Mothers' Changing Labour Supply in Britain, the US, and Sweden

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Changes in female labor supply were one of the most dramatic features of the labor market in Europe and the USA during the Twentieth Century, and are likely to be so during the Twenty-First Century as well. Labor supply among men changed relatively little during the last third of the Twentieth Century. In contrast, labor supply among successive cohorts of women grew more or less continuously, and by substantial amounts. How has this increase in female labor supply come about? What are some of the factors underlying this change? Has this change proceeded more or less equally across the board, or has it occurred at different rates in different countries and for different groups of women (e.g., for mothers, the less-educated, etc.)?

To address these questions, we consider the experience of Britain, Sweden, and the USA. Although they have different social systems, in some important respects female labor supply in these three countries is relatively similar (see Table 1, which shows male and female labor force participation rates). We believe that a careful look at changes in female labor supply in these countries is useful for several reasons: it will increase our understanding of how female labor supply has been changing in these countries; it may help us determine the future course of female labor supply in these countries; and it may also provide a forecast of the likely course of labor supply in other countries, in which female labor supply is currently lower.

1. Female labor supply: a look at cohort changes

By most measures – labor force participation, weeks worked per year, hours worked per week – female labor supply in most countries increased substantially during the last third of the Twentieth Century, both in absolute terms and relative to male labor supply. How much of this can be traced to changes across (rather than within) cohorts?

The data for Sweden – which are somewhat limited in several respects – suggest that the labor force participation rates of successive birth cohorts of both men and women have changed very little relative to those of persons born in the first several decades of the Twentieth Century. These data come from the *Statistikdatabasen* of Statistics Sweden, which provides information on labor force participation at different ages. By combining these data for different years and ages (e.g., persons born in 1956-65 at ages 16-24, 25-34, 35-44, etc.), one can construct age-labor force participation profiles for seven synthetic birth cohorts, starting with persons born in 1916-25 and ending with persons born in 1976-85. Figures 1, for men, and 2, for women, show very little change in labor force participation from one birth cohort to the next.

In contrast, data for the USA (which are somewhat more detailed than the Swedish data) tell a very different story. These data come from the Annual Demographic Files of the US Current Population Survey (CPS) for 1968-2002. The CPS is a large national sample survey that provides, *inter alia*, data on sex, age, and hours and weeks worked per year. By combining the CPS data for different years and ages, one can construct data for ten synthetic birth cohorts, starting with persons born 1925-29 and ending with persons born in 1970-74. Graphs of annual hours worked for successive cohorts show very clearly which aspects of labor supply have – and have not – changed appreciably in the last 35 years.

First consider Figure 3, which graphs annual hours of work[1] for each synthetic birth cohort of U.S. men from 1925-29 to 1970-75. Each cohort's labor supply[2] follows the familiar inverted-U-shaped pattern. Note that each cohort's behavior is (at least in this visual presentation) virtually indistinguishable from any other's. Now consider Figure 4, for U.S. women, which makes it very clear that labor supply for more recent female birth cohorts is substantially greater than that of earlier cohorts. Measured at age 45, for example, the labor supply of the most recent female cohorts is about 600 hours of work per year greater than that of the oldest cohort. Note also that, for the most recent birth cohorts, the oft-mentioned U-shaped

[1] We follow the usual practice of deriving annual hours of work by multiplying weeks worked during the year and average hours of work during the week. Note that this does not make any adjustment for paid vacations (which are not measured by the CPS), and thus measures hours of paid work rather than hours actually spent at work. For both men and women, results for labor force participation rates are similar to the results for hours of work which we discuss in the text.

[2] Both here and in the analyses discussed below, we define "labor supply" as time actually worked; we do not analyze labor force participation per se.

dip in female hours of work during the prime child-bearing and child-rearing years (ages 25-35) is virtually nonexistent.

Table 2 summarizes Figures 3-4 by means of OLS regressions, in which the dependent variable – annual hours worked – is regressed on a cubic in age and dummies for birth cohort. For men, the difference between the oldest cohort (born 1920-24) and more recent cohorts (as measured by the coefficients for the latter) is generally small (less than 100 annual hours); indeed, the difference between the oldest cohort and the three youngest cohorts (born 1960-64 or later) is statistically indistinguishable from zero. In contrast, for women, the upward climb in cohorts' annual hours of work is dramatic; the difference in annual hours between the youngest and oldest cohorts (those born 1970-74 vs. those born 1925-29) is more than 800 ($t = 38.6$).

In sum, as Table 2 reminds us, men certainly constitute a greater fraction of total labor supply than do women: the labor market as a whole is still predominantly male. However, as Figure 4 shows very clearly, women constitute a greater fraction of the *change* in total labor supply during the last 40 years; and it is for this reason that we think that female labor supply is particularly important.

Education and motherhood are almost always considered to be important determinants of labor supply, particularly of women. The synthetic cohort data from the CPS highlight some very interesting possibilities about these two factors (although they also require some careful caveats).

First consider Figures 5 and 6. Figure 5 shows show annual hours worked, by birth cohort, for synthetic cohorts of US women with less than a university education (i.e., less than 16 years of schooling); Figure 6 shows annual hours for synthetic cohorts of US women with at least a university education. Figures 5 and 6, like Figure 4, show steady increases in annual hours of work for successive female cohorts. Comparison of Figures 5 and 6 suggests that hours of work may have increased somewhat more among women with less than 16 years of schooling

(Figure 6) than with 16 or more years (Figure 5). Table 3 uses OLS regression to summarize Figures 5 and 6; note that – as measured by their differences relative to the reference birth cohort (those born in 1920-24) – growth in labor supply for recent cohorts is indeed greater among women with less than 16 years of education than among women with 16 or more years of education. (For example, for women born in 1970-74, the difference in annual hours relative to those born in 1920-24 is 609 (t = 14.14) among women with 16 or more years of education, vs. 733 (t = 19.41) among women with less than 16 years of education.)

Figures 7 and 8 summarize annual hours of work for synthetic cohorts of US women, first with (Figure 7) and then without (Figure 8) children under 18 in the home. It should be noted that, to an even greater degree than is the case with the other synthetic cohort profiles shown in this paper, the profiles in Figures 7 and 8 should be interpreted with caution, because the absence or presence of children can itself vary with age. This means that the synthetic cohort profiles in Figures 5 and 6 do not necessarily give one a good idea of the age profile of any actual cohort.[3]

With this important caveat in mind, it is nevertheless interesting to consider Figures 7 and 8. They suggest – subject to the qualifications just noted – that labor supply of successive cohorts of US women with children, although still relatively low, has increased considerably more than labor supply of successive cohorts of childless US women. The OLS regressions in Table 4 make the point numerically: as measured by their cohort dummy-variable coefficients, the difference in annual hours relative to those born in 1920-24 is 800 (t = 21.17) for women born in 1970-74 with children, vs. 497 (t = 23.94) for women born in 1970-74 without children.

In sum, this relatively impressionistic and informal review of the data suggests that, in the USA, cohorts with low *levels* of labor supply (women, women with less than a university

[3] For example, a woman who has no children at age 25, but then gives birth to a child at age 26, will move from Figure 5 to Figure 6, only to move back to Figure 5 later on as her child grows up and leaves her household. For many purposes, the ideal "cohort" data on women with children would refer to women who will actually have (or expect to have) exactly *n* children (*n* = 0, 1, 2, …) during their lifetimes. However, we know of no simple way to trace out cohort profiles of this kind using conventional survey data such as the CPS.

education, women with children) have nevertheless *increased* their labor supply to a greater degree than have cohorts with higher levels of labor supply (men, women with a university education or more, women with no children). What is much less clear is whether these phenomena are purely cohort trends or whether other factors are at least partly responsible.

Education receives at least some attention in virtually every discussion of changes and trends in female labor supply. On a naïve view, education is an important component of one's market wage, so, by raising the wage, greater levels of education would be expected to attract women into market work, inducing them to postpone motherhood and return to work quickly after childbirth (particularly when it is necessary to purchase child care at market prices). However, education may also raise the home wage (the "opportunity cost of time"), thereby pulling women back into the home. As in conventional labor supply models, the net effect of education on the hazard of motherhood and of labor market reentry will therefore depend on its relative impact on home and market wages. (Note also that wives' education may be associated with both their own and their husbands' lifetime earning power, generating income effects.)

To see some of these issues in the starkest possible terms, consider the following very simple model. There are three periods; a woman can have at most one child, born in either period 1 or 2 (but not period 3). Utility in each period U(N, C) depends on the number of children N (= 0 or 1) and on consumption C. Income is Y for a childless woman; during period t (= 1 or 2), childbirth entails lost income K (for consumption, foregone earnings, etc.); during any period s after childbirth, earnings are reduced by an amount D due to skill depreciation caused by prior absence from the workforce for child-rearing. There is no discounting, saving or borrowing. There are, then, three choices (and, thus, three possible equilibria), with implications for utility in each of the three periods:

choice	utility in: period 1	period 2	period 3
have a child in period 1	U(1,Y-K)	U(1,Y-D)	U(1,Y-D)
have a child in period 2	U(0,Y)	U(1,Y-K)	U(1,Y-D)
do not have a child	U(0,Y)	U(0,Y)	U(0,Y)

The decision to have a child in period 1 vs. period 2 will depend on the relative magnitudes of U(1,Y-D) and U(0,Y); clearly, women with substantial earnings losses arising from childbearing (large D) are more likely to postpone, whereas women with high marginal utility for children (large $\partial U/\partial N$) are more likely to have their child in period 1.

How might education E affect the decision to have a child, or to postpone childbearing? It seems natural to assume that earnings Y are increasing in E; following the discussion above, it also seems natural to assume that education also increases the marginal utility of children $\partial U/\partial N$. The first effect will encourage postponement of childbearing; the second will encourage early childbearing. The net effect of education on childbearing is therefore indeterminate *a priori*.

In the next sections, we use formal statistical tools to examine the empirical relation between motherhood, education, and female labor supply more closely. We focus on several key questions: *ceteris paribus*, have more recent cohorts of women increased their labor supply relative to past cohorts by either (a) postponing the start of motherhood, or (b) working (or returning to work) for pay sooner after entering into motherhood? are these effects greater or smaller at higher levels of education? to what extent are differences in childbearing and labor supply the result of factors other than cohort effects per se, such as educational attainment?

2. **The hazard of motherhood**

In this section, we consider factors related to, and changes in, entry into motherhood. Are higher levels of education associated with postponement of entry into motherhood? Have successive cohorts of women tended increasingly to postpone entry into motherhood? We investigate these questions using data for Sweden, Britain, and the USA. We focus on time to birth of one's first child, i.e., the hazard of (first) motherhood.[4]

The detail in the data gives us the opportunity to examine this using several different models: Models 1A and 1B focus on birth cohort as an independent variable, estimated either without (1A) or with (1B) the female unemployment rate). Models 2A and B add “completed” education (usually measured as of the last survey wave available to us). In Models 3A and B, education is instead measured as a time-varying covariate.[5] Treating education as a time-varying covariate of course entails measuring the actual level of education (for persons still in the risk set) at each date. Since education (in either the "completed" or the time-varying sense) and fertility may be interrelated, this raises complicated questions about causality that argue for considerable caution in interpreting the results.

A. Sweden

Table 5 presents results for Cox proportional hazard models of first birth – equivalently, the "hazard of motherhood" – for Swedish women born in 1950-75.[6] Each model controls for mother's educational level (classified as Medium or High, relative to the reference category Low). Note that, as indicated in Table 5, educational level in these analyses is measured as of the date of the survey in which respondents were interviewed about their fertility history (generally, this was at entry into the panel).

In all of the models considered here, the more recent (1963-75) cohort of women has a significantly lower hazard of first birth than does the older (1950-62) cohort. Likewise, in all of these models, both higher unemployment and higher education are also statistically significantly associated with a lower hazard. Thus, these results are entirely consistent with the notion that the

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[4] It is certainly feasible to use our data to consider of time to second, third, etc., childbirth, but this poses some rather complicated analytical issues that do not arise in analyses of time to first birth (Heckman and Walker, 1990, 1991; Heckman, Hotz and Walker, 1985).

[5] The Swedish data do not permit us to measure education as a time-varying covariate, so we do not estimate a "Model 3" for Sweden.

[6] See Appendix A for discussion of the data used in our analyses of Sweden, Britain, and the USA.

hazard of motherhood is significantly lower both for the more highly educated and for more recent birth cohorts.

In contrast, Heckman et al. (1985) found a higher hazard of first birth associated with a university education in data for the 1941-45 birth cohort in Sweden; however, controlling for individual heterogeneity rendered this effect statistically insignificant, perhaps reflecting the impact of assortative mating. Heckman and Walker (1990, p. 1412; 1991, p. 5), who consider birth cohorts from 1936 to 1960, report evidence of "pronatal cohort drift in the parameters of fitted models that is consistent with the introduction of pronatal Swedish policies." Our own results suggest, however, that Sweden's unexpected and unprecedented sharp rise in unemployment during the 1990's may have discouraged childbirth during more recent times.

B. Britain

Table 6 presents our results for Cox proportional hazard models of the hazard of motherhood for two cohorts of women in Britain. We find that in Britain, to an even greater extent than in Sweden, higher levels of education are strongly associated with a lower hazard of motherhood regardless of which model, and which set of other covariates, we consider. We also find, again as in Sweden, that in all of our models, the more recent British cohort has a significantly lower hazard of motherhood.[7]

In sharp contrast with Sweden, however, the results for Britain indicate that higher unemployment is associated with a significantly higher hazard of motherhood: in other words, in Britain, poor labor market prospects appear to attract young women towards earlier, rather than delayed, motherhood. This contrast with Sweden could arise because in Britain, employment and childbearing have been seen as substitutes rather than as complements, as in Sweden, with

[7] In their analyses of data from the British Household Panel Survey for 1991-98, Aassve et al. (2003) find that women from more recent birth cohorts or with higher levels of education have a significantly lower hazard of births. (Their equation for the hazard of a birth distinguishes among first, second, etc., births using dummy variables for parity, and is part of a system of equations that considers union formation and employment transitions as well as births per se.)

its range of policies – from parental leave to subsidized childcare – to promote the combination of parenthood and work.

C. The US

Table 7 presents results for Cox analyses of the hazard of motherhood for cohorts of women in the USA. In all models, the evidence concerning education is clear-cut: regardless of how education is measured (either as of 2000, or as a time-varying covariate), women with relatively high levels of education (as of the date measured) have a lower hazard of motherhood.[8]

In contrast, the results concerning cohort differences are by no means uniform, for they are sensitive to which other variables are included in the analysis. In particular, in Models 1A and 1B (in which the only other covariates are demographic variables and the unemployment rate), the cohort difference is not statistically significant at conventional test levels. Likewise, in Models 2A and B, which include education measured as of 2000, the cohort effect is again not statistically significant. In contrast, in Models 3A and B, which include variables for educational attainment as a time-varying covariate, the cohort effect is not only statistically significant, but also much larger in magnitude than in the other models. The results concerning unemployment are somewhat more uniform: in all models, unemployment is associated with a lower hazard of motherhood, although in some instances (Models 1B and 2B) the effect is somewhat imprecisely estimated. The procyclical tendency of fertility in the US cannot be attributed to any public policy supporting employed mothers, though the greater use of market childcare by mothers of very young children may be relevant here.

D. General discussion

[8] Caucutt et al. (2002, p. 828) argue that "women's wages play a key role in both the quantity and timing of children, and the time trend for recent birth cohorts has been toward giving birth at later ages. These phenomena cannot be explained by women's education decisions…" However, in their regression analyses for the proportion of children born after age 27 that control for wages and total number of children, a variable for years of education is positive (implying that women with more education tend to have more children after age 27) and significant for all three birth cohorts considered. (Caucutt et al. do not test for cohort differences.)

Are the results for our three countries consistent with, or at odds with, each other? In a nutshell, the results for both Sweden and Britain provide strong support for the notion that the hazard of motherhood is lower both (a) for more recent cohorts and (b) for women with more education. On the other hand, higher unemployment is associated with a significantly higher hazard of motherhood in Sweden, but a significantly lower hazard in Britain.

In contrast, the evidence in our US analyses is somewhat puzzling. On the one hand, no matter how education is measured – as a time-varying covariate, or as of 2000 – the results indicate that greater educational attainment is associated with a significant reduction in the hazard of motherhood, as is also the case for both Sweden and Britain. On the other hand, the results concerning cohort effects are quite sensitive to how education is measured: if education is measured as of 2000, there is no indication of a significant cohort effect for the US; but if education is measured as a time-varying covariate, the results imply that women in the more recent cohort have a significantly lower hazard of motherhood than do women in the earlier cohort with the same level of education. Finally, like those for Sweden – but unlike those for Britain – the results for the US suggest that higher unemployment is associated with a slower entry into motherhood, although this effect is not always precisely estimated.

3. The hazard of working for pay after first childbirth

In this section, we consider another margin on which female labor supply may have adjusted over time, and which may have contributed to the increase in female labor supply: changes in working (or returning to work) for pay after childbirth. Is education associated with working sooner after childbirth? Relative to previous cohorts, have more recent cohorts entered (or returned to) paid work sooner after childbirth? *Ceteris paribus*, do women who postpone childbearing until later ages tend, after giving birth, to reenter the labor market sooner or later than other women?

We estimate three variants of each of three different models. Model 1 is the basic model, with a variable for birth cohort; Model 2 adds includes variables for completed education; Model 3 treats education as a time-varying covariate.[9] Within each model, variant A includes only basic variables; variant B adds a variable for the female unemployment rate; and variant C includes variables for both the female unemployment rate and the age of the mother as of the birth of her first child (for short, "time to first birth").

A. Sweden

Table 8 presents Cox proportional hazard models for marker work after the first childbirth for Sweden. The sample (167 women) is rather small – work history data in this phase are available only for women who had their first child after entering the study – which may help explain why most of the effects are quite imprecisely estimated. For what it is worth, the coefficient for birth cohort is negative-signed effect that is almost (but not quite) significant at conventional test levels until one adds the unemployment variable – which, *inter alia*, registers the adverse labor market conditions in Sweden during the 1990's. This reduces cohort differences still further in terms of both magnitude and statistical significance. There is a tendency, sometimes significant, for the hazard of market work to decline (at a decreasing rate) as time to first birth increases, whether or not education is also held constant (see Models 1C and 2C). In general, differences by educational attainment in the hazard of work after the first birth are not statistically meaningful (see Models 2A-2C in Table 8).[10]

B. Britain

[9] The Swedish data do not permit us to measure education as a time-varying covariate, so we do not estimate a "Model 3" for Sweden.
[10] In a probit analysis by Gutiérrez-Domènech (2003, p. 19, Table 11) of the probability of employment for Swedish women within eight years after the first birth, neither education effects nor cohort effects turn out to be statistically significant.

Next consider Table 9, which presents our results for proportional hazard models of work after the first birth in Britain. Our data pool event histories from two cohorts born 12 years apart. In our basic analysis (Model 1A), the later cohort has a greater chance of entering employment, though not quite significantly so. This cohort effect disappears in Model 1B, which adds unemployment (which itself has the expected negative effect on working). Model 1C adds time to (i.e., mother's age at) first birth, for which it is especially important to control in these data. (The earlier cohort is observed up to age 42, whereas the later cohort is observed only up to age 30.) Once this is taken into account, the younger (1970) cohort appears to have a significantly greater propensity to work after the first birth. Greater time to first birth is also, at least initially, significantly associated with working sooner after the first birth. This result remains after educational attainment is added (Model 2C), whereas greater education is also unambiguously and significantly related to a greater hazard of working after the first birth.

In the final model (Model 3C), unemployment becomes insignificant although all of the other covariates – cohort, education, and time to first birth – are quite precisely determined. The results for educational attainment and time to first birth are remarkably robust, and are essentially the same regardless of whether they are considered separately or together. These results also do not depend on whether education is measured as of age 30 (Model 2) or as a time-varying covariate (Model 3).

C. The US

Our results for Cox proportional hazard models for the US of work after the first birth appear in Table 10. In addition to the other variables considered in variant C of our models (i.e., time to first birth and its square), we add an indicator for whether the birth occurred during or after 1993 (when Federal legislation promoting unpaid family leave after childbirth took effect).

In many cases, the different models produce quite similar results. In each model, the more recent cohort (born in 1961-64) has a significantly higher hazard of work after the first birth. Similarly, in all cases, a higher female unemployment rate significantly reduces the hazard of work after childbirth. Likewise, in all three models, the coefficient for the "time to first birth" variable is positive but not statistically significant (see the results for Models 1C, 2C and 3C).[11] The coefficient for births after 1992 is always both negative and significant; taken at face value, this is consistent with the hypothesis that Federal legislation providing for limited unpaid family leave tended to reduce the hazard of (returning to) work after the first birth – although it should be noted that this may be confounded with other changes that occurred after 1992.

The results concerning education are sensitive to which other variables are included in the analysis. In Models 2A and 3A, which control only for cohort and education (either as of 2000 or as a time-varying covariate, respectively), education is positively and significantly associated with a greater hazard of work after the first birth. In contrast, in Models 2B and 3B, which control for cohort and unemployment as well as education, education is negatively associated with a greater hazard (albeit significantly so only in Model 3B). Finally, in Models 2C and 3C, which control for cohort, unemployment and time to first birth, the coefficients on the education variables are both negative and statistically significant.

D. General discussion

Our results concerning work after the first birth vary considerably from one country to another, and even from one model to another for the same country. Perhaps the most uniform finding is that higher female unemployment tends to discourage women from working after the first birth – although this effect is statistically significant in all models only for the US.

In most other respects, the results are mixed. For example, the results for Sweden imply that, *ceteris paribus*, more recent birth cohorts do not significantly accelerate or postpone work after the first childbirth, relative to earlier cohorts. In contrast, the US results imply that the

[11] We found no evidence of nonlinearity in the hazard of work with respect to time to first birth: the coefficient for the square of "time to first birth" was never significant at reasonable test levels in any of the models considered here.

more recent cohort tends to work (or resume work) after the first childbirth significantly sooner than the earlier cohorts, other things being equal. The same appears to be true in Britain, although there the cohort difference is statistically significant only in variant C.

Likewise, in Sweden and the US, the relation between time to first birth and the hazard of (resuming) work is often not significant; whereas in Britain, the hazard of work after motherhood significantly increases (at a diminishing rate) with the mother's age at first birth. Finally, the relation between education and the hazard of work after first birth is never significant in Sweden; is always positive and significant in Britain; and in the US is positive and significant in some models, negative but not significant in some models, and both negative and significant in still other models.

4. **Overall summary: In lieu of a conclusion**

Table 11 summarizes our overall results. The only truly uniform finding is that, in all three countries, education is significantly associated with a lower hazard of first motherhood (or equivalently, with a longer time to first birth) for persons in the same birth cohort. There is some evidence (some of it statistically significant) that suggests that, *ceteris paribus*, the hazard of first motherhood is lower for more recent cohorts. However, whereas the *ceteris paribus* hazard of work after the first birth is significantly higher for more recent cohorts in the US, in Sweden there are no significant cohort differences in this hazard. The evidence on the *ceteris paribus* relation between education and the hazard of market work is likewise not clear: in Britain it is always positive and significant; in Sweden it is never significant; in the US, it is positive and significant in some models, but negative and significant in others. Almost 20 years ago, Heckman et al. (1985, p. 179) commented that "unlike many other areas of knowledge in economics and social science, there are few widely accepted or carefully confirmed 'stylized facts' in fertility dynamics to guide economic model builders." The situation does not seem to have changed much since then.

What might account for these apparent differences in behavior among the three countries we have analyzed, and for the seeming absence of stylized facts? One obvious answer is that social and labor market institutions in these three countries are very different. Of course, it is one thing to speculate that institutional differences might help explain cross-country behavioral differences, and quite another to identify particular institutional differences that do in fact explain such behavioral differences.

In this connection, it should be noted that economic theory provides surprisingly little guidance as to the likely direction of the relation between a factor such as education and the hazard of either motherhood or work after childbirth. First consider the relation between education and motherhood in a purely static setting. On a naïve view, education is an important component of one's market wage, and so – by raising the wage – greater levels of education would be expected to pull women towards market work, inducing them to postpone motherhood and (return to) work quickly after childbirth. A million wage regressions support this view; but a moment's thought suggests that education may also raise the home wage (home productivity, or the "opportunity cost of time"), thereby pulling women into the home. As in conventional labor supply models, the net effect of education on the hazard of motherhood and on the hazard of market work after motherhood will now depend on its relative impact on the home and market wages. However, this is only the beginning of the story, for education also affects the availability of substitutes in child care and the elasticity of substitution between inputs. For example, as Leibowitz (1974) has noted, more-educated women may feel that there are fewer good substitutes for their own time, leading them to spend almost as much of their own time in child care as do women with less education.

In a dynamic framework, matters become still more complicated. For example, in a life-cycle perspective, higher education may entail a lifetime wealth effect, both in its own right and via assortive mating, that will enable women to spend less time in the labor market over their lifetimes and thereby tending to offset the substitution effect of education, operating through higher wage rates. Note also that questions about timing are likely to be just as relevant to education as they are to motherhood: just as women may postpone childbirth, they may also postpone (or accelerate) education. Hence, completed education will not necessarily be related to childbirth or to the return to work after childbirth in the same way as education measured at other points in the life cycle (e.g., treated as a time-varying covariate, as in some of our analyses). Our results (e.g., for the US in Table 10) show that this is indeed the case.

In sum, simple theories about how education will affect the hazard of motherhood or of work after childbirth are almost certain to be over-simplified; and it is likely to be very difficult to tease unambiguous predictions about such effects from any comprehensive model of the role of education in motherhood and work decisions.

One final point concerns the relation between these theoretical notions and the econometric techniques used in the analyses described here. Particularly in a life cycle perspective, work, education and motherhood are all choices; yet the analyses presented in this paper follow much prior work in taking education as given in "explaining" motherhood, and in taking both education and motherhood as given in "explaining" work choices. (For example, many of the analyses in this paper control for education in analyzing the hazard of motherhood, and control for both education and mother's age at first birth in analyzing the decision to work after childbirth.) From an empirical point of view, the fundamental problem with this approach is that it ignores unobservables. For example, women who desire to have children may plan on making only small investments in education (at least, if education raises home productivity less than market productivity) and on working relatively little. This will generate a strong negative correlation between education and children, suggesting that the former "causes" the latter, even though – at least in this story – both education and children are both determined by unobservable preferences. Likewise, our results for Britain show that, *ceteris paribus*, women who have their first child relatively late will return to the work force statistically significantly sooner than women who have their first child relatively early; but this negative relationship is not necessarily "structural" or "causal." Rather, it may be "spurious," arising simply from the neglect of unobservables (above-average tastes for work, above-average market productivity, etc.) that affect both the hazard of motherhood and the hazard of work after first birth (Heckman and Walker, 1990, 1991).

Evidence from other analyses of fertility suggests that "controlling for unobservables in a robust nonparametric fashion vitally affects the sign and statistical significance of the estimated effect of early life cycle events on subsequent fertility outcomes" (Heckman et al., 1985, p. 180). Developing a lifecycle econometric model that controls for unobservables and treats work, education and motherhood as interrelated choices will be difficult; but then again, pretending that each is exogenous to the others is difficult too.

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Table 1: Civilian Labor Force Participation Rates by Country and Sex, 1961 and 2001

year	Britain	US	Sweden	Canada	Australia	Japan	France	Germany	Italy	Netherlands
men										
1961	86.6	82.9	87.1	81.8	n/a	84.3	n/a	82.7	81.8	n/a
2001	70.8	74.4	68.1	72.6	73.1	75.5	64.2	66.3	61.4	75.4
women										
1961	40.1	38.1	46.1	31.0	n/a	52.4	n/a	41.0	32.5	n/a
2001	55.2	59.8	59.6	59.5	56.4	48.5	49.2	48.8	36.3	55.7

Source: U.S. Bureau of Labor Statistics. All series are adjusted to follow U. S. concepts.

Table 2: OLS Regression Analyses of Annual Hours Worked for Synthetic Birth Cohorts, by Sex – USA

	men			women		
variable	parameter estimate	standard error	t	parameter estimate	standard error	t
age	-158.07	17.74	-8.91	-285.49	12.61	-22.63
age2	5.32	0.40	13.04	8.02	0.29	27.63
age3	-0.05	0.00	-17.67	-0.06	0.00	-31.82
cohort dummies (reference: born 1920-24):						
born 1925-29	-76.32	20.32	-3.76	20.97	14.44	1.45
born 1930-34	-94.31	19.64	-4.80	93.94	13.96	6.73
born 1935-39	-82.31	19.34	-4.25	209.38	13.75	15.22
born 1940-44	-61.38	19.75	-3.11	319.18	14.04	22.73
born 1945-49	-77.47	20.58	-3.76	443.21	14.63	30.28
born 1950-54	-91.22	21.53	-4.24	548.50	15.30	35.83
born 1955-59	-76.49	22.69	-3.37	617.43	16.13	38.26
born 1960-64	-34.53	24.11	-1.43	690.49	17.14	40.28
born 1965-69	-3.86	26.03	-0.15	745.16	18.51	40.25
born 1970-74	8.91	29.50	0.30	809.27	20.97	38.59
intercept	3382.81	247.10	13.69	3767.72	175.67	21.45
R^2, number of observations.	0.9641, 237			0.9767, 237		

Table 3: OLS Regression Analyses of Annual Hours Worked for Synthetic Birth Cohorts, by Education – US Women

variable	16 years of education or more: parameter estimate	standard error	t	less than 16 years of education: parameter estimate	standard error	t
age	-543.69	25.90	-20.99	-214.64	11.67	-18.38
age2	13.75	0.59	23.06	6.44	0.26	23.96
age3	-0.11	0.00	-24.88	-0.05	0.00	-28.68
cohort dummies (reference: born 1920-24):						
born 1925-29	-44.18	29.66	-1.49	18.39	13.37	1.38
born 1930-34	47.88	28.68	1.67	75.69	12.92	5.85
born 1935-39	124.58	28.24	4.41	183.60	12.73	14.42
born 1940-44	192.97	28.83	6.69	284.28	12.99	21.87
born 1945-49	299.68	30.05	9.97	393.00	13.54	29.01
born 1950-54	395.01	31.43	12.57	488.32	14.17	34.46
born 1955-59	444.19	33.13	13.40	566.28	14.93	37.91
born 1960-64	468.50	35.20	13.31	641.21	15.86	40.41
born 1965-69	525.94	38.01	13.84	679.90	17.13	39.68
born 1970-74	608.98	43.06	14.14	732.91	19.41	37.75
intercept	7917.40	360.74	21.95	2732.92	162.62	16.81
R^2, number of observations.		0.9056, 237			0.9773, 237	

Table 4: OLS Regression Analyses of Annual Hours Worked for Synthetic Birth Cohorts, by Presence of Children – US Women

	no children under 18			with children under 18		
Variable	parameter estimate	standard error	t	parameter estimate	standard error	t
age	378.90	72.61	5.22	-169.77	64.21	-2.64
age2	-10.51	2.13	-4.93	6.21	1.88	3.30
age3	0.09	0.02	4.61	-0.06	0.01	-3.41
cohort dummies (reference: born 1930-34):						
born 1935-39	168.51	22.47	7.50	149.74	19.87	7.53
born 1940-44	264.91	21.71	12.20	257.76	19.20	13.42
born 1945-49	386.43	21.33	18.11	393.42	18.86	20.85
born 1950-54	452.35	21.27	21.26	498.82	18.81	26.51
born 1955-59	486.25	21.27	22.85	562.03	18.81	29.87
born 1960-64	512.53	21.74	23.57	634.13	19.23	32.97
born 1965-69	497.97	22.65	21.98	705.81	20.03	35.23
born 1970-74	496.92	23.94	20.75	800.03	21.17	37.78
Intercept	-3230.38	815.27	-3.96	1590.55	721.00	2.21
R^2, number of observations.		0.9501, 120			0.9793, 120	

Table 5: Cox Proportional Hazard Models of Time to First Birth – Sweden

variable	hazard ratio	standard error	z	Pr > z
Model 1A: cohort				
born 1963-75	0.720	0.054	-4.41	0.000
Model 1B: cohort and lagged female unemployment rate				
born 1963-75	0.786	0.062	-3.06	0.002
unemployment rate	0.928	0.023	-3.07	0.002
Model 2A: cohort and education at survey date				
born 1963-75	0.771	0.058	-3.46	0.001
education: medium	0.597	0.050	-6.16	0.000
high	0.488	0.040	-8.83	0.000
Model 2B: cohort, education, and lagged female unemployment rate				
born 1963-75	0.831	0.066	-2.34	0.019
education: medium	0.607	0.051	-5.97	0.000
high	0.490	0.040	-8.78	0.000
unemployment rate	0.935	0.023	-2.73	0.006

born 1963-75 = dummy for birth cohort (reference: born 1950-62)
education: medium = dummy for "medium" education
high = dummy for "high" education
(reference = "low" education)
unemployment rate = female unemployment rate, lagged 12 months

Data refer to women born during 1950-75 (n = 1539). Education is measured as of the survey date, when fertility history was also collected (mostly at entry into the panel). As shown below, this varies from 1984 to 1998. See Appendix A for further details.

Data on education and fertility are derived from the following surveys:

	born 1950-62:	born 1963-75	all
1984	259	38	297
1986	102	56	158
1993	283	347	630
1996	12	50	62
1998	205	187	392
total	861	678	1539

Table 6: Cox Proportional Hazard Models of Time to First Birth – Britain

variable	hazard ratio	standard error	z	Pr > z
Model 1A: cohort				
born 1970	0.788	0.019	-9.71	0.000
Model 1B: cohort and lagged female unemployment rate				
born 1970	0.816	0.020	-8.14	0.000
unemployment rate	1.051	0.008	6.60	0.000
Model 2A: cohort and education at age 30				
born 1970	0.885	0.022	-4.94	0.000
education: medium	0.670	0.019	-13.89	0.000
high	0.396	0.013	-27.40	0.000
Model 2B: cohort, education at age 30 and lagged female unemployment rate				
born 1970	0.9172	0.023	-3.43	0.000
education: medium	0.668	0.019	-13.98	0.000
high	0.396	0.013	-27.42	0.000
unemployment rate	1.052	0.008	6.82	0.000
Model 3A: cohort and time-varying education				
born 1970	0.877	0.022	-5.29	0.000
education: medium	0.633	0.018	-15.78	0.000
high	0.420	0.015	-25.03	0.000
Model 3B: cohort, time-varying education and lagged female unemployment rate				
born 1970	0.907	0.023	-3.87	0.000
education: medium	0.631	0.183	-15.89	0.000
high	0.422	0.015	-24.91	0.000
unemployment rate	1.049	0.008	6.38	0.000

born 1970 = dummy variable for birth cohort (reference: born 1958)
education: medium = dummy variable for "medium" educational attainment
high = dummy variable for "high" educational attainment (reference = "low" educational attainment)
unemployment rate = female unemployment rate, lagged 12 months

Data refer to women born in 1958 and 1970 in the combined NCDS (1958) and BCS (1970) surveys (n=11,390 in total). See Appendix A for further details.

Table 7: Cox Proportional Hazard Models of Time to First Birth – USA

variable	hazard ratio	standard error	z	Pr > z
Model 1A: cohort				
born 1961-64	0.971	0.041	-0.73	0.466
Model 1B: cohort and lagged female unemployment rate				
born 1961-64	0.958	0.041	-1.04	0.301
unemployment rate	0.964	0.021	-1.72	0.085
Model 2A: cohort and education at 2000				
born 1961-64	0.980	0.041	-0.50	0.616
education: medium	0.568	0.072	-7.87	0.000
high	0.303	0.081	-14.67	0.000
Model 2B: cohort, education at 2000 and lagged female unemployment rate				
born 1961-64	0.967	0.041	-0.81	0.419
education: medium	0.568	0.072	-7.87	0.000
high	0.303	0.081	-14.67	0.000
unemployment rate	0.965	0.021	-1.70	0.089
Model 3A: cohort and time-varying education				
born 1961-64	0.852	0.043	-3.75	0.000
education: medium	0.559	0.060	-9.74	0.000
high	0.630	0.081	-5.71	0.000
Model 3B: cohort, time-varying education and lagged female unemployment rate				
born 1961-64	0.837	0.044	-4.10	0.000
education: medium	0.555	0.060	-9.84	0.000
high	0.626	0.081	-5.79	0.000
unemployment rate	0.955	0.021	-2.18	0.030

born 1961-64 = dummy for birth cohort (reference = born 1957-60)
education: medium = dummy for "medium" education
high = dummy for "high" education
(reference = "low" education)
unemployment rate = female unemployment rate, lagged 12 months

Data refer to women born during 1957-64 in the NLSY79 survey (n=3,108). All analyses include dummies for black race and Hispanic ethnicity (reference category is white non-Hispanics). See Appendix A for further details.

Table 8: Cox Proportional Hazard Models of Work After First Birth – Sweden

variable	hazard ratio	standard error	z	Pr > z
Model 1A: cohort				
born 1963-75	0.717	0.129	-1.86	0.063
Model 1B: cohort and female unemployment rate				
born 1963-75	0.818	0.166	-0.99	0.321
unemployment rate	0.959	0.029	-1.37	0.170
Model 1C: cohort, female unemployment rate, and childbirth variables				
born 1963-75	0.843	0.238	-0.61	0.544
unemployment rate	0.955	0.032	-1.37	0.170
time to first birth	0.696	0.148	-1.70	0.089
time to first birth, squared	1.006	0.004	1.76	0.078
Model 2A: cohort and education at first birth				
born 1963-75	0.716	0.129	-1.86	0.063
education: medium	0.796	0.176	-1.03	0.303
high	1.054	0.218	0.25	0.801
Model 2B: cohort, education at first birth, and female unemployment rate				
born 1963-75	0.848	0.173	-0.81	0.420
education: medium	0.747	0.168	-1.30	0.193
high	1.087	0.226	0.40	0.690
unemployment rate	0.947	0.030	-1.73	0.084
Model 2C: cohort, education at first birth, female unemployment rate, and childbirth variables				
born 1963-75	0.843	0.242	-0.59	0.552
education: medium	0.740	0.167	-1.33	0.183
high	1.197	0.265	0.81	0.416
unemployment rate	0.943	0.032	-1.70	0.088
time to first birth	0.632	0.141	-2.06	0.039
time to first birth, squared	1.008	0.004	2.12	0.034

```
born 1963-75         = dummy for birth cohort (reference:  born 1950-62)
education:  medium   = dummy for "medium" education
              high   = dummy for "high" education
                       (reference = "low" education)
unemployment rate    = female unemployment rate, lagged 12 months
time to first birth  = mother's age at birth of first child
```

Data refer to women born in 1950-75 who gave birth to their first child during 1984-97 (n=167). Uses monthly information on labor force status. See Appendix A for further details.

Table 9: Cox Proportional Hazard Models of Work After First Birth – Britain

variable	hazard ratio	standard error	z	Pr > z
Model 1A: cohort				
born 1970	1.050	0.028	1.84	0.065
Model 1B: cohort and female unemployment rate				
born 1970	1.008	0.029	0.29	0.780
unemployment rate	0.974	0.008	-3.36	0.000
Model 1C: cohort, female unemployment rate, and childbirth variables				
born 1970	1.197	0.041	5.31	0.000
unemployment rate	0.992	0.009	-0.88	0.380
time to first birth	1.171	0.027	6.97	0.000
time to first birth, squared	0.998	0.000	-5.13	0.000
Model 2A: cohort and education at age 30				
born 1970	1.025	0.027	0.91	0.360
education: medium	1.204	0.038	5.80	0.000
high	1.330	0.050	7.68	0.000
Model 2B: cohort, education at age 30 and female unemployment rate				
born 1970	0.990	0.029	-0.36	0.720
education: medium	1.202	0.038	5.76	0.000
high	1.320	0.049	7.45	0.000
unemployment rate	0.978	0.008	-2.85	0.000
Model 2C: cohort, education at age 30, female unemployment rate and childbirth variables				
born 1970	1.169	0.040	4.52	0.000
education: medium	1.104	0.036	3.06	0.000
high	1.138	0.044	3.34	0.000
unemployment rate	0.992	0.009	-0.88	0.380
time to first birth	1.164	0.027	6.69	0.000
time to first birth, squared	0.998	0.000	-5.02	0.000

Table 9: Cox Proportional Hazard Models of Work After First Birth – Britain (continued)

variable	hazard ratio	standard error	z	Pr > z
Model 3A: cohort and time-varying education				
born 1970	1.029	0.027	1.08	0.280
education: medium	1.205	0.039	5.83	0.000
high	1.380	0.051	8.63	0.000
Model 3B: cohort, time-varying education and female unemployment rate				
born 1970	0.996	0.029	-0.15	0.879
education: medium	1.203	0.038	5.79	0.000
high	1.368	0.051	8.36	0.000
unemployment rate	0.979	0.008	-2.69	0.007
Model 3C: cohort, time-varying education, female unemployment rate, and childbirth variables				
born 1970	1.169	0.040	4.52	0.000
education: medium	1.106	0.036	3.10	0.002
high	1.163	0.046	3.82	0.000
unemployment rate	0.993	0.009	-0.85	0.395
time to first birth	1.162	0.026	6.60	0.000
time to first birth, squared	0.998	0.000	-4.97	0.000

born 1970 = dummy variable for birth cohort (reference: born 1958)
education: medium = dummy variable for "medium" educational attainment
high = dummy variable for "high" educational attainment (reference = "low" educational attainment)
unemployment rate = female unemployment rate, lagged 12 months
time to first birth = mother's age at birth of first child

Data refer to women born in 1958 and 1970 in the combined NCDS (1958) and BCS (1970) surveys who gave birth to at least one child (n=7,846 in total). See Appendix A for further details.

Table 10: Cox Proportional Hazard Models of Work After First Birth – USA

variable	hazard ratio	standard error	z	Pr > z
Model 1A: cohort				
born 1961-64	1.541	0.046	9.33	0.000
Model 1B: cohort, and female unemployment rate				
born 1961-64	1.129	0.047	2.58	0.010
unemployment rate	0.162	0.042	-43.26	0.000
Model 1C: cohort, female unemployment rate, and childbirth variables				
born 1961-64	1.191	0.064	2.74	0.006
unemployment rate	0.158	0.067	-27.70	0.000
time after 1992	0.672	0.114	-3.49	0.001
time to first birth	1.001	0.001	1.27	0.204
Model 2A: cohort, and education at 2000				
born 1961-64	1.650	0.047	10.71	0.000
education: medium	1.288	0.089	2.97	0.005
high	2.607	0.098	9.77	0.000
Model 2B: cohort, education at 2000, and female unemployment rate				
born 1961-64	1.121	0.047	2.42	0.015
education: medium	0.891	0.090	-1.29	0.197
high	0.874	0.102	-1.32	0.187
unemployment rate	0.160	0.043	-42.47	0.000
Model 2C: cohort, education at 2000, female unemployment rate, and childbirth variables				
born 1961-64	1.194	0.064	2.77	0.006
education: medium	0.875	0.090	-2.20	0.138
high	0.859	0.103	-1.48	0.140
unemployment rate	0.158	0.067	-27.65	0.000
time after 1992	0.666	0.114	-3.56	0.000
time to first birth	1.002	0.001	1.47	0.142

Table 10: Cox Proportional Hazard Models of Work
After First Birth – USA (continued)

variable	hazard Ratio	standard error	z	Pr > z
Model 3A: cohort, and time-varying education				
born 1961-64	1.668	0.047	10.95	0.000
education: medium	1.453	0.081	4.63	0.000
high	3.154	0.091	12.66	0.000
Model 3B: cohort, time-varying education, and female unemployment rate				
born 1961-64	1.115	0.047	2.30	0.021
education: medium	0.833	0.082	-2.24	0.025
high	0.814	0.096	-2.15	0.031
unemployment rate	0.159	0.043	-42.37	0.000
Model 3C: cohort, time-varying education, female unemployment rate and childbirth variables				
born 1961-64	1.198	0.064	2.83	0.005
education: medium	0.812	0.083	-2.52	0.011
high	0.793	0.098	-2.37	0.018
unemployment rate	0.159	0.067	-27.63	0.000
time after 1992	0.660	0.114	-3.64	0.000
time to first birth	1.002	0.001	1.68	0.094

born 1961-64 = dummy for birth cohort (reference = born 1957-60)
education: medium = dummy for "medium" education
high = dummy for "high" education
(reference = "low" education)
unemployment = female unemployment rate
time after 1992 = dummy for first birth occurred in 1993 or later
time to first birth = mother's age at birth of first child

Data refer to women born during 1957-64 in the NLSY79 survey who gave birth to at least one child (n=2,191). All analyses include dummies for black race and Hispanic ethnicity (reference category is white non-Hispanics). See Appendix A for further details.

Table 11: Summary of Results in Tables 5-10

outcome, effect	Sweden	Britain	US
hazard of first birth:			
more recent cohort	- and SS all models	- and SS all models	- all models (NS except when education is TVC)
more education	- and SS all models	- and SS all models	- and SS all models
higher unemployment	- and SS all models	+ and SS all models	- all models (sometimes NS)
hazard of work after first birth:			
more recent cohort	- but NS all models	+ but SS only in Models C	+ and SS all models
more education	NS all models	+ and SS all models	+ and SS in Models 2A, 3A - but NS in Model 2B - and SS in Models 2A, 3B-C
higher unemployment	- but NS all models	- and SS in Model B - and NS in Model C	- and SS all models
older at birth of first child	- then + (often NS)	+ then - SS in all models	+ but NS all models

SS = statistically significant at 0.05 level
NS = not statistically significant at 0.05 level
TVC = time-varying covariate

Models C include variables for unemployment and for time to first birth and its square.
Models B include a variable for unemployment but not time to first birth.
Models A do not include variables for either unemployment or time to first birth.

Appendix A: Datasets Used in the Analyses

Data for Britain

The data for our analyses of Great Britain come from two major cohort datasets. The British Cohort Study (BCS) provides data on persons who were all born in the same week in April 1970. They were interviewed most recently in 1999/2000. This sweep contains detailed information on birthdates of any children, and on work histories from age 16 to age 30.

The National Child Development Study (NCDS) provides data on persons who were all born in a single week in March 1958. They have been interviewed at various points in their lives, with the three most recent sweeps occurring in 1981, at 23; 1991, when cohort members were 33; and in 1999/2000, when cohort members were 42. Monthly work histories were compiled at each of these sweeps and information on dates of any pregnancies was collected in 1991 and 2000. We exclude from our sample NCDS cohort members who were present at the 2000 sweep but not at the 1991 sweep, since these persons were asked only about births since age 33 (rather than about all births).

Our total sample consists of 11,390 women, with 5,802 from NCDS and 5,588 from BCS.

Variables

Education
The work history data for each cohort was used to measure the number of months spent in full-time education from the September after the 16th birthday up to age 30. The minimum school-leaving age in Britain of 16 implies a minimum of 11 years in full-time education. Categorical variables were constructed for years of education up to the age of 30. "Low" education is defined as no more than 11 years of full-time education (i.e., no time spent in full-time education beyond age 16); "medium" education is defined as 12 to 13 years of education (i.e., up to two years beyond the minimum); and "high" education is defined as 14 or more years of full-time education.

Our time-varying education variable is measured by counting months of full-time education. The minimum is again assumed to be 11 years of full-time education at age 16; the low, medium, and high educational attainment categories are defined in the same way as for the fixed education covariate, but for NCDS cohort members interviewed in 2000, all months in fulltime education up to age 42 are counted.

Labor force participation after childbirth
The work history data was used to find out whether the woman returned to work at some point from three months after childbirth onwards. Employed status could be either full-time or part-time. Those not in employment are categorised as either "not employed" or "in full-time education".

Time Series Unemployment Data
Our unemployment variable is the monthly UK female claimant count unemployment rate, obtained from the Office for National Statistics (ONS).

Data for the US

The data for our analyses of the US come from the National Longitudinal Study of Youth 1979 (NLSY79). This followed persons born during 1956-64 from 1978 to the present (the last available observations currently available refer to 2000). NLSY79 provides the month and year of birth of all persons (both adults and their offspring); we adopt the convention that all births occur in the middle of the month.

Variables

Education
NLSY measures education as years of schooling completed as of May of each year (education as of birth of first child refers to education in May of the year of the first child's birth). We use three education categories: Low (under 12 years, i.e., less than High School); Medium (12-15 years, i.e., High School graduate, possibly with some higher education, but no undergraduate degree); and High (16 years or more, i.e., an undergraduate degree, possibly with some post-graduate education).

Work experience
NLSY categorizes each individual as working or not working (a category that can include on leave of absence from paid work as well as not in the labor force, unemployed, etc.) for each week during 1978-2000. We defined the date of first work (or returning to work) after childbirth as the first week after childbirth on which the individual is observed to be working.

Unemployment rates
The monthly unemployment rate data for females age 16 and over are not seasonally adjusted, and are derived from the U. S. Bureau of Labor Statistics (www.bls.gov).

Data for Sweden

Our data for Sweden are derived from the HUS (*HUShållens ekonomiska levnadsförhållanden*), a longitudinal survey that covers the years 1984-1996 at biannual or triannual intervals

Variables

Age of mother at birth of the first child
The age of the mother at birth of the first child is calculated from the difference between the birth year of the children and that of the mother. We select only biological children of women for the analyses. The information on biological children is collected at entry to the survey and for individual women it can be either of the surveys HUS 1984, 1986, 1993, 1996 and 1998.

Education
We created variables for three levels of education: Low (11 years of schooling or less, i.e., less than a three-year Gymnasium course), Medium (12-14 years, i.e., three-year Gymnasium or more, but less than college or university training), and High (college or university training of two years or more).

Labor force participation after childbirth
To measure labor force participation, we used a spell file on employment. The first month of women being at work ("gainfully employed" in the HUS) since month 4 is regarded as the month that she started working. Employment status in the HUS is categorized as "gainfully employed," "vacation, work leave, sick leave, etc.," "unemployed," and "not gainfully employed incl. schooling, house-keeping, retired."

Unemployment rate
Data on female unemployment rates are derived from OECD, *Labour Force Statistics 1966-1986* (pp. 392-393) and *Labour Force Statistics 1979-1999* (pp. 252-53).