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Part-time working and pay amongst Millennium Cohort Study mothers

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Acknowledgements

Abstract

One aspect of the pay penalty to motherhood in Britain has been the lower rates of hourly pay offered in part-time jobs rather than full-time jobs to equivalently qualified and experienced women. This 'part-time penalty' is not a universal experience; it does not apply for example in Australia. It now seems no longer to be a uniform experience across the UK labour market. This paper investigates new evidence from the Millennium Cohort Study. It broadly suggests that switching from full-time work into part-time work after a first birth is still associated with a reduction in relative hourly pay, when it is accompanied by a change of employer. The new finding is that mothers who managed to take advantage of new opportunities to reduce hours in their existing jobs, without changing employer, seem to have escaped the more severe hourly pay consequences of part-time working. This is likely to be the result of increased statutory rights and actual improvements in employer practice rather than differences in the characteristics of working mothers who pursue different employment strategies. These institutional changes seem to have made it possible to cut hours without substantially lowering hourly pay. However part-time jobs in general remain relatively disadvantaged.

Introduction

Six million women in Britain work part-time hours[1], representing around two-fifths of the female workforce at any one time. Around three-fifths of all women worked part-time at some point over a ten-year period covered in panel data from the New Earnings Survey, 1991-2001 analysed by Connolly and Gregory, (2008). The proportion is even higher among employed mothers. Many women switch from working full-time to part-time after having a baby, although some switch back to full-time hours when their children are older. Part-time work has been associated with lower hourly rates of pay than for full timers. On average, the hourly earnings of women working part-time were 70 per cent of those of women working full-time in 2008 (Annual Survey of Hours and Earnings, 2008). Part-time work also tends to be concentrated in lower ranking occupations. In 2006, a third of female part-time employees were working in one of just five low-ranking occupational groups: sales assistants, cleaners, care assistants, general clerks, and educational assistants (Gregory and Connolly, 2008). Many women move from higher into lower-ranking jobs when they switch from full-time to part-time (Connolly and Gregory, 2008; Dex et al., 2008a). There is also evidence that the changes in employer and occupation accompanying many of the moves from full-time into part-time work have historically had lasting negative effects on women's pay (Connolly and Gregory, 2009).

However, the picture is not necessarily static. There have been a number of attempts to improve the status and rewards of part-time jobs, such that it is worth continuing to monitor the situation. This paper analyses the work patterns and earnings of a relatively new group of mothers over the five years after having a first baby from the Millennium Cohort Study (MCS)[2]. These births from September 2000 to the end of 2001 occurred in the context of new legislation about part-time working and rewards. The Part-time Workers (Prevention of Less Favourable Treatment) Regulations came into force on 1st July 2000. These stated that "A part-time worker has the right not to be treated by his employer less favourably than the employer treats a comparable full-time worker". The regulations covered pay and conditions of employment, including employees who switched from full-time hours to part-time hours with the same employer and those who returned to part-time work after an absence of up to 12 months.   In principle, these regulations should have protected the pay and position of employees who remained with the same employer and reduced their hours of work. However, they did not require employers to offer work on a part-time basis to anyone who wanted it and they did not protect the pay and conditions of part-time employees who changed jobs in order to work part time.[3] The National

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[1] The standard definition of part-time work in Britain is jobs with basic working hours of less than or equal to thirty hours a week. Survey evidence suggests that this definition corresponds closely, in the majority of occupations, to individuals' own self-defined hours status (Manning and Petrongolo, 2008).

[2] See Plewis (2007) for details on the design of MCS.

[3] The Right to Request Flexible Working, introduced in 2003, gave parents of children aged under six (or of children with disabilities under eighteen) the right to *apply* to work flexibly and required employers to consider applications seriously. It also increased the generosity and reduced the eligibility conditions for paid maternity leave. This regulation would not have benefited the MCS mothers over the period of their first birth, but may have benefited some of them while their children were still young or upon later births.

Minimum Wage, introduced in 1999, aimed to improve wages at their lowest levels. This may also have boosted part-time wages.

The purpose of this paper is to look at the pay consequences for mothers of reducing their working hours after having a first baby around the Millennium, since the introduction of the Part-time Workers Regulations and the National Minimum Wage. These new mothers represent a diverse group of women by age, levels of education, ethnic backgrounds, family and employment circumstances, from all parts of the UK. Our data are not capable of offering a precise evaluation of the effects of the above legislation, since they provide no suitable counterfactual groups. Instead, our strategy has been to look at systematic differences in hourly wages in part-time and full-time work for groups of mothers with broadly similar qualifications and other observed characteristics across several different cross-sectional and longitudinal samples. The results suggest that a switch from full-time to part-time hours over the first childbirth frequently entailed a change of employer, a reduction in job status and decrease in relative hourly earnings. Mothers who reduced their hours of work, but who remained with the same employer, were more likely to sustain their relative levels of pay over the five years after the birth.

Previous literature

Brewer and Paull (2007) used data from the British Household Panel Survey (BHPS) covering the period 1991-2003 and from the Family and Children Study (FACS), an annual panel survey of families, for the period 1999-2003, to examine variations in women's employment and wages after childbirth. These data cover a similar period to the MCS mothers sample in the present analysis. Brewer and Paull (2007) found that having children is a critical event in women's working lives, marking a sharp drop in their participation in paid work and the start of a ten-year decline in wages, relative to men's. They found evidence that longer employment absences around childbirth were associated with a range of changes in employment, including switches into part-time work, a change in employer, occupation or industry, a move from permanent into temporary work, a move away from supervisory status and a lower chance of promotion. Looking at mothers' wages across several interviews, they found that previous part-time working was associated with lower wage growth two or three years after the birth. They suggested that the results are consistent with a pattern of generally lower wage growth for part-time work.

Joshi and Paci (1998) used earlier data from the National Child Development Study (NCDS), the 1958 birth cohort, at age 33 in 1991 to test how far responsibility for children accounted statistically for the lower pay of part-time workers, allowing for differences in their levels of education and job experience. They tested this by decomposing the difference in mean log hourly pay between full-time and part-time workers into three parts: first, differences in pay between full-timers and part-timers who were mothers; second, differences between full-timers and part-timers who were childless; and third, a composition effect, representing the higher concentration of mothers in part-time work. They did not find evidence to support the hypothesis that

the low pay of part-timers can be attributed to their family responsibilities (part-timers without children were also low paid). In contrast, they found that the lower pay of mothers can be largely attributed to their concentration in part-time jobs, as well as to their lower levels of human capital, compared to childless women.

Research focusing on the part-time pay gap amongst employed women, not just mothers, has shown that much of the gap can be attributed statistically to differences in the educational and family characteristics of part-time and full-time employees. However, the main studies have also found that a portion of the part-time pay gap remains unexplained by individual characteristics (Ermisch and Wright, 1993; Joshi and Paci, 1998; Manning and Petrongolo, 2008). In one of the first studies to look at part-timers' pay, Ermisch and Wright (1993) estimated wage functions for women in full-time and part-time jobs using the 1980 Women and Employment Survey. They found evidence that part timers received lower wage offers than similarly qualified full timers, by estimates ranging from 2 to 8.5 per cent.[4] In the analysis of the 1958 cohort at age 33, Joshi and Paci (1998) found, within the cohort members who had children and were employed at age 33 in 1991, full timers were paid a log hourly wage on average 0.117 log points more than part-timers. Just over half of this gap (0.067) was attributable to human capital characteristics, and 0.050 to an otherwise unexplained premium in full-time pay (Joshi and Paci, 1998, Table 6.4). They found a higher unexplained full-time premium (0.114) among mothers born in 1946, employed in 1978. They also investigated the association between maintaining employment continuity around a birth and subsequent pay. While this helped to support the level of pay in full-time jobs, it did not protect part-time pay from the otherwise unexplained mark-down.

Occupational segregation of full- and part-time jobs, combined with lower rates of pay in occupations offering part-time work, also contribute to explaining the part-time pay gap. Using data from the Labour Force Survey (LFS) for the period 2001-2003, Manning and Petrongolo (2008) found that the part-time pay gap, around 10 per cent when adjusted for qualifications and individual characteristics, dropped to just 3 or 4 per cent when differences in occupational composition were accounted for. Similar estimates for women from the 1958 birth cohort in 1991 were for a full-time premium of 24 per cent when only human capital was controlled reducing to 6 per cent after adjusting for job characteristics including occupation (Joshi and Paci, 1998, Table 7.2). Whilst women's full-time jobs have spread through the occupational structure over the last three decades, part-time jobs remain concentrated within low-paying sectors. Increasing wage inequality has also reduced the relative rates of pay in lower-paying occupations (Manning and Petrongolo, 2008), although the minimum wage has been found to have some beneficial effects at the bottom of the wage distribution (Brown, 2009).

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[4] Using the standard decomposition method (Oaxaca, 1973; Blinder, 1973), Ermisch and Wright (1993) estimated that a woman with average characteristics would be paid 8.5 per cent less in part-time than in full-time work. An average full timer would be paid 8 per cent less if she switched from full-time into part-time work, whereas the average part timer would be paid only 2 per cent more if she switched from part-time into full-time work. The difference in estimates reflects the different composition of the full-time and part-time workforce, plus the estimates of the effects of selection.

Examining occupational segregation and wages from an individual longitudinal perspective, there is evidence of considerable mobility between jobs and occupations for both women and men over time (Dex et al., 2008b; Bukodi and Dex, 2009). For women, a move into part-time work following a first birth has often been occupationally downward. The likelihood of downward mobility after a birth has decreased for women who became mothers in the 1980s and 1990s, compared to earlier generations, but still affects a substantial minority (Dex et al., 2008a). Occupational downgrading when moving from full-time into part-time work has also helped explain the part-time pay gap   Using longitudinal data from the New Earning Survey Panel (NESPD) and the British Household Panel (BHPS), Connolly and Gregory (2008) found that a significant fraction of highly-qualified women who started out in professional careers moved into lower-paying occupations when they switched from full to part-time work, particularly if they change employer. In a further paper examining earnings in the NESPD, Connolly and Gregory (2009) found that the combined effects of moving into a part-time job and changing occupation predicted an immediate drop in hourly earnings of around a third, followed by a permanently lower earnings trajectory. These authors found that it is changes in occupation and employer, rather than part-time status per se, which affects earnings in the long-term.

Using data from the survey of the 1958 cohort in 1991, when cohort members were aged 33, Bynner et al. (1996) found evidence that women with children were less likely to be using their work-related skills in their jobs than men, particularly if they are working part-time. At this survey, cohort members were asked to rate their skills and their use of skills in relation to fifteen work-related areas. They found that women with children were less likely to have received training than men or childless women. Amongst respondents who reported that they had good skills, a larger proportion of women with children reported that they were not using their skills in their current jobs, compared to women without children and men.

Analysing the effects of recent policy changes (see above), Manning and Petrongolo (2008) found no evidence in LFS data that they had made an immediate difference to the part-time pay gap. They suggested that the policies may not have made a difference because they did not target occupational downgrading into part-time work, but only treatment by the same employer for a comparable job. They argued that policy measures to increase the availability of high-level part-time jobs would be likely to be the best way to reduce the part-time pay gap.

Millennium Cohort data allow us to carry out further analysis of the effects on pay of mothers who switched from full-time to part-time hours after a first birth, using a large recent longitudinal data set, also containing rich data on mothers' characteristics.

The sample of MCS first-time mothers

The Millennium Cohort Study (MCS) is based on a national UK sample of children born between 1 September 2000 and 31 August 2001 in England and Wales and between 24 November 2001 and 11 January 2002 in Scotland and Northern Ireland.

The MCS purposively over-sampled families in electoral wards with higher rates of child poverty, and higher proportions of minority ethnic populations in England, in order to obtain large enough samples to analyse and compare outcomes for these particular groups. Sample weights are provided with the datasets and can be incorporated into analyses to adjust for the stratification of the original sample, i.e. the over-sampling of children born in disadvantaged and ethnically diverse wards, to obtain representative population estimates. Here, we use the MCS weight designed for analysis of the whole UK dataset (aweight2).[5] We also estimated the models using the 'survey' commands in STATA to adjust for the clustered design (by ward) of the survey, but found that allowing for clustering did not have an impact on our conclusions. Estimates of means were similar, and although not identical, so were estimates of standard errors. This probably reflects the fact that the subsamples of first–time mothers in employment was not as tightly clustered as the original full sample. Moreover, cases from wards with only one observation were excluded from these analyses. On this basis, the results presented in this paper are from models that are weighted, but not adjusted for clustering. We have not adjusted our estimates for potential biases associated with survey non-response.

The first three surveys of the MCS were used in these analyses. The first, MCS1, was conducted when the cohort baby was nine months old in 2001/2, the second, MCS2, when the cohort child was aged three, in 2004/5, and the third, MCS3, at age five in 2006.

The core sample used in the present analysis includes 5,025 first-time mothers of the Millennium Cohort children who responded at all of the first three surveys[6]. This sample forms the basis for the descriptive statistics presented in the next section. Table A1 provides information on the cases excluded from the core sample.

The wage analyses are based on the following samples:

1. The cross-section samples include all first-time mothers who were in paid employment (as employees) and who reported their earnings and hours of work at the relevant survey.

2. The longitudinal sample includes first-time mothers who were in paid employment (as employees) and who reported their earnings and hours of work at all three post-birth surveys.

Table 1 shows the sample sizes for these samples. Cases with missing hours of work or missing earnings are excluded from the analyses altogether*.* Table A2 shows exclusions from the cross-section section samples. Cases with missing items for other variables have generally been kept in the analyses and details are given in each case.

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[5] as set out in Plewis (2007)

[6] The other MCS mothers, approximately five ninths of the original sample, had already had at least one child before the cohort birth in 2000-01. The survey did not ask about their employment prior to their first birth. These mothers were less likely than first time MCS mothers, studied in this paper, to be employed over the first five years of the MCS surveys.

Table 1: Sizes of samples used for analysis of wages: unweighted numbers

| Sample	9 month survey	Age 3 survey	Age 5 survey
1) Cross-sectional employee samples	2,237	2,164	2,460
2) Longitudinal employee sample	1,104	1,104	1,104
3) First-time mothers responding to all the first three surveys	5,025	5,025	5,025

Employment is defined on the basis of having done at least 8 hours of paid work in the week prior to interview. The assignment of part-time status was done on the basis of usual hours reported, taking 30 hours per week or more as full-time and part-time as under 30 hours a week.

Before-tax (gross) hourly earnings are used as the key measure of pay. The self-employed were treated as having missing wage data. The measure of gross hourly earnings was derived from responses to questions on reported last gross pay and corresponding reported pay periods. A derived measure of gross weekly earnings was divided by reported weekly hours of work to obtain an hourly figure. Overtime pay was included in the numerator and overtime hours were included in the denominator. Measures were adjusted to January 2000 prices. Table A3 shows the source variables used to derive the variables used in the analyses.

Mothers' work and pay patterns

Around one fifth of all the first-time mothers were in full-time work at the 9 month survey, around two-fifths were in part-time work and around two-fifths were not in work (Figure 1). The proportions working full-time, part-time and not at all are similar at the later interviews. However, the percentage of first-time mothers who had taken up paid work at some point since the cohort birth increased steadily across the three post-birth surveys. This indicates that some mothers had entered employment, but had left again, frequently to have another child.

Figure 1: Percentage of first-time mothers currently in full-time or part-time work (including self-employment) and percentage in work at any point since cohort birth.
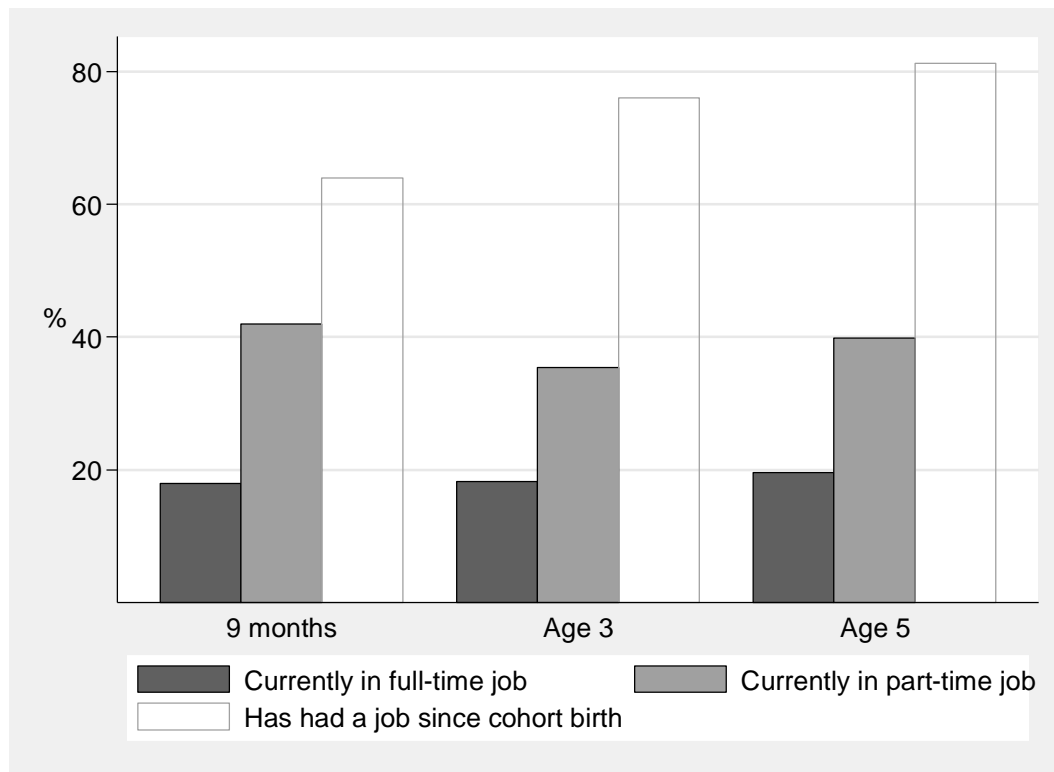
Note: These weighted percentages are based on the full sample of 5,025 excluding 13 cases where information on current work status was not reported – 11 at 9-months and 2 at age 5

Since the sample is of first-time mothers, it is a reasonable assumption that most were working full-time hours before the birth. Table 2 shows the proportions of employed mothers who actually said whether or not they were working shorter hours in their current job, when their baby was 9 months old, compared to the job that they were doing when pregnant. In their case, 70 per cent of mothers who were working part-time 9 months after their birth had a job during pregnancy with longer hours.

The majority of mothers who had returned to work by the time the baby was 9 months old returned to the same employer as when pregnant and the vast majority had taken maternity leave. Table 2 also shows the percentages of mothers who had changed job status or job content if they had returned to work when the baby was 9 months old. Mothers who returned to part-time work were more likely than those who were working full time after childbirth to have experienced changes in their employer, job content and job status.

Table 2: Percentage of first-time mothers with jobs before and after the birth who changed hours of work, employer and job content after the birth: employees by hours at 9 month survey. (weighted)

	In full-time work	In part-time work	All in work
% who reduced hours after birth	16.0	69.6	53.0
% who returned to same employer after birth	89.7	78.7	82.1
% who took maternity leave	96.9	93.3	94.4
% who changed job content after birth	20.5	34.5	30.2
% who changed to lower status job after birth *	5.2	14.6	11.7
Sample (N)**	904	1,780	2,684

*Respondents were asked to compare their current job at the 9 month survey to the job they were doing when pregnant. Derived from variables *amjbdm0a – amjbdm0f, amsaem00 and amfile.*

**The sample (n=2,684) excludes mothers who were not currently in work at the 9 month survey and those who were not working during their pregnancy (*amwkpr)*. Unlike the wage samples, the sample includes employees who had missing wages.

Table 3 shows the median hourly earnings for all full-time and part-time employees at each of the post-birth surveys[7]. The changes in wages across interviews only partly reflect differences in wage growth for full-time and part-time employees since they also reflect changes in the composition of the sample at each interview. There is an increasing proportion of women employed in the age 3 and 5 surveys who had taken longer absences from work following the first birth.

Table 3: Median hourly wage by full-time/part-time status at each survey, 2000 prices. (weighted)

	9 month survey	Age three survey	Age five survey
Part-time employees	£8.00	£7.44	£7.27
Full-time employees	£9.41	£9.23	£9.86
Ratio PT/FT wage (std. error)	0.85 (0.03)	0.81 (0.03)	0.74 (0.02)
Sample* (N)	2,237	2,164	2,460

*These are the cross-sectional wage samples (Table 1), including all employees who reported their earnings and hours of work. The standard error of the ratio of medians was obtained by bootstrapping the sample, since there is no closed form formula for this the standard error.

The distribution of full-time and part-time jobs across occupational groups at each survey shows that part-time employees were more likely to be working in middle-level and low-ranking occupations than full-time employees (Table 4). However, for employed MCS mothers, part-time employment was not wholly or even mainly located in the lowest skilled occupations. Despite some improvements, the part-time jobs reported by mothers in MCS were still on the whole at lower grades than for full-time jobs.

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[7] The rest of the paper compares means of log hourly wages, which, like the median of the actual wage distribution, place less weight on comparisons at the top and bottom of the wage distribution than means of actual wage distributions.

Table 4: Percent in each occupational group by full-time/part-time status at each survey.

	9 month	Age three	Age five
Part-time employees			
I Managers and Senior Officials (includes office managers)	8.0	7.9	6.8
II Professional (includes teachers)	13.0	11.3	12.9
III Associate Professional and Technical (includes nurses)	20.4	18.2	17.4
IV Administrative and Secretarial	21.5	24.6	25.7
V Skilled Trades	1.6	1.8	1.9
VI Personal Service (includes care assistants, nursery nurses and childminders)	12.7	12.8	12.5
VII Sales and Customer Service (includes cashiers and check out staff)	13.2	13.9	12.7
VIII Process, Plant and Machine Operatives	1.6	1.1	0.8
IX Elementary (includes waitresses, kitchen assistants and bar staff)	8.0	8.5	9.2
Sample **(N)	1,821	1,524	1,671
Full-time employees			
I Managers and Senior Officials (includes office managers)	20.1	23.1	24.4
II Professional (includes teachers)	20.7	16.6	17.8
III Associate Professional and Technical (includes nurses)	21.4	22.3	20.6
IV Administrative and Secretarial	20.6	20.0	18.4
V Skilled Trades	0.9	1.4	1.2
VI Personal Service (includes care assistants, nursery nurses and childminders)	6.0	8.0	8.3
VII Sales and Customer Service (includes cashiers and check out staff)	3.6	3.6	5.2
VIII Process, Plant and Machine Operatives	2.5	1.6	1.6
IX Elementary (includes waitresses, kitchen assistants and bar staff)	4.1	3.6	2.6
Sample **(N)	905	931	894

Percentages are derived from occupation variables *amsocc0, bmjbso00* and *cmjbso00.*

*Percentages are weighted

 ** All employees (excluding self-employees) who reported their hours of work and occupation are included in these samples. Unlike the wage samples, the samples include those who had missing wages.

Modelling the part-time pay gap using cross-sectional samples

The usual approach to modelling the pay gap for part-timers is to enter a dummy variable into the equation modelling individuals' log hourly pay, as in Equation (1):

$$\ln(w_i) = \alpha + \beta X_i + \delta PT_i + u_i \qquad (1)$$

where w_i is the hourly wage rate of individual i, PT is a dummy variable indicating working part-time (=1) or working full time (=0), and δ is the marginal effect on log hourly wage of working part time, after controlling for a set of relevant characteristics of the individual, represented by X_i. Typically this model is estimated on cross-

sectional data. It is possible to estimate the model in equation (1) using MCS data for employed mothers at each MCS sweep of data. Characteristics which can be used in the model include mothers' highest educational qualification up to that interview, mother's age, UK country and region of residence, and mother's ethnicity. MCS did not collect data on mother's work experience prior to the start of the study, so it is not possible to control for it. However, since these are all first-time mothers, the majority will have worked up to being pregnant with this first child and the inclusion of information on educational qualifications and age will capture their varying amounts of work experience to a large extent. At MCS sweeps two and three further controls can be added where mothers have had additional children. This will adjust for some, though not all, of the impact of periods out of work since the cohort birth, for those concerned. We return to this point later.

We estimated the adjusted part-time pay gap (δ) using both linear regression and propensity score matching models (Rosenbaum and Rubin, 1983). Propensity score matching was explored as an alternative to ordinary regression as it avoids assumptions about the mathematical form of the relationship between individual characteristics and wages. Instead, a probit model of whether individual mothers worked part time or full time at each interview was estimated in order to calculate the propensity scores (on the basis of the same set of variables as entered the wage regressions). Mothers were then matched based on these scores using the 'nearest neighbour' method and the mean log part-time wage was compared to a weighted mean for a matched group of full-time employees. No common support restrictions were used and no cases were excluded. The matching estimates for the cross-sectional samples (not shown) were very similar to estimates obtained from linear regression models. This gives us more confidence in this set of results. The estimates for the longitudinal samples were different in the matching and the linear regression estimates, and the interpretation and possible reasons for these differences are discussed in the relevant section."

One potential problem of either approach to estimating the effects of working part time on hourly wages, relates to the selection of mothers into full or part-time employment. It is possible, even likely, that mothers who decide to work part time after childbirth are systematically different from those who opt to work full time. Hakim (2000) suggests they differ in a number of observed ways. For example, those who work full time are often more highly educated than those who opt to work part time. Such differences can be controlled for in the model, where appropriate measures are contained in the data. But Hakim suggests they also differ in their preferences, and these characteristics are less likely to be observed directly. The estimation of equation (1) using ordinary least squares (OLS) may lead to omitted variable bias in the value of δ if there are unobserved variables that influence both the decision to work part time and the hourly wage rate. Mothers' decisions to work part time or full time may also be related to the level of earnings it is possible to achieve in one or another package of hours. So those who are most (least) concerned about their pay will opt for full-time (part-time) work. This leads to an endogeneity problem whose impact is also that the estimation of δ will be biased. The best it is possible to do with the data is to control broadly for observed differences in qualifications and other wage-related characteristics. Also, in the last

section, we look at the effect of a given individual switching into part-time work in a smaller, longitudinal sample of working mothers.

The pay gap results of estimating this model using linear regression for the three interview cross-sections are displayed in Table 5 and the full model results are displayed in Appendix Table A4. The raw wage gap shows a part-time shortfall of approximately 13 log points 9 months after the birth,[8] rising to 18 points at 3 years and 24 points by 5 years. The gap in average log hourly pay for full-time and part-time employees, after controlling for a range of individual characteristics is reduced substantially at each survey and is not significantly different from zero at 9 months after the birth. When the child is 3 the adjusted gap is 12 points, and at age 5, 20 points. However, since we control only imperfectly for work experience, especially at the age 3 and age 5 surveys, the adjusted difference in the pay of full-timers and part-timers (holding fixed individual characteristics) may also pick up differences in work experience since the birth up to the survey in question.[9]

Table 5: Raw and adjusted differences in mean log hourly wages between part-time and full-time employees, cross-sectional samples (standard errors in brackets, weighted).

	9 month survey	Age three survey	Age five survey
Raw log gap	-0.13 (0.03)	-0.18 (0.03)	-0.24 (0.03)
Adjusted log gap*	-0.02 (0.02)	-0.12 (0.02)	-0.20 (0.02)
Sample** (N)	2,237	2,164	2,460

*The estimate from the least squares model is the coefficient on a dummy variable indicating part-time work). Other controls include: highest qualification, age, country and region of residence, ethnicity, and, for the two later surveys only, number of children born since the first birth. Full model results are displayed in Appendix Table A4.
**Mothers in work at survey in question who reported their earnings and hours of work.

Using the cross-sectional data, we began to explore the relationship between working part-time and changing employer. Mothers were asked at the 9 month survey whether they were with the same employer as when they were pregnant and were asked at later surveys about changes in jobs and employers. We were not able to explore the relationship between change of occupational status and change of hours explicitly since information about occupational status before the cohort birth was not collected in all cases (only those covered in Table 2). However, changing employer also frequently entails changing occupation and is the main route through which any occupational downgrading is likely to take place.

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[8] This corresponds to a PT:FT ratio of 0.88 at the means of the logs, which is close, but not identical, to the ratio at the median wages shown in Table 3.

[9] The estimated penalty to part-time work is also similar if all MCS mothers, not just first-time mothers, are included in the wage analysis; -0.01 for all employees at the first survey, -0.11 at age 3, and -0.19 at age 5. This strengthens the basis for comparison with the NCDS mothers in 1991 in Joshi and Paci (1998), where the sample was not restricted to any particular sequence of births. For them the adjusted part-time premium was -0.05. As few of them had very young children, the comparison suggests that the MCS mothers of 3 and 5 year olds may have faced a stronger part-time penalty than had been in force in the early 1990s.

Table 6: Coefficients on part-time working and change of employer, cross-section sample, results from linear regression (standard errors in brackets, weighted).

	9 month survey	Age three survey	Age five survey
Worked part-time since the birth*	+0.01 (0.02)	-0.11 (0.03)	-0.15 (0.04)
Changed employer since the birth*	-0.06 (0.05)	-0.18 (0.05)	-0.03 (0.05)
Changed employer and worked part-time (interaction term)	-0.13 (0.07)	-0.03 (0.05)	-0.17 (0.06)
Sample** (N)	2,197	2,017	2,293

*By the time of the survey in question **Mothers in work at survey in question who reported their earnings and hours of work. 47 cases were excluded from the age 3 sample and 29 from the age 5 sample because information on change of employer was not given. Mothers who were not working during the first pregnancy are also excluded from the samples. Controls included: highest qualification, age, country and region of residence, ethnicity, and, for the two later surveys only, the number of children born since the first birth.

The results in Table 6 show that MCS mothers' lower rates of hourly pay in part-time work appear to be associated with changing their employer between the birth and the survey in question. However, having worked part-time, even without changing employer, was associated with a significantly lower hourly wage three and five years after the birth.

Modelling the part-time pay gap using a longitudinal sample

A limitation of estimates from cross-sectional employee samples is that some of the measured pay gap attributed to part-time working may in fact be due to the impact of longer periods spent out of work since the cohort birth. Moreover, it is difficult to disentangle the immediate and sustained effects of part-time working and changing employer on pay. To explore these relationships further, we focussed on a longitudinal sample of employees in work at all three post-birth surveys, and estimated differences in pay between part-time and full-time workers. Doing so, however, comes at the cost of decreasing sample size to one fifth of the full sample of first-time mothers and around a half of the cross-sectional employee samples. There is also some loss of generalisability, since more continuous employment after the birth is atypical. Table A7 summarises the means of characteristics for this longitudinal employee sample. The first part of the analysis used cross-sections of the longitudinal sample.

Table 7 shows our estimates of the adjusted log gap in pay between those who worked part time at the survey in question and those who worked full time at the survey in question. The model and variables included are exactly the same as for the cross-sectional analysis, the only difference being the restriction on the sample. The estimates are not very different from those shown in Table 5 for the cross-sections of employees. This supports the idea that part-time working, even without long periods out of the labour market, is associated with lower hourly pay.

Table 7: Raw and adjusted difference in mean log hourly wages between part-time and full-time employees, longitudinal sample (weighted)

	9 month survey	Age three survey	Age five survey
Raw log gap	-0.13 (0.04)	-0.17 (0.04)	-0.25 (0.04)
Adjusted log gap**	-0.01 (0.03)	-0.10 (0.03)	-0.19 (0.03)
Sample** (N)	1,104	1,104	1,104

Controls included: highest qualification, age, country and region of residence, ethnicity, and, for the two later surveys only, number of children born after first birth. Full model results are displayed in Appendix Table A6. **Longitudinal sample includes only mothers who were in work at all three of the post-birth surveys who also reported their earnings and hours of work at each of the surveys.

The second part of our analysis focuses on the relationship between changing employer and reducing hours of work and their impacts on pay. For the longitudinal employee sample, two thirds of mothers (67%) worked part-time throughout the five-year period (23.7%) after the birth and just under a quarter worked full-time over this period. Some mothers switched to part-time work, 6.2 per cent switched to part time by age 3 and 3.1 per cent between then and age 5. Even among mothers who worked fairly continuously over these five years, many experienced changes in their employment. Of those mothers who only worked part time over this period, half (49%) also switched employer at some point. Of those mothers who worked full-time (allowing for some breaks for maternity leave), 44.3 per cent changed employer.

Table 8 shows results from models including the different combinations of experience after childbirth, with and without the adjustment of further covariates. Hourly pay at age 5 was lowest for mothers who worked part time and had changed employer by the age 5 survey. The unadjusted part-time gap compared to those who worked full-time for the same employer is -0.48 and the adjusted gap -0.32. Those who had reduced their hours at some point since the birth but had remained with the same employer had lower pay than those in full-time work, but the difference was less (-0.23, -0.16, unadjusted and adjusted respectively). Those who had changed employer but worked full-time had wages insignificantly different from full-timers who had not changed employer.

Table 8: Impacts of part-time work and changes of employer on log hourly pay at age five survey, longitudinal sample

Reference category = Worked full-time and stayed with same employer since birth	Unadjusted log gap* (std. error)	Adjusted log gap** (std.error)
Worked part-time and changed employer since birth	-0.48 (0.06)	-0.32 (0.06)
Worked part-time and stayed with same employer since birth	-0.23 (0.06)	-0.16 (0.06)
Worked full-time and changed employer since birth	-0.07 (0.08)	-0.01 (0.06)
Sample (N)	1,085	1,085

*Estimated from a linear regression model of log hourly wage at the age 5 survey; 19 cases were excluded because they were not in work during the first pregnancy. **Estimated from a linear regression model including following control variables: highest qualification, age, country and region of residence, ethnicity and number of children born after first birth. Weights were used in the analysis. Full model results in Appendix Table A8.

Our final exercise was to focus in on the effects of reducing hours whilst remaining in the same job, and on whether this was a way of sustaining levels of pay over the five

years after the birth. We restricted the sample to the half (n = 514) who were in employment at all three surveys with the same employer over the five year period. Table 9 shows the estimates from different models of the effects of having worked part time on pay amongst women who remained with the same employer. Unlike previous exercises, we obtained different results from the linear regression and propensity-score matching models, so we present results from both. The results from propensity-score matching provide some evidence that reducing hours of work for those able to remain with the same employer has only weak negative effects on hourly pay, much less severe than for mothers do not stay with the same employer. The adjusted estimates, though negative, are close to zero at all three surveys, and not statistically different from it.   The alternative, linear regression, estimates suggest that the adjusted part-time penalty for those who reduce hours with the same employer becomes larger and statistically significant as time goes by.

Table 9: Model coefficients showing impacts of switching to part-time hours with the same employer on log hourly pay at each survey, longitudinal sample

	Unadjusted log gap* (std. error)	Adjusted log gap** (std. error)
Estimates from linear regression model		
9 month survey	-0.12 (0.06)	-0.04 (0.04)
Age 3 survey	-0.20 (0.06)	-0.12 (0.06)
Age 5 survey	-0.23 (0.06)	-0.16 (0.06)
*Estimates from propensity-score matching model**		
9 month survey	-0.12 (0.06)	-0.05 (0.04)
Age 3 survey	-0.20 (0.07)	-0.02 (0.03)
Age 5 survey	-0.23 (0.05)	-0.06 (0.05)
Sample (N)	514	514

*Estimated from separate linear regression models of log hourly wage at each survey.
 **Standard errors were estimated using a bootstrap method since two sets of weights was used. ***Both models included following control variables: highest qualification, age, country and region of residence, ethnicity and, for the two later surveys only, number of children born after first birth. Full model results in Appendix Tables A7, A8 and A9.

A closer look at the results from the propensity-score matching model reveals some of the difficulties with trying to find similar groups of full-time and part-time employees in order to isolate the impacts of working part-time hours on pay. Appendix Table A11 shows the mean characteristics of matched groups of employees who have worked either full time or part time with the same employer for at least 5 years, since before the first birth. It shows that even after matching on the propensity score (estimated from probit models shown in Appendix Table A10), the group of full-time employees are less likely to have A-level qualifications, more likely to have degree or higher qualifications and much less likely to have had further children after the first birth. One estimation strategy would be to restrict further the sample and matching criteria to find full-time employees with more similar observed characteristics (i.e. weight more heavily those with A-levels and more children). However, such a strategy would involve a further loss of statistical power and an increased likelihood that unobserved selectivity biases would drive the results. In other words, mothers who returned to work full-time after having three children would represent a small and unusual group, whose wages may also be heavily affected by their high-level of commitment to their jobs.

On the broader question of how far our results are compromised by various selection biases, there are three main sources of selection bias that may be important. Firstly, differences in individual job commitment and attitudes between full-time and part-time workers may result in upward bias in estimates of the unexplained (adjusted) part-time pay gap. Secondly, unmeasured differences in previous pay and employer characteristics that incentivise full-time hours may result in some upward bias in estimates of the unexplained gap, since full-time work is partly the outcome, not the cause, of higher pay. Thirdly, unmeasured differences in previous pay and employer characteristics may incentivise and enable staying in the same job. In this case, staying with the same employer, whilst reducing hours, may again be partly an outcome, not a cause, of sustained levels of pay. This would cause downward bias in estimates of the effects of reducing hours with the same employer.

In reality, it is likely to be a combination of individual, employment and family circumstances that influence mothers' decisions about employment over the five years after first having a baby. There is much variation in work patterns amongst MCS mothers, and the strong correlations between characteristics and work strategies. These make it difficult to pin down the impact of part-time working on pay, in isolation from the other decisions about work and having more children.

Conclusions

The results presented in this paper suggest that switching from full-time work into part-time work on becoming a mother is associated with a reduction in relative hourly pay, a change of employer and a loss of job status for women who had their first child around the Millennium.

This is not the first time that a pay penalty to part-time work has been observed. In general, the part-time penalties observed amongst mothers who were employed when the cohort child was at least 3 years old are at least as high as those reported for employed mothers in earlier decades. What is new here is our finding that mothers who availed themselves of new opportunities to reduce hours in their pre-birth jobs, seem to have escaped the hourly pay consequences of taking up part-time employment, at least initially. This may reflect statutory maternity leave rights to return to the same employer having been extended and improvements in employer practice. This conclusion is further supported in earlier analyses of the pay of the 1958 cohort at age 33 in 1991 (Joshi and Paci, 1998). There, mothers who had near continuous employment histories around a period of maternity leave seemed to sustain their earning power, but only if they worked full-time. Pay in part-time jobs did not appear to enjoy such protection. Now it does seem possible to cut hours in some well-paying jobs without substantially lowering the hourly rate in the short-term, though the protection may not extend to wage growth and promotion in the longer term.

Under the Part-time Workers Regulations, introduced just before the mothers in our sample had their first child, it is not legal to change the terms of employment or pay of an employee who reduces their hours of work in the same job, although they may

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legally miss out of opportunities for advancement and promotion. The decrease in relative hourly pay associated with the reduction in working hours is strongly linked to the other job changes which this entails, including a change of employer, a change in job content a change of occupation or a loss of status. Clearly, the Regulations do not protect the pay and job status of these employees.

It is not possible to determine the elements of choice and constraint involved in the change of employer and loss of job status and pay when moving from full-time into part-time work. Some new mothers may positively seek less responsibility and seniority when their children are young. Others may be unfairly limited in their opportunities to use and develop their skills and may be underpaid for their work. Further, those who do willingly accept lower pay and status when children are young may find it difficult to regain their former positions once children are older and they increase their hours of work. The future patterns of work and pay amongst the mothers of the Millennium Cohort will reveal these longer-term impacts.

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Appendix Tables

Table A1: Selected sample and excluded cases

	n	%
Selected sample (first-time mothers, responded at all three surveys)	5,025	26
Excluded cases:		
Cohort birth was not the first birth	7,677	40
Original main respondent not natural mother	28	-
Change in main respondent	953	5
Non-response at one of the three surveys*	5,561	29
Total*	19,244	100

*These figures include all families who have *ever* participated in the study, including those who took part in the first survey and those who were newly recruited at the second survey.

Table A2: Exclusions from the cross-sectional samples used to analyse wages

	9 months	Age 3	Age 5
Selected sample (current employee with observed wage)	2,237	2,164	2,460
Excluded cases:			
Not working (including maternity leave)	2,132	2,362	2,143
Self-employed	158	208	271
Employee with missing wage	498	291	151
Total	5,025	5,025	5,025

Table A3: Names of source variables used to derive main variables for analysis

	9 months	Age 3	Age 5
Current employment status	amwkst amemse	bmpsta bdmwrk bmemps	cmpsta cmemse cdmwrk cmwkwk cmjbaw
Hours of work	amwkhr	bmwkhr	cmwkhr
Part-time hours	amwkhr (<30)	bmwkhr (<30)	cmwkhr (<30)
Gross hourly earnings	amgroa amgrop	bmgroa bmgrop	cmgroa cmgrop
Part-time spell between surveys	-	bmpsta bmftpt	cmpsta cmftpt
First and further births (from household file)	ahcrel ahpage	bhcrel bhpage bhcdby	chcrel chpage chpdby
Change of employer	amsaem amwkpr	bmwrkc bmastaa	cmchjb cmchemp
Highest qualification at 9 month survey	adnvq	-	-
Age at 9 month survey	admagi	-	-
Ethnicity (at 9 month survey)	amethe	-	-
Country of residence at 9 month survey	aactry	-	-
Region of residence at 9 month survey	aaregn	-	-
Weight variable	aweight2	-	-

*Names of variables used in datasets available via the Economic and Social Data Service
at http://www.esds.ac.uk/findingData/mcs.asp

Table A4: Coefficients from linear regression models, cross-sections, first-time mothers, dependent variable = log hourly wage (full results to go with Table 5)

	9 months	Age 3	Age 5
Part-timer at current survey	**-0.02 (0.02)**	**-0.12 (0.02)**	**-0.20 (0.02)**
Age at 9 month survey	+0.04 (0.00)	+0.03 (0.00)	+0.03 (0.00)
Highest qualification level at 9 month survey (ref <= NVQ 1)			
NVQ 2 (GCSE or O-level)	+0.18 (0.05)	+0.16 (0.03)	+0.10 (0.04)
NVQ 3 (A-level)	+0.27 (0.05)	+0.26 (0.04)	+0.22 (0.04)
NVQ 4 (Diploma/Degree or above)	+0.53 (0.05)	+0.49 (0.03)	+0.48 (0.04)
Ethnicity (ref = White) Mixed race	+0.22 (0.04)	-0.01 (0.06)	-0.37 (0.15)
Indian	-0.06 (0.07)	-0.12 (0.07)	-0.14 (0.09)
Pakistani or Bangladeshi	-0.07 (0.13)	-0.09 (0.11)	+0.18 (0.12)
Black or Black British	-0.46 (0.08)	-0.20 (0.11)	-0.15 (0.07)
Other ethnic group (inc. Chinese)	-0.11 (0.06)	-0.05 (0.07)	-0.02 (0.08)
Country and region of residence at 9 month survey (ref = London) North East (England)	-0.45 (0.06)	-0.25 (0.07)	-0.30 (0.07)
North West (England)	-0.37 (0.05)	-0.26 (0.06)	-0.32 (0.05)
Yorkshire and Humberside	-0.42 (0.05)	-0.30 (0.06)	-0.38 (0.06)
East Midlands	-0.36 (0.05)	-0.25 (0.06)	-0.34 (0.06)
West Midlands	-0.30 (0.06)	-0.26 (0.06)	-0.33 (0.06)
East of England	-0.19 (0.07)	-0.22 (0.07)	-0.24 (0.07)
South East (England)	-0.23 (0.05)	-0.17 (0.06)	-0.23 (0.05)
South West (England)	-0.40 (0.05)	-0.32 (0.06)	-0.32 (0.06)
Wales	-0.41 (0.04)	-0.29 (0.05)	-0.31 (0.05)
Scotland	-0.36 (0.04)	-0.23 (0.05)	-0.28 (0.05)
Northern Ireland	-0.46 (0.04)	-0.27 (0.06)	-0.37 (0.05)
Number of further children born by age 3 survey (ref = none)			
One further child	-	+0.08 (0.03)	-0.01 (0.03)
Two or more further children	-	-0.29 (0.31)	=0.23 (0.19)
Number of further children born between age 3 and age 5 survey (ref = none)			
One further child	-	-	+0.12 (0.03)
Two or more further children	-	-	+0.33 (0.08)
Constant	+0.93 (0.11)	+1.24 (0.08)	+1.20 (0.08)
Sample (N)	2,237	2,164	2,460
R-squared	0.36	0.32	0.37

*Models were estimated using probability weight *aweight2*.

Table A5: Means of characteristics of cross-section samples

	9 months	Age 3	Age 5
Log hourly wage	**2.16**	**2.12**	**2.14**
Part-timer at current survey	**0.68**	**0.67**	**0.67**
Age at 9 month survey	29.7	29.4	29.5
Highest qualification level at 9 month survey (ref <= NVQ 1)			
NVQ 2 (GCSE or O-level)	0.24	0.27	0.26
NVQ 3 (A-level)	0.18	0.18	0.18
NVQ 4 (Diploma/Degree or above)	0.52	0.47	0.48
Ethnicity (ref = White) Mixed race	0.004	0.004	0.005
Indian	0.014	0.018	0.013
Pakistani or Bangladeshi	0.007	0.008	0.006
Black or Black British	0.012	0.015	0.014
Other ethnic group (inc. Chinese)	0.029	0.029	0.032
Country and region of residence at 9 month survey (ref = London) North East (England)	0.04	0.04	0.04
North West (England)	0.10	0.12	0.10
Yorkshire and Humberside	0.08	0.09	0.09
East Midlands	0.06	0.06	0.06
West Midlands	0.08	0.07	0.08
East of England	0.08	0.07	0.08
South East (England)	0.16	0.17	0.17
South West (England)	0.10	0.08	0.09
Wales	0.05	0.05	0.05
Scotland	0.09	0.11	0.11
Northern Ireland	0.03	0.03	0.03
Number of further children born by age 3 survey (ref = none)			
One further child	-	0.25	0.35
Two or more further children	-	0.004	0.01
Number of further children born between age 3 and age 5 survey (ref = none)			
One further child	-	-	0.50
Two or more further children	-	-	0.05
Sample (N)	2,237	2,164	2,460

*Means are weighted using aweight2

Table A6: Coefficients from linear regression models, longitudinal employee sample, first-time mothers, dependent variable = log hourly wage (full results to go with Table 7)

	9 months	Age 3	Age 5
Part-timer at current survey	**-0.01 (0.03)**	**-0.10 (0.03)**	**-0.19 (0.03)**
Age at 9 month survey	+0.04 (0.00)	+0.03 (0.00)	+0.03 (0.00)
Highest qualification level at 9 month survey (ref <= NVQ 1)			
NVQ 2 (GCSE or O-level)	+0.15 (0.05)	+0.18 (0.03)	+0.20 (0.06)
NVQ 3 (A-level)	+0.23 (0.05)	+0.27 (0.04)	+0.28 (0.06)
NVQ 4 (Diploma/Degree or above)	+0.48 (0.05)	+0.49 (0.03)	+0.54 (0.06)
Ethnicity (ref = White) Mixed race	+0.11 (0.04)	-0.03 (0.06)	+0.60 (0.05)
Indian	-0.13 (0.12)	-0.19 (0.07)	-0.12 (0.14)
Pakistani or Bangladeshi	+0.21 (0.22)	+0.12 (0.21)	+0.19 (0.20)
Black or Black British	-0.32 (0.11)	-0.27 (0.10)	-0.16 (0.08)
Other ethnic group (inc. Chinese)	-0.13 (0.10)	-0.14 (0.09)	-0.16 (0.09)
Country and region of residence at 9 month survey (ref = London) North East (England)	-0.42 (0.07)	-0.34 (0.09)	-0.37 (0.08)
North West (England)	-0.37 (0.06)	-0.39 (0.08)	-0.39 (0.07)
Yorkshire and Humberside	-0.45 (0.07)	-0.45 (0.08)	-0.38 (0.07)
East Midlands	-0.29 (0.07)	-0.34 (0.08)	-0.34 (0.07)
West Midlands	-0.26 (0.08)	-0.37 (0.09)	-0.36 (0.08)
East of England	-0.21 (0.08)	-0.22 (0.09)	-0.19 (0.10)
South East (England)	-0.24 (0.07)	-0.26 (0.08)	-0.19 (0.07)
South West (England)	-0.33 (0.08)	-0.40 (0.08)	-0.32 (0.08)
Wales	-0.37 (0.06)	-0.35 (0.07)	-0.31 (0.06)
Scotland	-0.31 (0.06)	-0.35 (0.07)	-0.29 (0.07)
Northern Ireland	-0.41 (0.07)	-0.43 (0.08)	-0.40 (0.07)
Number of further children born by age 3 survey (ref = none)			
One further child	-	+0.11 (0.04)	-0.03 (0.04)
Two or more further children	-	-0.06 (0.20)	=0.47 (0.19)
Number of further children born between age 3 and age 5 survey (ref = none)			
One further child	-	-	+0.10 (0.04)
Two or more further children	-	-	+0.31 (0.09)
Constant	+0.89 (0.11)	+1.29 (0.13)	+1.19 (0.12)
Sample (N)	1,104	1,104	1,104
R-squared	0.39	0.33	0.40

*Models were estimated using probability weight *aweight2*.

Table A7: Means of characteristics of longitudinal employee samples

	9 months	Age 3	Age 5
Log hourly wage	**2.12**	**2.19**	**2.20**
Part-timer at current survey	**0.67**	**0.61**	**0.60**
Age at 9 month survey	29.8	29.8	29.8
Highest qualification level at 9 month survey (ref <= NVQ 1)			
NVQ 2 (GCSE or O-level)	0.25	0.25	0.25
NVQ 3 (A-level)	0.19	0.19	0.19
NVQ 4 (Diploma/Degree or above)	0.51	0.51	0.51
Ethnicity (ref = White)			
Mixed race	0.0003	0.0003	0.0003
Indian	0.010	0.010	0.010
Pakistani or Bangladeshi	0.006	0.006	0.006
Black or Black British	0.013	0.013	0.013
Other ethnic group (inc. Chinese)	0.027	0.027	0.027
Country and region of residence at 9 month survey (ref = London)			
North East (England)	0.05	0.05	0.05
North West (England)	0.12	0.12	0.12
Yorkshire and Humberside	0.10	0.10	0.10
East Midlands	0.05	0.05	0.05
West Midlands	0.08	0.08	0.08
East of England	0.07	0.07	0.07
South East (England)	0.16	0.16	0.16
South West (England)	0.10	0.08	0.08
Wales	0.05	0.05	0.05
Scotland	0.11	0.11	0.11
Northern Ireland	0.03	0.03	0.03
Number of further children born by age 3 survey (ref = no further children)			
One further child	-	0.26	0.26
Two or more further children	-	0.002	0.002
Number of further children born between age 3 and age 5 survey (ref = no further children)			
One further child	-	-	0.46
Two or more further children	-	-	0.05
Sample (N)	1,104	1,104	1,104

*Means are weighted using aweight2

Table A8: Coefficients from linear regression models, longitudinal employee sample, first-time mothers, dependent variable = log hourly wage at age 5 survey (full results to go with Table 8)

Work pattern up to age 5 survey (ref = full-time and stayed with same employer)	
Worked part-time and changed employer	**-0.32 (0.06)**
Worked part-time and stayed with same employer	**-0.16 (0.06)**
Worked full-time and changed employer	**-0.01 (0.06)**
Age at 9 month survey	+0.03 (0.00)
Highest qualification level at 9 month survey (ref <= NVQ 1)	
NVQ 2 (GCSE or O-level)	+0.17 (0.05)
NVQ 3 (A-level)	+0.25 (0.06)
NVQ 4 (Diploma/Degree or above)	+0.51 (0.05)
Ethnicity (ref = White) Mixed race	+0.63 (0.06)
Indian	-0.10 (0.15)
Pakistani or Bangladeshi	+0.18 (0.17)
Black or Black British	-0.17 (0.08)
Other ethnic group (inc. Chinese)	-0.11 (0.08)
Country and region of residence at 9 month survey (ref = London) North East (England) North West (England) Yorkshire and Humberside East Midlands West Midlands East of England South East (England) South West (England) Wales Scotland Northern Ireland	 -0.41 (0.08) -0.41 (0.07) -0.39 (0.07) -0.39 (0.07) -0.36 (0.08) -0.21 (0.10) -0.23 (0.07) -0.32 (0.08) -0.33 (0.06) -0.31 (0.07) -0.43 (0.07)
Number of further children born by age 3 survey (ref = none)	
One further child	+0.04 (0.04)
Number of further children born between age 3 and age 5 survey (ref = none)	
One further child	+0.07 (0.04)
Two or more further children	+0.22 (0.09)
Constant	1.46 (0.12)
Sample (N)	1,085
R-squared	0.40

*Models were estimated using probability weight *aweight2*.

Table A9: Coefficients from linear regression models, restricted longitudinal sample of employees who remained with the same employer up to the age 5 survey, first-time mothers, dependent variable = log hourly wage (full results to go with Table 9)

	9 months	Age 3	Age 5
Part-timer	**-0.04 (0.04)**	**-0.12 (0.06)**	**-0.16 (0.06)**
Age at 9 month survey	+0.03 (0.00)	+0.03 (0.00)	+0.03 (0.00)
Highest qualification level at 9 month survey (ref <= NVQ 1)			
NVQ 2 (GCSE or O-level)	+0.24 (0.07)	+0.29 (0.07)	+0.18 (0.10)
NVQ 3 (A-level)	+0.21 (0.06)	+0.30 (0.07)	+0.24 (0.10)
NVQ 4 (Diploma/Degree or above)	+0.49 (0.05)	+0.55 (0.06)	+0.48 (0.10)
Ethnicity (ref = White)			
Indian	-0.08 (0.15)	-0.11 (0.10)	-0.11 (0.25)
Pakistani or Bangladeshi	+0.36 (0.31)	+0.49 (0.08)	+0.55 (0.13)
Black or Black British	-0.59 (0.23)	-0.37 (0.10)	-0.28 (0.12)
Other ethnic group (inc. Chinese)	-0.08 (0.16)	-0.09 (0.11)	-0.10 (0.12)
Country and region of residence at 9 month survey (ref = London)			
North East (England)	-0.53 (0.09)	-0.42 (0.14)	-0.44 (0.11)
North West (England)	-0.44 (0.09)	-0.37 (0.15)	-0.44 (0.08)
Yorkshire and Humberside	-0.61 (0.09)	-0.53 (0.13)	-0.47 (0.10)
East Midlands	-0.32 (0.09)	-0.35 (0.13)	-0.45 (0.08)
West Midlands	-0.27 (0.15)	-0.36 (0.16)	-0.34 (0.13)
East of England	-0.21 (0.12)	-0.18 (0.15)	-0.19 (0.15)
South East (England)	-0.26 (0.09)	-0.22 (0.13)	-0.23 (0.08)
South West (England)	-0.40 (0.07)	-0.43 (0.14)	-0.40 (0.07)
Wales	-0.45 (0.09)	-0.35 (0.13)	-0.36 (0.08)
Scotland	-0.31 (0.09)	-0.37 (0.13)	-0.31 (0.08)
Northern Ireland	-0.51 (0.10)	-0.49 (0.14)	-0.52 (0.09)
Number of further children born by age 3 survey (ref = none)			
One further child	-	+0.12 (0.06)	+0.03 (0.06)
Number of further children born between age 3 and age 5 survey (ref = none)			
One further child	-	-	+0.12 (0.05)
Two or more further children	-	-	+0.25 (0.11)
Constant	+1.26 (0.17)	+1.42 (0.18)	+1.41 (0.20)
Sample (N)	514	514	514
R-squared	0.35	0.31	0.36

*Models were estimated using probability weight *aweight2*.

Table A10: Coefficients from probit model used in propensity-score matching, restricted longitudinal sample of employees who remained with the same employer up to the age 5 survey, first-time mothers (full results to go with Table 9) *dependent variable = part-time work*

	9 months	Age 3	Age 5
Age at 9 month survey	-0.03 (0.01)	-0.03 (0.01)	-0.02 (0.01)
Highest qualification level at 9 month survey (ref <= NVQ 1)			
NVQ 2 (GCSE or O-level)	+0.29 (0.31)	+0.30 (0.31)	+0.30 (0.31)
NVQ 3 (A-level)	-0.09 (0.30)	-0.09 (0.30)	-0.08 (0.31)
NVQ 4 (Diploma/Degree or above)	-0.22 (0.28)	-0.24 (0.28)	-0.25 (0.29)
Ethnicity (ref = White)			
Indian	-0.77 (0.54)	-0.74 (0.54)	-0.79 (0.54)
Pakistani or Bangladeshi	-0.64 (0.66)	-0.67 (0.66)	-0.70 (0.67)
Black or Black British	-0.39 (0.60)	-0.32 (0.61)	-0.33 (0.61)
Other ethnic group (inc. Chinese)	-1.08 (0.35)	-1.08 (0.35)	-1.07 (0.35)
Country and region of residence at 9 month survey (ref = London)			
North East (England)	-0.45 (0.34)	-0.40 (0.35)	-0.36 (0.35)
North West (England)	-0.57 (0.27)	-0.55 (0.27)	-0.53 (0.27)
Yorkshire and Humberside	+0.17 (0.31)	+0.18 (0.32)	+0.18 (0.32)
East Midlands	+0.59 (0.44)	+0.56 (0.44)	+0.52 (0.44)
West Midlands	+0.32 (0.37)	+0.36 (0.37)	+0.38 (0.38)
East of England	+0.45 (0.36)	+0.47 (0.36)	+0.46 (0.36)
South East (England)	+0.45 (0.28)	+0.47 (0.38)	+0.47 (0.28)
South West (England)	dropped	dropped	dropped
Wales	-0.10 (0.23)	-0.08 (0.23)	-0.08 (0.23)
Scotland	-0.21 (0.25)	-0.20 (0.25)	-0.22 (0.25)
Northern Ireland	-0.96 (0.25)	-0.96 (0.25)	-0.99 (0.26)
Number of further children born by age 3 survey (ref = none)			
One further child	-	+0.19 (0.14)	+0.04 (0.18)
Number of further children born between age 3 and age 5 survey (ref = none)			
One further child	-	-	+0.23 (0.16)
Two or more further children	-	-	+0.27 (0.35)
Constant	1.59 (0.54)	1.50 (0.55)	1.35 (0.56)
Sample (N)	514	514	514

*Model was estimated *without* weights within Stata psmatch2 program.

Table A11: Means of characteristics after matching (full results to go with Table 9)

	9 months		Age 3		Age 5	
	(1)	(2)	(1)	(2)	(1)	(2)
Age at 9 month survey	30.6	31.1	30.6	30.8	30.6	31.2
Highest qualification level at 9 month survey (ref <= NVQ 1)						
NVQ 2 (GCSE or O-level)	0.28	0.28	0.28	0.31	0.28	0.37
NVQ 3 (A-level)	0.20	0.08	0.20	0.06	0.20	0.12
NVQ 4 (Diploma/Degree or above)	0.47	0.63	0.47	0.61	0.47	0.49
Ethnicity (ref = White) Indian Pakistani or Bangladeshi Black or Black British Other ethnic group (inc. Chinese)	0.004 0.004 0.006 0.016	0.011 0.001 0.008 0.008	0.004 0.004 0.006 0.016	0.030 0.000 0.003 0.005	0.004 0.004 0.006 0.016	0.008 0.000 0.010 0.005
Country and region of residence at 9 month survey (ref = London) North East (England) North West (England) Yorkshire and Humberside East Midlands West Midlands East of England South East (England) Wales Scotland Northern Ireland	0.04 0.09 0.10 0.07 0.06 0.08 0.23 0.06 0.09 0.02	0.03 0.09 0.09 0.11 0.08 0.10 0.21 0.07 0.09 0.02	0.04 0.09 0.10 0.07 0.06 0.08 0.23 0.06 0.09 0.02	0.03 0.09 0.09 0.14 0.04 0.15 0.22 0.05 0.08 0.02	0.04 0.09 0.10 0.07 0.06 0.08 0.23 0.06 0.09 0.02	0.04 0.13 0.09 0.16 0.06 0.14 0.17 0.04 0.10 0.01
Further children by age 3 survey (ref = none)						
One further child	-		0.31	0.15	0.31	0.13
Further children between age 3 and age 5 survey (ref = none)						
One further child	-		-	-	0.50	0.44
Two or more further children	-		-	-	0.07	0.01
Sample (N)	348	94	348	102	348	104

* (1) Part-time employees. (2) Matched (weighted) group of full-time employees. Means are weighted using *aweight2* and are multiplied by the propensity score weights (_weight in Stata program psmatch2) for the full-time employees (non-treatment group).