The Accumulation of (Dis)advantage: Post-marital Wage Trajectories over Men and Women's Life Course *

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* Manuscript prepared for the 2014 Annual Meeting of the Population Association of America.

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Abstract

For a long time, sociologists have examined the wage effect of marriage. Yet, they largely focus on a summary comparison between wages earned by the married and the unmarried with a single estimate, glossing over the variation in the wage effect of marriage across post-marital years. This paper extends this literature by examining men and women's post-marital wage trajectories under the life course perspective. Applying fixed-effect models to 100,848 person-year observations of the NLSY79 data, I found that (1) marriage is associated with faster wage growth for men, yet slower wage growth for women; (2) the cumulative effects of marriage on men and women's post-marital wage trajectory are driven by different factors: the positive association between marriage and wage growth for men is mainly attributable (by at least 44%) to their increased participation in productivity-enhancing work experience, while the negative association between marriage and wage growth for women is mainly attributable (by at least 41%) to childbearing. Taken together, my findings suggest that studying the wage effect of marriage from the static perspective may obscure the dynamic process through which the effect accumulates gradually, as well as the important gender difference in the mechanisms driving such accumulation process.

1. Introduction

For a long time, the sociological literature has examined the gender difference in the wage effect of marriage. The dominant view in this field is that marriage is associated with a significant wage premium for men, yet a much smaller wage premium, or even a wage penalty for women (Budig and England 2001; Chun and Lee 2001; Killewald and Gough 2013). Some of these works attribute the gender differences in the wage effect marriage to household specialization (Becker 1985, 1991; Chun and Lee 2001; Korenman and Neumark 1991; Waite 1995). Some others argued that married men earn higher wages because they are better motivated at work (Becker 1985; Gorman 2000; Korenman and Neumark 1991; Mincer and Ofek 1982; Pollmann-Schult 2011), whereas married women earn lower wages because they are more oriented towards the family and are less motivated at work (Drobnič, Blossfeld, and Rohwer 1999). In general, this line of works largely focuses on a summary comparison between the levels of wage earned by the married and the unmarried with a single estimate, glossing over the temporal variation in the wage effect of marriage across post-marital years. For simplicity, I will call this approach the *static perspective*.

One important limitation of the static perspective, I contend, is its ignorance of the simple but fundamental fact that the transition into marriage marks the beginning of a long-term life course experience. Marriage should be seen, not as a one-time event, but as a major turning point that shapes the individual's trajectory in subsequent years. As such, the wage effect of marriage may occur not instantaneously, but rather through a cumulative process that unfolds slowly over the life course. Hence, there is no reason to posit that the size of the wage effect of marriage remains unchanged over post-marital

years. To fully understand the potential temporal heterogeneity in the wage effect of marriage, it is necessary that the sociological literature on this matter supplement the static perspective with a long-term, dynamic and life course perspective.

Essential to the life course perspective, and also of great significance to theories of marriage and family, is the *cumulative process* through which marriage influences individuals' experiences and earnings. If, as the specialization theory believes, the husband and wife decide to specialize in time allocation between market and domestic activities, they may continuously do so in post-marital years. As a result, the husband (wife) may experience a growing amount of wage gains (losses) over post-marital years. Also, the longer a couple stay in their marriage, the more likely they are to have children, and given the well-documented motherhood penalty and fatherhood premium especially for married couples, it is reasonable to expect the increasing likelihood of childbearing to accelerate the husband's wage growth yet limit the wife's wage growth. The life course perspective will explicitly incorporate such long-term, cumulative, dynamic nature of these proposed mechanisms into the analysis. And ultimately, under this perspective, it is possible to discern not only how much marriage matters, but also through what specific processes does the wage effect of marriage accumulate over time.

More broadly, examining the cumulative effect of marriage on post-marital wage trajectories will advance sociological understandings of the maintenance and reproduction of gender inequality over the life course, a macro-level phenomenon that has drawn growing attention from recent stratification research (Bielby and Bielby 1992; Blau and Ferber 1992; Fernandez-Mateo 2009; Marini 1989; Noonan, Corcoran, and Courant 2005; Tomaskovic-Devey and Skaggs 2002; Corcoran, and Courant 1993). If, as

I will confirm later with empirical evidence, men accumulate wage gains and women accumulate wage losses gradually over their post-marital years, the gender wage gap will thus widen from year to year. Thus, marriage can work as a microlevel mechanism that reproduces the macrolevel gender inequality over the individual life course. This further implies that the recent two decades of rising age at first marriage in the American society may have worked to narrow the overall gender wage gap in the population.

Meanwhile, investigation into the life course variation of the wage effect of marriage is also triggered by methodological concerns. The temporal variation of the wage effect of marriage may render the estimated average wage premium or penalty sensitive to the time window of post-marital years that the sample covers. To illustrate, suppose men's marriage wage premium increases over years of marriage. Then, one study that uses a sample covering married men up to their first three years of marriage may yield a substantially smaller wage premium than another study that uses a sample covering married men up to ten years of marriage – not because individuals in the former study actually benefit less from marriage than individuals in the latter do, but rather because these two studies cover samples that differ in the time window of years of marriage. Therefore, overlooking the temporal heterogeneity in the wage effect of marriage may put the researcher at the peril of ignoring the sample compositional differences as an important source of differences between empirical findings.

Finally, studying the cumulative wage effect of marriage has several practical implications. From the individual's viewpoint, the pattern by which the wage effect of marriage varies over years of marriage may alter the individual's incentives for marriage timing (Loughran and Zissimopoulos 2009). For example, if the wage costs of marriage

for women increases over years of marriage, there will be benefits for women's career advancement and earnings if they get married later, and this could be a reason why some women nowadays "rationally" choose to delay their marriage for the benefits of their careers. From the policy-maker's viewpoint, because my investigation of the cumulative wage effect of marriage will ultimately identify the relative importance of various specific mechanisms in explaining married women's accumulation of wage disadvantage, policy makers can draw on these results to design more effective policies so as to improve the overall career development and economic standings of married women.

Motivated by these broad theoretical, methodological, and practical interests, this study reconsiders the wage effect of marriage by examining the changes in men and women's post-marital wage trajectories. I conduct empirical analysis on two levels. First, I examine the *total* effect of marriage on post-marital wage trajectories for men and women, without controls for possible mediating variables. Second, I investigate the extent to which this total effect can be explained by the mechanism of childbearing and work experience. By applying fixed-effect models to the male and female sample of the NLSY79 data separately, I find that marriage is associated with faster wage growth for men yet slower wage growth for women. Further, by conservative estimates, the cumulative effects of marriage on men and women's post-marital wage trajectory are driven by different factors: the positive association between marriage and wage growth for men is mainly attributable (by at least 44%) to their increased participation in productivity-enhancing work experience, while the negative association between marriage and wage growth for women is mainly attributable (by at least 41%) to childbearing and motherhood penalty.

2. From the Static to the Life Course Perspective

Prior research typically studies the wage effect of marriage by comparing the wage earned by those who are married and unmarried of similar demographic and educational background (e.g. OLS regression estimator), or by comparing the wages of the same person when the person is married and when the person is single (e.g. the fixed-effect estimator). For simplicity, I call this perspective the "static perspective," because they either assume that the wage effect of marriage is uniformly distributed over a person's post-marital years, or marginalize the temporal variation in this wage effect into an average measure. Figure 1 illustrates the static perspective with the case for men. The horizontal axis is years of labor market experience, and the vertical axis is wage. The vertical straight line indicates the point at which the person gets married. The solid line plots the wage trajectory if the person had remained single, and the dashed line plots the wage trajectory after the person got married under the static perspective. As the figure shows, being married moves the person's wage trajectory upward to a higher position. Yet, since the static perspective assumes the wage effect of marriage to be invariant over time, the wage trajectories of being married and being single are *parallel* to each other, resulting in a *constant* wage advantage of being married over being single.

[Figure 1]

The static perspective typically glosses individuals who have experienced different years of marriage together under the category of "the married," ignoring the *temporal* variations of the wage effect of marriage in post-marital years. From the life course perspective, however, the effect of marriage on wage is the result of the long-term, dynamic interactions between marriage, family transitions, and work history, and labor

market institutions (Elder, Johnson, and Crosnoe 2003; Shanahan 2008; Warren, Sheridan, and Hauser 2002). Thus, ignoring the temporal variation in the wage effect of marriage may obscure the important cumulative process through which marriage shapes the entire trajectory of the life course. In keeping with this argument, this study supplements the static perspective with the life course perspective that explicitly accounts for the heterogeneity in the wage effect of marriage over the life course. Figure 1 also illustrates the contrast between the life course perspective and the static perspective. The dotted line demonstrates the wage trajectory for being married under the life course perspective. The line moves upwards upon getting married, yet by a smaller amount than that of the static perspective. However, the wage trajectory has a steeper slope for being married than being single. As a result, the wage gap between the married and the single widens over years of marriage. That is, married men's wage advantage accumulates gradually over their post-marital years.

Of course, the cumulative wage effect of marriage has not gone completely overlooked in existing research. Kenny (1983) used retrospective data and found that men experience higher wage growth in their married months compared to their unmarried months. Later, noting that prospective longitudinal data is better suited for studying this subject, Korenman and Neumark (1991) analyzed the National Longitudinal Survey of Young Men and found that marriage premium arises slowly over time as a result of faster wage growth for married men relative to unmarried men. More recently, Dougherty (2006) studied the effect of marriage up to ten years after marriage and found that the marriage premium for males peaks about five years after marriage and then remained stable, while the marriage premium for females peaks only two years after marriage and

then starts to decline. The study by Loughran and Zissimopoulos (2009) confirmed the findings that marriage lowers the rate of wage growth for women, yet suggested that marriage lowers the wage growth of men as well.

Building on this line of inquiry, this study brings two new contributions. First, I emphasize that the wage effect of marriage should be studied within the context of individuals' work and family life (Elder 1985; Mayer 2009). Thus, not only will I estimate the total effect of marriage, but also I will bring in various dimensions of detailed, individual-level, dynamic measures of work experience and childbearing as potential mechanisms to explain the wage effect of marriage. Second, while prior works have mentioned the potential gender differences in the specific underlying mechanisms for explaining the cumulative wage effect of marriage, they have yet to provide a systematic assessment of the relative contributions of these mechanisms. This study, instead, will draw on estimation from several fixed-effect models to quantify the contributions of different mechanisms to the overall accumulation of wage (dis)advantage over the life course. In making such quantitative assessment for men and women respectively, I will depict a comprehensive picture of the gender differences not only in the pattern, but also in the underlying sources, of the cumulative wage effect of marriage.

3. Theories and Hypotheses

3.1 The Total Effect of Marriage

I start with theories and hypotheses on the total effect of marriage on the post-marital wage trajectories for men and women. Prior literature has proposed a number of pathways through which men may receive wage gains while women may incur wage

losses due to marriage. The specialization theory posits that for the benefit of the whole family, married men specialize in market activities and married women specialize in non-market activities (Becker 1985, 1991; Hersch and Stratton 2000; Korenman and Neumark 1991). The work effort argument states that married men put more efforts into work so as to meet the obligations to other family members, while married women do the opposite (Gorman 2000; Pollmann-Schult 2011). Employer discrimination literature argues that employers may perceive married men as more reliable, therefore, married men are more likely to get promotions and pay rises (Coverman 1983; Loh 1996). Through all these pathways, men are expected to receive positive wage returns on marriage, while women are expected to receive lower or even negative wage returns on marriage. And more importantly, because it may take a substantial span of time for these effects to materialize, I expect the wage effects of marriage to increase over time for men, and decrease over time for women. If the wage effects of marriage increases with time, this will be reflected in the positive association between marriage and wage growth in subsequent years, and vice versa. Thus, I state the following *Hypothesis 1*:

> ***Hypothesis 1 (total effect):*** *Marriage is associated with a higher rate of wage growth for men and a lower rate of wage growth for women.*

3.2 Potential Mechanisms

Next, I will bring in life experiences in the work and family domains to explain the cumulative wage effects of marriage on post-marital wage trajectories. In particular, this paper will discuss two prominent mechanisms: childbearing and work experience.

First, marriage may affect wage attainment through the affecting the likelihood of childbearing. Married individuals are more likely to have children than unmarried individuals and the likelihood of having a child increases with years of marriage. Childbearing may affect men and women's wages in several ways. First, having a child significantly increases the demand for unpaid household labor, and according to specialization theory, the responsibility to meet this demand within the family usually falls on the shoulder of the mother. Since mothers allocate more efforts and energy to child-care as opposed to lucrative activities, women likely incur wage penalties for motherhood (Budig and England 2001; Budig and Hodges 2010; Correll, Benard, and Paik 2007; Gough and Noonan 2013; Hochschild and Machung 1989). Being a father, on the contrary, raises the man's sense of responsibility as a breadwinner, gives him greater incentive to invest in productivity-enhancing human capital, and makes him perceived as more reliable by the employer. Thus, childbearing could increase the wage that men receive from work (Glauber 2008; Hodges and Budig 2010; Killewald 2013). Second, as the role strain theory predicts, with the presence of children in the household, the intense demand of energy from both work and non-work realms at the same time could lead to psychological strain for individuals (Glavin, Schieman, and Reid 2011; Goode 1960; Grzywacz 2000), and such psychological strain could cause substantial reduction in the labor-market productivity of the working mothers, who are considered the primary care-giver of the child by social norms. Third, given the persistence of discrimination by the employer in the workplace, working mothers are considered as less productive and paid less even if they have proved their competence and commitment at work (Benard and Correll 2010; Correll et al. 2007). To the extent that all these factors, take effect gradually

over time, we expect childbearing to accelerate the husband's wage growth yet impede the wife's wage growth (Dougherty 2006; Gangl and Ziefle 2009; Percheski and Wildeman 2008). Therefore, childbearing may mediate the positive effect of marriage on men's wage growth and the negative effect of marriage on women's wage growth, as I state below:

> ***Hypothesis 2 (childbearing):*** *Marriage can affect wage growth through affecting childbearing. Thus, controlling for childbearing will reduce the positive effect of marriage on wage growth rate for men and the negative effect of marriage on wage growth rate for women in post-marital years.*

Second, marriage could affect individuals' wage growth rate by altering their experiences in the labor market from year to year in several ways. First, marriage may affect individuals' labor market attachment, which then translates into their changes in wages and wage growth. Prior literature suggested that married men have stronger motivations at work, engage in more human capital investment and accumulation, attach more closely to the workplace, and stay in the same job for a longer period of time (Becker 1985; Gorman 2000; Killewald and Gough 2013; Korenman and Neumark 1991; Mincer and Ofek 1982; Pollmann-Schult 2011). On the contrary, getting married makes women allocate more time and energy in domestic labor and less to wage-earning market activities, they demonstrate lower levels labor market attachment and efforts at work (Drobnič et al. 1999). Second, from the long-term perspective, being repeatedly and continuously out of work could be associated with particularly large negative effects on earnings (Gregg and Tominey 2005). Therefore, if married women stay unemployed for a

longer period or spend more time out of the labor force work than unmarried women, they are likely to experience greater wage losses from lack of labor market attachment over their lives. Married men, on the other hand, may search for new jobs more intensely than unmarried men, and thus are less likely to incur continuous, long-duration unemployment. As a result, they are expected to have faster wage growth over time than unmarried men. Third, since different jobs differ substantially in terms of potential earnings, the dynamic pattern of within-person job mobility may result in temporal changes in a person's wage from year to year (Mouw and Kalleberg 2010). Specifically, marriage may induce men to move to more lucrative occupations (Pollmann-Schult 2011), while it may limit women's opportunities for upward career mobility or cause them to "rationally" give up better job opportunities in exchange of more flexible work-family compatibility (England 2005). To the extent that one's work experience unfolds gradually over the life course, it may mediate the cumulative effect of marriage on wages. Therefore, I expect controlling for work experience to reduce the total effect of marriage on men and women's wage growth, as I state in the following:

> ***Hypothesis 3 (work experience):*** *Marriage can affect wage growth through affecting work experience. Thus, controlling for measured work experience will reduce the positive effect of marriage on wage growth rate for men and the negative effect of marriage on wage growth rate for women in post-marital years.*

Certainly, it is not reasonable to assume that the impacts of the above two mechanisms are independent and separable. In fact, it is well-recognized that childbearing may affect wages via affecting individuals' labor market attachment. For

example, since having a child increases the demand for domestic labor, the specialization theory will predict an increase in men's labor supply and a decrease in women's labor supply following childbearing (Becker 1991; Killewald and Gough 2013). In addition, changes in work experience may precede transition into parenthood: some women, anticipating the earnings cost of having a child in the future, may internalize these potential obstacles in earnings growth and choose jobs with lower earnings or flatter earnings trajectories even before having a child (Miller 2011). Noting this, in my later analysis, I will obtain (1) the raw effect of each mechanism without partialling out the other mechanism, and (2) the partial effect of each mechanism with the effect of the other mechanism ruled out. These two effects will give me the leverage to discern the degree to which the effects of the two mechanisms overlap with each other, as well as to draw a reasonable *range* for the contribution of each mechanism.

4. Data and Methods

4.1 Data

To analyze post-marital wage trajectories, a longitudinal dataset that contains within-individual repeated measures on work history and family transitions is needed. The National Longitudinal Survey of Youth 1979 data (NLSY79 hereinafter) fits well with the purpose of this study, as it follows a nationally representative sample of 12,686 young people aged 14 to 22 when they were first surveyed in 1979. These individuals were interviewed annually through 1994 and on a biennial basis thereafter. The NLSY79 dataset provides rich information about the year-to-year variations of individual family transitions, work experiences, and wage trajectories, and has thus been chosen by many

prior works to examine the association between family transitions and labor market outcomes (e.g. Budig and England 2001; Hodges and Budig 2010; Killewald and Gough 2013; Killewald 2013; Loughran and Zissimopoulos 2009). My analysis draws on all currently available waves (1979-2010) of the NLSY79 data. The sample is weighted in all analyses below.

4.2 Measures

Wage. The key dependent variable is the logarithm of hourly wage of the individual's current/most recent job, which is adjusted to 1999 dollars according to the national-level Consumer Price Index.[1] Log hourly wage is preferred to annual earnings, because unlike annual earnings, hourly wage is not affected by the total hours worked by the individual and thus is a better measure of the economic return that the individual receives for one hour of labor that he or she provides (Killewald and Gough 2013). The major advantage of taking the log transformation of wage is that the change in log hourly wage from year *t-1* to year *t* directly reflects the *percentage change* in earnings over one year. I code the individual's wage as missing if he or she is not working at the time. The fixed-effect models to be used in this study are flexible with these missing values and unbalanced data between different individuals. In auxiliary analysis not reported, I conducted my analysis with imputed missing wages using the person's wage record in the past three years, and the results are not changed.

Marital status. I categorize marital status by four mutually exclusive groups: (1) never-married and living singly (referred to as "single" hereinafter); (2) cohabiting; (3) married and spouse present in the household, (4) other (including divorced, widowed or separated). For missing observations on marital status, I impute the individual's marital

status at the current period using the record of marital status in the previous record.

Years of marriage. To capture the long-run effect of marriage on wage trajectories, I construct a key indicator termed "years of marriage." For the married person-years, this variable is calculated as current age minus the person's age at first marriage, and minus the years of gaps between marriages if the person has experienced more than one marriages. For the unmarried person-years, this variable equals zero. For example, consider a person who first got married at age 25, then got divorced at age 30. Suppose that five years after this divorce, the person re-married at age 35 and remained in this marriage thereafter. Then this person's "years of marriage" at age 40 is calculated as:

40 (current age) – 25 (age at first marriage) – 5 (between-marriage gap) = 10 years.

Meanwhile, while cohabitation is an important alternative option of union formation (Kiernan 2001; Seltzer 2000; Thornton, Axinn, and Xie 2008), this study does not look into the long-run effect of cohabitation, because the starting and ending dates of cohabitation is subject to relatively more reporting errors than the reporting for marriage history due to conceptual ambiguities (Manning and Smock 2005; Seltzer 2000).

Parenthood status. I measure the demand for child care in the household by the number of children in the household. Excluding children residing elsewhere limits my focus to the actual demand for childcare in the immediate household.

Work experience. Time-varying work experience is measured by a set of job-related variables, including the individual's tenure (in weeks) with his or her current employer, the total number of hours worked in the previous year, the number of weeks spent unemployed and out of the labor force in the previous year, and the cumulative number of weeks spent unemployed and out of the labor force in the past. Work

experiences also include time-varying dummies for individual's occupation classified using a 41-category coding scheme to capture the within-person between-occupation job mobility on wages and wage growth.[2]

Other control variables. My models also control for potential experience and its square term. Potential experience is calculated as age minus 18 for those with high school education or less, age minus 22 for those with some college education, and age minus 25 for those with college education and above. Other controlling variables include: racial categories (coded as white, black and Hispanics) and educational attainment (coded as high school and below, some college education, and college an above). In fixed-effect models, these controlling variables are interacted with potential experience.

4.3 Sample Restrictions

My analysis will focus on the part of the sample that has at least one year of potential experience (dropping 12.44% of the total person-year observations) and has non-missing wage information (dropping another 50.36% of the total person-year observations). Those who become parents before any work experience may experience different impact of marriage and childbearing from those who become parents after the individual has entered the labor market. Therefore, I exclude the respondents who have at least one child in the household before age 18, which results in the dropping of 6.74% of the total person-year observations. Finally, because the fixed-effect model identifies the effect of independent variables by their within-person variations, I keep respondents in the sample who appear at least twice in the sample, dropping an additional 5.91% of the total person-year observations. Table A1 in the Appendix gives the detailed statistics of sample restrictions. After sample restrictions, my analytic sample comes to a total of 53,151

person-year observations for men, and 46,697 person-year observations for women.

4.4 Analytic Strategy

One important challenge to estimating the wage effect of marriage is the possibility that individuals' fixed, unobserved attributes may be associated with their marital status as well as wage. Such unobserved selectivity can be netted out by fixed-effect models applied to longitudinal data, because this type of models identify the effect of marriage by comparing wages of the *same* individual when he or she is in different marital status (Dougherty 2006; Gray 1997; Killewald and Gough 2013; Korenman and Neumark 1991; Pollmann-Schult 2011). My analysis will also employ the fixed-effect model, yet, in addition to controlling for the indicator of years of labor market experience, I will extend previous static models by including years of marriage in the independent variables. Meanwhile, to account for the possibility that the effect of years of marriage on wage may vary with years of marriage, I employ the step-wise linear spline function to parameterize years of marriage. Specifically, this spline function separates years of marriage into early stage (the first five years after marriage), middle stage (six to fifteen years of marriage), and late stage (at least sixteen years after marriage). The fixed-effect models with a linear spline function of years of marriage is expressed as below:

$$
\begin{aligned}
lnW_{it} = \alpha_0 + \alpha_1 Exp_{it} + \alpha_2 Exp_{it}^2 \quad & \text{(baseline wage and wage growth)} \\
+ \textstyle\sum_{j=2}^{J} \beta_j X_{jt} \quad & \text{(adding time-varying controlling variables)} \\
+ \textstyle\sum_{k=3,4,\&5} \alpha_k D_{kt} \quad & \text{(adding marital status)} \\
+ \gamma_1 T_1 + \gamma_2 T_2 + \gamma_3 T_3 \quad & \text{(adding linear splines for years of marriage)} \\
+ \eta_i + \epsilon_{it} \, . \quad & \text{(adding fixed effects and residual)}
\end{aligned}
$$

In the above equation, the dependent variable, lnW_{it}, is log hourly wage, Exp_{it} and Exp_{it}^2 represent the linear and square term of potential experience respectively. X_{jt}'s are person-specific and time-varying variables pertaining to childbearing and work experience. Different models in my later analyses control for different sets of $X_{it}'s$. Each element in D_k (k=1,2, 3, and 4) represents a dummy for the person's marital status, with single held as the reference category. The coefficient on the dummy for the status of being married indicates the effect of being married at the point where the person first enters marriage. $T_1, T_2, and\ T_3$ represent three linear splines indicating early, middle, and late stages of marriage. The key coefficients of interest are γ_1, γ_2 and γ_3, which indicate the marginal increment in wage as an individual moves from t years of marriage to $t+1$ years of marriage for the three stages of marriage respectively. The size of the effect of years of marriage provides a measure of *how much steeper* a married person's post-marital wage trajectory will be relative to the wage trajectory if the person had remained single. A positive (negative) γ means that marriage has a positive (negative) effect on wage growth, and a zero value means that marriage has no effect on wage growth. η_i captures the effect of individual fixed attributes that remain invariant over time, which will be netted out by the within-person comparisons in fixed-effect model estimation. In all my analyses, this fixed-effect model is estimated for men and women separately.

The fixed-effect model, however, does not rule out the potential bias in estimating the wage effect of marriage due to the association between the individual's age of first marriage and the wage growth rate (Loughran and Zissimopoulos 2009). In my sensitivity analysis to be presented in Section 6, I will expand on this issue and test the robustness of my conclusions by breaking down the entire sample into sub-groups

containing individuals who got marriage at different ages.

Given this specification, I will run three sets of models for the male and female sample to test the three hypotheses laid out in Section 3. The first set of models examines the total effect of marriage by excluding time-varying controls in the equation. *Hypothesis 1* predicts that marriage associates positively (negatively) with wage growth rate for men (women), therefore, I expect $\gamma's$ to be positive for men yet negative for women. The second set of models adds controls for childbearing and the third set of models adds controls for work experience. *Hypotheses 2 and 3* predict that controlling for childbearing and work experience will reduce the positive or negative associations between marriage and wage growth for men and women, therefore, I expect to see the attenuation of the $\gamma's$ towards zero after variables of childbearing and work experience are introduced into controlling variables.

5. Results

5.1 Descriptive Statistics

Weighted descriptive statistics of the NLSY79 sample are given in Table 1. Men and women differ in their marital and parental experiences: the sample median age at first marriage is 24, and women get married at a younger age (with median 23) than men do (with median 26). Throughout the life course, a smaller share of men are married than that of women. At age 45, 21.83% of men remain never married while much less proportion of women (13.20%) are never married by then. Women live with greater number of children in the household than men consistently at age 20, 30 and 40. Men and women also differ substantially in their average hourly wage and work experiences. Men

earn higher wages than women throughout the life course, yet the hourly wage of women as a proportion of that of men decreases from 0.83 ($=e^{-0.19}$) at age 20 to about 0.69 ($=e^{-0.37}$) at age 40. On average, men have longer tenure with their employer and work more hours. Men spend slightly more weeks unemployed than women, yet the annual and cumulative weeks spent out of the labor force for women is almost twice as large as that for men.

[Table 1]

Figure 2 demonstrates Lowess-smoothed wage trajectories for different sub-group. The solid and dashed lines indicate the average log hourly wage for men and women in the total sample starting from age 24, which is the median age at first marriage in the NLSY79 sample (see Table 1). On average, men and women's wages both increase over time, yet men experienced faster wage growth than women. The next two lines plot the average log hourly wage by years of marriage for the married sub-sample. The wage trajectory of married men not only starts up at a higher level, but also increases at a faster pace than the total sample of men. To the opposite, the sub-group of married women experience a slower pace of wage growth than the total sample of women in post-marital years. Therefore, the descriptive pattern of wage trajectories is consistent with my overall expectation that married men experience faster wage growth than unmarried men and married women experience slower wage growth than unmarried women. The following model-based analysis will conduct a more systematic investigation about whether this overall pattern still holds after various individual-level attributes and experiences are controlled for.

[Figure 2]

5.2 The Total Effect of Marriage on Wage Growth

The first set of models tests the total effect of marriage on wage growth after marriage without controls for childbearing or work experience. The full results of the estimation are given in Table A2 in the Appendix, and selected coefficients on marital status and years of marriage are reported as Model M1 in Table 2. There is no significant difference in the common coefficients of the two models. For the male sample, being married is associated with a 7.9 percent wage premium relative to being single at the beginning of marriage, and this wage premium increases with years of marriage by 0.6-0.7 percent points per year after marriage. The coefficient on years of marriage is significant at middle and late stages of marriage. This result supports the prediction for men in *Hypothesis 1* that marriage increases men's rate of wage growth in subsequent years. For the female sample, married women experience an insignificant wage gain of about 1 percent relative to those who are single at the beginning of marriage. Yet, compared to single women, married women experience a *lower* wage growth rate, especially during the middle stage of marriage: compared to the annual wage growth rate for the single women, the annual wage growth rate of married women is significantly lower by 1.2 percent during the middle stage of marriage. Only during the latest stage of marriage (15 years and above) do married women start to catch up with single women, as married women experience a higher annual wage growth by about 0.7 percentage point (significant at 10% level) compared to single women during this period. Yet, given the slowing down of wage growth rate during the first fifteen years of marriage, at this rate, a woman has to stay married for more than 40 years before she could make up for the forgone wage growth during the first 15 years of marriage. Thus, overall, the findings

support the predictions for women in *Hypothesis 1* that marriage slows down women's wage growth.

[Table 2]

In the introduction section, I pointed out that failure to account for the temporal variation of the wage effect of marriage may make the estimated average wage effect of marriage sensitive to the time window of post-marital years that the sample covers. Here, let me draw on the estimations from Model M1 to illustrate this point with a numeric example. Suppose Study A uses a sample that only contains men who are single and who are married for no more than three years. For simplicity, we assume that among the married, the proportion of those who are married for 0, 1, 2, and 3 years are equal. Applying the estimates from Model M1, the average marriage wage premium among this sample is calculated to be 8.8 percent. Suppose Study B uses a sample that contains men who are single and who are married for zero, one, two…and up to fifteen years, with the sample uniformly distributed across different years of marriage. Then, by applying the same method of calculation, the average marriage wage premium in Study B is 13 percent, which is 4.2 percent higher than the estimated marriage premium from Study A. The disparity between the two results, as illustrated above, may not stem from the essential disagreement about the actual returns to marriage between the two studies, but rather comes as a natural result of the difference in the length of the time window that the two samples cover. Hence, ignoring the uneven distribution of the wage effect of marriage over the life course may lead to misinterpretation, or at least inadequate understandings, of empirical results.

For a visual illustration, the solid and dashed lines in Figure 3 (for men) and

Figure 4 (for women) demonstrate the predicted wage trajectories for the single and the married, respectively, based on the estimates from Model M1[3]. In the two figures, the X-axis is years of marriage from zero to twenty years, and the Y-axis is the predicted log hourly wage. Married men earn higher wages than single men at the beginning of their marriage, and also experience a steeper post-marital wage trajectory than the single do. Married women started off at a slightly higher wage relative to the single. However, the wage trajectory for married women in post-marital years is flatter than the wage trajectory for single women. Thus, as time goes by, the wage of single women soon surpasses the wage of married women, and the wage gap between single and married widens gradually over the life course.

[Figure 3]

[Figure 4]

To summarize, the above results support the prediction from *Hypothesis 1* that marriage affects men and women's wage growth differently: it positively affects men's post-marital wage growth, yet negatively affects women's post-marital wage growth.

5.3 Childbearing as a Mediating Mechanism

Next, I scrutinize the mediating effects of two specific mechanisms in producing the cumulative wage effect of marriage. I start with the mechanism of childbearing.

How does the number of children in the household change over years of marriage, and to what extent does this pattern differ from the pattern for those who are single? As a preliminary analysis, I use the fixed-effect model to predict the number of children in the household using a set of covariates as included in Model M1. Table A5 presents the

coefficients and Panel (a) of Figure A1 plots the predicted trajectories of married-single gaps in the number of children in the household by years of marriage for men and women respectively. Compared with the single, married people have greater number of children in the household. For both men and women, this marriage-single gap in number of children in the household increases during the early and middle stages of marriage, and decreases during the late stage of marriage.[4]

Given the significant married-single gap in the number of children in the household, and provided that parenthood brings wage benefits to men and wage losses to women, I expect the size of the total effect of marriage on wage growth to shrink after childbearing is controlled for in the model. To test this, in Model M2, I add controls for the number of children in the household to Model M1. Since specialization theory predicts that the wage effect of childbearing may vary by marital status (Budig and England 2001; Killewald and Gough 2013), we also include the interaction between the number of children in the household with dummies of marital status to capture the heterogeneous effect of childbearing by marital status. The full model is presented in Table A3. The number of children in the household associates positively with wage for single, married, and divorced men, and negatively (but with a small amount) for cohabiting men. The number of children in the household associates negatively with wage for women, and the negative effect is largest for married women. [5]

My main focus is the selected coefficients on marital status and years of marriage in Model M2, which are presented in Table 2. For men, the annual increase in marriage wage premium remains almost unchanged after controlling for childbearing. Thus, my results lend weak support to the prediction for men *Hypothesis 2*. For women, the

coefficients on years of marriage in the three stages of marriage: the negative effect of marriage on wage growth in the early stage of marriage turns positive (yet insignificant); the coefficient in the middle stage shrinks in magnitude by one third (from -0.012 to -0.008); the coefficient in the late stage shrinks by almost half (from 0.007 to 0.004) and becomes insignificant. Therefore, the findings strongly support the prediction for women in *Hypothesis 2* that controlling for childbearing will help explain away some portion of women's accumulation of relative wage disadvantage.

To present the results visually, the dash-dotted lines in the earlier-introduced Figure 2 (for men) and Figure 3 (for women) plot the predicted wage trajectories in post-marital years after childbearing has been controlled for. For men, controlling for childbearing moves the wage trajectory of the married closer to the wage trajectory of the single, yet by a very minimal amount. For women, however, controlling for childbearing causes substantial shift in the slope of the post-marital wage trajectory. This means a substantial amount of married women's accumulation of wage disadvantage in post-marital years operates through the mechanism of childbearing.

5.4 Work Experience as a Mediating Mechanism

Next, I examine the extent to which changes in post-marital work experience explain the changes in men and women's post-marital wage trajectories. In preliminary analysis, I use fixed-effect models to estimate the effects of marital status and years of marriage on the individual's time-varying work experience measured by seven indicators: job tenure, total hours worked in the year, annual number of weeks unemployed, annual number of weeks out of the labor force, cumulative number of weeks unemployed, cumulative

number of weeks out of the labor force, and the occupational mean wage. The occupational mean wage is an occupation-level indicator constructed by the following steps: first, I use data from the Current Population Survey from 1990 to 2000 to estimate a human capital wage determination equation with occupation dummies included as independent variables; second, I save the coefficient on the dummy for each occupation as the indicator of its occupational mean wage. Selected coefficients are reported in Table A4, and the results are presented visually in Penal (b)-(h) in Figure A1.[6] Overall, relative to being single, staying longer in marriage induces men to stay longer with current job, work longer hours and spend more time in the labor market. On the opposite, staying longer in marriage reduces women's amount of hours worked and increases their amount of time spent out of the labor force. In addition, during the early stage of marriage, men tend to move to higher-paying occupations, while women likely move to lower-paying occupations. In short, in post-marital years, men are likely to engage in more lucrative work activities while women are likely to participate in less lucrative work activities.

To assess the extent to which work experience explains away the effect of marriage on wage trajectories, Model M3 further adds controls for work experience to the previous Model M2. Controls for work experience include the seven time-varying indicators of work experience as described in the previous paragraph, as well as the interactions between these variables (except for the cumulative measures and occupation) with potential experience to capture the heterogeneity in their effects at different career stages. The full set of estimated coefficients is presented in Table A3. Job tenure and total hours worked positively affects wage. Hence, given married men's greater increase in job tenure and hours worked in post-marital years relative to being single (as shown in Panel

(b) of Figure A1), changes in these experience may partly explain why men experience faster wage growth in post-marital years. On the contrary, married women's substantial drop in work hours after marriage (as shown in Panel (c) of Figure A1) is likely to limit their wage growth in post-marital years. The results in Table A3 also suggest that except for the first few years of labor market experience, unemployed and out-of-the-labor-force experiences negatively affect men and women's wages, and the sizes of these effects grow over one's career. Thus, the increase in the annual number of unemployment weeks for married men (as shown in Panel (d) of Figure A1) may partly counter-act their increase in wage growth after marriage, while the increase in women's number and duration of unemployment and out-of-labor-force weeks after marriage likely lowers married women's wage growth.

My main focus is the selected coefficients on being married and years of marriage, which are reported as Model M3 in Table 2. For men, the effect of marriage on wage on the baseline reduces from 7.8 to 5.3 percentage points, which means that work experience explains away some of men's marriage premium at the baseline. The annual increase in the marriage wage premium in the middle stage of marriage reduces substantially from 0.7 to 0.2 percentage point and becomes insignificant from zero, and the coefficient in the late stage also reduces moderately from 0.7 to 0.5 percentage point and the significant level changes from 5% to 10%. Thus, the findings strongly support the prediction for men in *Hypothesis 3* that controlling for work experience explains away a substantial amount of the total effect of marriage on men's wage growth. For women, the coefficient on years of marriage increases moderately in the early and late stages of marriage, yet decreases moderately in the middle stage. Hence, once childbearing is controlled for,

work experience has no substantial impact on the effect of marriage on wage growth, which means I find little support for the prediction for women in *Hypothesis 3.*

To present the results visually, the dotted lines in Figure 3 (for men) and Figure 4 (for women) give the predicted wage trajectories in post-marital years after childbearing and work experience have both been controlled for. Controlling for work experience beyond childbearing shifts married men's wage trajectory to a lower position and a flatter slope. This suggests married men's greater participation in lucrative work activities operates as one important mechanism through which they accumulate their wage advantage over post-marital years. For women, however, controlling for work experience beyond childbearing does not make much difference to their post-marital wage trajectory, which implies that after childbearing is controlled for, work experience explains very little of married women's wage disadvantage in post-marital years.

As cautioned earlier, in the analysis above, I first controlled for childbearing (Model M2), and then controlled for work experience (Model M3). Thus, strictly speaking, the effect of work experience should be interpreted as its effect on wage *net of* the effect of childbearing. In reality, of course, it is possible that childbearing partials out some of the effect of work experience (Budig and Hodges 2010; England 2005). In auxiliary analysis, I estimate the fixed-effect model with controls for work experience but not childbearing. The results are presented as Model 2B in Table A4. Consistent with the findings from my main analysis, adding controls for work experience alone explains a substantial amount of the positive effect of years of marriage on men's wage growth. Controlling for work experience changes the coefficient on years of marriage in the early stage from -0.006 to 0.002, implying that at the early stage of marriage, changes in work

experience does operate in a way that limits women's wage growth. Yet, controlling for work experience does not change the coefficient on years of marriage during the middle or late stages of marriage. Thus, the auxiliary analysis confirms that our finding of a substantially larger explanatory power of childbearing than work experience for women is not a simple artifact of the possibility that the impacts of these two mechanisms may overlap with each other.

Finally, Table 3 summarizes the three hypotheses and the above findings with regard to whether they support these hypotheses. In short, the findings support the prediction for both men and women in *Hypothesis 1*, strongly support the prediction for women yet weakly support the prediction for men in *Hypothesis 2*, strongly support the prediction for men yet weakly support the prediction for women in *Hypothesis 3*.

[Table 3]

5.5 Quantitative Assessment of the Relative Contributions of Two Mechanisms

Section 5.2 demonstrated that because marriage accelerates men's wage growth and limits women's wage growth, married men accumulate their wage advantage, and married women accumulate their wage disadvantage over post-marital years. Section 5.3 and 5.4 tried to explain this total effect using childbearing and work experience. In the next step, I will continue my investigation with a quantitative assessment of the relative contributions of the two mechanisms to the accumulation of wage (dis)advantage for men and women.

The quantitative assessment is implemented via the following steps. First, for men and women respectively, I calculate the married-single gap in log hourly wage at the

beginning of marriage and at twenty years after marriage, under the model with no controls (M1), with controls for childbearing (M2), with controls for work experience (M2B), and with controls for childbearing and work experience (M3). Then, I calculate the predicted *changes* in married-single wage gap over the twenty years under the four models for men and women respectively. A positive change in the gap indicates a growth in the marriage wage premium over the life course, and a negative change in the gap indicates a drop in the marriage wage premium, or a growth in the marriage wage penalty over the life course. In these predictions, when I say one mechanism is "controlled for," it means that I assume this mechanism had not operated in a way that affects people's wages.

The results are presented in Figure 5. The changes in the married-single wage gap are positive for men yet negative for women. For men, when neither childbearing nor work experience is controlled for, the married-single gap in log hourly wage increases by 0.135, meaning that the wage premium of being married increases by 13.5 percentage points over the twenty years. Controlling for childbearing alone reduces the increase in men's marriage premium very slightly to 0.124, and controlling for work experience reduces it by almost a half to 0.075. When both controls are included, the increase in married-single gap in log hourly wage turns 0.061, which is less than half of that in Model M1. For women, if no controls are included, the married-single gap in log hourly wage drops by 0.115 – implying a growth of the marriage wage penalty by 11.5 percentage points – over the twenty years. Controlling for childbearing alone significantly alleviates the magnitude of the growth in married women's wage penalty to 0.045, and controlling for work experience alone reduces its magnitude to 0.075.

Controlling for both childbearing and work experience together reduces the magnitude of growth in women's marriage wage penalty to 0.028, about one quarter of the size in the model with no controls.

[Figure 5]

Finally, to represent the predictions in Figure 5 as relative proportions, I express the contributions of childbearing and work experience as a percentage of the change in married-single gap in the total effect model (i.e. Model M1). To iterate an earlier point, the impact of childbearing and work experience may overlap with each other, therefore, a more credible and comprehensive approach to present their relative contributions is to calculate their contributions both with and without the other mechanism controlled for. For example, the contributions of childbearing can be calculated either by the change from M1 to M2 (i.e. the change without work experience controlled for), or by the change from M2B to M3 (i.e. the change with work experience controlled for). As such, the two calculations will provide us with the lower and upper bounds of the contributions of the mechanism of childbearing. Similar calculations can be conducted for work experience.

The results from such quantitative assessment are given in Table 4. The relatively narrow range between the lower and upper bounds of the contributions of the two mechanisms for men indicates that there is not much overlap in the influence of childbearing and work experience on the cumulative wage effect of marriage, while the relatively wide range between the lower and upper bounds for women indicates that the two mechanisms overlaps to some substantial extent for women. As the percentages show, for men, childbearing explains *at most 11%* of the accumulation of wage advantage in the twenty years following marriage, while work experience explains *at least 44%* of this

accumulation. For women, childbearing explains *at least 41%* of the accumulation of wage disadvantage in the twenty years following marriage, while work experience explains *at most 35%*. Therefore, even by conservative measures that compares the smallest possible contribution of the dominant mechanism with the largest possible contribution of the non-dominant mechanism, I still have confidence to conclude that the total effect of marriage on post-marital wage growth is mainly attributable (by at least 44%) to changes work experience for men, yet mainly attributable (by at least 41%) to changes in childbearing for women.

[Table 4]

6. Sensitivity Analysis and Discussion of Limitations

Like all empirical investigations, my analysis relies on several assumptions. One important assumption is that there is no unobserved heterogeneity that associates simultaneously with the age at first marriage and the person's wage growth rate. Yet, in reality, individual-specific wage growth rate may be correlated with age at marriage (Loughran and Zissimopoulos 2009). For example, those who are likely to experience faster wage growth in post-marital years may choose to marry earlier. Thus, the pattern of post-marital wage trajectories may vary by groups of individuals who got married at different ages. Also, one may expect the results to be more robust among the majority of individuals who got married at the age around the population average, where the selectivity of age at first marriage is relatively moderate. As a sensitivity analysis, I separately estimate Model M1, M2, and M3 for three mutually exclusive sub-groups: those who get married before age 20, those who get married between age 20 and 30, and

those who get married after age 30, which take up 8%, 75%, and 17% of total person-year observations respectively. The results are given in Table A6. Consistent with my expectations, the results are roughly unchanged for those who got married between age 20 and 30. However, as expected, most of the coefficients are insignificant for those who got married before age 20 and after 30.

Next, I discuss three additional limitations of my analysis, with a specific focus on how they may affect my conclusions. The first limitation comes from the possibility that individuals – especially women – may optimize their wage attainment by *self-selecting* into jobs that are associated with relatively higher wage gains or lower wage cost of marriage or childbearing (Becker 1985; England 2005; Polachek 1981). In other words, individuals themselves may have already *mitigated* some of the wage cost to their via this self-selection process. As a result, my analysis may have under-estimated the negative wage effect of marriage for women: if women had not buffered against their anticipated risks of wage losses by purposefully selecting "more optimal" jobs, the negative effect of marriage on wage growth would have been even larger.

The second limitation is the lack of measures about work experiences on the finer-grained organizational level in the NLSY79 data. Some prior studies suggest that more subtle mechanisms affecting individuals' life course wage trajectories, such as workplace networks, organizational arrangement, and employer-employee relations, are likely to lie within the organizational environment and the workplace network structure (Tomaskovic-Devey, Thomas, and Johnson 2005; Tomaskovic-Devey and Skaggs 2002). Due to data limitation, many of these factors are unfortunately not accounted for in my analysis. Thus, my results may understate the impact of work experience on men and

women's wage trajectories. With either quantitative or qualitative data that incorporate these finer-grained, dynamic measures of workplace dynamics, it remains a promising area for future works to explore further on this subject.

The third limitation consists in the inability of the currently available NLSY79 data to account for individuals at their older ages, as most of the respondents have not passed age 50 in the currently available waves. Thus, my results are most informative of the effect of marriage on wage growth during early- and mid-stages of their careers and marriages. Given the variation of the pattern of post-marital wage growth by marital stages especially for women, it is reasonable to expect that marriage affects wage growth differently at older ages than at younger ages. With the continuing collection of NLSY79 data, it would be possible in the future to extend my analyses to the effect of marriage on post-marital wage trajectories at older ages.

7. Conclusions and Discussions

A long-standing topic in social stratification research is the gender inequality in wage. To understand this inequality, one needs to consider the remarkable gender differences in the impact of family transitions on wages (Gerson 1986). Needless to say, a family transition is usually not a one-time event, but rather a turning point that initiates a new, long-term stage of life. The transition into marriage, of course, is no exception. Yet, unfortunately, prior works on the wage effect of marriage have generally adopted what I, for simplicity, defined as the static perspective, overlooking the varying extents of the marriage premium or penalty over the individual's life course. To supplement the static perspective, this study reconsiders the wage effect of marriage under the long-term, dynamic, and life

course perspective. My results showed that research on family and work has much to gain by exploiting the long-term, dynamic, life course nature of the wage effect of marriage. Below, I will summarize two major findings of this study with a focus on their theoretical and practical implications.

First, I found that marriage exerts cumulative effects on men and women's wages: marriage accelerates wage growth for men yet limits wage growth for women. As such, married men (women) accumulate their relative wage advantage (disadvantage) over single men (women) across the life course. This finding can be seen as a long-term, life course extension of the well-documented consensus that marriage generally benefits men's earnings yet hurts women's earnings. Also, the revealed significant temporal variation in the wage effect of marriage re-affirms the necessity of adopting the life course, trajectory-based perspective to understand this issue. Further, to put this finding in the context of the broad literature on life course gender inequality, the gender difference in the cumulative wage effect of marriage can be seen as an important micro-level pathway through which gender inequality is maintained and reproduced over the life course (Budig 2002; Fernandez-Mateo 2009; Noonan, Corcoran, and Courant 2005). This study, by depicting a comprehensive picture of the accumulation process of wage (dis)advantage in post-marital years, suggests that marriage in today's American society operates as a de-equalizing force that drives up the gender wage gap over individuals' lives. This also implies that the trend of retreat form marriage in contemporary United States could work to equalize men and women's earnings on the macro level.

Second, the study suggests that men and women differ significantly in the dominating mechanism that drives the effect of marriage on wage growth. For women,

the finding that childbearing substantially impedes women's career advancement in post-marital years corroborates those from the motherhood penalty literature (Budig and England 2001; Budig and Hodges 2010; Gough and Noonan 2013; Hochschild and Machung 1989). In particular, the large impact of childbearing on married women's accumulation of wage disadvantage holds true regardless of whether work experiences are controlled for. This suggests that labor market activities alone are not sufficient to understand motherhood penalty for married women. In addition to changes in work experiences, factors such as psychological strain due to work-life conflict, or discrimination from the employer, may pose extra impediments to married mothers' wage growth. On the contrary, for men, work experience – indicated by a set of variables including job tenure, employment hours, labor market attachment, and occupation – explains a substantial amount of the positive effect of marriage on men's wage growth, a finding that accords with the specialization theory and human capital theory (Becker 1985; Mincer and Ofek 1982). More importantly, quantitative assessment showed that the influence of changes in work experience on married men's wage remains strong even after fatherhood has been accounted for. Therefore, from the public policy perspective, this recommends that the preferred policy measure to alleviate the unequal wage effects of marriage for men and women lies in promoting more equal sharing of child care responsibilities and parenting roles within the family, because this could remove some substantive barriers to the wife's career advancement yet not necessarily costing the husband large wage drops.

Beyond theoretical and policy implications, findings from this study also stimulate two methodological implications. First, they remind future researchers of the

difference in the time window of the sample as an importance source of the discrepancy in the estimated average wage effect of marriage among different studies. As I illustrated with a numeric example in Section 5.2, given the temporal variation in the wage effect of marriage, studies that rely on different samples covering individuals who have been married for different numbers of years are likely to generate different estimates of the "average wage effect of marriage." Thus, the researcher should be cautious when comparing two such studies. I also recommend future researchers to explicitly model the temporal variation of the wage effect of marriage so as to make the results less sensitive to the choice of sample. Second, studies that aim to model the likelihood or timing of the entrance into marriage often takes interest in constructing a summary measure to represent an individual's expected amount of long-term economic potential in post-marital years (e.g. Xie et al. 2003). Constructing this measure requires that the researcher have a basic knowledge about the *potential trajectories* of post-marital wages so as to calculate a weighted sum of the "present value" of multiple future income streams at the point of marital decision. Thus, the estimated post-marital wage trajectories under the life course perspective can be utilized by this line of works as the basis for constructing the indicator of individual-specific "economic potential" in post-marital years.

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Endnotes

[1] To see this, note that the derivative of the logarithm of variable Y can be expressed as: $dln(Y) = dY/Y$. That is, for an increment of Δ in Y, $\ln(Y)$ will increase by an increment of Δ/Y.

[2] The coding scheme of 41 collapsed occupational categories is available from the author upon request.

[3] The prediction presented in this paper assumes that on average, the individuals get married around the time they enter the labor market. The demonstrated pattern of wage trajectories is not sensitive to alternations of the assumption about the timing of individuals' entry into marriage relative to their entry into the labor market.

[4] This is likely due to the possibility that their children are moving away from their parents when they both enter older ages.

[5] Unlike the significant effect of having a child on parent's earnings as has been documented in some prior works, (e.g. Budig and England 2001; Killewald and Gough 2013), the coefficients on childbearing and its interactions with marital status are not significant on the 5% level. This is most likely due to the inclusion of three linear splines of years of marriage in the model which subsumes some of the effects of childbearing through their association with the likelihood of childbearing. Supplementary analysis not reported here suggests that the wage effect of the number of children becomes significant after the splines for years of marriage are removed from the model.

[6] All the fixed-effect models use normal link functions, except for the models for annual and cumulative weeks unemployed and weeks out of the labor force, which use Poisson link functions to better predict count variables.

Figures and Tables

Figure 1 Graphic illustration of the post-marital wage trajectories for men under the static and life course perspectives.

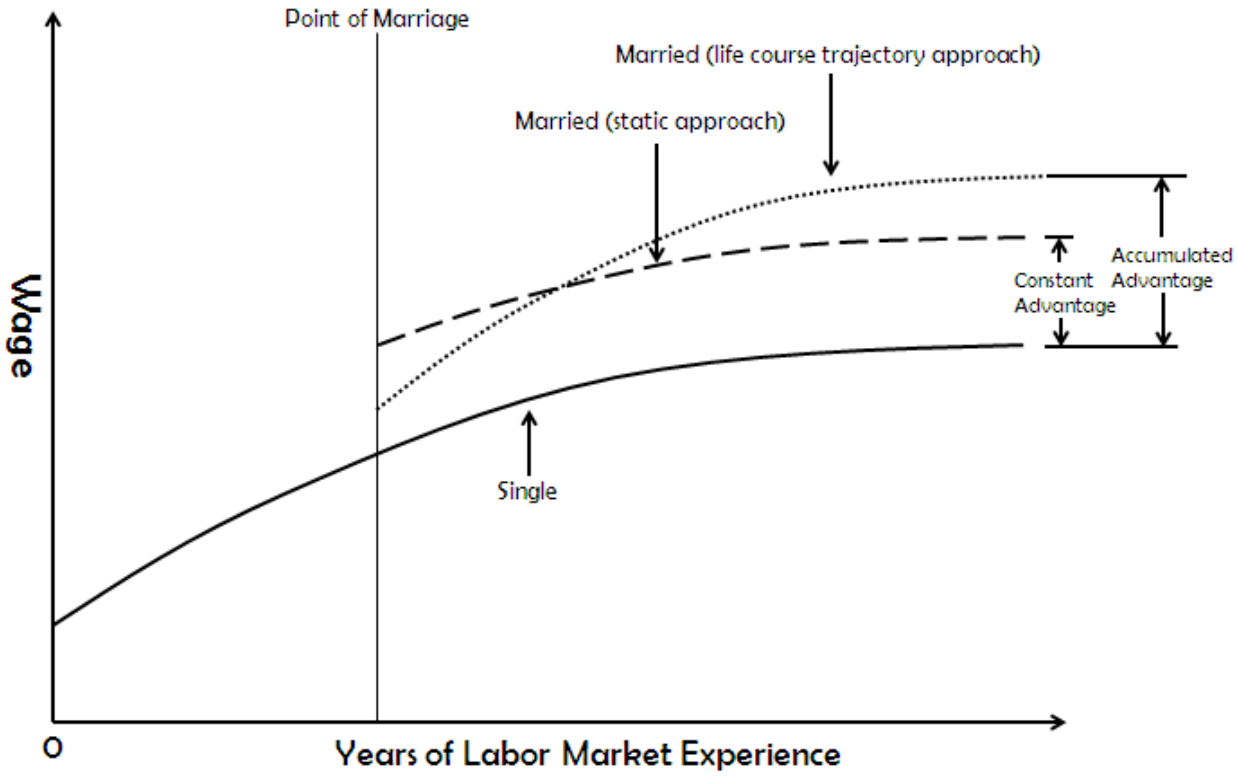
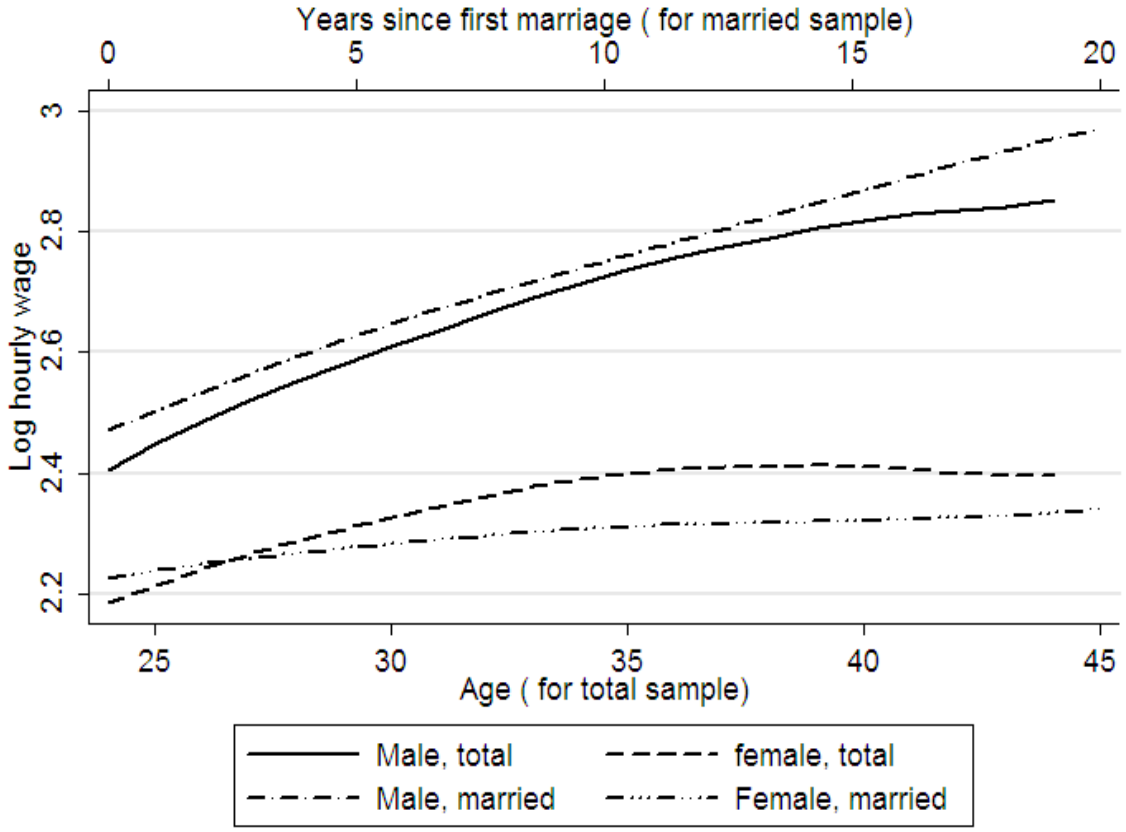


Figure 2 Descriptive pattern of the trajectories of log hourly wage over the life course



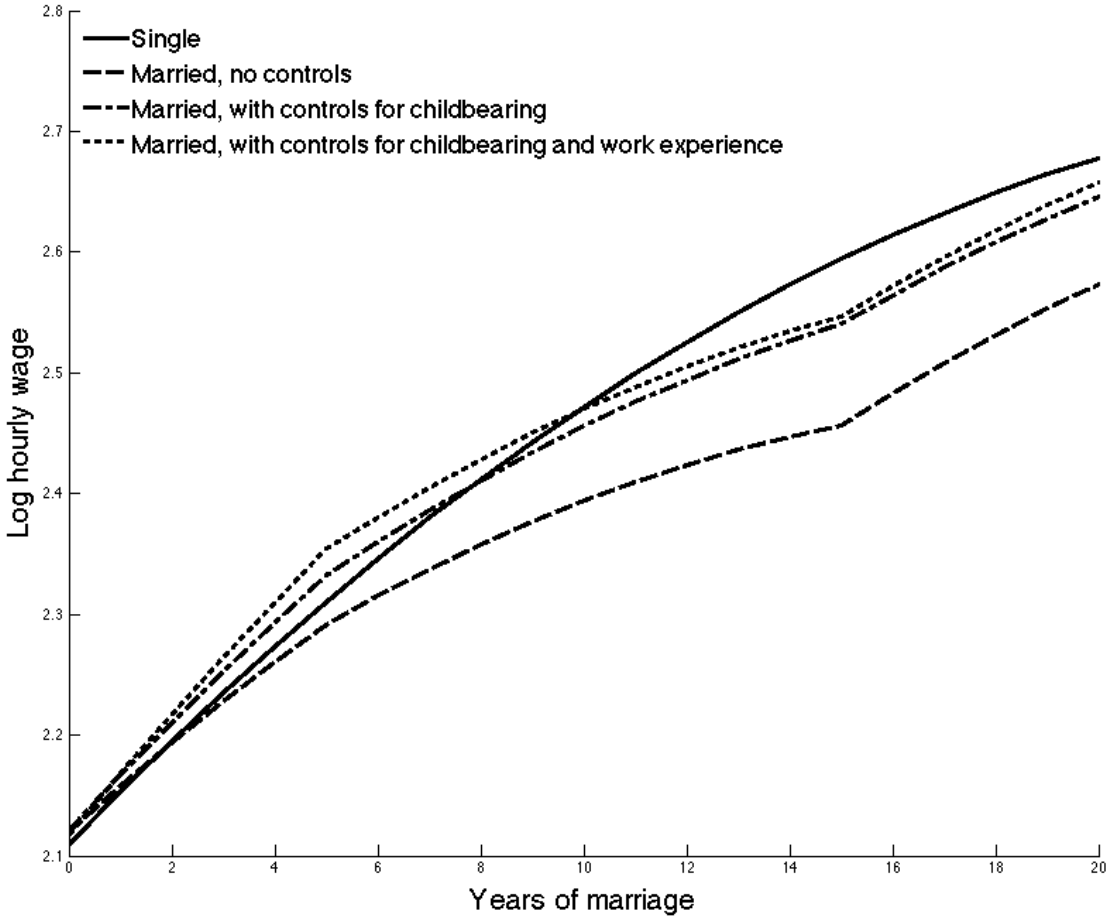
NOTES:

1. Data Source: National Longitudinal Survey of Youth 1979-2010, Bureau of Labor Statistics.
2. The upper X-axis indicates the number of years since first marriage for the married sample; the lower X-axis indicates the individual's age for the total sample regardless of marital status. Age 24 is the median age at first marriage in the sample, and this is why it is chosen as the starting age for calculating the trajectory for the total sample.
3. All sample statistics are weighted.

Figure 3 Predicted wage trajectories for the single and married with different sets of controls, male

NOTE:
Predictions are based on the NLSY79 sample and the estimated coefficients from Model M1 (for single and married with no controls), M2 (for married with controls for childbearing), and M3 (for married with controls for childbearing and work experience).

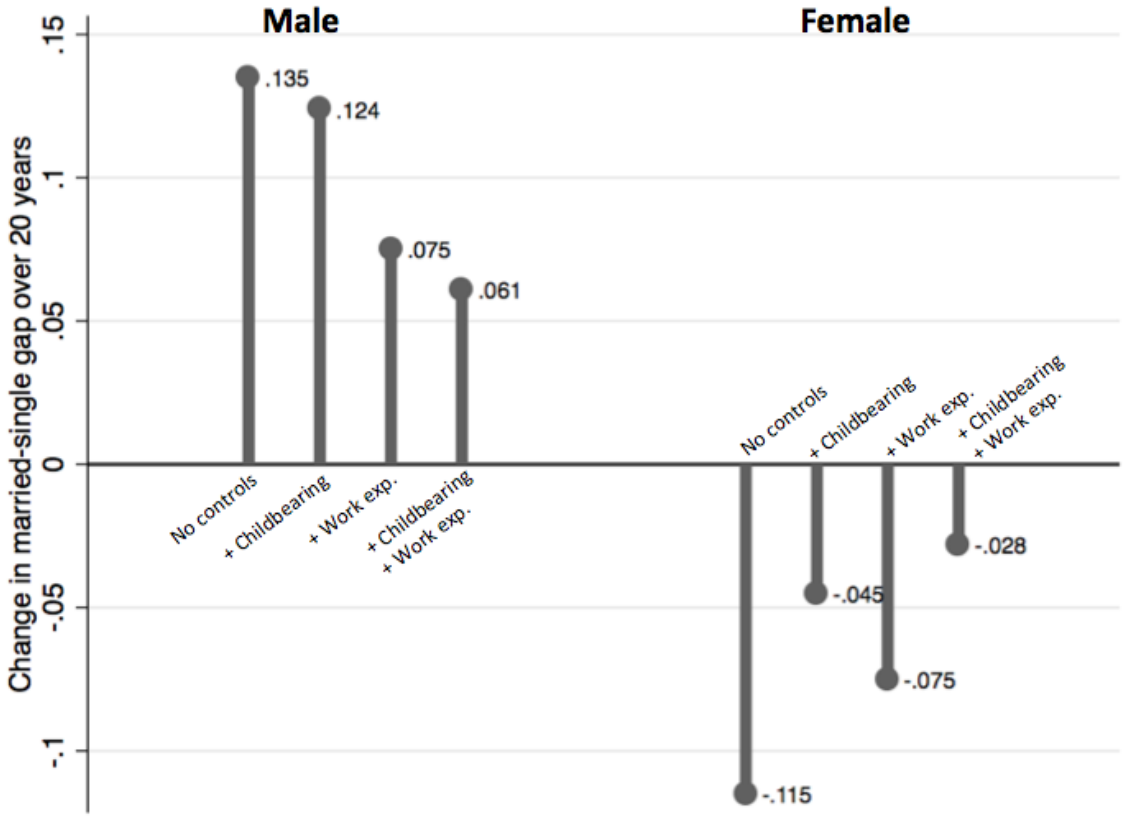
Figure 4 Predicted wage trajectories for the single and married with different sets of controls, female



NOTE:

Predictions are based on the NLSY79 sample and the estimated coefficients from Model M1 (for single and married with no controls), M2 (for married with controls for childbearing), and M3 (for married with controls for childbearing and work experience).

Figure 5 Predicted changes in married-single gap in log hourly wage over the 20 years for male and female under models with different controls



NOTE:
Predictions in this figure are based on models M1 (no controls), M2 (+childbearing), M2B (+work exp.), and M3 (+childbearing and +work exp.) as reported in Table 2 and Table A4. The numeric results reported above are in correspondence with the predicted wage trajectories as demonstrated visually in Figure 3 and Figure 4.

Table 1 Weighted sample statistics

	Men	Women	Total
Gender	50.84%	49.16%	---
Race			
White	79.97%	79.67%	79.82%
Black	13.74%	14.01%	13.87%
Hispanic	6.29%	6.32%	6.31%
Educational attainment at age 25			
High school or less	59.95%	56.70%	58.35%
Some college but less than four years	20.17%	23.37%	21.74%
At least four years of college	19.88%	19.93%	19.91%
Marriage history			
Age at first marriage (median)	26	23	24
Proportion married at age 20	10.31%	23.79%	16.93%
Proportion married at age 30	53.10%	60.26%	56.62%
Proportion married at age 40	58.30%	61.99%	60.11%
Proportion never married at age 45	21.83%	13.20%	17.59%
Years of marriage	7.25 (8.16)	7.85 (8.44)	7.54 (8.31)
Childbearing			
# of children in the household at age 20	0.07 (0.31)	0.27 (0.57)	0.17 (0.47)
# of children in the household at age 30	0.87 (1.09)	1.35 (1.20)	1.12 (1.18)
# of children in the household at age 40	1.30 (1.30)	1.56 (1.21)	1.44 (1.26)
Log hourly wage			
Log hourly wage at age 20	2.08 (0.47)	1.89 (0.46)	1.99 (0.47)
Log hourly wage at age 30	2.57 (0.58)	2.31 (0.63)	2.45 (0.62)
Log hourly wage at age 40	2.79 (0.76)	2.42 (0.82)	2.60 (0.81)
Work experience (by person-years observations)			
Job tenure (weeks)	245.64 (284.91)	220.12 (262.07)	233.38 (274.47)
Hour worked, last year	1940.19 (970.75)	1394.32 (971.48)	1663.94 (1008.74)
# of weeks unemployed, last year	2.88 (8.48)	2.09 (7.11)	2.48 (7.83)
# of weeks out of the labor force, last year	5.84 (14.36)	13.47 (20.19)	9.72 (17.97)
Cumulative # of weeks unemployed	37.24 (59.84)	27.81 (46.50)	32.62 (53.92)
Cumulative # of weeks out of the labor force	72.69 (126.16)	164.57 (200.65)	117.77 (173.12)

NOTES:

1. Data Source: National Longitudinal Survey of Youth 1979-2010, Bureau of Labor Statistics.
2. Standard deviations are presented in parentheses.
3. All sample statistics are weighted.

Table 2 Selected coefficients from fixed-effect models predicting log hourly wage for men and women with different controls

	M1 (no controls)		M2 (M1 + controls for childbearing)		M3 (M1 + controls for childbearing + work experience)	
	Male	Female	Male	Female	Male	Female
Married (reference: single)	0.079***	0.010	0.078***	0.012	0.053***	0.008
	(0.014)	(0.018)	(0.014)	(0.019)	(0.015)	(0.018)
Years of marriage (linear splines)						
Early stage (0-5 years)	0.006†	-0.006	0.004	0.003	0.005	0.007†
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Middle stage (6-15 years)	0.007***	-0.012***	0.007**	-0.008**	0.002	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Late stage (≥16 years)	0.007*	0.007†	0.007*	0.004	0.005†	0.006*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Controls for Childbearing	No	No	Yes	Yes	Yes	Yes
Controls for Work experience	No	No	No	No	Yes	Yes
Person-year observation	53151	47697	53151	47697	46054	40689

NOTES:

1. Data Source: National Longitudinal Survey of Youth 1979-2010, Bureau of Labor Statistics.
2. Standard errors are presented in parentheses. *** p<0.001; ** p<0.01; * p<0.05; † p<0.1.
3. Being married means that the person is married and his/her spouse is physically present; the reference category is being never married. The models also include a dummy for a person being either divorced or married but separated from their spouse, and a dummy for cohabiting individuals. The models control for potential experience and its square term. Other baseline controlling variables include: the interactions between racial categories (coded as white, black and Hispanics) with potential experience, and the interactions between educational attainment (coded as high school and below, college educated, and beyond college education) with potential experience.
4. Controls for childbearing are implemented by including the number of biological/step/adopted children in the household, as well as the interaction between this variable with marital status. Controls for work experience include job tenure, total hour worked in the previous year, annual and cumulative weeks unemployed, annual and cumulative weeks out of the labor force, as well as the interactions between these variables and potential experience (except for cumulative measures). They also include the person's occupation coded into 41 categories. The complete sets of coefficients estimated from the fixed-effect models are reported in Appendix Table A2 and A3.
6. All analyses are weighted.

Table 3 Summary of Hypotheses and Findings from Fixed-effect Models

Hypothesis	Supported by data?	
Hypothesis 1 (total effect): Marriage is associated with a higher rate of wage growth for men and a lower rate of wage growth for women.	Male	Supported
	Female	Supported
Hypothesis 2 (childbearing): Marriage can affect wage growth through affecting childbearing. Thus, controlling for childbearing will reduce the positive effect of marriage on wage growth rate for men and the negative effect of marriage on wage growth rate for women in post-marital years.	Male	Weakly supported
	Female	Strongly supported
Hypothesis 3 (work experience): Marriage can affect wage growth through affecting work experience. Thus, controlling for measured work experience will reduce the positive effect of marriage on wage growth rate for men and the negative effect of marriage on wage growth rate for women in post-marital years.	Male	Strongly supported
	Female	Weakly supported

Table 4 Percentage of change in married-single wage gap explained by childbearing and work experience for men and women

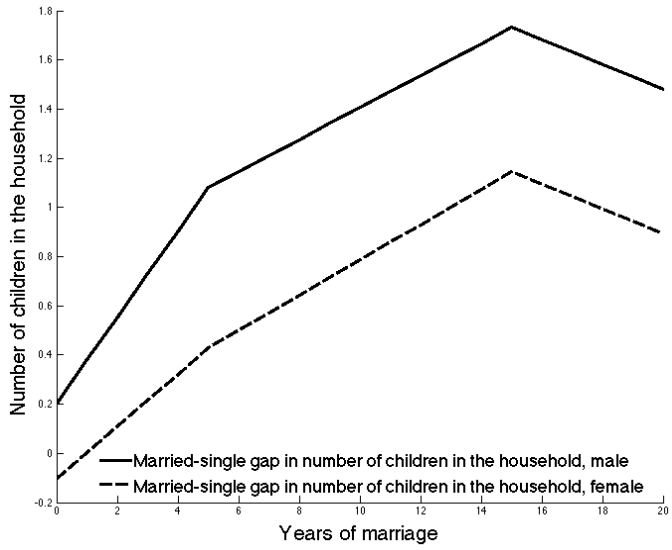
Mechanism	Percentage of change in married-single wage gap explained			
	Male		Female	
	Lower bound	Upper bound	Lower bound	Upper bound
Childbearing	8%	11%	41%	61%
Work experience	44%	47%	15%	35%

NOTES:

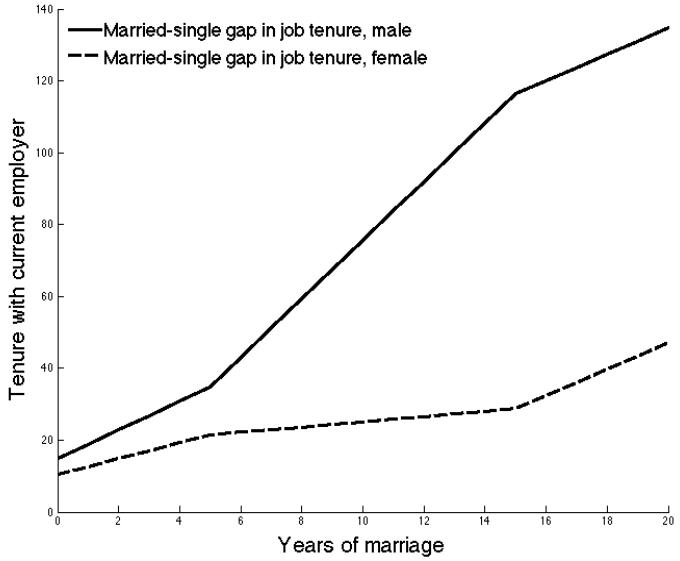
Predictions in this figure are based on models M1 (no controls), M2 (+childbearing), M2B (+work exp.), and M3 (+childbearing and +work exp.) as reported in Table 2 and Table A4, and the numeric results reported in this table are in correspondence with the prediction as demonstrated visually in Figure 3 and Figure 4.

Appendix Figures and Tables

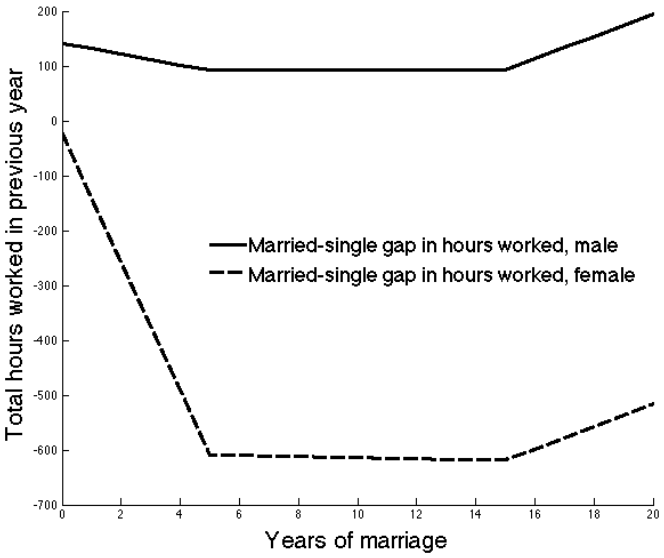
Figure A1 Predicted marriage-single gaps in childbearing and work experiences by years of marriage



(a) number of children in the household



(b) job tenure

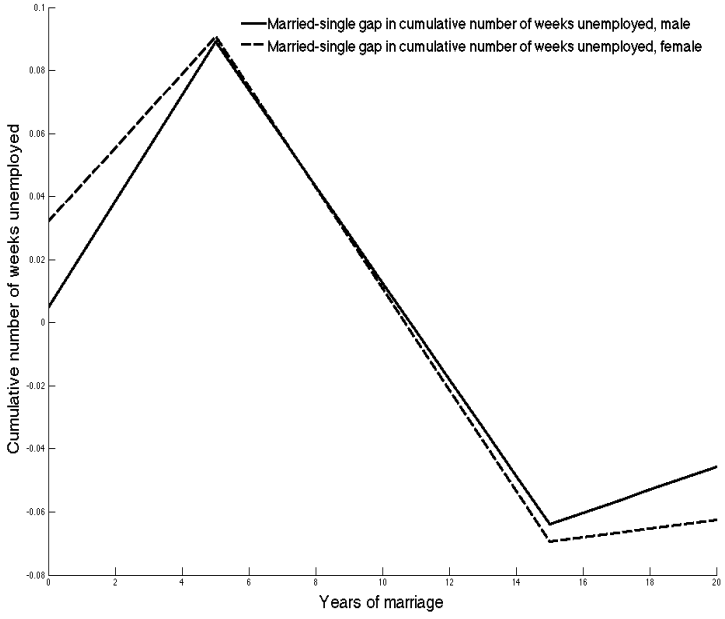


(c) total hours worked per year

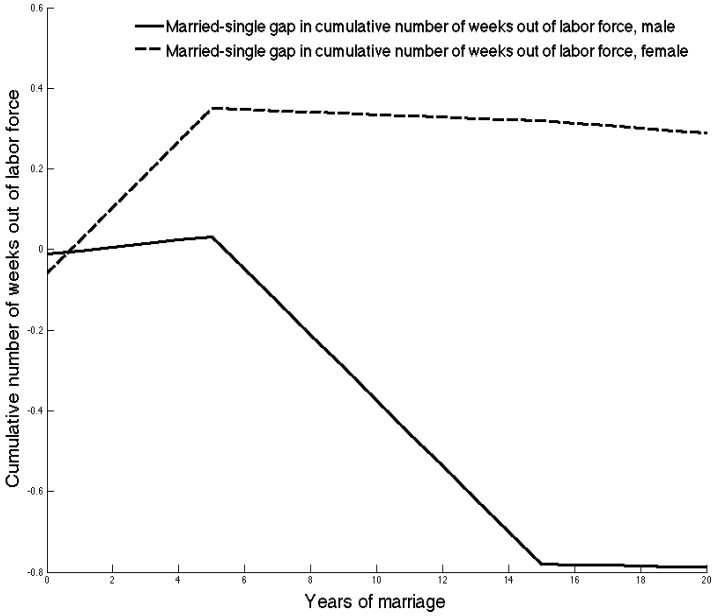
(d) number of weeks unemployed per year

Figure A1, continued

(e) number of weeks spent out of the labor force per year



(f) cumulative number of weeks unemployed



(g) cumulative number of weeks spent out of the labor force

(h) occupational mean wage

Table A1 Statistics for sample restriction

Specification of sample restriction	Person-year observations			
	Men	Women	Total	% of all sample
All Sample	211299	207339	418638	100%
At least one year of potential experience	185602	180973	366576	87.56%
Non-missing wage	81441	74298	155739	37.20%
No children before 18 years old	69426	58089	127515	30.46%
Appearing in the sample at least twice	53151	47697	100848	24.09%

NOTE:
Data Source: National Longitudinal Survey of Youth 1979-2010, Bureau of Labor Statistics.

Table A2 Full results from the fixed-effect model predicting log hourly wage with no controls (Model M1)

	M1 (no controls)	
	Male	Female
Potential experience	0.0391***	0.0440***
	(0.00308)	(0.00327)
Squared experience	-0.000931***	-0.000780***
	(0.0000807)	(0.0000840)
Marital status (reference: single)		
Married	0.0793***	0.0104
	(0.0141)	(0.0182)
Divorced or widowed	0.0296	-0.0298
	(0.0221)	(0.0250)
Cohabiting	0.0537**	-0.00649
	(0.0204)	(0.0229)
Education (reference: high school or less)		
Some college ×experience	0.000157	-0.00378*
	(0.00200)	(0.00185)
At least four years of college ×experience	0.00247	-0.0206***
	(0.00210)	(0.00276)
Race (reference: Hispanic)		
Black×experience	-0.00298	-0.000678
	(0.00161)	(0.00196)
White×experience	0.00239	-0.00102
	(0.00142)	(0.00176)
Years of marriage		
Early stage (0-5 years)	0.006	-0.006
	(0.003)	(0.004)
Middle stage (6-15 years)	0.007***	-0.012***
	(0.002)	(0.002)
Late stage (≥16 years)	0.007*	0.007*
	(0.003)	(0.003)
Constant	2.207***	2.021***
	(0.0108)	(0.0141)
# of person-year observations	53151	47697

NOTES:
1. Data Source: National Longitudinal Survey of Youth 1979-2010, Bureau of Labor Statistics.
2. Standard errors are presented in parentheses. *** p<0.001; ** p<0.01; * p<0.05; † p<0.1.
3. All analyses are weighted.

Table A3 Full results from the fixed-effect model predicting log hourly wage with controls for childbearing and work experience

	M2 (M1 + controls for childbearing)		M3 (M1 + controls for childbearing + work experience)	
	Male	Female	Male	Female
Potential experience	0.0385***	0.0482***	0.0540***	.0574***
	(0.00312)	(0.00338)	(0.00394)	(.00422)
Squared experience	-0.000931***	-0.000780***	-0.000821***	-0.000726***
	(0.0000807)	(0.0000840)	(0.0000972)	(0.0000957)
Marital status (reference: single)				
Married	0.0793***	0.0104	0.0530***	0.00799
	(0.0141)	(0.0182)	(0.0146)	(0.0182)
Divorced or widowed	0.0296	-0.0298	0.0158	0.00108
	(0.0221)	(0.0250)	(0.0238)	(0.0270)
Cohabiting	0.0537**	-0.00649	0.0453	-0.00405
	(0.0204)	(0.0229)	(0.0238)	(0.0245)
Education (reference: high school or less)				
Some college ×experience	0.000157	-0.00378*	-0.000712	-0.00523**
	(0.00200)	(0.00185)	(0.00197)	(0.00173)
At least four years of college ×experience	0.00247	-0.0206***	0.000187	-0.0208***
	(0.00210)	(0.00276)	(0.00211)	(0.00261)
Race (reference: Hispanic)				
Black×experience	-0.00288	-0.00129	-0.00192	-0.000545
	(0.00161)	(0.00197)	(0.00147)	(0.00188)
White×experience	0.00247	-0.00131	0.00106	-0.00192
	(0.00143)	(0.00176)	(0.00129)	(0.00171)
Years of marriage				
Early stage (0-5 years)	0.004	0.003	0.005	0.007
	(0.004)	(0.004)	(0.004)	(0.004)
Middle stage (6-15 years)	0.007**	-0.008**	0.002	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)
Late stage (≥16 years)	0.007*	0.004	0.005	0.006*
	(0.003)	(0.003)	(0.003)	(0.003)
# of children	0.0413	-0.0207	0.0519	-0.00991
	(0.0315)	(0.0175)	(0.0320)	(0.0168)
# of children × married	-0.0338	-0.0316	-0.0425	-0.0231
	(0.0320)	(0.0178)	(0.0324)	(0.0172)
# of children × divorced/widowed	-0.0361	-0.00189	-0.0477	0.000251
	(0.0345)	(0.0187)	(0.0339)	(0.0181)

Table A3, continued				
# of children × cohabiting	-0.0515 (0.0338)	-0.00384 (0.0346)	-0.0638 (0.0354)	-0.00187 (0.0350)
Job tenure			0.000367*** (0.0000504)	0.000538*** (0.0000611)
× experience			-0.00000884*** (0.00000215)	-0.0000171*** (0.00000266)
Hours worked last year			0.0000170 (0.0000113)	0.0000428*** (0.0000129)
× experience			-0.00000519*** (0.000000938)	-0.00000475*** (0.00000107)
Weeks unemployed last year			-0.000458 (0.000855)	-0.00191 (0.00107)
× experience			-0.000267*** (0.0000679)	-0.000125 (0.0000706)
Weeks out of the labor force last year			-0.00130 (0.00102)	-0.000478 (0.000774)
× experience			-0.000343*** (0.0000729)	-0.000275*** (0.0000649)
Cumulative weeks unemployed			-0.00164*** (0.000223)	-0.00167*** (0.000346)
Cumulative weeks out of the labor force			-0.000901*** (0.000173)	-0.000720*** (0.0000888)
Controls for occupation	No	No	Yes	Yes
Constant	2.208*** (0.0108)	2.017*** (0.0144)	2.301*** (0.100)	2.092*** (0.145)
# of person-year observations	53151	47697	46054	40689

NOTES:

1. Data Source: National Longitudinal Survey of Youth 1979-2010, Bureau of Labor Statistics.
2. Standard errors are presented in parentheses. *** p<0.001; ** p<0.01; * p<0.05; † p<0.1.
3. All analyses are weighted.

Table A4 Selected coefficients from the fixed-effect model in auxiliary analysis with controls for work experience

	M2B: (M1+ controls for work experience)	
	Male	Female
Married (reference: single)	0.055***	0.006
	(0.014)	(0.018)
Years of marriage (linear splines)		
Early stage (0-5 years)	0.006	0.002
	(0.003)	(0.004)
Middle stage (6-15 years)	0.002	-0.012***
	(0.002)	(0.002)
Late stage (≥16 years)	0.004	0.007**
	(0.003)	(0.003)
Controls for Childbearing	No	No
Controls for Work experience	Yes	Yes
Person-year observation		

NOTES:

1. Data Source: National Longitudinal Survey of Youth 1979-2010, Bureau of Labor Statistics.
2. Standard errors are presented in parentheses. *** p<0.001; ** p<0.01; * p<0.05; † p<0.1.
3. All analyses are weighted.

Table A5 Selected coefficients from fix-effect models in preliminary analysis predicting number of children in the household and indicators of work experiences

		Married (reference: single)		Years of marriage						N
				Early stage (0-5 years)		Middle stage (6-15 years)		Late stage (≥16 years)		
# of children in household	Male	0.206***	(0.0224)	0.175***	(0.00633)	0.0651***	(0.00376)	-0.0503***	(0.00542)	60564
	Female	-0.101***	(0.0240)	0.163***	(0.00661)	0.0716***	(0.00355)	-0.0502***	(0.00425)	59930
Job Tenure	Male	14.90**	(5.692)	4.005*	(1.594)	8.145***	(1.143)	3.671	(1.891)	54643
	Female	10.40	(7.080)	2.215	(1.658)	0.724	(1.194)	3.697*	(1.484)	49236
Hours worked	Male	141.3***	(22.00)	-9.922	(5.304)	0.202	(2.992)	20.08***	(4.022)	59826
	Female	-23.09	(26.39)	-117.1***	(6.589)	1.010	(3.455)	20.68***	(3.604)	59216
Weeks unemployed, last year	Male	-0.177***	(0.0114)	4.005*	(1.594)	8.145***	(1.143)	3.671	(1.891)	42238
	Female	-0.0502***	(0.0146)	2.215	(1.658)	0.724	(1.194)	3.697*	(1.484)	42198
Weeks out of labor force, last year	Male	-0.296***	(0.00824)	0.0288***	(0.00217)	-0.0253***	(0.00117)	-0.0244***	(0.00133)	45290
	Female	0.327***	(0.00646)	0.0774***	(0.00138)	-0.0254***	(0.000681)	-0.0147***	(0.000748)	51454
Cumulative weeks unemployed	Male	0.00530	(0.00325)	0.0168***	(0.00074)	-0.0153***	(0.000286)	0.00379***	(0.000263)	80734
	Female	0.0322***	(0.00466)	0.0117***	(0.00099)	-0.0160***	(0.000359)	0.00134***	(0.000271)	79623
Cumulative weeks out of labor force	Male	-0.0118***	(0.00239)	0.00877***	(0.00053)	-0.0183***	(0.000198)	-0.00129***	(0.000175)	88303
	Female	-0.0587***	(0.00244)	0.0818***	(0.00048)	-0.00312***	(0.000152)	-0.00608***	(0.000109)	96183
Occupation mean wage	Male	0.0107*	(0.00525)	0.00185	(0.00131)	-0.000717	(0.000706)	0.0000261	(0.000904)	49402
	Female	0.000355	(0.00656)	-0.0067***	(0.00151)	-0.000621	(0.000821)	0.00106	(0.000850)	45012

NOTES:

1. Data Source: National Longitudinal Survey of Youth 1979-2010, Bureau of Labor Statistics.
2. Standard errors are presented in parentheses. *** p<0.001; ** p<0.01; * p<0.05.
3. Being married means that the person is married and his/her spouse is physically present; the reference category is being never married. The models also include a dummy for a person being either divorced or married but separated from their spouse, yet the coefficient is not reported in the table. The models control for potential experience and its square term. Other controlling variables include: the interactions between racial categories (coded as white, black and Hispanics) with potential experience, and the interactions between educational attainment (coded as high school and below, college educated, and beyond college education) with potential experience.
4. The fixed-effect models are linear regression model with the fixed-effect estimator, except for the fixed-effect models for the annual and cumulative number of weeks unemployed and week out of the labor force, which are Poisson regression model with the fixed-effect estimator

Table A6 Coefficients on linear splines of years of marriage in sensitivity analyses assessing the robustness of results to sub-divided groups by age of first marriage

	M1 (no controls)		M2 (M1 + controls for childbearing)		M3 (M1 + controls for childbearing + work experience)	
	Male	Female	Male	Female	Male	Female
Age of first marriage <20						
Early stage (0-5 years)	-0.00290	-0.0224*	0.000351	-0.0228*	-0.00761	-0.0195
	(0.0140)	(0.0100)	(0.0136)	(0.0110)	(0.0147)	(0.0117)
Middle stage (6-15 years)	0.0116	-0.00231	0.0123	-0.00264	-0.00430	-0.00665
	(0.00802)	(0.00508)	(0.00810)	(0.00538)	(0.00753)	(0.00466)
Late stage (≥16 years)	0.000724	0.0104	0.000204	0.0107	0.00537	0.00930
	(0.00912)	(0.00627)	(0.00917)	(0.00648)	(0.00921)	(0.00609)
# of person-year observations	2695	5428	2695	5428	2336	4598
Age of first marriage 20-30						
Early stage (0-5 years)	0.00895*	-0.00450	0.00694	0.00603	0.00774	0.0102*
	(0.00398)	(0.00499)	(0.00450)	(0.00518)	(0.00445)	(0.00514)
Middle stage (6-15 years)	0.00850***	-0.00942***	0.00767**	-0.00453	0.00382	-0.00735**
	(0.00242)	(0.00277)	(0.00256)	(0.00281)	(0.00249)	(0.00273)
Late stage (≥16 years)	0.00652*	0.00603	0.00704*	0.00300	0.00449	0.00573
	(0.00330)	(0.00310)	(0.00330)	(0.00319)	(0.00308)	(0.00311)
# of person-year observations	40093	35396	40093	35396	34747	30087
Age of first marriage >30						
Early stage (0-5 years)	0.00655	0.00792	0.00840	0.0104	0.00513	0.00903
	(0.00796)	(0.0133)	(0.00789)	(0.0138)	(0.00742)	(0.0131)
Middle stage (6-15 years)	0.00109	-0.0217	0.00183	-0.0209	-0.00461	-0.0165
	(0.00654)	(0.0117)	(0.00650)	(0.0123)	(0.00685)	(0.0122)
Late stage (≥16 years)	0.0273*	-0.0728*	0.0276*	-0.0720*	0.0176	-0.0706*
	(0.0139)	(0.0288)	(0.0139)	(0.0290)	(0.0131)	(0.0294)
# of person-year observations	10363	6873	10363	6873	8971	6004

NOTES:

1. Data Source: National Longitudinal Survey of Youth 1979-2010, Bureau of Labor Statistics.
2. Standard errors are presented in parentheses. *** p<0.001; ** p<0.01; * p<0.05; † p<0.1.
3. All analyses are weighted.