

The Labor Supply Effects of Delayed First Birth

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Abstract

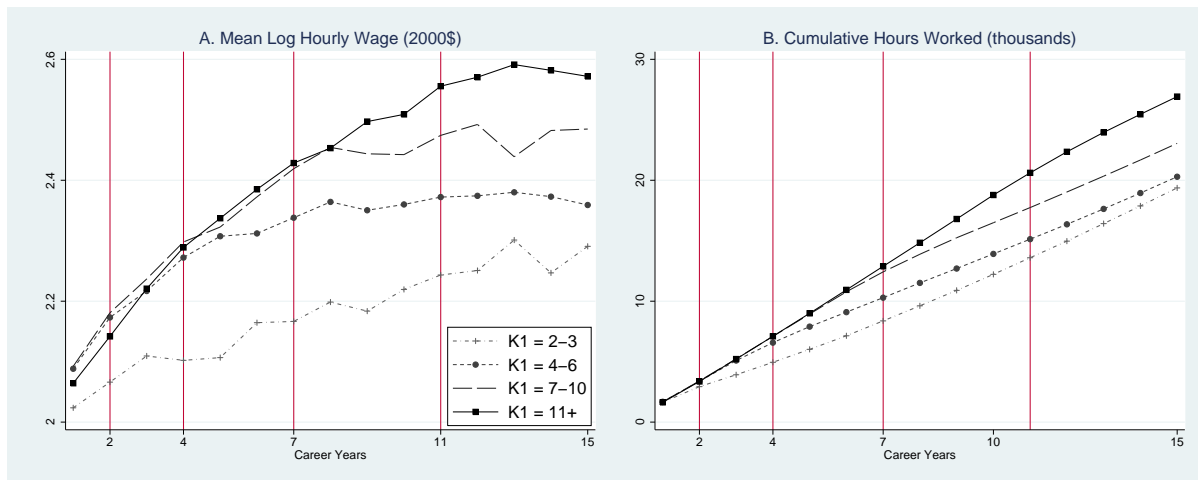
In this paper I explore the relationship between first-birth timing and post-birth labor supply, and how it is influenced by family and career characteristics. Given that pre-birth wages are increasing in fertility delay, the rising opportunity cost of time would suggest that later mothers work more. Yet I only find this pattern for high school graduates. For college graduates, I instead find surprisingly no relationship between first-birth timing and post-birth hours worked, despite strongly increasing pre-birth wages. Furthermore, after controlling for family and career factors, many of which influence hours worked and are correlated with fertility timing, this different pattern by education remains.

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1 Introduction

Much of the economic discussion surrounding the labor market impacts of childbearing focuses on the change in women’s labor supply after motherhood (Angrist and Evans, 1998; Jacobsen, Pearce, and Rosenbloom, 1999), and especially around the first birth (Shapiro and Mott, 1994; Barrows, 1999; Klerman and Leibowitz, 1999). For women who have their first child after they start working – for whom that baby may act as an interruption to their labor market behavior – one can also consider whether the *timing* of that birth influences their subsequent labor supply. In the following paper I explore how the pattern of hours worked in the year after first birth is related to fertility timing, and how that pattern is influenced by family and career characteristics.

Figure 1: Wages and Hours Worked By Career Year

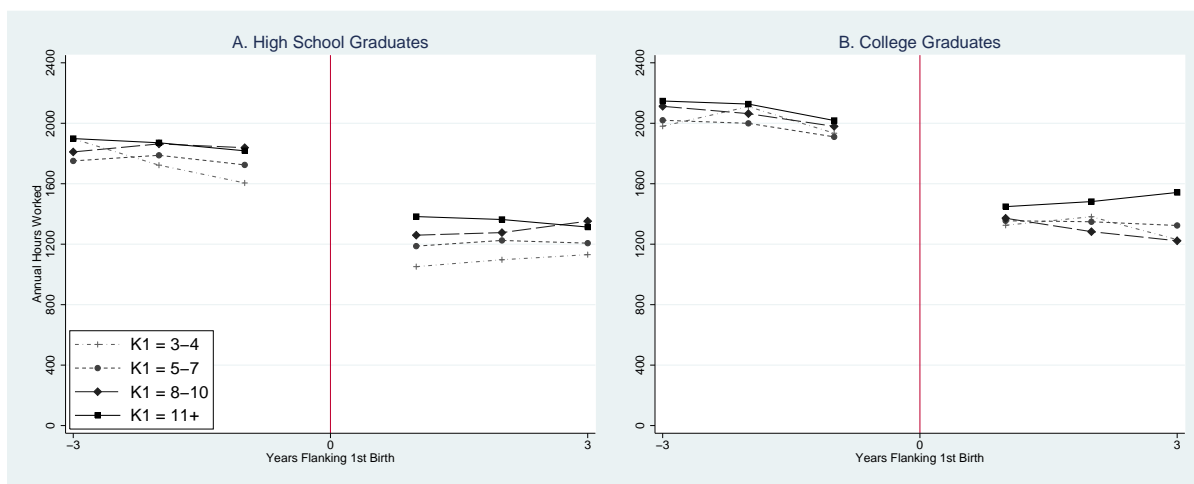


NOTES: Figure A plots mean wages over the first 15 calendar years after labor market entry, grouping women by their timing of first birth (K_1), for the NLSY79 mothers who have that child after labor market entry. Figure B plots total cumulative hours worked over these same 15 years. The patterns, but not levels, are almost identical if plotted separately for high school and college graduates.

There is a compelling opportunity cost story that would suggest that later mothers work longer hours after motherhood. For women from the 1979 cohort of the National Longitudinal Survey of Youth (NLSY79), Figure 1a plots the pattern of wages over time from the point of labor market entry, grouping women by their “career” timing of first birth (Herr, forthcoming). We see that because wages rise over time, the wage level at the point of motherhood is increasing in fertility delay. Thus because later mothers face a higher wage, the greater opportunity cost of their time at home should induce them to work more.

For these same women, Figures 2a and 2b plot the pattern of hours worked in the years flanking first birth, now separately for women who enter the labor market with a high school diploma and a college degree. For both education levels, we see that hours worked in the 3 years before first birth are mildly increasing in fertility timing, consistent with the value of their time.¹ Yet as evident in Figure 1b, the pattern of hours worked from the point of labor market entry is almost identical for all mothers, diverging only at the point of motherhood.

Figure 2: Hours Worked Flanking First Birth



NOTES: Figure plots, by education level at labor market entry, average annual hours worked in the 3 calendar years before and after first birth, grouping women by their first-birth timing (K_1).

Yet after first birth we see a distinctly different pattern by education level. Among high school graduates we see the expected pattern: later mothers work more in the calendar year after first birth, although the relationship weakens over this 3-year period. By comparison, for college graduates, although the latest mothers works distinctly more, average hours worked are almost identical for all other mothers.²

What might explain this lack of a relationship between first-birth timing and post-birth labor supply among college graduates? One possibility is that the pattern is obscured by the influence

¹We also see that hours fall slightly before first birth. For high school graduates, hours drop the year before, which may reflect reduced hours during pregnancy. For college graduates, however, we see a drop over this full 3-year stretch, which may reflect a “leaning out” pattern, per Sheryl Sandberg.

²If I separately plot the extensive and intensive margins, the first three groups of college mothers are again very similar in both dimensions. By comparison, the latest group are equally likely to drop out at birth, but return to work more quickly (in part because fewer have a second child in these 3 years), and their hours worked if working are distinctly higher. By comparison, among high school graduates, the relationship between average hours worked and first-birth timing is more clearly evident at the intensive margin.

of other factors that vary with fertility timing. For instance, all else equal, later mothers are more likely to be married, and their husbands will be earning more. The relationship between own potential wages and labor supply may therefore be obscured by a decreasing marginal value of her earnings to the household.

Another possibility is that the characteristics of “college-type” women, or “college-type” jobs, creates this difference by education. Women who complete a college degree may be more invested in their careers, gaining a sense of identity from their role in the labor market. Furthermore, college women not only work in systematically different professions, but also report higher levels of job satisfaction. Because they are more likely to work in jobs that offer additional dimensions of utility beyond the offered wage, this may uncouple the expected relationship between first-birth timing and post-birth labor supply.³

Using data for women from the NLSY79 to explore the relationship between the career timing of first birth and women’s post-birth hours worked, I find a clearly positive raw correlation for high school graduates, but no such slope for college graduates. I also find that for all women, both family and career characteristics influence total hours worked after first birth. Yet even after controlling for these factors, the initial pattern between timing and labor supply remains.

2 Data and Methods

In this analysis I use data for the women from the NLSY79, who by 2008 had reached the ages of 44 to 51. Of the initial 6,283 14- to 22-year old women, I observe 4,247 through at least age 40 (roughly the end of the childbearing years), at which point 84 percent have had children.⁴ Given my focus on the interruption effects of the arrival of a first child, I focus on those women who have their first birth after labor market entry (71 percent of mothers who have at least a high school

³Another key characteristic, for which the NLSY79 provides no information, is job flexibility. If “college-type” jobs are more difficult to combine with motherhood, this inflexibility may overwhelm the pull of higher wages, leading women to cut back hours by either dropping out of the labor force or downgrading jobs. (One might consider long work hours as a proxy for a demanding work environment, but it is difficult to untangle which part of observed hours is driven by the requirements of the job versus the taste of the woman.)

⁴Exclusive of the military and supplemental white/poor samples, which were dropped in 1984 and 1991, respectively, we observe 89 percent of this sample through age 40.

diploma when they start working).⁵ Lastly, I exclude those with their first birth the year that they start working (for whom I lack pre-birth job information), and those with a first birth more than 17 years later (to ensure sufficient post-birth information).⁶ This provides a sample of 1,331 high school and 416 college graduates.

For these women, Table 1 reports average career timing of first birth and annual hours worked the following calendar year, as well as their hourly wage the year before first birth, and several key family and career characteristics. We see, for instance, that college women work slightly more the year after first birth, and earn substantially more the year before. They are also more likely to be married, and have higher-earning spouses. We also see that college and high school women tend to work in different occupations, and college graduates report significantly higher satisfaction with their pre-birth job.

To explore the relationship between fertility timing and motherhood labor supply, I first plot pre-birth wages and post-birth hours worked by timing of first birth. I next run a series of OLS regressions of total hours worked in the calendar year after first birth, on first-birth timing (K_1), including the following progression of controls:

1. The month of the first birth (which influences the child's age in the following calendar year), and factors that influence the distribution of potential wages.⁷
2. Controls for family characteristics (marital status and husband's earnings the year after first birth, expected number of children as reported shortly before first birth, whether the first birth was twins, and her gender norm views⁸), and family background (race, religion, and her mother's education and labor supply).
3. Factors that may indicate or influence a woman's career ambitions, including her AFQT score, and expected education and career outcome at age 35 (reported at approximately age 18).⁹ The latter includes whether she anticipates working, and if so, her expected occupation. (I distinguish between traditionally "female" and "male" professions.)

⁵Following Herr (forthcoming), to determine the year a woman entered the labor market, I first establish when she finished continuous schooling, and from that point forward I search for the first twelve-month period in which she worked at least 1000 hours.

⁶Among high school and college graduates, 4 and 2 percent, respectively, have a first birth within a year after they start working. Fewer than 2 percent of either group have a first birth more than 17 years after labor market entry.

⁷These include U.S. region, SMSA status, local unemployment rate, and calendar year in the year after first birth.

⁸This is calculated by summing the responses to a series of questions on appropriate gender roles in the family; higher values reflect more conservative views. For unmarried women, husband's income includes child support and alimony.

⁹The Armed Forces Qualifications Test (AFQT) is considered a reasonable proxy of ability.

Table 1: Summary Statistics

	(1)	(2)	(3)
	All	High School	College
First-Birth Timing (K_1)	7.1	7.0	7.4
	(4.0)	(4.1)	(3.6)
Hourly Wage ($K_1 - 1$, \$)	11.8	10.2	16.8
	(6.6)	(4.9)	(8.6)
Hours Worked ($K_1 + 1$)	1242.0	1197.9	1382.9
	(916.9)	(905.3)	(940.6)
Married ($K_1 + 1$, %)	83.6	79.9	95.2
	(37.1)	(40.1)	(21.4)
Husband's Earnings ($K_1 + 1$) (\$thousands)	41.4	35.8	56.8
	(36.4)	(31.0)	(44.6)
Career Expectations by Age 35 (at 18, %):			
'Male' Professional	26.5	21.0	44.2
	(44.1)	(40.7)	(49.7)
'Female' Professional	24.4	22.8	29.8
	(43.0)	(41.9)	(45.8)
Not Working	12.1	13.5	7.7
	(32.7)	(34.2)	(26.7)
Pre-Birth Occupation (%):			
'Male' Professional	12.4	6.1	32.0
	(33.0)	(23.9)	(46.7)
'Female' Professional	18.5	12.0	38.8
	(38.9)	(32.5)	(48.8)
Clerical	38.3	44.9	17.8
	(48.6)	(49.8)	(38.3)
Services	16.3	20.3	4.1
	(37.0)	(40.2)	(20.0)
Love Job (%)	42.8	39.8	52.1
	(49.5)	(49.0)	(50.0)
Observations	1747	1331	416

NOTES: Table reports means (and standard deviations) for NLSY79 women who have their first child after labor market entry ($K_1 \in [2, 17]$), and who enter the labor force with at least a high school diploma. Monetary values are translated into year-2000 dollars using the Consumer Price Index for all urban consumers.

4. Pre-birth job characteristics, such as job satisfaction, tenure, and occupation.¹⁰
5. The pre-birth wage level; if later mothers work longer hours because of their higher opportunity cost of time, controlling directly for the value of time should fully absorb the relationship between first-birth timing and post-birth labor supply.

Throughout, my focus is on the estimated slope on first-birth timing, to assess whether an underlying positive correlation is being obscured by systematic differences in family structure and

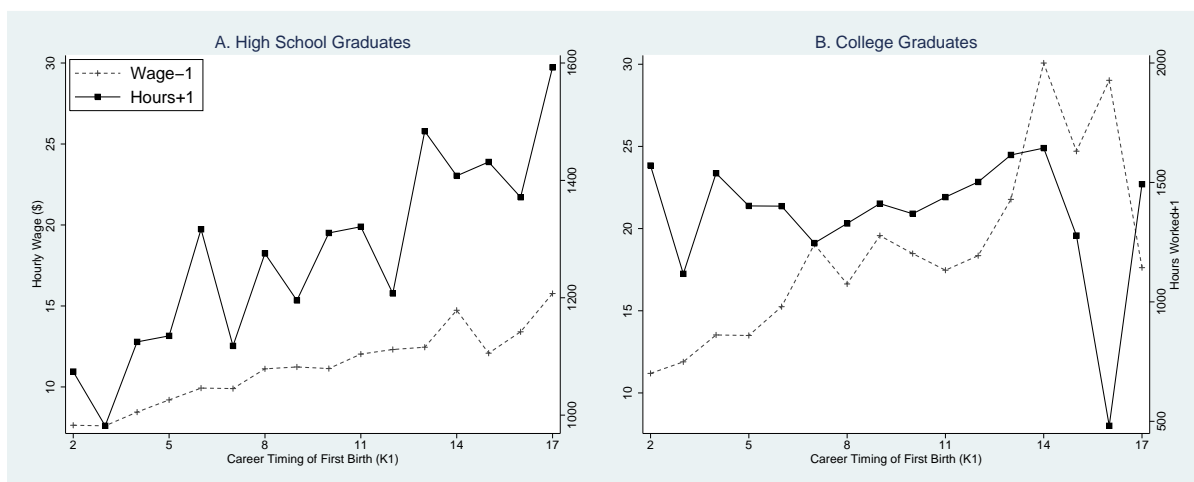
¹⁰Because tenure is mechanically related to career timing of first birth, I use an indicator for having worked at least 18 months in the previous job, which can be defined for my full sample.

background, career motivation, and pre-motherhood job characteristics. I run separate regressions for high school and college graduates, but use a pooled specification to identify which factors have a differential effect by education level.

3 Results

Figure 3 plots the pattern of pre-birth wages and post-birth hours worked by timing of first birth. Consistent with Figure 1a, in both Figures 3a and 3b we see that the pre-birth wage is increasing in K_1 . We also see that total hours worked in the calendar year after first birth is increasing for high school graduates, but not for college graduates.

Figure 3: Pre-Birth Wages and Post-Birth Hours Worked by First-Birth Timing



NOTES: By first-birth timing (K_1), this figure plots the average hourly wage observed in the calendar year before K_1 , and the average annual hours worked in the calendar year after K_1 , by education level at labor market entry.

Tables 2 and 3 next report the OLS estimates of the relationship between K_1 and hours worked the following year, for high school and college graduates, respectively, as I control for the increasing number of individual characteristics. In Column (1) of each we again see the pattern evident in Figures 3a and 3b, a positive raw slope on K_1 for high school, but not college graduates. In Columns (2) we then see the strong influence of family characteristics. For instance, husband's earnings, gender-role views, and whether her own mother worked, strongly influence the extent to which a given new mother works, and for each the relationship is statistically indistinguishable by education level. Furthermore, because husband's earnings are increasing in first-birth timing,

the strong negative relationship between his earnings and her labor supply dampens the underlying positive relationship between K_1 and hours worked. The slope for college graduates, however, remains flat.

In Columns (3) I then control for factors related to her career ambitions and ability. Two interesting patterns emerge. First, the coefficients on AFQT scores and expected education suggest different directions of selection for working mothers. Among high school graduates, higher-ability women are more likely to work, while among college graduates, the reverse holds. And second, we see that among college but not high school graduates, career expectations reported in the late teens are strongly related to labor supply after motherhood. Yet despite the importance of these factors, their inclusion has little effect on the coefficient on K_1 .

In Columns (4) I then control for pre-birth job characteristics. As one might anticipate, college graduates working in traditionally-male professional jobs work more, and high school graduates working in services and sales work less. We also see that women who report the greatest job satisfaction pre-motherhood work longer hours afterwards, although the effect is much stronger for college graduates. For high school graduates, these differences in pre-birth job characteristics drive part of the positive correlation between timing and labor supply.

Thus in sum, although many of these family and career characteristics influence post-birth labor supply, and several are likewise related to first-birth timing, after their inclusion the initial pattern between timing and labor supply remains. Only among high school graduates do we see that delayed first birth is correlated with higher post-birth labor supply.

Lastly, in Columns (5) I directly test the underlying assumption that first-birth timing influences labor supply by affecting the value of women's time. For high school graduates, we do see that higher pre-birth wages are associated with longer post-birth hours. Yet the coefficient on K_1 falls by less than half. This suggests that other dimensions of fertility delay may lead to a stronger labor market connection for these mothers.

Table 2: First-Birth Timing and Post-Birth Labor Supply: High School Graduates

Y=Hours Worked ($K_1 + 1$)	(1) Baseline	(2) +Family	(3) +Ambition	(3) +Job	(4) +Wage ($K_1 - 1$)
First-Birth Timing (K_1)	19.1+ (10.4)	36.9** (10.6)	42.1** (10.6)	26.0* (10.3)	17.1 (10.4)
Married ($K_1 + 1$)		-71.4 (69.5)	-81.3 (69.3)	-150.0* (66.6)	-152.0* (66.0)
Husband's Earnings ($K_1 + 1$)		-3.7** (0.9)	-4.0** (0.9)	-4.3** (0.8)	-5.2** (0.8)
Expected Total Children		-29.1 (30.5)	-34.1 (30.4)	-57.2* (29.1)	-61.2* (28.8)
Gender-Role Norms		-37.5** (8.8)	-29.6** (9.0)	-23.9** (8.6)	-23.1** (8.6)
Mother Worked (when 14)		116.0* (50.9)	103.4* (50.9)	111.9* (48.7)	113.0* (48.3)
AFQT Score			4.1** (1.2)	3.1** (1.2)	2.2+ (1.2)
Highest Grade Wanted (at 18)			5.6 (14.0)	8.4 (13.4)	4.7 (13.4)
Career Expectations by Age 35 (at 18, excluded category = clerical):					
'Male' Professional			74.2 (70.6)	91.0 (67.7)	88.3 (67.1)
'Female' Professional			25.4 (67.2)	52.3 (65.8)	58.8 (65.2)
Not Working			-68.4 (75.7)	-35.4 (72.4)	-35.8 (71.8)
Pre-Birth Occupation (excluded category = clerical):					
'Male' Professional				85.8 (104.4)	41.3 (103.9)
'Female' Professional				-38.6 (79.4)	-92.3 (79.5)
Sales				-377.4** (107.2)	-373.2** (106.2)
Services				-261.9** (65.7)	-260.5** (65.1)
Loved Pre-Birth Job				83.6+ (50.6)	67.4 (50.3)
Hated Pre-Birth Job				-396.1** (146.2)	-405.2** (145.0)
Pre-Birth Job Tenure \geq 18 months				326.2** (50.0)	297.8** (50.0)
Hourly Wage ($K_1 - 1$)					28.1** (5.9)
Adjusted R2	0.04	0.10	0.11	0.19	0.20
Observations	1,331	1,331	1,331	1,331	1,331

NOTES: Table lists the coefficients (and standard errors) from the OLS regressions of annual hours worked in the calendar year after first birth on K_1 , including the series of controls discussed in Section 2. Significance levels are indicated by + (at the 10% level), * (at 5%), and ** (at 1%).

Table 3: First-Birth Timing and Post-Birth Labor Supply: College Graduates

Y=Hrs Worked ($K_1 + 1$)	(1) Baseline	(2) +Family	(3) +Ambition	(3) +Job	(4) +Wage ($K_1 - 1$)
First-Birth Timing (K_1)	-7.3 (22.4)	0.1 (21.4)	3.5 (21.7)	-3.0 (21.3)	-5.0 (21.6)
Married ($K_1 + 1$)		-273.3 (226.3)	-315.7 (223.0)	-382.7+ (218.4)	-366.9+ (220.2)
Husband's Earnings ($K_1 + 1$)		-4.8** (1.1)	-4.7** (1.1)	-4.4** (1.1)	-4.6** (1.1)
Expected Total Children		-88.8 (61.5)	-79.3 (61.1)	-63.1 (59.9)	-66.3 (60.2)
Gender-Role Norms		-42.8* (17.7)	-40.1* (17.7)	-35.4* (17.3)	-34.8* (17.4)
Mother Worked (when 14)		183.4+ (94.5)	151.2 (96.1)	160.5+ (94.3)	156.9+ (94.7)
AFQT Score			-1.7 (2.7)	-3.1 (2.6)	-3.4 (2.6)
Highest Grade Wanted (at 18)			-116.2* (46.8)	-121.7** (45.5)	-123.6** (45.7)
Career Expectations by Age 35 (at 18, excluded category = clerical):					
'Male' Professional			351.5** (132.0)	327.9* (129.6)	323.5* (130.2)
'Female' Professional			418.3** (141.4)	394.3** (137.7)	391.7** (138.3)
Not Working			-275.8 (188.7)	-276.4 (185.1)	-272.3 (186.2)
Pre-Birth Occupation (excluded category = clerical):					
'Male' Professional				308.5* (132.1)	290.6* (135.0)
'Female' Professional				200.1 (129.2)	192.7 (130.5)
Sales				238.0 (237.7)	218.4 (240.0)
Services				306.9 (245.4)	314.7 (246.5)
Loved Pre-Birth Job				242.6** (91.6)	239.2** (92.3)
Hated Pre-Birth Job				17.9 (332.7)	30.4 (334.0)
Pre-Birth Job Tenure \geq 18 months				401.4** (100.2)	391.9** (101.5)
Hourly Wage ($K_1 - 1$)					4.3 (6.6)
Adjusted R2	0.03	0.16	0.20	0.25	0.25
Observations	416	416	416	416	416

NOTES: Table lists the coefficients (and standard errors) from the OLS regressions of annual hours worked in the calendar year after first birth on K_1 , including the series of controls discussed in Section 2. Significance levels are indicated by + (at the 10% level), * (at 5%), and ** (at 1%).

By contrast, for college graduates I find the unexpected result that post-birth labor supply is unrelated to pre-birth wages. Thus the expected pattern between timing and labor supply is missing for these women not because first-birth timing is unrelated to the opportunity cost of time, but because their post-birth labor supply is surprisingly unrelated to the value of their time.¹¹

4 Conclusion

In combination, the evidence presented here illustrates two interesting results. First, for high school graduates, we see the expected pattern that delayed first birth is correlated with higher post-birth labor supply, ostensibly because of the higher opportunity cost of time for later mothers. Yet when I control directly for pre-birth wages, this explains less than half of the observed relationship with timing. This suggests the importance of some other factor that is correlated with fertility timing, or that delayed first birth itself strengthens a woman's connection to the labor market.

The second interesting result is that for college graduates, it remains unclear what is acting to uncouple the link between the value of a woman's time – which is increasing with fertility delay – and hours worked in motherhood. The lack of this expected relationship, despite the compelling opportunity cost story, suggests that the labor supply decision of college graduate mothers is driven by factors that are more important to the household utility maximization decision than the monetary value of her time.

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¹¹If I rerun these specifications on the intensive and extensive margins, the same patterns hold. Among high school graduates, later mothers are both more likely to work in the year after first birth, and given working, work longer hours. For college graduates, neither margin is influenced by fertility timing.

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