 hours per year, 1997. Excludes self-employed and those enrolled in education.	Difference between mean log wages of childless women and mothers. Mothers are specified as women who have a biological child.	**+2% any children**
Germany	**GSOEP**	Gangl & Ziefle (2009)	Women born from 1960 - 1964, employed or not employed 1984 - 2001	Percentage each child lowers female wages, taken from fixed-effects regression coefficient for number of children, controlling for age, year, unobserved heterogeneity and non-random selection into employment. Motherhood specified as number of children born and excludes step-children.	**-18% per child**
			Women born 1965 - 1969, employed or not employed 1984 - 2001		**-16% per child**
Germany	**GSOEP**	Felfe (2008)	Women aged 16 to 46 years, employed or not employed 1984 - 2005	Percentage having at least one child lowers female wages, taken from fixed-effects regression coefficient, controlling for relationship status, years of education, age, year, unobserved heterogeneity and non-random selection into employment. Motherhood specified as birth of at least one child.	**-19.4% any children**

Note: [a] Where the overall motherhood wage gap is presented as a dollar difference, I calculate the percentage wage gaps by dividing the difference by the mean wage of childless women.

Table 3.11: Estimates of the overall motherhood wage gap, cross-national comparative studies

Survey data	Source	Sample	Research approach: method and specification of motherhood	Country	Motherhood wage gap (as percent of childless) [a]
ECHP	Davies & Pierre (2005)	Female wage-earners aged 30 - 40 years, 1994 (wave 1)	Mothers' mean wage as percentage of mean wage of childless women. Mothers are specified as women who have at least one resident child and gave birth to their oldest resident child before age 30.	**UK**	**-12% one child** **-15% two children** **-12% three or more children**
				Denmark	**+9% one child** **+3% two children** **-12% three or more children**
				France	**No gap one child** **+5% two children** **-14% three or more children**
				Belgium	**-7% one child** **-2% two children** **-7% three or more children**
				Germany	**-12% one child** **-15% two children** **-12% three or more children**
				Netherlands	**No gap one child** **-4% two children** **-10% three or more children**
				Ireland	**-1% one child** **-6% two children** **-9% three or more children**
				Italy	**+5% one child** **+5% two children** **-8% three or more children**
				Greece	**+2%one child** **No gap two children** **-12% three or more children**
				Spain	**-7% one child** **-6% two children** **-18% three or more children**
				Portugal	**-1% one child** **-6% two children** **-9% three or more children**

Survey data	Source	Sample	Research approach: method and specification of motherhood	Country	Motherhood wage gap (as percent of childless) [a]
ECHP	Gash (2009)	Female wage-earners 25 - 45 years, 1994 – 2001 (waves 1 - 8)	Percentage each child lowers female wages, taken from OLS regression coefficient for number of children. Motherhood specified as number of resident children.	**UK**	**-3.8% per child (s)**
				West Germany	**-2.8% per child (s)**
				Denmark	**No difference**
				Finland	**No difference**
				France	**No difference**
				Netherlands	**+1.7% per child (s)**
LIS & Swedish Level of Living Survey	Harkness & Waldfogel (2003)	Female employees aged 24 - 44 years, 1991 / 1994 / 1995.	Difference between mean hourly wages of childless women and mothers, as percentage of mean wage of men. Mothers are specified as women with at least one resident child.	**UK**	**-12.7% relative to mean male wage**
				US	**-8% relative to mean male wage**
				Canada	**+0.7% relative to mean male wage**
				Australia	**+6% relative to mean male wage**
				Sweden	**-1.6% relative to mean male wage**
				Finland	**-0.1% relative to mean male wage**
				Germany	**-1.6% relative to mean male wage**
LIS	Todd (2001)	Full-year, full-time employees aged 22 - 44 years, 1994 / 1995 / 1997	Percentage children lowers female wages, taken from OLS regression coefficients for number of children, controlling for marred, age, and education. Motherhood specified as number of children less than 18 years.	**US**	**-8.6% one child** **-12.1% two children** **-1.7% three or more children**
				Canada	**-7.2% one child** **-6.3% two children** **- 15.8% three or more children**
				Sweden	**-40.4% one child** **-41.2% two children** **-56.3% three children**
				Germany	**-17.7% one child** **-24.6% two children** **-13.5 three or more children (ns)**
				Netherlands	**-0.6% one child (ns)** **-3.5% two children (ns)** **-2.9% three or more children (ns)**

Survey data	Source	Sample	Research approach: method and specification of motherhood	Country	Motherhood wage gap (as percent of childless) [a]
NCDS	Waldfogel (1998a)	Women aged 26 - 33 years in 1991 (mean 30 years), taking most recent wage 1987 - 1991.	Difference between mean hourly wages of childless women and mothers, as percentage of mean wage of men (in 1991 dollars or pounds). Unclear how motherhood was specified.	**Britain**	**-25% any children**
NLSY79				**US**	**-22% any children**
WERS	Whitehouse (2002)	Female employees aged 25 - 49 years, with job in workplace with 20 or more employees, Australia 1995 & Britain 1998	Difference between mean hourly wages of childless women and mothers, as percentage of mean wage of men and mean wage of childless women. Mothers specified as women who have at a resident child.	**Britain**	**-7.4% any dependent children**
AWIRS				**Australia**	**-0.3% any dependent children**

Note: [a] Where the overall motherhood wage gap is presented as a dollar difference (e.g. Waldfogel, 1998a), I calculate the percentage wage gaps by dividing the difference by the mean wage of childless women. Note that I am unable to recalculate the motherhood wage gaps as a percentage of childless women's mean wage for Harkness and Waldfogel (2003).
Results from the study by Dupuy and Fernández-Kranz (2009) are not described in this table as the analysis does not present separate estimates of the overall motherhood wage gap for each country.

Appendix 3B Supplementary analysis

Table 3.12 assesses whether estimates of the overall motherhood wage gap are sensitive to adjustments of the analytic sample and the measurement of motherhood. Following the approach of Harkness and Waldfogel (2003), I calculate the motherhood wage gap after, first, narrowing the sample to women aged 24 to 44 years, and second, excluding waged or salaried self-employed women working in an unincorporated business. Results are displayed in panels 1B and 1C and can be compared with estimates from sample A, all waged or salaried women aged 22 to 45 years, reproduced in panel 1A. Removing women aged 22, 23 and 45 years from the sample does not alter my main finding of no significant wage gap between mothers and childless women. However, excluding self-employed females in unincorporated enterprises, does lead to the detection of a significant motherhood wage gap in Australia. On average, mothers' wages are 5.9% ($1.12) lower than childless women's wages (panel 1C). This gap is higher than the -3.6% gap reported earlier (sample B, Table 3.7). The estimate in panel 1C excludes self-employed women in unincorporated business, but retains self-employed women who work for a wage or salary in incorporated businesses. However, checks show the main reason for the widening of the motherhood wage gap estimate is the slight variation made to the age bounds of the sample. The significant gap in panel 1C disappears when women aged 22 and 23 years are brought back into the sample.

The next aspect of sample construction I explore is whether the exclusion of extreme values on work hours and wages influence results. In panel 1D, I summarise the mean wages of all mothers and childless women, with wage data added for employees and self-employed (in an incorporated business only) women 24 to 45 years who work fewer than 6 hours per week, more than 60 hours per week and who worked 'regular' hours but had a derived wage less than $2 per hour or more than $120 per hour. These sample modifications depress the estimated overall motherhood wage gap, with the null hypothesis that the mean wage of mothers is equal to the mean wage of childless women not rejected. This happens because mothers' mean wage rise from $17.77 to $18.79. Further investigation (not shown) reveals that a large share of mothers working less than 6 hour per week attract very high wage rates. I argue that it is more likely that these values are more likely to be a product of measurement error than to be 'true' values for a small number of women who work very short hours because they attract a high wage.

Recall that Harkness and Waldfogel (2003) measure motherhood using household information on the presence of any resident children, not fertility history. Hence, I repeat the sequence described above after revising the childless category to include mothers with non-

resident children (see panels 2A, 2B, 2C and 2D). Results show that the inclusion of women with non-resident children narrows the motherhood wage gap.

Finally, I explore whether the descriptive results change when women with non-resident children are classified as mothers (see panels 3A, 3B, 3C and 3D). This modification also narrows the point estimate of the motherhood wage gap. Overall, the absence of a motherhood wage gap among currently employed women in Australia appears to be a fairly consistent finding. Given the difficulties of deriving a wage rate for self-employed women, I argue the most reliable estimate comes from female employees (excluding owner-managers). This estimate, reported in the body of this chapter, suggests Australian mothers' mean wage is no lower (or higher) than the mean wage of childless women.

Table 3.12: Sensitivity of estimates of overall motherhood wage gap to sample constraints and operationalisation of motherhood

	Employed women, waged				
	Mean wage	**Motherhood wage gap**	**(95% CI)**	**Percent motherhood wage gap**	**Total n**
Employed women, excluding all mothers with non-dependent children					
(1A) Employed, 22 - 45 years (sample A)					
No children	$18.25				837
Mothers	$18.13	-$0.13		-0.7%	1,078
(1B) As with (1A), but without females 22, 23 & 45 years					
No children	$18.75				707
Mothers	$18.08	-$0.67		-3.6%	1,027
(1C) As with (1B), but without self-emp in uninc. business					
No children	$18.79				695
Mothers	$17.77	-$1.02*	(-$1.78, -$0.25)	-5.4%	985
(1D) As with (1C), adding females with low/high wages					
No children	$18.76				707
Mothers	$18.79	$0.03		+0.2%	1,063
Employed women, including women with non-dependent children in childless category					
(2A) Employed, 22 - 45 years					
No dependent children	$18.15				914
Mothers[a]	$18.13	-$0.02		-0.1%	1,078
(2B) As with (2A), but without females 22, 23 & 45 years					
No dependent children	$18.58				768
Mothers	$18.08	-$0.49		-2.6%	1,027
(2C) As with (2B), but without self-emp in uninc. business					
No dependent children	$18.58				754
Mothers	$17.77	-$0.80*	(-$1.54, -$0.06)	-4.3%	985
(2D) As with (2C), adding females with low/high wages					
No dependent children	$18.65				777
Mothers	$18.79	$0.14		+0.8%	1,063
Employed women, including women with non-dependent children in mother category					
(3A) Employed, 22 - 45 years					
Childless[b]	$18.25				837
Have had child(ren)	$18.04	-$0.21		-1.2%	1,155
(3B) As with (3A), but without females 22, 23 & 45 years					
Childless	$18.75				707
Have had child(ren)	$17.99	-$0.76		-4.1%	1,088
(3C) As with (3B), but without self-emp in uninc. business					
Childless	$18.79				695
Have had child(ren)	$17.66	-$1.13**	(-$1.88, -$0.37)	-6.0%	1,044
(3D) As with (3C), adding females with low/high wages					
Childless	$18.76				707
Have had child(ren)	$18.70	-$0.06		-0.3%	1,133

Note: Means are estimated using HILDA responding person weights. Variance estimates are also adjusted for survey design.

[a] The reason this mean is not equal to that reported for mothers in panel 1A is because there are seven women who have never had any biological or adoptive children but have parenting responsibility for a dependent child, presumably a step or foster child.

[b] The reason this mean is not equal to that reported for childless women in panel 1A is because there are seven women who have never had any biological or adoptive children but have parenting responsibility for a dependent child, presumably a step or foster child.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: HILDA, wave 1 (2001).

Chapter 4: How do children influence female wages in Australia?

4.1 Introduction

Four theoretical explanations have been put forward to explain how children influence female wages. First, parenthood interferes with the maintenance and acquisition of human capital where mothers interrupt employment or work part-time to care for children. Second, the physical demands of motherhood leads to a decline in job effort that is linked to a lowering of pay. Third, mothers will trade earnings for access to family-friendly job conditions. Fourth, discrimination limits mothers' or part-time employees' career progression. Finally, another possibility is that motherhood does not have a causal effect on female wages at all. A negative correlation between motherhood and wages could arise where unmeasured factors, such as career ambition, ability and work orientation, influence both fertility and wages.

Empirical research directed towards understanding why children have a negative effect on wages has largely focused on the contribution of differences in human capital, part-time work and unobserved heterogeneity. The widely cited US study by Budig and England (2001) shows that differences in human capital and part-time work explain a substantial portion of the overall wage gap between mothers and childless women. In this chapter I attempt to replicate this study with recent Australian panel data. The first aim is to assess whether there is indeed a wage penalty for motherhood in Australia after controlling for stable omitted variables using fixed-effects regression. The second aim is to assess whether the motherhood wage penalty can be explained by differences in human capital and mothers' participation in part-time work. The third aim is to determine whether children have a negative influence on female wages in Australia, after controlling for differences in work experience, tenure and part-time hours.

The next section of this chapter builds on my review of the literature in chapter 2. Here I synthesise findings reported in empirical research examining causes of the wage penalty for motherhood. This review informs the development of four hypotheses. Section 5.3 describes the female wage model and statistical method. I then describe the analytic sample, noting the influence of both attrition and selection into employment. Variable construction is described next. Results are presented in Section

4.4. I commence with a comparison of work experience and tenure by number of children. Next I examine whether variation in observed human capital and part-time hours can explain how children negatively affect female wages in Australia. Finally, Section 4.5 discusses the relative importance of human capital and part-time work in understanding the wages of Australian mothers. I qualify my interpretation of the statistical findings in light of the assumptions in my model and note limitations imposed by the available survey data.

4.2 Causes of the motherhood wage penalty: Empirical findings

Human capital theory is prominent in empirical analyses of the causes of the motherhood gap in pay across both economics and sociology. According to human capital theory, employment interruptions to care for children negatively affect wages through foregone work experience and skill atrophy. During an interruption, mothers are expected to forego wage growth they otherwise would attract through rising experience and tenure. Skill atrophy can occur when skills are not practiced regularly, leading to a decline in job productivity (Mincer & Polachek, 1974). Job-specific skills and knowledge can also become out-dated during spells away from employment, particularly in industries where new technologies develop rapidly. Mothers who commence working for a new employer on re-entry to the labour force are expected to receive a wage that is lower than the wage they had before exiting the labour force (Mincer & Ofek, 1982). Human capital theory suggests that new employees will initially lack firm-specific human capital and employers factor this into wage offers. As tenure lengthens, the accumulation of firm-specific human capital will lead to improved job productivity and wages will rise accordingly (Mincer & Ofek, 1982).

Human capital theory has also informed research on the experience-wage profile of women employed in part-time jobs (Corcoran, Duncan & Ponza, 1983; Nenen & de Grip, 2009). Returns to experience accrued in part-time jobs are expected to be lower than returns to full-time jobs where rises in job productivity and access to informal training are directly linked to time on the job. Moreover, employers may provide less formal training to part-time employees because returns to this investment are not realised as quickly as returns to training full-time employees. Women who work part-time hours may also invest less in their own career development because the opportunity and financial costs of formal training or study are recuperated less rapidly (Corcoran et al., 1983).

Empirical research demonstrates that increased work experience and longer tenure are positively associated with women's (and men's) hourly wages in many countries, including the US (e.g. Kim & Polachek, 1994), Britain (e.g. Joshi, Makepeace & Dolton, 2007), Australia (e.g. Rummery, 1992), France (e.g. Meurs, Pailhe & Ponthieux, 2008) and Sweden (e.g. Albrecht et al., 1999). Yet the precise shape of the female wage profile continues to be debated, with studies producing varied estimates of: (a) maximum growth rates; (b) the rate wage growth drops off as experience rises; and (c) the level of experience where wage growth reaches zero. Accordingly, predictions of the wage growth foregone by mothers during maternity leave or spells outside the labour force vary. There is also evidence that breaks in employment lead to lower re-entry wages (after adjusting for work experience) in the US (Baum, 2002; Corcoran & Duncan, 1979; Corcoran et al., 1983; Jacobsen & Levin, 1995; Kim & Polachek, 1994; Mincer & Ofek, 1982; Spivey, 2005; Stratton, 1995), Britain (Swaffield, 2007), Sweden (Albrecht et al., 1999) and France (Meurs et al., 2008). Empirical research shows that returns to part-time experience are significantly lower than returns to full-time experience (Budig & England, 2001; Connolly & Gregory, 2008; Corcoran et al., 1983; Dex, Ward & Joshi, 2008; Ermisch & Wright, 1993; Ferber & Waldfogel, 1998; Manning & Robinson, 2004). Although these findings are conventionally explained with human capital theory, other theoretical frameworks emphasising employers' misconceptions, statistical discrimination and institutionalised human resource practices also possibly explain these patterns. With few empirical studies collecting reliable data on job productivity, it remains unclear whether work experience and employment interruptions affect female wages through changes in job productivity or through other social processes (Blau et al., 1998; England & Folbre, 2005).

Two approaches have been taken to evaluate the extent to which the overall motherhood wage penalty is caused by employment interruptions and part-time work experience. The first is a staged modelling approach. This involves estimating a baseline female wage model with an explanatory variable for children, as well as other background controls, (e.g. year, age). Next, variables measuring observed human capital are added to the model and changes in the magnitude of the coefficient for children are examined. Findings from five US studies and a single cross-national comparative study applying this staged method are summarised in Table 4.1. Human capital differences explain part, but not all, of the motherhood wage penalty in all analyses of US mothers (Anderson et al., 2002; Budig & Hodges, 2008; Budig & England, 2001; Gangl & Ziefle, 2009; Korenman & Neumark, 1992; Neumark &

Korenman, 1994). Differences in research design, measures of human capital and the selection of control variables might explain why human capital is found to explain most of the motherhood wage penalty in some studies, but only a moderate portion of the penalty in other studies. Another possibility is that the determinants of the motherhood wage penalty have changed over time.

A single cross-national study, by Gangl and Ziefle (2009), has applied the staged regression approach to investigate differences in the relative contribution of human capital to the motherhood wage penalty in the US, Britain and Germany. In the US, the study found three-quarters of the overall motherhood penalty could be explained by the effects of children on human capital, after accounting for unobserved heterogeneity. The measures of human capital are years work experience, duration of the most recent child-related interruption (up to 6 years) and movement between employers. In Britain, around 90% of the overall motherhood penalty could be explained by these measures of human capital. Different findings were found for German women. Human capital explains only 30% to 40% of the motherhood wage penalty in Germany. Gangl and Ziefle (2009) observe that Germany has more generous statutory maternity leave provisions and suggest this may exacerbate the role of statistical discrimination. In the de-regulated labour markets of Britain and the US, wage growth is more closely tied to human capital accumulation and, as a consequence, children largely affect female wages through foregone work experience and movement between employers.

The second approach used to examine how interruptions contribute to the motherhood wage penalty is a modified Oaxaca decomposition (Joshi et al., 1999). The decomposition separates the component of motherhood wage penalty that is a product of differences in the composition of mothers' and childless women from the component that arises through varying returns to observed characteristics. Findings from a British study applying this method shows that around 70% of the motherhood gap in pay can be explained by human capital differences, measured as years employed from 26 to 32 years and tenure in current job (Joshi et al., 1999). Previous research on female wages in Australia has focused on documenting the magnitude of the overall motherhood wage gap and has applied neither the staged modelling approach nor a modified Oaxaca decomposition to investigate whether children affect female wages through human capital loss.

Table 4.1: Contribution of human capital to motherhood wage penalty in US, British and German studies

Study	Country	Data	Method	Coefficient for children		
				Baseline	Control for human capital	% change
Anderson et al. (2002)[a]	US	NLS-YW68, 1968-1988 (15 waves)	Fixed-effects	One child -0.041	-0.046	+12%
				Two children -0.081	-0.070	-14%
			Pooled OLS	One child -0.165	-0.066	-60%
				Two children -0.288	-0.093	-68%
Budig & England (2001)[b]	US	NLSY79, 1982-1983 (11 waves)	Fixed-effects	-0.068 per child	-0.047 per child	-31%
			Pooled OLS	-0.081 per child	-0.018 per child	-78%
Budig & Hodges (2008)[c]	US	NLSY79, 1979-2004 (21 waves)	Simultan-eous quantile regression	10th quantile -0.063 per child	-0.020 per child	-68%
				Median -0.105 per child	-0.007 per child	-93%
				90th quantile -0.105 per child	-0.011 per child	-90%
				95th quantile -0.096 per child	-0.015 per child	-84%
Gangl & Ziefle (2009)[d]	German women born 1960 - 1964	GSEOP 1984 - 2001 (18 waves)	Fixed-effects	-0.179 per child	-0.113 per child	-37%
	German women born 1965 - 1969	GSEOP 1984 - 2001 (18 waves)	Fixed-effects	-0.159 per child	-0.114 per child	-28%
	Britain women born 1965 - 1969	BHPS 1991 - 2002 (11 waves)	Fixed-effects	-0.126 per child	0.010 per child	-92%
	US women born 1955 - 1959	NLSY79, 1979 - 1996 (18 waves)	Fixed-effects	-0.093 per child	-0.023 per child	-75%
	US women born 1960 - 1964	NLSY79, 1979 - 1996 (18 waves)	Fixed-effects	-0.161 per child	-0.042 per child	-74%
Korenman & Neumark (1992)[e]	US	NLS-YW68, 1982	Cross-sectional OLS	One child -0.05	-0.04	-20%
				Two children -0.18	-0.07	-61%
Neumark & Korenman (1994)[f]	US	NLS-YW68, 1982, only women who at least one sibling	Sibling fixed-effects	-0.071 per child	-0.050 per child	-30%
			Cross-sectional OLS	-0.089 per child	-0.074 per child	-17%

Note: [a] Baseline model controls for marriage and age. Human capital measures are education, experience and duration NILF.
[b] Baseline model controls for age and year. Human capital measures are education, full-time tenure, part-time tenure, full-time experience, part-time experience, number of breaks and still at school. Model with human capital measures also controls for marital status.
[c] Baseline model controls for age and year. Human capital measures are highest grade completed, experience, tenure, currently at school and AFQT score. Model with human capital measures also controls for work hours and family background.
[d] Baseline model controls for age, year and selection into employment. Human capital measures are experience, length of interruption to care for youngest biological child and changed employers.
[e] Baseline model controls for marital status, education and region. Human capital measures are experience and tenure.
[f] Baseline model controls for marriage, schooling, region and year. Human capital measure is work experience.

Empirical research investigating the causes of the motherhood wage gap has been influenced by two other theories concerning the character of part-time employment. First, in economics and sociology, part-time work is often conceptualised as a non-pecuniary job amenity that mothers' trade financial rewards to access (Budig & England, 2001; Ermisch & Wright, 1993). Second, institutional explanations suggest employers and managers assume part-time employees will be less committed than full-time employees and that this affects staffing decisions and wage offers (Williams, 2001). According to institutional accounts, employers and managers constrain transitions from full-time to part-time hours and, as a consequence, reduced hours are accessed only by moving into a lower status job or occupation (Connolly & Gregory, 2008; Pocock, 2003).

In both the US and Britain, women who work part-time tend to have lower wages than full-time women, net of differences in observed human capital (Ermisch & Wright, 1993; Francesconi & Gosling, 2005; Gornick & Jacobs, 1996; McGinnity & McManus, 2007). Some studies also show mothers' participation in part-time employment partly explains the motherhood wage penalty (Anderson et al., 2002; Budig & England, 2001; Joshi et al., 1999; Waldfogel, 1997a). For example, Waldfogel (1997a) observes that adding a measure of part-time employment into a female wage model leads to a decline in the effect of children on wages from -5.6% to -3.9% for one resident child and -14.7% to -11.7% for two or more resident children in the US (with controls for human capital, demographics and unobserved heterogeneity in both models). In Britain, Joshi and Paci (1998) found that the higher rate of part-time employment among mothers explained about 40% to 50% of the motherhood wage gap. A more recent study by Gangl and Ziefle (2009), however, found that British mothers' movement into part-time work did not contribute to the motherhood wage penalty. Gangl and Ziefle (Gangl & Ziefle, 2009) had more detailed information on employment interruptions and employer mobility in their wage model and this might explain why part-time work hours was not found to contribute to the wage penalty for children[45]. If the transition from full-time to part-time hours is correlated with a more discontinuous pattern of employment or a higher likelihood of separation from an employer, then a transition to part-time hours may affect mothers' wages indirectly. (I review empirical research examining this possibility in the next chapter).

[45] Of course, another possible explanation is that there have been compositional changes in the types of mothers who work part-time hours in more recent cohorts.

Many studies examining the causes of the motherhood wage penalty find differences in employment continuity and part-time work only partly explain how children negatively affect female wages. For studies drawing on cross-sectional survey data, a significant negative association between children and wages might be an artefact of heterogeneity bias. This type of bias will arise if more highly paid women have unobserved characteristics that increase the likelihood of remaining childless or having fewer children. With panel data, this form of bias can be accounted for using fixed-effects or first-difference regression (I describe this method later in this chapter). The unexplained part of the wage penalty is typically viewed as capturing the effects of both employer discrimination and the lowering of effort directed to paid work, which stems from the time and energy mothers' expend caring for children in the home (Budig & England, 2001; Waldfogel, 1995). The residual gap may also be a result of mothers' trading wages for other family-friendly job conditions, such as flexible working hours and paid maternity leave (Anderson et al., 2003). In the US and Britain, results from some, but by no means all, fixed-effects analyses show children negatively affect female wages after controlling for unobserved heterogeneity, work experience and part-time work. Estimates of the residual motherhood wage penalty from 14 panel studies are presented in Table 4.12 in Appendix 4A. In the US, the estimated residual penalty ranges from 3% to 4% per child (Anderson et al., 2003; Avallar & Smock, 2003; Budig & England, 2001; Taniguchi, 1999; Waldfogel, 1997a). Analysis of the motherhood wage penalty in Germany has shown a higher residual penalty of 11% to 12% per child (Gangl & Ziefle, 2009). In Britain, the residual wage penalty for motherhood has been estimated to be 9.1% for one child and 16.1% for two or more children (Waldfogel, 1995, 1998a). Yet a different British study observed no residual wage penalty for children after controlling for work experience and job characteristics (Gangl & Ziefle, 2009).

In summary, previous research reveals that the wage penalty for motherhood in the US and Britain is partly caused by employment interruptions and part-time working hours. Yet these two processes do not consistently provide a complete explanation of the causes of motherhood wage penalty and results from longitudinal studies, which control for unobserved heterogeneity, suggest children may negatively affect female wages through other social processes.

Research questions

The aim of this chapter is twofold. First, I reassess whether motherhood negatively affects female wages in Australia. In the previous chapter, cross-sectional comparisons suggest there is no wage disparity between mothers and childless women at the aggregative level in Australia in 2001. However, Australian mothers do appear to receive slightly lower wages than childless women when the focus moves to specific age groups. This chapter takes a different analytic approach, using panel data and longitudinal methods to estimate the average wage difference between periods of childlessness and motherhood. Using fixed-effects regression I am able to examine the average effect of children on female wages after controlling for unobserved characteristics that remain stable over time. Neither of the two earlier studies of the motherhood gap in pay in Australia (Harkness & Waldfogel, 2003; Whitehouse, 2002) were able to control for unobserved heterogeneity.

Second, I investigate whether factors found to negatively influence mothers' wages in the US and British labour markets likewise influence mothers' wages in Australia. More specifically, I explore whether the wage penalty for motherhood can be explained by the effects children have on women's work experience, tenure and working hours. I also examine whether there is a wage penalty for motherhood after accounting for human capital loss and movement into part-time work. The approach I take mirrors that of Budig and England (2001). By adding explanatory variables in stages, I explore whether the negative effects of children can be explained by observed variation in work experience, tenure and part-time employment. The two previous Australian studies by Harkness and Waldfogel (2003) and Whitehouse (2002) were unable to assess whether differences in actual work experience contributed to the motherhood wage gap in Australia because of data limitations. Regression analysis undertaken by Whitehouse (2002) did control for tenure, though it is unclear whether the inclusion of this explanatory variable reduces the magnitude of the negative correlation between children and wages. Empirical analysis I undertake in this chapter therefore provides new evidence on the possible causes of the motherhood wage gap in Australia.

My analysis is informed by four specific hypotheses. Several US and British have shown that the motherhood wage penalty can be partly explain by foregone work experience and human capital depreciation (Anderson et al., 2002; Budig & England, 2001; Gangl & Ziefle, 2009; Neumark & Korenman, 1994). In Australia, I also expect

employment interruptions to affect wage outcomes. Previous cross-sectional analysis of female wages in Australia has shown that wages significantly rise as actual work experience increases and that wages are significantly lower for women who have taken at least one career break (controlling for education) (Rimmer & Rimmer, 1997). This is consistent with predictions from human capital theory. Given these earlier findings my first hypothesis is:

- In Australia, children will negatively affect female wages through employment interruptions that affect accumulated work experience and tenure.

Yet it is unclear whether employment interruptions will be as important in Australia as they have been found to be in earlier US and British studies. On the one hand, Australia has tended to have lower maternal employment rates than the US and Britain, which implies that more Australian mothers interrupt employment or that the average interruption is longer. Job-protected parental leave is available for a longer period in Australia than the US and Britain (see Table 2.1 for summary of differences). On the other hand, fewer Australian mothers may experience involuntary job separations because anti-discrimination laws explicitly prohibit job dismissal on the grounds of family responsibilities. In neither the US nor Britain is direct discrimination on the basis of family responsibilities explicitly prohibited under sex discrimination laws, though responsibility for family care has been deemed a form of disparate treatment on the basis of sex in some cases (Williams & Segal, 2003). Nevertheless, direct discrimination on the grounds of family responsibilities may be no less common in Australia if employed women are unwilling to lodge complaints about direct discrimination.

Previous US and British research suggests that mothers' involvement in part-time work explains part of the wage penalty for motherhood (Anderson et al., 2002; Budig & England, 2001; Joshi et al., 1999; Waldfogel, 1997a). Previous Australian research shows that part-time employment is comparatively better remunerated in the Australian labour market. Indeed, research shows that part-time employment does not negatively affect female wages, even after controlling for other job characteristics (Booth & Wood, 2008; Gornick & Jacobs, 1996; Preston, 2003; Rodgers, 2004). Given these Australian findings, my second hypothesis is:

- Mothers' participation in part-time work will not explain the motherhood wage penalty in Australia.

Previous Australian research, however, investigated wage disparities across the entire female working-age population (Booth & Wood, 2008; Gornick & Jacobs, 1996; Grimshaw et al., 2001; Harley & Whitehouse, 2001; Preston, 2003; Rodgers, 2004). Women participate in part-time work for different reasons over the lifecourse and this may structure the quality of part-time jobs women can access. Some of the constraints mothers face combining parental care with employment, such as accessing child care close to home or the workplace, may reduce mothers' access to quality part-time jobs. Given these constraints, my third hypothesis is:

- Wage premiums for part-time employment in Australia will be lower for women of child-bearing age than across the wider population of working age women.

In this chapter, I do not formally test this hypothesis. Rather I compare my results with findings published in an earlier Australian study by Booth and Wood (2008). Using the first four waves of HILDA, Booth and Wood (2008) observe an 11% wage premium for part-time work among women aged 18 to 60 years using fixed-effects regression (with controls for job and demographic characteristics). The analysis I present in this chapter draws on six waves of HILDA. With a slightly longer panel, the sample will retain more observations from women who take parental leave or interrupt employment between a transition from full-time to part-time working hours. This trajectory is likely to be common in Australia where parents are eligible for 12 months parental leave. Hence, analysis presented in this chapter aims to complement that of Booth and Wood (2008) by focusing on women of child-bearing age and using data from a longer panel.

Other theories that could possibly explain the motherhood wage penalty include compensating differentials, employer discrimination and changes in job productivity. In cross-sectional studies, a negative association between children and wages may be spurious if higher paid women have unobserved characteristics that mean they are more likely to remain childless or to have fewer children. With longitudinal data, selection into motherhood can be accounted for using fixed-effects regression. In the US and Britain, longitudinal analyses often show that children negatively affect female wages even after controlling for unobserved heterogeneity, work experience and part-time work (Anderson et al., 2003; Budig & England, 2001; Waldfogel, 1997a). Given these earlier findings, my fourth hypothesis is:

- Children will lower female wages after controlling for unobserved heterogeneity, work experience, tenure and part-time work.

I anticipate that this negative effect will remain in the final wage model with controls for detailed employment characteristics, including contract, sector, organisation size and industry, and the demographic variables marital status, health and region. In the final wage model, I incorporate two measures of family-friendly job conditions. These are "regular" work from home and the availability of flexible start and finish hours. Inspection of the direction and significance of the coefficients for these two measures allows for a preliminary appraisal of whether pecuniary rewards are traded for non-pecuniary benefits in the Australian labour market. However, survey data with more detailed measures of family-friendly job conditions would be needed to evaluate whether compensating differentials explains part of motherhood wage penalty in Australia.

4.3 Method

Female wage model

In this chapter, my model is based on the conventional female wage equation. My model takes the general linear form[46]:

$$\ln \mathrm{WAGE}_{it} = \theta + \beta_1 \mathrm{CHILD}_{it} + \beta_2 \mathrm{EXP}_{it} + \beta_3 \mathrm{EXP}_{it}^2 + \sum \beta_{4-6} \mathrm{TEN}_{it} + \beta_7 \mathrm{PART}_{it}$$

$$+ \beta_8 \mathrm{AGE}_{it} + \sum \beta_j \mathrm{JOB}_{jit} + \sum \beta_j \mathrm{DEM}_{jit} + \sum \beta_j \mathrm{YEAR}_{jt} + c_i + u_{it}, t = 1, 2, ..., 6$$

where i indexes individual females and t indexes time (wave). Wages are expressed in 2001 prices[47]. β are the partial regression coefficients to be estimated for each explanatory variable and θ is the overall intercept. The key explanatory variables in my model are number of children (CHILD), actual years work experience (EXP), three dummy variables for tenure (TEN) and a dummy for part-time hours (PART). AGE is included to control for differences in potential experience and JOB is a vector of variables capturing both demand and supply factors affecting wage rates. DEMO is a vector of demographic controls, including marital status and health. (I describe these

[46] I follow the statistical nomenclature used by Wooldridge (2002). Wooldridge (2002, p. 247) notes that he uses c instead of a greek letter (such as α) to make clear his assumption that unobserved time-constant variation takes the form of a random variable (the modern approach) and is not a parameter to be estimated (the traditional approach). In this thesis I follow the modern approach, treating the unobserved person-specific effect, c_i, as a random variable, independent of whether this variation constitutes a true random effect or not (Woodridge, 2002).

[47] I explain how I deflate wages to 2001 prices in a subsequent section describing variable construction.

measures further in a later section.) Finally, dummy variables for each year are included to control for period-specific effects.

The model divides unexplained variation (or error) into the two components c_i, representing unobserved time-constant person effects, and u_{it} representing the idiosyncratic errors arising from the effects of unmeasured time-varying factors. The unobserved person-specific effect, c_i, is assumed to capture several attributes, such as cognitive ability, self-discipline, career orientation and family preferences, but on the assumption that these attributes are all stable over the six waves. Whether these unobserved attributes, with the exception of cognition, should be conceptualised as stable is subject to debate in sociology (Crompton & Harris, 1998; Hakim, 2000; Proctor & Padfield, 1999). (I describe how the absence of measures for salient time-varying attributes might affect coefficient estimates later.)

Analysis is undertaken using fixed-effects regression. This method enables unbiased and consistent coefficients to be estimated where an explanatory variable is correlated with stable unobserved characteristics (Allison, 2005; Wooldridge, 2002)[48]. Protection against bias caused by unobserved heterogeneity, also termed omitted variable bias, is not afforded through the main alternative method of analysis, random-effects estimation. Random-effects regression is usually a more efficient estimator. Following Allison (2005) and Halaby (2004), I use fixed-effects rather than random-effects regression because I prioritise issues of bias and consistency in estimates above efficiency[49]. In addition, I undertake Hausman (1978) tests as a formal check for correlation between unobserved heterogeneity and the explanatory variables. The Hausman test rejected the null hypothesis that the random-effects method is appropriate[50]. Hence, random-effects estimation is not used on both substantive and technical grounds.

[48] Unbiased and consistent coefficients can potentially be estimated using instrumental variables regression. The major difficulty of the instrumental variable approach is the identification of an instrument that affects fertility decisions, but not wages (Ellwood et al., 2004).
[49] Random-effects estimation imposes the strong assumption that unobserved heterogeneity, c_i, is independent of all explanatory variables. Biased and inconsistent estimates will result from random-effects estimation if regressors are correlated with unobserved heterogeneity.
[50] Hausman test has chi2 statistic of 450.4 with 42 degrees of freedom and a probability of less than 0.0000 for model D. Following an approach described by Mundlak (1978), I also estimate a model where the within-person and between-person variation on time-varying regressors is partitioned. Two parameters for each time-varying measure are derived, one capturing within-person variation and the other between-person variation. Within and between parameter estimates for a given predictor will be alike where there is no correlation between that explanatory variable and the unobserved person-effects (Allison, 2005, p. 36). Results from this

Fixed-effects estimation calculates partial regression coefficients after "conditioning out" the unobserved heterogeneity. Parameter estimates are derived by transforming each respondent's data on a given variable at each wave into a deviation from their overall mean on that variable across all waves. The estimation method, here with a single explanatory variable for number of children, can therefore be summarised as:

$$\left(\ln \mathrm{WAGE}_{it} - \ln \overline{\mathrm{WAGE}}_i\right) = \beta_1\left(\mathrm{CHILD}_{it} - \overline{\mathrm{CHILD}}_i\right) + \left(c_i - \bar{c}_i\right) + \left(u_{it} - \bar{u}_i\right), t = 1, 2, ..., 6$$

where $\ln \overline{\mathrm{WAGE}}_i$ is the mean log wage of person i across waves t and $\overline{\mathrm{CHILD}}_i$ is the mean number of children ever given birth to by person i across waves t. By definition, unobserved heterogeneity, c_i, is constant over time, so the term $(c_i - \bar{c}_i)$ is conditioned out of the estimation equation.

A crucial feature of the fixed-effects method is that coefficients are estimated using within-person variation only. Hence, for those characteristics that vary between persons and not over time, such as country of birth, the fixed-effects method cannot calculate a partial regression coefficient. Given all my key explanatory variables vary over time, this feature of the fixed-effects method does not pose a problem for my analysis. By conditioning out all time invariant between-person variation, the resultant parameters represent associations net of the observed control variables in the model, as well as unobserved attributes that remain constant over time.

Fixed-effects estimation entails several assumptions. For brevity, I do not formally describe each assumption here. One important assumption is that the idiosyncratic errors, u_{it}, are strictly exogenous, meaning that this error is statistically independent of all explanatory variables at all points in time (Allison, 2005; Wooldridge, 2002)[51]. In the context of my wage models, this assumption will be violated if the decision to have a child at a given age is related to wage shocks prior to a birth event or if fertility decisions are influenced by anticipated future wage growth. Accordingly, the direction of causality will run in the reverse direction or there will be simultaneous causal pathways running in both directions. Conventional fixed-effects analysis cannot solve this endogeneity problem. Moreover, the idiosyncratic errors, u_{it}, might actually be

model reject the null hypothesis that the "deviation" coefficient for number of children is equal to the "mean" coefficient for children.

[51] Exogeneity assumptions are slightly weaker in a first-difference model than the fixed-effects model. However, my data is highly unbalanced and does not lend itself to first-difference regression.

capturing the effect of time-varying work orientations, rather than the term for unobserved heterogeneity, c_i, if mothers adjust their career ambitions after the arrival of children and where this change influences wage outcomes. In this case, the partial regression coefficient for children will pick up the combined influences of changing work orientations and discrimination.

Women's self-selection into employment may also lead to biased and inconsistent parameter estimates if the propensity of employment is time varying and this is correlated with observed or unobserved factors structuring wages (Dustman & Rochina-Barrachina, 2007). Selection bias will also arise if wage growth has a direct effect on women's subsequent decisions to remain in the labour force (Semykina & Wooldridge, 2006). Several studies of the motherhood wage gap do investigate whether self-selection on employment biases parameter estimates derived from a fixed-effects regression using a variant of the two-step Heckman model (Amuedo-Dorantes & Kimmel, 2005; Budig & England, 2001; Datta Gupta & Smith, 2002; Gangl & Ziefle, 2009; Glauber, 2007; Korenman & Neumark, 1992). Results from these analyses are inconclusive, with some studies finding that the correction term for selection (lamda) is statistically significant (Amuedo-Dorantes & Kimmel, 2005; Gangl & Ziefle, 2009, for US and Germany) and other studies finding that the correction term is not significant (Budig & England, 2001; Gangl & Ziefle, 2009, for Britain; Glauber, 2008; Korenman & Neumark, 1992). Following the approach of Wooldridge (1995), I test whether selection into employment affects the estimation of female wage equations. I do not detect selection bias in this analysis. For this reason, the results I present in the body of this chapter are for female wage equations estimated without a selection correction. Misspecification of the equation used to test for selectivity bias, however, could prevent me from detecting "real" selection bias. The selection equation I use and the adjusted fixed-effects estimates are described in Appendix 4B.

I also estimate analogous models using the method of pooled OLS regression, where I treat each wave as a separate cross-section. I adjust the standard errors for non-independence of repeated observations from the same respondent using the Huber-White sandwich estimator of variance. Conventional OLS estimation on pooled cross-sections will provide consistent partial regression coefficients only where unobserved person-specific effects, c_i, are independent of fertility behaviour and all

other explanatory variables (Wooldridge, 2002)[52]. A comparison, therefore, of the coefficient estimate for children using pooled OLS regression with the coefficient estimate using fixed-effects regression allows me to judge whether my concern over heterogeneity bias is indeed warranted.

All analyses are undertaken using Stata. Fixed-effect estimation using the xtreg function in Stata adjusts standard errors for serial correlation.

Analytic strategy

My modelling approach proceeds in five stages. First, I derive an overall estimate of the additive influence of each child on female wages, with controls for unobserved heterogeneity and period-specific effects (model A)[53]. Second, I add measures of work experience and tenure (model B). Third, I add a measure of part-time work hours (model C). Fourth, I estimate models with the full set of explanatory and control variables (model D)[54]. This fourth fixed-effects model allows me to derive parameter estimates for the key explanatory variables, work experience, tenure and part-time work, net of various other time-varying job characteristics. A comparison of the coefficient estimates for children across the four fixed-effects models tells me whether time-varying observable characteristics, particularly differences in human capital and part-time work, constitute a key means via which children negatively impact on female wages. A significant coefficient for children in model D suggests processes other than human capital loss, employer transitions and part-time work contribute to a lowering of mothers' wages. As noted in my literature review, I am not able to ascertain whether any residual association represents discrimination against mothers, movement into a more family-friendly job or changes in job productivity.

A number of different models are estimated as robustness checks. First, I top-code weekly work hours at 48, which I take as a rough estimate of the maximum hours full-time salaried employees are likely to have specified in an employment contract. I then derive a rough measure of long full-time employees' "nominal" wage rate. Re-

[52] More precisely, OLS estimation on a pooled dataset will provide consistent partial regression coefficients only where the composite error, v_{it}, is independent of the explanatory variables.
[53] Also, I do not use the longitudinal person weights provided with HILDA because these have been designed for a balanced dataset.
[54] Although it is possible to decompose the motherhood wage gap into a component attributable to compositional differences and a component due to different rates of returns, I chose not to employ this modelling strategy. In the research literature contrasting mothers and childless women's wages, this decomposition has only been undertaken with cross-sectional data (see Joshi et al., 1999). Decomposition of the gender gap in pay has, however, been undertaken with panel data (see Kilbourne, Farkas, Beron, Wier & England, 1994). I did not pursue this strategy as preliminary results showed that the wage gap is too narrow to support this type of modelling.

estimating female wage models with this alternate dependent variable provides a check of the robustness of the coefficient for part-time work (model E). The concern here is that women who work extremely long full-time hours may have low wages by virtue of unpaid overtime and this may influence parameter estimates. Second, I estimate the female wage model with a dummy variable specification for number of children (model F). Third, I substitute number of dependent children for total number of children ever given birth to (model G). If the negative association between children and female wages is primarily caused by mothers' redirection of effort towards childcare and away from paid work (Becker, 1985), then a model with number of dependent children will possibly be more informative than a model with total number of children.

Sample

In this chapter, my analytic sample is comprised of female employees of child-bearing age. The sample is limited to employees for two reasons. First, as noted in the preceding chapter, wages are difficult to derive for self-employed females. Second, causal explanations of the motherhood wage gap highlight the hiring practices of employers and internal workplace processes, factors which are relevant only to employees.

To construct a panel dataset, I pool observations from each female respondent across the 2001 to 2006 waves of HILDA. With annual interviewing, a maximum of 6 waves of data are available for each female respondent. Respondents aged 22 to 45 years in 2001 are considered in-scope[55]. To this large initial sample of female respondents I apply a number of restrictions[56]. First, I exclude all person-wave observations where the respondent is enrolled in full-time study (though for respondents who transition into or out of full-time education I retain waves of data where the woman is not studying full-time). Second, I exclude person-wave observations where the respondent has non-resident or adult children. For those mothers who have a youngest child transitioning from dependent to non-dependent status, I retain waves of data only for the years where the child is dependent. I also exclude a small number of female respondents who display implausible fertility

[55] I retain 483 person-time observations from 163 "temporary sample members" and 36 person-time observations from 11 "other permanent sample members" who join the HILDA sample on a permanent basis after wave 1. The original cross-section is a random draw of Australian households, some of which include a female adult of child-bearing age, rather than a random draw of females.

[56] A justification of many of the sample restrictions is covered in the sample description in chapter 3.

transitions, such as a reduction in total number of births ever had[57]. Third, I remove all person-time observations from respondents who had their first child at age 17 years or younger[58]. Fourth, person-wave observations are retained where the respondent is employed at the time of the survey and is supplying labour to an employer in return for a wage or salary. For each female respondent to act as her own control in the regression models, it is necessary that each respondent has at least two waves of data where they are working as an employee for a wage or salary. This means I lose women who work as an employee at a single wave between 2001 and 2006. Although this requirement is not necessary for pooled OLS regression, I maintain this criterion so I can compare findings between the pooled OLS and fixed-effects regression methods. Fifth, person-wave observations are lost due to missing, implausible and outlying values on the wage rate[59], or any of covariates in the final regression model. Female respondents are retained in the analytic sample as they age, which means that at wave 6 respondents are aged 27 to 51 years.

Table 4.2 summarises how each restriction influences the number of respondents and number of person-wave observations retained in the final analytic sample of female employees. The final sample consists of 8,902 person-year observations, with an average of 4.2 years (waves) of data from 2,107 individual females. Missing, implausible or outlying data contributes to the loss of 3.3% of female employees and 3.9% of all potential employee observations in the person-year sample. Low levels of item non-response can largely be attributed to the use of personal interviews to collect information on current employment and weekly earnings, but to some extent has been further minimised by imputing missing values on selected control variables. (I describe the imputation strategies in the section on variable construction.)

[57] Some of these transitions could be capturing rare changes in family circumstances, such as the death of a child, and are not necessarily caused by response error.
[58] I also exclude females for whom age at first birth cannot be derived due to non-response or poor quality data.
[59] Outlying values are defined as less than $2 per hour or more than $120 per hour. I also exclude women working less than 6 hours or more than 60 hours per week from wage calculations because wage values are typically very high or low.

Table 4.2: Impact of sample restrictions on sample size, female respondents aged 22 - 51 years

Criteria to narrow analytic sample	Number of persons	Number of person-time observations	Average time observations per person
Females 22 - 45 years [a]	4,058	18,366	4.5
Not studying full-time	4,016	17,837	4.4
Childless or have dependent children[b]	3,787	16,277	4.3
Childless or first birth age 18 years or older[c]	3,645	15,726	4.3
Employed	3,061	11,477	3.8
Employee	2,800	9,885	3.5
Employee, two or more waves[d]	2,179	9,264	4.3
Final sample of female employees (with valid data on all covariates)[e]	2,107	8,902	4.2

Note: [a] This baseline sample consists of all female respondents 22 to 45 years in 2001 who participated in HILDA at least once between waves 1 and 6 (but not necessarily at wave 1).
[b]Childless women are defined as women who have never had any children. Female respondents who have implausible fertility transitions are also excluded.
[c] Female respondents who have missing or implausible data on age at first birth are also excluded.
[d]Female respondents who work for an employer, but do not receive a wage or salary, are also excluded.
[e] Female respondents who only provide a single person-time observation to the final dataset due to missing data on the covariates are also excluded.
Source: HILDA waves 1 - 6 (2001 - 2006).

In the wider sample of Australian females of child-rearing age, a substantial share of respondents are not employed and, therefore, do not receive a wage. Removing observations for respondents who are not employed reduces the person-time sample by 27% (4,249 observations out of 15,726) and the person sample by 16% (584 women out of 3,645). Excluding the self-employed, in turn, reduces the person-time sample by a further 1,592 observations and the person sample by 261 women. As expected, mothers with young children have comparatively higher rates of non-employment relative to both childless women and mothers with older children (see Table 4.3). In the panel sample, 43% of person-time observations from female respondents with a dependent child aged less than 6 years are retained in the analytic sample of employees, compared to 82% of person-time observations for childless women. Also, person-time observations from mothers with three or more children are slightly more likely to be excluded from the final sample because these mothers have higher rates of both self-employment and non-employment. I investigate whether this biases parameter estimates in supplementary analysis published in Appendix 4C.

Table 4.3: Employment status by age of youngest child and by number of children, person-time observations from women aged 22 - 51 years, 2001 - 2006

Motherhood status	Employee	Self-employed	Not employed	Total n
Never had children	82.1	7.8	10.1	4,759
Age of youngest child				
0 - 5 years	43.0	10.8	46.2	5,199
6 - 12 years	63.7	11.1	25.2	4,090
12 - 17 years	70.1	9.2	20.6	1,618
Number of children				
One child	59.7	7.0	33.3	2,262
Two children	58.3	9.8	31.8	4,702
Three or more children	47.7	13.8	38.5	3,949
All person-time observations	63.1	9.8	27.1	
Total n	9,886	1,537	4,249	15,672

Note: Excludes female respondents in full-time education, had their first child at age 17 years or younger, have non-dependent children and with missing or invalid information at age first biological child was born. Respondents who work as an employee but do not receive a wage or salary are excluded. Percentages are not weighted.
Source: HILDA waves 1 - 6 (2001 - 2006).

Attrition of female sample members over time threatens the representativeness of the sample of female employees and, in turn, the generalisability of my findings. Summarising the extent of female survey attrition is difficult[60]. Although some female employees are lost because they respond to HILDA only once, other women in the sample respond at all waves, but only work for an employer at a single wave. Around one-quarter of female respondents who work for an employer between 2001 and 2006 (619 women out of 2,800) are observed working as an employee at only a single wave and are excluded from the final analytic sample. This loss represents the combined effects of attrition and selection out of employment.

My main concern is that attrition is non-random. This would arise if attrition is correlated with women's employment transitions, wage rates, birth events or changes in working hours. For example, an association between attrition and employment could arise if households are less readily contactable where all adult members in a household work full-time or where full-time employees are more time pressured and less likely to agree to be reinterviewed. Attrition inherently involves the loss of information, particularly for those individuals who do not return at a later wave (i.e. censored observation). Hence, the following discussion on how attrition might affect the sample can only be speculative. My greatest concern is that the arrival of an infant

[60] In this thesis, attrition is defined as occurring where a sample member is not surveyed at the most recent wave of data collection or any wave prior to this, but has responded at least once (Zabel, 1998).

causes some groups of mothers to permanently attrite from the sample, though this is something I cannot observe.

Figure 4.1 plots wave-on-wave response rates and the percentage of wave 1 respondents reinterviewed at each subsequent wave by whether the female respondent has children and is employed at wave 1[61]. All figures refer to a sample of female respondents aged 22 to 45 years in 2001 (excluding full-time students, mothers who have adult children at all waves and mothers who had their first birth as a teenager). Overall, levels of attrition are not markedly different when comparing childless women and mothers who were employed at wave 1. The group with the highest rates of non-response are childless women who were not employed at wave 1. However, these summary plots potentially mask associations because female sample members transition between employment and non-employment over time.

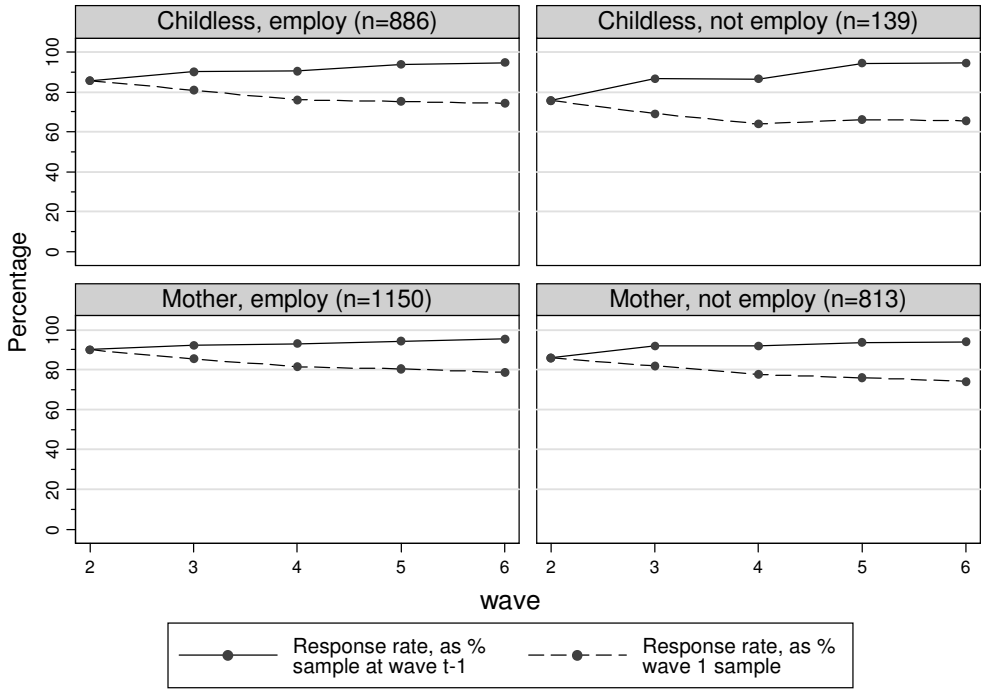


Figure 4.1: Survey attrition by motherhood and employment status in 2001, female respondents aged 22 - 51 years, 2001 - 2006

[61] Another indicator of attrition is the percentage of respondents interviewed at a given wave who did not respond at the wave immediately prior. Of the female respondents who have wave non-response at wave 2, 23.8% were interviewed at wave 3. The comparable figures for waves 4, 5 and 6 are 13.7%, 17.8% and 11.3% respectively.

In Table 4.4, I look more closely at the panel sample of female respondents, examining both whether prospective and retrospective attrition is correlated with employment status and several demographic attributes. I find that rates of survey attrition are slightly lower among respondents who work part-time and mothers with a child aged 12 years or younger. Women with lower levels of education have slightly higher rates of attrition. Similar to other household panel surveys (Zabel, 1998), I observe that the incidence of attrition is higher among childless women. Yet it is difficult to predict how this might affect my results without knowing more about the labour market characteristics of these childless women. One possibility is that young women in highly-skilled professions are less likely to be retained in the panel where their employment involves long working hours and geographic mobility. This process of attrition would possibly depress the average wage growth of young, childless women, and, in turn, downward bias parameter estimates for children. However, the descriptive analysis in Table 4.4 suggests that wave non-response is lower, not higher, among women with a degree or higher qualification than women who have not attained any tertiary qualifications (though this figure is calculated for all female respondents aged 21 to 45 years).

Variable construction

Dependent variable

The dependent variable in all models is the natural logarithm of the hourly wage currently received by the respondent in their main job. Modelling the natural logarithm allows me to examine percentage changes in wages instead of absolute changes. Percentage changes are arguably of greater interest than absolute changes because absolute changes are likely to vary more across the wage distribution. Taking the natural logarithm also brings the wage distribution closer to normal.

Hourly wages are calculated by dividing gross weekly earnings by total weekly working hours. As noted in the previous chapter, I exclude female respondents working less than 6 hours per week or more than 60 hours per week because these employees show extremely high or low wage rates respectively. Also, I delete observations where the derived wage rate is very low (less than $2 in 2001 dollars) and very high (more than $120 in 2001 dollars).

The HILDA interview utilises several questions to elicit data on current weekly earnings and work hours as a means of reducing item non-response (see chapter 3 for

Table 4.4: Labour market location and demographic characteristics by response status, female respondents aged 22 - 51 years, 2001 - 2006

	Future HILDA participation, waves 1 - 5 (%)		Past HILDA participation, waves 2 - 6 (%)	
Characteristic at wave t	**Respond at wave t + 1**	**Attrite at wave t + 1**	**Respond at wave t - 1**	**Attrition at wave t - 1**
Employment status				
Not employed	90.7	9.3	96.5	3.5
Part-time	93.3	6.7	97.4	2.6
Full-time	90.3	9.7	96.1	3.9
Motherhood status				
Never had children	89.3	10.7	95.4	4.6
Number of child				
One child	91.3	8.7	96.4	3.6
Two children	93.0	7.0	97.5	2.5
Three or more children	92.2	7.8	97.2	2.8
Age of youngest child				
0 - 5 years	92.6	7.4	96.7	3.3
6 - 12 years	92.6	7.4	97.8	2.2
13 - 17 years	90.8	9.2	96.9	3.1
Relationship status				
Married or de-facto	92.2	7.8	97.3	2.7
Separated, divorced, widowed	90.9	9.1	95.7	4.3
Single, never married	88.4	11.6	94.4	5.6
Education				
High school or less	89.8	10.2	96.2	3.8
Diploma / certificate	91.8	8.2	96.9	3.1
Degree	93.8	6.2	97.2	2.8
Age				
22 - 24 years	83.3	16.7	95.2	4.8
25 - 30 years	89.4	10.6	94.7	5.3
31 - 35 years	91.4	8.6	95.7	4.3
36 - 40 years	92.4	7.6	97.6	2.4
41 - 45 years	93.9	6.1	98.0	2.0
All wave-on-wave observations	91.5	8.5	96.7	3.3
Number of observations	10,969	1,024	10,851	371

Note: Sample comprises wave-on-wave observations from female original sample members, excluding person-time observations if studying full-time or have adult children at wave t. I also exclude all observations from mothers who had their first birth as a teenager and mothers who have implausible fertility trajectories.
Source: HILDA, waves 1 - 6 (2001 - 2006).

a description). Preliminary analysis explores whether the pattern of earnings and working hours answers given by a respondent (and item non-response) is associated with my central independent variables, in particular motherhood status, work experience and part-time hours. These results are published in Appendix 4. Overall, I consider it unlikely bias is introduced by differences in the mode via which respondents provide earnings and work hours' data or by the inclusion of imputed values.

To account for changes in purchasing power over time, I deflate hourly wages to 2001 prices using CPI (ABS, 2007a)[62]. National earnings benchmarking by the ABS shows that the total weekly earnings of adult, full-time women grew notably faster than CPI over the 6 year period the panel spans[63]. Trends in full-time earnings may not reflect changes in the returns to part-time jobs, which is the reason I do not deflate wages for movements in average total weekly earnings. Instead, I control for possible upward period-specific trends in female wages by including dummy variables for each survey year in the regression models, with 2001 (wave 1) as the omitted category.

Explanatory variables

Motherhood

In this chapter, I define mothers as women who have given birth to (or adopted) at least one child and have one or more dependent children living in their household. Childless women are defined as having no biological, adoptive, step, foster or adult children. I anticipate that mothers who have had more children will, on average, have more interruptions to employment. Given this expectation, the models include a continuous variable for number of children ever born (up to the interview date), with values top-coded at three children. This specification assumes an additive, linear form to the relationship. In supplementary analysis, I substitute the continuous measure with three dummy variables to check for a non-linear relationship.

Number of children ever born is taken from a single question in the HILDA personal interview. At waves 1 and 5, all respondents are asked, "How many children in total have you ever had? That is, ever given birth to or adopted", with a further

[62] CPI measures price movements in the cost of a 'basket' of goods and services consumed by a household (ABS, 2007a). I deflate wages using CPI figures for the third quarter of each year, as this most closely approximates the timing of the HILDA fieldwork schedule. Setting 2001 income to 100, hourly wages for subsequent years are adjusted by factors of 0.97 (2002), 0.94 (2003), 0.92 (2004), 0.90 (2005) and 0.86 (2006).

[63] From 2001 to 2006, CPI in the third quarter increased by 16%. Over this same period, average full-time, adult female total earnings increased by 24.5% (ABS, 2006b). I am grateful to Hielke Buddelmeyer for bringing this to my attention.

instruction that this count should not include step or foster children[64]. Although not made explicit to respondents, the intention is that this question will encompass both biological or adopted children who are currently alive, as well as children who have died. Despite some ambiguity in the treatment of deceased children, the measure of number of children appears reliable with only a small number of "implausible" transitions over the course of the panel. Women with implausible fertility transitions are excluded from the analysis.

Fixed-effects estimation utilises within-person variation to derive parameter estimates, meaning that it is imperative that some female respondents in my sample experience a change in the number of biological or adoptive children they have over the six waves. Table 4.5 summarises the frequency of fertility events for women in my panel sample by tabulating number of children a woman had at the last wave they are observed working as an employee by number of children a woman had at the first wave they are working as an employee. Of the female employees who are initially childless, around 19% have at least one child by the last wave they are observed working as an employee. A substantial percentage of female employees who initially have one child have two children when they are last observed working for an employer. Fewer third-order birth transitions are observed in my sample, with only 5% of female employees with two or more children transitioning to three or more children. The proportion of all female respondents aged 22 to 54 years experiencing a fertility transition is substantially higher in the wider sample because many female respondents had not returned to work for an employer after a birth event and before the sixth wave of data collection. (I examine the characteristics of these mothers in the next chapter.)

A greater number of transitions are observed with the measure number of dependent children in the household, instead of number of children ever had (results not shown), because here I observe both the exiting of children from the parental household in addition to the entrance of children at birth[65]. As children move through different stages of development, the demands of parenthood on mothers' time

[64] At waves 2, 3, 4 and 6, the question is worded more simply as, "How many children do you have?", but again with an instruction to exclude step or foster children. However, where the first personal interview falls after wave 1 a slightly different interview schedule is used (the New Person Questionnaire instead of the Continuing Person Questionnaire). Respondents who enter the HILDA sample in wave 2 to wave 5 are asked, "How many children in total have you ever had?" in their first interview but not subsequent interviews.

[65] For instance, of the 283 females with three or more dependent children when they were first surveyed, around 24% had changed to having two dependent children and another 10% to a single dependent child by their last observation. The first and last observation here refers to first and last observation where the female is working for an employer.

Table 4.5: Total children at first interview by total children at last interview, female employees aged 22 - 51 years, 2001 - 2006

Number of children ever had, last observation	Number of children ever had, first observation				
	Childless	One child	Two children	Three or more children	All
Childless	81.3	0	0	0	35.7
One child	12.4	69.3	0	0	14.3
Two children	6.0	28.2	94.8	0	30.3
Three or more children	0.3	2.6	5.2	100	19.7
All females (row %)	43.9	12.8	25.4	17.9	100
Total n	925	270	535	377	2,107

Note: All figures are unweighted.
Source: HILDA, waves 1 - 6 (2001 - 2006).

undoubtedly changes (Dribe & Stanfors, 2009; Kalenkoski & Foster, 2008). If the caring demands of children have a causal affect on female wages through a decline in job productivity, it follows that mothers' wages should improve as children become less dependent, all else being equal. Arguably, the entrance of a child into the household constitutes an immediate "shock", whereas the transition of a child to an independent adult is a gradual process. Therefore, the exiting of a child from the parental household may not result in an immediate redirection of effort away from unpaid work in the home towards paid employment. This is the principal reason I focus on changes in parental status arising from the entrance of a child into a household.

Part-time hours

In this thesis, I follow the Australian convention of defining part-time jobs as up to 34 hours per week and full-time jobs as 35 hours or more. This facilitates a comparison with earlier Australian research on relative wage differential between part-time and full-time employees (Booth & Wood, 2008; Gornick & Jacobs, 1996; Preston, 2003; Rodgers, 2004). Part-time work is derived from weekly working hours in main job where the respondent has more than one job. Full-time employment is treated as the reference category.

Human capital

My models capture differences in human capital using measures of work experience and tenure with current employer[66]. Work experience here refers to years in paid work

[66] A fourth measure of human capital available in HILDA is years in current occupation. This measure is not included in the wage model because occupational experience tends to be correlated with years of work experience and employer tenure. Another measure of human capital, job training, was only added to HILDA in wave 3.

since leaving full-time education for the first time, and in the questionnaire is distinguished from two other states, these being periods "unemployed and looking for work"[67] and periods "neither working nor looking for work"[68]. Years in paid work includes spells of both part-time and full-time employment. HILDA does not collect data on work experience accumulated in part-time jobs versus full-time jobs. Models include a quadratic term for work experience, to allow for a non-linear association. My analysis does not include years not in the labour force (NILF) as an explanatory variable because this variable is collinear with work experience and age.

The measure of work experience has moderately high levels of item non-response because of the design of the work history questions. At the first interview, respondents are asked to estimate total years work experience since leaving education. At each subsequent HILDA interview, work experience is updated using data on the number of part months the respondent has been in paid work since the previous fieldwork period. Unfortunately, at the second and subsequent interviews the HILDA questionnaire only asks about involvement in paid employment, in part months[69], since the previous fieldwork period and does not go back further for those respondents who did not participate at the previous wave.

Instead of excluding respondents with missing data on work experience, which would seriously exacerbate attrition bias, I impute gains in work experience for respondents who do not respond at one or more waves. Taking the available data on work experience gains since the previous fieldwork period, I calculate the proportion of time a respondent has been in paid work as a function of total months since the previous fieldwork period (defined as commencing in July). In turn, I impute months gained work experience since the previous interview by multiplying this proportion by the actual number of months passing since the respondent was last interviewed. Imputation is only undertaken for those respondents who do not respond at one or two

[67] I checked whether childless women are more likely to experience unemployment, or to classify involuntary interruptions as unemployment, than mothers. The average duration of unemployment for women who have experienced a spell of unemployment is typically short and does not vary according to motherhood status (mean = 1.3 years). At wave 1, around 24% of childless employees had experienced at least one month of unemployment since leaving full-time education, compared to 19% of mothers.

[68] In a small number of cases, respondents provided an answer in terms of months and these have been transformed to part years. Note that respondents were only asked for a monthly figure where they had spent less than one full year in paid work, unemployed or other.

[69] The HILDA employment calendar asks respondents to list their employment status at the beginning, middle and end of each month since early July in the year prior. Unlike the BHPS or NLSY, the HILDA survey does not ask for information on the dates a respondent commenced and finished each job since the previous wave.

successive waves; work experience is left missing for respondents who do not respond at three or more successive waves. Work experience data is imputed in this way for 94 person-time observations from 54 respondents.

An alternative imputation strategy is adopted for female respondents where wave non-response coincides with a birth event. For this group, information on total months away from paid employment around a recent birth was collected in an occasional question module on fertility at wave 5. This more detailed data is used to impute work experience gains for 24 person-time observations from 13 respondents in the analytic sample.

Tenure with current employer is classified as fewer than 2 years, 2 to 4 years, 5 to 9 years and 10 years or longer. The reference category is 10 years or longer. Tenure is collected from respondents anew at each wave. This question design introduces some measurement error. Tenure can appear to be unchanged or to change greatly wave-on-wave for some female respondents who have remained working for the same employer due to recollection error. This is likely to be more of an issue for older women who have been with the same employer for a long period. For this reason, I use a categorical measure of tenure in place of the usual linear specification in the female wage model. Tenure has low levels of item non-response in HILDA. Descriptive statistics on these key explanatory variables are presented in Table 4.14 in Appendix 4B.

Control variables

The selection of other job and demographic variables to include in the final model has been guided by other panel studies of the motherhood wage gap (Anderson et al., 2003; Budig & England, 2001; Gangl & Ziefle, 2009; Waldfogel, 1997a), as well as earlier cross-sectional Australian studies of the gender wage gap and female wages (Preston, 2003; Rodgers, 2004; Wooden, 1999). Control variables fall into the two general categories of other job characteristics and demographic attributes. Construction of the control variables for time-varying employment characteristics largely follows convention.

Few questions on the uptake and availability of family-friendly workplace provisions are available in the HILDA questionnaire. Yet respondents are asked about

working from home and the availability of flexible start and finishing hours[70]. The work from home variable is taken from a question asking whether any of the respondent's "usual working hours" are spent working at home. The reference category takes the value none. The two contrast categories are work from home as a formal arrangement and work from home as an informal arrangement. Although the theory of compensating differentials does not discriminate between formal and informal type arrangements, different types of negotiation are likely to take place with an employer where work from home is arranged on an informal basis.

The second measure of family-friendly job conditions is access to flexible start and finishing times[71]. Employees who report that flexible start and finishing times are not available in their current job are treated as the reference[72]. The first dummy variable is coded 1 where this form of flexibility is available. Associated with this item is a second dummy variable coded 1 for respondents who mark the "don't know" answer option (n = 700). Childless women are more likely than mothers to indicate that they are not aware whether flexible start and finishing times are available to them in their current workplace (see Table 4.14). This could represent differences in terms of availability or knowledge of flexible work options. Availability of flexible start and finishing times is taken from the paper-based SCQ, left behind after the personal interview. Around 7% of person-time observations (n = 609) have missing data on the

[70] In preliminary analysis, I also explored whether a measure of availability of parental or family carers leave. This measure did not reach statistical significance in any of the fixed-effects or pooled OLS models. Moreover, descriptive comparisons showed availability of these two types of leave was correlated with the availability of flexible start and finishing hours. Hence, I exclude this measure from the final models.

[71] Predictions arising from the theory of compensating wage differentials have been examined in terms of both employees' usage of family-friendly work provisions and availability of family-friendly provisions across the workplace (or sections within a workplace) (Gariety & Shaffer, 2001; Heywood et al., 2007; Weeden, 2005). One argument is that only those employees who use flexible work provisions trade pecuniary rewards for more amenable job conditions. Conversely, employers might factor the future, expected costs of an employee taking up a flexible working provision when offering prospective staff a package of pecuniary rewards and non-pecuniary benefits (Heywood et al., 2007). This second argument predicts there will be a wage differential with respect to availability, whereas the first argument predicts that a wage differential with respect to usage. Given that HILDA has no measures of the uptake of family-friendly job benefits aside from work from home, I am not able to contribute to this debate in these analyses.

[72] The wording of the question asking about flexible start and finishing times changed slightly between waves 1 and 2. A wave 1 the question is based on availability of flexible hours in a current job, whereas at subsequent waves the question is widened, asking whether "you or other employees at a similar level to you at your workplace, would be able to use these [flexible start and finish times] if needed". Despite the modification of the question, the distribution of responses is not noticeably different at wave 1 from the distribution observed at later waves.

availability of flexible start and finishing times because they did not return an SCQ. Rather than drop these observations, I add a missing SCQ dummy to the final model.

A peculiar feature of the Australian labour market is the high rate of casual employment, particularly among part-time employees. Casual employment lacks a precise legal definition in the Australian industrial relations system, though casual jobs typically provide lower levels of job protection and fewer leave entitlements (for a review see PC, 2006). Across most Australian industrial agreements and awards, casual employees receive an hourly wage loading to compensate for foregone paid leave benefits and other loadings (e.g. overtime loading, Sunday wage loading). The size of this wage loading varies across enterprise agreements and industry awards[73]. To adjust for the possibility that these wage loadings might upwardly bias the wages of part-time employees, my final model controls for casual employment. Employment contract is derived from a self-report question asking respondents to classify their current contract as “permanent or on-going”, fixed-term or casual. The reference category is a permanent or on-going contract. A small number of respondents mark the “other” option attached to this question. I assign these 27 cases to the category permanent or ongoing contract.

In many Australian industrial agreements, other non-standard conditions of employment also attract a wage loading. To account for these loadings, my final model includes controls for non-standard work days or work hours schedule. The dummy variable for non-standard hours is coded 1 for respondents who work regular evening shifts, night shifts, rotating shifts, split shifts, on call work or other irregular arrangements. The reference category is regular daytime hours. To control for non-standard work day schedules, I construct two dummy variables. The first dummy variable is for regular weekend work (which may or may not also include work from Monday to Friday) and varied or irregular arrangements. The reference is work days fall between Monday and Friday.

The final model also includes a control for sector. Sector is classified as either private for-profit organisations or public and not-for-profit organisations (including government organisations, government business enterprises, private “not-for-profit” organisations and other non-commercial organisations). The reference category is private sector. I also include a separate control for employment through a labour-hire

[73] Average casual loadings in enterprise agreements and awards ranged from 15% to 33% between 1994 and 2002 (Watson, 2005).

firm or a temporary employment agency. Respondents who receive earnings through an agency are coded 1 on this dummy variable.

Supervision of other workers is incorporated as a proxy measure of workplace seniority. The question allows me to distinguish those employees who have no supervisory responsibilities (coded 0) with those who supervise one or more co-workers (coded 1 on this dummy variable). Organisational size is collapsed into a four-category variable, with the reference taken as 500 or more employees. The three dummy variables are fewer than 20 employees, 20 to 99 employees and 100 to 499 employees[74]. Members of trade unions or professional associations are coded 1 on a dichotomous variable. Following the Australian convention, respondents who answer "don't know" at this question are assumed to not have union or employee association membership (n = 52).

I also control for highest level of education with the two dummy variables diploma or certificate and bachelor degree or higher. The reference category is no tertiary qualification[75]. A single occupational dummy variable is included in the final model. The occupation dummy is coded 1 for employees working as a manager, professional or associate professional. The reference category includes clerical, sales and service workers (across advanced, intermediate and elementary levels); tradespersons; production and transport workers; and labourers and related workers. In my early analysis I experimented with different specifications for occupation. More refined measures of occupation did not lead to any improvement in model fit, possibly because the Australian Standard Classification of Occupations (ASCO, ABS, 1997) distinguishes occupational levels according to entry qualifications and work experience. My models capture this variation with measures of education and work experience. Occupational data is only made available in broad categories, which means I am not able to adjust for the possibility that mothers are more likely to work in feminine

[74] For respondents who had difficulty providing an estimate of organisation size closed response categories were presented. Where an organisation had more than one workplace, the closed category options were "less than 100 employees" and "at least 100 employees". For 25 cases where the less than 100 employees option was selected, I impute organisational size as 20 to 99 employees (the modal category) while for the 506 cases where the 100 or more option was selected, I impute organisational size as 500 or more employees. Where the organisation had a single workplace, the closed category options were "less than 20 employees" and "at least 20 employees". For the 18 respondents who marked the latter category, I impute organisational size as 500 or more employees (the modal category).

[75] In preliminary analysis, I explored whether the residual pay penalty for children varied according to education level. As the interaction terms between number of children and education were not statistically significant, I excluded the interaction terms from the final model.

occupations, such as nursing or child care workers, which historically have received lower level of remuneration relative to skilled masculine occupations.

Measures of industry are also included in the final models. I condense the 49 standard categories of industry in Australia (ABS, 1993) into eight categories because my sample has very few female respondents working in masculinised industries. My models include the following seven dummy variables: (a) government administration and defence; (b) education; (c) health and community services; (d) retail trade, cultural and recreational services, and personal and other services; (e) transport and storage, wholesale trade, construction, and electricity, gas and water supply; (f) manufacturing; and (g) agriculture and mining. The reference category comprises finance and insurance, and property and business services.

I also control for a series of demographic characteristics. Age is included as a control variable to adjust for differences in years of potential work experience. I also control for marital status with two dummy variables. These are first, separated, divorced or widowed women and, second, never married women. Women who live with a partner in a registered marriage or de-facto relationship are the reference[76]. In preliminary analysis, marital status was interacted with number of children. The interaction terms were not statistical significant in the fixed-effects model and so I do not include the interaction terms in the final model.

I also include a dummy measure for whether a respondent has a medical or health condition. This variable specifically refers to a long-term health condition, impairment or disability that limits the type or amount of work a respondent is able to undertake and has lasted or is likely to last for 6 months or more. This measure is based on respondent's self-assessment. The reference category is no health condition, impairment or disability limiting work.

Finally, the wage model controls for general geographic variation in the labour market. The two dummy variables are: (a) residing in an inner regional area; and (b) residing in an outer regional, remote or very remote area. Respondents who live in a major city are the reference.

To minimise the number of cases lost due to missing data, I impute values for item non-response on the variables sector (n = 12), contract (n = 2), temporary agency

[76] In preliminary analysis, I distinguished women in couple relationships according to whether they were registered as married or de-facto. As the dummy variable for being in a de-facto relationship, rather than a registered marriage, was not significantly associated with female wages, I dropped this measure from my final models.

work (n = 2) and industry (n = 17). I adopt a conservative imputation strategy by substituting the person-specific modal response for missing data. Descriptive statistics for the control variables are presented in Table 4.14 in Appendix 4B.

4.4 Results

Before examining the mechanisms that might explain the motherhood wage penalty in Australia, I investigate whether there is indeed a negative association between number of children and human capital in Australia. Few studies of Australian women's employment have summarised how children lower women's actual work experience, which can largely be attributed to the absence of suitable data in most Australian surveys[77]. A large body of research has already documented the comparatively high rate of part-time employment among Australian mothers (Abhayaratna et al., 2008; OECD, 2007), so I do not summarise patterns of working hours again in this chapter.

Descriptive analysis of human capital

Descriptive analysis presented in this section investigates whether Australian mothers have less work experience, shorter tenure and longer employment interruptions in comparison to childless women. This analysis is cross-sectional and uses survey data from the first wave of HILDA[78]. Table 4.6 describes the correlation between work experience and tenure with number of children, after controlling for differences in the ages of mothers and childless women. Results show that women with two or more children have significantly lower work experience and lower tenure than childless women of comparable age. The model predicts mothers with two children have around 2 years less work experience than childless women, holding age constant, and mothers with three or more children have around 3 years less work experience than childless women. In terms of tenure, mothers with two children tend to have worked for their current employer around 1 year less than childless women. On average, the work experience and tenure of mothers with one child is around the same as childless women of equivalent age.

[77] The Australian Department of Employment, Education and Training did conduct a survey on women's employment breaks in 1993 (see Rimmer & Rimmer, 1994). This survey focused on measuring number of discrete breaks in employment, instead of duration of career interruptions.
[78] The sample comprises female employees receiving a wage or salary at wave 1, with the sample exclusions applied in chapter 3 adopted again here. The standard errors account for the stratification and clustering of households at wave 1 using the Taylor series method in Stata. I also apply the person weights provided with the HILDA data.

Table 4.6: Cross-sectional partial regression coefficients predicting the correlation between number of children and work experience and tenure, female employees aged 22 - 45 years, 2001

	Work experience		Tenure	
	Coef	**(SE)**	**Coef**	**(SE)**
Number of children (ref: childless)				
One child	-0.16	(0.26)	-0.60	(0.43)
Two children	-1.95***	(0.35)	-0.95*	(0.43)
Three or more children	-3.31***	(0.37)	-1.46**	(0.53)
Age (years)	0.89***	(0.02)	0.28***	(0.03)
Constant	-15.94***	(0.47)	-4.51***	(0.79)
F statistic	879.6		43.01	
Probability	<0.0000		<0.0000	
Total n	1,774		1,774	

Note: Coefficient estimates are weighted by HILDA responding person weights. Variance estimates are also adjusted for survey design.
* p<0.05, ** p<0.01, *** p<0.001.
Source: HILDA, wave 1 (2001).

Table 4.7**Error! Reference source not found.** summarises mean time NILF by number of children ever had. Descriptive comparisons reveal that number of children is positively associated with time NILF. Compared to childless women, mothers who have had one child have spent around 1 year more time NILF, mothers who have two children have spent 3.3 more years NILF and mothers who have three or more children have spent 5.3 more years NILF.

Table 4.7: Mean years NILF by number of children, female employees aged 22 - 45 years, 2001

	Mean NILF	**(SE)**	**Mean difference, relative childless women**	**Total n**
Childless women	1.2	(0.08)		795
One child	2.2	(0.18)	1.1***	244
Two children	4.5	(0.30)	3.3***	431
Three or more children	6.5	(0.31)	5.3***	304

Note: Means are estimated using HILDA responding person weights. Variance estimates are also adjusted for survey design. Significance testing uses *F*-statistics from Wald test of null hypothesis that the mean wage of mothers with one, two and three or more children equals the mean wage of childless women with a Bonferroni adjustment.
* p<0.05, ** p<0.01, *** p<0.001.
Source: HILDA, wave 1 (2001).

In summary, cross-sectional differences in work experience and tenure by number of children are less marked than might be expected given the prominence afforded to this employment characteristic in previous research on mothers' relative wage outcomes. Comparisons of work experience and tenure in this section are likely to be influenced by Australian mothers' selection out of employment. By definition, mothers who spend the greatest amount of time outside of labour force to care for children are least likely to be observed in employment. Another possible reason for the narrow work experience gap is that women who delay their entrance into the labour market or interrupt employment to undertake tertiary study are more likely to remain childless than women who do not go on to tertiary study after secondary school. In other words, women who remain childless tend to enter the labour force later than women who go on to have children, whereas women who have children interrupt employment mid-career to care for young children. Unfortunately, HILDA did not ask respondents what they were doing in each period they were not employed since leaving secondary school. I now turn to examine whether the motherhood wage penalty in Australia can be explained by differences in work experience and tenure.

Regression results

Table 4.8 presents results for a baseline model estimating the overall influence of children on female wages in Australia over the period 2001 to 2006. This baseline model also includes controls for age and year. Wages are transformed to a natural log, which means coefficient values (when multiplied by a factor of 100) can be interpreted as the average percentage change in wages as number of children increases. This approximation is less precise when coefficient values are large, so percentage differences reported in the text are calculated using the formula $\exp \beta - 1$[79]. Confidence intervals (CI) are calculated at the 95% level. Fixed-effects regression controls for unobserved heterogeneity and provides some protection against the bias that will arise if low-waged women are more likely to have children or more children than high-waged women. Although I am primarily interested in the fixed-effect estimates, comparable cross-sectional OLS estimates are also derived by pooling the six waves and treating this sample as a cross-section.

[79] This is the multiplicative change in wages with a one unit change in explanatory variable. For example, the coefficient for children from model A using pooled OLS regression is -0.044 and after taking the exponential and subtracting one I calculate that the average percentage difference is -4.3% per child.

Table 4.8: Coefficient predicting the overall effect of children on wages, female employees 22 - 51 years, 2001 - 2006

	Model A			
	Fixed-effects		Pooled OLS	
	Coef	(SE)	Coef	(SE)
Number of children	-0.025*	(0.013)	-0.044***	(0.007)
Age (years)	-0.015	(0.016)	0.009***	(0.001)
Period controls				
2002	-0.014	(0.018)	-0.009	(0.010)
2003	0.072*	(0.033)	0.022*	(0.010)
2004	0.111*	(0.048)	0.034**	(0.011)
2005	0.154*	(0.064)	0.055***	(0.012)
2006	0.197*	(0.079)	0.072***	(0.013)
Intercept	3.387***	(0.533)	2.595***	(0.038)
Number of obs			8,902	
Number of persons			2,107	

Note: Significance tests and confidence intervals in pooled OLS estimation are adjusted for the clustering of observations within persons.
* p<0.05, ** p<0.01, *** p<0.001.
Source: HILDA, waves 1 - 6 (2001 - 2006).

Results from the fixed-effects analysis confirm that the overall effect of children on female wages is small, with motherhood found to depress wages by 2.5% per child (CI -4.9% to -0.01%). The cross-sectional OLS estimate suggests children lower wages by 4.3% (CI -5.6% to -2.9%)[80]. This point estimate is double the corresponding fixed-effects estimate, implying that part of the motherhood wage gap observed through aggregate comparisons of mothers and childless women's wages is a function of the comparatively higher rates of fertility among women who have low wages[81].

To investigate whether the negative effect of children is due to foregone human capital and participation in part-time employment, explanatory variables are added to the female wage model in three stages. Results from regression models B, C and D are presented in Table 4.9. Contrary to my first hypothesis, the addition of controls for work experience and tenure into the female wage equation does not produce a large change in the coefficient for children. The wage penalty declines from 2.5% to 2.1% per child[82]. Although this could be interpreted as a 16% decline in the penalty, statistical

[80] The estimate of the overall motherhood wage gap is larger here than the earlier estimate presented in chapter 3 because the regression analysis adjusts for age.
[81] With a short panel, however, an alternative interpretation is that the OLS estimate is larger because this captures an average of both the short-term and long-term effects of children. This seems unlikely based on my findings in subsequent models where I add controls for human capital and other employment characteristics.
[82] Note also that the 2.1% wage penalty observed in model 2 does not reach conventional levels of statistical significance (CI -4.7% to 0.5%).

tests suggest the change is not significant. One potential reason human capital might not explain the wage penalty for motherhood in this study is that there is insufficient within-person variation in work experience across the 6 year period. This does not appear to be the case. With pooled OLS estimation, the addition of work experience and tenure to the model similarly does not reduce the estimated residual effect of children on female wages. Together these findings imply that differences in work experience and tenure may not explain the motherhood wage penalty in Australia.

My second hypothesis is that the wage penalty for motherhood will not be caused by mothers' high levels of part-time employment in Australia. Results support this second hypothesis (see Table 4.9). The negative influence of children rises from -2.1% to -6.1% per child after the explanatory variable for part-time hours is added to the fixed effects model (though 95% confidence intervals around these two estimates do overlap). Part-time employment has a positive effect on female wages in Australia. In model 4, with the full set of controls for employment characteristics and unobserved heterogeneity, I find part-time wages are 13.4% (CI 11.2% to 15.7%) higher than full-time wages (fixed-effects estimates, see Table 4.9). This means the negative effect of children is offset by the positive effect of part-time employment.

Results from model D do not support my third hypothesis that the wage premium associated with part-time work would be less pronounced among women of child-bearing age than the wider population of female employees. Among female employees aged 18 to 60 years[83], Booth and Wood (2008) find that part-time employment confers a 10.5% wage premium. The 13.4% premium for part-time work observed in my analysis, restricted to female employees of child-bearing age, is slightly higher than this earlier estimate (though 95% confidence intervals overlap). This finding suggests Australian mothers, who comprise the majority of part-time employees in my sample, are not disproportionately located in low paid part-time jobs in a secondary labour market.

[83] Booth and Wood (2008) exclude full-time students, owner-managers and employees working in the industries of farming or fisheries.

Table 4.9: Coefficients predicting the effects of children, human capital and part-time hours on wages, female employees 22 - 51 years, 2001 - 2006

	Model B				Model C				Model D			
	Fixed-effects		Pooled OLS		Fixed-effects		Pooled OLS		Fixed-effects		Pooled OLS	
	Coef	(SE)	Coef	(SE)	Coef	(SE)	Coef	(SE)	Coef	(SE)	Coef	(SE)
Num children	-0.022	(0.013)	-0.047***	(0.007)	-0.063***	(0.014)	-0.042***	(0.008)	-0.059***	(0.014)	-0.021**	(0.007)
Human capital												
Work exp (yrs)	0.074***	(0.013)	0.019***	(0.004)	0.075***	(0.013)	0.019***	(0.004)	0.071***	(0.013)	0.022***	(0.004)
Work exp ^{2}	-0.001***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)
Tenure (ref: 10 yrs or more)												
Less 2 yrs	-0.003	(0.016)	-0.188***	(0.019)	-0.009	(0.016)	-0.185***	(0.019)	-0.005	(0.016)	-0.087***	(0.016)
2 - 4 yrs	-0.014	(0.015)	-0.149***	(0.019)	-0.015	(0.015)	-0.148***	(0.019)	-0.012	(0.015)	-0.075***	(0.015)
5 - 9 yrs	-0.002	(0.014)	-0.090***	(0.019)	-0.002	(0.014)	-0.089***	(0.019)	0.002	(0.014)	-0.040**	(0.015)
Part-time					0.126***	(0.010)	-0.027	(0.014)	0.130***	(0.010)	0.065***	(0.011)
Age (yrs)	-0.019	(0.016)	0.006**	(0.002)	-0.023	(0.016)	0.007**	(0.002)	-0.024	(0.016)	-0.0000	(0.002)
Adjusted R^2									0.078		0.332	
Number of obs	8,902				8,902				8,902		8,902	
Number of persons	2,107				2,107				2,107		2,107	

Note: Models 2, 3 and 4 also all include controls for survey year. Model 4 also controls for work from home, flexible working hours, employment contract, sector, employed through temporary labour agency, supervisory position, shift work, work weekends, irregular work schedule, organisational size, union member, education, managerial or professional occupation, industry, marital status, poor health and region.
Significance tests and confidence intervals in pooled OLS estimation are adjusted for the clustering of observations within persons.
* p<0.05, ** p<0.01, *** p<0.001.
Source: HILDA, waves 1 - 6 (2001 - 2006).

The intersection of the negative effect of children and the positive effect of part-time work on female wages yields some unexpected results. Results from model D predict that women who have one child and work part-time have an average wage 7.3% (CI 3.5% to 11.3%) higher than the wage they had while working full-time before family formation, whereas women who have one child and work full-time have wages 6.1% (CI -8.5% to -3.5%) lower than the wage they had while working full-time before family formation. For part-time mothers with two children, the positive effect of working part-time fully offsets the negative effect of two children. Yet the cumulative negative effect of three or more children does more than fully offset the positive effect of part-time work. Mothers who have three or more children and work part-time have wages 7.3% (CI 3.5% to 11.3%) lower, on average, than the wage they had while working full-time before family formation. Together, these findings suggest that part-time employment is linked to a substantial wage advantage for many mothers in the Australian labour market.

One potential explanation for the high wage premium associated with part-time work is that women employed on a full-time basis are more likely to work hours above that defined in their employment contract (Booth & Wood, 2008). Women working part-time, particularly mothers, may be less able or willing to work unpaid overtime as their full-time counterparts. To investigate this possibility, I re-estimate model D using a nominal wage rate. I derive a nominal rate by top-coding working hours to 48 hours for female employees working 49 to 60 hours[84]. Results from regression model E, which uses a nominal wage rate, are presented in Table 4.10 (see Table 4.15 in Appendix 4B for complete regression results). My main finding is unaltered with the substitution of nominal wages for actual wages. Part-time employment is associated with a 13.1% wage premium (CI 10.9% to 15.4%), after controlling for number of children, work experience, detailed job attributes and unobserved heterogeneity. This suggests that the positive association between part-time employment and wages is not caused by a tendency for full-time employees to work extra unpaid hours. Yet this method for calculating nominal wage rates does not take into account extra unpaid hours among women who have an employment contact specifying short full-time hours (i.e. 36 to 38 hours). Nevertheless, it seems unlikely declines (increase) in unpaid overtime among women transitioning out (into) of short full-time hours could singularly explain such a large difference. I return to consider other explanations for the part-time wage premium in Australia in the discussion section of this chapter.

[84] Recall that I exclude women working more than 60 hours per week from my sample.

Based on findings from US and British research on the motherhood wage penalty, my fourth hypothesis was that children would negatively affect wages after controlling for human capital, detailed job characteristics and unobserved heterogeneity. I find support for this hypothesis in model D, where I observe a residual wage effect of -6.1% per child. The -6.1% residual effect per child is larger than the overall effect of -2.5% per child. The reason the residual negative effect of children (model D) is larger than the 'overall' motherhood pay penalty (model A) is because of the large wage premium linked to part-time employment and the high rates of part-time employment among mothers.

Table 4.10: Coefficients predicting the effects of children and part-time work on nominal wages, female employees 22 - 51 years, 2001 - 2006

	Model E			
	Fixed-effects		Pooled OLS	
	Coef	(SE)	Coef	(SE)
Number of children ever had	-0.064***	(0.013)	-0.021**	(0.007)
Part-time	0.123***	(0.010)	0.055***	(0.011)
Adjusted R^2	0.073		0.342	
Number of obs	8,902		8,902	
Number of persons	2,107		2,107	

Note: Regression models also controls for work experience, tenure, work from home, flexible working hours, employment contract, sector, employed through temporary labour agency, supervisory position, shift work, work weekends, irregular work schedule, organisational size, union member, education, managerial or professional occupation, industry, marital status, poor health, region, age and survey year. Significance tests and confidence intervals in pooled OLS estimation are adjusted for the clustering of observations within persons.
* p<0.05, ** p<0.01, *** p<0.001.
Source: HILDA, waves 1 - 6 (2001 - 2006).

To check the robustness of these findings, I re-estimate model D with first, number of children specified as three dummy variables (model F) and second, number of dependent children in place of number of children ever had (model G). A summary of the fixed-effects regression coefficients from this supplementary analysis are presented in Table 4.11 (see Table 4.16 in Appendix 4B for complete regression results). Similar findings arise from a model with dummy variables for number of children ever had. Model F predicts one child lowers wages by 5.3%, two children by 10.1% and three or more children by 19.3%. In model G, a measure of number of dependent children is used in place of number of children ever had. Findings show that using number of dependent children attenuates the magnitude of the residual wage penalty linked to two children and three or more children (though 95% confidence intervals do overlap). This finding is consistent with my expectations. In model G, the coefficient for children is derived by comparing how wages change with the entrance or exit of a dependent child

from a household. The exit of a dependent child from a household probably does not result in an immediate reallocation of time and effort into paid employment, particularly where other dependent children remain in the household or an adult child continues living in the family home. Moreover, if children have a long term effect on career progression, then the exit of a dependent child from a household is unlikely to be linked to an immediate improvement in wage outcomes.

Table 4.11: Coefficients predicting the effects of children on wages, female employees 22 - 51 years, 2001 - 2006

	Model F Fixed-effects		Model G Fixed-effects	
	Coef	(SE)	Coef	(SE)
Number of children ever had				
One child	-0.054*	(0.021)		
Two children	-0.107***	(0.029)		
Three or more children	-0.215***	(0.051)		
Number of dependent children				
One child			-0.054**	(0.021)
Two children			-0.078**	(0.024)
Three or more children			-0.086**	(0.031)
Adjusted R^2 (within)	0.073		0.071	
Number of obs	8,902		8,902	
Number of persons	2,107		2,107	

Note: Regression models also controls for work experience, tenure, part-time work, work from home, flexible working hours, employment contract, sector, employed through temporary labour agency, supervisory position, shift work, work weekends, irregular work schedule, organisational size, union member, education, managerial or professional occupation, industry, marital status, poor health, region and survey year.
* p<0.05, ** p<0.01, *** p<0.001.
Source: HILDA, waves 1 - 6 (2001 - 2006).

In contrast to findings in the baseline model, estimates of the residual motherhood wage penalty are slightly higher using fixed-effects regression than pooled OLS regression (see model D, Table 4.9). A similar pattern was observed by Budig and England (2001) in their analysis of the motherhood wage penalty in the US. In this study, the residual penalty for motherhood is 6.1% per child (CI -8.5% to -3.5%) in the fixed-effects model, compared to 2.0% per child (CI -0.8% to -3.3%) in the pooled OLS model. There are two possible explanations for this difference. First, the fixed-effects regression controls for unobserved heterogeneity, whereas the pooled OLS regression does not. Women who become mothers may have slightly higher wages than women who never have children, after (but not before) conditioning on observable differences in human capital, job type and other family characteristics. For instance, this might occur if women's fertility decisions are linked to relationship quality and relationship

quality is structured by stable personality attributes that also positively affect wages, net of observed human capital and job characteristics.

Second, fixed-effects regression uses only within-person variation to calculate regression coefficients, whereas pooled OLS regression uses within- and between-person variation. With a short panel of 6 years, my fixed-effects coefficient for children will capture short-term wage declines following the entrance of a biological or adopted child into the household. In contrast, the pooled OLS coefficient will pick up on differences in the wages of women who remain childless and the wages of mothers who do not have any additional children over the 6 year period. If there is a rapid recovery in Australian mothers' wages after children enter school then I would expect the pooled OLS results to show a narrower residual wage penalty for motherhood than the fixed-effects results. There is no consensus on whether wage penalties for children increase or decrease as children grow older. Among high-skilled mothers, Ellwood et al. (2004) observe that wage penalties increase from 8% in the 5 years following a first birth to 21% after the first-born child reaches 10 years. Yet among low skilled mothers penalties remain steady at 7%. In contrast, Baum (2002) finds that female wages return to their pre-first child level 3 years after returning to work. It therefore remains unclear whether my pooled OLS results are biased by the absence of controls for some stable characteristics, such as personality, or alternatively that my fixed-effects results are capturing the large short-term effect of children on wages.

Turning now to look more closely at how work experience and tenure affect female wages in Australia. Model D predicts estimated wage returns to women's first year of experience average 7.4% (see Table 4.9). The quadratic term is significant, showing rates of wage growth decline as experiences rises. The turning point of the quadratic function is 60 years, which is well outside the range of observed values (range 0 to 35 years). Hence, returns to an additional year of experience remain positive, at least for women up to 51 years of age. The wage return for a further year of work experience is in addition to the wage growth associated with inflation, which I account for by adjusting wages to 2001 prices, as well as any general upward trend in female wages over the period 2001 to 2006, which I control for with the year dummy variables. The predicted returns to work experience in the fixed-effects model appear quite high. Estimated returns to work experience are lower in the pooled OLS regression, with a maximum growth rate of 2.2%. I consider why returns to work experience are high in the fixed-effects specification in the discussion.

Previous cross-sectional studies of female wages in Australia (Chapman & Mulvey, 1986; Daly et al., 2006; Pocock & Alexander, 1999; Wooden, 1999) show wages rise with lengthening tenure with an employer. My pooled OLS estimates similarly suggest a positive association between tenure and wages. Yet after controlling for unobserved heterogeneity, I find that tenure does not significantly influence female wages (see Table 4.9). Stable unobserved characteristics, such as ambition, may affect both women's decisions to transition between employers and wages. If this is the case, a positive association between tenure and wages in the pooled OLS analysis would not be observed after controlling for unobserved heterogeneity through fixed-effects regression. Yet it may also be that measurement error is downwardly biasing the fixed-effects results. Fixed-effects regression tends to be more sensitive to measurement error than other methods that use between-person variation to estimate coefficients (Wooldridge, 2006).

Several other job characteristics are included in the final female wage model (model D). Coefficients for these variables are presented in Table 4.15 in Appendix 4B. Here, I briefly discuss findings for several characteristics found to be important determinants of female wages in earlier Australian research.

Wages do not appear to be traded for flexible start and finishing hours as the coefficient is small and statistically insignificant in the fixed-effects model. The detection of a positive and statistically significant coefficient in the pooled OLS regression, but not the fixed-effects regression, implies that female employees in higher status jobs are more likely to have access to flexible start and finishing times (Weeden, 2005). This has been found in a number of other studies (Gariety & Shaffer, 2001; Weeden, 2005; but for opposing findings see Heywood et al., 2007).

Working from home on an informal basis appears to have a negative effect on female wages, based on the fixed-effects coefficient. Model D predicts that working from home informally lowers wages by 2.3%. In contrast, working from home under a formal agreement does not significantly affect wages. One reason for the disparate finding is that employees who work from home on an informal basis do so in an unpaid capacity. These hours of unpaid overtime might depress hourly wage rates. It is unclear whether the negative estimate for an informal arrangement does actually reflect women trading wages for job flexibility or is an outcome of other workplace processes.

Findings from the fixed-effects model show that wages are 2.7% higher in casual jobs than permanent jobs, net of part-time hours, work hours schedule, weekend work

and several other job attributes. Historically, industrial agreements in Australia provided casual employees with a wage loading in lieu of the absence of paid sick and annual leaves, lower levels of protection against job termination and limited redundancy payouts (Smith & Ewer, 1999). Although it is not clear how many casual employees would be entitled to this casual pay loading over the period of this study, it is likely some do and this would explain the 2.7% higher wage associated with casual employment.

Employment through a temporary labour supply agency has a positive effect on wages in the fixed-effects model. This finding could possibly be explained by strong employment growth and low unemployment in Australia over the period covered in this study (Barrett, Burgess & Campbell, 2005; O'Brien, Valadkhani & Townsend, 2008). Women who commenced working for a temporary labour agency may have been attracted by the wage premium offered by agencies supplying skilled staff to industries facing labour shortages. Alternatively, labour supply agencies may offer slightly higher wages to compensate for the absence of other job benefits, such as paid sick or annual leave, and high levels of job insecurity.

Consistent with previous cross-sectional studies of female wages in Australia (Daly et al., 2006; Wooden, 1999), I observe that wages are significantly lower in small organisations. Employment in a managerial or professional occupation has a positive effect on wages, after controlling for unobserved heterogeneity and other job characteristics. Results from both the fixed-effects and pooled OLS regression show there is no relationship between sector and wages, which is at odds with previous cross-sectional evidence of a private sector wage premium (Eastough & Miller, 2004; Langford, 1995; Preston & Crockett, 1999a; Preston, 2000; Wooden, 1999). Most previous cross-sectional studies of the determinants of female wages in Australia have examined wage differences for full-time employees (Eastough & Miller, 2004; Langford, 1995; Preston & Crockett, 1999a; Preston, 2000). The findings presented in this chapter may differ from earlier Australian studies because the sample includes women who work part-time.

Geographic influences on wages are also observed in the fixed-effects model, with wages significantly lower in regional and remote areas compared to metropolitan cities. Results from the fixed-effects model suggest marital status does not affect female wages. In the pooled OLS model, however, never married women have significantly lower wages than married or cohabiting women. The most likely

explanation for this disparity is that never married women have unobserved, stable attributes that both reduce their likelihood of partnering and are associated with low wages.

4.5 Discussion

The aim of this chapter has been to investigate how children affect female wages in Australia. In cross-sectional analysis presented in the previous chapter, I observed an overall motherhood wage gap of -3.6% among female employees, though the wage gap was not found to be statistically significant at conventional levels. Results from a longitudinal analysis of female wages from 2001 to 2006 reveal a slightly different pattern. The fixed-effects analysis shows that having children lowers wages by an average 2.5% per child, controlling for unobserved heterogeneity and age. Results from the pooled OLS regression also show that mothers have significantly lower wages than childless women, after conditioning on age. Taking advantage of the six waves of data clearly improves statistical power and has allowed for the detection of small, significant differences in the population.

Contrary to expectations, the regression analysis shows that the overall 2.5% wage penalty per child is not a consequence of employment interruptions. The addition of measures for actual work experience and tenure into the wage model does not substantially attenuate the estimated effect of children on female wages in Australia. This finding contrasts with longitudinal studies of the causes of the motherhood wage penalty in the US and Britain, where 30% to 90% of the overall penalty has been found to be explained by the affect of children on human capital (Budig & England, 2001; Gangl & Ziefle, 2009; c.f. Anderson et al., 2002). It is unclear why the motherhood wage penalty in Australia is not explained by human capital. One possibility is that reliance on a short panel survey, spanning only 6 years, leads to the censoring of longitudinal data for mothers who take an extended break from the labour force after the birth of a child. By design, the wages of mothers who re-enter the labour force after an interruption of 5 or more years are not observed. Yet if censoring is the main issue, I would expect the addition of measures of actual work experience and tenure to attenuate the association between children and wages in a pooled cross-sectional model estimated using OLS. This pattern is not detected. In the pooled OLS model, no substantive change in the coefficient for children is observed after adding the explanatory variables work experience and tenure into the model. Again, it is plausible selection out of employment biases estimates from the pooled cross-sectional analysis.

Selection bias will arise if low waged women are more likely to exit the labour force for an extended duration after the birth of a child than high waged women.

One reason the motherhood wage penalty in Australia may not be explained by interruptions to paid work around childbirth is that most Australian mothers had a statutory entitlement to 12 months job-protected parental leave over the period of this study. Parental or maternity leave policies that establish the right for mothers to return to their previous job following child-birth are likely to offer protection against downward wage mobility. This is because leave enables mothers to maintain an attachment to a position where firm- and job-specific human capital has been accumulated (Waldfogel, 1998a). Although Australia has not yet established a statutory paid maternity leave scheme[85], a large share of Australian women would have been entitled to unpaid job-protected leave. Indeed, a higher percentage of Australian women investigated in this study would have access to unpaid job-protected leave than in the cohorts of women examined in earlier US studies of the motherhood wage penalty. From 2001 to 2006, all Australian women employed under a permanent contract (and some casual employees) and with their current employer for at least 12 months would be entitled to return to their former job following up to 52 weeks parental leave[86]. Access to unpaid maternity leave is far more constrained in the US, where eligibility is tied to work hours (1,250 hours in the last year), tenure (at least 12 months) and organisational size (50 or more employees)[87]. Also, eligible US women can access a maximum of 12 weeks job-protected leave in the year after a birth. In Australia, 83% of new mothers who were employed before a birth were estimated to have been eligible for 12 months job-protected leave in 2004 (PC, 2009). Another Australian study observed that around 75% of mothers who were employed before a birth were eligible for maternity leave in the mid 1980s (Glezer, 1988). In the US, only 31% of new mothers who were employed

[85] A statutory 18 weeks paid parental leave will be available for mothers with a child born or adopted on or after 1 January 2011 (Australian Government, 2009).
[86] In Australia unpaid job-protected leave around a birth is termed parental leave and the 52 weeks leave can be shared between the mother or father. In practice, unpaid parental leave is predominantly taken by mothers (Whitehouse, Baird, Diamond & Hosking, 2006).
[87] This leave entitlement was enacted in 1993 through the Family and Medical Leave Act (FMLA). Some female employees in the US had access to leave to care for an infant prior to the enactment of the FMLA through state or organisation provisions (Waldfogel, 2001). Nevertheless, the share of female employees entitled to family leave and use of leave by mothers with infants appears to have increased following the passage of FMLA (Waldfogel, 2001).

before a birth were estimated to have been eligible for 12 weeks job-protected leave in the mid 1990s (Baum, 1997)[88].

Longitudinal studies of the motherhood wage penalty in Britain examine the motherhood wage penalty in the period 1981 to 1991 (Waldfogel, 1995, 1998a) and 1991 to 2001 (Gangl & Ziefle, 2009). The eligibility criteria for the right to job reinstatement following a birth changed over this 20 year period. From 1976 to 1993, statutory maternity leave was available to British women who had worked for their current employer for 2 years full-time (at least 16 hours per week) or 5 years part-time (8 to 15 hours per week) (Zabel, 2009). This leave guaranteed eligible women a right to return to their former job up to 29 weeks after childbirth. Waldfogel, Higuchi and Abe (1999) suggest that around half of female workforce would have been eligible for maternity leave in the early 1990s. From 1994 to 2000, all employed women became eligible for 14 weeks job-protected leave (Zabel, 2009). Although more Australian women are likely to have been eligible for some job-protected leave prior to 1993, more British mothers would have been eligible for job-protected leave following 1993.

Another reason human capital may not explain the motherhood wage penalty in Australia is because of the stronger job protections available for parents and employees more broadly. In Australia, dismissal on the grounds of family responsibilities is explicitly identified as a form of discrimination under the *Sex Discrimination Act*. More generally, job protections are slightly stronger in Australia than the US and Britain and this may protect all employees, including mothers, from involuntary job separations (OECD, 2004b).

Limitations with the work experience data collected in HILDA could also curtail the detection of changes in human capital following the entrance of a child into a household. The work experience measure does not distinguish between periods of full-time and part-time work experience. Most Australian mothers with young children work part-time, which means many mothers are likely to have accumulated work experience on a part-time basis after the birth of their first child. To the extent wages grow less rapidly with increases in part-time work experience, foregone wage growth may not impact on wages when mothers' interrupt part-time employment for a higher order birth.

[88] Another general population survey found that around 55% to 60% of Australian employees reported having access to unpaid parental leave in 1997 and 2000, though around 13% to 18% of respondents were not sure whether they were entitled to unpaid parental leave or not (Whitehouse, 2005, p.493). US surveys of private sector employees in 1995 and 2000 suggest around 47% of private sector employees were eligible for family or medical leave (Waldfogel, 2001, p.20).

Second, some periods of maternity and parental leave from a job appear to be counted as years in paid work by respondents, rather than years neither working nor looking for work[89]. This measurement error might result in an underestimation of the causal importance of work interruptions. Finally, the wage model lacks a measure of number or length of interruptions and does not directly test whether skill atrophy occurs during employment interruptions. Given years not employed is collinear with years of actual work experience and age, the significant negative effect of an interruption is likely to be picked up in the coefficient for age. In all fixed-effects models, age does not significantly affect wages (see models A, B, C and D), implying skill atrophy is not a determinant of female wages in Australia. Yet this may only apply to interruptions spanning less than 5 years. Precise measures of the duration of full-time work experience, part-time work experience, maternity leave and time not employed are needed for a thorough assessment of the influence of children on women's human capital and wages. Although I find that the overall 2.5% wage penalty is not caused by employment interruptions, future research with a longer panel and more detailed measures of human capital is needed before it can be concluded that the less restrictive eligibility criteria for job-protected parental leave in Australia, relative to the US, protects Australian mothers from downward wage mobility associated with returning to a different employer after a birth.

Results from my fixed-effects analysis suggest wage returns to work experience are quite high for female employees in Australia. A comparison with earlier Australian research is problematic because this empirical literature has relied on derived measures of potential work experience. For mothers, potential work experience is likely to overestimate actual experience and, in turn, downward bias estimated returns to experience[90]. There are four possible explanations for the high estimated returns for work experience. First, the analysis examines female wages from 2001 to 2006, a period when Australia was experiencing strong growth in total employment and low unemployment (O'Brien et al., 2008). This may have prompted employers to offer attractive wage increases as a means of retaining skilled employees and to fill staff vacancies through the promotion of current employees. Second, wage equations are estimated for women aged 22 to 45 years and exclude older women who will tend to

[89] Instructions associated with the work experience questions note that periods of paid leave, including a specific reference to paid maternity leave and holiday leave, should be recorded as employed. No specific instruction is given on how to count periods of unpaid leave. Inspection of the data suggests that many mothers counted unpaid leave as time employed.

[90] This excludes recent cross-sectional studies of the gender wage gap using HILDA. I do not report on these findings here as they come from the same sample and period.

attract lower rates of return for each additional year in employment. Third, returns to experience might be upwardly biased by non-random selection out of employment and survey attrition. Bias will arise if an unobserved characteristic, such as migration, negatively influences: (a) wage growth; (b) participation in HILDA, and; (c) decisions to participate in paid employment, which affects accumulated work experience. My analysis suggests that the fixed-effects estimates are not biased by selection out of employment. However, the selection model does not account for survey attrition and this may bias the regression coefficients. Fourth, work experience may be endogenous where women's successive employment decisions and, in turn, accumulated work experience, are influenced by previous or forecasted wage shocks (Dustman & Rochina-Barrachina, 2007). The coefficient for work experience would be upwardly biased if women remain continuously employed because they anticipate high wage growth in future years. Unfortunately, it is difficult to identify an instrument to adjust for this type of endogeneity in a wage model estimated using fixed-effects. Future research drawing on other surveys that collect data on actual work experience would certainly offer a valuable insight into the factors that determine female wages in the Australian labour market.

Consistent with previous Australian research (Booth & Wood, 2008), my analysis shows that part-time wages are significantly higher than full-time wages. This finding is observed in the fixed-effects and pooled cross-sectional models that include detailed controls for other job characteristics, such as contract, work schedule and occupation. The fixed-effects results reveal a 13.4% wage premium for part-time employment. My analysis also shows that mothers' participation in part-time work does not explain the wage penalty for motherhood in Australia. Indeed, the positive effect of part-time employment appears to more than offset the wage penalty for one or two children. In the fixed-effects model with the full set of controls, I observe a residual motherhood wage penalty of 6.1% per child and a 13.4% wage premium for part-time work. The model therefore predicts that women who have one child and work part-time earn an average 7.3% more per hour than they had when employed full-time prior to the birth of their first child. In contrast, mothers who have one child and return to full-time employment are expected to earn 6.1% less per hour than they had before the birth of their first child. This finding is peculiar to Australia. British research shows that the wage penalty for motherhood is significantly higher for mothers who work part-time than mothers who work full-time (Waldfogel, 1995). In the US, part-time employment

has also been found to negatively affect wages in panel studies (Budig & England, 2001; Gangl & Ziefle, 2009[91]; Glauber, 2007; Waldfogel, 1997a).

In a recent study, Booth and Wood (2008) offer three possible explanations for the part-time wage premium in Australia. These are: (a) part-time workers are less likely to work unpaid overtime than full-time workers; (b) Australian employers pay part-time workers more per hour because of a high demand for part-time staff or the higher efficiency of part-time employees; and (c) employees with short part-time hours are not required to make compulsory superannuation contributions (equal to 9% of their salary) and this inflates gross wage rates. Booth and Wood (2008) empirically test whether part-time employees earning less than $450 per month, the threshold under which compulsory superannuation contributions must be made, could explain the part-time wage premium. Results show that adjusting for compulsory superannuation contributions does not attenuate the part-time premium, which is not unexpected given a very low share of part-time employees earn less than $450 per month. Surprisingly, Booth and Wood (2008) did not consider the influence of women's decision to transition from full-time to part-time work (or from part-time to full-time work) on estimates of the part-time wage premium. In the following discussion, I consider how unpaid overtime and wage offers might positively affect part-time wages, processes Booth and Wood (2008) identified, as well as the potential effects of women's selection into part-time employment.

The significant premium linked to women's part-time employment in the Australian labour market may be due to variation in the propensity of women to undertake unpaid overtime. In this thesis, hourly wages are derived by dividing gross weekly earnings by average weekly working hours (in a main job for those women with more than one job). Actual hourly wages will be lower than the notional wage rate specified in an employment agreement where unpaid overtime is regularly undertaken. It is plausible that women are less likely to undertake unpaid overtime when they are employed on a part-time, rather than full-time, basis. For example, mothers typically transition into part-time employment to reduce their time in paid employment, so it is likely these women would be reluctant to work extra hours. Also, children often need to

[91] Part-time employment is not significantly associated with female wages for the cohort of US women from 1955 - 1959. For the cohort of US women born 1960 - 1964, a part-time wage premium is observed for women working in a masculine occupation in the private sector. Gangl and Ziefle (2009) interact part-time working hours with four other explanatory variables (feminised occupation, occupational prestige, sector and self-employment). With these interactions, it is difficult to determine whether part-time employment would, on average, have a positive or negative effect on female wages in the cohort of women born 1960 - 1964.

be collected from child care or school at specific times and this may prevent mothers from remaining at work late. To investigate whether unpaid overtime influences the regression findings, I re-estimated my final model using nominal wages with weekly work hours top-coded at 48 hours. Using a nominal wage rate instead of an actual wage rate did not alter my main finding. Although the method I used to calculate a nominal wage rate does not account for unpaid overtime among women who work short or regular full-time hours (i.e. 36 to 42 hours per week), it is unlikely a 13.5% wage premium could be singularly accounted for by differences in overtime.

Another explanation for the part-time premium is that Australian employers have a greater demand for labour than employers in the US and Britain. Economic theory suggests that wage offers will rise as demand for labour exceeds supply. Historically, rates of women's employment have been lower in Australia than the US and Britain. A number of reasons have been put forward for the slightly lower female employment rates in Australia in the post-War period. This includes stronger cultural beliefs in the traditional male-breadwinner family as the ideal family model and more generous family payments and taxation benefits for stay-at-home mothers (Apps, 2006). Historically, the cultural or institutional supports for mothers to exit employment could have reduced the supply of female labour and employers, particularly in feminised industries, may have prevented the development of secondary types of part-time job (Booth & Wood, 2008). Although the deregulation of working conditions and wages in the 1980s and 1990s may have given employers greater scope to change the wages and conditions of part-time employees, this may not have been pursued because of the perverse effect this would have on the supply of part-time workers.

Classical economic theory argues that wages are tied to job productivity and so part-time employees should attract a higher wage rate than full-time employees where they are more productive per hour. One reason full-time employees might be less productive would be because of the onset of fatigue towards the end of a workday or shift. It is unlikely that this theory can explain the wage premium for part-time work observed in this analysis for two reasons. First, not all part-time employees spread their working hours evenly across four or five days and so the productivity of part-time employees may well decline towards the end of a workday or shift. It seems unlikely that those part-time employees who care for dependent children on the days they are not working in a job would be less fatigued than full-time colleagues without children. Second, there is no obvious reason part-time women in Australia would be more productive than their full-time counterparts, but not part-time employees in the US and

Britain. Australia has a more regulated industrial relations system than the US and Britain and this would tend to reduce the scope for employers to adjust wages in response to observed differences in job productivity.

The high wage premium for part-time employment in Australia could be an outcome of women's decision to transition from full-time to part-time working hours. Although the fixed-effects estimates control for stable unobserved characteristics, the analysis does not account for the possibility that women choose to transition from full-time to part-time employment, rather than exit paid employment, if wage rates and occupational status are maintained. In other words, decisions to transition into part-time may be affected by the availability of quality part-time employment. Rather than transition into a lower paid part-time job, Australian women may continue to work full-time or withdraw from the labour force. This process would introduce endogeneity into the wage model. Instrumental variables estimation can be used to test for the endogeneity of working hours decisions. This method was not applied in this thesis because of the absence of suitable instruments for part-time work. Regression analysis with weak instruments is often inefficient and biased.

Contrary to expectations, my analysis does not show that the part-time wage premium is lower in the population of women of child-bearing age than the premium in the wider population of working age women. In a study of Australian women aged 18 to 60 years, Booth and Wood (2008) detect an average part-time wage premium of 11%, after controlling for detailed job characteristics, motherhood and unobserved heterogeneity. This is slightly lower, though not significantly so, than my estimate of a 13.4% premium for part-time employment. This suggests Australian mothers do not face any greater difficulty securing a family-friendly part-time job or experience greater discrimination by virtue of their parenting role. Again, this may be because of strong employer demand for part-time workers or the reluctance of Australian women to transition into a lower status part-time job. One limitation with the design of my analysis is that I do not formally test whether the average wage rise associated with moving from full-time to part-time work is equivalent to the average wage decline associated with moving from part-time work to full-time work. It is plausible that the average wage change associated with movements between part-time and full-time employment across the population of women of child-bearing age is not reflective of the experience of mothers who transition into part-time work to care for a young child. In the next chapter, I investigate how wages change for those mothers who commence part-time employment after a short interruption or period of parental leave around a birth.

Previous cross-sectional and longitudinal research from the US and Britain tends to show that children have a negative effect on female wages even after controlling for differences in human capital and part-time work (Anderson et al., 2002; Avallar & Smock, 2003; Budig & England, 2001; Taniguchi, 1999; Waldfogel, 1995, 1997a). The residual negative effect is typically interpreted as a consequence of the combined effects of employer discrimination, compensating differentials and the demands of care-giving on mothers' time and energy. In Australia, I similarly observe that children have a negative effect on female wages after adjusting for differences in work experience, tenure, detailed job characteristics and demographics. The fixed-effects analysis shows a residual penalty of 6.1% per child. This is slightly higher than the 3% to 4% residual penalty observed in many studies of US women (Anderson et al., 2003; Avallar & Smock, 2003; Budig & England, 2001; Taniguchi, 1999; Waldfogel, 1997a).

Findings from this Australian study are not strictly comparable with earlier US findings because of differences in research design and length of available panel data. As noted earlier, the experience of Australian mothers who return to paid employment after their children reach school-age will not be captured in fixed-effects coefficient, which is estimated using within-person variation over a 6 year period. With a longer panel, it would be interesting to re-examine the magnitude of the residual motherhood wage penalty in Australia. It is possible Australian mothers who delay returning to paid employment would be affected less by discrimination or lower work effort than their US or British counterparts because of the narrower wage distribution and comparative high wage floor for clerical and blue-collar work in Australia. These two features of the Australian labour market may offer mothers some protection against downward wage mobility after a long break away from paid work. Institutional differences in family and health care between Australia and the US could also lead to compositional differences in the types of mothers returning to paid employment. Unlike the US, health care in Australia is not tied to employment and there are parenting payments and taxation benefits to support low and medium income couple families and single parents work full-time in the home. With the absence of similar supports in the US, a higher proportion of mothers in low paid occupations in the US are likely to have to return to paid employment after a birth. Theory suggests the motherhood wage penalty will be highest for women in professional occupations, so cross-national differences in the propensity of non-professional women to return to paid employment after a birth may affect estimates of the motherhood wage penalty with a short panel. With cross-nationally comparative panel data, future research could empirically explore the relative

importance of labour market regulation and family policies as institutional factors structuring the residual motherhood wage penalty.

Appendix 4A Summary of panel studies estimating the residual effect of children

Table 4.12 Summary of the residual effect of children on female wages in US, Britain and Denmark using panel data

Study	Sample	Specification of motherhood	Control variables	Residual effect of children, fixed-effects regression
US				
NLS-YW69				
Anderson et al. (2003)	Women aged 14 - 44 years, 1968 - 1988.	Number of children under the age of 18 living in the household and number of adult children (aged 18 or older).	Experience, education, age, part-time, occupation, marital status, adults in household, husband's income, own non-labour income.	One child: -3.0% Two or more children: -5.5%
Avallar & Smock (2003)	Women aged 21 - 42 years, 1975 - 1985,	Number of resident children, including biological, adopted and step children.	Full-time experience, part-time experience, education, age, marital status, year.	-3.8% per child
Korenman & Neumark (1992)	White women aged 26 - 38 years, 1980 and 1982.	Not clearly described.	Experience, tenure, education, region, marital status.	Children no significant residual effect
Taniguchi (1999)	Women aged 14 - 40 years, 1968 - 1988.	Not clearly described.	Experience, hours worked, marital status, age, region, race.	-3.0% per child
Waldfogel (1997a)	Women aged 14 - 40 years, 1968 - 1988.	Number of resident children and any non-resident children.	Full-time experience, part-time experience, education, age, marital status, part-time.	One resident child: -3.8% Two or more resident children: -11.6% Non-resident child: -2.9%.
NLSY79				
Amuedo-Dorantes & Kimmel (2003)	Women aged 14 - 43 years, 1979 - 2000.	Women who have any children. Unclear whether includes non-resident, step or adopted children	Experience, tenure, education, occupation, age, marital status, other adults in household, urban residence, unemployment rate in area, year. Also incorporate employment selection correction.	-6.2% for any child if motherhood not delayed No significant residual effect if motherhood delayed
Avallar & Smock (2003)	Women aged 21 - 41 years, 1986 - 1998.	Number of resident children, including biological, adopted and step children.	Full-time experience, part-time experience, education, age, marital status, year.	-3.3% per child
Budig & England (2001)	Women aged 18 - 36 years, 1982 - 1993	Number of children. Unclear whether includes non-resident, step or adopted children.	Full-time experience, part-time experience, education, tenure, employment breaks, enrolled in school, part-time, union member, sector, occupation characteristics, child care worker, self-employed, industry, marital status, age, year.	-3.7% per child

Study	Sample	Specification of motherhood	Control variables	Residual effect of children, fixed-effects regression
Ellwood et al. (2004)	Women aged 20 - 42 years, , who has first child after age 21 and excluding women who remained childless	Years since birth of first child, as well as number of higher parity children.	Work experience, AFQT score.	-6% first 4 years after birth of first child -11% years 5 - 9 after birth of first child -15% 10 years after first birth and later -2% for each higher parity child
Gangl & Ziefle (2009)	Women aged 20 - 41 years, 1979 - 1996 (born between 1955 and 1959) Women aged 15 - 36 years, 1979 - 1996 (born between 1960 and 1964)	Number of children given birth to.	Experience, work interruptions, post-birth employer changes, education, number other employer changes, tenure, part-time, female occupation, occupational prestige, sector, self-employment, age, year. Also incorporate employment selection correction.	Women born 1955 - 1959: -0.8% per child Women born 1960 - 1964: -3% per child
Glauber (2007)	Women aged 17 - 50 years, 1982 - 2004.	Number of resident children, including biological, adopted and step children.	Marital status, race, number of jobs, work experience, part-time, tenure, occupational sector, percent women in job, education, age.	White women: No residual effect one child -6% two children -9% three children -6% four or more children African American women: No residual effect for children
Waldfogel (1998a)	Women aged 21 - 25 years, 1979 - 83 (initial wage) and aged 26 - 34 years, 1987 - 1991 ('late' wage). Intermediate wage taken from 1984 - 1986.	Number of children. Unclear whether this included non-resident, step or adopted children.	Experience, education, year.	One child: -4.6% Two or more children: -12.6%
Waldfogel (1997a)	Women aged 21 - 25 years, 1979 - 83 (initial wage) and aged 26 - 34 years, 1987 - 1991 ('late' wage). Intermediate wage taken from 1984 - 1986.	Number of resident children and any non-resident children.	Full-time experience, part-time experience, education, marital status, part-time, race.	One resident child: -3.8% Two or more resident children: -11.6% At least one non-resident child: -2.9%

Study	Sample	Specification of motherhood	Control variables	Residual effect of children, fixed-effects regression
Britain				
NCDS				
Waldfogel (1998a)	Women aged 23 years in 1981 and 33 years in 1991. Two or three observations per woman.	Number of children. Unclear whether this included non-resident, step or adopted children.	Experience, education, race.	One child: -9.1% Two or more children: -16.1%
Waldfogel (1995)	Women aged 23 years in 1981 and 33 years in 1991.	Number of children. Unclear whether this included non-resident, step or adopted children.	Full-time experience, part-time experience, education, part-time, marital status, age.	Full-time One child no significant residual effect if full-time Two or more children: -9.5% Part-time One child: -3.1% Two or more children: -12.5%
BHPS				
Gangl & Ziefle (2009)	Women aged 22 - 36 years, 1991 - 2001 (born between 1965 and 1969)	Number of children given birth to.	Experience, work interruptions, post-birth employer changes, education, number other employer changes, tenure, part-time, female occupation, occupational prestige, sector, self-employment, age, year. Also incorporate employment selection correction.	Children have no significant residual effect
Germany				
GSOEP				
Gangl & Ziefle (2009)	Women aged 20 - 41 years, 1984 - 2001 (born between 1960 and 1964) Women aged 15 - 36 years, 1984 - 2001 (born between 1965 and 1969)	Number of children given birth to.	Experience, work interruptions, post-birth employer changes, education, number other employer changes, tenure, part-time, female occupation, occupational prestige, sector, self-employment, age, year. Also incorporate employment selection correction.	Women born 1960 - 1964: -10.5% per child Women born 1965 - 1969: -12.2% per child
Denmark				
Administrative registers, Statistics Denmark				
Datta Gupta & Smith (2002)	Women aged less than 55 years, 1995.	Number of children. Unclear whether this included non-resident, step or adopted children.	Experience, education, province and marital status Years out of labour market in some models	One child: no significant effect Two or more children: no significant effect

Note: Table excludes longitudinal studies that control for potential work experience, not actual work experience (e.g. Davies & Pierre, 2005; Lundberg & Rose, 2000), and studies with panel data that do not use person fixed-effects regression to derive estimates of the residual wage penalty for motherhood (e.g. Petersen, Penner & Hogsnes, 2007).

Appendix 4B Additional tables

Table 4.13: Response pattern on weekly earnings and work hours questions by children and mean wage by response pattern, female employees aged 22 - 51 years, 2001 - 2006

Earnings response[a]	Work hours response[b]	Percent	Wage rate, main job ($2001) Mean	(SE)	Num
Childless women		100			
Gross earnings last pay period	Usual work hours	80.1	$19.73	(0.24)	2,648
	Average hours	2.2	$18.74	(1.06)	73
Net earnings last pay period	Usual work hours	6.6	$19.26	(0.53)	218
	Average hours	0.3	$18.35	(2.94)	9
Usual gross earnings per pay period	Usual work hours	8.6	$17.17	(0.43)	285
	Average hours	0.8	$15.89	(1.04)	27
Usual net earnings per pay period	Usual work hours	0.6	$21.29	(2.61)	21
	Average hours	0.1	$14.92	(0.69)	4
Impute gross earnings per week	Usual work hours	0.5	$26.52	(3.88)	17
	Average hours	0.1	$21.07	(3.41)	3
Mothers		100			
Gross earnings last pay period	Usual work hours	75.3	$19.21	(0.20)	3,830
	Average hours	2.0	$20.09	(0.92)	101
Net earnings last pay period	Usual work hours	6.5	$19.14	(0.60)	332
	Average hours	0.2	$24.71	(2.65)	9
Usual gross earnings per pay period	Usual work hours	12.9	$17.32	(0.35)	654
	Average hours	1.5	$15.46	(0.94)	77
Usual net earnings per pay period	Usual work hours	0.9	$17.52	(1.25)	44
	Average hours	0.1	$11.22	(2.17)	6
Impute gross earnings per week	Usual work hours	0.5	$24.97	(3.77)	26
	Average hours	0.2	$27.95	(3.14)	9

Note: Standard errors are adjusted for the clustering of observations from the same individual, but are not adjusted to take account of the sampling design and are not weighted.

[a] Where the most recent wage or salary payment is not typical of the respondent's usual pay, respondents are asked 'How much do you usually receive each pay period'. If this payment varies, then a further question is asked 'Looking over the last month, on average how much would you have received each week or fortnight?'

[b] Based on question 'Including any paid or unpaid overtime, how many hours per week do you usually work in [your main job or all your jobs]? If hours vary from week to week, respondent is then asked 'Including any paid or unpaid overtime, how many hours per week do you work on average over a usual 4-week period in [your main job or all your jobs]?'

Source: HILDA, waves 1 - 6 (2001 - 2006).

Table 4.14: Means and standard deviations of control variables for childless women and mothers, employees aged 22 - 51 years, 2001 - 2006

	Childless women	Mothers
Number of children	0	2.08
Work experience (years)	12.86	16.73
Tenure (ref: 10 yrs or more)		
Less than 2 yrs	0.35	0.29
2 - 4 yrs	0.32	0.29
5 - 9 yrs	0.20	0.22
Part-time	0.18	0.63
Work from home (ref: no)		
Informal arrangement	0.16	0.14
Formal arrangement	0.05	0.07
Flexible work hours available (ref: no)		
Yes, available	0.47	0.44
Don't know	0.10	0.07
Missing SCQ	0.07	0.06
Contract (ref: permanent)		
Casual	0.13	0.24
Fixed-term	0.12	0.10
Sector (ref: private)		
Public	0.41	0.45
Temporary agency worker (ref: no)		
Temporary worker	0.03	0.03
Supervisor (ref: no)		
Supervise other workers	0.51	0.44
Work hours schedule (ref: regular daytime work)		
Night or shift hours	0.18	0.21
Weekly day schedule (ref: Mon - Fri)		
Sat-Sun day schedule	0.11	0.12
Day schedule varies	0.11	0.14
Organisation size (ref: 500+)		
1 - 19	0.19	0.21
20 - 99	0.15	0.15
100 - 499	0.13	0.10
Member union or employee association (ref: not member)		
Member	0.29	0.31
Education (ref: no tertiary qualification)		
Diploma/certificate	0.24	0.28
Degree	0.47	0.31
Occupation (ref: clerical or manual)		
Manager or professional	0.60	0.47
Industry (ref: finance, insurance, property, business)		
Government	0.07	0.06
Education	0.14	0.20
Health, community	0.19	0.28
Retail, culture, recreation services	0.21	0.18
Transport, wholesale, construction, utilities	0.07	0.07
Manufacturing	0.08	0.05
Agriculture, mining	0.01	0.01
Age (years)	32.4	38.6
Marital status (ref: legally married or de facto)		
Separated, divorced or widowed	0.05	0.13
Single, never married	0.39	0.04
Health condition (ref: no)		
Health condition limits work	0.08	0.06
Region (ref: metropolitan city)		
Inner regional city	0.15	0.27
Outer regional or remote	0.09	0.12
Total n	3,548	5,356

Note: Means are unweighted.
Source: HILDA, waves 1 - 6 (2001 - 2006).

Table 4.15: Summary of predictors of actual and nominal wages, female employees aged 22 - 51 years, 2001 - 2006

	Model D - actual wage				Model E - nominal wage			
	Fixed-effects		Pooled OLS		Fixed-effects		Pooled OLS	
	Coef	(SE)	Coef	(SE)	Coef	(SE)	Coef	(SE)
Number of children ever had								
Continuous measure	-0.059***	(0.014)	-0.021**	(0.007)	-0.064***	(0.013)	-0.021**	(0.007)
Human capital measures								
Work experience (years)	0.071***	(0.013)	0.022***	(0.004)	0.069***	(0.013)	0.022***	(0.004)
Work experience squared	-0.001***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)	-0.001***	(0.000)
Tenure (ref: 10 yrs or more)								
Less than 2 yrs	-0.005	(0.016)	-0.087***	(0.016)	-0.004	(0.016)	-0.085***	(0.016)
2 - 4 yrs	-0.012	(0.015)	-0.075***	(0.015)	-0.009	(0.015)	-0.072***	(0.015)
5 - 9 yrs	0.002	(0.014)	-0.040**	(0.015)	0.004	(0.014)	-0.039*	(0.015)
Part-time hours	0.130***	(0.010)	0.065***	(0.011)	0.123***	(0.010)	0.055***	(0.011)
Employment characteristics								
Work from home (ref: no)								
Informal arrangement	-0.024*	(0.011)	-0.014	(0.014)	-0.020	(0.011)	0.004	(0.014)
Formal arrangement	-0.022	(0.015)	0.027	(0.023)	-0.019	(0.015)	0.036	(0.022)
Flexible work hours available (ref: no)								
Yes, available	0.004	(0.008)	0.023*	(0.010)	0.003	(0.008)	0.022*	(0.010)
Don't know	0.003	(0.012)	-0.002	(0.016)	0.003	(0.012)	-0.001	(0.016)
Missing SCQ	0.012	(0.014)	0.032*	(0.016)	0.013	(0.014)	0.033*	(0.016)
Contract (ref: permanent)								
Casual	0.026*	(0.011)	-0.010	(0.014)	0.026*	(0.011)	-0.011	(0.014)
Fixed-term	0.005	(0.012)	-0.019	(0.013)	0.006	(0.011)	-0.02	(0.012)
Public sector	0.006	(0.012)	-0.002	(0.015)	0.006	(0.012)	-0.004	(0.015)
Temporary agency worker	0.049*	(0.021)	0.023	(0.028)	0.050*	(0.020)	0.023	(0.028)
Supervise other workers	0.008	(0.008)	0.025**	(0.009)	0.009	(0.008)	0.028**	(0.009)
Work hours not regular daytime	0.020	(0.012)	0.025	(0.015)	0.020	(0.012)	0.023	(0.015)
Work day schedule (ref: Mon - Fri)								
Sat-Sun day schedule	-0.014	(0.013)	-0.038*	(0.016)	-0.008	(0.013)	-0.029	(0.016)
Day schedule varies	-0.014	(0.013)	-0.005	(0.016)	-0.01	(0.012)	-0.002	(0.016)
Organisation size (ref: 500+)								
1 - 19	-0.061***	(0.013)	-0.088***	(0.014)	-0.063***	(0.012)	-0.090***	(0.014)
20 - 99	-0.023*	(0.012)	-0.067***	(0.013)	-0.024*	(0.012)	-0.067***	(0.013)
100 - 499	0.009	(0.012)	0.012	(0.014)	0.009	(0.012)	0.014	(0.013)
Union or employee association member	0.016	(0.011)	0.029**	(0.011)	0.017	(0.011)	0.029**	(0.011)
Education (ref: no tertiary qualification)								
Diploma/certificate	0.034	(0.027)	0.030*	(0.013)	0.034	(0.026)	0.029*	(0.013)
Degree	0.055	(0.046)	0.187***	(0.016)	0.056	(0.046)	0.191***	(0.016)

	Model D - actual wage				Model E - nominal wage			
	Fixed-effects		Pooled OLS		Fixed-effects		Pooled OLS	
	Coef	(SE)	Coef	(SE)	Coef	(SE)	Coef	(SE)
Manager or professional occupation	0.062***	(0.011)	0.230***	(0.013)	0.062***	(0.011)	0.231***	(0.013)
Industry (ref: finance, insurance, property, business)								
Government	0.036	(0.022)	0.042	(0.023)	0.035	(0.022)	0.039	(0.023)
Education	0.010	(0.024)	-0.114***	(0.021)	0.008	(0.024)	-0.113***	(0.021)
Health, community	0.003	(0.020)	-0.068***	(0.018)	0.001	(0.020)	-0.070***	(0.018)
Retail, culture, recreation services	-0.016	(0.018)	-0.123***	(0.016)	-0.016	(0.017)	-0.125***	(0.017)
Transport, wholesale, construction, utilities	0.008	(0.021)	-0.040	(0.021)	0.004	(0.021)	-0.041*	(0.021)
Manufacturing	-0.003	(0.023)	-0.050*	(0.021)	-0.003	(0.023)	-0.049*	(0.021)
Agriculture, mining	0.029	(0.037)	-0.096*	(0.045)	0.031	(0.037)	-0.098*	(0.045)
Demographic characteristics								
Marital status (ref: married or de-facto)								
Separated, divorced or widowed	-0.001	(0.021)	-0.021	(0.016)	0.002	(0.021)	-0.018	(0.016)
Single, never married	-0.029	(0.018)	-0.069***	(0.015)	-0.029	(0.017)	-0.068***	(0.015)
Poor health limits work	-0.025	(0.016)	-0.059**	(0.019)	-0.024	(0.015)	-0.058**	(0.019)
Region (ref: metropolitan)								
Inner regional city	-0.058**	(0.023)	-0.052***	(0.013)	-0.060**	(0.022)	-0.051***	(0.013)
Outer regional or remote	-0.092**	(0.030)	-0.073***	(0.018)	-0.092**	(0.030)	-0.073***	(0.018)
Age	-0.024	(0.016)	-0.0000	(0.002)	-0.023	(0.015)	0.0000	(0.002)
Period controls								
2002	-0.029	(0.021)	-0.012	(0.010)	-0.029	(0.020)	-0.011	(0.010)
2003	-0.012	(0.038)	0.013	(0.010)	-0.012	(0.038)	0.014	(0.010)
2004	-0.011	(0.056)	0.018	(0.011)	-0.012	(0.056)	0.017	(0.011)
2005	-0.005	(0.075)	0.038***	(0.011)	-0.006	(0.075)	0.037**	(0.011)
2006	0.005	(0.094)	0.053***	(0.011)	0.005	(0.093)	0.053***	(0.011)
Intercept	2.847***	(0.544)	2.642***	(0.049)				
Number of obs			8,902				8,902	
Number of persons			2,107				2,107	

Note: Significance tests and confidence intervals in pooled OLS estimation are adjusted for the clustering of observations within persons.
* p<0.05, ** p<0.01, *** p<0.001.
Source: HILDA, waves 1 - 6 (2001 - 2006)

Table 4.16: Summary of predictors of wages in supplementary analysis, female employees aged 22 - 51 years, 2001 - 2006

	Model F - dummy variables Fixed-effects		Model G - dependent children Fixed-effects	
	Coef	(SE)	Coef	(SE)
Number of children ever had				
One child	-0.054*	(0.021)		
Two children	-0.107***	(0.029)		
Three or more children	-0.215***	(0.051)		
Number of dependent children				
One dependent child			-0.054**	(0.021)
Two dependent children			-0.078**	(0.024)
Three or more dependent children			-0.086**	(0.031)
Human capital measures				
Work experience (years)	0.071***	(0.013)	0.075***	(0.013)
Work experience squared	-0.001***	(0.000)	-0.001***	(0.000)
Tenure (ref: 10 yrs or more)				
Less than 2 yrs	-0.005	(0.016)	-0.003	(0.016)
2 - 4 yrs	-0.012	(0.015)	-0.010	(0.015)
5 - 9 yrs	0.002	(0.014)	0.004	(0.014)
Part-time hours	0.129***	(0.010)	0.128***	(0.010)
Employment characteristics				
Work from home (ref: no)				
Informal arrangement	-0.024*	(0.011)	-0.024*	(0.011)
Formal arrangement	-0.022	(0.015)	-0.021	(0.015)
Flexible work hours available (ref: no)				
Yes, available	0.004	(0.008)	0.004	(0.008)
Don't know	0.003	(0.012)	0.002	(0.012)
Missing SCQ	0.012	(0.014)	0.011	(0.014)
Contract (ref: permanent)				
Casual	0.026*	(0.011)	0.026*	(0.011)
Fixed-term	0.005	(0.012)	0.005	(0.012)
Public sector	0.006	(0.012)	0.006	(0.012)
Temporary agency worker	0.049*	(0.021)	0.050*	(0.021)
Supervise other workers	0.008	(0.008)	0.007	(0.008)
Work hours not regular daytime	0.020	(0.012)	0.020	(0.012)
Work day schedule (ref: Mon - Fri)				
Sat-Sun day schedule	-0.014	(0.013)	-0.014	(0.013)
Day schedule varies	-0.014	(0.013)	-0.014	(0.013)
Organisation size (ref: 500+)				
1 - 19	-0.061***	(0.013)	-0.062***	(0.013)
20 - 99	-0.023*	(0.012)	-0.024*	(0.012)
100 - 499	0.009	(0.012)	0.008	(0.012)
Union or employee association member	0.016	(0.011)	0.016	(0.011)
Education (ref: no tertiary qualification)				
Diploma/certificate	0.033	(0.027)	0.034	(0.027)
Degree	0.054	(0.046)	0.057	(0.046)
Manager or professional occupation	0.062***	(0.011)	0.062***	(0.011)
Industry (ref: finance, insurance, property, business)				
Government	0.036	(0.022)	0.035	(0.022)
Education	0.011	(0.024)	0.009	(0.024)
Health, community	0.003	(0.020)	0.002	(0.020)
Retail, culture, recreation services	-0.016	(0.018)	-0.014	(0.018)
Transport, wholesale, construction, utilities	0.008	(0.021)	0.008	(0.021)
Manufacturing	-0.002	(0.023)	-0.002	(0.023)
Agriculture, mining	0.029	(0.037)	0.029	(0.038)
Demographic characteristics				
Marital status (ref: married or de-facto)				
Separated, divorced or widowed	-0.002	(0.021)	-0.001	(0.021)
Single, never married	-0.029	(0.018)	-0.031	(0.018)
Poor health limits work	-0.025	(0.016)	-0.025	(0.016)
Region (ref: metropolitan)				

	Model F - dummy variables Fixed-effects		Model G - dependent children Fixed-effects	
	Coef	**(SE)**	**Coef**	**(SE)**
Inner regional city	-0.058*	(0.023)	-0.059**	(0.023)
Outer regional or remote	-0.093**	(0.030)	-0.092**	(0.030)
Age	-0.024	(0.016)	-0.024	(0.016)
Period controls				
2002	-0.029	(0.021)	-0.035	(0.020)
2003	-0.012	(0.038)	-0.023	(0.038)
2004	-0.012	(0.056)	-0.028	(0.056)
2005	-0.006	(0.075)	-0.028	(0.075)
2006	0.004	(0.094)	-0.024	(0.093)
Intercept	2.848***	(0.544)	2.757***	(0.543)
Number of obs		8,902		
Number of persons		2,107		

* p<0.05, ** p<0.01, *** p<0.001.
Source: HILDA waves 1 - 6 (2001 - 2006)

Appendix 4C Test for selection bias

Method

Supplementary analysis presented in this appendix investigates the influence of mothers' selection out of employment. I follow the two-step method developed by Wooldridge (1995). The first step is to estimate employment status using probit regression and then calculate inverse Mill's ratios (IMR). The second step is to estimate a wage model using fixed-effects regression, with the IMR incorporated as an additional regressor. The estimated variance for the coefficient associated with the IMR forms the basis of a test for selectivity bias.

I estimate the probability of employment at each wave with a sample of females who are either not employed or are working for an employer for a wage or salary. I exclude females who are self-employed in the probit employment model (as well as a small number of employees who do not receive a wage or salary). Explanatory variables in the probit model include number of children, age of youngest child, marital status, partner's employment status, partner's gross financial year income (GFYI), work experience, highest level of education, age, non-English speaking background, own mothers' employment status when aged 14 years and region. These variables are often included in the selection equations where a two-step Heckman model of female wages (e.g. Amuedo-Dorantes & Kimmel, 2005; Gangl & Ziefle, 2009; Harkness & Waldfogel, 2003). The dummy variables marital status, highest level of education and region are the same as that in the wage model.

Number of children ever had is included in the probit model as a series of three dummy variables (one child, two children and three or more children). Age of youngest child is captured by dummy variables for youngest child aged 2 years or younger and youngest child aged 3 to 5 years[92]. The reference category is youngest dependent child is aged 6 to 17 years.

Partners' current employment status takes a value of 1 where the partner is either not employed or unemployed. Partners' employment status is derived by merging data collected from the spouse directly. Missing data is substantial on this variable because I lack a match for female respondents who have a partner that did not particulate in the HILDA survey at any or all waves. Where the respondents' partner participates in the

[92] Alternative specifications were tried for this measure, but did not lead to improvements in model fit.

survey at two or more waves, I impute partners' employment using responses collected at earlier or later waves. I impute employment as the person-specific modal response. Where no modal response can be identified, partners' employment status is coded as 1 on the missing dummy variable associated with this measure. For many female respondents, I have no partner interview data or interview data for single wave only. Often partner data is missing or "sparse" for women who transition between being single and being in a cohabiting relationship. All cases where spouse employment is missing or sparse are coded 1 on the missing dummy variable associated with this measure.

Own mothers' participation in a paid employment at age 14 years of age is a proxy measure for gender role socialisation. The first dummy variable is coded 1 where the respondent's mother was employed when they were aged 14 years. The second dummy variable is coded 1 for females who were not living with a mother at age 14 (271 person-time observations) or could not recall their mothers' employment status (299 person-time observations). The reference category is mother was not employed. Finally, non-English speaking background is a dummy variable coded 1 for women who speak a language other than England in the home[93].

Results

Results from the fixed-effects regression analysis with an IMR included are presented in Table 4.17. Coefficients from the probit regression model used to derive IMR are presented in Table 4.18 and summary statistics for all explanatory variables in this model are presented in Table 4.19. Results from the probit regression model predicting employment are consistent with expectations. Single mothers are less likely to be employed than couple mothers and mothers with two or more children are less likely to be employed than mothers with a single child. Employment also rises with increases in the age of their youngest child. Compared to women with no tertiary qualifications, women with a degree or a diploma or certificate are more likely to be employed. Women with a partner who is either not employed or unemployed are less likely to be employed. Women from a non-English speaking background are also less likely to be employed. Own mothers' employment appears to encourage women's employment, which may occur through the transmission of less conservative gender role attitudes.

[93] Except at wave 1, where a different question was used. At wave 1, NESB is coded 1 for females who indicate that English is not the only language spoken in the home.

Finally, region does not appear to be associated with the likelihood of employment among women aged 22 to 51 years.

Although most explanatory variables in the probit model are significantly associated with women's employment, the addition of the IMR to the fixed-effects regression model does not change the main findings. The coefficient for the IMR is not statistically significant and the null hypothesis of no employment selection bias is not rejected.

Table 4.17: Coefficients predicting the effects of children, human capital and detailed job characteristics on wages with selection correction, female employees aged 22 - 51 years, 2001 - 2006

	Model H Fixed-effects	
	Coef	**(SE)**
Lambda	0.018	(0.024)
Number of children ever had	-0.066***	(0.016)
Human capital measures		
Work experience (years)	0.071***	(0.013)
Work experience squared	-0.001***	(0.000)
Tenure (ref: 10 yrs or more)		
Less than 2 yrs	-0.005	(0.016)
2 - 4 yrs	-0.012	(0.015)
5 - 9 yrs	0.002	(0.014)
Part-time hours	0.129***	(0.010)
Employment characteristics		
Work from home (ref: no)		
Informal arrangement	-0.024*	(0.011)
Formal arrangement	-0.023	(0.015)
Flexible work hours available (ref: no)		
Yes, available	0.004	(0.008)
Don't know	0.003	(0.012)
Missing SCQ	0.013	(0.014)
Contract (ref: permanent)		
Casual	0.026*	(0.011)
Fixed-term	0.005	(0.012)
Public sector	0.006	(0.012)
Temporary agency worker	0.050*	(0.021)
Supervise other workers	0.008	(0.008)
Work hours not regular daytime	0.020	(0.012)
Work day schedule (ref: Mon - Fri)		
Sat-Sun day schedule	-0.014	(0.013)
Day schedule varies	-0.014	(0.013)
Organisation size (ref: 500+)		
1 - 19	-0.061***	(0.013)
20 - 99	-0.023*	(0.012)
100 - 499	0.009	(0.012)
Union or employee association member	0.016	(0.011)
Education (ref: no tertiary qualification)		
Diploma/certificate	0.037	(0.027)
Degree	0.063	(0.047)
Manager or professional occupation	0.062***	(0.011)
Industry (ref: finance, insurance, property, business)		
Government	0.036	(0.022)
Education	0.010	(0.024)
Health, community	0.003	(0.020)
Retail, culture, recreation services	-0.016	(0.018)
Transport, wholesale, construction, utilities	0.008	(0.021)
Manufacturing	-0.002	(0.023)
Agriculture, mining	0.029	(0.037)
Age (years)	-0.024	(0.016)
Intercept	2.837***	(0.544)
Number of obs	8,902	
Number of persons	2,107	

Note: Regression models also controls for marital status, health, region and survey year.
* significant at p<0.05; ** significant at p<0.01; *** significant at p<0.001
Source: HILDA, waves 1-6 (2001-2006)

Table 4.18: Coefficients from probit model predicting employment, women aged 22 - 51 years, 2001 - 2006

	Wave 1		Wave 2		Wave 3		Wave 4		Wave 5		Wave 6	
	Coef	**(SE)**	**Coef**	**(SE)**	**Coef**	**(SE)**	**Coef**	**(SE)**	**Coef**	**(SE)**	**Coef**	**(SE)**
Family type (single*children)												
Single	-0.265*	(0.121)	-0.121	(0.124)	-0.218	(0.132)	-0.296*	(0.140)	-0.203	(0.143)	-0.078	(0.134)
1 child	-0.357**	(0.130)	-0.355**	(0.135)	-0.469***	(0.139)	-0.447**	(0.144)	-0.129	(0.149)	0.008	(0.140)
2 or more children	-0.598***	(0.114)	-0.567***	(0.113)	-0.656***	(0.119)	-0.634***	(0.122)	-0.516***	(0.123)	-0.202	(0.114)
single * 1 child	-0.601***	(0.168)	-0.622***	(0.173)	-0.552**	(0.187)	-0.846***	(0.180)	-0.673***	(0.187)	-0.122	(0.201)
single * 2 or more children	-0.956***	(0.137)	-0.826***	(0.139)	-1.052***	(0.143)	-1.103***	(0.143)	-0.907***	(0.143)	-0.625***	(0.137)
Youngest child (ref: 6-17 yrs)												
0-2 years	-1.084***	(0.087)	-1.012***	(0.091)	-1.007***	(0.094)	-0.936***	(0.097)	-0.909***	(0.097)	-1.005***	(0.098)
3-5 years	-0.483***	(0.087)	-0.534***	(0.088)	-0.538***	(0.089)	-0.547***	(0.093)	-0.443***	(0.097)	-0.426***	(0.099)
Partners' employment status (ref: employed or no partner)												
Partner not employed or unemployed	-0.743***	(0.116)	-0.699***	(0.124)	-0.728***	(0.121)	-0.921***	(0.133)	-0.780***	(0.136)	-0.708***	(0.133)
Employment status missing	-0.266*	(0.124)	-0.304*	(0.132)	-0.100	(0.157)	-0.094	(0.164)	0.014	(0.163)	0.289	(0.194)
Education (ref: no tertiary)												
Diploma/certificate	0.333***	(0.069)	0.307***	(0.071)	0.308***	(0.072)	0.347***	(0.074)	0.314***	(0.073)	0.360***	(0.075)
Degree	0.685***	(0.074)	0.656***	(0.076)	0.673***	(0.076)	0.725***	(0.078)	0.801***	(0.080)	0.617***	(0.078)
Age (years)	-0.007	(0.006)	0.007	(0.006)	0.004	(0.006)	0.002	(0.006)	-0.002	(0.006)	0.001	(0.006)
Non-English speak background (ref: no)												
Yes	-0.299***	(0.083)	-0.332***	(0.087)	-0.318***	(0.089)	-0.190*	(0.096)	-0.213*	(0.098)	-0.346***	(0.097)
Own mothers' employment age 14 (ref: not employed)												
Mother employed age 14	0.116*	(0.058)	0.143*	(0.060)	0.136*	(0.061)	0.166**	(0.063)	0.173**	(0.064)	0.160*	(0.064)
Not applicable / don't know	-0.006	(0.129)	-0.115	(0.152)	-0.082	(0.161)	-0.295	(0.161)	-0.103	(0.164)	0.001	(0.171)
Region (ref: metropolitan)												
Inner regional city	0.048	(0.070)	0.051	(0.073)	0.070	(0.073)	0.059	(0.075)	0.091	(0.076)	0.091	(0.076)
Outer regional or remote	-0.036	(0.086)	-0.014	(0.092)	0.012	(0.094)	0.033	(0.098)	-0.007	(0.099)	-0.089	(0.099)
Intercept	1.312***	(0.203)	0.776***	(0.210)	0.909***	(0.220)	0.976***	(0.231)	1.010***	(0.241)	0.738**	(0.237)
Log-likelihood (full model)	-1363.5		-1225.6		-1189.0		-1121.9		-1089.0		-1078.3	
LR chi2 (17)	677.0		570.5		574.4		496.2		496.2		358.4	
Pseudo-R^2	0.199		0.189		0.195		0.181		0.167		0.143	
Total n	2,705		2,435		2,374		2,233		2,216		2,166	

Note: Sample excludes self-employed women.
* p<0.05, ** p<0.01, *** p<0.001.
Source: HILDA, waves 1 - 6 (2001 - 2006).

Table 4.19: Means (and standard deviations) of variables in probit selection model, women aged 22 - 51 years, Australia 2001 - 2006

	Childless, employee			Mother, employee			Childless, not employed			Mother, not employed		
	Wave 1		Waves 1-6	Wave 1		Waves 1-6	Wave 1		Waves 1-6	Wave 1		Waves 1-6
	Mean	(SD)	Mean	Mean	(SD)	Mean	Mean	(SD)	Mean	Mean	(SD)	Mean
Family status (single*num of children)												
Single	0.48		0.45				0.56		0.52			
1 child				0.19		0.17				0.18		0.15
2 or more children				0.64		0.65				0.64		0.64
single * 1 child				0.06		0.05				0.05		0.05
single * 2 or more children				0.11		0.12				0.14		0.16
Age of youngest child (ref: 6-17 years)												
0-2 years				0.22		0.19				0.48		0.41
3-5 years				0.21		0.19				0.21		0.23
Partners' employment status (ref: employed or no partner)												
Partner not employed or unemployed	0.03		0.03	0.04		0.03	0.07		0.1	0.12		0.1
Employment status missing	0.04		0.03	0.05		0.04	0.05		0.05	0.06		0.04
Education (ref: no tertiary qualification)												
Diploma/certificate	0.23		0.24	0.24		0.27	0.17		0.2	0.21		0.24
Degree	0.41		0.46	0.26		0.3	0.22		0.27	0.12		0.15
Age (years)	29.86	(6.2)	32.3	36.97	(5.3)	38.39	32.79	(7.0)	34.54	34.31	(6.0)	35.66
Non-English speak background (ref: no)												
Yes	0.12		0.1	0.11		0.11	0.16		0.15	0.16		0.16
Own mothers' employment at age 14 (ref: not employed)												
Mother employed age 14	0.56		0.6	0.54		0.55	0.49		0.52	0.48		0.5
Not applicable / don't know	0.11		0.07	0.03		0.02	0.16		0.09	0.04		0.04
Region (ref: metropolitan)												
Inner regional city	0.15		0.15	0.25		0.27	0.17		0.2	0.23		0.24
Outer regional or remote	0.09		0.09	0.14		0.12	0.15		0.14	0.14		0.13
Total n	805		3,907	1,026		5,975	98		481	776		3,766

Note: Sample excludes self-employed women. All figures are unweighted.
Source: HILDA, waves 1 - 6 (2001 - 2006).

Chapter 5: Australian mothers' job transitions and wages after a birth

5.1 Introduction

Over the past 40 years, the length of women's interruptions to employment to care for young children has shortened in most industrialised countries. The establishment of job-protected maternity leave has also enabled more mothers to return to the same job with the same employer after a birth. Yet in liberal welfare states, a significant portion of mothers still appear to return to a different employer or job either because of ineligibility for job-protected maternity leave or a preference to move into a more family-friendly job (Waldfogel et al., 1999). Previous research from the US and Britain has shown that female wages are negatively affected by the commencement of paid work with a new employer after a birth (Baum, 2002; Estes & Glass, 1996; Hofferth & Curtin, 2006) and the transition from full-time to part-time work hours (Connolly & Gregory, 2009).

In this chapter I investigate how the transition from full-time to part-time work after a birth affects mothers' wages in Australia. I focus on transitions into part-time work because this transition is particularly common among Australian mothers. The analysis has two specific aims. First, I investigate whether transitions into part-time work after a birth are associated with other job transitions, in particular movement to a new employer and downward occupational mobility. Second, I examine the structural determinants of wage growth around a birth event using first-difference regression.

This chapter is organised as follows. The next section reviews several US and British studies examining how work hours transitions affect female wages. Section 5.3 describes the wage model, statistical method and construction of the analytic sample. Section 5.4 presents the results, commencing with a summary of the frequency of job transitions among mothers. The remaining part of section 5.4 uses first-difference regression to model changes in wages around a birth event. The final section puts forward a series of explanations for those findings that differ from my expectations. I also note limitations and discuss how these might be addressed in future research.

5.2 The impact of work hours transitions on wages

Theories of compensating wage differentials and labour market segmentation underpin arguments that wages will be negatively affected by a transition from full-time to part-time work hours. The theory of compensating differentials suggests that employees consider the package of financial rewards and non-financial amenities (or disamenities) when searching for a job (Rosen, 1986). Many family-friendly job conditions are assumed to impose a cost on employers due to reduced productivity or higher administrative overheads and these costs will be passed onto employees. Economists have often viewed part-time employment as a job amenity because employers with a large part-time workforce will face higher staffing costs (Abhayaratna et al., 2008; Ermisch & Wright, 1993; Rodgers, 2004). This follows from the premise that a larger part-time workforce is needed to produce the same output as a full-time workforce and that staff costs are directly correlated with number of employees. Mothers can therefore choose to sacrifice a portion of their wages to access part-time hours (Budig & England, 2001).

Institutional theories of the labour market move the focus away from the employment choices of individuals and instead highlight the formal and informal processes within the workplace that constrain a reduction in working hours. Historically, the labour market has been structured around an ideal worker who maintains a continuous, full-time attachment to the labour force and is able to prioritise paid work above other commitments (Tomlinson, 2006; Williams, 2001). Part-time work is incompatible with this definition of an ideal worker and, as a result, part-time employees tend to be viewed as less committed or less productive. According to this perspective, part-time employees are differentiated from full-time employees through organisational policies or the actions of workplace managers, with implications for career progression and wage growth (Pocock, 2003; Tomlinson, 2006). Institutional theories describing the segmentation of part-time and full-time employees within organisations emphasise the rigidity of employers and managers, whereas the theory of compensating differentials implies that employers and managers will accommodate the needs of employees who desire shorter work hours by passing on the assumed cost of this arrangement. Institutional explanations also suggest that the provision of part-time employment does not necessarily lead to higher staffing costs and that the perception that part-time employees are less committed can be a form of statistical discrimination (Glass, 2004).

Several longitudinal studies have examined whether there are immediate changes in hourly wages and other job characteristics with the transition from full-time to part-time hours. In Britain, a substantial percentage of women appear to change occupations to access part-time hours, which in turn affects wages (Blackwell, 2001; Connolly & Gregory, 2008, 2009; Perry, 1988; Tomlinson, Olsen & Purdam, 2009). Connolly and Gregory (2008) have undertaken the most comprehensive study of the association between work hours transitions and occupational mobility. With a large sample of women aged 22 to 59 years in the New Earnings Survey Panel Dataset (NESPD) and the BHPS, Connolly and Gregory (2008) examine mobility between 15 hierarchically ordered occupational groups. In this occupational classification, teachers comprise the highest status occupational group and cleaners the lowest. Both descriptive and regression analyses show the transition from full-time to part-time employment is associated with downward occupational mobility. The probability of moving into a lower status occupation is 14.4% for women who transition from full-time to part-time hours, compared to 9.6% for women who remain full-time and 4.4% for women who remain part-time. The probability of downward occupation mobility is especially high for women who combine the transition from full-time to part-time hours with a movement to a new employer. Interestingly, the probability of upward occupational mobility is also higher for women who transition from full-time to part-time hours (9.6%) than for women who remain full-time or part-time (5.1%)[94]. Yet the likelihood of downward mobility is still higher than the likelihood of upward mobility for women who transition from full-time to part-time hours.

Another study by Johnes (2006) examines the association between transitions from full-time to part-time work and downward occupation mobility among British mothers who had a birth between 1992 and 2003. Johnes (2006) measures downward occupational mobility using the Goldthorpe and Hope occupation scale, developed in the early 1970s. Descriptive analysis shows that around one-quarter of mothers who transition from full-time to part-time hours in the 12 months after a birth move into a lower status occupation, compared to one-fifth of mothers who continue working full-time. Findings from the studies by Connolly and Gregory (2008) and Johnes (2006) could be interpreted as evidence that some employers and managers continue to limit the opportunities for women to maintain a career while working part-time work. Another

[94] The probability of transitioning into a higher status occupation is 9.6% for women who transition from full-time to part-time hours, compared to 5.1% for women who remain full-time and 5.1% for women who remain part-time (Connolly & Gregory, 2008).

possible explanation is that some mothers reduce their working hours and move into a less demanding occupation to focus on the care of their young children (Hakim, 2000).

Employees in higher status occupations tend to attract higher wages, so downward occupational mobility arising from the transition into part-time work is likely to affect wages. In another study, Connolly and Gregory (2009) explore whether the overall wage drop associated with a transition from full-time to part-time work in Britain can be explained by downward occupational mobility (using a 15 category classification) and employer mobility. The analysis shows that much of the immediate 7.1% wage penalty associated with the transition from full-time to part-time work hours is accounted for by other forms of job mobility. The addition of measures of occupational mobility and a change in employer reduces the wage penalty associated with a transition from full-time to part-time work to 1.5%. Employer and downward occupational mobility both have a significant negative effect on wages. Women who move into a lower status occupation attract an immediate wage penalty of 6.4%. Wages are also an average 1.8% lower for women who transition to a new employer, relative to those who continue with their former employer. The negative influence of downward occupation and employer mobility on wages is even higher for women who concurrently transition into part-time work. Women who move into a lower status occupation and transition from full-time to part-time work receive an average wage increase (or decrease) that is 16.5% lower than the average wage increase accrued over the previous 12 months among women who do not undertake a job transition.

Somewhat different results have been reported in two US studies of work hours transitions. In a small study of US mothers who move to a new employer after a birth, Estes and Glass (1996) observe that a reduction in working hours does not have a significant, negative effect on wages[95]. A larger US study by Hirsch (2005), drawing on the Current Population Survey, found that the transition from full-time and part-time hours in a given 12 month period did not have a negative effect on wage growth for women or men. However, transitions into part-time employment are found to have a negative effect on wages for women and men who concurrently move into a different industry and occupation. Among women, wage growth is 5% lower for women who transition into part-time work in a new industry and occupation, relative to women who remain working full-time in the same industry and occupation.

[95] Note that this study examines any reduction in work hours, not necessarily a transition from full-time to part-time work hours.

In summary, empirical research suggests that the transition from full-time to part-time work is correlated with other forms of job mobility, including downward occupational mobility. Studies examining the short-term effect of the transition from full-time to part-time work on female wages, after adjusting for other forms of job mobility, provide varying results. Results from a British study suggest this transition is associated with slightly lower wage growth (Connolly & Gregory, 2009), which could be due to compensating differentials or discriminatory workplace practices. In contrast, results from two US studies suggest that the transition from full-time to part-time work has no direct effect on wages (Estes & Glass, 1996; Hirsch, 2005).

Research questions

Similar to the liberal welfare states of Britain and the US, Australia provides comparatively limited support for mothers' employment through statutory paid maternity leave and state-sponsored child care (Jaumotte, 2004). Despite the absence of strong enabling policies, a substantial proportion of Australian mothers return to paid employment while fulfilling the role as primary carer for an infant or toddler. Most Australian mothers who return to paid work before their children enter school are employed on a part-time basis. Despite the prevalence of part-time work employment in Australia, no research has examined whether the transition from full-time to part-time hours is associated with occupational or employer mobility. Previous Australian research on part-time employment has tended to highlight the job insecurity of part-time women employed on a casual employment contract (Charlesworth, Campbell, Probert, Allen & Morgan, 2002; Pocock, 2003). These studies draw on cross-sectional survey data, though it is assumed that the transition to part-time work would often coincide with a transition into casual employment. For example, Pocock (2003, p. 167) argues that "the majority of part-time employees, regardless of preferences, give up job security when they take a part-time job".

The aim of this chapter is to describe the types of job characteristics that change with a transition from full-time to part-time employment around a birth and to quantify the impact of these changes on wage growth in Australia. To the extent that Australian employers and managers continue to structure the workplace around the norm of continuous, full-time employment, I expect that:

- The transition from full-time to part-time working hours around a birth will be associated with other types of job mobility.

The forms of job mobility I examine include: (a) movement to a different employer; (b) movement between a managerial or professional occupation and a clerical or blue-collar occupation; (c) movement between a supervisory and non-supervisory job; and (d) movement between a permanent or fixed term contract and a casual contract. The transition from a full-time managerial or professional occupation into a part-time clerical or manual occupation may not be solely due to workplace rigidities. Some mothers may choose to both reduce their working hours and move into a less demanding occupation because they would prefer to direct more time and energy to the care of children (Hakim, 2000). The descriptive analysis I undertake in this chapter does not allow for an investigation of the relative merit of these explanations. Instead my aim is to test whether there are indeed correlations between different types of job transitions among Australian mothers who return to paid work within 3 years of a birth.

Many forms of job mobility associated with the transition to part-time work would be expected to negatively affect wages. In developed labour markets higher status occupations that require formal qualifications tend to attract higher rates of pay. Hence, the transition into a lower status occupation would be expected to lead to a decline in wages. Similarly, employees with supervisory responsibilities are more likely to be located in higher status roles within an organisation and a transition out of a supervisory role would be expected to result in a decline in wages. Human capital theory also suggests that movement between employers will lead to a short-term decline in wages because of the absence of firm-specific human capital. Based on these observations, my second hypothesis is:

- The transition from full-time to part-time working hours around a birth will be associated with a decline in wages, whereas continued full-time employment will be associated with no change or small increase in wages.

I anticipate that this decline will arise through the combined effects of various types of job mobility that are expected to be associated with a transition from full-time to part-time work. Note that I do not expect the transition from permanent to casual employment to have a negative effect on wages because casual employees in Australia receive a pay loading in lieu of foregone leave and job protection benefits. Indeed, the presence of this wage loading could possibly mask wage declines associated with other forms of job mobility.

In the final part of this chapter, I test whether the transition from full-time to part-time working hours around a birth significantly affects wage growth after controlling for

other forms of job mobility. Theories of compensating amenities and institutional segmentation suggest that the transition from full-time to part-time work may negatively affect wages after controlling for other forms of mobility. To date, evidence that this occurs remains mixed (Connolly & Gregory, 2009; Estes & Glass, 1996; Hirsch, 2005). To the extent all mothers with young children are exposed to statistical discrimination or face difficulties accessing other family-friendly job conditions (e.g. flexible start and finishing hours), the transition into part-time work may not significantly affect wage growth around a birth.

5.3 Method

Female wage model

In this chapter, my model again draws on the conventional linear wage equation. My model takes the form:

$$\ln \mathrm{WAGE}_{it} = \theta + \beta_1 \mathrm{PART}_{it} + \sum \beta_j \mathrm{TEN}_{ijt} + \beta_5 \mathrm{PROF}_{it} + \beta_6 \mathrm{SUP}_{it} + \sum \beta_j \mathrm{X}_{ijt} + \beta_{12} \mathrm{YEAR}_t + c_i + u_{it}, \ t = 1, 2$$

where i indexes an individual birth event and t indexes time. In this specification time does not refer to wave; instead $t = 1$ is the last wage observation falling before a birth event and $t = 2$ is the first wage observation on return to employment after a birth. The key explanatory variables are part-time work (PART), three dummy variables for tenure (TEN), occupational class (PROF) and supervisory role (SUP). Other control variables, as indicated by the vector X, include work experience, employment contract, sector, work from home and whether the birth is a mothers' first. Note that the estimated effect of part-time work on mothers' wages that I present in this chapter is not strictly comparable to that presented in the previous chapter because of differences in the targeted population and analytic design.

First-difference regression is used to model changes in mothers' wages. Like fixed-effects regression, first-difference regression uses within-person variation to estimate coefficients[96]. An investigation of the wage differential between full-time and part-time employment with cross-sectional survey data will be biased where

[96] First-difference and fixed-effects regression will produce identical results where data from persons are available across two periods of time. Following convention, I describe results from a two-period analysis with reference to differencing rather than demeaning.

unobserved characteristics have a causal affect on both wages and mothers' propensity to transition to part-time work. Researchers have identified a number of unobserved characteristics that could affect both wages and part-time work, including career ambition or cognitive ability (Ferber & Waldfogel, 1998; Hirsch, 2005). With first-difference regression, coefficient values are estimated after subtracting the before-birth wage equation from the after-birth wage equation. With a single explanatory variable for part-time work, the resulting equation takes the form:

$$\ln WAGE_{it} - \ln WAGE_{it-1} = \beta_1 (PART_{it} - PART_{it-1}) + (c_{it} - c_{it-1}) + (u_{it} - u_{it-1}),\ t = 1, 2$$

By definition, c_i are constant over time and the term ($c_{it} - c_{it-1}$) reduces to zero in the estimation equation. Hence, first-differencing controls for unobserved heterogeneity and protects against omitted variable bias.

First-difference regression uses within-person variation to derive partial regression coefficients and, therefore, contrasts mothers who transition from full-time to part-time hours with mothers who experience no change. Mothers who remain part-time, however, may experience lower wage growth than mothers who remain full-time. I explore this possibility in two ways. First, I estimate the model with a sub-sample of mothers who were working full-time before the birth and compare how the coefficient changes when the contrast group excludes mothers who remain part-time. Second, I test whether there are differences in wage growth between mothers who remain full-time, remain part-time and transition from full-time to part-time. I achieve this by incorporating a three-way interaction term between current part-time, lagged part-time hours and work experience. This model can be summarised as:

$$\ln WAGE_{it} = \beta PART_{it} + \beta PART_{it-1} + \beta EXP_{it} + \beta(PART_{it} * EXP_{it}) +$$
$$+ \beta(PART_{it} * PART_{it-1} * EXP_{it}) + \sum \beta X_{it} + \beta YEAR_t + c_i + u_{it},\ t = 1, 2$$

The coefficient for ($PART_{it-1}$) is not estimated because this is time invariant, though the coefficient for the interaction term ($PART_{it}$ * $PART_{it-1}$ * EXP) can be estimated.

A key assumption for models estimated using first-difference regression is exogeneity. Exogeneity will be violated if the idiosyncratic errors, u_{it}, are correlated with any explanatory variable. In terms of the underlying behaviour being modelled, part-time work will be endogenous if wage growth leading up to a birth has a causal affect on decisions to return to the labour force after a birth on a part-time basis. One possibility is that women of child-bearing age who are employed full-time and

experience gender-based discrimination in the workplace before family formation would be more likely to transition into part-time employment because of this discrimination. Unfortunately, with a relatively short panel survey, I have little scope to explore these more complex behavioural models[97].

The modelling treats the unit of analysis as a birth event. Given women can have multiple birth events between 2001 and 2006, not all birth observations are statistically independent. To account for this, I adjust the standard errors for non-independence using the cluster option in Stata.

Sample

In this chapter the analytic sample consists of female respondents who give birth to or adopt[98] at least one child between 2001 and 2006 and who are employed both before and after this birth. I retain respondents aged 22 to 45 years in 2001 and exclude female respondents enrolled in full-time study and those who had a first birth at age 17 years or younger. The absence of data on household members' date of birth in the publicly released data-file means I identify women as having experienced a birth by collating information across waves on changes in the number of children ever had and the presence of at least one resident, biological or adopted child aged 1 year or younger[99]. In the HILDA sample, I observe at least one birth event for 657 women, comprising 21% of women of child-bearing age in the unbalanced panel sample (see Table 5.1). Many of these 657 women, however, are not employed leading up to a birth event. Moreover, with only 6 waves of panel data available, I am only able to observe mothers' return to work where this occurs within 1 to 5 years after a birth. This left censoring is most pronounced for women who have a birth between waves 5 and 6 (2005 to 2006) and means that the final sample will capture more births occurring around waves 2 and 3 (2002 to 2003). Before I describe the sample of births, I will first outline how I select before and after-birth employment observations.

In Australia, pregnant women can commence unpaid parental leave several weeks before they are due to give birth. Women may also withdraw from the labour

[97] There is also the further issue of identifying suitable instruments.
[98] I refer to the entrance of a new child into the household through both a biological birth or the adoption of an infant as a "birth" event. I am not able to assess whether any of the birth events are actually an adoption as HILDA questions in the personal interview do not distinguish between biological and adoptive children.
[99] For female respondents who have one or two successive waves of attrition, I relax the second criteria to having a resident child aged two years and three years or younger respectively. I exclude respondents who have three or more successive waves of attrition.

force several months before a birth event. For these reasons, I take the before-birth employment observation as either: (a) the wave immediately prior to the arrival of a new child in the household; or else, (b) two waves prior to the arrival of a new child in the household[100]. Most women who were not employed at the two waves prior to the arrival of an infant were in the "building" phase of family-formation, rather than commencing this phase of the life course, and hence, were either not employed at earlier waves or were in the midst of their first birth around this time.

Identification of after-birth employment is complicated by women's planning of their fertility, which sees successive births closely spaced[101], and the censoring of longitudinal data for those respondents who have a birth towards the end of the 6 year survey period. Therefore, I limit my analysis to those mothers who return to paid employment within 3 years of a birth. More specifically, I take the after-birth employment observation as either: (a) the wave where the infant first enters the household for mothers who indicate that they are employed; (b) the second wave after the infant enters the household for mothers who indicate that they were not employed at the previous wave, but had returned to paid work by this second wave; or else, (c) the third wave after the infant enters the household for mothers who indicate that they were not employed at the previous two waves, but had returned to paid work by this third wave.

Imputation of the employment and leave trajectories of mothers after the arrival of an infant is undertaken for a small number of cases. Mothers on leave from a job are conventionally classified as employed and this definition has been applied in HILDA. Specific information on leave status is not available in the public-release version of the HILDA data and I rely on responses to other employment questions to impute leave status[102]. I assume that women who are classified as employed and who are missing or

[100] For instance, where an infant arrives in a household between waves 2 and 3, I will take wave 2 as the before-birth observation if the mother is working as an employee with a wage or salary at wave 2. If the mother is not in the labour force (NILF) at wave 2, but is working for an employee at wave 1, I take wave 1 as the before-birth observation.

[101] For example, looking at those with a first birth, I find that 179 female respondents are observed transitioning from childless to one biological child and a further 122 female respondents are observed transitioning from childless to one biological child to two biological children over the course of the HILDA survey.

[102] The skip logic of the HILDA questionnaire directs mothers who are away from work on unpaid maternity leave past the current employment section (unless this leave has been for less than four weeks), while mothers currently on paid maternity leave (or less than 4 weeks unpaid leave) are directed to complete the employment questions. Due to data restrictions in the confidentialised version of HILDA, I lack information on "leave" versus "provide labour" in the reference week for those women who are classified as employed.

have a value of zero for usual weekly work hours are on leave from a job. For these cases I take the after-birth observation to be the subsequent wave where working hours are positive (n = 19). Some wave non-response appears to fall around the birth of a child, which is not surprising given the demands of caring for a newborn child. Where there is a single wave of non-response around the time of a birth, I assume that the mother was on leave or outside the labour force and take the subsequent wave as the after-birth observation where the mother is employed (n = 14). Both of these imputation decisions were guided by other Australian research showing that mothers who worked for an employer prior to a birth are most likely to return to paid work between 9 to 12 months after a birth, around the time 12 months unpaid maternity leave would finish (Baxter, 2008).

Of the 657 women who have at least one birth over the course of the first 6 waves of HILDA, just over half are excluded because they were not employed leading up to the birth and/or are not observed returning to paid employment within 3 years. Given the difficulty of identifying a wage rate for the self-employed, I exclude women who were self-employed before the birth event and mothers who transition into self-employment after a birth. I exclude women working less than 6 hours per week or more than 60 hours per week because these employees tend to have extremely high or low rates of pay respectively. This leaves a sample of 263 female respondents. Finally, the regression analysis excludes five observations where there is a transition from part-time to full-time hours as there are insufficient cases for an examination of the wage outcomes of these women and one observation that came up as highly influential in my diagnostic analysis using Cook's distance.

Table 5.1: Influence of sample restrictions on sample of birth observations

Criteria to narrow analytic sample	Number of women	Number of births, 2001 - 2006
Women 22 - 45 years, childless or have dependent children[a]	3,645	-
Interviewed at least two waves	3,149	-
At least one birth, 2001 - 2006	657	-
Waged job before and after birth	263	309
Final sample, excluding part-time to full-time transitions	257	300

Note: [a] This baseline sample consists of all women 22 to 45 years in wave 1 excluding female respondents who either: (a) never complete a HILDA personal interview; (b) are enrolled in full-time study at all waves interviewed; (c) show 'implausible' fertility transitions; and (d) had their first birth at age 17 years or younger, or have missing data in the child question grid.
Source: HILDA waves 1 - 6 (2001 - 2006).

The final sample consists of 300 births from 257 respondents. In terms of child parity, the sample comprises 156 first births, 112 second births, 26 third births and 6 fourth or higher parity births. Of the 43 women who contribute two birth observations to the final sample, 40 contribute a first and second birth observation and the balance contribute two higher order births. One further complexity is that the after-birth wage observation for one birth may comprise the before-birth observation for a later birth. This occurs for 11 women who contribute two births to the final dataset. As the estimation method applied in this chapter adopts a difference-in-differences approach, the deletion of one of these two birth observations is not necessary. Duplication will arise where a woman has two births in very short succession, such that there is a before first birth employment observation and an after second birth employment observation, but no intermediate employment observation falling after the first birth and before the second birth. Careful checks show that this happens for another 11 female respondents. I have prepared the dataset of birth observations in such a way that these cases are represented only once.

Table 5.2 summarises the timing of the before-birth and after-birth employment observations in the final sample. Most before-birth wages reference the wave immediately preceding the entrance of a new infant, whereas around half of the after-birth wage observations fall at the first wave after an infant enters the mothers' household.

The final sample of Australian mothers who give birth to a child and return to waged employment within 3 years constitutes a distinct segment of the wider population of Australian women. A sophisticated statistical treatment of Australian women's fertility behaviour is beyond the scope of this thesis. Here, I instead explore whether women who are "building" a family between 2001 and 2006 vary from other

Table 5.2: Timing of before-birth and after-birth wage observations, female respondents who return to waged employment within 3 years of a birth, 2001 - 2006

	Measure of before-birth wage		
Measure of after-birth wage	**Wave t - 1**	**Wave t - 2**	**Total n**
Wave t	150	14	164
Wave t + 1	119	7	126
Wave t + 2	9	1	10
Total n	278	22	300

Note: Calculations assume that birth occurs before wave non-response for those female respondents who temporarily attrite from the sample.
Source: HILDA waves 1 - 6 (2001 - 2006).

women who have a stable family situation on two demographic factors, education and age (which changes over time but at a constant rate). Women in the building phase of family formation are here defined as having one or more births between 2001 and 2006 (though they were not necessarily childless in 2001). To describe these broad trajectories, I look only at the sub-sample of female respondents who were interviewed at wave 1 and wave 6.

Descriptive comparisons presented in Table 5.3 confirm that parental status trajectories vary according to age and education. Consistent with the demographic literature on fertility, women who have a university degree are more likely to remain childless from 2001 to 2006 than women with no tertiary qualification. Thirty-one percent of women with a degree remain childless compared to 15% of women who have completed year 12 or have a lower level of secondary education. Conversely, women with no tertiary qualification are more likely to have at least one dependent child in 2001 and not experience a birth over the subsequent 5 years, in comparison to women with a diploma or certificate and women with a university degree. To some extent, these comparisons by education will capture cohort differences, with more recent generations of Australian women completing tertiary education at higher rates and expected to delay family formation for longer than older generations of Australian women. Surprisingly, women who have a university degree are slightly more likely to be building a family than women with no tertiary qualification. However, the difference is fairly small. Twenty-eight percent of women with a university degree experience at least one birth between 2001 and 2006, compared to 23.1% of women with a diploma or certificate and 21.2% of women with no formal tertiary qualification.

In Table 5.4 I investigate the association between education and employment continuity among those women who experience at least one birth between 2001 and 2006. Comparisons show that mothers who have a university degree are more likely to be observed in waged employment within 3 years of a birth than mothers who have a diploma, certificate or no tertiary qualification. This pattern has been documented in earlier Australian research on mothers' employment trajectories around a birth (Baxter, 2008). Taken together, this contextual material highlights the need for caution when discussing the generalisability of my statistical findings.

Table 5.3: Child-bearing trajectories by education and age, female respondents aged 22 - 51 years, 2001 - 2006

	At least one birth 2001 - 2006 (%)	No change in number of children 2001 - 2006		Total n
		Remain childless (%)	Mothers, no further children born (%)	
Education[a]				
High school or less	21.2	15.2	63.6	1,075
Diploma or certificate	23.1	22.7	54.1	510
Degree or higher	27.6	30.8	41.6	642
Age[a]				
22 - 25 years	36.1	52.5	11.3	238
26 - 30 years	47.7	26.5	25.8	449
31 - 35 years	33.3	14.1	52.6	523
36 - 40 years	8.8	15.0	76.3	560
41 - 45 years	0	16.4	83.6	457
All women 22 - 45 years interviewed 2001 & 2006	23.5	21.4	55.1	2,227
Total n	523	477	1,227	

Note: Percentages and total n are unweighted. The sample comprises those female respondents who were interviewed at wave 1 (2001) and wave 6 (2006), which is why the sample size differs from the earlier table. I also exclude persons enrolled in full-time education, parents who had their first child at age 17 years or younger and parents with non-dependent children at all waves.
[a] Education and age in 2001.
Source: HILDA, waves 1 - 6 (2001 - 2006).

Table 5.4: Participation in waged employment before and after a birth by education and age, female respondents with at least one birth, 2001 - 2006

	Wage before & after birth (%)	No wage before or after birth (%)	Total n
Education[a]			
High school or less	33.3	66.7	228
Diploma or certificate	37.3	62.7	118
Degree or higher	52.5	47.5	177
Age[a]			
22 - 25 years	38.4	61.6	86
26 - 30 years	39.7	60.3	214
31 - 35 years	42.0	58.0	174
36 - 40 years	44.9	55.1	49
All	40.7	59.3	523

Note: Percentages and total n are unweighted. The sample comprises those female respondents who were interviewed at wave 1 (2001) and wave 6 (2006), which is why the sample size differs from the earlier table. I also exclude persons enrolled in full-time education, parents who had their first child at age 17 years or younger and parents with non-dependent children at all waves.
[a] Education and age in 2001.
Source: HILDA, waves 1 - 6 (2001 - 2006).

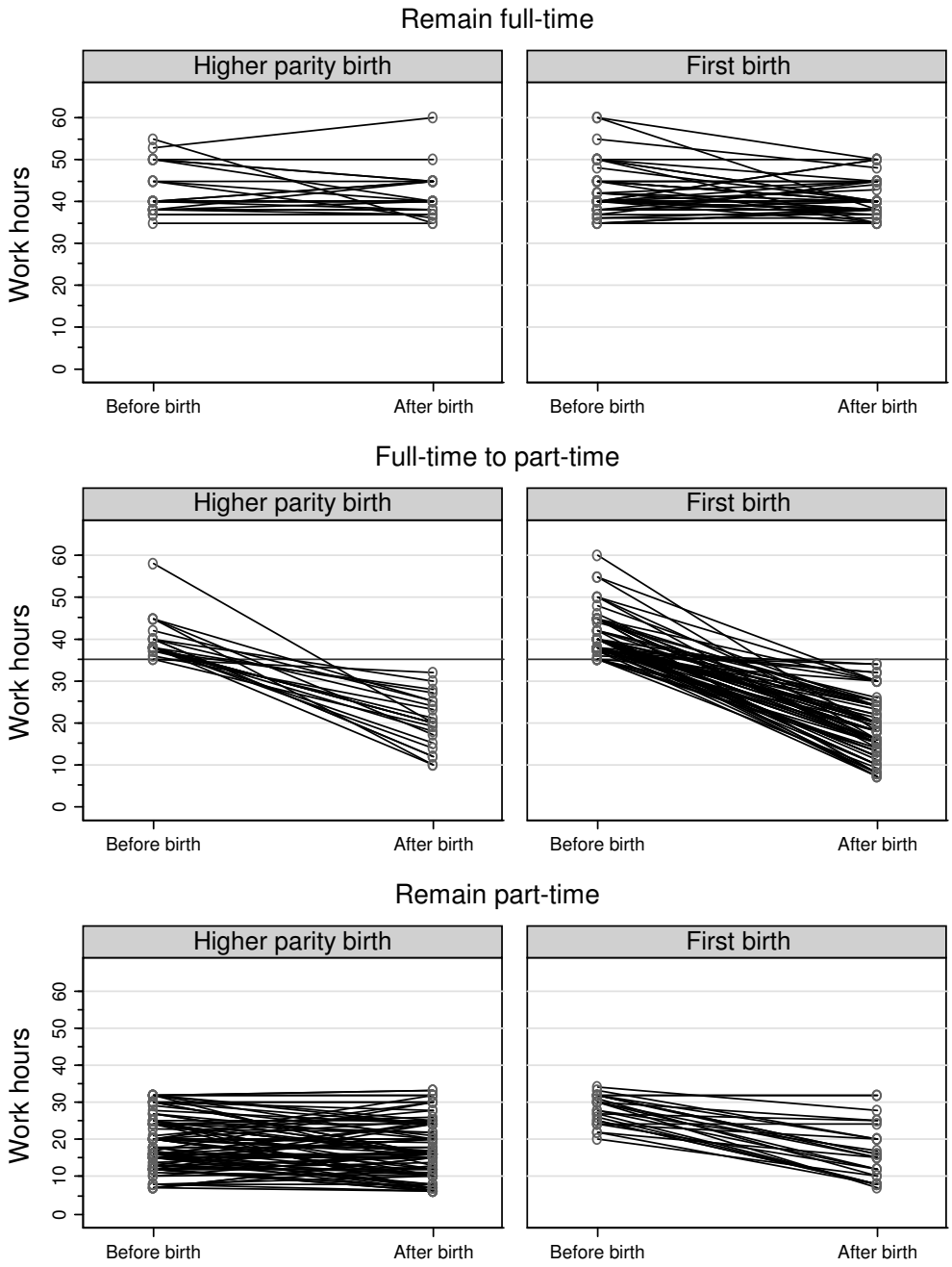
Variable construction

The construction of hourly wages follows the same method outlined in earlier chapters. The dependent variable is hourly wages, deflated to 2001 prices using CPI (ABS, 2007a) and expressed as a natural logarithm. A detailed description of the construction of this measure was presented in chapter 3.

Part-time working hours is a key variable in this analysis. Part-time work is defined as less than 35 hours per week in the respondents' main job. There is substantial heterogeneity in the weekly working hours of mothers who work part-time before and/or after a birth event. This is shown in the scatter plot in Figure 5.1. Mean weekly work hours of mothers working full-time are quite high at 41 hours per week both before and after a birth. Among mothers who return to paid employment on a part-time basis mean weekly work hours are only 18 hours per week. Part-time working hours before a birth vary by birth parity. Women's part-time hours average 28 hours per week leading up to a first birth, compared to 19 hours per week leading up to a higher parity birth. In my sample, there are no distinct clusters of short, medium or long part-time hours along the distribution of weekly work hours. Given the absence of distinct clusters of part-time work and constraints imposed by sample size, an analysis of differences in wage growth between mothers' transitioning into short and long part-time work is not pursued.

The other key explanatory variables are tenure, occupational class and supervisory responsibilities. Tenure is divided into the four categories: (a) less than 2 years; (b) 2 up to 5 years; (c) 5 up to 10 years, and (d) 10 years or longer (the reference category). Mothers who have been with their current employer less than 2 years on return after a birth are assumed to have commenced work with a new employer. The measure of occupational class has only two categories because few mothers work in masculine occupations in my sample. The occupation dummy is coded 1 for managers, professionals and associate professionals. The reference category includes clerical, sales and service workers, tradespersons and other manual occupations. Supervision of other workers is coded 0 for employees with no supervisory responsibilities and coded 1 for those who supervise one or more co-workers. HILDA does not ask respondents for further information on the extent of their supervisory responsibilities. In the regression analysis, I do not include interaction terms between work hours transitions and these other forms of job mobility. This is

mainly due to sample size constraints, but is also informed by findings in my preliminary analysis.



Source: HILDA waves 1-6

Figure 5.1: Distribution of weekly work hours by work hours transitions and birth parity, women who return to waged employment within 3 years of a birth, 2001 - 2006[103]

[103] The sample size for each plot are: remain full-time, higher parity = 28; remain full-time, first birth = 51; full-time to part-time, higher parity = 23; full-time to part-time, first birth = 79; remain part-time, higher parity 94; remain part-time first birth = 26.

The wage model includes controls for work experience, employment contract, sector, work from home and whether the birth is a mothers' first. Control variables were identified on theoretical grounds and were retained in the final wage model where transition probabilities in the final sample are not too low. The measure of work from home could be considered a family-friendly job condition that mothers might move between employers or jobs to access. The theory of compensating differentials suggests that employees will accept lower paid jobs to gain non-pecuniary job benefits. (In this chapter, I did not include the measure of flexible start and finishing times in my models because there was limited within-person variation on this variable in the small sample of birth observations.)

As identified in the previous chapter, the measure of work experience available in HILDA has a number of limitations. Of greatest concern for the estimation of models predicting wage change around a birth is the absence of specific instructions concerning the classification of spells of unpaid maternity leave. Inspection of employment calendar data suggests that most mothers are classifying leave as spells in employment. Hence, change in work experience will tend to measure potential, rather than actual, work experience between the before-birth employment observation and the after-birth employment observation. Despite this limitation, I retain the work experience measure in the models as substantively similar results were observed on the other coefficients when this term was excluded (see Table 5.12 in Appendix 5A). Also, I exclude age from my final models because changes in age are highly correlated with changes in potential work experience.

Other measures to control for mothers' foregone work experience were explored. An alternate proxy measure I identified is the age of the child when the mother is first observed back in waged employment, ranging from 0 to 2 years. As few mothers in my sample return to paid employment after their child's second birth, I construct a single dummy variable distinguishing mothers who return before the child's first birthday (coded 0) from mothers who return after their child's first birthday (coded 1). All models were re-estimated with age of child on return to waged employment in place of work experience as a check on the robustness of the coefficient estimates. Results are presented in Appendix 5A. Overall, coefficient estimates and statistical tests remain unchanged. This might be because the alternate measure is quite imprecise. Some mothers are likely to have returned to paid employment several months before being interviewed for HILDA, with an infant experiencing their first birthday in that period.

Construction of the control variables follows the procedures described in chapter 4, with the exception of employment contract. With a smaller sample, I include a dummy variable coded 1 for casual employment and 0 for fixed-term or permanent employment. Finally, I add a control variable to the wage model for first births (coded 1). The reference category includes second, third and fourth births.

Preliminary investigation of mothers' relationship status showed that few mothers experienced a change in marital status around a birth event. Only seven women transition from a couple relationship to being single, a further six women transition from single to living with a partner and six women remain single. These low transition probabilities are not unexpected, as research on Australian mothers' employment shows that single mothers who have a pre-school child are far less likely to be in paid work than married or cohabiting mothers who have a young child (Gray et al., 2003). For this reason, the wage model does not include a control variable for marital status.

Descriptive statistics for the control variables by work hours before the birth are presented in Table 5.5.

5.4 Results

The results section is divided into two parts. The first part describes the frequency of job transitions among Australian mothers who return to work for an employer within 3 years of a birth. I also investigate whether transitions into part-time work are associated with other job transitions, including employer mobility, occupational mobility, a change in supervisory responsibilities and movement onto a casual contract. The second part explores whether job transitions after a birth are associated with higher or lower wage growth. I compare the before-birth and after-birth wages, as well as wage growth, by work hours transitions. Following this, I summarise findings from the regression analysis.

Table 5.5: Means (standard deviations) of variables in regression model, women who return to waged employment within 3 years of a birth, 2001 - 2006

	Full-time before birth		Part-time before birth		All	
	Before	After	Before	After	Before	After
Tenure (ref: more than 10 years)						
Up to 2 years	0.20	0.25	0.33	0.26	0.25	0.26
2 up to 5 years	0.38	0.29	0.33	0.33	0.36	0.30
5 up to 10 years	0.30	0.27	0.24	0.28	0.28	0.28
Work experience, years	11.9 (4.5)	13.1 (4.6)	12.3 (4.4)	13.5 (4.4)	12.1 (4.5)	13.2 (4.5)
Age of child on return (ref: Less than 1)						
1 to 2 years	-	0.58	-	0.58	-	0.58
Contract (ref: permanent or fixed-term)						
Casual	0.03	0.14	0.31	0.37	0.14	0.24
Sector (ref: private)						
Public	0.43	0.43	0.42	0.42	0.42	0.43
Work from home (ref: no)						
Informal arrangement	0.20	0.19	0.11	0.09	0.19	0.15
Formal arrangement	0.12	0.12	0.04	0.07	0.09	0.10
Birth parity (ref: not first birth)						
First birth	-	0.72	-	0.22	-	0.52
Number of birth observations	180		120		300	

Note: All figures are unweighted. Standard deviations are not adjusted for clustering of birth observations within women.
Source: HILDA, waves 1 - 6 (2001 - 2006).

Descriptive statistics: Frequency of job transitions

Table 5.6 describes the frequency of working hours transitions among Australian women who interrupt employment for up to 3 years around a birth in the period 2001 to 2006. Results confirm that the transition from full-time to part-time work is prevalent, with around 56% of women who were working full-time before a birth returning to a part-time job after a birth. The probability of transitioning from full-time to part-time work is higher after a first birth than a higher order birth. Sixty-one percent of mothers working full-time before the birth of their first child change to part-time hours on their return to paid employment, compared to 45% of mothers who were working full-time before a higher parity birth. Around two-thirds of mothers were working part-time before a higher parity birth, so in all some 77% of Australian mothers who interrupt employment for up to 3 years around a birth are working part-time on return.

Table 5.6: Work hours before and after a birth by birth parity, women who return to waged employment within 3 years of a birth, 2001 - 2006

	Work hours before the birth (%)		
Work hours after birth	**Full-time**	**Part-time**	**All**
Birth of first child			
Full-time	39.2	3.7[a]	33.1
Part-time	60.8	96.3	66.9
All	82.8	17.2	100
Total n	130	27	157
Birth of child other than first			
Full-time	54.9	6.9	23.0
Part-time	45.1	93.1	77.0
All	33.6	66.5	100
Total n	51	101	152
All births			
Full-time	43.7	6.3	28.1
Part-time	56.4	93.8	71.8
All	58.6	41.4	100
Total n	181	128	309

Note: Total refers to number of birth observations. Eleven female respondents contribute two birth observations to this sample.
[a] Cell consists of single observation.
Source: HILDA, waves 1 - 6 (2001 - 2006).

Table 5.7 summarises the frequency with which mothers commence work with a new employer after a birth. Around three-quarters of mothers who return to waged employment within 3 years of a birth return to their previous employer. Consistent with expectations, the probability of commencing work with a new employer is higher among mothers who transition from full-time to part-time hours than mothers who remain full-time. Around 37% of mothers who move from full-time to part-time hours commence work with a new employer, compared to only 10% of mothers who remain full-time[104]. One-quarter of mothers who remain working part-time commence working for a new employer after a birth, which suggests some Australian mothers undertake employer mobility for reasons other than obtaining part-time work hours.

[104] In other analyses, I examined whether the probability of transitioning to a new employer is higher among those women who had very short tenure with an employer prior to a birth. This analysis has been excluded here because some cells had few observations.

Table 5.7: Mothers' movement to a new employer by work hours transitions, women who return to waged employment within 3 years of a birth, 2001 - 2006

	Work hours transitions (%)			
Employer mobility	**Remain full-time**	**Full- to part-time**	**Remain part-time**	**All**
Return to same employer	89.9	62.8	74.2	74.4
Return to new employer	10.1	37.3	25.8	25.6
Total n	79	102	120	301

Note: Total refers to number of birth observations. Eleven female respondents contribute two birth observations to this sample.
Source: HILDA, waves 1 - 6 (2001 - 2006).

Next I examine whether there is an association between work hours transitions and downward mobility, using the two indictors supervisory responsibility and occupational class. Results are presented in Table 5.8 and Table 5.9 respectively. Transitional probabilities for movements out of a managerial or professional job and out of a job with supervisory responsibilities are slightly higher for mothers who transition from full-time to part-time hours than mothers who remain working full-time or part-time. Among mothers with a supervisory job before a birth who transition from full-time to part-time hours, around half return to a job with no supervisory responsibility. In comparison, 21% of mothers who remain full-time and have supervisory responsibilities before a birth return to jobs with no such responsibility. Results in Table 5.8 also summarise the probability of the opposite transition, upward movement into a job with supervisory responsibilities. I detect no association between taking up a supervisory role and work hours transitions.

Among those mothers who move from full-time to part-time work the probability of transitioning into a managerial or professional occupation is about equal to the probability of transitioning out of a managerial or professional occupation, with both rates around 22%. A different pattern is observed among mothers who remain working part-time, where a very small proportion of part-time mothers in clerical or manual occupations before a birth moving into a part-time managerial or professional job on return (around 5%, comprising only three observations). Transitional probabilities for mothers who remain part-time are slightly higher when looking at movements from a managerial or professional job into a clerical or manual job after a birth. Yet this experience is still relatively uncommon, with only 14% of women who worked part-time in a managerial or professional job before a birth transitioning to a part-time clerical or manual job on return. Transitional probabilities for both movement into and out of a managerial or professional occupation are lower for mothers who remain full-time than for mothers who transition from full-time to part-time work.

Table 5.8: Transitions between a supervisory and non-supervisory job by working hours, women who return to waged employment within 3 years of a birth, 2001 - 2006

	Supervisory job before the birth (%)		
Supervisory job after birth	**Supervisor**	**Not supervisor**	**All**
Remain full-time			
Supervisor	76.9	14.8[a]	44.3
Not supervisor	21.1	85.2	55.7
All	65.8	34.2	100
Total n	27	52	79
Full- to part-time			
Supervisor	50.9	15.6	64.7
Not supervisor	49.1	84.4	35.3
All	55.9	44.1	100
Total n	57	45	102
Remain part-time			
Supervisor	72.2	16.7	58.3
Not supervisor	27.8	83.3	41.7
All	45.0	55.0	100
Total n	66	54	120
All births			
Supervisor	66.3	15.9	56.8
Not supervisor	33.7	84.1	43.2
All	45.9	54.2	100
Total n	163	138	301

Note: Total refers to number of birth observations. Eleven female respondents contribute two birth observations to this sample.
[a] Cell consists of four observations.
Source: HILDA, waves 1 - 6 (2001 - 2006).

Yet causality may run in the reverse direction if mothers' occupation class influences the propensity to return full-time, instead of mothers' decisions to work part-time structuring the continuation of employment in a managerial or professional occupation. Economic theory suggest that mothers in a managerial or professional occupation before a birth are more likely to continue working full-time after a birth because these women tend to have higher wages and face higher opportunity costs for a reduction in working hours. Another possibility is that the ability to negotiate reduced working hours with an employer is easier for highly educated women with skills in demand (Reynolds & Aletraris, 2006). A thorough investigation of the direction of causality is not pursued in this thesis. Nevertheless, comparisons of working hours transitions by occupational class suggest that mothers who were working full-time in a managerial or professional occupation before a birth are only slightly more likely to remain full-time than mothers who were working in clerical occupations (results not shown in Table 5.9). Of the mothers who worked full-time in a managerial or

professional job prior to the birth, 54% transition from full-time to part-time work, compared to 61% of mothers in a clerical or manual occupation.

Table 5.9: Upward and downward occupational mobility by working hours, women who return to waged employment within 3 years of a birth, 2001 - 2006

	Occupation before the birth (%)		
Occupation after birth	**Manager or professional**	**Clerical or manual**	**All**
Remain full-time			
Manager or professional	92.2	14.3[a]	64.6
Clerical or manual	7.8[a]	85.7	35.4
All	64.6	35.4	100
Total n	28	51	79
Full- to part-time			
Manager or professional	78.5	21.6	57.8
Clerical or manual	21.5	78.4	42.2
All	63.7	36.3	100
Total n	65	37	102
Remain part-time			
Manager or professional	86.0	5.4[b]	48.3
Clerical or manual	14.1	94.6	51.7
All	53.3	46.7	100
Total n	56	64	120
All births			
Manager or professional	85.0	12.4	55.8
Clerical or manual	15.0	87.6	44.2
All	59.8	40.2	100
Total n	121	180	301

Note: Total refers to number of birth observations. Eleven female respondents contribute two birth observations to this sample.
[a] Both cells consist of four observations.
[b] Cell consists of three observations.
Source: HILDA, waves 1 - 6 (2001 - 2006).

In Table 5.10, I examine whether the transition into part-time work is associated with a transition from a permanent to casual contract. Of those mothers who worked in a full-time, permanent job before a birth and returned to a part-time job, around one-fifth move into a causal job. In contrast, very few mothers who remain in full-time employment transition from permanent to casual employment around a birth. Among mothers who remain working part-time, 17% of those who had a permanent contract before a birth move into a job with a casual contract. Transitions from casual to permanent employment are also observed. Around one-fifth of mothers who worked in a casual job before a birth moved into a permanent job on return. Indeed, the overall rate mothers' transition from casual to permanent employment around a birth (20.9%)

is slightly higher than the overall rate mothers' transition from permanent to casual employment (14.3%). These findings imply that part-time employment under a casual contract is not widespread among Australian mothers who return to paid work within 3 years of a birth.

In summary, the descriptive analysis of job transitions after a birth suggests that the transition from full-time to part-time working hours is associated with employer mobility and movement from a supervisory to non-supervisory job in Australia. The descriptive tables are, however, based on a sample of around 300 births and some variability in the transitional probabilities would be due to sampling error. I now turn to examine whether these job transitions affect mothers' wages on return to paid employment.

Table 5.10: Transitions between permanent and casual contract by working hours, women who return to waged employment within 3 years of a birth, 2001 - 2006

	Contract before the birth (%)		
Contract after birth	**Permanent**	**Casual**	**All**
Remain full-time			
Permanent	98.7	-	98.7
Casual	1.3[a]	-	1.3[b]
All	100	-	100
Total n	79	0	79
Full- to part-time			
Permanent	77.1	33.3[a]	74.5
Casual	22.9	66.7[a]	25.5
All	74.1	5.9[a]	100
Total n	96	6	102
Remain part-time			
Permanent	83.1	18.9[a]	63.3
Casual	16.9	81.1	36.7
All	69.2	30.8	100
Total n	83	37	120
All births			
Permanent	85.7	20.9	76.4
Casual	14.3	79.1	23.6
All	85.7	14.3	100
Total n	258	43	301

Note: Total refers to number of birth observations. Eleven female respondents contribute two birth observations to this sample.
[a] Cells consist of fewer than 10 observations.
Source: HILDA, waves 1 - 6 (2001 - 2006).

Statistical model: Wage changes around a birth event

Before presenting the regression results, I compare overall wage growth around a birth event by work hours before and after a birth. Table 5.11 presents these descriptive findings. Here I use *F*-statistics from Wald tests to examine whether increases or declines in wages are statistically significant[105]. Contrary to predictions, my descriptive analysis reveals that Australian mothers who transition from full-time to part-time hours attract higher wage growth than mothers who continue in full-time employment after a birth. Wages increase by an average $3.11 per hour or 15% among those mothers who transition from full-time to part-time hours, whereas mothers who remain in full-time or part-time work attract no significant wage growth. Mothers who transition from full-time to part-time work appear to have slightly lower wages leading up to a birth than mothers who remain working full-time or part-time, though the 5% difference is not statistically significant. Moreover, there are no statistically significant differences in the mean wage growth of mothers who work part-time before and after a birth compared to mothers who remain in full-time employment. For both groups of mothers, there are no statistically significant rises in wages around a birth event. In summary, this descriptive analysis shows that mothers' transitions from full-time to part-time work around a birth are not associated with a decline in wages in Australia.

Table 5.11: Mean hourly wage and mean wage change by work hours transitions, women who return to waged employment within 3 years of a birth, 2001 - 2006

	Mean change ($)	Hourly wage ($)				Total n
		Before birth		After birth		
		Mean	(SE)	Mean	(SE)	
Remain full-time	-0.44	21.73	(0.88)	21.29	(0.95)	79
Full-time to part-time	3.11**	20.70	(0.87)	23.81	(1.10)	101
Remain part-time	-1.31	21.82	(0.85)	20.50	(0.91)	120
All births	0.31	21.42	(0.53)	21.82	(0.61)	300

Note: Wages are adjusted to 2001 prices using CPI.
*** p< 0.001, ** p< 0.01, * p<0.05.
Source: HILDA waves 1 - 6 (2001 - 2006).

I now turn to examine how each job transition affects the wages of Australian mothers who return to employment within 3 years of a birth. Table 5.12 presents coefficients for five wage models estimated using first-difference regression. Model A is the baseline regression model estimated using data from all birth events. In Models B

[105] Wages are expressed in 2001 dollars, but are not adjusted for period effects. The standard errors account for the presence of multiple birth events from the same woman using the cluster option in Stata. I do not apply person weights in this analysis because I only use data from a small sub-sample of HILDA respondents.

and C I estimate the wage equation for the sub-sample of mothers experiencing a first birth and a higher order birth respectively. In Model D I re-estimate the wage equation for the sub-sample of mothers who were employed full-time before the birth. Finally, in Model E I add an interaction term between transitions in working hours and work experience. The dependent variable, hourly wages, is logged so coefficient estimates approximate percentage differences. Within the text I report the percentage differences using the equation $\exp \beta - 1$.

Consistent with the descriptive comparisons, the regression analysis shows that mothers who change from full-time to part-time working hours have significantly higher wage growth than mothers who do not undertake this transition. On average, wages increase by 16.9% more for mothers who transition from full-time to part-time work. This estimate is about equal to the overall 15% wage increase observed in the descriptive analysis[106]. Wage growth is high for mothers transitioning from part-time to full-time work around a first birth (15.4%) and a higher parity birth (17.7%) (see models B and C). The reference category for these comparisons comprises mothers who remain full-time or remain part-time around a birth. It is possible, however, that wage growth will be higher for mothers who remain in full-time employment than mothers who remain part-time and this may downward bias the estimated effect of the transition from full-time to part-time hours on mothers' wages. Excluding mothers work worked part-time before a birth, however, does not alter my main finding (see model D). Compared to mothers who continued working full-time after a birth, mothers who transition into part-time work attract 15.8% higher wage growth around a birth. Differences in wage growth are investigated further in a model (model E) with interaction terms between working hours and work experience. None of the interaction terms in this model reach statistical significance, which suggests that mothers who remain working full-time do not attract higher wage growth around a birth than mothers who remain working part-time. It is possible that limitations with the measurement of accrued work experience in the HILDA survey compromises the detection of significant differences. However, descriptive comparisons presented earlier similarly suggest that there are no differences in wage growth between mothers who remain working full-time and mothers who remain working part-time.

[106] In a regression model with a single explanatory variable for part-time work and controls for year the wage premium for part-time work is estimated to be 20% (β = 0.1822, SE = 0.0497).

Table 5.12: Coefficients predicting changes in wages around a birth, women who return to waged employment within 3 years of a birth, 2001 - 2006

	Model A, all births		Model B, first births		Model C, higher order births		Model D, full-time before birth		Model E, all births	
	Coef	**(SE)**	**Coef**	**(SE)**	**Coef**	**(SE)**	**Coef**	**(SE)**	**Coef**	**(SE)**
Part-time	0.156**	(0.047)	0.143*	(0.059)	0.163*	(0.076)	0.147**	(0.056)		
Tenure										
Less than 2 years	0.027	(0.081)	-0.111	(0.142)	0.116	(0.105)	0.033	(0.107)	0.034	(0.080)
2 up to 5 years	0.028	(0.075)	-0.012	(0.137)	0.023	(0.107)	0.115	(0.093)	0.036	(0.073)
5 up to 10 years	0.047	(0.067)	-0.042	(0.123)	0.122	(0.085)	0.085	(0.088)	0.059	(0.066)
Manager or professional	0.155**	(0.048)	0.166*	(0.084)	0.137*	(0.068)	0.092	(0.057)	0.152**	(0.049)
Supervise other workers	0.003	(0.042)	-0.022	(0.057)	0.030	(0.056)	0.036	(0.052)	0.005	(0.042)
Work exp	-0.048	(0.042)	-0.034	(0.059)	-0.068	(0.067)	-0.006	(0.051)	-0.009	(0.054)
Interaction terms										
Full-part									0.183	(0.102)
Work exp*full-part									-0.047	(0.071)
Work exp*part-part									-0.050	(0.037)
Casual contract	0.095	(0.060)	0.193*	(0.078)	0.045	(0.097)	0.140	(0.078)	0.103	(0.061)
Public sector	0.077	(0.066)	0.201*	(0.098)	-0.005	(0.106)	0.093	(0.085)	0.083	(0.067)
Work from home (ref: no)										
Informal arrangement	-0.049	(0.052)	0.010	(0.073)	-0.110	(0.073)	-0.036	(0.061)	-0.049	(0.052)
Formal arrangement	0.037	(0.056)	0.003	(0.089)	0.072	(0.108)	-0.036	(0.058)	0.042	(0.056)
First birth	0.030	(0.042)					-0.011	(0.052)		
Constant	3.378***	(0.480)	3.216***	(0.638)	3.606***	(0.969)	2.920***	(0.560)	3.311***	(0.480)
F statistic	2.90		1.86		2.01		2.58		2.78	
(df)	(17, 256)		(16, 140)		(16, 140)		(17, 168)		(18, 256)	
Probability > F	0.0001		0.029		0.016		0.001		0.0002	
Within R^2	0.108		0.175		0.141		0.152		0.111	
Total observations	600		312		288		360		600	
Total births	300		156		144		180		300	

Note: All models include controls for period-specific effects (coefficients not shown). Standard errors are adjusted for the clustering of birth observations within females.
* p<0.05, ** p< 0.01, *** p< 0.001.
Source: HILDA, waves 1 - 6 (2001 - 2006).

Results from the regression analysis reveal that occupational mobility has a significant effect on changes in mothers' wages around a birth. On average, wages decline (increase) by 16.7% with a transition out of (into) a managerial or professional job relative to those mothers who remain in the same occupation. This relationship is observed around both first births and higher parity births. Transitions from a supervisory into a non-supervisory job do not appear to significantly affect wage growth.

Results from the regression analysis also suggest that wage growth is not significantly lower for mothers who move to a new employer after a birth. Mothers who have been with their current employer less than 2 years at the time of the after-birth observation, are assumed to have commenced work with a new employer after a birth. In the regression analysis the coefficient for short tenure does not reach statistical significance.

My findings suggest small increases in actual work experience between the before-birth and after-birth interviews do not affect wage growth. This may be due to measurement error on the work experience variable. Spells of maternity leave are not differentiated in the work history question module and most female respondents appear to be classifying spells of maternity leave as employment. Another possibility is that there is too little variation on accumulated work experience in my sample. If most Australian mothers take 12 months leave around a birth it will be difficult to detect significant differences between the minority of mothers who return to employment rapidly and forego work experience for a short period, with the majority of mothers who return around 12 months after a birth. Yet findings from a national survey of mothers suggests that there is substantial heterogeneity in the timing of mothers' returns to paid employment after a birth (Baxter, 2008). In supplementary analysis, I check the robustness of other regression coefficients for measurement error on the work experience (see Appendix 5A). Regression coefficients are largely unchanged with the exclusion of the work experience variable and the substitution of work experience for age of youngest child at the time of the after-birth survey into the wage model.

Two other job changes that affect mothers' wage outcomes are employment contract and sector, though only for those mothers who undertake these transitions around a first birth. Mothers who transition from a permanent to causal contract experience wage growth that is 21.3% higher than mothers who do not experience a change in their employment contract, controlling for several other job characteristics

that may also have changed. Conversely, mothers who transition from a casual to permanent job experience wage growth that is 21.3% lower than mothers who do not change employment contract around their first birth.

The regression analysis also shows that transitions from the private to public sector around a first birth are associated with wage growth that is 22.3% higher than mothers who do not change sector. This transition is fairly uncommon among Australian mothers returning to paid employment within 3 years of a birth. Only 9.1% of mothers employed in the private sector before a birth transition into the public sector after their first birth and 8.8% of mothers employed in the public sector transition into the private sector. In the regression model, I observe no significant association between changes in working from home and wages. Finally, there are no differences in wage growth according to the parity of the mothers' birth.

5.5 Discussion

The aim of this chapter has been to examine whether transitions from full-time to part-time work around a birth were associated with other forms of job mobility in Australia and, in turn, assess the overall impact of these changes on wages. The analysis focused on the transition into part-time work following an interruption to or period of leave from employment to care for a newborn because previous research has shown part-time employment to be prevalent among Australian mothers with young children (Baxter, 2005a). My descriptive analysis of mothers' employment shows that the transition from full-time to part-time work hours is quite common after a birth event. Among those mothers who were working full-time before a birth and returned within 3 years, 61% returned on a part-time basis after a first birth and 45% returned on a part-time basis after a higher parity birth.

Previous research on women's work hours transitions in the British labour market shows that the transition from full-time to part-time work is associated with downward occupation mobility (Blackwell, 2001; Connolly & Gregory, 2008; Johnes, 2006; Perry, 1988; Tomlinson et al., 2009). Results from my study of Australian mothers' work hours transitions around a birth are somewhat different. Although the probability of downward occupation mobility is higher among mothers who transitioned from full-time to part-time work than mothers who remained full-time or part-time, the probability of upward mobility is also higher among mothers who transitioned from full-time to part-time work. On the one hand, 22% of mothers who worked full-time in a managerial or professional

occupation before a birth and who transitioned into part-time work on return experienced downward occupational mobility. On the other hand, 22% of mothers who worked full-time in a clerical or manual occupation before a birth and who transitioned into part-time work on return experienced upward occupational mobility. This finding is at odds with arguments that the segmentation of part-time employment within organisations constrains work hours transitions and that women's participation in part-time employment precludes upward occupational mobility.

One reason for the higher rate of upward occupational mobility among mothers who transition from full-time to part-time work may be that Australian employers are keen to retain skilled female staff who want to return to paid work on a part-time basis. As noted in the previous chapter, Australia experienced strong economic growth from 2001 to 2007 and many employers at this time were voicing concerns about the difficulty of recruiting and retaining skilled staff. Skilled women who wanted to transition from full-time work to part-time work were perhaps perceived by managers to be more likely to return to a different employer than women who were already working part-time or women who wanted to return full-time. Measurement error could also possibly explain why transitional probabilities into and out of managerial or professional occupations were about equal. Yet this seems unlikely given that transitional probabilities into and out of managerial or professional occupations were lower for mothers who remained part-time or remained full-time. Also, data on job title and duties were collected in the personal interview, thereby minimising ambiguous responses, and were coded into occupations using the most rigorous coding scheme available in Australia (ABS, 1997)[107].

Although the transition from full-time to part-time is not linked to poorer occupational outcomes, this transition is found to be associated with other forms of job mobility, in particular movement to a new employer and movement out of a supervisory role. Only 10% of mothers who continued working full-time returned to a different employer after a birth, compared to 37% of mothers who transitioned from full-time to part-time work. Forty-nine percent of mothers who transitioned from full-time to part-time work and who had a supervisory role before a birth moved into a non-supervisory role after a birth. In contrast, only 21% of mothers who remained working full-time and who had a supervisory role before a birth moved into a non-supervisory role. Finally,

[107] Note that the sample excludes self-employed women and would exclude upward occupational mobility associated with becoming an owner-manager of a small business.

my descriptive analysis shows there is a modest correlation between work hours transitions and movement from a permanent to casual job.

Given the transition from full-time to part-time work hours is associated with both movement to a new employer and movement into a non-supervisory job, it might be expected that mothers who transition into part-time work would attract lower wage growth than mothers who continued in full-time work. Yet my findings do not support this hypothesis. Mothers who transition from full-time to part-time hours after a birth have higher wages on return and have higher wage growth than mothers who return to full-time work. Before adjusting for other employment characteristics, I observed that the wages of mothers who transitioned from full-time to part-time hours around a birth increased by an average 15%, whereas mothers who remained working full-time or part-time did not receive any wage increase. After controlling for changes in other employment characteristics, I found that wage growth was around 16% higher for mothers who transitioned from full-time to part-time work relative to mothers who continued in full-time work. The slight change in the observed percentage wage rise was not statistically significant.

One reason the transition from full-time to part-time work does not lead to a drop in overall wages is because other forms of job mobility associated with this transition did not significantly affect wages. Wage growth was not found to be affected by transitions into and out of a supervisory position. This may be because the measure of supervisory responsibilities in HILDA poorly approximates managerial level. Some supervisors may have overseen the work of one or two junior staff and changes in supervisory responsibility may be caused by the restructuring of teams or staff shortages, rather than movement into a job with fewer or more responsibilities.

My results also show that mothers who move to a new employer after a birth do not experience significantly lower wage growth than mothers who return to their former employer. This is an unexpected finding as previous US research shows that returning to a different employer after a birth has an immediate negative effect on wages (Baum, 2002). There are several possible explanations why my Australian results differ. First, among Australian mothers employer mobility may be more strongly linked to career progression and less to separations that occur in the absence of job-protected maternity leave. As discussed in the previous chapter, job-protected leave after a birth is available to a larger share of the potential population and for a substantially longer period in Australia than the US (and to a lesser extent the cohorts of women examined

in some British studies). As a result, fewer Australian mothers may be forced to resign from an employer when they are pregnant because of a lack of job-protected leave to care for a newborn. Some Australian mothers who transitioned to a new employer may have been able to access family-friendly working conditions with their previous employer, but chose to move to a new employer to take up a more senior position. Second, mothers who do not have access to job-protected leave may exit employment for an extended period in Australia, rather than move into a lower paid job with a different employer. This option is likely to be more financially viable in Australia than the US because the Australian tax and welfare system provides greater financial supports for low and medium income families with a single or no income earner. Finally, I relied on the measure of very short tenure to approximate employer mobility. This measure would not detect movement to a former employer on return after a birth and this might bias the regression coefficient towards zero.

Movement into or out of a managerial or professional occupation is found to have a significant effect on wages. The predicted wage penalty for movement from a managerial or professional occupation to a clerical or manual occupation was estimated to be 16.5%. The absence of a clear association between the transition into part-time work and downward occupational mobility means that the negative effect of downward occupational mobility does not indirectly affect the wages of mothers who transitioned into part-time work. Note that I did not directly test whether the wage gains associated with upward occupational mobility significantly differed from the wage losses associated with downward mobility. This was imposed by the small sample available. If mothers do face discrimination when searching for jobs in Australian labour market, I would expect the wage gains associated with upward occupation mobility to be a significantly lower quantum than the wage losses associated with downward mobility. This would be an interesting avenue for future research.

Both the descriptive comparisons and regression results show that the transition from full-time to part-time work is linked to higher wage growth, relative to mothers who remain in full-time or part-time employment. This finding suggests that the transition into part-time work entails neither movement into a lower paid position within an organisation nor the trading of wages for reduced work hours, at least in the short term. A significant wage premium for part-time work was also observed in the previous chapter where I examined the determinants of female wages in a broader population of Australian women aged 22 to 51 years. The two key explanations for the part-time wage premium I developed in the previous chapter were stronger demand for part-time

employees, coupled with a history of centralised wage determination in Australia, and women's selection into part-time work. Here I discuss these two explanations in the context of mothers' transitions around a birth.

Historically Australia has a history of directing assistance to low and medium income families with a single income earner, which has nearly always been the father, and no income families, which have predominantly been single mother families. This is likely to have encouraged more Australian mothers in low and medium income families to exit employment after a birth by lowering the financial incentive to remain in employment, particularly in the context where child care expenses were only partially subsidised by the state[108]. Attitudinal research also suggests the ideal of the traditional male breadwinner family was more strongly valued in Australia in the 1990s (Evans, 2000). To date, it has been difficult to establish whether the value placed on the traditional breadwinner family was an outcome of the specific family support system established by the political elite or whether the development of the family support system in Australia was indeed informed by a widely held belief that mothers who care for children full-time in the home should receive support from the state. Taking a longer term perspective, it is possible that both the supports for stay-at-home mothers and the value placed on the traditional breadwinner family has reduced the supply of female labour in the Australian labour market and this has created a situation where employers have maintained the real wages of part-time employees. In the 1970s and 1908s, wage determination was heavily centralised and collective agreements usually provided pro rata wages and conditions to part-time workers (O'Connor, Orloff & Shaver, 1999). Employers may not have reduced the wages of part-time employees in real terms with the deregulation of the industrial relations system in the late 1980s and 1990s if women were not available to fill newly created part-time jobs that offered very low wages. Yet, this still does not explain why wage growth was found to be significantly higher among mothers who transitioned from full-time to part-time work than mothers who remained full-time or part-time.

[108] The design of the system of family cash payments and taxation benefits to single and no income earner families has been adjusted on a number of occasions over the past 20 years, as has the system of cash payments, taxation benefits and child care subsidies for families where the mother was employed (for an overview see Baxter, 2005a; Australian Institute of Health and Welfare (AIHW), 2009). Complexity associated with the means-tested accessibility and the frequent modification of the family benefit provisions in Australia means it has been difficult to quantify the distribution of state funding between traditional breadwinner families, families without an income earner and families where the mother was employed over time. Nevertheless, Apps (2006) argues that the design of the Australian family tax system creates high effective marginal tax rates for second income earners in low and medium income families and this is likely to have the effect of discouraging employment.

Another reason wage growth may be comparatively high for mothers who transition from full-time to part-time work is that Australian employers have wanted to retain skilled staff in the period covered in this study. Indeed, the provision of part-time working hours may have been advantageous to employers if this meant skilled women with firm-specific human capital would bring forward the timing of their return. One key limitation with my model was the absence of a reliable control for the duration of time mothers' were on maternity leave or not employed around a birth event. If mothers who transitioned from full-time to part-time work returned to a former employer more rapidly than mothers who remained in full-time or part-time work, then the wage premium for the transition into part-time work could be capturing some of the effect of differences in the length of mothers' interruptions. Longer interruptions would be expected to be associated with lower wage gains than short interruptions because of either skill atrophy or statistical discrimination by employers who presume those mothers who take a long period of leave would be less committed to paid work (Buligescu, de Crombrugghe, Menteolu & Montizaan, 2008). It is important to note that demand for labour was high in Australia from 2001 to 2006, the period examined in this study. Like other developed countries, the macro-economic environment changed rapidly following the collapse of global financial markets in 2008. It is quite possible that the relatively high wage growth experienced by mothers who transitioned from full-time to part-time work would not be observed in the current labour market conditions with comparatively higher unemployment.

Another limitation with the analysis presented in this chapter is that the sample was restricted to mothers who returned to paid work within 3 years after a birth event. The experience of mothers who interrupt employment for a longer period could plausibly be quite different. Mothers who delay returning to paid employment may be at a greater risk of downward occupation mobility when re-entering the labour force in a part-time capacity due to skill atrophy or employers' perceptions that these mothers are less committed to a career. My descriptive analysis showed that Australian mothers who do not return to employment within 3 years of a birth tended to have lower levels of education. This group of mothers may be in a weaker bargaining position when it comes to returning to paid work than mothers with a higher education. Yet the norm of the full-time worker is unlikely to be as strong in clerical, sales and service occupations as managerial and professional occupations (Glass, 2004). On this basis, it might be expected that lower educated mothers who return to paid work after an extended break would not be penalised for the commencement of part-time work. Future research with

additional waves of HILDA could examine whether the wage outcomes of transitioning from full-time to part-time work varies by length of interruption and education.

Finally, the focus of this chapter has been on the short term impact of the transition from full-time to part-time work around a birth event. The theories of human capital and workplace segmentation both suggest wage growth will be lower for spells of part-time employment than for spells of full-time employment. An interesting avenue for future research would be to investigate whether the short-term gains I observe to be associated with the transition from full-time to part-time work after a birth are offset in the longer term by losses associated with lower returns to part-time work experience.

Appendix 5A Supplementary analysis

Table 5.13: Coefficients predicting change in wages around a birth, women who return to waged employment within 3 years of a birth, 2001 - 2006

	Model A, all births		Model B, first births		Model C, higher order births		Model D, full-time before birth	
	Coef	**(SE)**	**Coef**	**(SE)**	**Coef**	**(SE)**	**Coef**	**(SE)**
Part-time	0.158***	(0.047)	0.141*	(0.059)	0.166*	(0.075)	0.147**	(0.056)
Tenure								
Less than 2 years	0.051	(0.078)	-0.088	(0.136)	0.146	(0.103)	0.035	(0.107)
2 up to 5 years	0.043	(0.074)	0.007	(0.133)	0.038	(0.107)	0.116	(0.095)
5 up to 10 years	0.057	(0.067)	-0.029	(0.120)	0.128	(0.085)	0.086	(0.089)
Manager or professional	0.152**	(0.048)	0.157+	(0.082)	0.140	(0.070)	0.092	(0.057)
Supervise other workers	0.0003	(0.042)	-0.023	(0.057)	0.027	(0.057)	0.036	(0.052)
Casual	0.090	(0.060)	0.187*	(0.077)	0.037	(0.099)	0.140	(0.078)
Public sector	0.076	(0.065)	0.199*	(0.098)	-0.001	(0.102)	0.095	(0.084)
Work from home (ref: no)								
Informal arrangement	-0.047	(0.051)	0.008	(0.073)	-0.095	(0.072)	-0.036	(0.061)
Formal arrangement	0.036	(0.057)	-0.003	(0.088)	0.077	(0.108)	-0.037	(0.058)
First birth	0.024	(0.042)					-0.012	(0.052)
Constant	2.845***	(0.096)	2.857***	(0.142)	2.808***	(0.134)	2.859***	(0.136)
F statistic	2.94		1.97		1.94		2.75	
(df)	(16, 256)		(15, 141)		(15, 140)		(16, 168)	
Probability > F	0.0002		0.021		0.024		0.0006	
Within R^2	0.104		0.173		0.136		0.151	
Total observations	600		312		288		360	
Total births	300		156		144		180	

Note: All models include controls for period-specific effects (coefficients not shown). Standard errors are adjusted for the clustering of birth observations within females.
* p<0.05, ** p< 0.01, *** p< 0.001.
Source: HILDA, waves 1 - 6 (2001 - 2006).

Table 5.14: Coefficients predicting change in wages around a birth, women who return to waged employment within 3 years of a birth, 2001 - 2006

	Model A, all births		Model B, first births		Model C, higher order births		Model D, full-time before birth		Model E, all births	
	Coef	**(SE)**	**Coef**	**(SE)**	**Coef**	**(SE)**	**Coef**	**(SE)**	**Coef**	**(SE)**
Part-time	0.159***	(0.046)	0.140*	(0.058)	0.166*	(0.075)	0.147**	(0.055)		
Tenure										
Less than 2 years	0.051	(0.079)	-0.071	(0.136)	0.142	(0.103)	0.046	(0.108)	0.057	(0.081)
2 up to 5 years	0.040	(0.076)	0.017	(0.133)	0.034	(0.108)	0.114	(0.097)	0.038	(0.076)
5 up to 10 years	0.055	(0.068)	-0.018	(0.120)	0.125	(0.085)	0.093	(0.090)	0.064	(0.069)
Manager or professional	0.153**	(0.048)	0.158+	(0.082)	0.141	(0.070)	0.089	(0.057)	0.145**	(0.048)
Supervise other workers	-0.001	(0.042)	-0.025	(0.056)	0.027	(0.057)	0.037	(0.052)	-0.0004	(0.041)
Interruption to employment										
Return child aged 1 - 2 years	-0.064	(0.055)	-0.104	(0.071)	-0.026	(0.077)	-0.101	(0.066)	0.003	(0.069)
Interaction terms										
Full-part									0.247**	(0.079)
Return 1 - 2 years * full-part									-0.156	(0.098)
Return 1 - 2years * part-part									-0.044	(0.067)
Casual	0.092	(0.060)	0.185*	(0.077)	0.038	(0.099)	0.134	(0.076)	0.091	(0.060)
Public sector	0.082	(0.065)	0.219*	(0.099)	-0.001	(0.102)	0.107	(0.088)	0.085	(0.067)
Work from home (ref: no)										
Informal arrangement	-0.047	(0.052)	0.008	(0.072)	-0.096	(0.073)	-0.036	(0.063)	-0.049	(0.051)
Formal arrangement	0.047	(0.057)	0.015	(0.089)	0.079	(0.109)	-0.014	(0.060)	0.045	(0.056)
First birth	0.021	(0.042)					-0.024	(0.055)		
Constant	2.803***	(0.100)	2.781***	(0.151)	2.793***	(0.141)	2.783***	(0.146)	2.778***	(0.097)
F statistic	2.94		2.00		1.84		2.63		2.85	
(df)	(17, 256)		(16, 140)		(16, 140)		(17, 168)		(18, 256)	
Probability > F	0.0001		0.017		0.032		0.0008		0.0001	
Within R^2	0.109		0.186		0.137		0.164		0.116	
Total observations	600		312		288		360		600	
Total births	300		156		144		180		300	

Note: All models include controls for period-specific effects (coefficients not shown). Standard errors are adjusted for the clustering of birth observations within females.
* p<0.05, ** p< 0.01, *** p< 0.001.
Source: HILDA, waves 1 - 6 (2001 - 2006).

Chapter 6: Conclusions

6.1 Summary of findings

The aim of this thesis was to investigate how children influence the wages of Australian women. Studies of female wages in the US, Britain and Germany have shown that children have a negative effect on wages, even after accounting for stable unobserved differences between women who become mothers and those who remain childless. These studies have often found that children affect wages through mothers' human capital accumulation and transitions into part-time work. Nevertheless, in some studies these two mechanisms do not appear to fully explain the motherhood wage penalty and theory suggests other processes might also be important. The theory of compensating differentials suggests mothers will trade wages to access family-friendly conditions, such as flexible start and finishing hours and better health insurance. In addition, employers and managers may discriminate against women with children if they perceive mothers to be less committed or less reliable than childless women. This might be more pronounced for mothers who transition into part-time work. Children might also negatively affect wages if motherhood involves a redirection of effort away from paid work to the care of children within the home.

This thesis contributed to knowledge of the motherhood wage penalty through a complementary study of the influence of children on female wages in Australia. I argued that Australia would provide an interesting case study because of the historical distinctiveness of the industrial relations system, low rates of maternal employment, high rates of part-time employment and discrimination laws that explicitly prohibit job dismissal on the basis of family responsibilities. I suggested that these features may work in opposing directions. On the one hand, the more centralised system of wage determination and the stronger job protections might have the effect of reducing the magnitude of the wage disparity between mothers and childless women. On the other hand, longer spells of parental leave and higher rates of non-employment might exacerbate the wage losses mothers' incur through foregone experience and human capital depreciation.

To date, only two studies have investigated the wage gap between mothers and childless women in Australia (Harkness & Waldfogel, 2003; Whitehouse, 2002). These two studies presented conflicting findings on the presence of a motherhood wage gap

in the mid 1990s. One study detected a motherhood wage gap, whereas the other study did not. Neither of these two studies considered the influence of children on work experience because of data limitations and it was ambiguous whether there was any wage disparity between part-time and full-time employees. Analysis I have presented in this thesis has significantly built on these previous studies. In particular, I have reassessed the size of the overall motherhood wage gap and investigated whether children negatively affect female wages through loss of human capital and transitions into part-time work.

Four key findings emerged from my analysis. First, the descriptive analysis (Chapter 3) and regression modelling (Chapter 4) tended to confirm that the overall motherhood wage gap was narrow in Australia. In 2001, the average wage of female employees with dependent children was not significantly lower than the average wage of childless women. Yet after controlling for age, I found a significant wage penalty for motherhood. Motherhood lowered wages by an average 2.5% per child in Australia (controlling for age and unobserved heterogeneity). I identified two key explanations for the narrow motherhood wage gap in Australia. I argued that Australian mothers' selection out of employment had the effect of narrowing the overall wage gap between childless women and mothers. Consistent with previous Australian research (Baxter, 2005a, 2008), I found that mothers without a tertiary qualification were less likely to be employed and more likely to take extended interruptions than mothers with a certificate, diploma or degree (Chapters 3 and 5). I then argued that relatively more mothers without a tertiary qualification would be expected to fall in the lower part of the wage distribution were they to be employed and showed that the resultant compositional differences between mothers and childless women would tend to have had the effect of narrowing the overall motherhood wage gap. In addition, Australian mothers comparatively higher participation in part-time employment did not affect wage disparities. The absence of a wage penalty for part-time employment partly explained why the overall motherhood wage penalty in Australia was narrower than that in Britain.

Second, my analysis showed there was a significant wage premium associated with part-time employment in the Australian labour market. Among women aged 22 to 51 years, part-time employment was associated with a wage premium of 13% (after controlling for work experience, tenure, family, job characteristics and unobserved heterogeneity. Chapter 4). I also found that wage growth was 17% higher for mothers who transitioned from full-time to part-time work around a birth, compared to mothers who continued in full-time or part-time work (after controlling for changes in employer,

occupation, work experience, contract, sector and agreement to work from home. Chapter 5). This was interpreted as evidence that the transition into part-time work was not associated with a movement into the secondary segment of the workforce, at least among women who interrupted employment for a short duration. I suggested that the wage premium associated with women's part-time employment was unlikely to be explained by differences in the rate or degree of unpaid overtime between jobs with full-time and part-time work hours. An analysis of nominal wage rates, which I derived by top-coding weekly work hours at 48 hours, did not reduce the size of the part-time wage premium.

Two alternative explanations for the part-time wage premium were proposed. These were employer demand for female labour, combined with the distinctiveness of the Australian industrial relations system, and women's decisions to transition into part-time work. Australian women's participation in part-time work grew in the 1970s and 1980s when the regulation of wages and conditions was strongly centralised. Collective agreements usually provided pro rata wages and conditions to part-time workers and those employed on a casual basis received a wage loading for foregone leave entitlements (O'Connor et al., 1999). Although wage determination has since been decentralised, wages disparities between full-time and part-time work hours do not appear to have emerged among women (Preston, 2003). I suggested that this may be because of a low supply of female labour relative to employer demand, which in turn could be a product of the cultural importance given to the traditional breadwinner family (Evans, 2000) and the high income supports available to one-income families relative to dual-income families (Apps, 2006). In an environment of strong economic growth, I noted that employers may have accommodated mothers' requests for part-time hours to improve staff retention. An alternative explanation for the part-time wage premium I proposed was that the availability of part-time work in a similar or higher position may have affected women's employment decisions. Mothers who had difficulty negotiating part-time hours in a job with equivalent pay and conditions to their previous full-time job may have chosen to exit the labour force and drawn on the income supports available for stay-at-home mothers in Australia.

Third, the regression analysis suggested that the motherhood wage penalty in Australia could not be explained by the influence of children on work experience and tenure (Chapter 3). This was an unexpected result as previous US and British studies have shown that 30% to 90% of the overall motherhood wage penalty could be explained by the effect of children on human capital (Budig & England, 2001; Gangl &

Ziefle, 2009; Joshi & Paci, 1998). When the focus narrowed to wage growth around a birth, I found that mothers' wages did not drop with a transition to a new employer (Chapter 4). Again, this finding departed from previous US research that has shown mothers' wages to be negatively affected by employer mobility (Baum, 2002; Connolly & Gregory, 2009). The reason predictions drawn from human capital theory were not supported in my analyses was not entirely clear. One argument I developed was that the longer duration and wider eligibility of job-protected leave available to Australian mothers after a birth, relative to cohorts of women examined in some earlier US and British studies, protected mothers against involuntary job separations. Regulations governing the dismissal of employees are also weaker in the US and Britain than Australia (OECD, 2004b) and this may reduce the frequency of involuntary separations in Australia. Alternatively, my reliance on a short panel survey, combined with a higher proportion of Australian mothers who return to paid work once their children are at school, might have introduced selection bias. On average, female respondents observed in employment would have spent less time outside the labour force than respondents who were not employed. Also, Australian mothers who were ineligible for job-protected leave may have chosen to interrupt employment for a longer period rather than search for a new job or accept a lower paid job. Sources of error in the measurement of actual work experience in HILDA were also highlighted.

Finally, I observed a significant residual wage penalty for children after I adjusted for differences in observed human capital, part-time hours, job characteristics and other household attributes (Chapter 4). Estimates of the residual motherhood wage penalty were 6% per child in the fixed-effects model and 2% per child in the pooled OLS model. I identified several limitations in the measure of work experience, so this residual wage penalty might still be capturing the effect of interruptions. Three other mechanisms might also have accounted for this correlation. These included the lower job productivity of mothers that could arise with a redirection of effort away from paid work to parental care, a tendency for mothers to trade wages for family-friendly job conditions (or shorter commute) and discrimination against mothers. A recent audit study in the US found that among female applicants with identical work experience, mothers were around half as likely as childless women to have received a call-back for an advertised business or marketing position (Correll et al., 2007). The laboratory experiment associated with this audit study also suggested that discrimination partly arises through status-based evaluations whereby mothers are rated as less competent and less committed to paid work than childless women (Correll et al., 2007). It is

plausible similar findings would emerge in Australia where full-time hours are also long in managerial and professional occupations and a cultural norm that mothers but not fathers should put the care of children above a career. Still, it is not evident that discrimination against mothers similarly affects professional women's chances of receiving an internal promotion or affects the employment trajectories of mothers in non-professional occupations (e.g. office assistant, hospitality workers).

In summary, the findings presented in this thesis suggested employed women were penalised less for motherhood in Australia than Britain or the US although Australian women still appeared to attract a wage penalty for children. The absence of a wage penalty for part-time employment clearly distinguishes the experience of employed mothers in Australia from that in Britain and the US. It was difficult to assess whether the institutional context impacted on the motherhood wage penalty via other mechanisms, such as a more compressed female wage distribution or higher minimum wage. Although the overall gap did indeed appear to be slightly narrower in Australia, it was possible that this would be fully explained by cross-national variation in the types of mothers who combine employment with parental care, as well as variation in the remuneration of part-time employment. Finally, my estimate of the residual wage penalty for motherhood in Australia was slightly higher (6% per child, Chapter 4) than estimates published in several US studies (Anderson et al., 2003; Avallar & Smock, 2003; Budig & England, 2001; Taniguchi, 1999; Waldfogel, 1997a). My Australian findings also departed from two earlier British studies that found no residual wage penalty for children after adjusting for human capital and work hours (Gangl & Ziefle, 2009; Joshi & Paci, 1998; c.f. Waldfogel, 1998a). Yet it was difficult to interpret the substantive meaning of the residual wage penalty for motherhood in Australia because this penalty was more than fully offset by the wage premium for part-time work. My analysis differed from other panel studies in terms of the length of the panel, the cohort of women sampled and construction of key explanatory variables measuring observed human capital. These differences made it especially difficult to compare estimates of the residual wage gap produced in previous studies. Future research drawing on cross-nationally comparative panel data (e.g. BHPS, PSID) would enable a more rigorous comparison of the overall and residual wage penalty for motherhood in Australia with that in the US and Britain.

Throughout this thesis, I have attempted to address threats to the validity of my analysis produced by heterogeneity bias and selection bias. Yet several variables in the wage model may have been endogenous and I acknowledge this potential source

of bias was not empirically addressed in the design of the statistical analysis[109]. In particular, accumulated work experience is a function of women's previous "decisions" to remain in the labour market. If these cumulative decisions are affected by wage offers, work experience will be not be exogenous with respect to wages[110] (Dustman & Rochina-Barrachina, 2007; Semykina & Wooldridge, 2006). Another concern is that women's fertility decisions may be affected by recent wage growth (or lack therefore in the presence of sex-based discrimination), in which case the causal relationship will be reversed and motherhood will not be strictly exogenous (Amuedo-Dorantes & Kimmel, 2005). Although instrumental approaches are available to address these potential sources of bias, panel estimation methods that account for heterogeneity, selection and endogeneity (e.g. Miller, forthcoming; Semykina & Wooldridge, 2006) are more complex and would have been difficult to apply to a short panel.

As with all longitudinal social science surveys, the findings I presented in this thesis could have been biased by non-random attrition. The exclusion of female respondents who were observed in waged employment at a single wave partly exacerbated the impact of survey non-response. Fixed-effects and first-difference regression use within-person variation to estimate coefficients, which means at least two wages were needed from each respondent. This requirement meant I inadvertently selected those with a stronger workforce attachment into the sample and this could possibly explain why I found such high returns to work experience. My descriptive analysis of attrition suggested female respondents who were childless, were single, had no tertiary qualifications and who were aged less than 30 years were slightly more likely to attrite from the sample. It was difficult to predict how this might introduce bias. My most significant concern was that professional women would be more likely to permanently attrite from the survey after a first birth where they had rapidly returned to full-time employment to continue their career. Mothers combining full-time employment with the role of parental care would probably have less free time to put towards participation in a survey. This pattern of attrition would upwardly bias the wage premium associated with transitions from full-time to part-time hours after a birth. The nature of attrition meant that I could not establish with any certainty whether this was likely to have occurred. I now turn to discuss how constraints on the scope of this study might be addressed in future Australian research.

[109] Endogeneity will also affect the consistency of parameter estimates.
[110] This would include both internal wage offers associated with promotions from a current employer and wage offers from a potential employer.

6.2 Future Australian research

Over the past decade, investment in large panel surveys of the Australian population has increased significantly. In this thesis, I aimed to take advantage of the availability of panel data from HILDA to investigate how children influenced female wages in Australia. In particular, I was able to assess whether part of the overall wage gap between childless women and mothers was due to differences in unobserved, stable characteristics that affect both wages and fertility decisions. I also investigated how wage growth around a birth was correlated with job transitions. These questions were not able to be addressed with previous cross-sectional survey data. Nevertheless, future research could build on the longitudinal analysis presented in this thesis in several ways.

My analysis of the motherhood wage penalty drew on the first six waves of HILDA and could therefore only model short-term changes in wages. As a result, I was not able to address how spells of part-time employment might impact on wages through reduced on the job experience. Moreover, although HILDA collected information on actual work experience, this was not differentiated into experience accumulated on a part-time and full-time basis. Qualitative research asking Australian women about their experience of part-time work suggests part-time employment limits opportunities for career progression (Junor, 1998; Pocock, 2003). In the US and Britain, quantitative studies of female wages have shown that returns to part-time experience are lower than returns to full-time experience (Budig & England, 2001; Dex et al., 2008; Ferber & Waldfogel, 1998; Manning & Robinson, 2004). As additional waves of HILDA become available, it will be possible to compare wage trajectories of women in full-time and part-time employment. An analysis of the influence of part-time and full-time work experience on wage outcomes and career progression in the Australian context drawing on other surveys would also be valuable.

As HILDA matures, it will also be possible to examine the influence of children on the wages of women who delay returning to the labour force. Human capital theory suggests that mothers who take longer interruptions would be expected to face a higher motherhood wage penalty because work experience would be foregone for a longer period and because of the higher likelihood of skill atrophy. In addition, mothers who interrupt employment for comparatively long periods may face greater discrimination when they re-enter the labour market if employers perceive these women to be less committed to paid work. Hence, it is likely the overall wage penalty

for motherhood would widen in a sample that included more mothers who had interrupted employment for several years. It is ambiguous how the residual motherhood wage penalty and the wage premium for part-time work might alter. Mothers who delay returning to paid employment may experience downward occupational mobility at higher rates with a transition into part-time work if there is interaction between skill atrophy and discrimination against part-time entrants. Mothers who take an extended interruption may also be in a weaker bargaining position when it comes to negotiating part-time hours.

Yet there are compositional differences between mothers who interrupt employment for a short, medium and long duration and this leads to a different set of hypotheses. Indirect discrimination on the basis of family responsibilities may be lower for women who delay returning to the extent these women are less likely to hold a professional qualification (Chapters 3 and 5) and more likely to return to an occupation where less importance is attached to demonstrating work commitment through continuous employment (e.g. hospitality workers). For women who were in low status occupations and paid at the minimum wage leading up to their first birth (e.g. cleaners), there would also be no scope for wages to legally decline through skill atrophy or discrimination after a long interruption (unless a woman moved onto a new award where the minimum wage was set at a lower rate). This may be particularly relevant in Australia where there is a comparatively high wage floor. Future research examining the wage penalty for children among mothers who delay returning to paid work could therefore offer further insight into the mechanisms producing the motherhood wage penalty.

Findings presented in this thesis were based on a study of female wages in the period 2001 to 2006. The wage premium associated with part-time work (Chapters 4 and 5) and the absence of a wage penalty for employer mobility (Chapter 5) may not be representative of female wage outcomes in the years prior to 2001 and following 2008 because of temporal variation in the macroeconomic environment. Demand for labour was strong between 2001 and 2006, with the female unemployment rate declining from 6.5% in September 2001 to 4.7% in September 2006 (seasonally adjusted, ABS, 2009b). With the downturn in the economy, the female unemployment rate has risen back to 5.5% (November 2009, ABS, 2009b). Future research on the impact of mothers' employment transitions in the economic context of lower growth and higher unemployment could provide a more comprehensive test of my argument that

employers offered comparatively high wages to mothers' transitioning into part-time work as a strategy to retain skilled staff.

6.3 Implications

Numerous government agencies, policy commentators and researchers in Australia have voiced concern about the overall quality of part-time jobs available to mothers (e.g. Charlesworth et al., 2002; House of Representatives Standing Committee on Family and Human Services, 2006; HREOC, 2007; Pocock, 2003). Poor quality part-time work has been characterised as offering a combination of inferior wages, lack of training, poorer access to promotions, unpredictable working hours and job insecurity. A number of reviews of work-family policy in Australia have highlighted the need for State and Federal Governments to do more to improve the quality of part-time work available to Australian women. Specific suggestions have included: education campaigns that inform employers how they can develop quality part-time jobs; business grants or funding for pilots that develop quality part-time jobs; and the "right to request" part-time work (Charlesworth et al., 2002; House of Representatives Standing Committee on Family and Human Services, 2006; HREOC, 2007). Calls for parents to have the right to request part-time hours have gained traction in recent years and have been incorporated into most public sector collective agreements, some private sector agreements and equal opportunity law in one State (Victoria). From 1 January 2010, the majority of Australian parents have the right to request flexible working conditions, including part-time hours, under the *Fair Work Act 2009*. Employees who care for a child under school age (5 years of age in most States and Territories) have the right to request flexible working conditions, with the main eligibility criteria being at least 12 months continuous service with the relevant employer[111] (Fair Work Ombudsman, 2008b). There is an expectation that employers will only refuse requests if there are reasonable business grounds to do so, though there is no arbiter to review whether an employer's refusal is reasonable[112]. As in the UK, the Australian Government presented the right to request flexible working conditions as a work-family policy aimed at assisting employed parents, rather than a policy response to gender inequality (see Lewis & Campbell, 2007 for UK context).

[111] Casual employees are eligible if there is a reasonable expectation of on-going work.
[112] Recourse may be available to parents who are refused flexible conditions on unreasonable grounds under State and Federal anti-discrimination laws.

Findings I presented in this thesis suggested that Australian mothers' transitions into part-time work did not detrimentally affect wages in the short term. So in the absence of any sudden change in mothers' labour supply, the statutory right to request reduced hours will not alter the average wage outcomes of mothers who move from full-time to part-time work simply because this transition does not appear to be associated with downward wage mobility in Australia. Nevertheless, the right to request flexible working conditions may assist mothers who might otherwise have been discouraged from returning to paid employment after a period of parental leave because their employer is now obliged to respond to requests for reduced working hours.

The current Federal Government is also expanding parental leave provisions in Australia. From 1 January 2010, parents have been able to request an additional 12 months unpaid parental leave, though employers can again refuse this on reasonable business grounds (Fair Work Ombudsman, 2008a). This additional entitlement extends the maximum period of job-protection available to mothers from 12 to 24 months. The Australian Government (2009) has also announced that it will establish a paid parental leave scheme in 2011. Under the government funded scheme, mothers (or fathers) will receive minimum weekly earnings at the full-time rate for 18 weeks, subject to eligibility[113] (Australian Government, 2009). In 2009, the minimum weekly wage was $543.78 and income received through paid parental leave would be a gross $9,788 before accounting for the portion returned through personal income taxation. Economic modelling suggests the paid parental leave scheme will lengthen the average time newborns receive care exclusively from a parent on leave by around 10 weeks (PC, 2009).

The impact of the expansion of parental leave provisions on mothers' wages is ambiguous (Blau & Kahn, 2003). Parental leave policies that extend the amount of time women spend outside the labour force caring for children could, in theory, negatively affect mothers' wage growth through foregone human capital accumulation and skill atrophy. Yet lengthening job-protected leave to 24 months may allow more mothers to remain attached to an employer while they care for a young child and this should

[113] Mothers will be eligible for paid maternity leave where they have been continuously employed for 10 of the 13 months leading up to a birth and at least 330 hours in the 10 months (PC, 2009). Mothers who are self-employed and employed under a casual contract will be eligible if they meet the work requirements. Mothers who earned more than $150,000 in the financial year prior to a birth will not be eligible for paid maternity leave. Mothers can request to transfer their paid parental leave to their partner (Australian Government, 2009).

benefit the wages of mothers who might otherwise have resigned (Waldfogel, 1998a). Indeed, the Australian paid parental leave scheme was designed to increase the financial incentives for mothers in low and medium income families to maintain employment continuity between births. Income mothers would receive through paid parental leave was designed to exceed the Baby Bonus ($5,000 in 2009), which mothers will continue to receive if they exit the labour force[114]. Unlike the Baby Bonus, parental leave payments will be subject to personal income taxation and the income gains for taking leave rather than exiting the labour force will therefore be greatest for mothers with low earnings[115] (PC, 2009).

Over the past 5 years, Australian social policy has generally shifted in focus from actively supporting stay-at-home mothers to increasing the labour force participation of mothers with school-aged children. In July 2006, the previous Liberal-National Government introduced work tests for single parents and no-income couple families reliant on income support ("Parenting Payment") who have children of school age. Single parents with a youngest child aged 8 years or older and partnered parents with a child aged 6 years or older now receive the unemployment benefit ("Newstart") and are required to actively search for paid work[116]. Child care assistance has also increased in recent years. In 2004, the Federal Government introduced the Child Care Tax Rebate to supplement assistance provided through the Child Care Benefit. Initially, the tax rebate was available for up to 30% of out-of-pocket child care expenses (capped at $4,000 per child), but was converted to a family payment in July 2006 and assistance was increased to 50% of out-of-pocket child care expenses in July 2008 (and the cap was raised from $4,354 to $7,500 per year per child). The current Labor Government is also reviewing all taxation benefits and family payments for couple and single parent families as part of the broader Henry Tax Review. Recommendations made in this review will be released to the public in the coming month, though the Chair of the Review has indicated that the financial incentives for second-income earners (mostly mothers) to remain outside the labour force once children enter school are

[114] In 2009, families were not eligible for the Baby Bonus where the combined taxable income was greater than $75,000 in the 6 months following a birth or adoption. From 2011, mothers who earn more than $150,000 in the financial year prior to a birth will not be eligible for the Baby Bonus. Mothers who are eligible for paid maternity leave can also choose to opt out of the scheme and receive the Baby Bonus instead (Australian Government, 2009).

[115] The relative income gain may change over time because the Baby Bonus is indexed to inflation (CPI), whereas rises in Parental Leave payments are linked to increases in the minimum full-time earnings.

[116] Parents who were receiving Parenting Payment before 1 July 2006 will continue to receive this payment up until their youngest child is aged 16 years, but will be required to look for part-time work or participate in training after their youngest child turns 7 years.

“problematic” (Henry, 2009). Together, these recent and prospective changes in social and taxation policy are likely to lead to an increase in the employment rate of Australian mothers. In this thesis, I have argued that the closing of the employment gap between mothers and childless women will not necessarily lead to the closing of the narrow motherhood wage gap. One reason the overall motherhood gap was quite narrow was because women who were located in the bottom of the wage distribution were more likely to exit employment after they had children. As relatively more low educated mothers enter employment, it is likely the overall motherhood wage gap in Australia will widen because of changes in the composition of mothers in the labour market. It is difficult to predict how this might flow on to measures of the overall gender wage gap because of structural change in industries that have historically been dominated by men (e.g. transportation, utilities). Nevertheless, future evaluations of the impacts of recent social policy changes on wage inequalities will need to recognise that an increase in mothers’ employment will not necessarily go hand in hand with an improvement in mothers’ average wage relative to that of childless women and men.

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