Perinatal Family Labour Supply:
Historical Trends and the Modern Experience

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Abstract:

The predominant perspective on perinatal family labour supply in the theoretical and empirical economics literature is that careers and children are simultaneous choices, so conditioning on the prenatal career ambitions of individuals, and particularly women, the event of a birth has little or no effect on labour market behaviour. There are, of course, many reasons to believe that this "all-or-nothing" view, rooted in assumptions of perfect foresight, overlooks significant labour market effects of children and that due to various trends, including rising correlation in husband-wife earnings, these effects may becoming increasingly important. Using historical Canadian Census data and rich longitudinal microdata, I use nonparametric techniques to identify discontinuities in employment probabilities, hours of work and wage outcomes of parents, and particularly dual-career couples, in the months just before and after a first birth. The evidence indicates that although the vast majority of new mothers and fathers who were employed prior to birth, maintain that employment, a non-trivial percentage of women (roughly 20%) appear to give up employment entirely after a birth and roughly half of them will not have returned to work 5 years later. More importantly, the percentage that drop out of the labour force is increasing and has been for at least the past two decades. This decrease is particularly evident among more educated and older women. Further, among new mothers and fathers who maintain their employment through the perinatal period, there is evidence of other types of labour supply adjustments including significant decreases (mothers) and increases (fathers) in both usual monthly hours of work and hourly wages. There is also evidence of increased probabilities of job changing in the year just before and after the birth for fathers, but not for mothers. Together these findings provide a much richer perspective on how today's dual-career families balance work and child rearing. In terms of its policy relevance, the findings emphasize the importance of measures that support parents in balancing work and family time, as opposed to measures that are focused on enabling parents, and particularly women, to maintain uninterrupted careers while raising children.

1. Introduction

There are currently two strands of research in the economics literature concerned with the labour market decisions of families with young children. The more recent is focused on identifying the effect of parental employment, particularly maternal employment, on child outcomes, such as school-age behavioural problems and academic success (e.g. Gregg, Washbrook, Propper and Burgess 2005; Baker and Milligan 2005). In terms of its policy relevance, this research primarily speaks to the value of extending parental leaves to allow parents to stay home longer on a full-time basis with their children, as well as tax incentives such as tax credits or income sharing for families with stay-at-home parents.[1] The second is the larger and more established literature concerned with understanding the causal relationships running between the fertility and labour market decisions of individuals (e.g. Nakamura and Nakamura 1985; Angrist and Evans 1998; Lundberg; Jacobsen Pearce and Rosenbloom 1999; Lundberg and Rose 2002). In contrast to the first literature literature, this research is primarily concerned with parental outcomes, and in particular causes of gender-based labour market differentials. In terms of its policy relevance, the findings from this research primarily speak to policies that enable parents, and in particular mothers, to experience childbirth without career interruption.[2]

The general message coming from the latter strand of research is that conditional on exhibiting career ambitions prior to childbirth, the arrival of children appears to have little or no effect on the labour supply or earnings of mothers and fathers. The standard explanation is that fertility and labour supply outcomes are simultaneously determined. For example, Nakamura and Nakamura (1985) argue that at some stage during adolescence women make deliberate or inadvertent choices that lead them to a career lifestyle or a life as primarily a homemaker and wife. Once we condition on this predetermined lifestyle intention, the event of childbirth appears to have little effect on the labour market behaviour of parents. Consistent with this idea, using the gender composition of the first two born children to instrument the incidence of having a third, Angrist and Evans (1998) find a small or possibly no effect of children on the labour

[1] So for example, Sweden now provides 15 months of parental leave, with 80% wage replacement for 12 months, presumably, based at least in part on beliefs about these types of effects of parental employment on infants. Also, the new Canadian Conservative government intends to provide all parents with children an annual payment of $1200 per child, whether or not the child is in a daycare. This policy was an explicit response to the previous Liberal government's national childcare policy, in which only parents of children in daycares would have benefited.

[2] Two examples are job protection legislation during maternity/paternity and parental leaves, and subsidized or nationalized daycare policies.

supply of college-educated women. Similarly, based on their extensive analysis of female labour supply behaviour, Nakamura and Nakamura (1985) conclude that: "viewed over time… most women either work continuously or never work; and those who do work tend to continue on from one year to the next with much the same level of work activity and earnings." And Shapiro and Mott (1992) end their analysis of the long-term employment behaviour of mothers with the perception that policies that enable mothers to balance motherhood and careers will encourage continued increases in female labour market attachment and reductions in gender wage differentials. Given the fact that young women now outnumber young men by a ratio of three-to-two in Canadian university enrolment, understanding to what extent this all-or-nothing perspective accurately reflects the modern experience of families experiencing childbirth seems important.

The difficulty is that this simplified view ignores the possibility that parents (or teenagers in the more strict adherence to the theory) do not have full information when making the choice of whether to follow a career or parenting track. Perhaps individuals systematically underestimate the time and effort costs of raising young children. Or perhaps the costs vary across individuals in a way that is unknown ex-anti. A colicky baby is neither chosen nor anticipated, but such a child surely affects the time and effort a parent can devote to labour market activities. We might then expect to see new mothers and fathers making adjustments in their labour market behaviour following childbirth, even when they appear to have made considerable labour market investments, in terms of their education and years of full-time labour market experience, prior to the birth. At the extreme they may be seen dropping out of the labour market entirely. Or more subtly they may maintain their employment status, but change their jobs, reduce their usual hours of work, or change their work schedule, perhaps to balance time at home with a spouse. These adjustments may of course be temporary but they are often coupled with feelings of pressure and stress and may have long-term consequences for parents and their children. Of course, they may also be entirely planned. In a survey of 138 female undergraduate students (freshman and seniors) at Yale University, the *New York Times* reports that 60% expect they will cut back on work or stop working entirely when they have children.[3] Whether planned or not, the notion that these adjustments occur is more consistent with the "post-feminist"

[3] Louise Story, "Many Women at Elite Colleges Set Career Path to Motherhood," *New York Times*, September 20, 2005, p1.

sentiments: “you can’t have it all” and “something has to give,” than with the all-or-nothing perspective that currently dominates the economics literature.[4]

This paper contributes to the literature concerned with the labour supply behaviour of parents following childbirth in two important ways. First, it uses Canadian Census data spanning three decades to identify long-term changes in the incidence of giving up employment following a birth among both new mothers and fathers. Second, using a longitudinal microdata set of roughly 4,640 married couples experiencing a birth between 1993 and 2003, of whom slightly more than 2,335 are new parents, it provides a detailed description of the monthly labour supply behaviour of new mothers and fathers *continuously* through the event of a childbirth. Of particular interest in the analysis, is the question of how the labour market behaviour of the modern dual-career couple responds to the birth of a child and how this behaviour may have changed over time. There are in fact a number of important reasons to believe that the predominant all-or-nothing perspective may not reflect the modern experience. The findings provide some evidence to suggest that conditional on being employed full-year full-time in the year prior to the birth of a first child, the probability of giving up employment following childbirth has been increasing since at least the early 1980s. Furthermore, even among university-educated mothers and fathers who were employed in the month of the birth, there is evidence of significant adjustments in hours of work and changes in hourly wages in the months following childbirth. These findings provide a very different picture of the modern experience than currently exists in the literature.

The remainder of the paper is organized as follows. In the following section I discuss a number of reasons why we might expect to see significant perinatal labour supply adjustments among dual-career families and why these adjustments may be coming increasingly common. I then describe the data used in the analysis and the empirical identification strategy. In section 4, I discuss the results and section 5 summarizes the main findings.

2. Theory

There are a number of theoretical reasons why we might expect new parents to make perinatal labour supply adjustments even when they both exhibit strong career ambitions prior to

[4] It is important to distinguish the independent effect of children from the actual behaviour of parents in the perinatal period. The latter may be entirely planned, but it is still of policy interest to know how parents adjust their labour market behaviour following the birth of a child, and to know how this behaviour may have changed through time.

the birth of a child. Consideration of some of these reasons suggests that these types of adjustments may be increasingly likely among today's dual-career couples. First, in a model with child quality effects of parents' time at home, Angrist and Evans (1996) show that in equilibrium, marginal home productivity is higher for higher-wage parents than lower-wage parents. Increased education of parents in the population should then, on average, lead to larger labour supply effects of childbearing. Second, not only are women increasingly likely to have career ambitions prior to childbirth, there is also evidence that high-wage women are increasingly likely to be married to high-wage men (Hyslop 2004). Conditioning on exhibiting career ambitions prior to childbirth, we might then expect increased adjustment following childbirth among career-type women. Third, there is some indirect evidence that families are increasingly concerned with the early development, and in particular, the intellectual development of their children. This could be a consequence of research showing the importance of the earliest years in intellectual and emotional development or in structural trends in labour markets that have led to substantial relative advantages of high skilled, highly educated workers. It is perhaps also reflected in trends in consumer products for young children towards an emphasis on products that best stimulate intellectual development, as well as government programs, such as Ontario's Early Years Centers, which emphasize, at the community level, the importance of early childhood development. To the extent that better educated parents are more conscious of these trends, their own labour supply behaviour may be increasingly responsive to childbirth. Finally, even if the distribution of unobserved ambition is unchanged through time, but larger percentages of women are completing university, perhaps due to some broader change in cultural expectations, then we might still see larger percentages of women with university degrees making labour supply adjustements following childbirth. Finally, if men are increasingly likely to be married to high-wage women, they are also increasingly likely to be able to afford to be at home on a full-time basis following childbirth or to adjust their hours of work. Combined with government initiatives to encourage fathers to take paternity leaves and broader cultural emphasis on the importance of paternal care, we might expect to see increased labour supply adjustments among new fathers.

3. Empirical Identification

3.1. Census data

To identify long-term trends in the perinatal labour supply behaviour of married couples, I exploit information on usual hours and weeks worked in the previous calendar year in the complete Master files of the 1971, 1981, 1991 and 2001 Canadian Censuses. Between 1981 and 2001, these samples represent 20% of the Canadian population, while the 1971 sample represents 1-in-3 Canadians. I begin by identifying three-person census families (husband-wife-child), where the child was born between January 1 and the Census date, which in each year occurs in the third week of May. I then calculate employment probabilities among these new mothers and fathers, conditional on the being employed 48 to 52 weeks, on a mostly full-time basis, in the previous calendar year. These probabilities can be identified consistently in these Census files, with essentially no sampling error, over this 30-year period. By also conditioning on mothers and fathers with a university degree, it is possible to more precisely identify the group of women and men who appear to have the greatest career attachment prior to the birth of their first child. Evidence that conditional on this attachment, employment probabilities of new parents are declining would be consistent with our expectations based on the logic in the previous section. To insure that any trends do not simply reflect broader labour market trends over these years, employment probabilities are also estimated relative to similarly aged childless wives and husbands.

3.2. Longitudinal survey data

The longitudinal analysis uses data from the Survey of Labour and Dynamics (SLID). These data provide continuous, detailed labour market and income information on households over 6-year periods. New panels were sampled in 1993, 1996 and 1999, so that by 2004, three complete 6-year panels were complete. In order to obtain a meaningful sample of married couples experiencing childbirth, it is necessary to pool these three panels.[5] Figure 1 graphs the resulting sample sizes relative to the birth month. Roughly 4,640 couples are observed experiencing a birth, but there is substantial sample attrition as we move away from the birth month. So for example, roughly 1,000 of these couples are no longer observed 1 year after birth and slightly more than 1,500 are lost when we look 1 year before the birth. The asymmetry of the

[5] A consequence of pooling these panels is that no appropriate sampling weight exists. However, comparing unweighted and weighted SLID estimates of employment probabilities among new mothers to similar estimates from the Labour Force Survey (LFS) and Census suggests that the representativeness of the sample is quite robust to whether or not a sampling weight is used (see Appendix A).

attrition reflects two choices in the data construction: (i) where couples experience multiple births during the six-year panel, only the first birth is examined; and (ii) sample selection is restricted to married couples and individuals experiencing a birth are more likely to be (de facto) married 1 year after the birth than 1 year before. The analysis of these data involves non-parametrically estimating the perinatal labour market behaviour and wages of married men and women. This is done using two strategies, which exploit different sources of variation. The first involves estimating the equation:

$$\boldsymbol{y}_{it} = \beta_0 + \boldsymbol{msb}_{it}^{T}\beta_1 + \boldsymbol{age}_{it}^{T}\beta_2 + \boldsymbol{month}_{t}^{T}\beta_3 + \boldsymbol{year}_{t}^{T}\beta_4 + \varepsilon_{it} \qquad (1)$$

where y_{it} is some labour supply decision or market outcome of individual i in month t; $\boldsymbol{msb}_{it}$ is a 143-element vector of dummy variables indicating months since birth (71 possible months observed before and after the birth plus the month of the birth); $\boldsymbol{age}_{it}$ is a vector of age-group dummies; $\boldsymbol{month}_{it}$ is a vector of month dummies; $\boldsymbol{year}_{it}$ is a vector of year dummies; and ε_{it} is an iid error with mean 0. In the analysis I consider changes in employment probabilities; probabilities of voluntary job separations, log usual monthly hours of work conditional on being employed in the birth month; and log hourly wages conditional on employment in the birth month. Finally, since $\boldsymbol{msb}_{it}$ is correlated with the calendar year, and the period between 1993 and 2003 was a period of economic expansion, it is important to control for broader macroeconomic conditions. To do this I estimate (1) also including the sample of childless married couples observed in the first year of each of the first three panels.

Identification of the parameter vector of interest, β_1, in (1) exploits the variation in $\boldsymbol{msb}_{it}$ both within and between individuals. A necessary condition for a consistent least squares estimate of β_1, is that $\boldsymbol{msb}_{it}$ is uncorrelated with ε_{it}. If we define $\varepsilon_{it} = c_i + \mu_{it}$, where c_i is some unobserved individual-specific fixed effect, the question becomes whether $\boldsymbol{msb}_{it}$ is correlated with either c_i or μ_{it}. Ignoring the two sample selection issues noted above and assuming attrition from the SLID sample is random, there is no reason to expect $\boldsymbol{msb}_{it}$ to be correlated with c_i, since it is random in which month individuals are sampled. However, restricting our sample to married couples and choosing which of multiple births to focus on in a nonrandom way could introduce this correlation. For example, individuals' taste (or distaste) for divorce could be correlated with some unobserved heterogeneity that is also correlated with the outcome variable y_{it}. In this case, limiting the identifying variation in $\boldsymbol{msb}_{it}$ to variation over t could improve our estimate of β_1. I therefore also estimate the fixed effects specification:

$$\boldsymbol{y}_{it} = \boldsymbol{msb}_{it}^{T}\gamma_1 + \boldsymbol{age}_{it}^{T}\gamma_2 + \boldsymbol{month}_{t}^{T}\gamma_3 + \boldsymbol{year}_{pt}^{T}\gamma_4 + \boldsymbol{c}_i + \mu_{it} \quad (2)$$

but where $\boldsymbol{msb}_{it}$ is now a vector of 8 grouped month-since-birth dummies, which is necessary given the degrees of freedom lost in estimating c_i. Also, since γ_1 now identifies individual variation through time, the year effects are interacted with dummies indicating in which of the three panels the observation was sampled.

Controlling for individual-specific fixed effects does not however deal with the possible correlation between μ_{it} and $\boldsymbol{msb}_{it}$. To the extent that the timing of births is simultaneously determined with long-term labour supply plans and intentions, such a correlation may exist, and we must be cautious in giving our estimate of γ_2 a strict causal interpretation. In this case the observed perinatal behaviour of individuals may have occurred even in the (counterfactual) absence of a birth (for example in the event of a miscarriage).[6] Instead the fixed effects estimate of γ_2 tells us how individuals *actually* adjust their labour market behaviour in the event of a birth, whether these adjustments were planned or not. By estimating these adjustments non-parametrically using continuous monthly data, it is possible to distinguish sharp discontinuities in the month of the birth to longer term and smoother adjustments over time. To the extent that they are sudden adjustments, it seems reasonable to interpret them as "child effects" in the sense that such sharp adjustments are unlikely to have occurred had the birth not occurred.

4. Results

4.1. Census data

Table 1 presents employment probabilities of married women with a first-born child under 5 months of age from the 1971, 1981, 1991 and 2001 Censuses. The columns distinguish between being employed and at work from being employed but absent and the rows condition on characteristics that imply increasing labour market attachment. In all the samples there is a large increase in the probability of being absent from a job between 1971 and 1981. This increase presumably reflects the increase in job-protected maternity leave periods, which increased in all provinces between these years, so that by 1981 all provinces, with the exception of Prince Edward Island, provided at least 17 weeks (Baker and Milligan 2005). Among all new mothers, there was also a substantial increase between 1981 and 1991 (45% to 56%), but as we condition

[6] Angrist and Krueger (1998) use IV methods in an attempt to identify exogenous variation in the birth event.

on new mothers with increasing levels of prenatal labour market attachment, the rates are relatively stable or even slightly decreasing. The changes through the 1990s for the samples of women employed full-year, full-time before the birth are even more suggestive of an upward trend in the likelihood of career women giving up employment following childbirth. So, for example, if we condition on the sample of new mothers aged 30 and above (implying more labour market experience) with a university degree, who were employed full-year full-time in the year before the birth, the likelihood of postnatal employment appears to have gradually declined since at least 1981.

These trends stand in sharp contrast to the tremendous and well-documented increases in female labour market participation that occurred in Canada between the 1960s and 1990s. What explains these patterns in the data? This evidence is of course entirely consistent with the reasons discussed in Section 2. However, in comparing employment rates of mothers with children under 1 in the Census data to comparable rates in the Labour Force Survey (LFS) and the SLID, there may be some reason for caution. Appendix A suggests that the Census data tends to consistently underestimate the employment probabilities of mothers with children. For example, in 2001 the Census data suggests an employment rate of 51%, compared to 60% in both the LFS and SLID. An important difference between the Census and survey data is the former is a self-completed questionnaire, whereas the latter are based on interviews. It may be that mothers on maternity leaves have a tendency to incorrectly code themselves in the Census as not absent from a job when they are on a maternity leave.[7] In the survey data, where interviewers are present, this error is less likely. What is more problematic is that the difference in the employment rates of mothers with children appears substantially larger in 2001 than in 1991, suggesting the measurement error is increasing over time. Perhaps then, the downward trends identified in Table 1 are not real, but simply reflect this measurement error. There are, however, two reasons to be suspicious of this explanation. First, the measurement error appears almost equally high among the much larger sample of women with a child under 25. If the issue was about miscoding of women on maternity leaves, the difference should be much smaller in this sample. Moreover, it is difficult

[7] Employment status in the Census is identified from responses to two separate questions. First, the questionnaire asks respondents how many hours they worked in the previous week. For those answering 0, they are asked whether this is because they were absent from a job. A list of reasons is given for absence, including illness, but a maternity leave is not one of them.

to think of reasons why women on maternity leaves would be increasingly likely to make this error.

Of course, in many situations the employment status of women in the first few months after a birth may be somewhat ambiguous, even to the well-trained LFS or SLID interviewer. Formally, an employment relationship exists until a Record of Employment (ROE) is issued, but for a new mother with no intention of returning to work, this definition is not meaningful. In some sense then, the self-reported data may be more reflective of a mother's true intentions and labour market attachment. Nonetheless, there is clearly potential for future research to provide stronger evidence of these trends. One possibility for doing this is to confirm the decreases over the 1990s using the SLID cross-sections, which span the period 1993 to 2003.

Table 3 shows a comparable table for new fathers with children under 5 months of age. Although the employment levels are all substantially higher than for women, there is also some evidence here of an increase in the probability of giving up employment following child birth. The changes are however, somewhat smaller. So among all men employed full-year full-time in the year before the birth, the probability of being employed was still 96% in 2001.

4.2. Longitudinal survey data

To begin I estimate linear probability models, where y_{it} in equation (1) is a dummy variable indicating either employment, whether or not the individual is actually at work, or positive hours of work at some point during month t. Figure 1 graphs the estimated coefficient vector β_1 for married women, where the sample of childless married women is excluded. The results indicate that 2 years prior to the birth of a child roughly 80% of women were employed and slightly fewer were also working. This rate remains stable until exactly 9 months prior to the month of the birth, when both the employment and work rates begin to drop. In the month after the birth slightly fewer than 20% of women were doing any labour market work. This decrease is not surprising, given that over the period 1993 to 2003 all provinces and the federal jurisdiction provided at least 18 weeks of job-protected maternity/parental leaves. What is, perhaps, more interesting is that one-quarter of all women who were employed prior to the birth, appear to have given up employment entirely 1 month after the birth. This seems to contrast in quite an important way with the all-or-nothing view of female labour supply that currently predominates the economics literature. The Census data suggests that this decrease may partly reflect a modern

trend. Further, one year after the birth, much less than half of these women appear to have returned to work. In fact, even 5 years after the birth, no more than half of these women appear have returned to labour market employment.

In figure 2, I present the comparable employment and work rates for men. Now roughly 90% of individuals were employed two years before the birth. Although there is some evidence of a drop in work rates in the first months after the birth, the decrease is small (no more than 1 percentage point), there is no evidence of a drop in the employment rates. What is more interesting are the upward patterns that appear in both rates after the birth. It is tempting to interpret this as increased labour market attachment and commitment of new fathers, but comparison to childless married men reveals that it reflects the procyclical variation in $\boldsymbol{msb_{it}}$ over the period of the data.

By including the samples of childless married women and men, the estimate of β_1 indicates the difference in the expected employment probability between women and men experiencing a birth conditional on age, year and month. Figure 4 presents the relative monthly work rates of married women experiencing a birth. Since the pre and postnatal rates likely depend on whether the birth is a first birth or subsequent birth, the figure distinguishes first birth from all births. The results suggest slightly lower work rates of all birth wives two years before the birth, relative to childless wives. This presumably reflects that some of these wives are already mothers, and a substantial portion of them likely to infants. Indeed, when we condition on first birth wives this difference becomes very close to 0. But, again, exactly 9 months before the birth, the work rates begin to decline and by the month after the birth, slightly more than 60% of all first birth mothers have stopped working entirely. The work rates then begin to increase, so that one year after the birth, roughly two-thirds of the women who stopped working have returned. Most of this increase appears to occur between the third and the ninth post-natal month. However, beyond the first year the rates are relatively stable. Among all new mothers they tend to decrease slightly, presumably reflecting second births, but even among new mothers there is still roughly a 10% differential 5 years after the birth. These long-term adjustments appear more clearly in Figure 5 where employment rates are examined. The results indicate that among all new mothers who were employed 12 months prior to the birth, nearly one-quarter will have given up their jobs by the time of the birth. Moreover over the following five years, the results

suggest that fewer than one-half of these women will have returned to market work. Again the view of continuous female perinatal labour market experience seems misleading.

In Figure 6, I reconsider the apparent postnatal decrease and subsequent gradual increase in the work rates of married men. Interestingly, the work rates of future first-time fathers are about 2% higher than similarly aged childless married men one to two years before the birth. This difference presumably reflects some unobserved heterogeneity. Figure 6 also confirms the suspicion that the postnatal rising work rates of married men, identified in Figure 3 reflect the expansionary period of the data. However, there is still evidence of a small decrease (2% at the most) in the probability of being at work in the first three postnatal months. The historical evidence from the Census suggests that this difference has, in fact, been increasing through time.

To insure that the relative employment effects identified above do not reflect unobserved heterogeneity that may be correlated with time since birth as a result of the data construction, the same effects were estimated controlling for individual-specific fixed effects. The results are presented, separately for mothers and fathers, in Table 3. Since we are particularly interested in the postnatal adjustments of parents with relatively strong prenatal labour market attachment, results are also presented separately for new mothers and fathers with and without a university degree in the month of the birth. The results for women are different from those in Figure 5 in two ways. First, the magnitude of employment adjustment in the first 6 months after birth is smaller (7 to 11% compared to about 20% in Figure 5). Second, there is weaker evidence of a rebounding of the rates in the subsequent postnatal months. Four to five years after the first birth, the probability of being employed remains 5 to 9% lower. Most interestingly, the university educated patterns and magnitudes are remarkably similar, and are only statistically different in the first year after the birth, (shown in third column) from the patterns observed among the non-university educated women. The results for fathers are also quite different from Figure 6, which is explained by the employment/work distinction. For both the university-educated and non-university educated samples the results suggest slight increases in postnatal employment rates. This is consistent with a intra-household production specialization, in which husbands' attachment to the labour market increases following the birth of a child.

Foregoing employment entirely is, of course, the ultimate labour market adjustment. More generally we might expect parents to change jobs, reduce their hours of work or make other adjustments types of adjustments that could affect their wage. In Figures 7 through 10 I

consider changes in the propensity of individuals to quit their jobs through the perinatal period. When all types of quits are identified the results for women indicate little difference in prenatal quit rates until about the third month when rates spike (Figure 7). This pattern is not observed among fathers, whether or not the sample is restricted to first-time fathers (Figure 9). An interesting question is to what extent the pattern reflects the non-employment transitions identified earlier, as opposed to job changing. To get some sense of this, in Figures 8 and 10, I consider only voluntary job separations where the individual was employed in the subsequent month. The results for women (Figure 8) reveal that the prenatal job separations entirely reflect transitions to non-employment. For men, on the other hand, the results are robust to this change in definition, indicating little perinatal job changing behaviour.

Even where new parents maintain employment and their prenatal jobs, they may reduce their hours of work in response to the time demands of childbearing. Figures 11 and 12 present the results from estimating equation (1) where the outcome variable is log usual monthly hours of work and the sample is restricted to parents who were employed in the month of the birth. It is important here to emphasize the distinction between usual and actual hours of work. Although we may be more interested in actual hours, the SLID hours data is retrospective asking respondents about working over previous calendar year, so measuring actual hours would, at best, be only possible with substantial error. To the extent that new parents change their regular work schedules following a birth, we should still see adjustments. These effects, however, likely understate the actual hours adjustments of new parents. Indeed, the results for mothers indicate quite substantial adjustments beginning exactly 9 months before the birth and continuing until about 1 year after the birth. In both the sample of all births and the sample of first births, the overall decrease in monthly hours over this 21-month period is about 15%. Further, these postnatal reduced work hours appear to persist four to five years after the birth. In sharp contrast, there is no evidence of reduced perinatal work hours for fathers. If anything births appear to result in increases in work hours, which appear quite large and persistent. The fact that two years prior to the observed birth, the rate, which includes current fathers, exceeds the rate of new fathers, provides additional evidence of the persistence of this effect. It is, of course, entirely consistent with Becker's (1965) theory of specialization in the family division of home and market production.

In Table 4, I estimate the same hours effects controlling for individual fixed effects. For both samples of women the patterns and magnitude of the postnatal adjustments are robust to the fixed effects. The results for university-educated are somewhat smaller, although for the most part I am unable to reject the difference is not simply sampling error. Interestingly though, in contrast to the patterns in Figure 12, the results for men no longer suggest gradually increasing postnatal hours of work. Rather for both samples of men the results suggest small immediate increases in hours of work of about 1 to 2% which persist through the first 4 or 5 years of the postnatal period.

Finally, Figures 13 and 14 consider perinatal wage dynamics of mothers and fathers who were employed in the month of the birth, relative to childless married men and women. Consistent with existing research the results indicate slightly negative wage adjustments following a birth for women, but positive effects for men. However, the nonparametric results provide a much richer perspective on the timing of these changes than is available from the usual fixed effects estimators that exist in the literature. Since we are conditioning on mothers who were employed in the month of their birth, it is not surprising that birth mothers have wages that are 10% higher than childless women 24 months before their births. What is more interesting is that this differential appears to decline long before birth and even conception. This is entirely consistent with the notion that labour market and fertility decisions may be to some extent simultaneously determined. Even two years prior to the birth of a first child, women may be making labour market choices, such as passing up promotional opportunities, which result in smaller wage gains. These decreases appear to continue until the month of the birth, when the differential stabilizes. The wage adjustment appears to persist for at least three years after the first birth. At this point there is some evidence of some catch-up, although the samples are thin and estimates increasingly imprecise. For fathers, quite a different pattern emerges. There is now little evidence of any adjustments in the prenatal months, but there is a clear pattern of relative wage gains in the first 24 (and maybe 36) postnatal months. The finding that childbirth has a positive effect on men's wages has found elsewhere. Though again, the nonparametric analysis in Figure 14 provides a much richer picture of the timing of this apparent child effect.

Table 5 presents fixed effects estimates of these perinatal wage dynamics. The results for both the university and non-university educated women are consistent with the finding of negative wage adjustments, particularly for the non-university educated group, but now these

effects appear to occur over the entire 5-year postnatal period. More interestingly, the results for fathers point to very different postnatal wage dynamics of university and non-university educated men. For the sample of fathers without a university degree, the estimates suggest postnatal wage gains of about 3%, but for university educated men, the effect is about 13%.

5. Conclusion

The predominant perspective in the current literature concerned with perinatal family labour supply is that conditional on exhibiting prenatal career ambitions, labour market behaviour is unaffected by childbirth. The evidence presented here suggests that not only does this view overlook important adjustments following childbirth, but these adjustments may be coming increasingly common. In particular, analysis of Canadian Census data spanning three decades suggests that conditional on being employed full-year full-time in the year before a birth, the probability of either working or being temporarily absent from a job has been decreasing over the past two decades or longer. Further, using longitudinal microdata from the period 1993 to 2003, there is evidence of significant adjustments in usual hours of work and in hourly wages in the periods following a birth. This essentially descriptive analysis provides a much richer perspective on the actual responses of families to a birth than currently exists in the literature.

In terms of the policy relevance of these findings, the predominant all-or-nothing perspective of perinatal family labour supply is consistent with an all-or-nothing policy environment in which governments provide career mothers with wage replacements in the short-term and subsidized daycare in the long-term, while mothers with no prenatal or postnatal employment are ignored. In contrast, a policy environment that was more consistent with the evidence presented here might support families in making labour market adjustments even when perinatal employment is continuous. Or it might encourage women who drop out of the labour market entirely following a birth, despite strong prenatal labour market attachment, to maintain some limited form of employment. An example of such a policy is the Swedish 1995 Parental Leave Act and Britain's 2002 Flexible Working Regulations Act, which both give new parents the right to opt for shorter working hours as a means of balancing employment and childrearing responsibilities. Consideration of such a policy or other policies that enable families to better balance careers and childrearing seems valuable.

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Appendix A: Comparison of Female Employment Rates from 3 Data Sources

May 1991.

	Census	LFS (weighted)	SLID (weighted)	SLID (unweighted)
Women aged 15-64	62.6	62.4	-	-
Women aged 15-64, with children under 25	61.5	64.0	-	-
Women aged 15-64, with children under 1	49.1	52.6	-	-

May 1996.

	Census	LFS (weighted)	SLID (weighted)	SLID (unweighted)
Women aged 15-64	62.1	62.0	63.3	63.4
Women aged 15-64, with children under 25	61.6	65.2	63.0	63.5
Women aged 15-64, with children under 1	50.6	54.2	55.5	56.1

May 2001.

	Census	LFS (weighted)	SLID (weighted)	SLID (unweighted)
Women aged 15-64	66.3	66.7	68.8	68.6
Women aged 15-64, with children under 25	66.9	71.9	70.0	69.9
Women aged 15-64, with children under 1	51.0	59.8	60.8	60.3

Notes:

1. The SLID rates are based on employment status in the 21st week of the calendar year (i.e. 3rd week in May).
2. Weighted population counts are roughly comparable in each of the 3 data sources.

Appenix B: Construction of SLID sample

1. Identify all census family wives, husbands and children in the cross-sectional data [use **CFTYPE** and **RMJCE**] . For each observation generate *census family size* and *date of birth of youngest census family member*.

2. For all census family wives identify the *id* of their husband.

3. Keep only census family wives. Also drop observations where wife is observed with a new husband during 6-year panel (since observations in the analysis are married couples, this avoids having multiple observations on the same individuals). Reshape dataset, so one observation per wife. Finally, drop wives where the husband is observed with a different wife earlier in the 6-year panel.

4. Identify childbirths using *date of birth of youngest census family member*, which after reshaping to individual-level data is a 6-element vector. The algorithm used essentially considers each year of the six-year panel looking for years in which the wife is married and a new birth has

occurred. For each year a variable is created indicating in which month of the year the birth occurred.

5. Where multiple births for a single couple, identify only the date of the first birth.

Table 1: Employment rates of married women with a first-born child under 5 months.

	Employed – at work		Employed –	Employed –
	< 20 paid hours	>= 20 paid hours	Absent	total
1. Total				
1971	3.9	10.8	3.2	17.9
1981	2.9	11.2	30.5	44.6
1991	3.1	10.7	42.2	56.1
2001	3.3	12.1	37.8	53.2
2. Worked full-year full-time in year before birth				
1971	3.8	18.7	8.8	31.3
1981	1.6	15.6	53.3	70.5
1991	2.3	12.3	57.8	72.4
2001	1.9	10.1	53.7	65.6
3. Worked full-year full-time in year before birth and university educated				
1971	2.8	21.0	13.1	36.2
1981	2.7	14.5	59.7	77.0
1991	2.6	13.2	60.3	76.0
2001	2.1	9.6	58.8	70.5
4. Worked full-year full-time in year before birth, university educated, and 30 or over				
1971	*	*	*	*
1981	1.5	16.5	61.0	78.9
1991	3.5	14.1	57.4	74.9
2001	2.0	10.5	59.6	72.1

Table 2: Employment rates of married men with a first-born child under 5 months.

	Employed – at work		Employed –	Employed –
	< 20 paid hours	>= 20 paid hours	Absent	total
1. Total				
1971	3.4	84.8	1.6	89.8
1981	1.6	86.9	3.9	92.4
1991	1.9	82.2	3.9	88.0
2001	1.9	83.0	3.8	88.8
2. Worked full-year full-time in year before birth				
1971	2.2	91.4	1.5	95.2
1981	1.0	93.8	3.2	98.1
1991	1.1	91.9	3.1	96.2
2001	0.8	91.7	3.8	96.3
3. Worked full-year full-time in year before birth and university educated				
1971	1.6	94.3	1.8	97.7
1981	1.5	95.6	2.2	99.3
1991	1.0	95.3	2.3	98.6
2001	1.0	92.7	3.5	97.2
4. Worked full-year full-time in year before birth, university educated, and 30 or over				
1971	1.4	93.7	2.0	97.2
1981	1.7	95.5	2.1	99.3
1991	1.0	95.3	2.5	98.9
2001	1.1	93.1	3.8	98.0

Table 3: Least squares fixed effects perinatal employment rates of new mothers and fathers.

	University-educated		Below university		Difference	
Time since birth			Mothers			
1-9 months before	-0.014	(0.008)	-0.059*	(0.006)	0.046*	(0.010)
0-6 months after	-0.065*	(0.011)	-0.114*	(0.008)	0.049*	(0.014)
7-12 months after	-0.073*	(0.017)	-0.113*	(0.011)	0.041*	(0.020)
1-2 years after	-0.071*	(0.018)	-0.099*	(0.012)	0.028	(0.021)
2-3 years after	-0.075*	(0.023)	-0.118*	(0.015)	0.043	(0.026)
3-4 years after	-0.066*	(0.025)	-0.121*	(0.018)	0.055	(0.029)
4-5 years after	-0.047	(0.030)	-0.089*	(0.024)	0.042	(0.036)
5-6 years after	-0.033	(0.046)	-0.051	(0.040)	0.018	(0.059)
Time since birth			Fathers			
1-9 months before	0.018*	(0.005)	0.011*	(0.004)	0.008	(0.006)
0-6 months after	0.009	(0.008)	0.002	(0.005)	0.008	(0.009)
7-12 months after	0.015	(0.011)	0.014*	(0.007)	0.001	(0.012)
1-2 years after	0.022	(0.012)	0.019*	(0.008)	0.003	(0.013)
2-3 years after	0.027	(0.014)	0.027*	(0.010)	-0.0002	(0.015)
3-4 years after	0.034*	(0.015)	0.031*	(0.012)	0.004	(0.016)
4-5 years after	0.033*	(0.017)	0.026	(0.016)	0.007	(0.019)
5-6 years after	0.009	(0.031)	0.032	(0.023)	-0.023	(0.035)

Note: Robust and clustered standard errors in parentheses. * indicates significance at the 5% level.

Table 4: Least squares fixed effects perinatal log usual monthly hours of work of new mothers and fathers who were employed in the month of the birth.

	University-educated		Below university		Difference	
Time since birth			Mothers			
1-9 months before	0.007	(0.012)	-0.006	(0.009)	0.012	(0.015)
0-6 months after	-0.048*	(0.016)	-0.110*	(0.011)	0.062*	(0.020)
7-12 months after	-0.109*	(0.025)	-0.182*	(0.018)	0.074*	(0.030)
1-2 years after	-0.144*	(0.027)	-0.201*	(0.020)	0.057	(0.032)
2-3 years after	-0.178*	(0.034)	-0.198*	(0.023)	0.023	(0.038)
3-4 years after	-0.198*	(0.045)	-0.212*	(0.031)	0.014	(0.051)
4-5 years after	-0.196*	(0.069)	-0.190*	(0.040)	-0.006	(0.075)
5-6 years after	-0.161	(0.104)	-0.298*	(0.051)	0.137	(0.111)
Time since birth			Fathers			
1-9 months before	0.033*	(0.015)	0.008	(0.009)	0.025	(0.018)
0-6 months after	0.014	(0.018)	0.010	(0.010)	0.004	(0.020)
7-12 months after	0.014	(0.020)	0.012	(0.013)	0.002	(0.022)
1-2 years after	0.006	(0.019)	-0.0003	(0.013)	0.006	(0.021)
2-3 years after	0.022	(0.019)	0.006	(0.014)	0.016	(0.020)
3-4 years after	0.016	(0.022)	0.016	(0.017)	-0.0002	(0.023)
4-5 years after	0.010	(0.025)	0.010	(0.022)	-0.0003	(0.027)
5-6 years after	0.044	(0.063)	-0.018	(0.033)	0.062	(0.068)

Note: Robust and clustered standard errors in parentheses. * indicates significance at the 5% level.

Table 5: Least squares fixed effects perinatal log hourly wage of work of new mothers and fathers who were employed in the month of the birth.

	University-educated		Below university		Difference	
Time since birth			Mothers			
1-9 months before	0.019	(0.007)	-0.0001	(0.004)	0.019*	(0.008)
0-6 months after	0.011	(0.009)	-0.009	(0.005)	0.020*	(0.010)
7-12 months after	0.013	(0.014)	-0.021*	(0.009)	0.034*	(0.016)
1-2 years after	0.019	(0.017)	-0.024*	(0.011)	0.043*	(0.019)
2-3 years after	-0.003	(0.022)	-0.021	(0.014)	0.018	(0.024)
3-4 years after	-0.032	(0.027)	-0.024	(0.017)	-0.008	(0.029)
4-5 years after	-0.047	(0.042)	-0.035	(0.026)	-0.012	(0.047)
5-6 years after	-0.015	(0.054)	-0.047	(0.047)	0.033	(0.068)
Time since birth			Fathers			
1-9 months before	0.013	(0.008)	0.008*	(0.004)	0.005	(0.009)
0-6 months after	0.057*	(0.010)	0.015*	(0.005)	0.041*	(0.012)
7-12 months after	0.076*	(0.016)	0.026*	(0.008)	0.050*	(0.018)
1-2 years after	0.105*	(0.019)	0.034*	(0.011)	0.071*	(0.021)
2-3 years after	0.129*	(0.024)	0.036*	(0.013)	0.093*	(0.025)
3-4 years after	0.130*	(0.024)	0.029	(0.016)	0.100*	(0.026)
4-5 years after	0.116*	(0.036)	0.025	(0.021)	0.092*	(0.038)
5-6 years after	0.135*	(0.050)	-0.003	(0.030)	0.138*	(0.055)

Note: Robust and clustered standard errors in parentheses. * indicates significance at the 5% level.

Figure 1: Survey of Labour and Income Dynamics (SLID) Sample Attrition

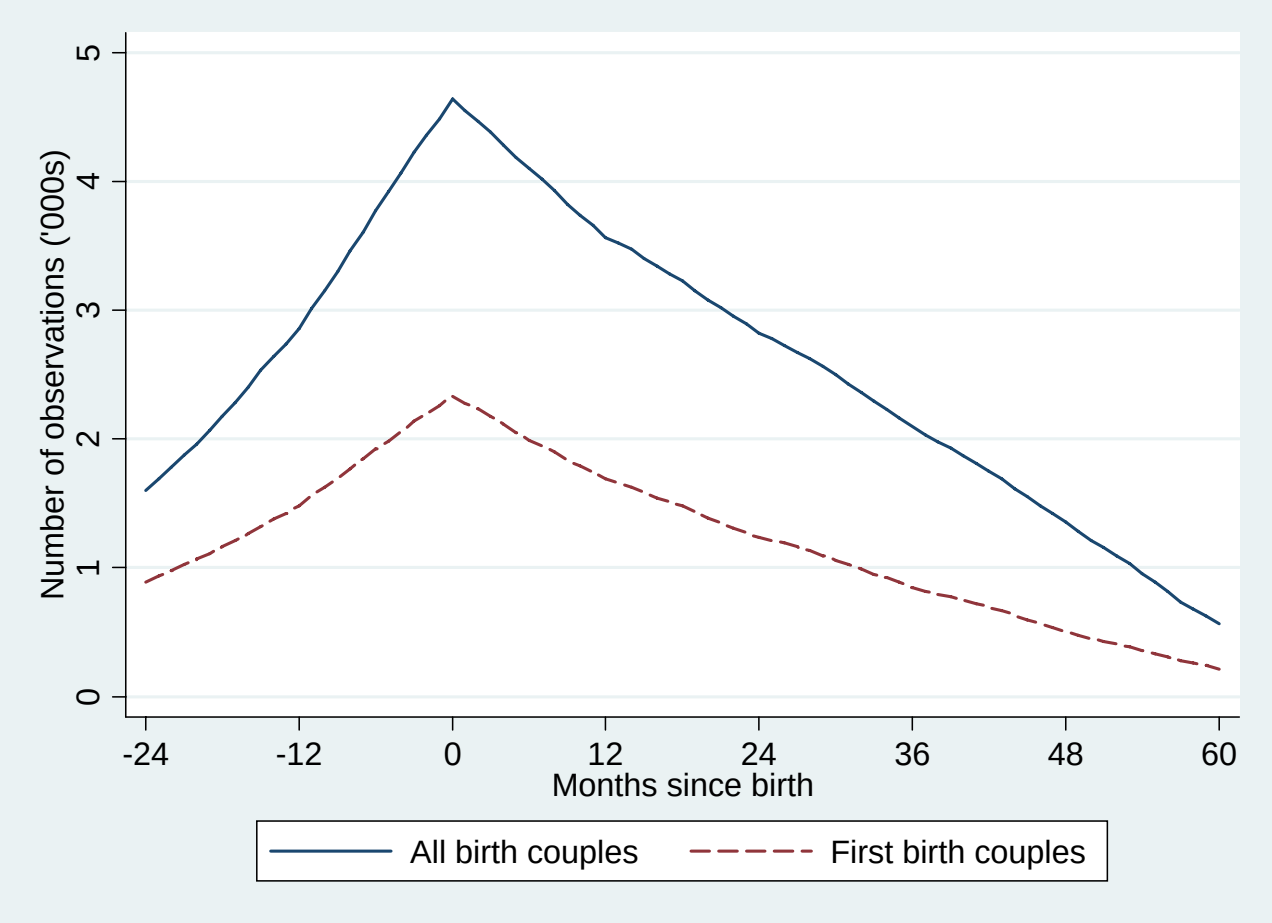
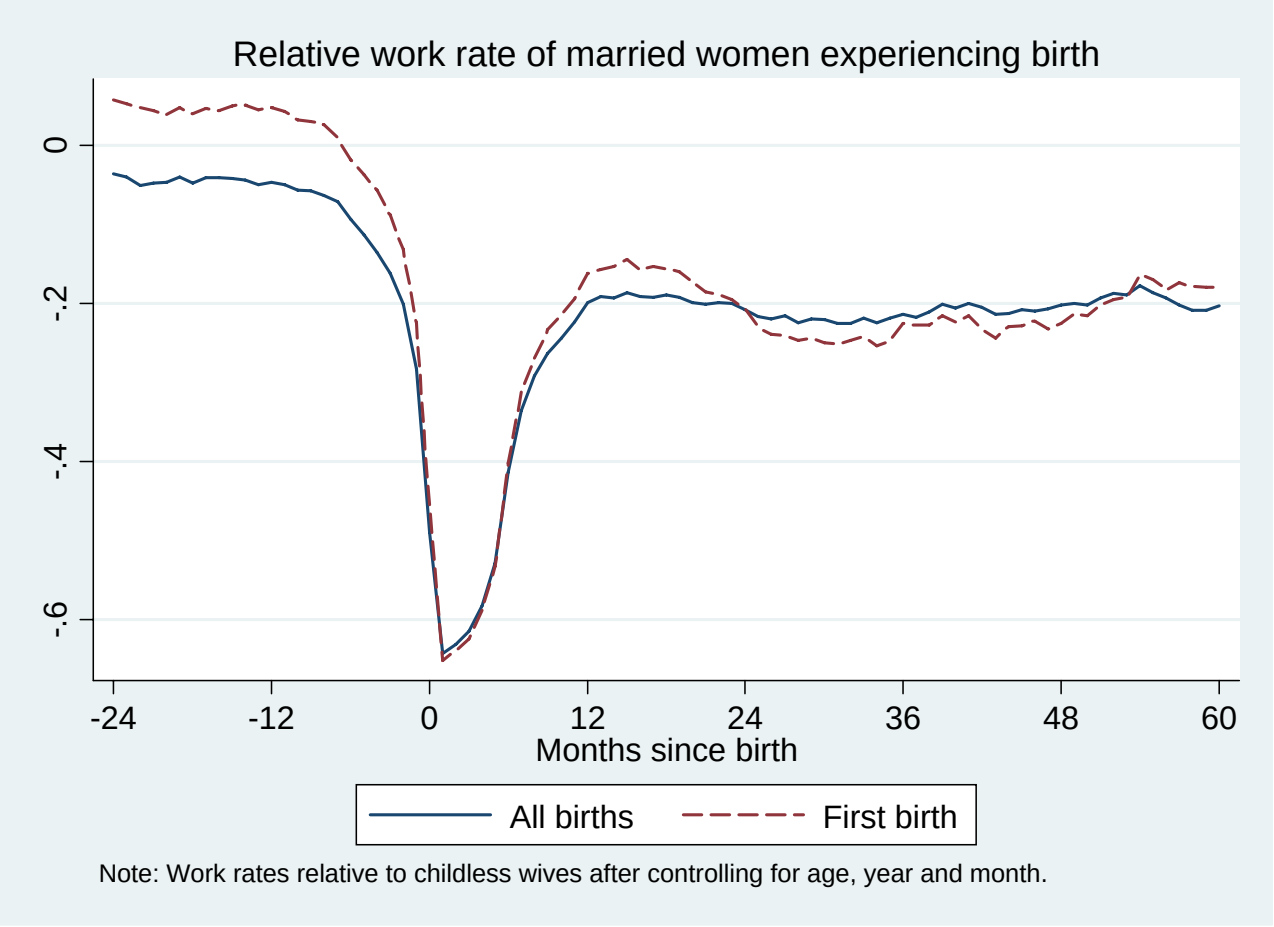


Figure 2: Perinatal employment rates of married women.

Figure 3: Perinatal employment rates of married men.

Figure 4: Relative work rate of married women experiencing birth



Note: Work rates relative to childless wives after controlling for age, year and month.

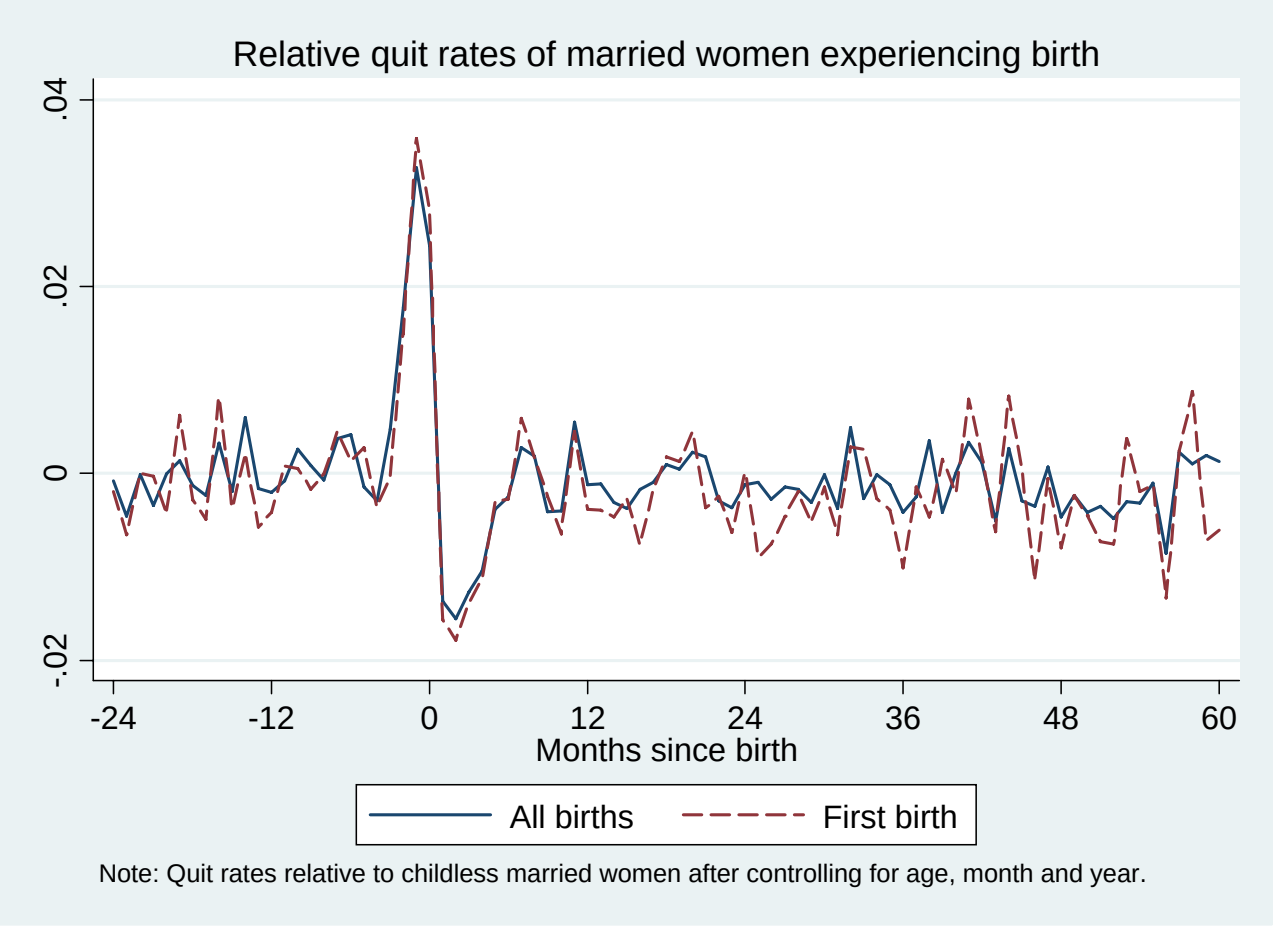
Figure 5: Relative employment rate of married women experiencing birth.

Note: Employment rates relative to childless married women after controlling for age, month and year.

Figure 6: Relative work rate of married men experiencing birth.

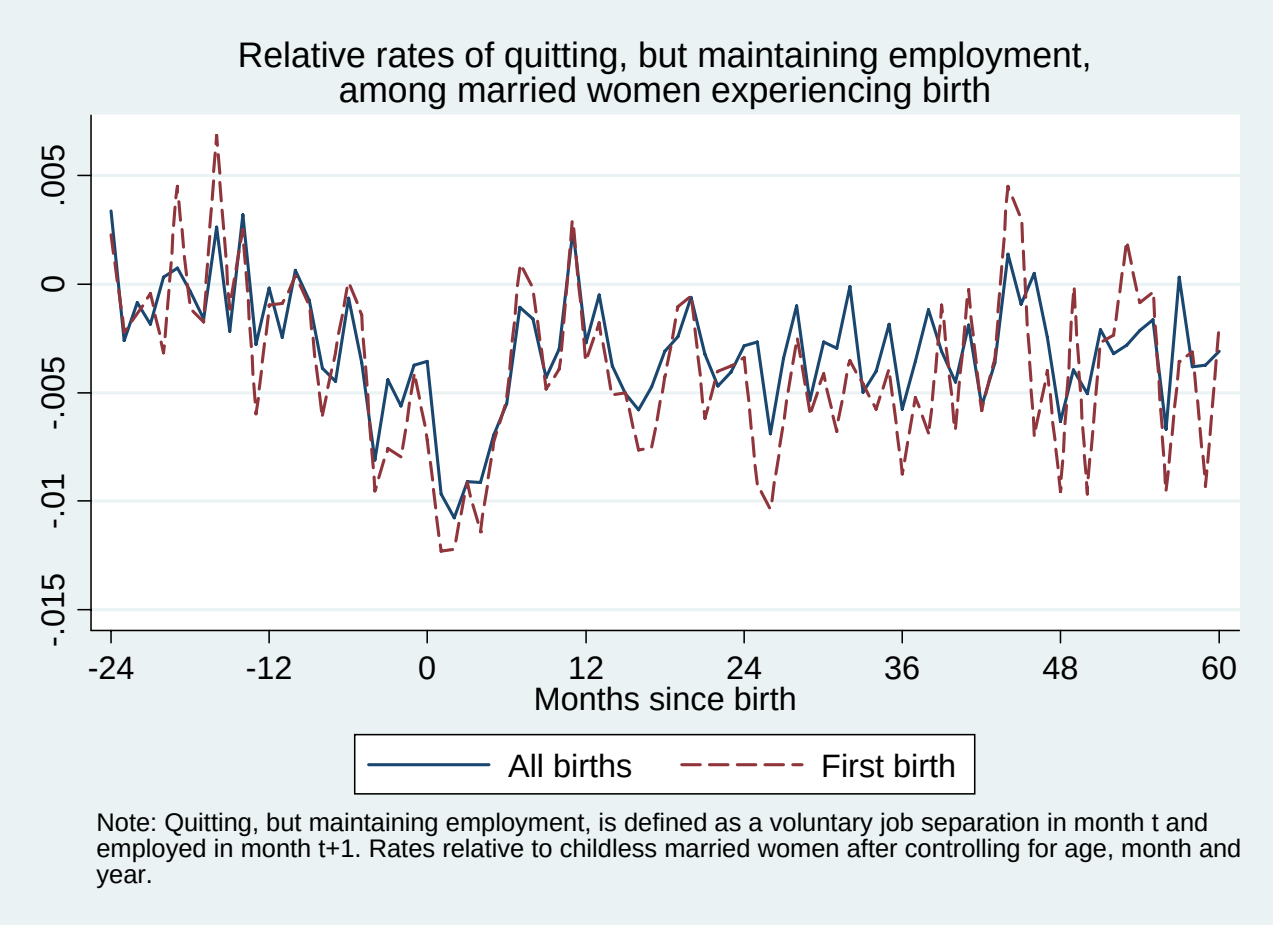
Note: Work rates relative to childless married men after controlling for age, month and year.

Figure 7: Relative quit rates of married women experiencing birth



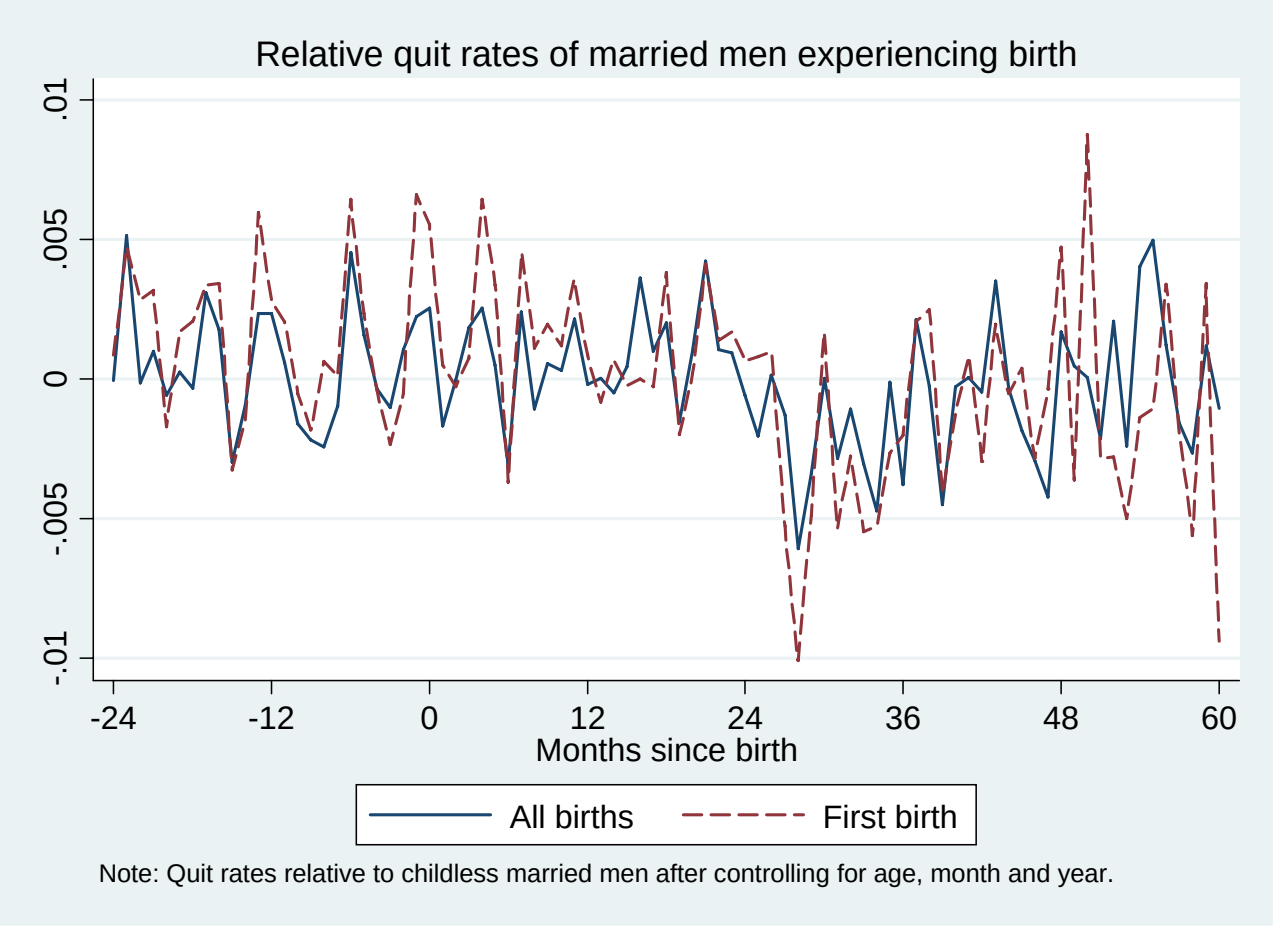
Note: Quit rates relative to childless married women after controlling for age, month and year.

Figure 8: Relative rates of quitting, but maintaining employment, among married women experiencing birth.



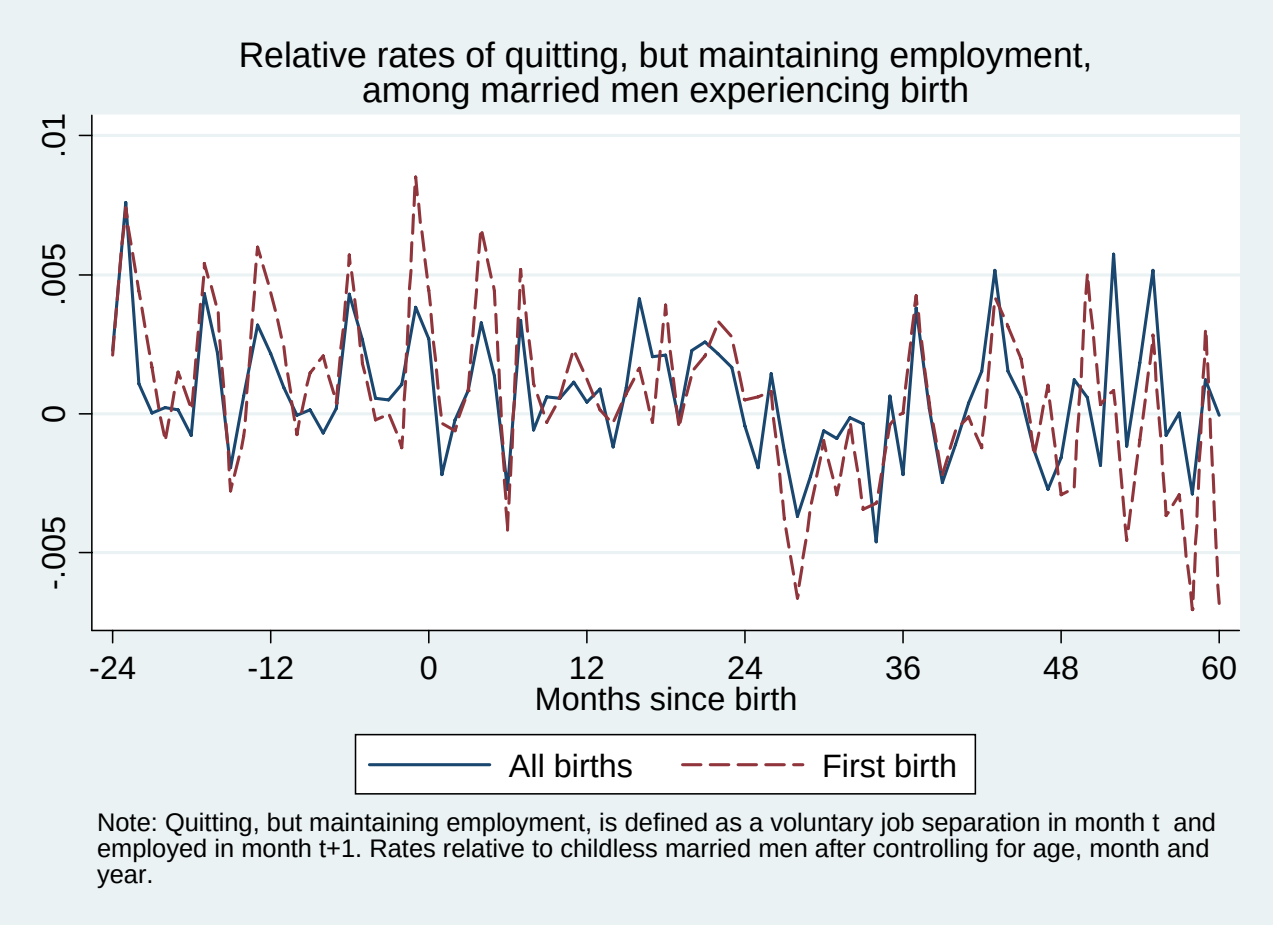
Note: Quitting, but maintaining employment, is defined as a voluntary job separation in month t and employed in month t+1. Rates relative to childless married women after controlling for age, month and year.

Figure 9: Relative quit rates of married men experiencing birth



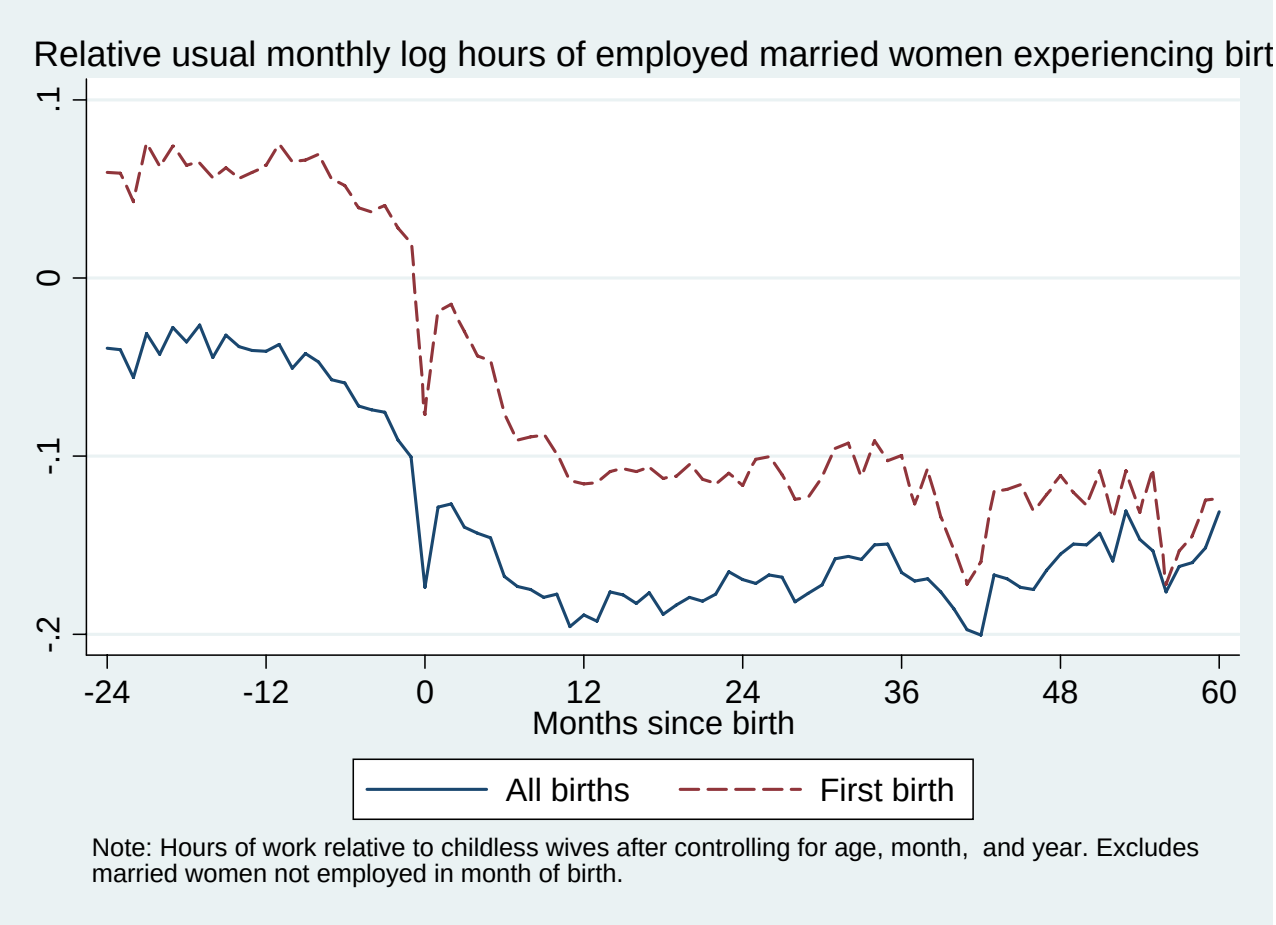
Note: Quit rates relative to childless married men after controlling for age, month and year.

Figure 10: Relative rates of quitting, but maintaining employment, among married men experiencing birth.



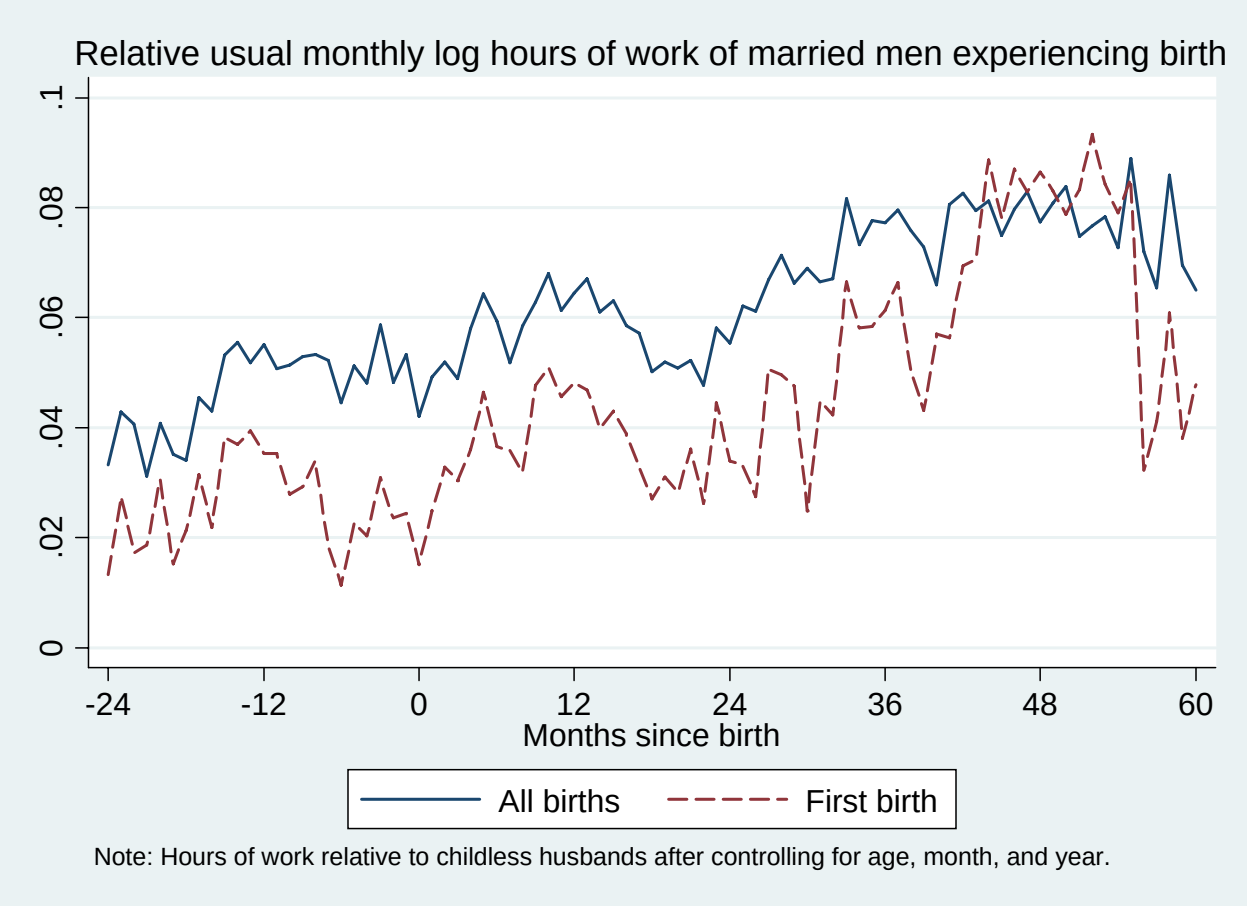
Note: Quitting, but maintaining employment, is defined as a voluntary job separation in month t and employed in month t+1. Rates relative to childless married men after controlling for age, month and year.

Figure 11: Relative usual monthly log hours of employed married women experiencing birth.



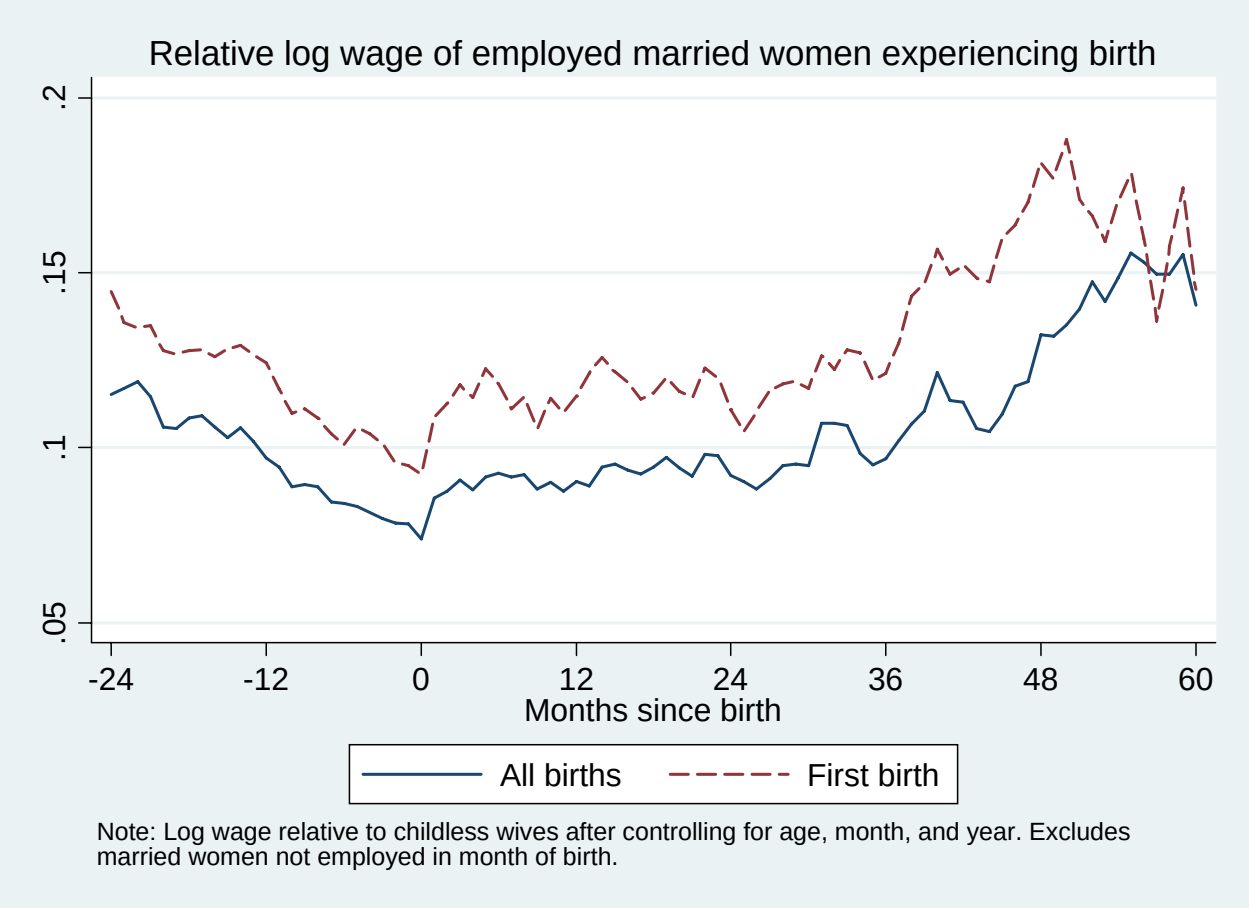
Note: Hours of work relative to childless wives after controlling for age, month, and year. Excludes married women not employed in month of birth.

Figure 12: Relative usual monthly log hours of work of married men experiencing birth.



Note: Hours of work relative to childless husbands after controlling for age, month, and year.

Figure 13: Relative log wage of employed married women experiencing birth.



Note: Log wage relative to childless wives after controlling for age, month, and year. Excludes married women not employed in month of birth.

Figure 14: Relative log wage wage of employed married men experiencing birth.

Note: Hours of work relative to childless husbands after controlling for age, month, and year. Excludes married men not employed in month of birth.