Marriage Formation and Local Economic Opportunity in the United States: A Comparison of Public-use and Restricted Access Census Data

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Abstract: In this paper, we investigate the relationship of male and female economic opportunity to marriage formation in 2000, examining how relationships vary with race and ethnicity. To address these issues, we carry out multi-level analysis of the effects of local economic conditions on the marriage decisions of young men and women. We will compare results obtained using the 5% sample of Census 2000 from the Integrated Public Use Microdata Series (IPUMS) with those from an analysis of restricted access census files available only through Census Bureau Research Data Centers (RDCs). The internal files allow the identification of small geographic regions to measure local economic conditions. This analysis will help gauge the value of the restricted access data by presenting a benchmark using public data.

This paper is part of a broader research project to assess the impact of changes in male and female economic opportunity on marriage formation in the United States since 1960. The rise in median age at first marriage over the past four decades is one of the most dramatic and consequential demographic shifts in American history. Initially, most analysts ascribed the change to rising economic opportunity and employment of women. Some argued that a reduction of gender-role specialization resulting from female labor force participation reduced the benefits of marriage for both men and women; others maintained that increasing economic opportunity gave growing numbers of women attractive alternatives to early marriage. More recently, however, demographic researchers have focused on men, contending that stagnant or declining male economic opportunity in the 1970s and 1980s contributed to the unprecedented delay in marriage by reducing the supply of marriageable men.

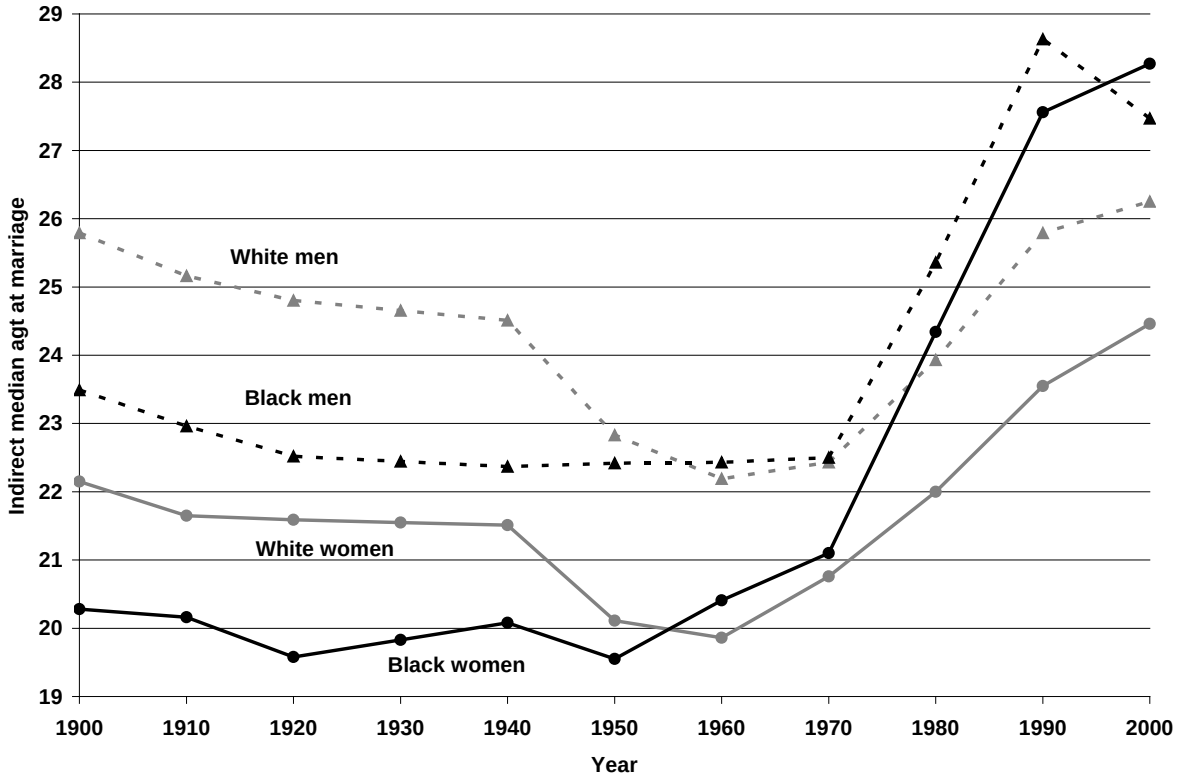
Our central aim is to assess historical changes in the effects of changing male and female opportunity simultaneously. We will investigate the relationship of male and female income and labor force participation to early marriage formation. To address these issues, we will carry out multi-level analysis of the effects of changes in local economic conditions on the marriage decisions of young men and women. Our analysis will capitalize on a vast new archive of restricted-access long-form census data currently in preparation by the Census Bureau in collaboration with the Minnesota Population Center. This data series, the "National Historical Census Files," includes the complete long-form census returns for the period from 1960 to 2000.

We hypothesize that changes in both male and female economic opportunity affected the shift in marriage formation. We also hypothesize that the relationship between female opportunity and marriage formation has evolved since 1960. In the decades after 1960, rising female opportunity discouraged marriage, but that effect diminished over time. After 1970, we

predict that the decline in the supply of young men with good jobs is increasingly associated with late marriage.

As seen in Figure 1, there are striking racial differences in marriage timing. Marriage age among native-born whites has shifted more rapidly during the last fifty years than in any earlier period. Before 1940, median marriage age for white men was confined to the range of 24.5 to 25.8 years. Among women, median marriage age varied by less than a year during this period, remaining within the range of 21.5 to 22.2 years. During the marriage boom of the post-war years, however, marriage age plummeted to a low of 22.1 for white men and 19.9 for white women in 1960. Since this nadir, white marriage age has been climbing steadily, and by 2000 it had surpassed the median for all previous years (Fitch and Ruggles 2000a).

Figure 1. Median Age at First Marriage: Native-born Whites and Blacks by Sex



The trend in the median first marriage age of blacks differs significantly from that of whites. Most notably, there was essentially no post-war marriage boom among blacks. Indeed, in 1960—the low point of marriage age for whites—black female age at marriage was at a 100-year peak. From 1970 to 1990, however, median age at first marriage among blacks increased even faster than that of whites. In 2000, there was a striking reversal of the trend among black males, who now appear to marry earlier than black females (Fitch and Ruggles 2004).

We will examine how associations between economic opportunity and marriage are affected by race and ethnicity. This study will break new ground by analyzing the local economic context of marriage decisions for African Americans, Hispanics, and non-Hispanic whites. Previous efforts to address this problem were stymied by inadequate geographic precision in available public use microdata and by insufficient sample sizes, especially for minority populations. By pioneering the use of a massive new data resource, we can for the first time develop precise measures of male and female economic opportunity for small geographic areas and major population subgroups. This information will yield estimates of the relationship of changing labor market conditions to marriage behavior across four decades of dramatic change in patterns of marriage formation.

In the proposed paper, we will investigate the relationship of male and female economic opportunity to marriage formation in 2000. We also examine how the associations between economic opportunity and the marriage of young people vary with race and ethnicity. To address these issues, we carry out multi-level analysis of the effects of local economic conditions on the marriage decisions of young men and women. The models will include controls for individual-level characteristics such as age and educational attainment and local characteristics such as partner availability, levels of cohabitation, housing costs and welfare generosity.

We will compare results obtained using the 5% sample of Census 2000 from the Integrated Public Use Microdata Series (IPUMS) with those from an analysis of internal census files available only through Census Bureau Research Data Centers (RDCs). The internal files allow the identification of small geographic regions to measure local economic conditions. This analysis will also help gauge the value of the restricted access data by presenting a benchmark using public data. The results that follow are from our first analysis of the public-use IPUMS data.

Theoretical Background

This paper examines the relationship between economic opportunity and marriage formation in Census 2000. We explore the association between marriage and several factors which have the potential to explain changing marriage patterns in the United State since 1960. The principal interpretations of late-twentieth century change in marriage behavior can be grouped into four broad categories: female economic opportunity, male marriageability, spouse availability, and cohabitation. The following sections describe these theories and the evidence relating to each of these hypotheses.

Female economic opportunity. Many analysts have argued that growing economic opportunities for women have contributed to delayed marriage. The period from 1960 to 2000 saw enormous change in gender norms and the growth of female labor-market participation, particularly after marriage and child-bearing. The rise of women's educational attainment, job opportunities, and wages since 1960 has substantially decreased women's economic dependence on a spouse. The independence theory of marriage formation posits that women will delay or forgo marriage if other more attractive alternatives are present (Cherlin 1980; Goldscheider and Waite 1986; Preston and Richards 1975; Waite and Spitze 1981). Long-run studies using

aggregated cross-sectional data and marriage market analysis support a positive relationship between rising female economic opportunity and delayed marriage for men and women (e.g., Cready, Fossett, and Kiecolt 1997; James 1998; McLanahan and Casper 1995; Mare and Winship 1991).

The role of women's rising economic opportunity in marriage formation, however, remains controversial. Oppenheimer sees the independence theory as an extension of Becker's specialization model of the gains to marriage (Oppenheimer 1994, 1997; Becker 1981). In Becker's formulation, the specialization of labor within the household is a key component to marriage formation and success; men and women each have something to gain through the union. However, as women obtain more access to the paid labor market and household chores become more mechanized, the gains to marriage for each partner decrease, thus delaying marriage and increasing the proportions never married (Becker 1981).[1] Oppenheimer (1994) questions the basis of specialization theory, arguing that families have not specialized in the past, but instead have adapted to changing economic circumstances, sending wives and children into the workforce when necessary.

In addition to the theoretical challenges, some empirical evidence has thrown the independence hypothesis into question. A number of investigators have assessed the relationship between economic status and marriage at the individual level using longitudinal data (Cherlin 1980; Goldscheider and Waite 1986; Lichter et al. 1992; Lloyd 2006; Oropesa, Lichter and Anderson 1995; Oppenheimer and Lew 1995; Sweeney 2002; Teachman, Polonko, and Leigh

[1] Oppenheimer (1994, 2000) maintains that the specialization model applies only to non-marriage and is not relevant to delayed marriage. Reducing the relative benefits to marriage at any given moment, however, would mean only that persons who wish to marry would tolerate a higher risk of non-marriage and forgo weaker marriage opportunities. This means that their odds of eventual marriage would be reduced but not eliminated; in general, a decline in the benefit to marriage would be expected to increase search time, thus delaying marriage. This point is discussed further below.

1987; Thornton, Axinn, and Teachman 1995; Xie et al 2003). Some of these individual-level findings appear to contradict both the independence hypothesis and the aggregate-level cross-sectional studies: they show a weak *positive* relationship between earnings and the probability of marriage, not the inverse relationship predicted by the independence hypothesis.

The finding that there is a modest positive association between women's earnings and the probability of marriage at the individual level does not necessarily contradict the hypothesis that the rise in the economic opportunities of women contributed to the rapid increase in marriage age during the past four decades. Some evidence suggests that the positive relationship may be a new development. Sweeney (2002) found no significant association between earnings and marriage formation for women born between 1950 and 1954, but a significant positive association for those born between 1961 and 1965. Goldstein and Kenney (2001) also suggest that the relationship between college education and marriage is reversing for recent cohorts; among women born prior to 1955, college education discouraged marriage, but for younger cohorts the opposite is expected to be true. It is possible, therefore, that rising opportunities for women helped delay marriage in the 1960s and 1970s, but that the more recent increase in marriage age resulted from other factors.[2]

Male marriageability. To explain the rise in marriage age and decline in proportions marrying since the 1960s, several analysts have argued that stagnant or declining male economic opportunity in the 1970s and 1980s contributed to the unprecedented delay in marriage by

[2] It is also possible that the individual-level positive association between female earnings and marriage is a byproduct of assortative mating. There is ample evidence that men and women tend to meet and marry partners of their own socioeconomic background (see for example Buss and Barnes 1986; Kalmijn 1991; Mare 1991; Qian and Preston 1993, Schwartz and Mare 2005). Because of a powerful positive association between the economic status and marriageability of men, women of high economic status may be more likely to marry than women of low economic status simply because they have a more marriageable pool of potential spouses. Thus, the weak positive association between economic status and the probability of marriage among women in longitudinal data might reverse if we could hold constant the economic status of their likely marriage partners.

reducing the supply of marriageable men. Many studies have shown a significant connection between poor male economic circumstances and delayed marriage (Cready, Fossett, and Kiecolt 1997; James 1998; Fossett and Kiecolt 1993; Lichter, LeClere, and McLaughlin 1991; Lichter et al. 1992; Lloyd and South 1996; Testa and Krough 1995; Wilson and Neckerman 1987). Assessing the role of men's ability to fulfill the breadwinner role, these studies find that young men and women are more likely to be married in areas with greater numbers of marriageable men. Qualitative research also provides evidence that young unmarried couples—even those with children—place a high priority on financial stability before marriage (Gibson, Edin, and McLanahan 2005; Smock, Manning and Porter 2005).

In a variation on this argument, Oppenheimer maintains that it is uncertainty in the career entry process that leads to delays in marriage. A young man without an established career or career path may be a poor marriage risk, and as the career entry process became more difficult in the 1970s and 1980s, couples spent more time searching for spouses and delaying marriage (Oppenheimer 1988, 1994; Oppenheimer, Kalmijn and Lim 1997). Both variations of the theory—a minimum income or the uncertainty of career-entry—predict that poor male economic opportunity will delay entry into marriage for both men and women.

However salient the evidence on male economic opportunity in recent decades, we believe it is critical to assess the role of economic opportunity for women and men simultaneously if we wish to understand the relationship between economic change and marriage formation. In broader historical perspective, we suspect that the decline of opportunity and increase in inequality among young men is of insufficient duration or magnitude to be responsible for the *entire* increase in marriage age. We hypothesize that the rise of female economic opportunity allowed women to increase the length of their spouse search, thus delaying

marriage. It is also likely, however, that this relationship has not remained constant over time, and that it varies according to socioeconomic stratum and racial and ethnic group.

Spouse availability. Several scholars have proposed that the availability of potential spouses has contributed to the dramatic fluctuations in marriage age during the past four decades. Spouse availability, as measured by sex ratios, has different expected effects on men and women: a surplus of men will increase marriage rates for women and decrease them for men, but a surplus of women will decrease marriage rates for men and women (Fossett and Kiecolt 1993; Grossbard-Shechtman 1993).

In addition to the crude sex ratio, more subtle measures can better identify the ratio of marriageable men to marriageable women. For example, sex ratios can be calculated using only marriageable persons—non-institutionalized men and women and employed men (e.g. Wilson and Neckerman 1987; Lichter et al. 1992). Such refined measures may explain more of the secular trend in marriage age than do crude sex ratios. Wilson and Neckerman (1987), for example, argue that increasing underemployment, death, and incarceration since the 1970s has created a dearth of marriageable African-American men, particularly in central cities.

Cohabitation. Some analysts argue that the rise of cohabitation has contributed to the increase of marriage age. We agree that cohabitation is critically important, and to some extent declining marriage formation is offset by increasing cohabitation (e.g., Bumpass, Sweet, and Cherlin 1991). We are wary, however, of regarding cohabitation merely as a substitute for traditional marriage. Cohabitation can also serve as a stage in the marriage process (similar to engagement) or as a stage in dating and sexual relationships (Smock and Manning 2004). Despite the heterogeneous nature of cohabitation, we expect where cohabitation levels are higher, marriage rates will be lower. Weaker marriage norms should allow couples to live

together without plans to marry and to delay marriage through extended engagements in cohabiting unions.

A key contribution of this study is the ability to assess how factors associated with marriage vary by race and ethnic groups. Some analyses suggest that although socioeconomic measures are strong predictors of marriage age for whites, they are less effective in explaining changes in marriage timing for African Americans. African-America marriage behavior, however, has shifted even more than that of whites (Hughes 2003; Lichter, LeClere, and McLaughlin 1991; Lichter et al. 1992; Lloyd and South 1996; McLanahan and Casper 1995). Recent studies have demonstrated that the availability of men is an important predictor of transitions to marriage after a nonmarital birth and can explain much of the difference in marriage rates of African-American parents (Harknett 2008; Harknett and McLanahan 2004).

Hispanic economic circumstances resemble those of African-Americans, but the historic pattern of marriage timing among Hispanics is similar to that of non-Hispanic whites (Vega 1990; Oropesa 1996). While significant attention has been paid to inter-marriage of Hispanics, there has been less research addressing this marriage paradox for Hispanics. Oropesa and collaborators found no relationship between individual economic characteristics and marriage among Mexican American women (Oropesa, Lichter and Anderson 1995). Lloyd (2006) finds that individual level measures of employment were positively associated with marriage for Latinas, but that contextual measures of women's employment were negatively associated with entering marriage. This study also tests the role of male economic opportunity and finds no association with Latina marriage (Lloyd 2006).

Data and Methods

Some analysts use individual-level longitudinal data to access the impact of economic circumstances on the probability of marriage (e.g., Goldscheider and Waite 1986; Oppenheimer 2000). Although valuable, the focus on current economic status obscures the role of economic *opportunity*. As Oppenheimer (1988, 1994, 2000) has stressed from a theoretical perspective, economic potential may have a greater impact on marriage probabilities than does current economic circumstances. It is difficult to measure job prospects at the individual level, however, and there are few available individual-level measures of the economic potential of prospective spouses.[3]

To assess the economic opportunities of both individuals and their potential spouses, many researchers have turned to contextual measures. These analyses predict marriage behavior using metropolitan-level or labor-market measures of male and female employment and education, sex ratios, and other local factors (Cready, Fossett, and Kiecolt 1997; Fossett and Kiecolt 1990, 1993; Harknett 2008; Harknett and McLanahan 2004; Hughes 2003, Lichter, LeClere, and McLaughlin 1991; Lichter et al. 1992; Lloyd 2006; McLanahan and Casper 1995; Preston and Richards 1975; South and Lloyd 1992; White 1981).

Some researchers have used aggregate statistics from the census summary files to obtain contextual economic data for labor markets or other small geographic areas. These data, however, are problematic because, in general, only crude measures are available. For example, the summary files do not provide income distributions for young adults for small geographic areas. Moreover, the available indicators do not allow researchers to control for population

[3] Some researchers (Lichter et al. 1992; Lloyd and South 1996; Smock and Manning 1997; Xie et al. 2003) have overcome the limitations of individual-level longitudinal data for measuring individuals and their potential partners' economic situations by attaching aggregate-level marriage market variables, assessing the economic circumstances of cohabiting unmarried partners, or estimating time-varying earnings potential. These studies, however, are restricted to specific cohorts over a brief period, and are of limited use for understanding historical change.

composition and, as discussed below, this can lead to endogeneity. The best solution is to derive economic context measures directly from census microdata, and several other researchers have studied marriage patterns across geographic areas, usually using metropolitan areas or labor market areas (e.g., Cready, Fossett, and Kiecolt 1997; Lichter, LeClere, and McLaughlin 1991; Lloyd 2006; McLanahan and Casper 1995; Oropesa, Lichter and Anderson 1995; Preston and Richards 1975; South and Lloyd 1992; White 1981).

To investigate the fit between economic opportunity and marriage formation, we constructed measures of local economic and demographic conditions directly from IPUMS 5% sample of Census 2000 (Ruggles et al. 2008). We use these variables in a multi-level analysis of the effects of local economic conditions on the marriage decisions of young men and women. The models also include controls for individual-level characteristics such as age and educational attainment and local characteristics such as partner availability, average rent, levels of cohabitation, and welfare generosity.

We calculate separate local measures and run separate models for non-Hispanic whites, blacks, and Hispanics. Non-Hispanic whites include anyone who reported "white" to the race question and did not report a Hispanic ethnicity; going forward, we refer to this group as whites. Blacks include all individuals who reported themselves as black or African American on the race question, regardless of Hispanic status. For both whites and blacks we include multi-race individuals who reported more than one race. We include anyone who reported themselves as "Spanish/Hispanic/Latino" in our Hispanic group, regardless of their reported race. We do not include a pooled analysis of all race and ethnicity groups, so we allow some individuals to fall in more than one category.

We have defined geographic areas using the Census Bureau's Public Use Microdata Areas (PUMAs) and Super-PUMAS, the smallest sub-state geographic regions identified in the 2000 public use microdata. PUMAs are smaller, containing at least 100,000 residents, and nest within Super-PUMAs, which contain at least 400,000 residents and two to six PUMAs. Neither PUMAs nor Super-PUMAs cross state lines. We have calculated separate areas, hereafter referred as zones, for each race and ethnicity group: whites, blacks, and Hispanics. Some PUMAs did not contain sufficient cases to generate reliable statistics for each group; in these cases, we combined PUMAs or used Super PUMAs as necessary to create zones with sufficient cases.[4] If a Super-PUMA still did not meet the case threshold, it was excluded from the analysis. There are more than twice as many zones for whites (2000 zones) as there are for blacks and Hispanics (approximately 1000 each). About twelve percent of blacks and Hispanics are excluded from analysis because there were insufficient cases to calculate race or ethnicity-specific variables in their Super-PUMA. Although these excluded cases are from places with small numbers of blacks or Hispanics, they are not exclusively from rural areas; as many cases are excluded from metropolitan as from non-metropolitan areas.

Although we use all available cases to create the contextual variables, we create a subsample of young adults for the regression analysis. This sample is limited to native-born individuals aged 25 to 29 who are not in an institution. By analyzing people in the second half of their twenties we avoid assessing the marriage patterns of the college-aged. We restrict the regression to native-born men and women; the marital status of the foreign-born may depend less on the economic conditions of their current residence than on the conditions of their home country. Finally, we exclude the institutionalized population. Institutionalized persons do not

[4] We used two thresholds. For the economic characteristics, described below, we required 50 men and 50 women aged 20 to 39 in the zone. For the demographic characteristics, we used a threshold of 30 men and 30 women aged 20 to 29. To be included in our analysis, a zone met both thresholds.

normally make good marriage prospects, and there is evidence suggesting that the information on the marital status of institutional inmates is flawed in Census 2000 (Fields and O'Connell 2004).

Contextual variables

The analysis employs economic opportunity variables, demographic contextual measures, and controls for welfare generosity and housing costs. These contextual variables are broadly similar to those used in other studies of marriage behavior (See for example Fitch and Ruggles 2000b; Cready, Fossett, and Kiecolt 1997; Hughes 2003; Lichter et al. 1992; Lloyd 2006).

We include two measures of economic opportunity for men and women: one measure of wage and salary income and one measure of overall employment. The male income and employment measures test the basic hypotheses that good male economic opportunities are associated with early marriage. The women's income and employment measures test two opposing hypotheses. High female opportunity allows women to forgo marriage or increase spousal search time. Alternatively, female opportunity may make women more valuable or attractive potential spouses, thereby facilitating early marriage in much the same fashion as is hypothesized for men. For both men and women, the income measure is intended to assess the *quality* of available jobs, whereas the employment variable focuses on the availability of work at any pay level.

We construct a median income variable from individual-level wage and salary information. For each zone, we calculate the median of the natural log of wage and salary income for individuals aged 20-39; the universe only includes individuals who worked last year and reported a wage or salary income greater than 0. To measure employment, we simply calculate the percentage of individuals aged 20-39 who are employed. We constructed both economic measures separately for each race and ethnicity.

We adjust the economic opportunity variables to avoid endogeneity. Many past analyses have assumed that measures of overall male and female labor force participation, wages, and education are exogenous to marriage formation (e.g., Cready, Fossett, and Kiecolt 1997; McLanahan and Casper 1995; Preston and Richards 1975; White 1981). In fact, marriage can affect economic behavior. Women frequently drop out of the labor force upon marriage; and, conversely, men sometimes drop out of school or enter the labor force because of marriage. Wages and salaries for both men and women could conceivably also be affected by marital status. Preston and Richards (1975), McLanahan and Casper (1995), and Ellwood and Jencks (2004) identified these problems, but to date none of the aggregate-level studies of marriage has resolved them.

Because of such endogeneity, studies that rely on crude aggregate measures of labor force participation, wages and education are likely to overestimate the impact of male and female economic opportunity on marriage formation. There are several methods to avoid this pitfall. Perhaps the simplest approach is to standardize the independent variables by marital status. This procedure controls for the effects of variation in marital status across time and space on the independent variables, and also allows us to simultaneously control for the effects of variation in age composition. For example, the standardized percent of women in the labor force in zone z at year t may be calculated as

$$W_z = \sum_a \sum_m w_{amz} \cdot p_{am}$$

where w_{amz} is the percent in the labor force at age a and marital status m in zone z, and p_{am} is the proportion of the standard population of age a and marital status m. The standard population is computed as the average of the national population characteristics in 2000. Thus, we can

calculate what the measures of economic opportunity would have been in each place if there had been no spatial variation in marital status or age composition.

As noted above, local marriage opportunities could also be affected by the availability of spouses. Many researchers following Lichter et al. (1992) construct elaborate age-specific sex ratios for the ratio of non-institutionalized men to women, offset by two years to reflect the average age interval between spouses (see, for example, Lloyd 2006). We have chosen cruder measures of sex ratio for this analysis. Fossett and Kiecolt (1991) determined that the particular age range used in a sex ratio did not improve predictions of African American family structure. We tried three different measures of the sex ratio of the unmarried population aged 20-29; all three provide similar results. We present results for the percentage of non-institutionalized unmarried population that is male, calculated by race and ethnicity. Future analyses will test more elaborate measure of sex ratio, including the age-specific sex ratio specified by Lichter et al. (1992).

We also assess the relationship of the local prevalence of cohabitation to marriage of young adults. We hypothesize that higher levels of cohabitation will be associated with less marriage. In areas where cohabitation is more widely accepted as an alternative to marriage, we expect fewer people to marry. In Census 2000, it is possible to identify cohabiting couples using the "unmarried partner" response on the relationship to householder question. We measure the level of cohabitation in an area as the percentage of 20-29 year-olds who are opposite-sex cohabitors.[5] This measure is calculated separated by race and ethnicity.

[5] Since same-sex cohabitors did not have the option to marry in 2000, we are restricting the overall level of cohabitation to opposite-sex cohabitation.

Public assistance provides women (particularly low-income mothers) with an alternative source of financial support, and can contribute to the economic independence of women. Because welfare generosity declined during the period where marriage age rose, it cannot explain shifts in the timing of marriage over historical time (Ellwood and Jencks 2004). But, at a given time welfare availability may have an impact on marriage transitions. The existing literature is inconclusive, either supporting the hypothesis of a negative impact on marriage or finding no effect (Blau, Kahn, and Waldfogel 2000; Lichter, LeClere, McLaughlin 1991; Lloyd 1996; see Moffitt 1998 for a review). Benefit levels represent the maximum monthly benefit level for a family of 3 in 2000 and are drawn from the Urban Institute's Welfare Rule Database (Table L3 in Rowe and Roberts 2004).

Finally, we also include a measure of housing costs for each zone. We anticipate that higher local housing costs will delay marriage, reflecting the traditional expectation that a couple have the means to set up an independent household (Hughes 2003). With the rise of cohabitation as an alternative independent living arrangement, the subjective bar for marriage may have risen, encompassing stable employment, savings, and even home ownership (Cherlin 2004; Smock, Manning, and Porter 2005). In addition to testing the hypothesis about the costs of establishing an independent household, the housing costs also control for cost of living differences reflected in the income measures. We calculate housing costs as the median rental costs, including utilities, of 2-bedroom apartments in each zone.

Analytic strategy

Our primary outcome or dependent variable is the binary measure of ever-married status (coded 0,1). In addition to the contextual variables, we will include age, educational attainment and current school enrollment as individual-level controls. The analytic goal is to analyze how

the variability in marriage is associated with the individual and zone-level measures for our subsample of native-born non-institutionalized men and women aged 25-29.

Because we have persons nested within zones, ordinary least squares (OLS) and logistic regression models are not appropriate. The data violate the independently and identically distributed (IID) assumption: there are correlations within zone (aggregate measures). Therefore, we estimate generalized linear mixed-effect (i.e., GLMM or multilevel) regression models. Some analysts argue these models are able to exploit hierarchically arranged data to disentangle the effects of contexts from the background effects of residents (Diez Roux et al. 2001). Oakes (2004) develops a similar model from first principles and shows that subject-level covariates are treated as fixed effects to adjust for differences in background composition (e.g., selection bias). Although our outcome of interest is subject-level ever-married status, we use general linear mixed models, akin to the linear probability model. This works well in hierarchical framework because we are implicitly modeling mean proportions about contexts, which are approximately Gaussian. The other advantage is that effects are on the additive scale (differences) instead of the ratio scale, which greatly simplifies interpretation. Zone-specific effects may be treated as either fixed or random, but random has inferential advantages (Murray 1998). Interpretation is straightforward: the coefficient for any predictor is the probability that a given person with the characteristics in zone z is married compared to the same person without the characteristic.

Results

Table 1 describes the mean values for all individual and zone-level variables.[6] The percentage ever-married reveals expected differences across racial and ethnic groups. White men

[6] The values reported for the individual variables reflect only the sub-sample included in the regression analysis: non-institutionalized native-born men and women. The zone-level measures include foreign-born and institutionalized populations, and the economic opportunity measures are also standardized by age and marital status, as described above.

and women are the most likely to be ever-married at 54% and 68%, respectively; the sex difference reflects the age difference in timing of first marriage. Hispanic men and women are slightly less likely to marry at young ages than whites; 50% of Hispanic men and 60% of Hispanic women are ever-married.[7] Less than 40% of black men and women aged 25-to-29 are ever-married and there is little difference in marriage prevalence between black men and black

[7] Marriage, especially early marriage, is substantially more common among foreign-born Hispanics (Landale and Oropesa 2007; Oropesa and Landale 2004).

Table 1. Descriptive Statistics for Individual and Contextual Variables

	Whites				Hispanics				Blacks			
	Males		***Females***		***Males***		***Females***		***Males***		***Females***	
	Means	SD	Means	SD	Means	SD	Means	SD	Means	SD	Means	SD
Ever-married (%)	54.24	49.8	67.54	46.8	49.91	50.0	60.26	48.9	37.65	48.5	37.45	48.4
Age	27.11	1.4	27.11	1.4	26.98	1.4	26.98	1.4	27.07	1.4	27.06	1.4
Education (%)												
Less than high school	10.48	30.6	8.28	27.6	24.25	42.9	20.70	40.5	19.09	39.3	16.80	37.4
High school degree	29.68	45.7	24.45	43.0	30.77	46.2	27.54	44.7	36.76	48.2	30.51	46.0
Some college	32.86	47.0	35.20	47.8	32.64	46.9	36.21	48.1	31.63	46.5	36.41	48.1
College	26.97	44.4	32.07	45.6	12.34	32.7	15.55	36.1	12.52	33.1	16.28	36.9
In School (%)	12.11	32.6	13.28	33.9	14.52	35.2	16.91	37.5	12.01	32.5	16.43	37.1
Contextual characteristics												
Percent Cohabiting	15.15	5.1	15.15	5.1	13.92	6.6	13.92	6.6	11.31	5.2	11.31	5.2
Percent Male	54.81	4.3	54.81	4.3	59.20	8.3	59.20	8.3	45.80	6.4	45.80	6.4
Median Rent ($100)	6.40	2.0	6.40	2.0	7.08	2.0	7.08	2.0	6.19	1.7	6.19	1.7
Median male income (ln)	10.19	0.2	10.19	0.2	9.89	0.2	9.89	0.2	9.87	0.2	9.87	0.2
Median female income (ln)	9.85	0.2	9.85	0.2	9.58	0.2	9.58	0.2	9.69	0.3	9.69	0.3
Percent men employed	83.60	6.1	83.60	6.1	72.67	8.9	72.67	8.9	64.79	13.5	64.79	13.5
Percent women employed	72.16	6.0	72.16	6.0	56.93	8.7	56.93	8.7	66.05	8.8	66.05	8.8
State welfare benefit level ($100	4.08	1.5	4.08	1.5	4.43	1.9	4.43	1.9	3.63	1.5	3.63	1.5
Number of cases	273,970		282,292		24,959		27,236		36,379		48,682	
Number of zones	1986		1986		975		975		918		918	

women. These means mirror the median age at first marriage in Figure 1 which indicates similar age at marriage for black men and women.

The individual variables are limited to age, educational attainment, and school attendance. Individual measures of income and labor force participation are likely to be influenced by marital status and are therefore excluded from the analysis. The educational distribution of whites is distinctive for the highest percentage of bachelor's degrees and lowest percentage not completing high school. Whites are twice as likely to have completed a bachelor's degree as blacks and Hispanics, and they are half as likely to not have completed high school. Blacks and Hispanics have similar levels of post-secondary training; about 45% of men and 52% of women have some college or have completed a bachelor's degree. A greater percentage of Hispanics, however, have not completed high school compared to blacks. Across all race and ethnic groups, women are more likely to have some college or to have completed a college degree than men, and are also less likely to have left school without a high school degree. Men are more likely than women to have completed high school but not continued for any post-secondary training.

While educational attainment for whites is higher, black and Hispanic women and Hispanic men are more likely to be currently enrolled in school than whites. This probably reflects efforts of economically disadvantaged people to pursue education in non-traditional paths. White men and women are probably more likely to complete schooling with parental assistance within the traditional timeframe, graduating with a bachelor's degree in their early 20s. Consistent with overall education levels, black and Hispanic students are more likely than whites to be pursuing post-secondary training and less likely to be enrolled in a post-baccalaureate programs.

The summary statistics for the demographic contextual measures reveal expected and unexpected findings. First, our sex ratio measure demonstrates the well-documented impact of mortality and institutionalization on the population of young black men. The denominator in our measure is the total unmarried non-institutionalized population aged 20-29 for each race and ethnic group. With this measure, a value of 50% would suggest similar levels of incarceration and mortality between men and women, but would also suggest similar ages at marriage. For whites, the average of about 55% male represents the greater numbers of unmarried men in this age group, largely driven by older ages at marriage. For Hispanics, the percentage is even higher, nearly 60%, reflecting the uneven migration of Hispanic men. Since black men and women are marrying at similar ages we would not expect a surplus of men, but 45 percent male demonstrates a considerable shortage of black men, most likely due to death and incarceration.

The second demographic measure—percent cohabiting—reveals an interesting difference in the spatial distribution of cohabitors. White men and women are more likely to be living in areas with higher levels of cohabitation among young adults. Nationally, 10% of whites aged 25-29 are in cohabiting relationships, but the average white person in our sample lived in a zone where 15% of the 20-29 cohort were cohabiting. White cohabitors are not uniformly distributed across zones, and more zones have higher levels of cohabitation than the national average. National levels of cohabitation are similar for Hispanics and blacks; about 10% of young adults aged 25-29 are opposite sex unmarried partners. Hispanics exhibit the same uneven spatial distribution as whites, with zone-level measures of cohabitation around 14%. The spatial distribution of cohabitors is more even for African Americans, with the average zone having 11% of young adults cohabiting.

Housing costs and welfare benefits also show the different spatial distribution of the three populations. Hispanics were more likely to live in zones with higher median rents—median monthly rent for Hispanics averaged $708 for a two-bedroom apartment—and in states with higher welfare benefits, averaging $443 per month. In contract, blacks live in communities with lower median rents ($619) and states with the lowest welfare benefit levels ($363). The median monthly rents for whites fall in the middle at $640, as does the average welfare benefit at $408. Almost a third of the Hispanics in this sample live in California which has the highest median rents and one of the highest welfare benefit levels. The median rent for Hispanics is inflated somewhat because this sample is missing some Hispanics living in rural areas, which would have lower rents. African Americans are much more likely to live in Southern states which have the lowest welfare benefit levels and lower rents. The difference in median rent could also occur due to residential segregation; if blacks live in poorer areas of larger metropolitan areas, these areas probably also have less expensive monthly rent.

The two economic measures—median income and percent employed—demonstrate that white men and women have the best economic opportunities. Hispanic men tend to follow between white and black men, while Hispanic women trail both white and black women. In terms of employment levels, the average percent employed is 84 for white men, but only 73% for Hispanic men and 65% for black men. The average employment level of black women is also about 65%, which falls between the 72% for white women and 60% for Hispanic women. Wage and salary income follows a similar trend. When comparing income—presented here as the median of the natural log of wage and salary income—the trends for women are the same. The median income is highest for white women and lowest for Hispanic women; black women fall in between. For men, white men have the highest median income, but black men and Hispanic men

have about the same median income. As discussed above, these measures have been standardized to the same population so they do not reflect any differences in the ever-married status or age of the populations.

Table 2 presents the results from multi-level linear probability models predicting ever-married status for men and women aged 25-29. We present three sets of models for whites, Hispanics and blacks, each separately by sex. The individual-level control variables for age and school attendance operate as expected; individuals are more likely to be married as they get older and school attendance is a deterrent to marriage. The coefficients for the school variable suggest, however, that the effect of school enrollment is greater for white women, Hispanic women and Hispanic men, compared to white men and black men and women.

The results for the education variable indicate that extremely low educational attainment is a hindrance for marriage, but that continued schooling causes delays in marriage. For all groups, the high school graduates and those with some college are the most likely to be married, compared to those without a high school degree and those with a bachelor's degree. For white and black men, those who have not completed high school are the least likely to be married; for Hispanic men, college graduates are the least likely. For women, only black women exhibit the strong positive relationship between educational attainment and marriage that other researchers have found. All Hispanic women with less than a 4-year college degree are predicted to have similar probabilities of marriage, about 10% higher than those with a bachelor's degree. For white women, the inverse relationship between education and marriage that would have predominated in the mid-twentieth century is not evident, but there is no evidence yet of the positive relationship demonstrated in other research (Goldstein and Kenney 2001).

Table 2. Coefficients from Multi-level Regression of Ever-Married Status: Men and Women, Aged 25-29

	Whites		Hispanics		Blacks	
	Males	***Females***	***Males***	***Females***	***Males***	***Females***
Intercept	-0.733	-0.663	-1.159	-1.623	-0.980	-1.274
Age	0.056 ***	0.046 ***	0.046 ***	0.040 ***	0.045 ***	0.037 ***
Education						
Less than high school	-0.009 **	0.026 ***	0.071 ***	0.093 ***	-0.037 ***	-0.049 ***
High school degree	0.013 ***	0.061 ***	0.093 ***	0.104 ***	0.028 ***	-0.001
Some college	0.035 ***	0.067 ***	0.106 ***	0.106 ***	0.073 ***	0.047 ***
College	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*
In School	-0.065 ***	-0.109 ***	-0.117 ***	-0.112 ***	-0.058 ***	-0.054 ***
Contextual characteristics						
Percent Cohabiting	0.000	0.001	0.000	-0.001	-0.001	0.000
Percent Male	0.001 **	0.007 ***	0.000	0.005 ***	0.001	0.005 ***
Ave Rent ($100)	-0.033 ***	-0.031 ***	-0.031 ***	-0.028 ***	-0.022 ***	-0.021 ***
Median male income (ln)	0.283 ***	0.292 ***	0.075 *	0.155 ***	0.086 **	0.082 **
Median female income (ln)	-0.319 ***	-0.338 ***	-0.035	-0.068 *	-0.096 ***	-0.052 *
Percent men employed	0.004 ***	0.004 ***	0.002 *	0.001	0.001 *	0.000
Percent women employed	-0.002 ***	-0.001 *	0.002 **	0.002 ***	0.004 ***	0.004 ***
State welfare benefit level ($100)	-0.020 ***	-0.017 ***	-0.019 **	-0.014	-0.003	-0.011
Number of cases	273,970	282,292	24,959	27,236	36,379	48,682
Number of zones	1986	1986	975	975	918	918
BIC statistic	366,882	335,456	34,810	36,809	48,975	65,729

*** p < .001; ** p < .01; * p < .05

The percent of young people cohabiting was not significantly related to marriage in any of the models. Local norms about cohabitation, as measured in this variable, are not associated with more or less marriage; this relationship, or lack thereof, holds if other contextual variables are removed from the model. The sex ratio measure, the percentage male, is positively associated with marriage and statistically significant for all women. A greater availability of potential male partners seems to facilitate women's entry into marriage. The percentage male is not associated with black or Hispanic men's marriage, but is positively associated with white men's marriage.

Both high average rents and high state welfare benefits are associated with lower levels of marriage. A $100 increase in average rent is associated with a 3% lower probability of marriage for whites and Hispanics and a 2% lower probability of marriage for black men and women. Rent varies between about $300 to about $1500 for all groups; the difference in marriage between the low rent zones and high rent zones could be as high as 24% for blacks and 36% for whites and Hispanics. The coefficients for welfare benefit level are also negatively associated with marriage, but they are only significant for whites and Hispanic men. Since variations in welfare benefits should have the most effect on disadvantaged single mothers, the statistically insignificant results for black and Hispanic women raise some doubts about the role of welfare in delaying marriage. We expect that future analyses of multiple census years that also control for state effects will yield more reliable estimates of the effects of benefit levels on marriage.

Men's economic opportunity, as predicted by the marriage market theories, is positively associated with marriage for men and women of all race and ethnicity groups. Both contextual measures—income and employment—have the largest coefficients and are most significant for

white men. These results are consistent with other research that finds a stronger relationship between men's economic prospects and marriage for white men compared to black men. For blacks and Hispanics, the percent of men employed is only weakly significant ($p < .05$) for men and not significant for women. The coefficients for male median income, however, are significant for all groups. It appears that simply the prospect of employment is not sufficient to make black and Hispanic men suitable marriage partners; higher male wages, however, do seem to facilitate marriage among these groups.

The results for women's economic opportunity are less straightforward. For white men and women, female income and employment is negatively associated with marriage. These results replicate the relationship documented in other studies using cross-sectional data, and support the female independence hypothesis. The presence of good paying jobs for white women seems to allow women to delay or forgo marriage. For Hispanics and blacks, female income and employment have the opposite effect. Median female income is negatively associated with marriage (except for Hispanic men where the coefficient is not statistically significant). The percent employed, however, is positively associated with marriage. Historically black women have combined marriage and employment to a greater extent than white women did. Women's employment, of any kind and of any income, may be a prerequisite to marriage for black and Hispanic women. The availability of high-paying jobs, however, may allow women to increase their spousal search time or forgo marriage. Alternatively, women of higher socio-economic status might have trouble finding suitable partner.

Conclusions

We conclude with a brief discussion of three key contributions this study. First, most similar analyses of marriage have failed to account for housing costs. Our model shows that

average monthly rent has a significant negative association with marriage, particularly for whites and Hispanics. Hughes (2003) is an exception; her study focused on marital and non-marital residential choices and found similar results, but her analysis of 1990 census data has not been extended forward or backward in time. Several researchers have found that cohabiting couples identify attaining financial goals, such as enough money for their own home, as a key reason to delay marriage (see for example, Edin and Kefalas 2005, England and Edin 2007, and Smock, Manning and Porter 2005). The importance of housing costs in our models reinforces this "white picket fence" theory developed through qualitative research.

The second contribution is to simultaneously assess men's and women's economic opportunity. Previous studies of earlier periods have found a positive relationship between men's economic opportunity and marriage formation; we find this relationship still holds. Good opportunities for men are associated with more marriage for men and women, although there are some interesting racial variations in the significance of our two measures of opportunity.

Our models also address the debate about the role of women's economic opportunity. Some research using longitudinal data of recent cohorts of women has found a positive association between marriage and various measures of human capital (educational attainment, income and employment). In our analysis, however, we still find only negative relationships between marriage and both measures of economic opportunity for white men and women. White women's economic opportunities are still associated with delayed marriage. For Hispanics and blacks, the results are more complicated; we find that female income is negatively related to marriage, but female employment is positively related to marriage. This suggests that employment is an asset to marriage for Hispanic and black women, but that jobs with higher income have the same effect as they do for whites, delaying marriage.

Our final contribution is to present an analysis of marriage for non-Hispanic whites, blacks and Hispanics of both sexes. Few marriage studies have examined these three groups together, and to our knowledge none have examined male marriage. Our findings for blacks and whites are consistent with previous research; economic opportunity variables are not as strongly correlated with black marriage as they are with white marriage. Other scholars have described a Hispanic marriage paradox: Hispanic economic circumstances that mirror those of blacks, but marriage patterns that mirror those of whites. This does not seem to be the case for native-born Hispanics. Their marriage levels and economic circumstance tend to fall between whites and blacks, and while the predictors of marriage in this analysis clearly work best for whites, these predictors are stronger for Hispanics than for blacks.

This analysis underscores the need to extend this analysis backward to determine how the relationship between marriage and these contextual variables has changed over time and across race and ethnicity. The restricted-access National Historical Census Files contain the complete long-form census data for the years 1960 to 2000; sample densities range from 16% in 2000 to 25% in 1960. In 2000, this represents at a three-fold increase in the number of cases compared to the public use sample used in this analysis. Within the Census Bureau Research Data Center, we will also have access to detailed geographic information, and we will be able to construct zones that include all non-Hispanic whites, blacks and Hispanics. This preliminary analysis of 2000 is possible using public use data, but the larger project would be impossible. Sub-state geographic areas are re-defined in each census years, and for pooled analysis of multiple census years we intend to create consistent geographic areas. The geographic detail and large scale of the restricted-access files will make it possible to conduct a series of analyses that simultaneously

examine the impact of male and female economic opportunities in different periods and for different racial and ethnic groups.

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