Child care costs and the return-to-work decisions of new mothers

Lisa Barrow

Introduction and summary

Women's labor force participation has nearly doubled over the last 50 years, from 31.0 percent in January 1948 to 60.6 percent by March 1999 (based on monthly data from the *Current Population Survey*). For women with young children, the increases have been even more dramatic. From 1947 to 1996, the labor force participation rate of women with preschool-aged children increased by more than a factor of five, rising from 12.0 percent to 62.3 percent (U.S. House of Representatives, 1998). The rapid increase in participation of women with young children indicates that women are spending less time out of the labor force for child bearing and rearing. Indeed, looking at new mothers in the *National Longitudinal Survey of Youth* (NLSY), of those who were working prior to the birth of their first child, three-quarters were back at work within a year of the birth.

An important consequence of the trend toward more rapid reemployment of new mothers is that recent generations of women will have more actual labor market experience (at each age) than their predecessors.[1] In labor economics, a standard analysis of the relationship between wages and education and age (reflecting potential experience) shows that wages increase with years of potential experience. For women, potential experience is likely to exceed actual experience by more than for men. Thus, the increase in women's actual work experience should be reflected in a narrowing of the gender earnings gap. In fact, despite the growing wage inequality of the 1980s, the male–female earnings gap has been closing steadily since the late 1970s. From 1978 to 1990, the ratio of female to male earnings rose from 0.73 to 0.85 for whites and from 0.60 to 0.70 for African-Americans.[2] According to O'Neill and Polachek (1993), about one-quarter of the closing of the male–female wage gap over the 1976–87 period can be attributed to changes in the actual labor force experience of women and an additional 50 percent can be accounted for by changes in returns to experience for women relative to men. Realistically, working women who choose to have children will have to take some time off of work either by taking family, sick, or vacation leave or by exiting the labor market entirely. However, given the importance of experience in determining wages, the faster women return to work following childbirth, the closer their actual experience will be to their potential experience and the smaller the average earnings penalty for women who have children.

In this article, I examine the economic determinants of a woman's decision to return to work quickly following childbirth. I consider three key factors in this decision: the opportunity cost of taking time out of the labor force (that is, the potential wage rate available to a woman), the wealth effect of other family income, and most particularly, the opportunity cost of working outside the home in terms of child care costs.

I first describe a simple theoretical model of a new mother's return-to-work decision. The model predicts that the decision to return to work will depend on a woman's wage net of hourly child care costs and other family income (including spouse or partner income). I then test the theoretical model as closely as possible. In order to get a measure of child care costs faced by women as they decide whether to return to work, I calculate average child care worker wages across states and over time to proxy for variation in child care cost across states and over time. I find that women with higher wages are significantly more

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likely to return to work, and women facing higher child care costs or having greater other family income are significantly less likely to return to work after first birth. I also find that older women, women with more education, and women whose adult female role model was working when they were teenagers are more likely to return to work.

Additional interest in women's labor force participation has been generated by the reforms to welfare programs that have a primary goal of getting recipients off of welfare and into the work force. Because the majority of welfare recipients are women with children, child care costs may have important effects on getting these women into the labor force. Therefore, I look for greater sensitivity to child care costs among women with less than a high school education who are not married or do not have a spouse present. I find no evidence that these women's labor force participation decisions are more sensitive to child care costs. Additionally, I find that for these women the decision to return to work is also no more sensitive to the unemployment rate of their home county than for other women.

While this study was not designed to test alternative policies, several inferences may be drawn. First, the results suggest that delayed child bearing may have a greater impact on increasing labor force participation of women with young children than increases in wages or decreases in child care costs. Second, while access to reliable child care is likely to be a necessity for successfully moving mothers from welfare to the labor force, this research shows no evidence that welfare recipients will be more responsive to changes in child care costs than other women. Finally, the increased probability of a woman working after childbirth associated with her female role model having worked suggests that we should expect to see continuing increases in the labor force participation rate of women, thus increasing the size of the labor force.

Previous research

Much of the previous literature on the labor supply behavior of women with young children has focused on the effect of child care costs.[3] Looking at Census Bureau estimates from the Survey of Income and Program Participation (SIPP) 1988 Panel, employed mothers spend an average of $73.30 per week on child care, while employed women with at least one child under age one spend an average of $88.60 per week.[4] Since, on average, these women work about 36 hours per week, child care costs represent a $2.00 to $2.50 per hour "tax" on the work effort of mothers with young children.

Anderson and Levine (1998) provide a good overview of much of the empirical literature examining the relationship between child care and mothers' employment decisions. They note that while many studies find the expected negative relationship between child care costs and women's labor force participation decisions, there is much variability among the estimates in how responsive women are to changes in child care costs.

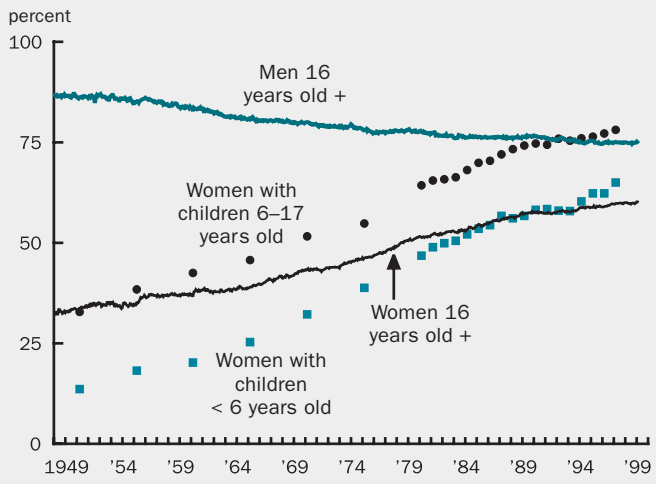
My approach builds on several of the earlier studies using the relatively detailed information available in the NLSY. Although some of the earlier studies—Blau and Robins (1991), Leibowitz, Klerman, and Waite (1992), and Klerman and Leibowitz (1990)—use NLSY data as well, their data are less current and hence less representative of women at first birth. In addition, I use the subset of new mothers who were working in the period before their first birth in order to focus specifically on the return-to-work decision.[5]

Women's labor force participation

As mentioned in the introduction, women's labor force participation rate has increased dramatically in the last 50 years. Labor force participation rates for women, men, and subgroups of women with children

FIGURE 1

Labor force participation rates



Source: U.S. Department of Labor, Bureau of Labor Statistics, 1948–99, *Current Population Survey*, Washington, DC.

are displayed in figure 1. The labor force participation rate for all women ages 16 and over has nearly doubled from 32 percent in 1948 to 60 percent in 1999. In comparison the labor force participation rate for men ages 16 and over decreased from 87 percent in 1948 to 75 percent in 1999. Over the same period, participation rates for women with preschool-aged children and women with school-aged children have increased even more dramatically. For women with children under six years old, labor force participation increased from 14 percent in 1950 to 65 percent in 1997. Similarly, women with children ages six to 17 increased labor force participation from 33 percent in 1950 to 78 percent in 1997.[6]

Child care worker wages as a measure of child care costs

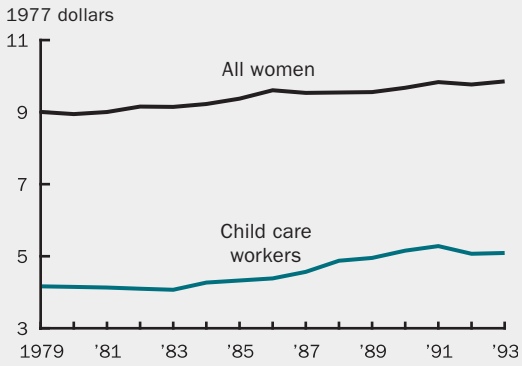
Because I cannot observe the actual price of child care faced by the women in my sample, I use average child care worker wages across states and over time as a proxy for child care costs. Child care worker wages are likely to be a major portion of the cost of providing child care. One would expect to see differences in the cost of child care across states due to differences in minimum wage levels and in the supply of low-wage labor, among other factors. Because these differences may change over time, I calculate measures of child care costs by state and year. Differences in child care costs across states could also arise because of differences in demand for child care. However, if states in which more women work have higher child care costs because there is more demand for child care, this will bias the estimates against finding the expected negative effect of child care cost on the probability a woman returns to work after first birth.

I calculate average hourly wages for child care workers by state and year for 1979 to 1993 from the National Bureau of Economic Research's *Current Population Survey* (CPS), Labor Extract, Annual Earnings File Extracts (National Bureau of Economic Research, 1979–93). The average is the weighted average of hourly earnings of all surveyed workers who report a three-digit occupation code for child care workers, private households, or for child care workers, except private households.[7] Hourly earnings are calculated as edited hourly earnings when paid hourly and edited or computed usual weekly earnings divided by edited usual weekly hours otherwise. Hourly earnings less than $0.50 and above the 99th percentile in each year are dropped.[8]

Nationally, real average child care worker wages increased over the period 1979–93. Average child care worker wages and average wages for all women are shown in figure 2. Wages for child care workers and average wages for all women both increased in real terms from 1979 to 1993. From figure 2, one can see that average child care worker wages were increasing faster than average wages for women, particularly over 1984–91. From 1979 to 1993, average women's wages increased by 9 percent, adjusted for inflation, while average child care worker wages rose by 22 percent.[9]

FIGURE 2

Average hourly wages



Source: U.S. Department of Labor, Bureau of Labor Statistics, 1979–94, *Current Population Survey*, Washington, DC.

Table 1 lists average child care worker wages by state for 1979–93. As one might expect, states or districts that had state minimum wages above the federal minimum wage throughout the 1980s such as the District of Columbia, Alaska, and Connecticut have higher than average child care worker wages over the period. Hawaii, Massachusetts, Rhode Island, and California did not raise their state minimum wages above the federal minimum wage until 1988, but they, too, have above-average child care worker wages over the period. Likewise, it is not surprising to find that West Virginia, Indiana, Idaho, and North Dakota, where wages are relatively low, have below-average child care worker wages.

Model description

To model women's return-to-work decisions, I assume that each woman has a reservation wage, that is, a "threshold" wage at which she would be willing to go back to work.[10] The probability that a woman returns to work is the probability that her wage offer net of child care costs exceeds her reservation wage. Thus, higher child care costs and lower wage offers will decrease the probability that a woman will go back to work. In addition, assuming that increases in

TABLE 1

Average child care worker wages by state, 1979–93

State	Average wage	State	Average wage
District of Columbia	6.45	Mississippi	4.35
Alaska	6.19	Vermont	4.34
Hawaii	5.82	Kentucky	4.33
New Jersey	5.79	Minnesota	4.32
Massachusetts	5.44	Arizona	4.28
Rhode Island	5.42	Tennessee	4.25
Connecticut	5.38	Alabama	4.22
New York	5.37	Missouri	4.20
California	5.31	Ohio	4.19
Nevada	5.23	Utah	4.13
New Hampshire	4.98	Arkansas	4.08
Maryland	4.98	Virginia	4.07
Georgia	4.94	Kansas	4.04
Florida	4.94	Michigan	3.99
Texas	4.80	Oregon	3.91
Oklahoma	4.78	South Dakota	3.91
Illinois	4.64	Maine	3.78
Delaware	4.60	Montana	3.72
New Mexico	4.56	Wisconsin	3.62
Pennsylvania	4.54	Nebraska	3.61
Louisiana	4.53	Iowa	3.50
Washington	4.46	West Virginia	3.48
Wyoming	4.43	Indiana	3.44
Colorado	4.42	Idaho	3.40
South Carolina	4.39	North Dakota	3.38
North Carolina	4.35	All states	4.58

Notes: Averages are reported in real 1997 dollars. Averages are the weighted average by state (or over all states) of hourly earnings of all surveyed workers in the 1979–93 NBER *CPS Annual Earnings File Extracts* who report a three-digit occupation code for child care workers, private household or for child care workers, except private households. Hourly earnings less than $0.50 and above the 99th percentile for each year are excluded.

Source: Author's estimates from National Bureau of Economic Research, 1979–93, *CPS Annual Earnings File Extracts*.

income increase the number of hours of leisure a person wants to consume, higher other family income will also decrease the probability of returning to work.

My empirical strategy is to study the determinants of the return-to-work decision for new mothers who were working prior to the birth of their first child. I limit the sample to women giving birth to their first child for simplification of the return-to-work decision. This group is more uniform in the sense that all mothers face a first birth but not all will face a subsequent birth. Additionally, these women are all facing the decision to return to work with the need to hire child care for a child under age one only, not for multiple children at various ages. Limiting the sample to women who worked in the year before birth defines a more homogenous group of women, since they all exhibit at least some attachment to the labor force prior to their first birth. This also allows me to use pre-birth wage information as a proxy for post-birth offered wages.

Data and estimation

NLSY data

The original NLSY sample contains 5,842 women, excluding the military sample that was dropped in 1985.[11] In this study, I primarily use the 1994 NLSY child file, which provides detailed information on the children of the original NLSY sample women, including some relevant information on their mothers. In addition, I use the 1993 NLSY youth file to get geographic and family income information for the mothers. According to the 1994 child file, there are 3,468 women whose first child was born between 1979 and 1994 and resided in the mother's household the first year of birth.[12] Characteristics of these women are reported in the first column of table 2.[13]

The NLSY reports the number of weeks before and after birth that a woman left and resumed employment. The women of the NLSY have high employment rates before giving birth; 76 percent of all mothers were working within 51 weeks prior to their first child's birth. Although the participation rate is high relative to the overall participation rate for women, this reflects in part the relatively young age of the NLSY women and, more generally, the age of women at the time of their first birth. The national rates are calculated for women ages 16 years and over, while the average age at first birth for NLSY women is 23 years. Nationally, the labor force participation rate for women in their early twenties is around 73 percent.[14]

Means and standard deviations for characteristics of the regression sample are presented in column 2 of table 2. The sample is limited to women who were working before the birth of their first child and women with complete data on variables used in the regression analysis. The women who were working prior to giving birth tend to have higher other family income and

are older (24 versus 21 years old) and better educated (12.9 versus 11.2 years of education).

As shown by the variable in row 2 of table 2, 76 percent of the mothers who were working returned to work within 51 weeks following their child's birth. A more detailed picture of the process is provided in figure 3, which shows the fraction of the sample from column 2 of table 2 who were working in each week before and after childbirth. Expectant mothers gradually withdraw from employment in the months before their delivery and then gradually return.[15] The pattern for the full sample of NLSY women in column 1 of table 2 is very similar to that of the regression sample.

In addition to the standard variables included in a labor force participation equation—wages, unemployment rates, age, education, and race—I include an indicator for the mother having had a working female role model when she was 14 and one for the presence of a woman's parent, step-parent, or grandparent in the household around the birth year. The role model variable is intended to help capture a woman's attitude about being a working mother. Although a woman may have different feelings about

TABLE 2

Mean characteristics for returners and non-returners

Description	Full sample	Regression sample	Return: Yes	Return: No	t-value
Worked within 51 weeks before first birth	0.765 [0.424]	1 [0]	1 [0]	1 [0]	—
Working within 51 weeks after first birth	0.616 [0.486]	0.762 [0.426]	1 [0]	0 [0]	—
State average wage for child care workers	4.506 [0.858] N = 3,302	4.559 [0.890]	4.560 [0.897]	4.555 [0.869]	0.1
Hourly wage fourth quarter before birth	9.274 [5.040] N = 2,237	9.221 [4.954]	9.666 [5.177]	7.797 [3.836]	8.4***
Spouse or partner present	0.781 [0.414]	0.820 [0.384]	0.839 [0.368]	0.760 [0.428]	3.6***
Spouse or partner income	19,430 [32,625] N = 3,207	23,840 [35,558]	23,970 [32,623]	23,422 [43,677]	0.3
Mother's age in years at child's birth	23.234 [4.201]	24.190 [3.990]	24.512 [3.918]	23.159 [4.047]	6.4***
Mother's education in years by birth year	12.416 [2.293] N = 3,466	12.942 [2.129]	13.143 [2.118]	12.298 [2.038]	7.7***
Adult female role model worked when mother was 14	0.524 [0.499]	0.537 [0.499]	0.552 [0.497]	0.491 [0.500]	2.3**
Parent, step-parent, or grandparent of mother resides in household in birth year	0.300 [0.458] N = 3,395	0.245 [0.430]	0.223 [0.417]	0.313 [0.464]	3.7***
African-American	0.228 [0.420]	0.194 [0.395]	0.195 [0.397]	0.189 [0.392]	0.3
County unemployment rate in year following birth	8.066 [3.327] N = 3,159	7.793 [3.288]	7.620 [3.166]	8.343 [3.598]	3.9***
Observations	3,468	1,956	1,490	466	

Notes: All means are unweighted. The number of observations, N, is noted where different from the base sample size. Wages and income are in real 1997 dollars. Standard deviations are in brackets. ***Indicates statistically different from 0 at the 1 percent significance level; and ** indicates statistically different from 0 at the 5 percent significance level.

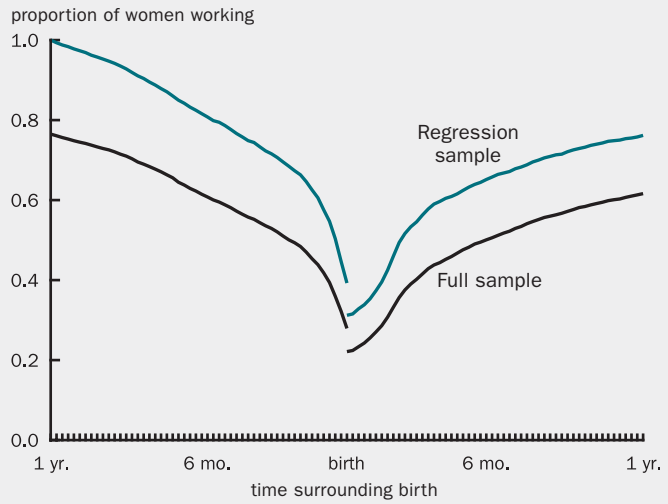
Source: Author's calculations using data from the Center for Human Resource Research, 1993 and 1994, *National Longitudinal Survey of Youth*, Columbus, OH

working when she has young children versus when her children are teenagers, this is the only information available on whether a woman lived in a household with a working female role model. The "grandparent" indicator is included to reflect a woman having greater access to low-cost child care. As shown in rows 9 and 10 of table 2, 52 percent of the NLSY women's role models worked when they were 14, and 30 percent of the overall sample of new mothers lived with their own parent, step-parent, or grandparent.

Columns 3 and 4 of table 2 show the characteristics of women in the regression sample who were and were not back at work within a year of childbirth. A simple comparison across the columns suggests that women with higher wages, those with a spouse or partner, older women, those with more education, and those whose mother worked are more likely to return to work quickly. Column 5 presents absolute t-values for the hypothesis that the means in column 3 equal the means in column 4. As predicted by the model, women who return to work have higher wages on average; however, differences in average child care costs and in average other family income for returners and non-returners are not statistically significant. The differences in age, education, working female role model, and unemployment rates are statistically significant. Women who return to work are older, more educated, more likely to have had a working role model, less likely to live with a parent or grandparent, and are living in counties with lower average unemployment rates.

FIGURE 3

Labor force participation, NLSY women



Source: Author's calculations using data from the Center for Human Resource Research, 1993 and 1994, *National Longitudinal Survey of Youth*, Columbus, OH.

The employment pattern illustrated by figure 3 suggests estimating a more "dynamic" model of weeks to return to work following birth such as a *tobit* or *hazard* model. The results from estimating a tobit model of weeks to return to work censored at 52 weeks, although not reported in this article, are consistent with the *probit* estimates discussed below. Women with higher wages and more education return to work more quickly following birth, and women facing higher child care costs and having higher other family income delay their return to work longer after birth. This should not be surprising, however, since none of the variables vary over the weeks following birth.

Probit estimation of the probability a woman returns to work following first birth

As discussed above, I assume each woman has a reservation wage at which she is willing to go back to work. As modeled, the offered wage and child care costs affect the net wage and thus the probability that the net offered wage exceeds the reservation wage, while some of the other characteristics are expected to affect a woman's reservation wage. The *probit* model estimates the probability of returning to work as a function of offered wage, child care costs, other family income, and demographic and labor market characteristics. The estimation equation is as follows:

$$1) \quad Pr[working\ 1\ year\ after\ birth] = \beta_0 + \beta_1 wage + \beta_2 C + Z\beta_3 + \beta_4 UR - \varepsilon,$$

where *wage* is the wage in the fourth quarter before birth,[16] C is the child care cost variable, Z is a matrix including age, education, other family income, and indicator variables for having a spouse or partner, having a working female role model, being African-American, and having one of the child's grandparents in the household, and UR is the county unemployment rate in the year following the birth year.

First, I estimate the model specified in equation 1. These results are presented in table 3. I report the change in probability of returning to work within one year of birth associated with a change in each independent variable.[17] For example, increasing the average child care worker wage by $1 decreases the probability that the average woman will return to work within one year of her child's birth by 0.038, from 0.778 to 0.740.[18] Thus, as predicted by the simple utility

TABLE 3

Probit estimates of labor force participation model

Independent variable	Associated change in probability of returning to work within 1 year
Child care worker wage	–0.038*** (0.012)
Pre-birth wage	0.017*** (0.003)
Spouse or partner income divided by 10,000	–0.012*** (0.003)
Indicator for spouse or partner	0.089*** (0.035)
Mother's age in birth year	0.007** (0.003)
Mother's education at birth year	0.017*** (0.006)
Role model work	0.041** (0.019)
Grandparent	0.001 (0.027)
African-American	0.049* (0.026)
Unemployment rate in year following birth	–0.007** (0.003)

Note: The dependent variable is an indicator for returning to work within one year of giving birth to the first child. The probability of returning to work predicted at the mean characteristics of the women in the sample is 0.778. The reported estimate is the change in probability of returning to work associated with a one unit change in a given variable, evaluated at the mean of the characteristics. For example, a $1 increase in the average child care worker wage is associated with a 0.038 decrease in the probability a woman returns to work, a decrease from 0.778 to 0.740. There are 1,956 observations. Standard errors are in parentheses. ***Indicates statistically different from 0 at the 1 percent significance level; **statistically different from 0 at the 5 percent significance level; and *statistically different from 0 at the 10 percent significance level.

maximizing model described above, women who live in states with higher child care costs, proxied by child care worker wages, are significantly less likely to return to work within one year of giving birth to their first child. In addition, lower wage women are less likely to return to work within one year of giving birth, as are women with higher partner or spouse income, controlling for the presence of a spouse or partner.[19] Older women, women with more education, and those who had a working female role model are all more likely to return to work after giving birth.

The theoretical model predicts that offered wage and hourly child care price should have coefficients equal in magnitude and opposite in sign. In comparing the wage and cost coefficients, the wage is measured in pretax dollars while child care expenditures are in after-tax dollars. In addition, the child care cost measure is the hourly child care worker wage rather than the hourly price. Given the Census Bureau estimates from the SIPP cited above, one would expect hourly child care costs to be at most 54 percent of average child care worker wages.[20] Assuming that the hourly cost of child care equals 54 percent of average child care worker wages, the tax rate would have to be in excess of 75 percent to generate the observed change in probability associated with a $1 change in the offered wage. This result can be partially reconciled if other costs of working are correlated with child care costs. If other costs of working are positively correlated with child care costs, then the effect of child care costs on the probability of returning to work is overstated.

Spouse/partner income affects women's probability of returning to work as predicted by the model: The higher a woman's spouse/partner income, the less likely she is to return to work. If other income is allowed to enter separately for women with spouses and women with partners, the decrease in probability associated with a $10,000 increase in spouse income is 0.011 with a standard error of 0.003; that is, the probability a woman will return to work falls from 0.778 to 0.767. Similarly, a $10,000 increase in partner income is associated with a decrease in the probability of returning to work from 0.778 to 0.752. Finally, 66 women with spouses or partners have other income calculated to be $0. When these observations are excluded, average child care worker wages becomes slightly more important. The change in probability associated with a $1 change in child care worker wages falls to –0.040 with a standard error equal to 0.012; that is, a decrease in probability from 0.778 to 0.738 is associated with a $1 increase in the average child care worker wage. The changes associated with other income, the spouse/partner indicator, age, female role model, the grandparent indicator, and African-American increase in magnitude, and the education coefficient decreases slightly.

The results presented in table 4 explore the possibility that women who are most like welfare recipients may differ from other women in their sensitivity to child care costs as well as to other economic variables,

in particular, the unemployment rate. I try two measures for similarity to welfare recipients: education less than 12 years at child's birth and the combination of both being unmarried and having fewer than 12 years of education at child's birth. Columns 1 and 2 of table 4 list probit estimates using the education indicator only, while columns 3 and 4 use the joint indicator of education and marital status. Columns 1 and 3 present the results allowing for differing sensitivity to child care costs. In both specifications there is little evidence that either less educated women or less educated women without a spouse present are any more sensitive to child care costs than all women in the sample. While the estimated change in probability of returning to work associated with a $1 change in hourly child care costs for the women most like welfare recipients is smaller than for all other women, the difference is not statistically significant at conventional levels. Similarly, their probability of returning to work is not significantly more responsive to higher unemployment rates as shown in columns 2 and 4.

The calculated child care cost, wage, and family income elasticities of employment provide one way to compare the results of this study to others.[21] The elasticity is the percent change in probability associated with a 1 percent change in a given variable. The specification of table 3 implies a child care cost elasticity of –0.23. In other words, a 1 percent increase in child care cost is associated with a 0.23 percent decrease in the probability of returning to work.[22] This estimate is similar to the average price elasticity of employment of –0.20 estimated by Connelly (1992a), but somewhat smaller than estimates from many other studies. Blau and Robins (1988) calculate a price elasticity of employment of –0.38 over a range of child care costs, Kimmel (1993) calculates an elasticity of –0.31 for married women using her preferred child care cost measure, and Powell (1997) calculates an elasticity of –0.38 for married women using predicted cost of child care. The elasticities calculated by Anderson and Levine (1998) for women with children under six years are also much larger, between –0.46 and –0.59. Ribar (1995) calculates a much smaller elasticity of –0.09, while that of Ribar (1992) is much higher at –0.74. The wage elasticity of labor force participation is much smaller, at 0.21,

TABLE 4

Probit estimates of labor force participation model, by education and marital status

	No high school diploma		No spouse and no high school diploma	
Indicator	–0.194	–0.073	–0.203	–0.060
	(0.167)	(0.078)	(0.219)	(0.112)
Child care worker wage	–0.040***	–0.036***	–0.036***	–0.036***
	(0.013)	(0.012)	(0.013)	(0.012)
Child care worker wage interacted with Indicator	0.021		0.010	
	(0.030)	—	(0.036)	—
Unemployment rate in year following birth	–0.007**	–0.007**	–0.007**	–0.006**
	(0.003)	(0.003)	(0.003)	(0.003)
Unemployment rate interacted with Indicator		–0.001		–0.008
	—	(0.007)	—	(0.011)
Pre-birth wage	0.017***	0.017***	0.017***	0.017***
	(0.003)	(0.003)	(0.003)	(0.003)
Spouse or partner income divided by 10,000	–0.011***	–0.011***	–0.011***	–0.011***
	(0.003)	(0.003)	(0.003)	(0.003)
Indicator for spouse or partner	0.086***	0.085***	0.055	0.054
	(0.035)	(0.035)	(0.036)	(0.036)

Note: The dependent variable is an indicator for returning to work within one year of giving birth to the first child. Each equation also includes the additional covariates listed in table 3. The reported estimate is the change in probability of returning to work associated with a one unit change in a given variable, evaluated at the mean of the characteristics. Columns 1 and 3 present the results allowing for differing sensitivity to child care costs. There are 1,956 observations. Standard errors are in parentheses. ***Indicates statistically different from 0 at the 1 percent significance level; and ** indicates statistically different from 0 at the 5 percent significance level.

than those estimated by Ribar (1992 and 1995) of 0.68 and 0.53, Kimmel (1993) of 0.58, Powell (1997) of 0.85, and Anderson and Levine (1998) of 0.58, but larger than the 0.04 calculated by Michalopoulos, Robins, and Garfinkel (1992).[23] Finally, the other income elasticity of –0.04 is very similar to the estimates of Michalopoulos, Robins, and Garfinkel (1992) and Ribar (1995), of –0.01 and –0.05, respectively.

Although more education seems to increase the probability that a woman will return to work after first birth, this result has several possible interpretations. It may be that women who get more education do so because they are more committed to the labor force and thus are more likely to go back to work. Alternatively, it may be that women with more education are more likely to hold jobs from which they can take leave as opposed to having to quit and, hence, they face lower costs of returning to work after birth.[24] Finally, this may be reflecting part of the wage effect due to the high correlation of education with wages and possible measurement error in the wage variable.

I include the working female role model variable to capture the idea that women may have different views about the appropriateness of working when they have children. Although a woman may view working when she has a young child differently than when she has a child aged 14, this is the only role model information available. Across all estimated equations, this variable has a consistent positive and significant coefficient. One might be concerned that this variable is reflecting an inter-generational correlation in income status rather than a role model effect per se. For example, poor women may be more likely to work, and their children may be more likely to be poor and, hence, also more likely to work. However, including other family income should help control for wealth, and the role model coefficient remains virtually unchanged when unearned income is excluded.

As for other variables in the model, older women are more likely to return to work after birth, although again this may partially be picking up the wage effect. Contrary to expectations, having a parent or grandparent in the household does not seem to affect the reemployment rate, suggesting that parents and grandparents may not serve as a major source of child care. While having a parent or grandparent in the home and the decision to return to work may be simultaneously determined, omitting the grandparent indicator does not change the coefficient estimates significantly. A better indicator of access to lower cost child care would be a measure of having relatives in close proximity, but this information is only available for one year of the NLSY. Finally, at the 10 percent level of significance, African-American women in this sample are more likely than other women to go back to work, and higher county unemployment rates reduce the probability that a woman returns to work after first birth.

Implications of the estimates

Using the table 3 results to explore some of the implications of the estimates, I simulate the effects of various factors on the probability of returning to work. Based on SIPP data, weekly expenditures on child care for families with a preschool-aged child increased 23 percent from 1986 to 1993. Considering a potential increase in child care subsidization that would reduce hourly costs by 20 percent, the probability of returning to work increases by 3 percentage points. If I assume these results hold for all women of childbearing age, this would lead to an expected increase in the labor force of 1.8 million workers.[25]

Next, as women delay child bearing they are more likely to return to work quickly, holding wages constant. Since wages generally increase over those years of delayed child bearing, older mothers will have an additional tendency to return to work quickly due to the higher opportunity cost of not working. On average the probability of returning to work is 0.78. The probability of returning for a 24-year-old (the median age at first birth) earning the average wage of 24-year-old mothers in this sample is 0.77. For a 27-year-old mother (the seventy-fifth percentile age at first birth in the sample) earning average wages for a 27-year-old in this sample, the probability increases to 0.83.[26]

From 1988 to 1991 the proportion of preschoolers being cared for by their fathers rose from 15 percent to 20 percent.[27] This number fell back to 16 percent in 1993, according to the most recent census report.[28] As suggested by the Census Bureau, this temporary rise in the percentage of children being cared for by their fathers in 1991 may be attributed to higher unemployment and underemployment of fathers. This is consistent with the possibility that worsening employment opportunities for women's spouses and partners during part of the sample period encouraged more women to return to work sooner after childbirth. For a high-wage woman (wage at the seventy-fifth percentile) with a high level of other family income (at the seventy-fifth percentile), the probability of returning to work in the first year is 0.80. If instead she faces low other family income (in the twenty-fifth percentile), the probability she returns within a year rises to 0.83.

Finally, from January 1992 to January 1999, t he unemployment rate in the U.S. dropped from 7.3 percent to 4.3 percent. The probability the average

woman returns to work when the unemployment rate is 7.3 percent is 0.78. When the unemployment rate drops to 4.3 percent, the probability of returning to work rises to 0.80.

These estimates suggest that delayed child bearing will play a much more important role in increasing women's labor force participation shortly after childbirth, and, hence, their overall actual work experience accumulation, than small increases in child care cost subsidization, the effects of changing employment opportunities for their spouses and partners, or decreases in the overall unemployment rate. Another interesting long-term implication of the increased labor force participation of mothers today is that their daughters may also be more likely to participate in the labor force. Thus, we should expect to see continued participation rate increases with new generations of women entering the labor force.

Conclusion

This article examines the effects of child care costs, potential wages, and other family income on a woman's decision to return to work shortly following the birth of her first child. Utility maximization predicts that child care costs and other family income will have a negative effect on the probability of returning to work, while potential wages will have a positive effect. A simple comparison of means of cost, wages, and other income for returners and non-returners shows differences as predicted by the model that are significant for the wage measure. Further multivariate analysis confirms these results for wages and indicates that child care costs and other family income also have statistically significant effects on the probability of returning to work. The estimates suggest that the elasticity of the reemployment rate for new mothers with respect to child care costs is about –0.23, while the elasticity with respect to other family income is about –0.04. Finally, the elasticity with respect to the mother's wage is about 0.21. Additionally, age and education, having a spouse or partner, having had a working female role model, and living in areas with lower unemployment rates have statistically significant, positive effects on the probability that a woman returns to work.

As mentioned in the introduction, the results of this study have implications for evaluating policy. The results suggest that delayed child bearing may have a greater impact on increasing labor force participation of women with young children than increases in wages or decreases in child care costs. Additionally, while access to reliable child care is likely to be a necessity for successfully moving mothers from welfare to the labor force, this research shows no evidence that welfare recipients will be more responsive to changes in child care costs than other women. Moreover, the overall estimate of responsiveness to changes in child care costs does not indicate that such changes will lead to large changes in labor force participation. Thus, increasing subsidization of child care without additional programs and incentives is not likely to have large effects on labor force participation among the welfare population. Finally, the increased probability of a woman working after childbirth associated with her female role model having worked suggests that we should expect to see continuing increases in the labor force participation rate of women, thus increasing the size of the labor force.

APPENDIX

Theoretical model

I model a woman's return-to-work decision as a utility maximization problem with child care expenditures entering the budget constraint and, hence, affecting the employment decision. First, I assume a woman makes her labor force participation decision by maximizing her utility, taking her husband's labor force participation and income as given.[1] Her problem is to maximize:

$$U(X, D, L) \text{ s.t. } (a)\ p_x X + p_d D \le wH + Y$$
$$(b)\ H + L = T$$
$$(c)\ 0 \le H \le T,\ 0 \le L \le T,$$

where X is a composite good excluding day care and leisure, p_x is the price of X, D is the hours of day care demanded, p_d is the hourly price of day care, H is the number of hours the woman works, w is the wage rate, Y is her husband's income plus other unearned income, T is the total time constraint, and L is the number of leisure hours.[2] In modeling the decision this way, I am implicitly assuming that maternal and market child care are good substitutes.

Assuming additionally that $H < T$ and $D=H$, the optimization problem can be written,[3]

$$2)\quad \mathcal{L} = U(X, L) - \lambda[p_x X + (w - p_d)L - ((w - p_d)T + Y)] + \delta(T - L),$$

with the associated conditions:

$$(a)\quad U_1 - \lambda p_x = 0,$$
$$(b)\quad U_2 - \lambda(w - p_d) - \delta = 0,$$
$$(c)\quad \lambda[p_x X + (w - p_d)L - ((w - p_d)T + Y)] = 0, \text{ and}$$
$$(d)\quad \delta(T - L) = 0,$$

where $\lambda > 0$ is the marginal utility of wealth and δ is a non-negative slack variable associated with the woman's hours of work decision. From condition (b), $w - p_d = U_2/\lambda - \delta/\lambda$. Calling U_2/λ the reservation wage, $w^*(H)$, the first-order condition can be rewritten as $w - p_d = w^*(H) - \delta/\lambda$. If the woman works, $\delta = 0$, the net wage exceeds the reservation wage evaluated at $H = 0$, and hours of work are chosen such that $w - p_d = w^*(H)$ when $H > 0$.

For simplicity, I assume a utility function consistent with linear labor supply,

$$3)\quad H_i = \beta_1(w_i - p_{di}) + \beta_2 Y_i + Z_i\beta_3 + \gamma_i,$$

for individual i, where Z is a vector of demographic characteristics and γ is an error term. The linear labor supply function restricts the coefficient on the wage net of child care costs to be the same regardless of the level of the wage. This is the easiest form to model empirically; however, given that my measure of cost is an index of the true cost of child care, I do not impose the additional restriction during estimation that the coefficients on wages and costs are equal. Substituting the budget constraint into equation 3 and solving for the reservation wage,

$$w_i^*(0) = \alpha_1 Y_i + Z_i\alpha_2 + \mu_i,$$

where $\alpha_1 = -\beta_2/\beta_1$, $\alpha_2 = -\beta_3/\beta_1$, and $\mu_i = -\gamma_i/\beta_1$. The probability that a woman works can be represented by

$$\Pr(H_i > 0) = \Pr\left[(w_i - p_{di}) > w_i^*(0)\right] = \Pr\left[\mu_i < (w_i - p_{di}) - \alpha_1 Y_i - Z_i\alpha_2\right].$$

Thus, higher child care costs and lower wages decrease the probability that a woman will go back to work. Assuming that leisure is a normal good, higher other family income also decreases the probability of returning to work.

An important consideration is that there may be unobserved taste shifters that have not been specified in the model. For example, let τ reflect taste for work and enter the model by affecting the marginal rate of substitution between leisure and money, that is, let $U = U(X, \tau^{-1}L)$. Condition (b) of equation 2 then becomes $w - p_d = (\tau^{-1})U_2/\lambda - \delta/\lambda$, where $\delta = 0$ if a woman works. The greater the taste for work (the greater τ), the lower the net wage needed to exceed $(\tau^{-1})U_2/\lambda$. Thus, correlations between τ and wages or child care costs can lead to biased estimates of their effects on the probability of returning to work.

Data

Child care cost measure

The state average child care worker wage is the weighted average by state and year of hourly earnings of all surveyed workers in the 1979–93 NBER CPS Annual Earnings File Extracts who report a three-digit occupation code for child care workers, private households, or for child care workers, except private households. Hourly earnings are calculated as hourly earnings where reported and as edited usual weekly earnings divided by edited usual weekly hours, otherwise. Hourly earnings less than $0.50 and above the 99th percentile for the year are dropped. Weights used are the earnings weights provided in the CPS data.

NLSY data

The wage and employment data before and after birth and mother's age at birth come from the NLSY 1994 child file and were constructed or measured in relation to the birth of the child. The pre-birth wage is the wage recorded for the fourth quarter before birth, and the post-birth wage is the wage recorded for the fourth quarter after birth. All wages are in real 1997 dollars. Wages less than $1 and greater than $160 are recoded to missing. Other variables are from the youth file and relate to the survey year which may or may not match up well with the birth year, depending on the month of birth. For determining the usual residence of the child, I count the child as living with the mother if his or her usual residence is coded as in the mother's household either in the survey year of the birth year or in the survey year after the birth year. Similarly, a spouse or partner or mother's mother, grandmother, stepmother, father, grandfather, or stepfather is present if the mother reports so either in the birth year or in the survey year following the birth year. Mother's education is the highest grade completed in the survey year of the birth year or the most recent available record from previous years, since the variable is missing unless the status has changed from the previous year. If highest grade completed is ungraded, it is considered missing.

The unemployment rate data in the youth geographic data are county unemployment data from the *County and City Data Book*. The unemployment rate at birth is measured as the unemployment rate in the birth year, and the unemployment rate after birth is measured as the unemployment rate in the survey year after the birth year. The state of residence is the residence reported in the survey year of the birth year unless the code is missing, in which case it is the state reported in the survey year following the birth year. The child care cost variable is then matched by these state codes.

From 1979 to 1989, respondents were asked for total income for their partner in the previous year. After 1989 respondents were asked for partner income broken down into several categories. Spouse income for all years is reported broken down into several categories. Other income for women with partners from 1979 to 1989 is partner income as reported in the following survey year. Other income for women with spouses for all years is calculated as annual spouse income from wages and salary, plus any farm or own business income, plus spouse unemployment compensation, plus respondent or spouse income from food stamps and other sources. Other income for women with partners from 1990 to 1993 is calculated as total partner income from wages and salary, plus any farm or own business income, plus partner's total welfare income. To minimize the loss of observations from missing information, other income is used as calculated for the year of the birth or the year after birth. All income is top-coded at $75,001 for 1979–84 and at $100,001 for 1985–93. Income is in real 1997 dollars.

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[1]The validity of this assumption is certainly debatable, and future analysis could model the labor supply decisions of a woman and her spouse/partner as a joint decision.

[2]Below, I assume a linear labor supply function. See Stern (1986) for a discussion of the form of the utility function and the implications of the assumption.

[3]I assume that day care is specifically purchased to cover hours worked and that a woman's leisure time includes time she spends caring for her children. Certainly, women may hire child care during their leisure hours, but I consider these nonwork child care hours to be a separate good included in the composite good.

NOTES

[1]Shapiro and Mott (1994) provide some evidence that labor force participation surrounding first birth is an important predictor of a woman's later labor force participation behavior, and hence greater actual work experience at all points in life.

[2]Blau and Kahn (1992).

[3]See Nakamura and Nakamura (1992) for a review of some of the literature analyzing the effect of children on female labor supply more generally. See Leibowitz and Klerman (1995) for a more recent paper looking at the effects of children on married mothers' labor supply over time.

[4]U.S. Department of Commerce, Bureau of the Census (1992). Mean expenditures are conditional on making positive child care payments and have been converted to real 1997 dollars.

[5]Much of this article is based on Barrow (1999).

[6]While it appears that women with school-aged children have higher labor force participation rates than men, this is a function of the difference in the age distribution of all men versus women with school-aged children. The participation rate for men with school-aged children is 93 percent (U.S. Department of Labor, Bureau of Labor Statistics, unpublished data).

[7]Weights used are the earnings weights provided in the CPS data.

[8]205 observations were dropped, leaving 20,080 wage observations for child care workers in 50 states and one district over 15 years.

[9]Approximately 95 percent of child care workers in the CPS data are women.

[10]See the appendix for a more formal description of the model.

[11]The NLSY is a nationally representative sample of 12,686 men and women who were between the ages of 14 and 21 in 1979, including a military sample and an oversample of African-Americans, Hispanics, and poor non-African-Americans and non-Hispanics. See Center for Human Resource Research (1989 and 1993) for more information on the survey.

[12]For the 918 women with first births before 1979, there are no birth year data available.

[13]The appendix contains more details of how the dataset is constructed.

[14]U.S. Department of Commerce, Bureau of the Census (1998), table No. 645. In 1997 the participation rate for women ages 16 to 19 was 51.0 percent, the rate for women 20 to 24 was 72.7 percent, and the rate for women 25 to 34 was 76.0 percent.

[15]Although a larger percentage of NLSY women return to work after first birth, the employment patterns are very similar to those of the *National Longitudinal Survey of Young Women* presented in McLaughlin (1982)

[16]Pre-birth wage is the best approximation I have of the wage women actually face when making their return-to-work decision. Because I am looking at these women over such a short time frame, I assume that there is minimal wage erosion.

[17]For continuous variables, this is the change in probability associated with an infinitesimal change in the independent variable, while for discrete variables it is the change associated with a one unit change in the independent variable.

[18]0.778 is the predicted probability of returning to work for a woman with the characteristics of the average woman in the sample. The predicted change in probability is calculated at this mean.

[19]Very few observations are affected by the income top-coding, and including an indicator for the presence of a top-coded income measure has no important effects on the results; however, women whose spouse or partner income is top-coded are significantly less likely to return to work.

[20]As noted above, U.S. Department of Commerce, Bureau of the Census (1992) estimates women with at least one child under age one spend an average of $88.60 on child care per week and work an average of 36 hours per week. This $2.46 per hour cost in 1997 dollars is 54 percent of the mean state average child care worker wage of $4.58 per hour.

[21]Elasticities are only available from a subset of the studies for a subset of the elasticities of interest. In the text I cite all studies for which an elasticity calculation is available.

[22]Elasticities are calculated at the mean employment rate and the mean average child care worker wage across observations.

[23]Even if mother's age and education at child's birth are omitted from the estimation, the wage coefficient is never large enough to generate an elasticity as large as the cited studies.

[24]The Family and Medical Leave Act of 1993 became effective after most of the women in the NLSY sample gave birth to their first child. This act allows workers at companies with more than 50 employees to take up to 12 weeks of "job-protected" leave to care for a child or other immediate family member, lowering the cost for many women of returning to the labor force after childbirth.

[25]I use census population estimates of approximately 60.1 million women aged 15 to 44 as of April 1, 1999.

[26]The probabilities are evaluated at the mean values for all covariates other than the ones being changed for the simulations.

[27]U.S. Department of Commerce, Bureau of the Census (1994).

[28]U.S. Department of Commerce, Bureau of the Census (1996).

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