The Motherhood Wage Penalty:
The Role of Occupation & Postponing Pregnancy

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THE MOTHERHOOD WAGE PENALTY:
THE ROLE OF OCCUPATION & POSTPONING PREGNANCY

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ABSTRACT

Many prior studies demonstrate the existence of a wage penalty for mothers versus women who never have children. This study uses data from the 1979 National Longitudinal Survey of Youth to investigate whether women who become mothers early in their careers experience a different motherhood wage penalty than women who become mothers late in their careers, as well as whether this relationship varies by occupation. The results of the analysis support the hypothesis that women who become mothers late in their careers suffer less of the motherhood wage penalty than women who become mothers early in their careers. Furthermore, I find that this effect varies by industry. Not only do the study’s results support the claim of previous researchers that mothers earn less than their non-mother counterparts, but it also suggests that by postponing pregnancy women will experience less of this effect than their early mother counterparts.
I would like to thank my Thesis Advisor, Tom Wei for his keen attention to detail and extreme patience with me throughout the process. I would also like to thank Mike Barker for his repeated guidance with the empirical methods, and for teaching me so much about STATA. A special thanks to Dr. Barbara Schone for her centering console during this iterative process. I also want to acknowledge Jim Steiner for his tireless efforts to keep me on track. And finally, a special thanks to my husband, my family, and Kerry Pace for their moral support throughout this entire graduate school process.

Many thanks,
Rose Ann Tutera
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BACKGROUND AND RESEARCH QUESTION

Recent research studies have documented that working mothers earn less than working non-mothers, on average (see Budig & England, 2001; Waldfogel, 1997). “Reported [wage] penalties range from 2% to 10% for one child and from 5% to 13% for two or more children (Budig & England, 2001; Waldfogel, 1995, 1997, 1998a)” (Anderson, Binder & Krause, 2003). In addition to human capital inputs and socioeconomic factors, potential reasons for this motherhood wage penalty include employer discrimination, gaps in employment tenure, and the subordination of married mothers’ careers to their husbands’ careers, their children’s needs, and their selection of “mother-friendly” jobs.¹ In this study, I explore whether women who have children later in their careers (late mothers) benefit monetarily by waiting longer to have children, and conversely, whether young mothers (early mothers) are punished for doing so too soon. Further, I analyze whether this difference varies by occupational industry.

I hypothesize that postponing childbearing until after one has an established career reduces the motherhood wage penalty, and that the industry in which one is employed also has an impact. I use individual-level data on women from the 1979 National Longitudinal Survey of Youth (NLSY79) to explore these hypotheses by first estimating the wage penalty for mothers based on the timing of their departure from their primary careers to have their first child.² Then, I analyze how the estimated wage penalty between women who become mothers early in their careers versus late in their careers varies by industry. Though the wage penalty for motherhood

¹ Budig and England (2001) test for the effect of this phenomenon. They define “mother-friendly” jobs as jobs that combine more easily with childrearing. For example, “mother-friendly” jobs can include less demanding and/or part-time jobs. “Mother-friendly” jobs enable mothers to juggle career and family. According to this definition, mothers are thus willing to tradeoff earnings for job flexibility.
² The NLSY79 is a publically available dataset from the United States Department of Labor’s Bureau of Labor Statistics.
has been documented in various nations throughout the world, I focus on mothers in the United States.

**Motivation & Literature Review**

According to the Population Reference Bureau’s “U.S. Labor Force Trends” 2008 Bulletin, “Since 1970, the proportion of all women in the labor force has increased from 43 percent to nearly 60 percent, while the proportion of men in the labor force decreased slightly, from 80 percent to 73 percent in 2007” (Populations Reference Bureau, 2008). Furthermore, in 2007, women comprised 46 percent of the workforce, indicating a significant cultural shift. However, it was not merely this trend of increased female participation in the workforce that was of interest; of particular interest was the fact that women with children are currently working in such great numbers (Waldfogel & Mayer, 2000).

Pew Senior Researcher Kim Parker (2009) wrote: “According to data collected by the U.S. Bureau of Labor Statistics, 59% of women now work or are actively seeking employment. An even higher percentage of women with children ages 17 or younger (66%) work either full or part time. Among those working mothers, most (74%) work full time while 26% work part time.”

One of the reasons for this increase in women’s participation in the labor force was an increasing control over when they have children. This included increased access and utilization of birth control as well as more active roles in the household decision-making processes. According to Ira S. Wolfe’s citation of the U.S. Census Bureau from 1961 to 1965, 44.4 percent of women worked during pregnancy, compared to 66.8 percent of women who worked during
pregnancy from 1991 to 1995 (Wolfe, 2007). Amuedo-Dorantes and Kimmel (2003) highlighted a subsequent trend worthy of further analysis: the fact that mother’s age at first birth was rising. They state that “in 1970, 19 percent of first births were to women aged 25 or older; by 2000 this percentage had increased to over 50 percent” (Amuedo-Dorantes & Kimmel, 2003). Data that are more recent indicated a continued trending in this direction: not only were more women postponing pregnancy, but they are also were postponing it longer. Using data from the National Center for Health Statistics and the Census Bureau, Pew researchers Livingston and Cohen (2010) highlighted the fact that in 1990, the percentage of teenagers (females below the age of 20) to give birth (13 percent) was greater than the percentage of women above the age of 35 to give birth (9 percent). In 2008, however, that trend reversed, with teenage mothers accounting for 10 percent of births and mothers above the age of 35 accounting for 14 percent of births (Livingston & Cohen, 2010).

With this changing role came the opportunity for women to pursue education and career opportunities, and to redefine their work-life balance from its traditional schema. However, juggling both careers and motherhood was not without its consequences, including the challenge of having a career that is interrupted by childbirth and childrearing. Studies demonstrated that mothers have less overall experience and less education, on average, than their non-mother counterparts. For example, Anderson, Binder, and Krause (2003) found that “…women who are never mothers attain 13.2 years of schooling on average, compared with 12.5 years for mothers.”

Early studies of the motherhood wage penalty focused more on the varying impact of marital status and childrearing on the wages between women and men. Economist Gary Becker (1964, 1981) posited that there is a direct link between human capital investments, family
structure (marital status), and earnings. He theorized that as women increased their investment in human capital and joined the workforce, both their potential earnings and the opportunity cost of childcare rose (Becker, 1981). Thus, as women became more valuable as potential earners, they were more likely to have returned to the workforce following childbirth. Using data from the ninth wave of the Panel Study of Income Dynamics, researcher Martha S. Hill studied the effects of children and marital status on wage, and concluded that workers with greater financial responsibilities to their families received higher wages (Hill, 1979). Furthermore, she was one of the first researchers who examined the effect of motherhood and found a 7 percent motherhood wage penalty and concluded that mothers’ intermittent work is statistically significantly explanatory when it comes to the wage penalty.

Jane Waldfogel (1997) used straightforward approaches to document that, on average, women with children earned less than women without children. According to her study, which used the National Longitudinal Survey of Young Women (NLS-YW) 1968 to 1988, the wage penalty for women with one child was 6 percent and 13 percent in annual wages for women with two or more children than their non-mother counterparts, after controlling for marital status, experience, and education. Avellar and Smock (2003) were the first researchers to compare two distinct cohorts (one from the 1975-1985 NLSY Women and one from the 1986-1998 NLSY) to confirm the negative association between motherhood and wage. After controlling for heterogeneity of human capital inputs through fixed-effects, Avellar and Smock concluded, like previous researchers, that each additional child is associated with a negative effect on women’s wage.
Additional studies have been conducted to hone in on the factors that influence this gap in earnings between mothers and non-mothers. Some studies examined work effort, the timing of one’s return to the workforce (how long one stays home to raise her children), job characteristics, and the impacts of college education, socioeconomic status, race, marital status, as well as other factors’ influence on earnings (see Hill, 1979; Anderson, Binder & Krause, 2003; Budig & Hodges, 1999; Budig & England, 2001; Korenman & Neumark, 1990; Waldfogel, 1998; Lundberg & Rose, 2000).

Inspired by Waldfogel’s 1997 study, Michelle J. Budig and Paula England claimed that the costs of childrearing are borne disproportionately by mothers (2001). They used panel data from the 1982-1993 National Longitudinal Survey of Youth (NLSY) with a person fixed-effects model to demonstrate that mothers earn 7 percent less per child than non-mothers. Budig and England’s paper assessed the explanatory power of a loss of full-time experience and seniority because of motherhood. By dividing the experience variable (the human capital input of interest) into years of full-time experience, years of part-time experience, years of full-time seniority, and years of part-time seniority, their study examined the difference between the earnings of mother and non-mothers. Budig and England concluded that job experience and seniority explained one third of the wage penalty. They also included a number of job characteristic variables to examine the explanatory power of mothers’ selection of “mother-friendly” jobs. In this regard, they concluded that “mother-friendly” characteristics explain little of the penalty, but that there is a propensity for mothers to choose part-time jobs.

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3 These four experience categories included individuals’ entire life cycle as professionals. Seniority is defined as experience in the organization for which one was currently working (Budig & England, 2001).
More current research by Deborah Anderson, Melissa Binder, and Kate Krause (2003) considered work effort using the NLSY Women data from 1968-88. These authors contributed to the existing literature by addressing heterogeneity among mothers identified by the timing of their return to the workforce (in terms of the amount of time spent raising their children from the time they are born) and how this factor interacted with work-schedule flexibility. To show the effect of controls on the motherhood wage penalty, the researchers regressed the log of hourly wage on a series of control including race, human capital measures, marital status, part-time status, occupation, and household resources. Then using a fixed-effects analysis and by estimating the wage penalties for different groups of mothers (classified according to the timing of their return to work post-childbirth), they answered their research question regarding the impact of time taken off to raise children. The goal of this study was not only to investigate the impact of the timing of a mother’s return to the workforce, but also to demonstrate how it interacts with both the age of her children as well as her work effort and work-schedule flexibility. In this case, work effort was assessed in terms of level of education of mothers (as a proxy for skill and demand of job) and commitment to returning to their careers sooner or to previous employers. The researchers concluded that the work effort theory does not offer a complete explanation of the wage penalty experienced by mothers. Furthermore, they concluded that high school graduates (medium-skill) mothers suffered more prolonged and dramatic wage losses than their low- and high-skill mothers (Anderson, Binder, & Krause, 2003).4

Ellwood and Jencks (2001) assessed the changing family structure by posing many questions, one of which was, “…does early as opposed to late childbearing actually do greater

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4 Economist Becker’s (1985) work effort hypothesis purported that women with children reduce their work effort in response to childcare duties. In other words, they are less productive at work due to having drained their energies raising their child(ren).
economic “harm” to the lifetime earnings prospect of women with more economic opportunities?” Like other researchers, their observations of current trends led them to conclude that this aspect of changing familial structures (among many others regarding childrearing and marital status) warranted deeper empirical analysis. Amuedo-Dorantes and Kimmel (2003) approached a similar question regarding the wage gap between mothers and non-mothers and the timing of fertility by focusing on education. Using a sample of college-educated women from the NLSY79, the authors hypothesized that the wage penalty is explained by the combination of education and postponed pregnancy—defined as giving birth for the first time after 30 years of age. Advocating for increases in college enrollment, they concluded that college-educated mothers experience a wage boost rather than a penalty because of fertility delays. In other words, they found that college-educated mothers do not experience a wage penalty and rather experience higher wages than their childless counterparts. Their research implies that education can offset the motherhood wage penalty and thus is couched in policy language regarding increased education incentives. Similar to Amuedo-Dorantes, Tanguchi’s (1999) earlier study looked at the fertility delays and education. To approach this question she too divided the groups of fertility timing according to age with three groups of first time moms: teenagers, individuals ages 20 to 27, and individuals 28 or older. Like later researchers, she found that increases in education decrease the wage penalty gap.

While much of this seminal work has accounted for nuanced characteristics of employment and education, none of the studies focused specifically on the implications of the timing of a mother’s leave from work in terms of a mother’s tenure and the subsequent effects of

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5 When creating the sample, Amuedo-Dorantes and Kimmel (2003) actually used age as the cutoff for early and late groups, with 30 years of age as the cutoff definition for postponing.
specific careers/occupations. To contribute to this body of research, I examine the implications of leaving a career early in one’s tenure to have a child (early mother) versus staying in a career longer term and then departing for motherhood (late mother). I divide years of experience into two distinct periods, early (first time motherhood during 0-3.99 years of work experience) and late motherhood (first time motherhood during years 4-12 of work experience). Further analysis uncovers whether the differences in wage penalty vary by industry. While I argue that postponing motherhood until one is established in one’s career serves to absorb some of the wage penalty, I also argue that despite policies such as the Family and Medical Leave Act, there are still industries in which early mother and late mother suffer varying degrees of the wage penalty.\textsuperscript{6}

By analyzing the impact of motherhood on wages, I can see the impact of a woman’s choice to become a mother on her earning potential and thus, the importance of policies that enable women to both participate in the workforce as well as to rear children. Furthermore, as noted earlier, recent trends indicate that women are generally becoming mothers later in life (Mathews & Hamilton, 2009). Therefore, this shift will potentially have great implications for the motherhood wage penalty as this phenomenon continues to evolve on this trajectory. Given current trends to delay pregnancy, I look at the effect of having greater workforce tenure at the time of her first childbirth and how this relationship varies by the occupation in which she is employed. This research could potentially inform future mothers of the impact of their decision to leave the workforce earlier rather than later in their careers as well as in which industries they would suffer the smallest penalty. If this early-late mother, industry effect exists, society may

\textsuperscript{6} In 1993, the U.S. passed the Family Medical Leave Act (FMLA), which allows eligible employees of covered employers to take up to 12 weeks of unpaid leave without jeopardy of losing his or her job.
lose economic efficiency by not supporting family structures that enable women to reach their full potential. Specifically in terms of the industry effect, there could be additional implications for how to create less divergence in the wage penalty between varying professions so that mothers are not pigeonholed into careers that are “mother-friendly” or suboptimal given their skill sets.

While policy-makers could argue that current trends in female participation in the workforce and the postponement of pregnancy reinforce the effectiveness of equal opportunity policies, a motherhood wage gap still exists. Furthermore, as I hypothesize, this gap is experienced differently for early mother and late mothers. As previous researchers claimed, there are institutional arrangements that can serve to lessen the motherhood wage gap, including publicly supported childcare, cash benefits for people with children, paid parental leave (Waldfogel, 1998). By making it easier to combine motherhood and adding incentives for education and career investment, society might see a lessen of this effect.

**Conceptual Framework and Hypotheses**

This study examines a potential factor that influences the motherhood wage penalty: the timing of when a working mother decides to leave her career. This study also examines whether that effect varies by industry. In particular, this study attempts to answer the following questions:

(1) Do women who first leave their careers after 0 to 3.99 years of work experience to have a child (early mother) suffer a greater wage penalty upon their return than women who first leave their careers later with 4 to 12 years of experience (late mother)?
(2) Does the wage penalty from being an early mother versus a late mother vary depending on the occupation in which one is employed?

To explore these questions, this study looks at the proportion change in wages for mothers based on their earnings prior to becoming a mother and their earnings after becoming a mother as compared to their predicted earnings should they not have become mothers, a value which is estimated from data on their non-mother counterparts.

Potential explanations for the variation in earnings for women include human capital inputs such as education and tenure, occupational characteristics, as well as socioeconomic factors such as race, gender, marital status, and number of children. When analyzing this variation through the lens of the labor-leisure and utility maximization economic models, it is apparent that mothers experience decreased utility levels and market wages compared with non-mothers, holding other factors constant (Amuedo-Dorantes & Kimmel, 2003). As seen in the below conceptual model (Figure 1), the analysis starts at the female level and then is divided in terms of mothers and non-mothers. There are myriad identifying factors (displayed in the boxes between mother and non-mother) that influence the earnings of both mothers and non-mothers (with the exception of number of children which is specific to mothers). Thus I control for race, marital status, number of children, number of jobs held over the lifetime of an individual, the highest level of education received during their lifetimes, and the industry they are employed in.
For mothers, in particular, though, there are additional potential explanations for the wage penalty including: employer discrimination; a professional career punctuated by gaps in employment and thus less overall work experience; and, the selection of jobs that pair more easily with childrearing. Several researchers have claimed that employers might not hire women with children or if hired offer them lower wages because of a perception that women with children exert less effort than non-mothers or men. This logic is synonymous with the work effort theory espoused by Becker (1985), as well as Budig and England’s (2001) “mother-
friendly” theory that women earn less than men because of a self-imposed “discrimination,” whereby their careers are secondary to childrearing and/or their husbands’ careers.

Though several factors explain the wage penalty experienced by mothers, I elect to divide the group of mothers into early mothers and late mothers based on years of tenure in the position they hold at the time of their first birth so that I can isolate any potential industry effects as well. Expectedly, mothers often have less experience and education than non-mothers do. Similarly, late mothers tend to have more experience and education than do their early mothers. Thus, it is reasonable that when late mothers return to the workforce after their first birth, they have more employment flexibility. Conversely, early mothers—with fewer inputs in terms of education and experience—are more likely to be confined to minimum levels of employment and thus experience far less wage flexibility. For example, in their assessment of work effort and work-schedule flexibility, Anderson, Binder and Krause (2003) find that “high school graduates are likely to hold jobs requiring their presence during regular office hours, and are unlikely to gain flexibility by finding work at other hours or by taking work home in the evening.”

Remarkably, however, in some instances this effect can work in the favor of early mothers. For example, given a lower salary starting point, early mothers have less variation in wage when they return to the workforce. While for late mothers, who potentially hold higher paying jobs at the time of their first birth, can experience a more significant drop in post-childbirth wage. However, I speculate that, on average, greater flexibility serves as an advantage to late mothers. In her book, *Creating a Life: Professional Women and the Quest for Children*, labor economist Sylvia Ann Hewlett (2002) highlighted the costs of being an early mother as
lower for younger first-time mothers than it was for older first-time mothers. However, these costs primarily include aspects such as health, fecundity, mate finding, and job market problems.

Furthermore, women who have more experience and are thus more established in their careers (late mothers) might experience less of a motherhood wage penalty because they have already established career-specific skills and rank. I anticipate the effect to vary based on the industry in which individuals are employed, with the assumption that certain industries are more “mother-friendly” and/or require different skills that are more easily established and maintained. For example, if one is in the engineering industry and knowledge of currently changing technologies is of the utmost importance, leaving later might serve as an advantage because of the pre-existing knowledge. Yet, it also might not matter given the fact that gaps in employment might cause an atrophy of knowledge and/or a lack of understanding of current trends. While others have looked at both the concept of “mother-friendly” characteristics and the length of time out of work, this study focuses specifically on whether this industry effect varies early mothers versus late mothers. Unlike previous studies, I do not delve into occupation characteristics, but focus on industry categories; that is, I attempt to discover whether there are differences between early and late mothers with respect to the industry in which they work and not the underlying systemic differences between those industries. Given that there are theoretical arguments for both sides in terms of whether the penalty is greater or less for early versus late mothers, this study uses the following data and methods to empirically explore the answer to this question.

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7 Occupation characteristics that have been previously investigated include for example: part-time, full-time, hazardous, and physically demanding. (Budig & England, 2001; Anderson et al, 2003)
DATA AND METHODS

The primary dataset for this analysis is the National Longitudinal Study of Youth 1979 (NLSY79), available through the Bureau of Labor Statistics. The NLSY79 is a nationally representative sample of 12,686 young men and women who were 14-22 years old when first surveyed in 1979. These individuals were interviewed annually through 1994 and on a biennial basis thereafter. This study utilizes available data for individuals from 1979 to 2008. Among the information surveyed are labor market experience, and human capital and other socioeconomic variables, including education, health, and fertility. This panel dataset provides a unique opportunity to study in detail the evolution of these individuals and their life experiences.

My sample includes only women, defined in terms of their motherhood status—women who became mothers at some point during the sample period (mothers) and women who did not become mothers at any point during the sample period (non-mothers). The primary dependent variable, wagepenalty, is the difference in pre-post changes in wages for mothers relative to the pre-post changes in wages of their counterfactual sample, non-mothers. By controlling for race, marital status at the time of a mother’s first birth, education, number of jobs over one’s lifetime, the industry of employed in, and number of children, I further isolate the effect of timing of motherhood on a mother’s wage. Given the impact of marital status on wage demonstrated in previous studies of familial structure and wage, marital status is an important control for accounting for the variation in wage penalty. For example, having a spouse who works, might preclude a mother’s necessity to return to work; or on the other hand, having a partner might enable greater flexibility in terms of childcare, whether that be because she can more easily afford care or because her partner can serve as an additional care provider. Likewise, educational
inputs are certain to impact a mother’s earning and thus need to be controlled. Below I detail how the wage difference variable was established using women’s wages and how instances such as a prolonged leave of absence from employment are addressed.

By dropping male respondents from the sample, recoding the gender variable to female, and dropping missing data, I restrict the sample to 5,414 women. This restricted sample of women enables me to create a dummy variable for mothers. In this case, I define “mothers” as women who have at least one child during the sample period. This yields 3,418 mothers. I then create two dummy variables indicating during what part of her career a mother had her first child—specifically, if she had their child with less work experience (0-3.99 years of experience), earlmom, or with more work experience (4-12 years of experience), latemom. Given the fact that the majority of mothers in the survey became mothers during the earlier period, the cutoff was set to 3.99 years, leaving an eight-year window for the late mother period. There are 2,980 early moms and 438 late moms. By using the variable yr0f1stbirth, which indicates the year of mothers’ first birth, I calculate the pre and post-birth wages, as well as the proportionate difference between the two. This pre-post proportional wage change was calculated by taking the average of the wages for the three available years preceding the year of the first birth for the pre-wage and then computing the difference between that value and the average wages for the first three available years following the birth.

I then estimate a counterfactual pre-post proportional wage change using data from the non-mother group (which consists of 1,996 observations). Like the two groups of mothers (early mom and late mom), the two groups of non-mothers reflect individuals with more experience and less experience at their primary job. In order to generate these variables, first for the early
tenure group in lieu of a birth year (since they do not have children), I created a cutoff of 2.6 years of experience. The 2.6-year cutoff was determined as the mean between 0 and 3.99 (the range of experience for early mothers). Thus, the pre-wage is an average of the first three available wages that precede non-mothers 2.6th year of experience and their post-wage is an average of the first three available wages that follow a non-mothers 2.6th year of experience. I refer to this group as the earlytenure group, which contains 754 observations. The latetenure group contains 154 observations and is calculated from non-mothers that act as the comparison group for the late mothers. For this group, the pre-wage is an average of the first three available wages that precede non-mothers ninth year of experience, (which is the mean for the late mom group which ranges from four to twelve years) and their post-wage is an average of the first three available wages that follow a non-mothers ninth year of experience. I then create a dummy variable for whether mothers and non-mothers are in the late group or the early group. This variable, late, is equal to one if the individual is in the late group (latetenure equal to one and laatemom equal to one).

Using the pre-post wage data from the early tenure and late tenure non-mothers, I predict the expected pre-post proportional wage change for early and late mothers, had they not become mothers. More specifically, I run a cross-sectional regression for non-mothers only with the pre-post proportional wage change (wage_diff as the dependent variable on race, marital status, industry, number of jobs held (over the lifetime of one’s career dummied into four categories of 10 jobs), education, and the late dummy. I then use the estimates from this regression on non-mothers to predict the sample of mothers’ pre-post proportional wage changes had they not become mothers. By subtracting the actual wage differential from the predicted wage
differential, I obtain a value for our motherhood wage penalty (the variable that then becomes the dependent variable in the regressions below and that is called wagepenalty).

After creating the key control variables and coding for missing values the sample is narrowed down to 1,495 mothers, 1,205 of which are early mothers and 290 of which are late mothers. As stated, the key control variables include: race, marital status, number of jobs, number of kids, industry, and education. Race (hispanic_black) is an indicator set equal to one if an individual is Hispanic or black and set equal to zero if an individual is white. Martial status (married) is an indicator set equal to one if the mother was married at the time of her first birth and set equal to zero if a mother was unmarried, separated or widowed. Number of jobs (numjobs) is dummied out into four categories: 1-10 (coded as zero), 11-20 (coded as one), 21-30 (coded as three), and 31-40 (coded as four). Number of kids (numkids) is a continuous variable that is the sum total of kids in a sample individual’s lifetime. Education (highestgrade) reflects the highest grade completed by the respondent at the time of the last survey in 2008. Education is dummied out into four categories: less high school (coded as zero), high school graduate (coded as one), college (coded as two), and higher than college (coded as three). The industry (new_industry) variable includes ten occupational categories: (1) Agricultural, Mining, & Construction; (2) Manufacturing; (3) Transportation; (4) Wholesale Trade; (5) Retail Trade; (6) Finance, Insurance & Real Estate; (7) Business & Repair Services; (8) Personal Services; (9) Professional & Related Services; and, (10) Public Administration. Given the fact that the industry data were not available in every year of the survey, the industry variable is derived from the respondents’ responses in the 2000 survey. Occupational categories are generated from the 1990 census, which is coded into 1980 occupation and industry codes and serves as a reference
point for recoding the industry data (U.S. Bureau of the Census, 1993). Summary statistics for
the sample are reflected in Table 1.

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<td>Wage Measurements</td>
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<tr>
<td>Number of Jobs (over lifetime)</td>
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<td>No. of Observations</td>
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Notes: Table figures report means for variables indicated. Pre- and post-motherhood wages are measured in dollars per year. Wage differential is a proportion change between the pre-wage and the post-wage. The cells for number of kids and number of jobs over lifetime show means of continuous variables. Pre-motherhood wage and post-motherhood wage are measured in dollars per year. The education variable is dummy into four categories—the omitted category is less than a high school education.

To demonstrate the effect of being an early mom versus a late mom, I run the first regression below on a sample of mothers only:

(1) Wage Penalty = β₀ + β₁Late Mother + β₂Race + β₃Married + β₄,₁₃Number Kids + β₁₄,₁₆Number Jobs + β₁₇,₂₅Industry + β₂₆,₂₈Education + ε

As the above equation indicates, there are multiple coefficients (or betas) for the variables that are defined in terms of vector of dummies.

In order to isolate the impact of the early-late mother effect on industry and to address my
second research question, I utilize the vector of dummies of the *new_industry* variable. Again with a sample of only mothers and using the same controls as in the first equation, I use a non-pooled approach and run ten regressions of wage penalty on the *late* variable for each of the ten dummy industries.

\[
\text{(2) Wage Penalty} = \beta_0 + \beta_1 \text{Late Mother} + \beta_2 \text{Race} + \beta_3 \text{Married} + \beta_{4-13} \text{Number Kids} + \beta_{14-16} \text{Number Jobs} + \beta_{26-28} \text{Education} + \epsilon
\]

I do this by using an “if” statement for setting industry equal to one through ten for the industry categories. This enables me to interpret the coefficient on Late Mother for each of the industries with a baseline category of Early Mother.

**Main Results**

The results suggest that late mothers—mothers who have children later in their careers—on average, are predicted to experience less of a wage penalty compared to early mothers, mothers who have children earlier in their careers (Table 2). Women who become mothers later in the careers experience 49 percentage points less of a wage penalty than do women who become mothers earlier in their careers, on average, controlling for marital status, education, race, number of kids, and number of jobs. The effect observed in my sample is highly statistically significant (p < 0.01). As seen in the summary statistics in Table 1, the mean wage penalty for mothers in the sample is 1.268, while the mean wage penalty for early mothers is slightly higher at 1.297. In the case of late mothers, the mean wage penalty is lower than both categories at 1.146. This demonstrates that the wage penalty is positive for all mothers, meaning
that mothers do experience a wage penalty, however, different depending on the classification of late and early. It is worth noting that about 79 percent of the sample was married at the time of their first birth.

Table 2: Regression Estimates of Wage Penalty on Late Motherhood

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Wage Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Mothers</td>
<td>-0.492***</td>
</tr>
<tr>
<td></td>
<td>(0.111)</td>
</tr>
<tr>
<td>High School Degree</td>
<td>1.581***</td>
</tr>
<tr>
<td></td>
<td>(0.412)</td>
</tr>
<tr>
<td>College Degree</td>
<td>2.134***</td>
</tr>
<tr>
<td></td>
<td>(0.407)</td>
</tr>
<tr>
<td>Higher than College</td>
<td>2.100***</td>
</tr>
<tr>
<td></td>
<td>(0.512)</td>
</tr>
<tr>
<td>Race (Hispanic or Black)</td>
<td>-0.513***</td>
</tr>
<tr>
<td></td>
<td>(0.141)</td>
</tr>
<tr>
<td>Married</td>
<td>0.161</td>
</tr>
<tr>
<td></td>
<td>(0.176)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.620</td>
</tr>
<tr>
<td></td>
<td>(0.557)</td>
</tr>
<tr>
<td>Observations</td>
<td>1,495</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.130</td>
</tr>
<tr>
<td>Industry</td>
<td>YES</td>
</tr>
<tr>
<td>Number of Kids</td>
<td>YES</td>
</tr>
<tr>
<td>Number of Jobs</td>
<td>YES</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results support my hypothesis that there is a wage differential between mothers who have children earlier in their careers versus later in their careers. Furthermore, I find that the wage penalty for early mothers and late mothers varies based on profession, as purported by my second hypothesis. While an F-test shows that the industries as a whole are jointly statistically significant, the series of regressions denoted in the second equation above help to demonstrate
the effect of late motherhood versus early motherhood in each of the industries. As exhibited in Table 3, industry categories (1) Agricultural/ Mining/ Construction, (2) Manufacturing, (4) Wholesale trade, and (10) Public Administration, are not statistically significant at any level. In other words, on average, mothers who have their children later in their careers do not experience more or less of a wage penalty than mothers who have their children earlier in their careers in those industries. However, mothers who have their children later in their careers in industry categories: (3) Transportation, (5) Retail trade, (6) Business & Repair Services, (7) Business & Repair Services, (8) Personal Services, and (9) Professional & Related Services, do experience less of a wage penalty than mothers who have children earlier in their careers, on average. These coefficients are statistically significant at varying conventional levels.

On average, late mothers who work in transportation; retail trade; finance, insurance and real estate; business and repairs services; personal services; and professional services and related services have a smaller wage penalty than their early mother counterparts. In particular, Professional & Related Services is worth further examination as it both the largest category with 560 observations and a category that I hypothesize will show a positive effect for late mothers. This category encompasses individuals who work in professions including education jobs, health services, and legal services. Assuming this category of jobs requires individuals to have more experience and/or more education, it makes sense that professional women who decide to have children later in their careers would suffer less of a wage penalty than women who decide to have children earlier in their careers. However, this effect is quite small compared to some of the other categories. It is worth noting that these results only compare early mother to late mothers within the industries, not across. In order to compare across industries, I use a non-pooled t-value
calculation. For example, in order to see how the Professional & Related Services industry compared to the Retail Trade industry, I calculate a non-pooled t-value of 1.23. This goes beyond the scope of my paper, but is worth further analysis.
### Table 3: Regression Estimates of Wage Penalty Motherhood for Industries

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Mothers</td>
<td>0.593</td>
<td>-0.0214</td>
<td>-0.692**</td>
<td>-0.741</td>
<td>-0.521*</td>
<td>-1.258***</td>
<td>-0.918***</td>
<td>-1.591***</td>
<td>-0.363*</td>
<td>0.314</td>
</tr>
<tr>
<td></td>
<td>(1.086)</td>
<td>(0.395)</td>
<td>(0.312)</td>
<td>(0.924)</td>
<td>(0.296)</td>
<td>(0.197)</td>
<td>(0.273)</td>
<td>(0.540)</td>
<td>(0.199)</td>
<td>(0.548)</td>
</tr>
<tr>
<td>Race (Hispanic or Black)</td>
<td>-0.495</td>
<td>-0.879</td>
<td>-0.623*</td>
<td>0.313</td>
<td>0.116</td>
<td>-0.952***</td>
<td>-1.211**</td>
<td>-1.295**</td>
<td>-0.465**</td>
<td>-0.779</td>
</tr>
<tr>
<td></td>
<td>(1.093)</td>
<td>(0.615)</td>
<td>(0.321)</td>
<td>(0.300)</td>
<td>(0.427)</td>
<td>(0.281)</td>
<td>(0.548)</td>
<td>(0.773)</td>
<td>(0.214)</td>
<td>(0.628)</td>
</tr>
<tr>
<td>Married</td>
<td>-0.891</td>
<td>-0.535</td>
<td>1.535*</td>
<td>-0.414</td>
<td>0.209</td>
<td>-0.0705</td>
<td>-0.688</td>
<td>-0.432</td>
<td>0.0819</td>
<td>0.426</td>
</tr>
<tr>
<td></td>
<td>(0.704)</td>
<td>(0.583)</td>
<td>(0.895)</td>
<td>(0.379)</td>
<td>(0.338)</td>
<td>(0.532)</td>
<td>(0.504)</td>
<td>(0.562)</td>
<td>(0.309)</td>
<td>(0.749)</td>
</tr>
<tr>
<td>High School Degree</td>
<td>3.580***</td>
<td>1.840*</td>
<td>-0.891</td>
<td>3.320***</td>
<td>0.275</td>
<td>1.543*</td>
<td>0.602</td>
<td>1.226**</td>
<td>0.677</td>
<td>2.036**</td>
</tr>
<tr>
<td></td>
<td>(1.292)</td>
<td>(1.092)</td>
<td>(0.709)</td>
<td>(1.219)</td>
<td>(0.426)</td>
<td>(0.843)</td>
<td>(0.860)</td>
<td>(0.480)</td>
<td>(1.275)</td>
<td>(0.998)</td>
</tr>
<tr>
<td>College Degree</td>
<td>3.365***</td>
<td>2.376**</td>
<td>-0.551</td>
<td>0.562</td>
<td>3.803***</td>
<td>1.100***</td>
<td>2.491***</td>
<td>1.443***</td>
<td>1.683***</td>
<td>2.036**</td>
</tr>
<tr>
<td></td>
<td>(0.870)</td>
<td>(1.067)</td>
<td>(0.622)</td>
<td>(0.536)</td>
<td>(1.300)</td>
<td>(0.394)</td>
<td>(0.782)</td>
<td>(0.704)</td>
<td>(0.493)</td>
<td>(0.998)</td>
</tr>
<tr>
<td>Higher than College</td>
<td>4.355***</td>
<td>3.312***</td>
<td>-0.103</td>
<td>4.756***</td>
<td>1.017</td>
<td>2.406**</td>
<td>1.803**</td>
<td>1.368**</td>
<td>1.368**</td>
<td>2.020**</td>
</tr>
<tr>
<td></td>
<td>(1.332)</td>
<td>(1.029)</td>
<td>(0.832)</td>
<td>(1.291)</td>
<td>(0.791)</td>
<td>(0.593)</td>
<td>(0.885)</td>
<td>(0.583)</td>
<td>(0.857)</td>
<td>(0.998)</td>
</tr>
<tr>
<td>Lifetime Number of Jobs (11-20)</td>
<td>2.584**</td>
<td>-0.254</td>
<td>0.205</td>
<td>-0.201</td>
<td>-0.265</td>
<td>-0.703**</td>
<td>-0.560</td>
<td>-1.030*</td>
<td>0.233</td>
<td>0.224</td>
</tr>
<tr>
<td></td>
<td>(1.193)</td>
<td>(0.512)</td>
<td>(0.396)</td>
<td>(0.730)</td>
<td>(0.436)</td>
<td>(0.331)</td>
<td>(0.421)</td>
<td>(0.598)</td>
<td>(0.244)</td>
<td>(0.757)</td>
</tr>
<tr>
<td>Lifetime Number of Jobs (21-30)</td>
<td>0.714</td>
<td>0.212</td>
<td>-1.498</td>
<td>-0.352</td>
<td>-0.931*</td>
<td>-2.947***</td>
<td>-1.266</td>
<td>-0.982*</td>
<td>-1.495</td>
<td>-1.335</td>
</tr>
<tr>
<td></td>
<td>(1.260)</td>
<td>(0.470)</td>
<td>(1.350)</td>
<td>(0.806)</td>
<td>(0.521)</td>
<td>(0.975)</td>
<td>(1.103)</td>
<td>(0.505)</td>
<td>(1.117)</td>
<td>(1.163)</td>
</tr>
<tr>
<td>Lifetime Number of Jobs (31-40)</td>
<td>3.403***</td>
<td>0.885*</td>
<td>1.375***</td>
<td>0.396</td>
<td>0.819</td>
<td>1.838***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
<pre><code>                                                                               | (1.008)                           | (0.480)                          | (0.230)                          | (0.241)                           | (1.249)                         | (0.358)                                       |                                             |                                 |                                             |                                         |
</code></pre>
<p>| Observations                  | 38                                                 | 175                              | 89                               | 26                               | 194                            | 128                                           | 87                                          | 88                               | 560                                          | 110                                       |
| R-squared                     | 0.271                                              | 0.081                            | 0.188                            | 0.417                            | 0.200                           | 0.249                                         | 0.238                                       | 0.187                            | 0.041                                        | 0.076                                    |</p>

*Notes:* The coefficient of interest is the variable on Late Mothers for which the baseline is Early Mothers. The Race variable is an indicator with Hispanic/Black=1 and White=0. The baseline category for the education variables is less than a high school degree and for the lifetime number of jobs is 1-10. Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1
DISCUSSION

As many studies have documented, working mothers earn less than non-mothers, working childless women. Though this can be explained by several factors from human capital inputs to environmental features, the fact that women who have children still earn less than non-mothers is problematic insofar as it signals the potential existence of discrimination against mothers. Despite a shifting trend in the timing of pregnancy (specifically later in individuals’ careers versus earlier), as women elect to pursue careers in addition to having children they still earn less than childless women, on average. This study contributes to the existing body of research by illuminating potential differences between the wage penalties for mothers who leave their careers with fewer than four years of professional experience as compared to those who leave after four or more years of experience. However, given the small sample size of the data once subdivided into early mothers and late mothers, and the ten industry categories, further research into this subject is recommended.

There are a few limitations in my research. In addition to sample size, the first concern is the fact that grouping women into the two main experience categories is a bit arbitrary in that there is no explicit reason that 3.99 and 4 years of experience are vastly different. In particular, defining these parameters is contingent upon availability of tenure data for the primary job that the individual held at the time surveyed. Given the fact that I cannot truly have a counterfactual example of what these mothers would earn had they not become mothers, the construction of a counterfactual sample of non-mothers is only an imperfect attempt to create a directly comparable group. Additional challenges exist with the industry constructions, particularly in
regards to the occupations sub-categorization. Since there are a large number of specific job titles, to make the analysis more tractable I group them in to broader occupational categories. However, these categories may be too broad and not adequately capture the potential nuanced effects that exist between well-specified positions. Once parsed out into the ten subgroups, with the exception of Professional & Related Services, the samples sizes for each of the groups is still quite low. Ideally, one would be able to further subdivide the sample to isolate effects of specific careers (for example, Professional Services includes all education jobs as well as all health careers, amongst others).

Another challenge is the fact that there is no way to assess with certainty the rationality of mothers versus non-mothers choices to leave the workforce at a particular time or to reenter at a particular time. In this sense, the analysis lacks information regarding why women decide to have children when they do. For example, a premise of this research is that women with more experience (late tenure) have higher earning potential as they have dedicated themselves to their careers for a longer period of time. However, I do not know that women who postpone pregnancy actually establish themselves in their careers, building necessary human capital qualifications for their careers including relevant years of experience. Perhaps these decisions are less strategic. For example, that they are influenced more by marital status or fertility. In particular, though, simply because a woman has more years of experience, it does not necessarily mean they are relevant years of experience. Say, for instance, she switches careers and then decides to have a child. She will seemingly be at the entry level of her career at the time of her pregnancy (or first birth). This calculation also does not take into account gaps in employment that result from external economic or environmental constraints.
Given that I am merely holding constant the total number of kids, highest grade completed at the time of the most recent survey, marital status at the time of the most recent survey rather than at the time of the birth, I am not controlling for all factors that might affect the wage penalty from motherhood. For example, at this time the study does not include whether the work is part-time or full-time, or a proxy for work effort or cognitive skills.

Despite the fact that this study does not find variation in the wage penalty between early mothers and late mothers for every single one of the ten occupational categories, industry itself is significant in this analysis. Thus, further research with a larger sample and further subdivision of occupations might tell a more compelling story—and one that is consistent with my hypothesis. A potential solution to eliminate inherent or explicit biases between professions should be addressed in employer policies as well as federal policies. On a personal level, women in today’s society can use this information to inform their own motherhood decisions and the opportunity costs for electing to postpone pregnancy versus having children early in their careers. Additionally, if late motherhood helps to explain some of the motherhood wage penalty, it is important to examine policies that enable women to pursue their educations and their careers prior to starting family.
REFERENCES


