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A Dynamic Analysis of Married Women's Labor Force Transitions Surrounding Childbirth*

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Abstract:
Using the National Longitudinal Survey of Youth 1979 (NLSY79), we formally analyze women's transitions back into the labor market surrounding the birth of their first child. Our results show that roughly 13 percent of married women (irrespective of their level of education) do not transition out of the non-employment state within our sample period (i.e., 156 weeks) after the birth of their first child. We also find that highly educated women (relative to their less educated counterparts) are more likely to return to the labor market in a reduced capacity (i.e., switching to part-time employment or a different occupation relative to their pre-birth occupation) if they stay out of the labor market for a sufficient length of time, despite the fact that we find that college educated women transition from non-employment into employment faster than their less educated counterparts. These results suggest that there is a role for both family pulls and workplace pushes in explaining women's labor market decisions surrounding childbirth.

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1. Introduction

Women have become an important part of the U.S. labor market. Not only was female labor force participation increased substantially since the 1960's from 37.7 percent in 1960 to 59.3 percent in 2007, women in 2007 comprised roughly half of the US workforce (Statistical Abstracts, Various Years). In order to ensure that the U.S. continues to be successful in the global economy it is important to make it feasible for women, particularly highly educated women, to remain attached to the labor market in light of their family responsibilities (e.g., elder care or child care).[1]

Before one can determine how to keep women fully engaged in the labor market, one must first determine if women (particularly highly educated women) are indeed becoming less attached to the labor market to care for their families, and if so, on what margins are they adjusting their labor market participation. Are women exiting (opting-out of) the labor market completely?[2] If women do exit the labor market due to family responsibilities, for how long do they exit? If they do choose to return to the labor market, do they return as full-time workers or do they return as part-time workers? Do they return to the same occupation or to a different occupation (outside of their trained area of expertise)? Do they shift from wage and salary work to self-employment? If

[1] The Obama Administration recognizes the importance of keeping women (and men) fully attached to the labor market without sacrificing their family responsibilities. Specifically, the President and the First Lady hosted a White House Forum on Workplace Flexibility on March 31, 2010 (http://www.whitehouse.gov/the-press-office/remarks-president-workplace-flexibility-forum), suggesting that workplace flexibility may be the key to keeping people fully engaged in the U.S. labor market which is necessary for the U.S. to remain competitive in the global economy. One of the outcomes of the administration's commitment to this issue is a pilot project where workplace flexibility programs will be offered to federal employees. For more information on the initiatives of the Obama Administration with respect to workplace flexibility see http://www.whitehouse.gov/search/site/workplace%20flexibility.

[2] The opt-out revolution, which posits that highly educated women (relative to their less educated counterparts) are exiting the labor market to care for their families at higher rates today than in earlier time periods, was first sensationalized by Belkin (2003) in a *New York Times* article. Since the Belkin (2003) article broke, there has been intense media attention on opting out. See for example, Wallis 2004, Story 2005, Trunk 2005, St. George 2009.

women are found to be less attached to the labor market to care for their families, then answering the latter set of questions will highlight that it is unlikely that it is just family pulls (e.g., the birth of a child) behind women's labor market decisions, but that there is a role for workplace pushes (e.g., lack of flexibility on the job) as well. This finding in turn can help highlight what types of policies would be effective in keeping women fully attached to the labor market.

While there has been a growing literature examining whether women (particularly highly educated women) are opting-out of the labor market to care for their families (Antecol 2010, Boushey 2005; 2008, Goldin 2006, Vere 2007, Cohany and Sok 2007, Fortin 2008, Shang and Weinberg 2009, and Percheski 2008)[3], to the best of our knowledge no one has formally examined the duration of out of the labor market spells surrounding childbirth conditional on leaving.[4] Nor have they examined what types of employment women transition back into.[5]

Using the National Longitudinal Survey of Youth 1979 (NLSY79), this paper attempts to formally analyze women's transitions back into the labor market surrounding the birth of their first child. Ideally one would like to examine the labor market transitions surrounding childbirth of women today, rather than those of women between the mid

[3] Several studies have examined the impact of career interruptions (opting-out) on labor market outcomes among alumni from top-ranked colleges (see Goldin and Katz 2008, Herr and Wolfram 2009, and Bertrand, Goldin, and Katz 2009.

[4] There is, however, a large literature examining the determinants of married women's labor supply (see Blundell and MaCurdy 1999 for a survey of the literature). In general, married women's labor supply is found to be positively related to own wages, negatively related to spouse wages and non labor income, and negatively related to the presence of children, particularly young children, in the household. The results are robust when endogeneity concerns with respect to children and wages (own and spousal) are taken into account (Mroz 1987).

[5] Several qualitative studies (see for example, Stone and Lovejoy 2004, Hewlett *et al*. 2005, Williams *et al*. 2006, Hewlett 2007, and Stone 2008) find that (conditional on leaving) women do not believe that their decision to opt-out of the labor market is permanent, nor do they believe that transitioning back into the labor market will be difficult. What women have reportedly found, however, is it takes long periods of time to re-enter the labor market and it many cases it requires the women to shift from their trained area of specialization.

1980s and the late 1990s. However due to the lack of longitudinal data availability for the current time period, which is necessary to construct detailed labor market histories, we are unable to examine the labor market transitions of women today. We argue however that looking at the transitions of women surrounding the birth of their first child and who were in the labor market between the mid 1980s and the late 1990s is still extremely informative about what drives women's labor force attachment decisions surrounding childbirth more generally for a number of reasons. First, the largest influx of women into the U.S. labor market occurred prior to the mid-1980s; female labor force participation increased by roughly 17 percentage points between 1960 and 1985 compared to roughly 5 percentage points between 1985 and 2007 (Statistical Abstracts, Various Years). Second, there is little evidence to suggest that women (particularly highly educated women) are exiting the labor market in larger numbers today relative to the 1980s and the 1990s to care for their families (see for example, Antecol 2010 Boushey 2005; 2008, Goldin 2006, Vere 2007, Cohany and Sok 2007, Fortin 2008, and Percheski 2008). Third, this is the first paper, to our knowledge, that formally analyzes women's labor market transitions surrounding childbirth in a dynamic setting, a contribution in its own right.

We first examine a two-state hazard model, non-employment (unemployment and out of the labor force) to employment by level of education. We then examine three-state competing risks models by level of education for two types of labor market transitions: non-employment to part-time or full-time employment and non-employment to the same occupation or to a different occupation.[6] Each of these models allows us to empirically

[6] We are in the process of examining a third type of labor market transition using the three-state competing risks model: non-employment to wage/salary sector or the self-employment sector.

determine to what extent women (particularly highly educated women) in the mid to late 1980s and early to late 1990s became less attached to the labor surrounding the birth of their first child.

Our results show that roughly13 percent of married women (irrespective of their level of education) do not transition out of the non-employment state within our sample period (i.e., 156 weeks) after the birth of their first child. We also find that highly educated women (relative to their less educated counterparts) are more likely to return to the labor market in a reduced capacity (i.e., switching to part-time employment or a different occupation relative to their pre-birth occupation) if they stay out of the labor market for a sufficient length of time, despite the fact that we find that college educated women transition from non-employment into employment faster than their less educated counterparts. These results suggest that there is a role for both family pulls and workplace pushes in explaining women's labor market decisions surrounding childbirth.

The remainder of the paper is as follows. In the next section we discuss the data. Section 3 presents the estimation strategy and results for the two-state hazard model and Section 4 presents the estimation strategy and results for the three-state competing risks models. The conclusions are presented in Section 5.

2. Data

We use the National Longitudinal Survey of Youth 1979 (NLSY79), which includes longitudinal data from 1979-2006 for a sample of men and women aged 14-22 in 1979. This data is ideal for our purposes because it contains information that allows us to

construct weekly work histories, as well as weekly birth histories,[7] which permits us to examine women's labor market transitions surrounding the birth of their first child. We focus on the first birth because it is likely this is the first time (perhaps with the exception of elder care responsibilities) a woman has to consider the work and family decision, i.e., a woman has to decided whether or not to work and (conditional on working) how intense she would like to work in light of both family responsibilities and workplace constraints.

As previously stated, the main drawback of this data is that it only allows us to focus on the labor market transitions of women who were in the labor market between the mid-1980s and the late 1990s. We argue however that examining women in this time period is still informative about women's labor market transitions surrounding childbirth more generally for a number of reasons. First, to the best of our knowledge there has to date been no formal dynamic analysis of women's labor market transitions surrounding childbirth which is a contribution in its own right. Secondly, there is no longitudinal data source that would allow one to examine the labor market transitions of women in the current time period (2000s) that is as rich as the NLSY79. Moreover, there is little evidence to show that women today are exiting the labor market in greater numbers than women in the 1980s and 1990s (see for example, Antecol 2010 Boushey 2005; 2008, Goldin 2006, Vere 2007, Cohany and Sok 2007, Fortin 2008, and Percheski 2008). Finally, the greatest increase in female participation occurred prior to the mid-1980s (see Statistical Abstracts, Various Years).

The panel is restricted to women who have complete work history information, that is, complete information on weekly labor force status (LFS) and hours worked per

[7] Weekly birth histories are drawn from the GEOCODE version of the NLSY79.

week (HRSWK). Specifically, if a woman never reports weekly work history information (LFS or HRSWK), they are excluded from the analysis. Moreover, we include weekly work history information on a woman up until the first time we do not have work history information on them, after that point they are dropped from the analysis. For example, if we have complete information on weekly work histories for a woman in weeks 0 through 627 (1978-1989), no information in weeks 628 through 835 (1990-1993), and information in weeks 836 through 1515 (1994-2006), this woman is dropped from the sample in week 628.[8] This restriction is imposed because we need continuous work history information to examine labor market transitions surrounding childbirth. Further, a woman is excluded from the analysis if we have valid information on their LFS in a given week but invalid information on their HRSWK in that week and we do not have valid information on their HRSWK in the weeks prior to or the weeks after the invalid skip.

The panel is further restricted to married women who were employed full-time (i.e., worked greater than 35 hours per week) 36 weeks out of the 52 weeks preceding the birth of their first child but exited the labor market either within 13 weeks preceding the birth of their first child or within 26 weeks after the birth of their first child. We restrict the sample to married women as the labor market decisions surrounding childbirth likely differ substantially between women who are married relative to their non-married counterparts. One reason for this, and certainly not the only one, is married women are able to factor in their partner's earnings in their re-entry decision. We restrict the sample

[8] There is one exception. If a woman is missing work history information at the beginning of the panel, but then have work history information, we do not drop them until they "exit" the panel for the first time after working. The rational is that work history information is missing for these women in the beginning weeks because they were too young to be active labor market participants.

to women who were employed full-time 36 weeks out of the 52 weeks preceding the birth of their first child to ensure that women were strongly attached to the labor market prior to the birth of their first child.[9] We restrict the sample to women who left the labor market either 13 weeks prior to or 26 weeks after the birth of their first child to allow women to exhaust their "formal" parental leave before they make their decision to return to the labor market. Henceforth, we refer to this restriction as leaving the labor market *after* the birth of their first child for descriptive ease, despite the fact that some women may have left *prior* to the birth of their first child.

Women who had their first birth prior to 1979 (and were married at the time of the birth) are excluded from the analysis because we do not have complete work history information for these women (249 person observations dropped). This restriction generally applies to women who were between 20 and 22 years of age in 1979 (i.e., 89% of the women were between these ages in 1979, 8% were 19, 2.5% were 18, and 0.5% were 16). In addition, women who had their first birth prior to finishing their formal education are excluded from the analysis. We impose this restriction because the "opt-out" literature suggests differential exit rates across the educational distribution (for example, see Antecol 2009), and we want to determine whether re-entry rates similarly differ across the educational distribution.

One issue that arises is how to treat higher-order births as these births will undoubtedly influence women's re-entry decisions, conditional on them exiting the labor market after the birth of their first child. While 75 percent of women have only 1 child

[9] We performed several robustness tests regarding women's prior labor market attachment. For example, women had to be employed full-time in the 36 weeks preceding the birth of their first child. This yielded slightly different results (i.e., the educational differences were no longer statistically significant) largely due to small sample sizes Results are available upon request. We also estimated a specification without the full-time work restriction preceding the birth of the first child. The results were very similar, and available upon request, despite the fact that our preferred specification has roughly 50 percent fewer observations.

(29.7 percent) or 2 children (45.3 percent), only 25 percent have 3 or more children for married women who were strongly attached to the labor market prior to the birth of their first child. While we do allow women to have two children, we exclude women with 3 or more children. We argue that we are able to limit the influence of the second birth on the re-entry decision following the first birth because we truncate women's non-employment spells at 156 weeks which is the median timing between the first and the second birth (see Section 3.1 below for detailed discussion).[10]

Due to small cell sizes, we exclude Asians and other races from the analysis. In other words, we only include whites, Hispanics, and blacks. We exclude married women employed in the military as their labor market decisions surrounding childbirth will likely differ substantially from their non-military counterparts. This in large part may be driven by the different institutional structures in military versus the non-military employment. Finally, we exclude anyone with missing information on any of the variables of interest. These sample restrictions translate into 18,535 (418) person-week (person) observations.[11]

We use the following measure of labor market attachment. LFP equals one if a respondent worked a positive number of hours (HRSWK>0) in a given week, and zero otherwise.[12] By the end of our sample period (156 weeks), 87 percent of women are attached to the labor market, i.e., transitioned from the non-employment state to the employment state (see Table 1). While there are no educational differences at this point,

[10] Similar results are found if we limit the sample to women with one child only.
[11] The final sample includes 16 teenage births, 4 to 18 year olds and 12 to 19 year olds. Results are similar if we exclude these women from the analysis.
[12] We also calculated an alternative measure of labor market attachment, LFPA, equal to one if the person stated they were employed (i.e., reported a job number or associated with employment [gap dates missing, all time not accounted for]) and zero otherwise (i.e., not working [unemployment vs. out of the labor force not determined], unemployed, out of the labor force). The correlation between LFP and LFPA is approximately 99 percent.

there are large differences in education over the sample period (discussed in more detail below).

We use the following measure of educational attainment. COLLEGEGRAD equals one if a respondent's highest level of education completed is a bachelor's degree and above, and zero otherwise. According to Table 1, 32 percent of married women in our sample have a college education.

In addition to educational attainment, we use a measure of the respondent's ability. Specifically, we use the Armed Forces Qualifying Test (AFQT) score demeaned for the age and education of the respondent when the test score was administered.[13] The average age and education adjusted AFQT score (henceforth referred to as AFQT) in our sample is 12.0 (see Table 1). Interestingly, the AFQT score for college educated married women, which is 24, is roughly 4 times as large as the AFQT score for less educated women even for this very selective group.

We also use measures of a respondent's mother's and father's highest level of education completed (MOM_ED and DAD_ED, respectively). We include these as mother's years of completed education and father's years of completed education. If parental education information is not available, we imputed it using the following variables: family size in 1979, family income in 1979, whether family was in poverty in 1979, region the family lived in 1979, whether the family lived in an SMSA in 1979, whether the family lived in an urban area in 1979, and race. This applied to only 14 and 31 person observations for mother's and father's education, respectively. Table 1

[13] AFQT information was missing for 22 women in our final sample. For these women, we imputed their AFQT scores using the following variables: father's education, mother's education, family size in 1979, family income in 1979, whether family was in poverty in 1979, region the family lived in 1979, whether the family lived in an SMSA in 1979, whether the family lived in an urban area in 1979, and race.

illustrates that, on average, the parents of the women in our sample have roughly 12 years of education (13 years of education for college educated women and 11 years of education for their less educated counterparts).

We use the following measure of pre-birth labor market experience. PREBIRTH_EXP is measured as the sum of LFP in the week prior to the birth of the respondent's first child (LFP is available between 1978 and 2006). This definition in conjunction with our sample restrictions ensures we have complete pre-birth labor market experience for all the women in our analysis (i.e., no women in our sample worked prior to 1978). Women worked 8 years (418 weeks) on average prior to the birth of their first child (see Table 1). Moreover, college educated women in our sample have more pre-birth work experience, 10 years (512 weeks) than their less educated counterparts, 7 years (375 weeks).

We use the following measures related to fertility. AGE_FIRSTBIRTH is the woman's age (in years) at the time of the birth of their first child. TWOKIDS equals one if a woman has two children, and zero otherwise. SECONDBIRTH_INSAMPLE equals one if the respondent gave birth to their second child within our sample period (i.e., within 156 weeks following the birth of their first child) and zero otherwise (i.e., gave birth to their second child outside of our sample period or did not have a second child). According to Table 1, women in our sample were roughly 27 years old when they gave birth to their first child. As expected, college educated women gave birth to their first child when they were older relative to their less educated counterparts (29 years old vs. 26 years old, respectively). Approximately half of the sample had two kids, with about 40 percent of this sample having their second child within our sample period.

Following the married labor supply literature (see Blundell and MaCurdy 1999 for a survey of the literature), we also include controls for own and spouse wages. OWNWAGE is a woman's wage and salary income (henceforth referred to as wages) from one year prior to the birth of their first child. By construction (i.e., our sample restrictions), this information is available for all women in our analysis with the following exception, 2 women had missing wage and salary information. For these women we impute own wages using the following variables: own education, own race, and own age. SPWAGE is a woman's spouses wage and salary income (including self-employment income) based on the year that the woman gave birth to their first child.[14] For that particular year, we have missing spousal wage information for about one quarter of the women in our sample. In order to minimize the number of imputed observations, we replace missing spousal wage information from the first birth year by using the spousal wage information in the year following and preceding the year of the first birth, respectively. Despite this, spousal wage information continues to be missing for 12 percent of our sample. For these observations, SPWAGE is imputed using the imputation described above for OWNWAGE.[15] Not surprisingly, women in our sample earn $16,300 while their spouses earn substantially more $28,190 (see Table 1). In addition, college educated women and their spouses earn substantially more than less-than-college educated women and their spouses.

We use two additional background measures. RACE is one if the respondent is non-Hispanic white or Hispanic, and zero if she is non-Hispanic black. Henceforth we

[14] Instead of spousal wage information from the first birth year, we also tried spousal wage from one year prior to the birth of their first child. We argue, however, that this will more likely affect their decision to transition out of the labor market than their transition back into the labor market. Having said this, results are similar and available upon request.

[15] We are in the process of gathering spousal information on education, race, and age. This information will ultimately be used in the imputation of OWNWAGE and SPWAGE.

refer to this as white and black. Table 1 reveals that the sample is predominantly white (90 percent). DOB is the respondent's year of birth, i.e., the respondent's birth cohort.

How long do married women remain non-employed (includes unemployed and out of the labor force) conditional on them being fully attached to the labor market prior to the birth of their first child and leaving the labor market after that birth? How many of them never transition back into the labor force within our sample period (i.e., 156 weeks)?

As a first attempt to answer these questions, we present empirical hazard rates and survival information by level of education in Panel A of Table 2 and Table 3 for the two-state case (non-employment to employment), respectively. The hazard rates are the ratio of the number of spells ending in week t to the number of spells lasting at least t weeks. It can be seen that the hazard rates are larger in earlier weeks for both college educated and non-college educated married women. This illustrates that married women are more likely to return to labor market within a few weeks after giving birth to their first child, with this probability declining as the duration of the non-employment spell increases. Moreover, the hazard rates for college educated married women are greater than those for married women with less than a college education in most of the weeks. In other words, college educated married women transition out of non-employment faster than their less educated counterparts.

The survival information illustrates further that transitions out of non-employment occur in earlier weeks, for example, 30 percent of married women have transitioned out of non-employment into employment between week 0 and week 10 while only 1 percent of married women have transitioned out of non-employment into employment between

week 70 and 80. Moreover, college educated married women transition out of non-employment to employment much faster than their less educated counterparts. Specifically, the percentage of college educated married women to remain in non-employment stabilizes by roughly week 80 while for less than college educated married women the percent remaining in non-employment continually falls across the sample period. Interestingly, by the end of our sample period (156 weeks), roughly 13 percent of married women remain in the non-employment state irrespective of their level of education.

Looking across the distribution it can be seen that after 5, 9, 16, and 57 weeks, 90, 75, 50, and 25 percent of married women in our sample are still in the non-employment state, respectively. While the percent of women in our sample still in the non-employment state do not differ by level of education for the 50^{th}, 75^{th} and 90^{th} percentile, the percent of women in our sample still in the non-employment state for the 25^{th} percentile differs substantially by level of education. Specifically, after 33 and 67 weeks, 25 percent of college educated and less than college educated married women in our sample, respectively, are still in the non-employment state. This further highlights that college educated married women transition out of non-employment much faster than their less educated counterparts. The remainder of the paper formally analyzes women's labor market transitions surrounding the birth of their first child.

3. *Two-State Hazard Model: Non-Employment to Employment*

3.1 Two-State Hazard Model Estimation

In order to formally determine the duration of women's non-employment (includes unemployment and out of the labor force) spells after the birth of their first child, conditional on them being fully attached to the labor market prior to that birth and leaving after that birth, we consider two-state (non-employment to employment) hazard models and we work in discrete time. We further assume random censoring at the 156th week after leaving the labor force to give birth to their first child (our sample period) We estimate our hazard models both with and without unobserved heterogeneity but present the specifications with unobserved heterogeneity for the sake of brevity in this section. The hazard function is defined using a logit specification so that the probability of leaving spell type j during week t of the spell is

$$\lambda_j(t \mid \theta_j) = \frac{1}{1+\exp(-L_j(t))}, \tag{1}$$

whre

$$L_j(t) = \alpha_j + \beta X_j(t) + h_j(t) + \theta_j . \tag{2}$$

In equation (2) $L_j(t)$ is our first measure of labor force attachment (LFP), $X_j(t)$ is a vector of explanatory variables (education, race, own and spouse wages, pre-birth labor market experience, age at first birth, second birth information, cohort, mother and father's education, AFQT score, and a time trend.) and θ_j is a normally distributed unobserved heterogeneity term with zero mean and constant variance, σ_v^2. For expositional ease, we suppress the individual subscript on functions and variables.

We model the duration dependence in the hazard model, $h_j(t)$,, as a higher order polynomial logarithmic function of t, given by[16]

$$h_j(t) = \sum_{k=1}^{\tau} \gamma_{kj} \log(t)^k. \quad (3)$$

The survivor function, which measures the probability that a spell of type j lasts more than t-1 weeks (conditional on unobserved heterogeneity), is given by

$$S_j(t-1 \mid \theta_j) = \prod_{s=1}^{t-1} [1 - \lambda_j(s \mid \theta_j)]. \quad (4)$$

and the probability of leaving a non-employment spell in week t conditional on surviving in this spell for t-1 weeks is

$$f_j(t \mid \theta_j) = \lambda_j(t \mid \theta_j) S_j(t-1 \mid \theta_j). \quad (5)$$

Given how we have defined entry into our sample, we only have "fresh" spells (see Ham and Lalonde 1996). The contribution to the likelihood function of fresh spells follows from these hazard functions. Moreover, we only have two labor market histories to consider in the two-state model. First, consider a woman who had a fresh non-employment spell that lasted t_u periods followed by an employment spell within the sample period (i.e., 156 weeks), the contribution to the likelihood function (conditional on unobserved heterogeneity) of these fresh spells is given by

$$f_u(t_u) = \int_{\theta_u} f_u(t_u \mid \theta_u) dG(\theta_u). \quad (6)$$

G(.) is the unobserved heterogeneity distribution function, which is the normal distribution in our specification.

[16] We tried different flexible functions (such as, a higher order polynomial) to model the duration dependence. The results were very similar and available upon request.

Second, consider a woman who never left their fresh non-employment spell during the sample period, the unconditional contribution of such a non-employment history is given by

$$S_u(T_u) = \int_{\theta_u} S_u(T \mid \theta_u) dG(\theta_u). \tag{7}$$

3.2 Two-State Hazard Model Results

How long does it take women to transition back into employment following the birth of their first child, conditional on them being fully attached to the labor market prior to that birth and exiting the labor market after that birth? In order to answer this question, we examine the non-employment durations of married women surrounding the birth of their first child. In particular, Table 4 presents the logit coefficient results for equation (2) without (column 1) and with (column 3) unobserved heterogeneity, as well as the corresponding odds ratios without (column 2) and with (column 4) unobserved heterogeneity.[17] For descriptive ease our discussion below focuses on the odds ratios. Irrespective of the specification considered, unobserved heterogeneity is never statistically significant; this is not surprising given the sample is relatively homogenous given the sample restrictions we imposed. Therefore we discuss the results that do not control for unobserved heterogeneity.

Table 4 illustrates that college educated women who worked full-time prior to giving birth to their first child and left the labor market after that birth, return to employment significantly sooner than their less educated counterparts. Specifically, for

[17] We also included controls for the woman's age at the time she was married to the man that she had her first child with and whether this marriage was her first marriage. Neither variable was statistically significant at conventional levels, nor did they alter the results of the other covariates. This is not surprising given the age at marriage is highly correlated with age at first birth given 90 percent of the sample were in their first marriage when they had their first birth. Results are available upon request.

every non-college educated married woman who transitions from non-employment to employment in a given week, roughly 1.4 college educated married women make the same transition. Duration dependence follows the expected pattern, that is, the level and cubed terms are positive and the squared terms is negative. As expected, we also find that women who have more pre-birth labor market experience transition into employment faster. While own wages do not impact women's transition back into employment, spousal wages have the expected odds ratios, i.e., women return to employment later the higher are their spouse wages. Turning to the fertility measures, a woman has two children takes longer to transition into employment, however if she had her second child after the sample period, her transition into employment is shorter than a woman who had their second child within the 156 weeks. Not surprisingly, this suggests that the timing of the second birth influences women's decision to remain out of the labor market. Interestingly, mother's education, father's education, cohort, nor AFQT affect a married woman's transition back into employment.

Figures 1 and 2 present the hazard function for married women who worked full-time prior to and left the labor market after the birth of their first child stratified by COLLEGRAD without and with unobserved heterogeneity, respectively. As the results without and with unobserved heterogeneity are similar, we focus on the former. The hazard function for married women with a college degree lies everywhere above that of married women with less than a college degree. This indicates that college educated married women are more likely to leave a non-employment spell in period t for all t periods within our sample period (i.e., 156 weeks) relative to their less educated counterparts, which corroborates the descriptive evidence presented in Section 2 (see

Table 2). Interestingly, the probability of leaving non-employment peaks at 7 weeks for both college and less than college educated married women. Thus married women who plan to transition out of non-employment do so at 7 weeks, irrespective of their level of education

Figures 3 and 4 present the analogous survivor function (equation 4) for married women stratified by COLLEGRAD without and with unobserved heterogeneity, respectively. Once again we focus on the former figures as unobserved heterogeneity is not significant. The survivor function is a graphical illustration of the probability of women staying non-employed. Given this, the steepest decline in the survivor function occurs within the first 7 weeks (irrespective of education level) which, of course, coincides with the peak of the hazard function (see Figure 1).

The survivor function for college educated married women lies everywhere below that of married women with less than a college education. This indicates that college educated married women, relative to their less educated counterparts, are less likely to survive in the non-employment spell in period t conditional on surviving until period t-1 for all t periods within our sample period. The median non-employment spell for married college educated women is 17 weeks. For non-college educated married women, the median non-employment spell is 21 weeks.[18] According to the model predictions roughly 11 percent and 7 percent of non-college educated and college educated married women remain in the non-employment state by the end of our sample period, respectively. Interestingly, the descriptive analysis showed virtually no difference by education level in either the median non-employment spell or the percentage of women

[18] The median non-employment spell for married women overall is 24 weeks.

remaining in the non-employment state by the end of our sample period (see Table 3) which clearly points to the importance of controlling for observable characteristics.

Despite the fact that college educated women transition from non-employment into employment faster than their less educated counterparts, the question remains whether they are transitioning back into the labor market in the same capacity. Are they staying attached to the labor market full-time or are they transitioning into part-time employment? Are they staying in the same occupation or are they shifting to a different occupation? It is important to understand the choices married women are making, particularly highly educated married women as women's educational attainment has risen substantially since the 1960s; in the 1960s and 1970s women received roughly 40 percent of the bachelor's degrees, in the 1980s women received roughly half of the bachelor's degrees, and in the 1990s and 2000s women received more than half (roughly 54 and 57 percent, respectively) of the bachelor degrees (Blau, Ferber and Winkler 2010). Moreover, if highly educated married women are transitioning back into the labor market in a reduced capacity relative to their less educated counterparts to care for their families, this could have severe implications for the competitiveness of the US labor market in the global economy. The remainder of the paper formally analyzes these issues.

4. Three-State Competing Risks Models: Non-Employment to Part-time vs. Full-time Employment and Non-Employment to the Same Occupation vs. a Different Occupation

Hewlett (2007) indicates that women who exit the labor market (generally for family responsibilities) often times choose to re-enter in a reduced capacity (e.g., part-time employment, flexible work arrangement, telecommuting, less demanding jobs, etc.). To examine this to some degree, we focus on transitions from non-employment into full-

or part-time employment, as well as on transitions from non-employment into the same occupation or into a different occupation (relative to their pre-birth occupation).[19]

In order to examine three state competing risks model we define two additional measures of labor force attachment. The first measure, LFP1, equals two if a respondent worked full-time (HRSWK>35) in a given week, equals one if a respondent worked part-time (HRSWK>0 & HRSWK<=35) in a given week, and equals zero if a respondent did not work (HRSWK=0) in a given week. The second measure, LFP2, equals two if a respondent worked in the same occupation relative to their pre-birth occupation in a given week, equals one if a respondent worked in a different occupation relative their pre-birth occupation in a given week, and equals zero if a respondent did not work (HRSWK=0) in a given week.

Are married women more likely to transition into part-time employment or full-time employment conditional on them being fully attached to the labor market prior to the birth of their first child, leaving after that birth, and then returning to the labor market after that birth? Do they transition back into the same type of occupation or to a different type of occupation? The empirical hazard rates (see Panel B and C of Table 2) for the three-state competing risks specification reveal that both college and less than college educated married women are more likely to transition from non-employment to full-time employment (see Panel B) and from non-employment to the same occupation (see Panel C), especially in earlier weeks. However, conditional on remaining in the non-employment state for a sufficient length of time, college educated married women appear more likely to transition from non-employment to part-time employment (e.g, see

[19] We are still in the process of analyzing transitions from non-employment into the wage/salary sector or self-employed sector.

transition rates in week 40 in Panel B of Table 2), which is not true for their less educated counterparts. Interestingly, it appears that the reverse is true for post-birth occupation choices (relative to pre-birth occupations). In particular, conditional on remaining in the non-employment state for a sufficient length of time, college educated married women continue to be more likely to transition from non-employment to the same occupation while their less educated counterparts appear to be (slightly) more likely to transition from non-employment to a different occupation (e.g., see transition rates in week 40 in Panel C of Table 2).

In addition to empirical hazard rates, we also present descriptive statistics for the three-state competing risks specifications in Table 5 which tend to reinforce the patterns discussed above. Specifically, of those women who transitioned back into employment after the birth of their first child, roughly 76 percent return full-time. Morever, college educated married women (conditional on transitioning back into the employment state after the birth of their first child) are less likely to return to full-time employment relative to their less-educated counterparts, 72 percent vs. 77 percent. Turning to occupational transitions, it can be seen that of those women who transitioned back into employment after the birth of their first child, roughly 65 percent return to their pre-birth occupation. Unlike the full-time/part-time transitions, however, college educated married women are more likely to return to their pre-birth occupation relative to their less-educated counterparts, 70 percent vs. 63 percent.

Interestingly, women returning to the labor market in a reduced capacity (i.e., switching to part-time employment or a different occupation relative to their pre-birth occupation) take much longer to make this transition, although this is more pronounced

for less than college educated married women. In particular, the median number of weeks it takes a college educated (less than college educated) married woman to transition into full-time and part-time employment are 12 (11) and 19 (36.5) and the same pre-birth occupation and a different occupation are 12.5 (10) and 19 (42.5), respectively.

These patterns suggesting there is some evidence that married women who were fully attached to the labor market prior to the birth of their first child are returning to the labor market in a reduced capacity after that birth. Furthermore, conditional on returning to the labor market in a reduced capacity, college educated married women use part-time employment opportunities more and faster relative to their less educated counterparts, as well as using different occupation opportunities faster (although less often) relative to their less educated counterparts. The remainder of the paper determines whether these patterns continue to persist using a formal analysis.

4*.1 Three-State Competing Risks Model Estimation*

We examine two three-state competing risks models: (1) non-employment to part-time or full-time employment; (2) non-employment to the same occupation or to a different occupation (relative to the pre-first birth occupation). Given the underlying principles translate to both cases, for descriptive ease we focus on the first of these (i.e., non-employment to part-time or full-time employment) here.

The same rationale for two-state hazard model applies for the three-state competing risks model in a discrete time framework. In this section, we only present the model without unobserved heterogeneity given unobserved heterogeneity did not matter

in the two-state case.[20] Specifically, we define the hazard function using a multinomial logit (ML) specification[21] so that the probability of leaving spell type j of state k during week t of the spell is

$$\lambda_{jk}(t) = \frac{1}{1+\exp(-L_{jk}(t))}, \tag{8}$$

where $L_{jk}(t)$ is our second measure of labor market attachment (LFP2) and the remaining functions and variables are as defined above (with state k subscripts).

In this case there are three labor market histories to consider. First, consider a woman who had a fresh non-employment spell that lasted t_{uf} periods followed by a full-time employment spell within the sample period (i.e., 156 weeks), the contribution to the likelihood function of these fresh spells is given by

$$f_{uf}(t_{uf}) = \lambda_{uf}(t)\prod_{\tau=1}^{t-1}(1-\lambda_{uf}(\tau)-\lambda_{up}(\tau)). \tag{9}$$

Second, consider a woman who had a fresh non-employment spell that lasted t_{up} periods followed by a part-time employment spell within the sample period, the contribution to the likelihood function of these fresh spells is given by

$$f_{up}(t_{up}) = \lambda_{up}(t)\prod_{\tau=1}^{t-1}(1-\lambda_{uf}(\tau)-\lambda_{up}(\tau)). \tag{10}$$

Third, consider a woman who never left their fresh non-employment spell during the sample period, the unconditional contribution of such a non-employment history is given by

[20] As a robustness check, we attempted to estimate the three-state case with unobserved heterogeneity however due to small sample sizes the standard errors became too large to make inference with precision.

[21] Because we use a ML model, we are implicitly assuming that the hazard, the probability of leaving non-employment, for both part-time and full-time employment is constant within the time interval, which is a week in our case, (Dolton and van der Klaauw, 1999). While this assumption is not a weak assumption, as long as the interval is small enough the predictions using the ML coefficient estimates are a very good approximation for the true hazard rates.

$$S_u(T_u) = \prod_{\tau=1}^{T} (1 - \lambda_{uf}(\tau) - \lambda_{up}(\tau)) \qquad (11)$$

4*.2 Three-State Competing Risks Model Results*

4.2.1 Non-Employment to Full-time or Part-time Employment

We estimate three-state competing risks model using a multinomial logit model for transitions from non-employment to full-time or part-time employment, and again discuss the odds ratios for interpretative ease (for completeness however we do report the coefficient estimates). As previously noted, we solely focus on the three-state case without unobserved heterogeneity given unobserved heterogeneity did not matter in the two-state case.

As our interest primarily lies in the differential effects of education, Panel A of Table 6 only presents the results for that covariate (the remaining covariates are generally consistent with those presented in the two-state case and are presented in Appendix Table A1 for completeness). We find that college educated married women transition from non-employment into both full-time and part-time employment faster than their less educated counterparts, although the effect for full-time employment is measured imprecisely. In order to fully understand these transitions, we now turn to the hazard function.

Figure 5 presents the hazard function for married women who worked full-time prior to giving birth to their first child, and left the labor market after that birth for the sample making transitions into part-time or full-time employment states stratified by COLLEGRAD (without unobserved heterogeneity). Both the part-time and the full-time hazard rates for college educated married women are always larger than those of their less educated counterparts with convergence between the two full-time hazard rates but

no convergence between the two part-time hazard rates. For college educated (less than college educated) married women the full-time employment hazard rate increases until week 6 (6) and then decreases while the part-time hazard rate increases until week 18 (17) and then decreases slightly.

Interestingly, up until week 49 the predicted part-time hazard rate for college educated married women is *less* than the predicted full-time hazard rate while for less than college educated married women the part-time hazard rate is not *less* than the full-time hazard rate until week 104. After week 49 (104) for college (less than college) educated married women, the probability of leaving the non-employment state for the part-time employment state is greater than the probability of returning to the full-time employment state. Roughly 25 percent of college educated married women are still non-employed in week 49 and roughly 20 percent of less than college educated married women are still non-employed in week 104. These patterns illustrate that college educated married women use part-time employment opportunities more and faster relative to their less educated counterparts when they return to labor market after giving birth to their first child.

4.2.2 Non-Employment to the Same Occupation or to a Different Occupation

Looking at transitions from non-employment to the same occupation or to a different occupation (relative to their pre-birth occupation), Panel B of Table 6 reveals that college educated married women transition from non-employment into their pre-birth occupation faster than their less educated counterparts, while the same is true for transitions from non-employment to a different occupation it is imprecisely estimated.

The significance of remaining covariates are generally consistent with those presented in the two-state case and are presented in Appendix Table A2 for completeness. To get a fuller understanding of these transitions, we now discuss the hazard function.

Figure 6 presents the hazard function for married women who worked full-time prior to giving birth to their first child, and left the labor market after that birth for the sample making transitions into the same or different occupation states stratified by COLLEGRAD (without unobserved heterogeneity). It can be seen that the hazard rate for the same (different) occupation reaches its maximum value in week 8 (29) for married women and then (slightly) decreases, irrespective of educational attainment. Both the same and different occupation hazard rates for college educated married women are always larger than those of their less educated counterparts, although the difference between the different occupation hazard rates is much less pronounced. While the same occupation hazard rates converge between the two educational categories, there is no convergence in the different occupation hazard rates by educational attainment.

As in the case of transitions from non-employment to part-time or full-time employment, there are interesting differences across the distribution. Up until week 44 (37) the different occupation hazard rate for college (less than college) educated married women is *less* than the hazard rate for the same occupation. After week 44 (37), when 26 (35) percent of college (less than college) educated married women are predicted to be in the non-employment state, the different occupation hazard rate for college (less than college) educated married women is *greater* than the hazard rate for the same occupation. While college educated married women, relative to their less educated counterparts, use different occupation opportunities (slightly) more when they return to labor market after

giving birth to their first child, it takes them (slightly) longer to do so. Interestingly, the descriptive analysis led one to the opposite conclusions (see Table 6), once again illustrating the importance of controlling for observable characteristics.

The patterns presented in Section 4.2.1 and 4.2.2 suggest that there is some evidence that college educated married women are re-entering the labor market in a reduced capacity relative to their less educated counterparts, however it is conditional on staying in non-employment for a sufficient length of time.

5. Conclusion

Policy makers have become increasingly interested in determining how to keep women, particularly highly educated women, fully attached to the labor market given family responsibilities and workplace constraints. We argue, however, that before one can understand how to keep women fully attached to the labor market, one must first determine if women are exiting ("opting-out" of) the labor market due to a household shock (i.e., elder care or child care) and (conditional on exiting the labor market) are they re-entering the labor market in a reduced capacity to care for their families.

Although there is a growing literature examining women's decisions to "opt-out" of the labor market for family responsibilities (e.g., child care), to the best of our knowledge, no one has formally examined the duration of married women's non-employment spells conditional on them being attached to the labor market prior to the birth of their first child and leaving the labor market surrounding that birth. Nor have they examined what types of employment married women transition back into. Using the National Longitudinal Survey of Youth 1979 (NLSY79), we formally analyze women's

transitions back into the labor market surrounding the birth of their first child by level of education.

Our results show that roughly 13 percent of married women (irrespective of their level of education) do not transition out of the non-employment state within our sample period (i.e., 156 weeks) surrounding the birth of their first child. We also find that highly educated women (relative to their less educated counterparts) are more likely to return to the labor market in a reduced capacity (i.e., switching to part-time employment or a different occupation relative to their pre-birth occupation) if they stay out of the labor market for a sufficient length of time, despite the fact that we find that college educated women transition from non-employment into employment faster than their less educated counterparts.

While we are not able to ascertain from our data why married women have chosen to re-enter the labor market in a reduced capacity, our results suggest that it is not just family pulls but also workplace pushes that appear to be behind their decisions. This is in line with recent research by Herr and Wolfram (2009) whose evidence suggests it is the lack of work-family friendly policies that influence women's labor market decisions in highly educated fields of study. Further research is needed to determine exactly what types of policies need to be implemented to ensure that women are given the option to return to the labor in the same capacity, rather than being pushed out. One possibility is flexible work arrangements. The impact of such arrangements is currently being investigated by the Obama Administration.[22]

[22] For more information on the initiatives of the Obama Administration with respect to workplace flexibility see http://www.whitehouse.gov/search/site/workplace%20flexibility.

References

Antecol, Heather. 2010. "The Opt-out Revolution: A Descriptive Analysis." Working Paper, Claremont McKenna College.

Belkin, Lisa. 2003. "The Opt-Out Revolution." *New York Times Magazine*, Oct. 26, 42-47, 58, 85-86.

Bertrand, Marianne, Claudia Goldin, and Lawrence F. Katz, 2009. "Dynamics of the Gender Gap for Young Professionals in the Financial and Corporate Sectors." Working Paper.

Blundell, Richard, and Thomas MaCurdy. 1999. "Labor Supply: A Review of Alternative Approaches." *Handbook of Labor Economics,*Volume 3A, pp. 1559-1695.

Boushey, Heather. 2005, "Are Women Opting Out? Debunking the Myth." Center for Economic Policy Research, Briefing Paper (Nov).

Boushey, Heather. 2008. "'Opting Out?' The Effect of Children on Women's Employment in the United States." Feminist Economics, 14(1), 1-36.

Cohany, Sharon R. and Emy Sok, 2007. "Trends in Labor Force Participation of Married Mothers of Infants." *Monthly Labor Review* (Feb), 9-16.

Dolton, Peter and Wilbert van der Klaauw, 1999. "The Turnover of Teachers: A Competing Risks Explanation." *Review of Economics and Statistics*, 81(2): 543-552.

Eberwein, Curtis, John C. Ham, and Robert Lalonde, 2002. "Alternative Methods Estimating Program Effects in Event History Models." *Labour Economics*, 9(2):249-278.

Fortin, Nicole, 2008. "Gender Role Attitudes and Women's Labor Market Participation: Opting-Out and the Persistent Appeal of Housewifery." Working Paper.

Goldin, Claudia, 2006. "The Quiet Revolution that Transformed Women's Employment, Education, and Family." *American Economic Review Papers and Proceedings*, Vol 96 (2), 1-21.

Goldin, Claudia and Lawrence Katz, 2008. "Transitions: Career and Family Life Cycles of the Educational Elite." American Economic Review Papers and Proceedings, Vol. 98 (2), 363-369.

Ham, John C. and Robert LaLonde, 1996. "The Effect of Sample Selection and Initial Conditions in Duration Models." *Econometrica*, 64(1):175-205.

Herr, Jane Leber and Catherine Wolfram, 2009. "Opt-Out Rates at Motherhood across High-Education Career Paths: Selection Versus Work Environment." NBER Working Paper # 14717.

Hewlett, Syliva Ann, Carolyn Buck Luce, Peggy Shiller, and Sandra Southwell, 2005. "The Hidden Brain Drain: Off-Ramps and On-Ramps in Women's Careers." Harvard Business Review Research Report 9491 (March).

Hewlett, Sylvia Ann. 2007. *Off-Ramps and On-Ramps: Keeping Talented Women on the Road to Success*. Boston, MA: Harvard Business School Press.

Mroz, Thomas A. 1987. "The Sensitivity of an Empirical Model of Married Women's Hours of Work to Economic and Statistical Assumptions." *Econometrica*, Vol. 55, No. 4 (July), pp. 765-799.

Percheski, Christine, 2008. "Opting Out? Cohort Differences in Professional Women's Employment Rates from 1960 to 2005." *American Sociological Review* 73(June), 497-517.

Shang, Qingyan and Bruce Weinberg, 2009. "Opting for Families: Recent Trends in the Fertility of Highly Educated Women." Working Paper.

St. George, Donna, 2009. "Census Dispels 'Opting-Out' Notion for Stay-at-Home Moms." *Washington Post*, Oct 1.

Stone, Pamela and Meg Lovejoy, 2004. "Fast-Track Women and the "Choice" to Stay Home." The Annals of the American Academy, V. 596 (November), 62-83.

Stone, Pamela. 2008. *Opting Out? Why Women Really Quit Careers and Head Home*. Berkeley, CA: University of California Press.

Story, Louise, 2005. "Many Women at Elite Colleges Set Career Path to Motherhood." *New York Times*, Sept 20, p. A1.

Trunk, P., 2005. "New Generation Puts the Focus on Family." *The Boston Globe*, Apr. 17, G1.

Vere, James P. 2007. "'Having it All' No Longer: Fertility, Female Labor Supply, and the New Life Choices of Generation X." *Demography* 44(4), 821-828.

Wallis, Claudia, 2004. "The Case for Staying Home." *Time Magazine*, March 22, p. 50.

Williams, Joan, Jessica Manvell and Stephanie Bornstein, 2006. "'Opt-Out' or Pushed Out?: How the Press Covers Work/Family Conflict. The Untold Story of Why Women Leave the Workforce." Working Paper, Work Life Law, UC Hastings College of Law.

Table 1 – Descriptive Statistics by Education Level

	Total (1)	College (2)	Less than College (3)	(2)-(3)
COLLEGEGRAD	0.32	-	-	
LFP	0.13	0.13	0.13	0.00
RACE	0.90	0.93	0.88	0.05
OWNWAGE	16.30	25.53	11.99	13.54***
SPWAGE	28.19	37.81	23.71	14.10***
PREBIRTH_EXP	418.22	511.56	374.66	136.90***
AGE_FIRSTBIRTH	27.03	29.42	25.91	3.51***
TWOKIDS	0.64	0.68	0.63	0.05
SECONDBIRTH_INSAMPLE	0.40	0.42	0.39	0.03
MOM_ED	11.65	12.59	11.21	1.38***
DAD_ED	11.69	12.92	11.11	1.81***
AFQT	11.96	23.95	6.37	17.58***
DOB	1960.41	1960.30	1960.46	-0.16
CHILD_DOB	1987.92	1990.22	1986.85	3.37***
Number of Women	418	133	285	-
Number of Observations	18535	5079	13456	-

Notes: *** Significant at 1%; ** Significant at 5%; * Significant at 10%.

Table 2 - Empirical Hazard Rates

PANEL A **Non-Employment to Employment**

Week	Total	College	Less than College
1	0.001	0.000	0.014
5	0.038	0.044	0.035
10	0.048	0.061	0.041
15	0.053	0.069	0.046
20	0.045	0.063	0.039
25	0.006	0.000	0.009
30	0.007	0.028	0.009
35	0.000	0.000	0.000
40	0.015	0.032	0.010
45	0.000	0.000	0.000
52	0.000	0.000	0.000
60	0.010	0.000	0.013
70	0.011	0.000	0.014
80	0.000	0.000	0.000
156	0.000	0.000	0.000

PANEL B **Non-Employment to Part-time or Full-time Employment**

Week	Total Part-time	Total Full-time	College Part-time	College Full-time	Less than College Part-time	Less than College Full-time
1	0.000	0.007	0.000	0.000	0.000	0.011
5	0.008	0.027	0.017	0.025	0.004	0.028
10	0.000	0.048	0.000	0.061	0.000	0.041
15	0.018	0.035	0.028	0.042	0.013	0.033
20	0.006	0.034	0.000	0.063	0.008	0.023
25	0.000	0.000	0.000	0.000	0.000	0.000
30	0.000	0.007	0.000	0.000	0.000	0.009
35	0.000	0.000	0.000	0.000	0.000	0.000
40	0.008	0.008	0.032	0.000	0.000	0.010
45	0.000	0.000	0.000	0.000	0.000	0.000
52	0.000	0.000	0.000	0.000	0.000	0.000
60	0.000	0.000	0.000	0.000	0.000	0.000
70	0.000	0.011	0.000	0.000	0.000	0.014
80	0.000	0.000	0.000	0.000	0.000	0.000
156	0.000	0.000	0.000	0.000	0.000	0.000

Table 2 – Empirical Hazard Rates (Cont.)

PANEL C	**Non-Employment to the Same Occupation or to a Different Occupation**					
Week	Total Same Occup.	Total Different Occup.	College Same Occup.	College Different Occup.	Less than College Same Occup.	Less than College Different Occup.
1	0.010	0.000	0.000	0.000	0.014	0.000
5	0.024	0.013	0.034	0.009	0.020	0.016
10	0.048	0.000	0.061	0.000	0.041	0.000
15	0.040	0.013	0.056	0.014	0.033	0.013
20	0.034	0.011	0.063	0.000	0.023	0.016
25	0.000	0.000	0.000	0.000	0.000	0.000
30	0.000	0.007	0.000	0.000	0.000	0.009
35	0.000	0.000	0.000	0.000	0.000	0.000
40	0.008	0.008	0.032	0.000	0.000	0.010
45	0.000	0.000	0.000	0.000	0.000	0.000
52	0.000	0.000	0.000	0.000	0.000	0.000
60	0.000	0.000	0.000	0.000	0.000	0.000
70	0.000	0.011	0.000	0.000	0.000	0.014
80	0.000	0.000	0.000	0.000	0.000	0.000
156	0.000	0.000	0.000	0.000	0.000	0.000

Table 3 – Descriptive Statistics for Two-State Hazard Model

PANEL A	**Non-Employed (Percentage of Women)**		
Week	Total	College	Less than College
0	100.00	100.00	100.00
10	70.10	74.44	68.07
20	42.34	36.09	45.26
30	35.41	27.07	39.30
40	31.34	22.56	35.44
52	26.56	18.80	30.18
60	24.16	18.05	27.02
70	21.29	14.29	24.56
80	20.33	13.53	23.51
90	18.42	13.53	20.70
104	16.51	13.53	17.89
110	16.51	13.53	17.89
120	15.07	13.53	15.79
130	14.11	13.53	14.39
140	13.16	12.78	13.33
156	12.68	12.78	12.63

PANEL B	***Percentiles (Number of Weeks)***			
	90	**75**	**50**	**25**
Total	5.37	9.52	17.81	61.50
College	4.60	9.75	16.33	32.83
Less than College	6.00	9.52	19.57	72.50

Table 4 - Two-State (Non-Employment to Employment) Survival Regression (Logit) Results

	Without Unobserved Heterogeneity		**With Unobserved Heterogeneity**	
	(1)	(2)	(3)	(4)
COLLEGEGRAD	0.323**	1.382	0.339**	1.404
	(0.133)		(0.162)	
SPWAGE	-0.007**	0.993	-0.008*	0.992
	(0.003)		(0.004)	
OWNWAGE	0.008	1.008	0.009	1.009
	(0.007)		(0.006)	
PREBIRTH_EXP	0.002***	1.002	0.002**	1.002
	(0.001)		(0.001)	
RACE	-0.188	0.829	-0.183	0.833
	(0.165)		(0.220)	
TWOKIDS	0.231*	1.259	0.260*	1.297
	(0.121)		(0.148)	
AGE_FIRSTBIRTH	-0.045	0.956	-0.052	0.949
	(0.111)		(0.128)	
SECONDBIRTH_INSAMPLE	-2.565***	0.077	2.834***	0.059
	(0.333)		(0.672)	
MOM_ED	0.007	1.007	0.001	1.001
	(0.025)		(0.033)	
DAD_ED	-0.004	0.996	-0.000	1.000
	(0.019)		(0.025)	
DOB	0.041	1.041	0.042	1.042
	(0.110)		(0.129)	
AFQT	0.001	1.001	0.001	1.001
	(0.002)		(0.003)	
CHILD_DOB	-0.057	0.943	-0.058	0.944
	(0.111)		(0.128)	
LOGD	2.447***	11.560	2.369***	10.680
	(0.598)		(0.581)	
LOGD2	-0.880***	0.415	-0.816***	0.442
	(0.234)		(0.266)	
LOGD3	0.080***	1.084	0.074**	1.077
	(0.028)		(0.032)	
Number of Women	418		418	
Number of Observations	18535		18535	

Notes: Columns 2 and 4 present the odds ratios of corresponding coefficients in columns 1 and 3. Robust standard errors are in parentheses. *** Significant at 1%; ** Significant at 5%; * Significant at 10%.

Table 5 – Descriptive Statistics for Three-State Competing Risks Models

PANEL A
PART-TIME/FULL-TIME

Percentage of Women who Transitioned into Employment	**Full-time**	**Part-time**
Total	75.60	24.40
College	71.96	28.04
Less than College	77.29	22.71

Median Number of Weeks Before Transitioning into Employment	**Full-time**	**Part-time**
Total	11.00	32.00
College	12.00	19.00
Less than College	11.00	36.50

PANEL B
SAME/DIFFERENT OCCUPATIONS

Percentage of Women who Transitioned into Employment	**Same Occupation**	**Different Occupation**
Total	65.12	34.88
College	68.10	31.82
Less than College	63.81	36.19

Median Number of Weeks Before Transitioning into Employment	**Same Occupation**	**Different Occupation**
Total	11.00	32.50
College	12.00	20.00
Less than College	11.00	43.00

Table 6–Three-State (Non-Employment to Part-time or Full-Time Employment and Non-Employment to the Same Occupation or to a Different Occupation) Multinomial Logit Survival Regression Results: Education

PANEL A	**Part-Time Employment**		**Full-Time Employment**	
	(1)	(2)	(3)	(4)
COLLEGEGRAD	0.734**	2.084	0.252	1.286
	(0.294)		(0.163)	
Number of Women	418		418	
Number of Observations	18535		18535	
PANEL B	**Same Occupation**		**Different Occupation**	
	(1)	(2)	(3)	(4)
COLLEGEGRAD	0.320*	1.377	0.387	1.472
	(0.167)		(0.240)	
Number of Women	418		418	
Number of Observations	18535		18535	

Notes: Columns 2 and 4 present the odds ratios of corresponding coefficients in columns 1 and 3. Results for the additional covariates presented in Appendix Tables A1 and A2 for Panels A and B, respectively. Robust standard errors are in parentheses. *** Significant at 1%; ** Significant at 5%; * Significant at 10%.

Figure 1 – Predicted Hazard Functions by Education for Transitions from the Non-Employment State to the Employment State (Without Unobserved Heterogeneity)

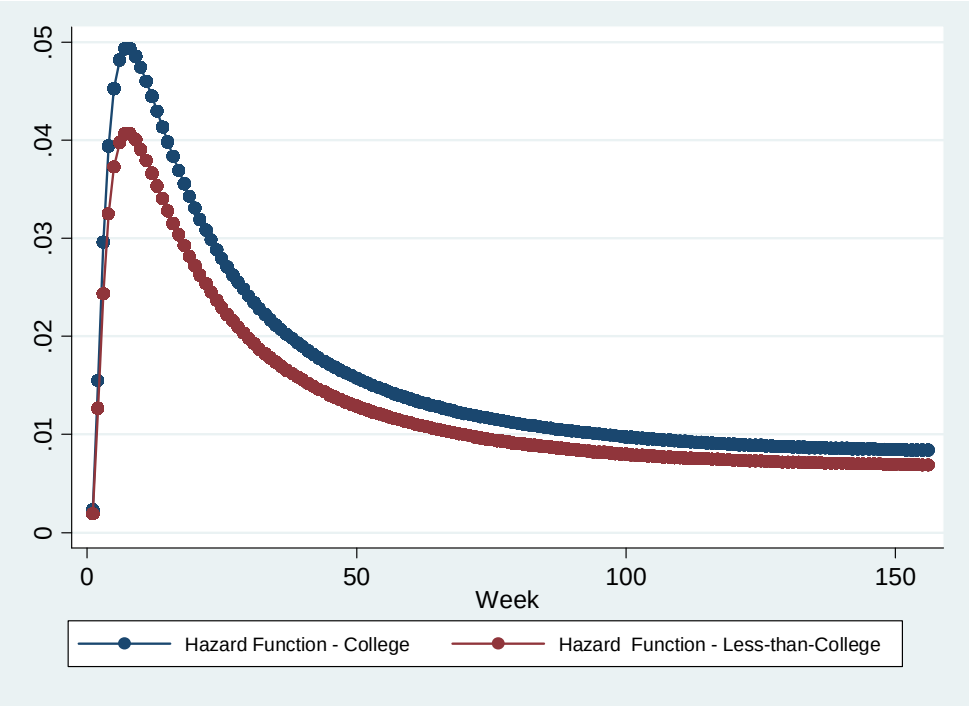


Figure 2– Predicted Hazard Functions by Education for Transitions from the Non-Employment State to the Employment State (With Unobserved Heterogeneity)

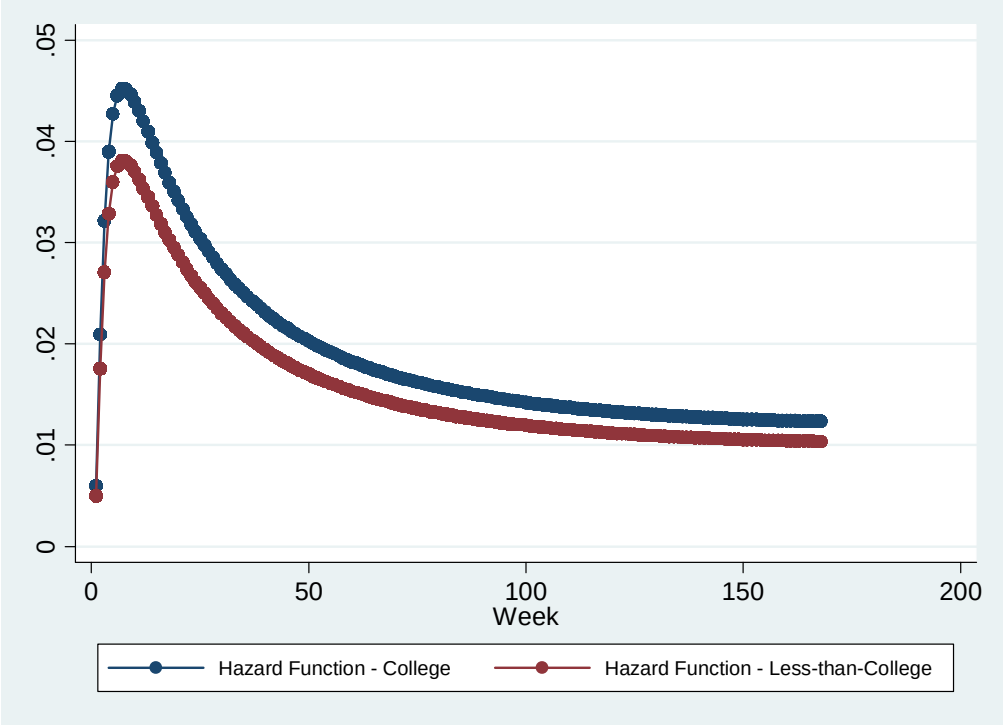


Figure 3 – Predicted Survival Function by Education (Without Unobserved Heterogeneity)

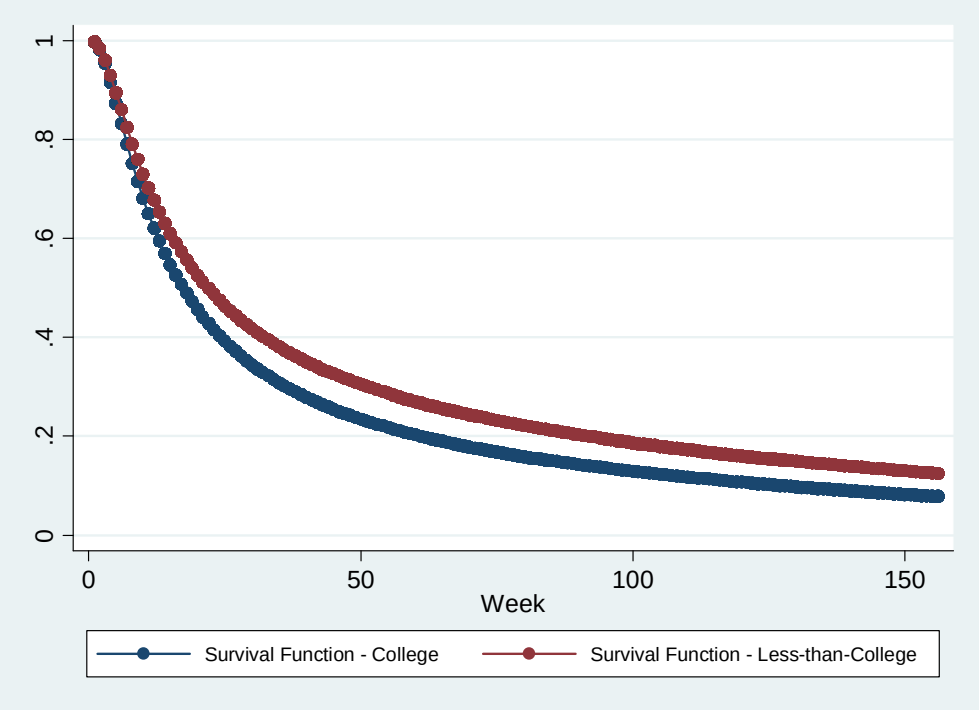


Figure 4 – Survival Function by Education (With Unobserved Heterogeneity)

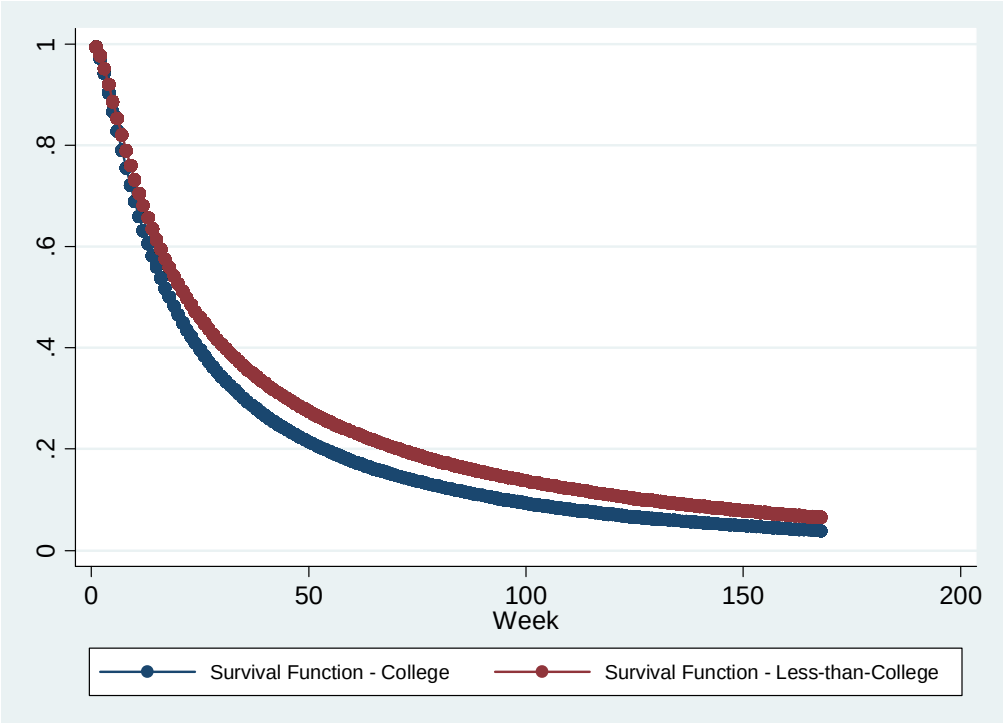


Figure 5 – Predicted Hazard Function for Transitions from the Non-Employment State to Part-time or Full-time Employment by Education

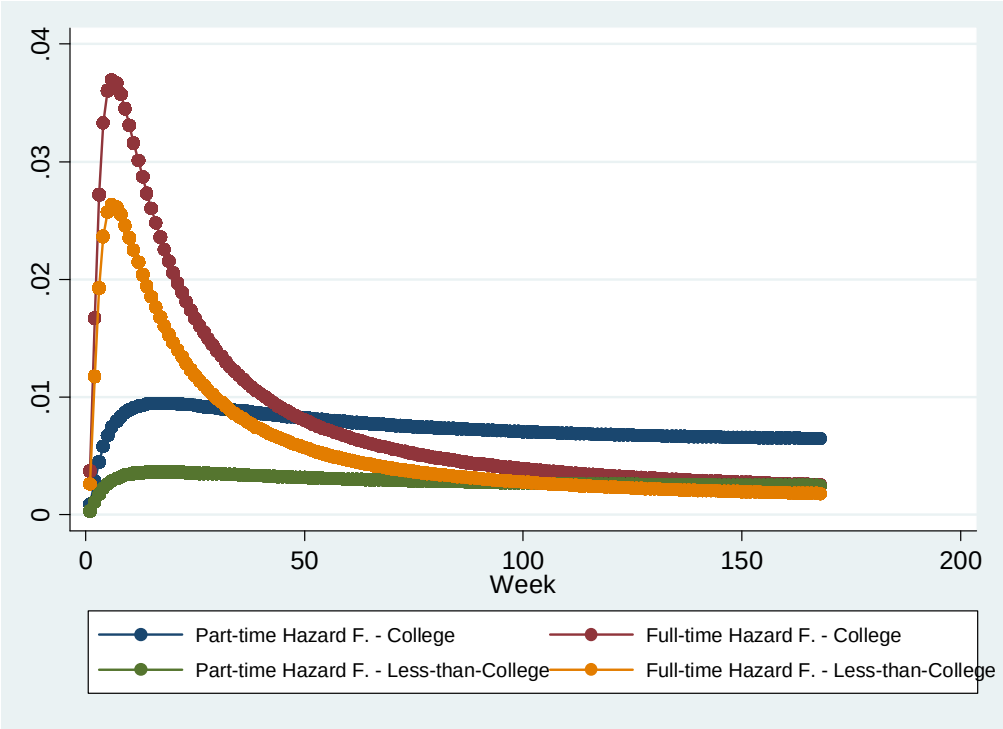
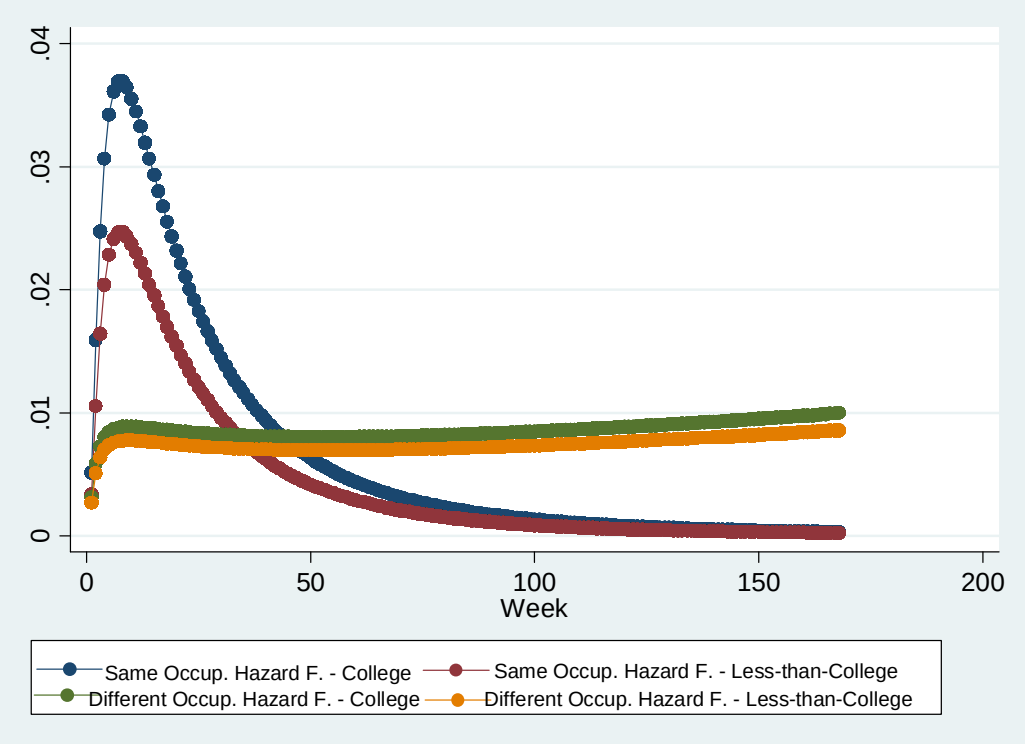


Figure 6 – Predicted Hazard Function for Transitions from the Non-Employment to the Same Occupation or to a Different Occupation by Education



APPENDIX TABLES

Table A1 - Three-State Competing Risks Model Results from Multinomial Logit Survival Regressions: Non-Employment to Part-time or Full-time Employment (Additional Covariates)

	Part-Time Employment		**Full-Time Employment**	
	(1)	(2)	(3)	(4)
SPWAGE	-0.006	0.994	-0.007*	0.993
	(0.004)		(0.004)	
OWNWAGE	0.020**	1.020	0.005	1.005
	(0.009)		(0.007)	
PREBIRTH_EXP	0.002	1.002	0.002**	1.002
	(0.002)		(0.001)	
RACE	-0.196	0.822	-0.145	0.865
	(0.364)		(0.209)	
TWOKIDS	0.463*	1.589	0.125	1.133
	(0.257)		(0.140)	
AGE_FIRSTBIRTH	-0.272	0.762	0.109	1.115
	(0.240)		(0.132)	
SECONDBIRTH_INSAMPLE	-2.749***	0.064	-2.794***	0.061
	(0.624)		(0.507)	
MOM_ED	0.009	1.009	0.010	1.010
	(0.066)		(0.029)	
DAD_ED	0.028	1.028	-0.018	0.982
	(0.046)		(0.023)	
DOB	-0.258	0.773	0.236*	1.266
	(0.248)		(0.132)	
AFQT	-0.005	0.995	0.002	1.002
	(0.005)		(0.003)	
CHILD_DOB	0.160	1.173	-0.209	0.812
	(0.236)		(0.132)	
LOGD	2.035**	7.652	2.860***	17.460
	(1.032)		(0.807)	
LOGD2	-0.547	0.579	-1.026***	0.358
	(0.408)		(0.327)	
LOGD3	0.044	1.045	0.089**	1.093
	(0.049)		(0.041)	
Number of Women	418		418	
Number of Observations	18535		18535	

Notes: Results for education presented in Panel A of Table 6. Columns 2 and 4 present the odds ratios of corresponding coefficients in columns 1 and 3. Robust standard errors are in parentheses. *** Significant at 1%; ** Significant at 5%; * Significant at 10%.

Table A2 - Three-State Competing Risks Model Results from Multinomial Logit Survival Regressions: Non-Employment to the Same Occupation or to a Different Occupation (Additional Covariates)

	Same Occupation		**Different Occupation**	
	(1)	(2)	(3)	(4)
SPWAGE	-0.002**	0.998	-0.009**	0.991
	(0.004)		(0.004)	
OWNWAGE	0.000	1.000	0.009	1.009
	(0.001)		(0.007)	
PREBIRTH_EXP	0.001	1.001	0.002**	1.002
	(0.001)		(0.001)	
RACE	-0.521	0.594	-0.013	0.987
	(0.343)		(0.203)	
TWOKIDS	0.216	1.241	0.229	1.258
	(0.206)		(0.149)	
AGE_FIRSTBIRTH	-0.365*	0.694	0.134	1.144
	(0.191)		(0.137)	
SECONDBIRTH_INSAMPLE	-2.291***	0.101	-2.901***	0.055
	(0.434)		(0.571)	
MOM_ED	0.014	1.014	-0.001	0.999
	(0.049)		(0.031)	
DAD_ED	-0.029	1.030	-0.019	0.982
	(0.033)		(0.024)	
DOB	-0.338*	0.713	0.242*	1.274
	(0.195)		(0.142)	
AFQT	0.002	1.002	0.000	1.000
	(0.004)		(0.003)	
CHILD_DOB	0.263	1.300	-0.229	0.795
	(0.191)		(0.141)	
LOGD	0.343	1.409	2.012***	7.477
	(0.286)		(0.352)	
LOGD2	-0.050	0.951	-0.500***	0.607
	(0.050)		(0.070)	
Number of Women	418		418	
Number of Observations	18535		18535	

Notes: Results for education presented in Panel A of Table 6. Columns 2 and 4 present the odds ratios of corresponding coefficients in columns 1 and 3. Robust standard errors are in parentheses. *** Significant at 1%; ** Significant at 5%; * Significant at 10%.