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The Motherhood Wage Gap for Women in the United States: The Importance of College and Fertility Delay

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RESUMEN
Una de las características de los últimos treinta años ha sido la reducción de primeros alumbramientos antes de los treinta años y el aumento de primeros alumbramientos después de los treinta años entre mujeres con títulos universitarios (Martin 2000). ¿Cuáles son algunos de los factores que explican la decisión por parte de las mujeres de posponer su deseo de tener hijos? Nosotros argumentamos que la diferencia salarial frecuentemente observada entre madres y no madres de similar nivel educativo (Waldfogel 1998) puede verse afectada por el retraso de tener hijos hasta que la mujer se haya asentado en su carrera. Utilizamos datos de mujeres del 1979 National Longitudinal Survey of Youth y encontramos que: (a) Madres con título universitario no experimentan penalización alguna en cuanto a salario, y (b) el retraso de decisión de tener hijos aumenta sus oportunidades gananciales más aún.

Palabras clave: Penalización salarial por tener hijos, fertilidad, retrasar la maternidad, madres con título universitario, Estados Unidos.

Clasificación JEL: J13, J31.

ABSTRACT
One of the stylised facts from the past thirty years has been the declining rate of first births before age 30 for all women and the increase rate of first births after age 30 among women with four-year college degrees (Martin 2000). What are some of the factors behind women's decision to postpone their childbearing? We hypothesize that the wage difference often observed between like-educated mothers and non-mothers (Waldfogel 1998) may be affected by the postponement of childbearing until after careers are fully established. We use individual-level data on women from the 1979 National Longitudinal Survey of Youth and find that: (a) College-educated mothers do not experience a motherhood wage penalty at all, and (b) fertility delay enhances their earnings opportunities even further.

Key words: Motherhood wage penalty, fertility, postponement of childbearing, college-educated mothers, United States.

JEL classification: J13, J31.

I. Introduction

Perhaps the second most significant demographic trend for women in the United States in the second half of the 20th century, after the dramatic increase in labor force participation, was the evolution of fertility patterns, including the slow but steady decline in overall fertility rates, and postponement of fertility. In 1960, the fertility rate per 1000 women in childbearing age was at a high of 120, and by the year 2000 this rate had fallen to 67. Described using the more abstract concept of total fertility rates, this rate fell from 2.48 per mother in year 1960 to 2.13 in the year 2000.[1] Additionally, over the same time frame, the mother's age at first birth was rising: in 1970, 19 percent of first births were to women aged 25 or older; by 2000 this percentage had increased to over 50 percent. Of course, fertility delayed is often fertility foregone, meaning that as more women put off having children, the overall fertility rate may well continue to decline as a result. These fertility trends in the United States have been mirrored by many other countries in Western Europe as well as by most other developed and even some lesser-developed countries (Population Council 1999, Lappegard 2000). In many of these countries, the fertility decline has continued and is now so low that it no longer achieves the threshold necessary for population replacement.[2]

Accompanying the fertility trends just noted has been an increase in the education level of mothers at the time of the child's birth. The median years of education for mothers has risen from 12.4 years in 1970 to 12.9 in the year 2000 (Martin et al. 2002). Across the same period,

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[1] The total fertility rate is an estimate of the number of births that a hypothetical cohort of 1000 women would experience throughout their childbearing years if they followed current fertility patterns. Fertility rates actually increased in 1999 and 2000, with total fertility rates in the year 2000 rising above replacement rates (the rate necessary to keep total population stable) for the first time in 30 years (*National Vital Statistics Reports* 2002). Also, as explained by Rindfuss et al (1996), the bulk of the fertility decline occurred in the early 1960s. Between 1963 and 1989, the overall fertility rate remained fairly stable at about 1.9.

[2] For example, the fertility rate in Spain in 2001 was 1.1, while in Sweden, Germany and Greece the rate was 1.4 or less (United Nations data cited in Bruni (2002)).

the percentage of mothers reporting 16 or more years of education has risen dramatically, from 17.8 percent to 25 percent (a 40 percent increase).

Why have these dramatic changes in fertility patterns occurred? Clearly, a number of factors have taken place simultaneously. The factors include the previously mentioned increase in female employment, particularly for mothers; rising education levels of all women; an opening up of professional, career occupations once dominated by men; and changing social attitudes, to name the most important. Most relevantly, the trends with regard to age at first birth and mother's education are linked. In particular, previous studies have examined the link between education and fertility decline, and found that the trends vary across educational and racial groups, with much bigger declines experienced by white highly educated women. Examining the differences particularly by education is important because the mere existence of differences suggests that childbearing incentives might differ between educated and less-educated women. As posed by Ellwood and Jencks (2001), the question is: "…does early as opposed to late childbearing actually do greater economic "harm" to the lifetime earnings prospect of women with more economic opportunities?" (p. 68).[3] We approach this question by examining the wage gap between mothers and non-mothers with an emphasis on the importance of (and interaction between) education and fertility timing.

Fertility decline and changes in childbearing timing are of interest and concern to researchers and policy-makers alike for four reasons. First, fertility rates below replacement rates serve as a threat to the long-term survival for any society as the impact of an aging population and reduced economic growth reverberates throughout the economy. Second, with rapidly aging (on average) populations, the ability to provide costly support services to the non-

[3] Hotz et al (2002) examine the opposite, often-stated hypothesis, that very early childbearing reduces economic stability compared with non-very early childbearing. The authors find no evidence of this teenaged fertility penalty.

working elderly becomes more uncertain. Third, as women delay fertility, they face declining fecundity in their thirties and forties. Consequently, more families face increased medical expenditures as they confront this natural consequence of aging, a cost that is passed on to society in higher overall medical expenditures and rising health care costs. Furthermore, more women are remaining childless although their preferences are otherwise, merely as a result of delaying fecundity. Finally, because these fertility (as well as marriage trends) vary substantially by education, the resulting impact on family structure produces a rising unequal income distribution in the United States, with an increasingly marginalized population of "have-nots" characterized by poor education, low marital rates, and high rates of single parenthood (Ellwood and Jencks, 2001).

The popular media has also entered the discussion of these trends, most recently with the book titled *Creating a Life: Professional Women and the Quest for Children*, by labor economist Sylvia Ann Hewlett (2002). Hewlett describes the difficulties faced by educated women, including job market problems, mate-finding problems, and fecundity problems resulting from delayed childbearing. Most relevant for this research is her conclusions that the "costs" associated with motherhood are lower for younger first-time mothers than older first-time mothers.[4] Her argument is a convincing one were such choices made in a static framework, but not so convincing when one considers that fertility/employment decisions somewhat early in life affect wage levels and wage growth throughout a working lifetime. That is, if bearing children early in life scars a woman's career advancement and earnings potential for a lifetime, then the decision-making process must consider the full lifetime costs and benefits of early versus late motherhood. In other words, the potential effects on the motherhood wage gap (and overall career success) arising from the timing of first birth must also be considered. By delaying

[4] Also see Crittendon (2001) for further popular media discussions of the costs of motherhood.

fertility, educated women leave time for a career to take off, allowing for a less-disruptive maternity period following this career build-up. How rational are these women? Are they making this decision to delay fertility in order to build up formal and on-the-job human capital in their twenties? If so, the fertility timing decision becomes more complicated, given the conflicting goals of career success and motherhood.

In our research, we contribute to this debate by re-formulating the fertility timing decision in the framework of a career-oriented woman's effort to minimize the so-called motherhood wage gap. Because education plays a role both in fertility decisions and in family pay gap outcomes, it is likely that education provides the link between these two factors. We find that college-educated mothers actually experience a wage boost compared with college-educated non-mothers, and this wage boost is enhanced by their postponement of motherhood. As explained in more detail in the final section of the paper, we speculate that, in the process of searching for family-friendly employers, college-educated mothers simultaneously are identifying those firms most likely to be friendly to women and to encourage their advancement within the firm.

In the next two sections of this paper, we describe in further detail trends in fertility and education, and their link to estimates of the motherhood wage gap. Next, in section IV, we discuss the conceptual framework and empirical methodology of our study. Section V then follows with a description of our data. We present and explain our findings in section VI, and our conclusions follow in Section VII.

II. Further Trends in Fertility and Education

As mentioned in the introduction, aggregate and detailed fertility trends in the United States changed dramatically in the past century. These changes are related intricately to simultaneous changes in women's work, education and marriage patterns. The most interesting change is the average age at first birth for first-time mothers, which has risen from 21.8 in 1960 to 24.2 in 1997. Next, looking at age at first birth, one also sees substantial variation by educational attainment. Less-educated women are much more likely to experience the first birth in their twenties, while more educated women are more likely to experience that first birth in the thirties. Additionally, the wage gap between mothers and non-mothers varies substantively by education, with more educated women experiencing a smaller penalty associated with motherhood. Descriptive evidence to support this conclusion can be found in Schmidt's (2002) study of unmarried mothers. She finds that less-educated unmarried mothers earn only 75 percent, on average, of their non-mother counterparts while the comparable percentage for more-educated unmarried mothers is 95 percent (p. 5). While these figures relate only to never-married mothers, they indicate that the motherhood wage penalty for all mothers is likely to be smaller for better-educated mothers.

Martin (2000) examines the growing trend of delaying fertility beyond the age of 30, and finds that the women underlying this aggregate trend are more educated women. He argues that fertility delay is a consequence of career building demands and the high costs of quality child care, with both factors becoming less insurmountable as the woman's career progresses and earnings grow. As a consequence, "… especially for college-educated women, the competition between work and family roles in the early adult years causes births to be consigned to the later adult years" (pg 523).[5]

Martin's focus is on delay of first birth beyond age 30, and so he also presents statistics concerning childlessness at age 30. He finds that in the time period 1990 to 1995, fifty-six

[5] Behrman et al (1999) provide evidence that improvements in health over time might be more important than rising educational levels in explaining differences in fertility across world regions.

percent of women with four-year college degrees were still childless at age 30, while only 17 percent of those women with less than a high school education were childless at age 30. Both of these percentages were higher than in previous periods. Next, Martin examines the incidence of first birth after age 30 for college-educated women and finds that childlessness falls from the late 1970s to the early 1990s from 65 percent to 49 percent. That is, while more educated women remain childless at age 30, they are becoming more likely to experience a late birth, thereby compensating at least in part for that earlier delay in fertility. He concludes "Conflicts between women's work and family lives reduce fertility in early adulthood for all women, and especially for college-educated women. Yet I find a compensating increase in family formation rates after age 30 only for women with four-year college degrees" (p. 523). Chen and Morgan (1991) also find that the likelihood that childless women age 30 and over will experience a first birth has increased over time. They also note that a large racial gap persists in the timing of first birth.

Rindfuss et al. (1996) examine the link between fertility delay and education levels in the time period 1963 to 1989. First, they note the rising incidence of college completion for women, increasing from 12 percent in 1970 to 23 percent in 1990. Second, they conclude that there is an increasing educational difference in fertility timing, partially due to substantial time pressures for higher educated women early in their career development.[6] Finally, they assert that the trend in further delay in fertility by higher educated women results in ever-growing inequality experienced by children of lesser-educated parents and better-educated parents.[7]

[6] According to Murphy and Welch (1990), on the job human capital investment and therefore wage growth occurs disproportionately in the early years of a worker's life.

[7] Rindfuss et al (1996) also observe that while the total fertility rate for college-educated women (at 1.5) falls below the overall rate of 1.9, the college rate exceeds the total rate in many entire countries. Looking at detailed age-specific fertility rates, there have been dramatic differences by age levels. Looking at the percentage changes from 1973 to 1988: ages 15-19: -10 percent, 20-24: -7 percent, 25-29: 1 percent, 30-34: 33 percent, and 35-39:26 percent.

There is also theoretical evidence to support this connection. Gustafsson (2001) examines the optimal age of motherhood from both theoretical and empirical standpoints. Her theoretical research identifies women's career planning as the primary explanation for postponement of maternity. This implies that the delay of fertility will be most beneficial for career-oriented women, who are also likely to be relatively better educated (See also Iyugen 2000). This theoretical contribution is extended by Caucutt et al. (2002), who develop an equilibrium search model of marriage, divorce, and child investment that permits differences in the timing of fertility. They find that labor markets produce incentives for fertility delay and that these incentives can explain the motherhood wage gap as well as fertility trends in the past 40 years.

Blackburn et al. (1990) examine the fact that mothers who have delayed fertility until their thirties tend to earn higher wages using a lifecycle model of fertility timing and human capital investment. They find that the increased wages for "late" mothers are driven by greater formal human capital investments (p. 24). They do not, however, address the issue of whether higher educated women can improve their earnings potential by delaying fertility.

In summary, this literature suggests a strong connection between fertility delay and education, although the explanations are not clear. We address this issue in a more rigorous way in the following section.

III. The Motherhood Wage Gap and its Potential Link to Changing Fertility Patterns

On average, women with children earn less than women without children, even when various relevant productivity characteristics are controlled. This so-called motherhood wage gap has been discussed in the labor economics literature for many years, originally as a by-product of comparisons between married and single working women, and the more broad comparison of wages across sex. Early literature examining the sex wage gap proffered the explanation that marriage and childbearing altered the earnings capacity differentially by sex. For example, Becker (1985) suggests that some portion of the wage gap observed between single and married mothers arises from the choice by married mothers to work in less intensive and more convenient jobs (p. S54). Of course, married men are not typically observed making such trade-offs.

Typically, estimates of the motherhood wage gap are obtained from estimates of linear log wage equations estimated with a sample of working women, with a variety of right hand side regressors, including demographic and productivity characteristics, sometimes job characteristics, and variants of motherhood status measures (including a 0-1 dummy variable for being a mother, the total number of children of the mother, and two 0-1 dummy variables for having one child and having 2 or more children). Hill (1979) was one of the first to use such a model to examine the effect of motherhood on wages. She uses one wave of the PSID and while she finds a 7 percent motherhood wage penalty for white women when productivity characteristics are excluded, when they are added into the regression, the motherhood wage penalty nearly disappears. She finds that the driving factor in the wage differences is intermittent work for mothers. In fact, she concludes that "the number of children is a good proxy variable for differential work history and labor force attachment for white women" (p. 591).

Future work focused further on disentangling the effects of marital status and motherhood status on women's wages. Korenman and Neumark (1992) provide a nice review of this marriage, fertility, and wage literature and find little evidence of a direct motherhood wage penalty. Nonetheless, they explain that the existing literature suffers from econometric deficiencies that may have led to unreliable findings. They rely on the NLS-YW[8] and estimate

[8] Their cross-section results rely on 1,207 working white women in 1982; their longitudinal results use two years of data: 1980 and 1982, resulting in a sample of 911 women.

several different versions of wage equations, using both cross-sectional and panel data methods, OLS and instrumental variable methods. Their work represents the first econometrically rigorous examination of the motherhood wage gap. They address the following problems: endogeneity of experience, tenure, marriage, and motherhood; unobserved heterogeneity; and the importance of employment selection. Their results fail to reject the exogeneity of marriage and motherhood, but reject the exogeneity of tenure and experience. It is likely that they reach this finding regarding motherhood because they do not differentiate the wage gap by education levels, which may alter the results of such exogeneity tests. Additionally, they use an instrumental variable approach that relies on the same set of instruments for a heterogeneous set of potentially endogenous regressors. Interestingly, they do not find the employment sample selection correction to be important but, again, this may be because they are not focusing in differences by education. We expect this selection to vary in importance by education level, as suggested by Neal (2001). Finally, they find that implementing appropriate panel data methods to model heterogeneity is important. Regarding specific estimates of the motherhood wage gap, their results vary tremendously by specification and estimating technique. Most often, however, they find no significant effect on wages of having a first child, but rather large effects from the second child (in the neighborhood of a 10 to 20 percent penalty). Interestingly, implementing panel data methods eliminates this effect, but their methods rely on just two time periods of data, possibly resulting in unreliable estimates. Their instrumental variable estimates lead to their conclusion that working continuously following childbirth will not eliminate the motherhood wage gap.

The literature that follows Korenman and Neumark (1992) utilizes somewhat less technical approaches, although the bulk continues to implement panel data techniques. Perhaps the most prominent of this more recent (post Korenman-Neumark) literature on this topic are the papers by Waldfogel (1997, 1998a, 1998b). Waldfogel takes a rather straightforward approach to the question and finds that the motherhood wage gap is in the area of 8 percent per child. More precisely, her fixed effects results suggest a wage penalty of 4.6 percent for the first child and 12.6 percent for two or more children. She uses the NLSY and requires that each woman have a recorded wage early in the panel and late in the panel. Her research also attempts to link the wage gap to policy, and finds that women who have access to family leave upon childbirth are more likely to return to their pre-childbirth employer and, consequently, receive a wage boost that partially offsets the motherhood wage penalty (75 percent of the wage penalty is eliminated).

Budig and England (2001) compare the motherhood wage gap between married and unmarried mothers using the NLSY. They implement a fixed effects regression approach to address the likelihood of unobserved heterogeneity in their sample. They do not correct their regressions for selection into employment but state that "if women for whom the motherhood wage penalty would be the worst are the most likely to remain out of the labor force, our models will underestimate the motherhood penalty" (p. 213). They suggest that their fixed effects method helps to net out the potential endogeneity of marital status. They also discuss the likely endogeneity of childbearing, and suggest that it is the improper modeling of this endogeneity that could lead to mistaken conclusions regarding the existence or magnitude of a motherhood wage gap (p. 210). Their motherhood control is a variable for total number of children, and they find the wage gap to range between 3.7 percent and 7.3 percent, depending on the list of control variables. Their primary contribution to this literature is two-fold: first, their article presents a very nice discussion of the reasons for interest in this topic as well as a detailed verbal interpretation of their findings. Second, they include a comprehensive set of controls for experience and tenure with the current employer, distinguishing between full-time and part-time years. They note, as a side issue, that they fail to find decisive evidence of differential wage penalties by the mother's skill level. They explain that their findings fail to support the hypothesis that the motherhood wage gap is explained by reduced work effort.

Anderson et al. (2002a) address one specific explanation offered for reduced wages for mothers; that is, reduced work effort. They use the NLS-YW in a panel framework and find no evidence that reduced work effort is at the root of the wage gap. They estimate the wage gap at 3 percent for the mothers with one child and at 6 percent for mothers of two or more children. They posit that the wage gap is largely caused by high costs of flexible work schedules for women holding medium office jobs with standard work hours. Anderson et al. (2002b) examine specifically the existence of educational differentials in the wage gap, with an additional focus on differences based on timing of return to work following childbirth. Their cross-sectional results suggest that the highest educated workers experience the largest motherhood wage penalties, possibly because it is for those workers that intermittent work can be the most costly. However, when they implement a fixed effects model, the results vary widely depending on the particular list of regressors. When they include experience, the wage gap for white college-educated mothers with more than one child is 15 percent. In some specifications, white college educated mothers actually enjoy a wage boost.[9]

How do estimates of the motherhood wage gap compare to such gaps in other developed countries? Todd (2001) examines the link between educational attainment and the family pay gap for five industrialized countries, and finds that the nature of the gap differs across

[9] This paper does not correct for employment sample selection, which could contribute to the differential but inconsistent findings by education.

countries.[10] She shows that for the United States and Canada, better-educated mothers experience a very small (nearly non-existent) wage penalty, leading her to conclude "high educational attainment acts as a 'shock absorber'." Harkness and Waldfogel (forthcoming) also present an international comparative study, with a focus on seven industrialized nations.[11] They find notable differences across countries in the family pay gap, with the largest gap in the United Kingdom and the smallest in the Nordic countries. They also find a link between the magnitude of the family pay gap in a specific country and that country's gender wage gap. They suggest that some portion of these differences might be due to differences in family-friendly policies in the workplace.

What does the existing wage gap literature say about the role of fertility timing? Three papers from the wage gap literature address this issue and serve as useful lead-ins to our research. Chandler et al (1994) test the link between marriage and fertility delay and earnings and find that there is an association between delay and enhanced earnings. They define birth delay as the difference between actual age at first birth and predicted age at first birth; therefore, delay of fertility is defined in a static framework and is not very useful in addressing the larger issue of the gradual but steady increase in age at first birth that has occurred over many years. In addition, the authors do not address selection or endogeneity issues, nor do they control for education level in their analyses. Following a similar approach, Drolet (2002) examines the link between fertility timing and the motherhood wage gap using Canadian data from the 1998 Survey of Labour and Income Dynamics. She relies primarily on cross-sectional data but also incorporates a two-period model in some of her analyses, and she conducts her analysis separately for three different cohorts of women. She finds that compared to those mothers with

[10] The five countries she studies are Canada, the United States, Germany, the Netherlands, and Sweden.
[11] The seven countries they study are Australia, Canada, the United Kingdom, the United States, Germany, Finland, and Sweden.

early first births, delayed mothers experience 6 % higher wages; in fact, she finds no statistically significant difference in wages between late mothers and non-mothers. She does not examine a potential link between educational attainment and this reduction of the motherhood wage gap.

Most relevant for our project is recent work by Taniguchi (1999). Taniguchi looks separately at two issues: the impact on the motherhood wage gap of fertility delay, and the importance of education on this wage gap. She uses data from the NLSYW to determine how much of the gap can be eliminated by delaying fertility. She relies on the total number of children as her measure of motherhood, making it somewhat difficult to place her findings within the broader literature. To approach this question, she sets up three categories of fertility timing: teenaged birth, birth from 20-27, and birth at age 28 or later. In her baseline results, she estimates the wage gap to be approximately 2.5% to 3%, in the range of Budig and England's (2001) result, which relied on the same measure of motherhood. Looking at fertility delay, she estimates the wage gap separately by age at first birth and shows that late mothers experience a very small (and not statistically significant) wage gap.

Separate from the fertility timing concern, Taniguchi estimates the wage gap by education, and consistent with Todd (2001) and Anderson et al (2002b), finds that the wage gap declines as education rises. In fact, she finds that college-educated mothers experience a wage boost. However, by addressing the two issues (fertility timing and education) separately, it is not possible to interpret the source of the reduced wage gap because, as described earlier, fertility delay goes hand in hand with increased education.[12]

[12] Two other potential drawbacks of her research are somewhat outdated data (Waldfogel (1997) notes that the motherhood wage gap is rising), and a miss-specified wage equation. She uses observed hours of work on the right hand side of the wage equation, thereby producing measurement error that it is highly correlated with measurement error in the dependent variable. Extending her findings, Chiodo and Owyang (2003) present a nice theoretical explanation for the differences in the importance of marriage on wages by sex**.**

Our research contributes to the existing literature in three ways. First and most importantly, by isolating the role that fertility timing plays in the determination of wages, separately from the role of education, we are able to address the specific question posed by Ellwood and Jencks concerning the reasons for fertility delay by higher-educated women. Recall that fertility delay is primarily a phenomenon of the higher educated. Thus, we provide separate estimates of the wage effects for college-educated childless women, college-educated mothers, and college-educated mothers who delay fertility. Second, by building our econometric model step by step, accounting for more potentially important estimation concerns, we are able to isolate the importance of each model extension. Finally, we produce estimates of the effect of motherhood on wages for college-educated women who delay fertility, while accounting for the potential endogeneity of both motherhood status and fertility delay.

IV. Conceptual Framework and Empirical Methodology

Following the neoclassical model of labor-leisure choice, we assume that women are utility maximizing individuals who allocate their time so as to ensure that the last dollar spent on leisure provides the same utility as the last dollar spent on the consumption of goods and services. Women will enter the labor market only if the offered market wage exceeds their reservation wage. Once working, they will choose to work the number of hours for which the offered market wage matches their marginal rate of substitution (that is, the rate at which they are willing to give up leisure hours in exchange for additional consumption).

If there exists a motherhood wage penalty, the lower market wage encountered by mothers relative to the one earned by women who remain childless, would generate both an income and a substitution effect among the former. While the income effect would increase their hours of work, the substitution effect would decrease their hours of work. Regardless of which of the two effects dominates, the market wage reduction would move working moms to a lower indifference curve with a lower associated reservation wage.[13] As a result, whether they increase or reduce their hours of work, working moms would have to settle for a labor market equilibrium characterized by a lower utility level and a lower market wage than the ones attained by working women who remain childless. The market wage and utility level available to working mothers relative to their childless counterparts can be further reduced if, in addition to the motherhood wage penalty, there is an additional "early" motherhood penalty for women who give birth by age 30. In that event, working moms who do not delay childbearing would have to settle for a labor market equilibrium characterized by a lower utility level and a lower market wage than the ones attained by working mothers who delayed childbearing and, given the existing motherhood wage penalty, lower than the one attained by women who remain childless. That is, postponing fertility may mitigate the wage gap often observed between like-educated mothers and non-mothers. In this paper, we attempt to assess whether this is the case for higher educated women. In particular, we examine the wage difference between college-educated early versus late mothers to assess the variability of the motherhood wage effect for college-educated mothers according to the timing of their first birth. Evidence of the latter may provide an explanation for the observed postponement of maternity among highly educated women.

A. Baseline Estimation of the Motherhood Wage Gap Associated with Fertility Delay

We follow human capital theories and assume that the offered market wage received by working mothers can be expressed as a function of personal, family, and job related characteristics as follows:

(1) $\ln w_{ijt} = f\,(P_{it}, F_{it}, J_{ijt}, R_t) + \varepsilon_{ijt},$

[13] This discussion ignores, of course, the possibility of increased utility from having children.

where w_{ijt} stands for the market wage received by the *i*th respondent in the *j*th job at time *t*; *P* stands for a vector containing information on personal characteristics affecting earnings, such as educational attainment; *F* is a vector of family related characteristics potentially affecting the working mothers' earnings, such as whether or not they have kids and whether they gave birth before or after age 30; and *J* represents a vector of job related characteristics, such as tenure and occupation. Finally, the vector *R* includes a set of regional and yearly dummies to broadly account for any remaining macroeconomic factors that may affect individual earnings.[14]
Note, however, that since the analysis is focused on employed women, our wage regressions need to correct for the sample selection bias incurred when focusing on working respondents. Otherwise, the observed wage differential may overstate or understate the difference in average wage offers. In particular, if women do not participate in the labor market when their earnings fall below a threshold or reservation wage, women in the lower end of the wage distribution are less likely to work. Their scant work participation will offset their lower average wage offers, narrowing the observed wage gap, and obscuring the role of the timing of motherhood on wages. Additionally, given the role of education in our empirical investigation, we need to avoid the possibility that the importance of selection differs systematically between high versus low educated workers (Neal 2001). Hence, we address the selection incurred when focusing on working women with the inclusion of the inverse Mill's ratio (λ_{it})—constructed using the predictions from a probit model of the likelihood of being working—among the regressors in equation (1). In addition to the respondent's personal, family, and regional characteristics included in the wage regression, the selection model for being working includes information on the highest grade completed by the respondent's mother and father, as well as a dummy variable

[14] Such as local unemployment rates and region of the country in which they reside.

indicative of whether the respondent lived with her parents by age 18. Based on human capital theory, we exclude these three regressors from the wage regression as determinants of the respondent's current hourly wage other than through her educational attainment, which we already control for. In addition, we include years of schooling in the selection model for being working, whereas the educational attainment information included in the wage regression is captured through a set of dummy variables reflecting the highest grade completed by the respondent. The results from estimating two selection models for being working, one using a dummy variable for motherhood and the other one distinguishing between mothers with one child versus mothers with two or more children, are contained in Table A in the appendix.[15]

Finally, since differences in the earned wages by non-mothers, mothers who do not delay childbearing, and mothers who do delay might occur due to unobserved personal characteristics, we estimate equation (1) using fixed-effects to account for sample heterogeneity.[16]

B. Model Extensions: Endogeneity of Motherhood and Delayed Motherhood

Nonetheless, even after correcting for the likelihood that women might work in a given year, we still need to account for endogeneity issues endangering the reliability of our coefficients estimates. In particular, there are two variables of key interest in equation (1) suspected of being endogenous to wages: the motherhood dummy and a dichotomous variable indicative of late motherhood. Women's motherhood and timing of motherhood are likely to depend on the existence and size of a motherhood and/or an early motherhood wage penalty. To assess empirically whether this is the case, we first test for the endogeneity of motherhood and

[15] Both models correct the standard errors for clustering at the individual level.

[16] We specified the individual effects as fixed-effects after testing for their appropriateness in this case using the Breusch and Pagan Lagrangian multiplier and the Hausman specification test. Results are available from the authors upon request.

delayed motherhood following Hausman (1978) and conclude that the motherhood decision and the timing of motherhood are both, not surprisingly, endogenous.[17]

However, correcting for the endogeneity of motherhood and the timing of motherhood is more complex. One possibility for addressing these endogeneity problems is to estimate a bivariate probit model outlining women's motherhood and late motherhood decisions as follows:[18]

(2) $Y_i^{Motherhood} = 1$ if $(\theta_1' W_i + u_{1i}) > 0$, otherwise: $Y_i^{Motherhood} = 0$, and

(3) $Y_i^{Delayed\ Motherhood} = 1$ if $(\theta_2' W_i + u_{2i}) > 0$, otherwise: $Y_i^{Delayed\ Motherhood} = 0$,

where $(u_{1i}, u_{2i}) \sim BVN(0,0,1,1,\rho)$, $\rho = Cov(u_{1i}, u_{2i} \mid W_i)$. The binary variables: $Y_i^{Motherhood}$ and $Y_i^{Delayed\ Motherhood}$ equal 1 if the respondent is a mom and if she delayed motherhood, respectively, whereas the vector W_i contains various characteristics influencing both motherhood decisions.[19] These two motherhood equations are identified by the following regressors: mother's highest grade completed, father's highest grade completed, and the dummy variable indicative of whether the respondent lived with her parents by age 18. As in the case of the selection model for being working, based on the human capital theory, we exclude these three regressors from the wage regression as determinants of the respondent's current hourly wage other than through her educational attainment, which we already control for. Similarly, we include years of schooling in the bivariate probit model for motherhood and delayed motherhood, whereas the educational attainment information included in the wage regression is captured through a set of dummy

[17] Results are available from the authors upon request.
[18] We correct the standard errors for clustering at the individual level.
[19] In particular, W_i includes the following controls: age, age squared, race, marital status, years of educational attainment, the number of other adults in the household, previous year's household income minus the respondent's labor income, a dummy variable indicating whether the respondent lives in an urban area, a dummy variable indicating whether the respondent lives in a high unemployment area, regional dummies, mother's highest grade completed, father's highest grade completed, and a dummy variable indicative of whether the respondent lived with her parents by age 18.
[19] Results are available from the authors upon request.

variables reflecting the highest grade completed by the respondent. It is well known that valid instruments need to fulfill two characteristics. One is being correlated with motherhood and delayed motherhood, as it is the case here. Second, the chosen instruments need not to be correlated with the error term from the wage regression, which we also confirm using an over-identification test.[20] We then compute the predicted probabilities of motherhood ($Pdpb_i^{Motherhood}$) and delayed motherhood ($Pdpb_i^{Delayed\ Motherhood}$) to instrument for women's motherhood decisions and to correct for their endogeneity with earned wages. As a result, our final wage equation is given by:

(4) $$\ln w_{ijt}=\alpha_i+\beta_1'Pdpb_i^{Motherhood}+\beta_2'Pdpb_i^{Delayed\ Motherhood}+\beta_3'P_{it}+\beta_4'F_{it}+\beta_5'J_{ijt}+\beta_6'R_t+ +\beta_7'\lambda_{ijt}+\varepsilon_{ijt},$$

where F now includes all family and job related characteristics, with the exception of motherhood and delayed motherhood.

As discussed in the previous sections of the paper, the earlier literature examining the wage penalty associated with early motherhood often failed to address the aforementioned econometric problems, endangering the unbiasedness and consistency of the estimated parameters.[21] In order to appropriately asses the value of correcting for the aforementioned econometric problems, and with the purpose of providing the reader with a benchmark comparison of our results to those obtained by the earlier literature, we gradually build-up the model, present the results, and discuss the findings under the different estimation techniques.

[20] As indicated at the bottom of Table 8, which contains the results from our estimation correcting for the endogeneity of motherhood and delayed motherhood, we accept the null hypothesis and conclude that our instruments are exogenous at the 1 percent level.

[21] While the recent literature does incorporate panel data methods in various ways, the bulk does not address the employment selection issue (with the exception of Korenman and Neumark 1992 and Anderson et al 2002) and only Korenman and Neumark make any serious attempt at addressing the multitude of endogeneity problems inherent in this empirical exercise.

V. The Data and Some Descriptive Evidence

We use data from the National Longitudinal Survey of Youth (NLSY79). Since 1979, a vast amount of information on the educational attainment, employment, and fertility patterns of a representative sample of individuals between the ages of 14 and 21 as of December 31, 1978 has been collected.[22] Due to modifications in the survey design implemented over the years, the 2000 wave of the NLSY79 contained information on 8,033 individuals, of whom 4,113 were women.[23]

We work with an unbalanced panel dataset on women from the 19 rounds of the NLSY79.[24] We restrict our sample to person-year observations for which information is available regarding education, employment, fertility, and other regression variables, such as an hourly rate of pay. We deflate hourly wages using the CPI index and restrict our sample to individuals reporting hourly earnings between $1 and $100.[25]

Table 1 contains a detailed description of the variables used in the analysis for the year 2000, along with their means and standard deviations. Because these data have been used extensively by researchers, and most relevantly, used by several previous wage gap researchers, we provide here only a cursory description of our sample. The women in our sample are 39 years of age on average, and 58 percent are married. Thirty percent of the sample is African American and 19 percent Hispanic, reflecting the over-sampling present early in the NLSY's survey design. Regarding education, the average years of education is 13.3 years, with

[22] Respondents were interviewed yearly between 1979 and 1994. Beginning with the 1994 interview, interviews are only scheduled to take place biennially.
[23] Earlier waves of the NLSY79 included a sample of 1,280 military youths and a supplemental sample designed to over sample civilian Hispanic, black and economically disadvantaged non-black and non-Hispanic youth. However, these two samples were mostly dropped in 1985 and in 1991, respectively.
[24] Hence, we calculate robust standard errors to account for the resulting heteroscedasticity that may affect our estimation.
[25] The CPI for all urban consumers, not seasonally adjusted, with base period 1982-1984 was retrieved from http://www.bls.gov/cpi/home.htm

approximately 21 percent having completed four years of college. Eighty-two percent of the women are mothers by this final period of data, and about 10 percent delayed fertility until their thirties.[26] Looking now at employment characteristics, these working women received an hourly wage of $8.23 in 1982-1984 dollars, and more than one quarter held part-time jobs. Finally, luckily reflecting a strong commitment to the labor force and career, thirty-six percent of the women held jobs in professional and managerial occupations.

Before estimating our model, it is of interest to examine whether the wage data seem to support, at least from a descriptive point of view, our hypothesis. We start by examining if our data corroborate the findings from the previous literature motivating our analysis. This is shown in Table 2 and Table 3. In particular, Table 2 supports the existence of a statistically significant motherhood wage penalty, while Table 3 confirms the link between higher education and delay of fertility by showing that college educated women delay childbearing by an average of approximately 6 years.

Why are women delaying childbearing? In the previous section, we hypothesize that one reason is the higher pay earned by these women relative to their counterparts who do not delay childbearing. This hypothesis is validated by the figures in Table 4, which show that women who delay childbearing until after 30 earn almost twice as much as their female counterparts who do not (i.e. $11/hr versus $6/hr in 1982-1984 dollars). In fact, Table 5 shows further that this is still the case among college-educated women, for whom the difference in earnings between early and late mothers is also statistically significantly different from zero and economically meaningful (reaching approximately $4/hr).

[26] We chose the age of 30 as representative of the delayed motherhood since the average age at first birth of college-educated women is 26.32 years, with a standard deviation of 4.05 years. Also, this is the age cut-off used by other researchers (see Martin (2000), for example).

Finally, Table 6 checks for descriptive evidence of the importance of sample heterogeneity in the explanation for the observed wage differences between working mothers who delay childbearing and other working-women, thus, the need to account for it econometrically. A simple way to assess whether this is the case is to look at a sample of women who were childless at age 25, and compare the wages, at that point in time, of women in the group who delay childbearing to those of women who remain childless. Table 6 shows that, indeed, future mothers earned approximately 50 cents more (a statistically significant difference) than their childless counterparts even before the future mothers ever had children. This suggests the importance of modeling heterogeneity as distinct from the endogeneity of fertility. In what follows, we pursue our regression approaches to examine in a rigorous way whether the motherhood wage gap among college-educated women may be affected by postponing childbearing once we account for other respondent's personal, family, and work related characteristics.

VI. Results

A. Baseline Estimates and Corrections for Selection Bias and Heterogeneity

Before discussing how the wage effects of motherhood vary for college-educated mothers who delay childbearing versus college-educated women who do not, we replicate the results provided by the earlier literature examining the motherhood wage gap to place our research in the existing literature. We present these preliminary findings in Table B in the appendix. We estimate two different specifications, one using a motherhood dummy and the second one using two dichotomous variables indicating the presence of only one child and of two or more children. As in much of the earlier literature, we estimate these two regressions using pooled OLS and without any correction for either sample selection or endogeneity. As previous studies, we find that mothers earn approximately 6 percent less than their childless counterparts, with the motherhood penalty for mothers with more than one child approximately doubling that of mothers with only one child.

Do college-educated early versus late mothers experience different motherhood wage effects? Table 7 expands the earlier literature estimations, allowing us to address this question.[27] Note that, as in Table B in the appendix, Table 7 has 6 columns containing results for two measures of motherhood (a 0-1 motherhood dummy variable and then measures of one child and two or more children), corresponding to Models (1) and (2). Also, the table contains increasingly appropriate econometric techniques. We present each model's results separately so that the reader can discern the effects of modifying the empirical approach one step at a time.

The first and second model specifications in Table 7, model (1) and model (2), constitute our benchmark specifications.[28] However, given the robustness of our results to alternative specifications of the number of children, we focus our discussion on the model specification using the motherhood dummy variable. Note that Table 9 provides a summary of the summed coefficients used to discuss wage effects in text. Using model (1) as our benchmark specification, which controls fertility timing, we find that mothers earn approximately 7 percent less than their childless counterparts, but the motherhood wage effect for college-educated mothers is nearly zero. Turning to fertility timing, the 7 percent motherhood wage gap dissipates for women who delay childbearing beyond age 30, who earn, on average, 7 percent higher hourly wages than their childless counterparts and 14 percent more than mothers who do not delay

[27] At this point, it is worth noting that, in our quest to learn about the wage gains resulting from delaying childbearing, we have also explored whether women with less than a college education reduce their motherhood wage gap by delaying childbearing. Our findings indicated the lack of any statistically significant gain from delaying childbearing among women with less than a college education. This serves as an explanation for the observation noted earlier that fertility delay is largely a phenomenon for higher-educated women.

[28] We also estimated our models including information on the total number of children and the results were very similar to those in the previous literature (see, for example, Budig and England (2001)).

childbearing. Is this still the case among college-educated women? As summarized for this model specification in Table 9, college-educated women who delay childbearing earn approximately 19 percent more than their childless counterparts, and approximately 21 percent more than college-educated women who do not delay childbearing. Hence, our findings suggest that delayed fertility for college-educated women serves to boost wages even beyond the wage enhancement associated with motherhood. As we discuss in more detail in the final section of the paper, one explanation for this wage boost involves unobserved job quality.

The discussed motherhood wage differentials are quite substantial and might be over-stated due to the selection biases and individual heterogeneity. Hence, model (3) and model (4) include a correction for the sample selection incurred when focusing on working women, while model (5) and model (6) further re-estimate the models accounting for individual heterogeneity through the use of a fixed-effects panel data technique. According to the estimated coefficient for the inverse Mill's ratio in model (3) and model (4), we incur a significant sample selection bias in the estimation of the motherhood wage penalty when restricting the analysis to employed women. Accounting for the aforementioned sample selection bias cuts the average motherhood wage penalty estimate from the earlier specifications by approximately half. In particular, focusing on the estimates from model (3), the motherhood wage gap drops from 7 percent to 4 percent. College-educated mothers now experience a wage boost of approximately 2.5 percent. Additionally, the payoff to delaying childbearing rises, with late mothers earning approximately 10 percent (versus 7 percent in the previous specification) more than similar childless women, and 15 percent (versus 14 percent in model (1)) more than women who do not delay childbearing. Does the timing of motherhood continue to affect the motherhood wage effect experienced by college-educated women? As summarized in Table 9, college-educated women who delay motherhood continue to earn about 19 percent more than college-educated childless women, and approximately 22 percent more than college-educated women who do not delay childbearing. Hence, delaying motherhood continues to pay off among college-educated women after we correct for any potential sample selection resulting from focusing on working women.

Finally, in model (5) and model (6), we account further for individual level heterogeneity by re-estimating model (3) and model (4) using a fixed-effects regression technique. Accounting for individual level heterogeneity erases the statistical significance of much of the educational attainment dummy variables and reduces the payoff to a college degree to approximately 14 percent. Similarly, the magnitude of our estimate for the sample selection correct term λ drops substantially once unobserved heterogeneity is controlled, suggesting that controlling unobserved individual heterogeneity captures much of the individual unobservable characteristics correlated with being employed. In contrast, accounting for individual fixed-effects increases the motherhood wage penalty back to approximately 7 percent, whereas it reduces the premium to delaying childbearing to approximately 7 percent. As a result, the wage premium enjoyed by women who delayed motherhood relative to childless women practically disappears. Is this also the case among college-educated women? As in the previous cases, Table 9 summarizes the results from model (5) for college-educated women. In this model, the wage boost to college-educated women (versus childless college-educated women) remains approximately 2.5 percent. Additionally, while the use of fixed-effects reduces the estimated payoff to delaying motherhood, we still find that college-educated women who delay motherhood earn 15 percent more than college-educated childless women, and approximately 13 percent more than college-educated women who do not delay childbearing.

In sum, once we correct for the sample selection biases incurred when focusing on working women as well as for their individual level heterogeneity, late mothers earn approximately the same as their childless counterparts and 7 percent more than mothers who do not delay childbearing. And, college-educated mothers earn approximately 2.5 percent more than their childless counterparts. The benefits to delaying childbearing are further reinforced among college-educated women. College-educated mothers who postpone childbearing actually earn about 15 percent more than like-educated women who remain childless, and approximately 13 more than college-educated mothers who do not postpone childbearing beyond age 30. That is, the motherhood wage penalty converts to a wage boost for college-educated women. The possibility of wage enhancement may provide an explanation for the observed postponement of childbearing among highly educated women.

B. Accounting for the Endogeneity of Motherhood and the Timing of Motherhood

While we recognize the difficulty of appropriately correcting for the likely endogeneity of the motherhood decision and, to a greater extent, properly correcting for the endogeneity of the decision to postpone childbearing, we cautiously explore the consequences of correcting for the endogeneity of motherhood and the timing of motherhood in Table 8. We expect that this modification to our model will be important to the estimates in part because of the descriptive result shown in Table 6 and discussed earlier. Recall that Table 6 shows that college-educated mothers who delay fertility earn approximately 50 cents more than their childless counterparts. Clearly, these women differed in their labor market productivity even prior to having children.

As in Table 7, our discussion proceeds in a sequential manner, this time using the simplified motherhood dummy specification given the robustness displayed by our previous results to alternative motherhood specifications. We assess the effect of correcting for the endogeneity of motherhood and, subsequently, for the endogeneity of motherhood delay using the predicted probabilities derived from the bivariate probit model in Table C in the appendix. This is done in model (7) and model (8) in Table 8. Focusing on the results from model (7), we find that exclusively correcting for the endogeneity of motherhood results in a motherhood wage gap of 8 percent. Most notable is the dramatic drop in the wage effect experienced by childless college-educated women (it turns negative and loses significance), resulting in a substantial relative wage boost for college-educated mothers of approximately 23 percent. Turning to fertility timing, now there is a 6 percent wage premium for delaying childbearing. Hence, delaying motherhood reduces the motherhood wage gap but does not completely eliminate it. However, as indicated in Table 9 for model (7), college-educated women who delay childbearing earn approximately 35 percent more than their childless counterparts, and 11 percent more than college-educated women who do not postpone motherhood.

When we correct further for the endogeneity of delayed motherhood in model (8), the statistical significance of the motherhood wage penalty and the delayed motherhood wage premium completely disappears, while the large wage boost for college-educated mothers versus childless college-educated women persists. Nonetheless, we find a significantly larger premium to delaying childbearing among college-educated women, who appear to earn approximately 43 percent than their childless counterparts and 21 percent more than college-educated women who do not delay motherhood. Hence, even after accounting for the endogeneity of motherhood and delayed motherhood, we continue to find a statistically significant wage premium to delaying childbearing beyond 30 among college-educated women. This wage premium to delayed motherhood, which completely disappears for non-college educated mothers, may be partially at jobs," then it is conceivable that such workers might exhibit wage boosts rather than wage penalties.

What might be some of the factors behind our first result that college-educated mothers experience a wage boost (in comparison to college-educated non-mothers)? There must exist some relevant unobserved factors accounting for this result. Most importantly, we do not observe enough information regarding job characteristics to determine, for equal wage jobs, which jobs might be considered "good jobs" versus "bad jobs." Jobs that are "good" might provide family-friendly benefits (such as flexible work hours or occasional work from home) that diminish any negative wage effects of childbearing, while also providing other good benefits like job training and job flexibility. Training will enhance job growth, while flexibility is likely to serve as a perk that reduces turnover amongst better workers. It is possible that when mothers seek job matches that best accommodate work/family responsibilities, they are also inadvertently identifying jobs with other positive benefits. That is, the availability (and observability) of family-friendly policies might serve as a signal of job quality in a broader sense. Additionally, employers who provide the most generous family-friendly policies are also likely to be the most motivated to attract and retain female employees. As a consequence, these family-friendly policies might also signal a less discriminatory workplace.

Our second major finding relates to fertility timing. We find that college-educated mothers can enhance their motherhood wage boost further by delaying fertility. College-educated mothers who delay first birth until age 30 or beyond experience higher wages, once observed productivity factors are controlled, than their counterparts who do not postpone motherhood. This further wage boost is estimated to lie in the range of 10 to 20 percent. The result of this finding is the reformulation of our hypothesis regarding college-educated mothers' jobs," then it is conceivable that such workers might exhibit wage boosts rather than wage penalties.

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A final contribution of our paper lies in its comprehensive treatment of the most important econometric concerns, including modeling the sample selection bias incurred when focusing on working women and for the potential endogeneity of motherhood and delayed motherhood. As our results show, precise numerical estimates are affected by these model improvements, but the basic results do not change.

Overall, these findings reinforce the concern voiced by Ellwood and Jencks (2001) and Rindfuss et al. (1996), who worried that a differential wage gap by education (which now we see can be increased by delaying fertility) will contribute to growing inequality between families with less-educated adults and families with better-educated adults. Along with our earlier footnoted finding that fertility delay does *not* affect wages positively for less-educated workers, we are led to the policy suggestion that extension of family-friendly policies down the job quality "pipeline" is warranted. That is, less-educated workers might benefit from better accommodation of work/family conflicts. Left alone, employers often are motivated to implement family-friendly policies for their most valuable employees, who are likely to be the better-educated mothers. Additionally, college-educated women who do not have children might consider seeking jobs that provide quality family-friendly benefits under the assumption that such employers will also provide other less readily observed benefits—like job training and potential for advancement, and also might offer a more female-friendly work environment.

The second policy concern relates to the link between fertility delay and fertility foregone. For college-educated mothers, delaying fertility has clear benefits. As described extensively in the earlier parts of the paper, there is the social concern, at least in the United States, with maintaining current fertility rates while the percentage of mothers with college degrees is growing. This begs the question: how might policy be devised to make it beneficial for college-educated women to begin childbearing earlier? Worded differently, what is it precisely about late childbearing that is so beneficial for college-educated women? One answer might be job flexibility. Once workers reach a level of seniority in the office, productivity is not tied so closely with "face time." Therefore, the professional repercussions of maternity leaves, for example, are not so great given that some portion of the job can be performed from home or with short visits to the office. A second suggestion is to improve family leave policies, making it more affordable and modifying the leave to permit the possibility of a gradual return to work. Given that current leave policy guarantees only unpaid leave, it might be the case that only more senior employees can afford a family leave and a gradual return to work following the leave. A final suggestion reiterates that made by Martin (2000), who noted that more-educated parents tend to desire higher quality childcare, which can be quite expensive. For these mothers, delaying fertility and therefore experiencing sufficient wage growth to afford higher quality care might be necessary. Any policy that assists in the purchase of high quality care (even for families with what most would consider comfortable incomes) might be warranted.

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Table 1
Variables, Means, and Standard Deviations in the Year 2000

Variable Name	Variable Description	Means	S.D.
Age	Age of respondent	39.0743	2.2449
Hispanic	Race dummy	0.1860	0.3891
Black	Race dummy	0.3020	0.4592
Other Race	Race dummy	0.5121	0.4999
Adults in HH	Number of adults in the household	1.7806	0.7960
Married	Marital status dummy	0.5808	0.4935
Years of Education	Completed years of schooling	13.2754	2.3763
Less than High School	Educational attainment dummy	0.0826	0.2753
High School	Educational attainment dummy	0.4443	0.4970
Some College	Educational attainment dummy	0.2630	0.4403
College	Educational attainment dummy	0.2101	0.4074
Motherhood	Dummy equal to 1 if woman is a mother	0.8264	0.3788
One Kid	Dummy equal to 1 if woman only has one child	0.2422	0.4285
Two Kids or More	Dummy equal to 1 if woman only has more than one child	0.5717	0.4949
Delayed Motherhood	Dummy equal to 1 if woman delayed motherhood after age 30	0.0962	0.2949
Family Resources	(Previous Year Family Income–Respondent's Labor Income)	15890.78	22678.77
Working	Dummy variable equal to 1 if woman works	1.0000	0.0000
Part-time Job	Dummy variable equal to 1 if woman works part-time	0.2746	0.4464
Tenure	Tenure in weeks	298.3043	292.1734
Work Experience	Work experience in weeks	35.1235	34.3159
Real Hourly Wage	Real hourly wage in 1984-1986 dollars	8.2302	6.2559
Professional & Managers	Occupation dummy	0.3560	0.4790
Sales	Occupation dummy	0.0884	0.2840
Clerical	Occupation dummy	0.2366	0.4251
Craftsmen	Occupation dummy	0.0221	0.1471
Operatives	Occupation dummy	0.0741	0.2620
Laborers	Occupation dummy	0.0275	0.1635
Farm	Occupation dummy	0.0084	0.0911
Services	Occupation dummy	0.1864	0.3895
Mother's Highest Grade	Mother's highest grade completed	10.8158	3.1209
Father's Highest Grade	Father's highest grade completed	10.8206	3.8568
Live with Parents by Age 18	Dummy equal to 1 if respondent lived with parents at age 18	0.6065	0.4886
Urban	Dummy equal to 1 if respondent lives in an urban area	0.7554	0.4741
High Unemployment Rate	Dummy equal to 1 if respondent lives in an area with high unemployment	0.0548	0.2276
North East	Regional dummy	0.1476	0.3548
North Central	Regional dummy	0.2390	0.4265
South	Regional dummy	0.4229	0.4941
West	Regional dummy	0.1905	0.3927
Predicted Probability of Motherhood	Predicted Probability of Motherhood	0.8639	0.1386
Predicted Probability of Delayed Motherhood	Predicted Probability of Delayed Motherhood	0.1737	0.1368

Table 2
Motherhood Wage Penalty

By Motherhood Status	Mean Hourly Wages	Standard Error	Difference in Means	t-statistic
Childless Woman	6.5235	0.0270	0.4288	11.9826***
Mother	6.0947	0.0235	-	-

Notes: *** Signifies statistically different from zero at the 1 percent level or better, **signifies statistically different from zero at the 5 percent level or better and *signifies statistically different from zero at the 10 percent level or better.

Table 3
Average Age at First Birth Among College-educated Women

By Educational Attainment	Mean Age at First Birth	Standard Error	Difference in Means	t-statistic
No College Degree	20.4315	0.0177	-5.8928	-94.9335***
College Degree	26.3244	0.0595	-	-

Notes: *** Signifies statistically different from zero at the 1 percent level or better, **signifies statistically different from zero at the 5 percent level or better and *signifies statistically different from zero at the 10 percent level or better.

Table 4
Wage Premium Associated to Late Motherhood

By Delayed Motherhood	Mean Hourly Wages	Standard Error	Difference in Means	t-statistic
Not Delayed Motherhood	5.9165	0.0224	-4.7590	-21.9380***
Delayed Motherhood	10.6754	0.2158	-	-

Notes: *** Signifies statistically different from zero at the 1 percent level or better, **signifies statistically different from zero at the 5 percent level or better and *signifies statistically different from zero at the 10 percent level or better.

Table 5
Wage Premium Associated to Late Motherhood Among College-educated Women

By Delayed Motherhood	Mean Hourly Wages	Standard Error	Difference in Means	t-statistic
Not Delayed Motherhood	9.7875	0.1245	-4.1680	-10.1590***
Delayed Motherhood	13.9555	0.3909	-	-

Notes: *** Signifies statistically different from zero at the 1 percent level or better, **signifies statistically different from zero at the 5 percent level or better and *signifies statistically different from zero at the 10 percent level or better.

Table 6
Wage Differences Between Childless Women and Late Mothers Before Birth

By Motherhood Status	Mean Hourly Wages	Standard Error	Difference in Means	t-statistic
Childless	5.9672	0.1772	-0.5175	-2.3410**
Late Mother	6.4847	0.1321	-	-

Notes: *** Signifies statistically different from zero at the 1 percent level or better, **signifies statistically different from zero at the 5 percent level or better and *signifies statistically different from zero at the 10 percent level or better.

Table 7
Coefficients and Standard Errors of Real Hourly Wage Regressions

Independent Variables	**Model (1): Pooled OLS**	**Model (2): Pooled OLS**	**Model (3): Pooled OLS & Selection Correction**	**Model (4): Pooled OLS & Selection Correction**	**Model (5): FE & Selection Correction**	**Model (6): FE & Selection Correction**
	Coefficient (S.E.)	**Coefficient (S.E.)**	**Coefficient (S.E.)**	**Coefficient (S.E.)**	**Coefficient (S.E.)**	**Coefficient (S.E.)**
High School	0.1033***	0.1058***	0.0719***	0.0726***	0.0104	0.0061
	(0.0067)	(0.0069)	(0.0090)	(0.0093)	(0.0194)	(0.0200)
Some College	0.2079***	0.2064***	0.1544***	0.1537***	0.0374	0.0353
	(0.0076)	(0.0078)	(0.0106)	(0.0108)	(0.0236)	(0.0242)
College	0.3795***	0.3772***	0.2961***	0.2949***	0.1432***	0.1291***
	(0.0096)	(0.0098)	(0.0142)	(0.0144)	(0.0307)	(0.0312)
Motherhood	-0.0701***	-	-0.0427***	-	-0.0707***	-
	(0.0049)		(0.0092)		(0.0107)	
One Kid	-	-0.0491***	-	-0.0183*	-	-0.0634***
		(0.0058)		(0.0099)		(0.0111)
Two Kids or More	-	-0.0967***	-	-0.0745***	-	-0.1252***
		(0.0059)		(0.0102)		(0.0125)
Delayed Motherhood	0.1374***	0.1202***	0.1454***	0.1235**	0.0744***	0.0657***
	(0.0184)	(0.0187)	(0.0214)	(0.0216)	(0.0211)	(0.0211)
College*Motherhood	0.0413***	-	0.0674***	-	0.0960***	-
	(0.0108)		(0.0124)		(0.0153)	
College*One Kid	-	0.0213	-	0.0336***	-	0.0806***
		(0.0140)		(0.0160)		(0.0175)
College*Two Kids or More	-	0.0597***	-	0.0956***	-	0.1260***
		(0.0132)		(0.0151)		(0.0180)
College*Delayed Motherhood	0.0766***	0.0859***	0.0474	0.0627*	0.0544	0.0579*
	(0.0292)	(0.0296)	(0.0334)	(0.0339)	(0.0338)	(0.0339)
Lambda	-	-	0.0845***	0.0802***	0.0275**	0.0218**
			(0.0117)	0.0118	(0.0108)	(0.0108)
No. of observations	45247	43956	31417	30662	31417	30662
F statistic	876.69	802.36	598.74	550.05	244.80	227.54
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: *** indicates significance at the 1 percent level, ** indicates significance at the 5 percent level, and * indicates significance at the 10 percent level. All regressions include a constant term, age, age squared, race, marital status, dummy indicative of any adults in the household, work experience, work experience squared, tenure, tenure squared, occupation dummies, urban residence, high unemployment rate area, and regional dummies.

Table 8
Coefficients and Standard Errors of Real Hourly Wage Regressions with Endogeneity Corrections

Independent Variables	**Model (7): FE, Selection & Endogeneity Corrections**	**Model (8): FE, Selection & Endogeneity Corrections**
	Coefficient (S.E.)	**Coefficient (S.E.)**
High School	0.0042	0.0091
	(0.0199)	(0.0200)
Some College	0.0267	0.0352
	(0.0249)	(0.0250)
College	-0.0066	0.0089
	(0.0359)	(0.0361)
Delayed Motherhood	0.0567***	-
	(0.0204)	
College*Delayed Motherhood	0.0505	-
	(0.0315)	
Predicted Probability of Motherhood	-0.0824*	-0.0772
	(0.0488)	(0.0490)
Predicted Probability of Delayed Motherhood	-	0.1020
		(0.0891)
College*(Predicted Probability of Motherhood)	0.3294***	0.2974***
	(0.0274)	(0.0304)
College*(Predicted Probability of Delayed Motherhood)	-	0.1039
		(0.0879)
Lambda	0.0668***	0.0538***
	(0.0091)	(0.0088)
No. of observations	31417	31429
F statistic	248.32	247.43
Prob > F	0.0000	0.0000
Over-identification Test	$9.43 < \chi^2_{3, 1\%}$	$6.29 < \chi^2_{2, 1\%}$

Note: *** indicates significance at the 1 percent level, ** indicates significance at the 5 percent level, and * indicates significance at the 10 percent level. All regressions include a constant term, age, age squared, race, marital status, dummy indicative of any adults in the household, work experience, work experience squared, tenure, tenure squared, occupation dummies, urban residence, high unemployment rate area, and regional dummies.

Table 9
Comparison of Wage Effects

Group Category	Computation	Model (1): Pooled OLS	Model (3): Poled OLS & Selection Correction	Model (5): FE & Selection Correction	Model (7): FE, Selection & Endogeneity Corrections	Model (8): FE, Selection & Endogeneity Corrections
		Coefficient (F-test of Joint Significance)	**Coefficient (F-test of Joint Significance)**	**Coefficient (F-test of Joint Significance)**	**Coefficient (F-test of Joint Significance)**	**Coefficient (F-test of Joint Significance)**
Mothers	Mom	-0.0701***	-0.0427***	-0.0707***	-0.0824*	-0.0772
		(203.27)	(21.86)	(43.73)	(2.91)	(2.52)
Late Mothers	(Mom+Delayed Mom)	0.0673***	0.1027***	0.0037***	-0.0257**	0.0248
		(123.33)	(33.15)	(23.71)	(5.52)	(1.95)
Childless Women With College	College	0.3795***	0.2961***	0.1432***	-0.0066	0.0089
		(1548.10)	(436.54)	(21.76)	(0.03)	(0.06)
Mothers With College	(College+Mom+College*Mom)	0.3507***	0.3208***	0.1685***	0.2404***	0.2291***
		(920.10)	(227.40)	(31.45)	(58.55)	(40.64)
Late Mothers With College	(College+Mom+Delayed Mom+ College*Mom+College*Delayed Mom)	0.5647***	0.5136***	0.2973***	0.3476***	0.4350***
		(600.91)	(171.44)	(30.22)	(46.51)	(45.58)

Note: *** indicates significance at the 1 percent level, ** indicates significance at the 5 percent level, and * indicates significance at the 10 percent level.

Appendix

Table A
Probit Model for Being Working

Independent Variables	Model (A.1) Coefficient (S.E.)	Model (A.2) Coefficient (S.E.)
Years of Education	0.1214***	0.1134***
	(0.0073)	(0.0075)
Motherhood	-0.7810***	-
	(0.0292)	
One Kid	-	-0.6978***
		(0.0309)
Two Kids or More	-	-0.9418***
		(0.0360)
Family Resources	-3.82e-06***	-3.71e-06***
	(3.03e-07)	(2.96e-07)
Mother's Highest Grade	0.0124***	0.0140***
	(0.0061)	(0.0062)
Father's Highest Grade	0.0024	0.0017
	(0.0045)	(0.0046)
Live with Parents by Age 18	0.0379***	0.0319***
	(0.0276)	(0.0280)
No. of observations	49609	48247
Wald Chi2(19)	2268.84	2204.22
Prob > chi2	0.0000	0.0000

Note: *** indicates significance at the 1 percent level, ** indicates significance at the 5 percent level, and * indicates significance at the 10 percent level. The regressions include a constant term, as well as controls for age, age squared, race, marital status, dummy indicative of any adults in the household, urban residence, high unemployment rate area, and regional dummies.

Table B
Coefficients and Standard Errors of Real Hourly Wage Regressions Exclusively Focusing on the Impact of Motherhood

Independent Variables	**Model (B.1): Pooled OLS**	**Model (B.2): Pooled OLS**
	Coefficient (S.E.)	**Coefficient (S.E.)**
High School	0.1049***	0.1073***
	(0.0067)	(0.0069)
Some College	0.2125***	0.2104***
	(0.0075)	(0.0078)
College	0.4064***	0.4030***
	(0.0086)	(0.0088)
Motherhood	-0.0570***	-
	(0.0046)	
One Kid	-	-0.0348***
		(0.0053)
Two Kids or More	-	-0.0866***
		(0.0056)
No. of observations	45262	43968
F statistic	963.77	908.78
Prob > F	0.0000	0.0000

Note: *** indicates significance at the 1 percent level, ** indicates significance at the 5 percent level, and * indicates significance at the 10 percent level. All regressions include a constant term, age, age squared, race, marital status, dummy indicative of any adults in the household, work experience, work experience squared, tenure, tenure squared, occupation dummies, urban residence, high unemployment rate area, and regional dummies.

Table C
Bivariate Probit Model for Being a Mother and for Delaying Motherhood

Probability of Motherhood	**Coefficient (S.E.)**
Years of Education	-0.1920***
	(0.0119)
Family Resources	1.17e-06***
	(2.84e-07)
Mother's Highest Grade	-0.0201**
	(0.0086)
Father's Highest Grade	-0.0126**
	(0.0063)
Live with Parents by Age 18	-0.2394***
	(0.0401)
Probability of Delaying Motherhood	**Coefficient (S.E.)**
Years of Education	0.0536**
	(0.0646)
Family Resources	7.6e-08***
	(2.79e-07)
Mother's Highest Grade	0.0373**
	(0.0085)
Father's Highest Grade	0.0070***
	(0.0114)
Live with Parents by Age 18	0.2464***
	(0.0765)
No. of observations	49587
Wald Chi2(16)	3444.06
Prob > Chi2	0.0000

Note: *** indicates significance at the 1 percent level, ** indicates significance at the 5 percent level, and * indicates significance at the 10 percent level. The regressions include a constant term, as well as controls for age, age squared, race, marital status, dummy indicative of any adults in the household, urban residence, high unemployment rate area, and regional dummies.

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La Fundación Centro de Estudios Andaluces (**centrA**) tiene como uno de sus objetivos prioritarios proporcionar un marco idóneo para la discusión y difusión de resultados científicos en el ámbito de la Economía. Con esta intención pone a disposición de los investigadores interesados una colección de Documentos de Trabajo que facilita la transmisión de conocimientos. La Fundación Centro de Estudios Andaluces invita a la comunidad científica al envío de trabajos que, basados en los principios del análisis económico y/o utilizando técnicas cuantitativas rigurosas, ofrezcan resultados de investigaciones en curso.

Las normas de presentación y selección de originales son las siguientes:

1. El autor(es) interesado(s) en publicar un Documento de Trabajo en la serie de Economía de centrA debe enviar su artículo en formato PDF a la dirección de email: wpecono@fundacion-centra.org
2. Todos los trabajos que se envíen a la colección han de ser originales y no estar publicados en ningún medio de difusión. Los trabajos remitidos podrán estar redactados en castellano o en inglés.
3. Los originales recibidos serán sometidos a un breve proceso de evaluación en el que serán directamente aceptados para su publicación, aceptados sujetos a revisión o rechazados. Se valorará, asimismo, la presentación dei trabajo en seminarios de **centrA**.
4. En la primera página deberá aparecer el título del trabajo, nombre y filiación del autor(es), dirección postal y electrónica de referencia y agradecimientos. En esta misma página se incluirá también un resumen en castellano e inglés de no más de 100 palabras, los códigos JEL y las palabras clave de trabajo.
5. Las notas al texto deberán numerarse correlativamente al pie de página. Las ecuaciones se numerarán, cuando el autor lo considere necesario, con números arábigos entre corchetes a la derecha de las mismas.
6. La Fundación Centro de Estudios Andaluces facilitará la difusión electrónica de los documentos de trabajo. Del mismo modo, se incentivará económicamente su posterior publicación en revistas científicas de reconocido prestigio.