

## **Education and Hypergamy, and the “Success Gap”**

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**October 2005**

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\* This research was supported by NIH Grant R03HD41611. A version of this paper was circulated in 2003 as CSSS Working Paper #33 under the title, “Does Education Really Disadvantage Women in the Marriage Market?” I am grateful to Ted Bergstrom, Janet Currie, Paula England, Hank Farber, Shoshana Grossbard, Peter Hoff, Levis Kochin, Tom MaCurdy and two anonymous referees for helpful comments and suggestions. Kisa Watanabe and Jelena Zurovac provided excellent research assistance.

## **Education and Hypergamy, and the “Success Gap”**

### **Abstract**

“Hypergamy” is the tendency for women to marry up with respect to education or other characteristics associated with economic well-being. Hypergamy tends to disadvantage women at the top of the education distribution. The magnitude of this disadvantage is the “success gap”. The increase in the concentration of women relative to men at the top of the education distribution over the last several decades will tend to increase competition for educated men and widen the success gap. However, shifts in preferences, social norms, or parameters defining the gains to specialization and exchange will counter this concentration effect. The question of whether, on net, the success gap has increased or decreased over the period is therefore an empirical question.

I develop measures of the success gap, and hypergamy, and track them for women age 40-44 with U.S. Census data. The success gap declined substantially between 1980 and 2000. Hypergamy also declined. However, the pattern was not uniform across the education distribution. I also find “sheepskin effects” of education on marriage

## I. Introduction

Marriage has changed substantially over the last several decades. One of the most notable changes is the overall decline. For instance, between 1970 and 2002, the median age at first marriage increased by nearly four years for both men and women, and the likelihood that an individual age 40-44 never marries more than doubled. Divorce rates increased as well. As a result, the percentage of adults in the population married fell substantially, from 71.7 in 1970 to 55.3 percent in 2002.<sup>1</sup> The decline in marriage has been accompanied by a surge in women's human capital accumulation and labor force participation rates, both in absolute terms, and relative to those of men.

Such major social change has raised concerns among various segments of the public. One fear is that women's marriage prospects will be hampered by their professional achievements. Economist Sylvia Hewlett expressed this view in a *New York Times* interview: "Nowadays...the rule of thumb seems to be that the more successful the woman, the less likely it is she will find a husband or bear a child." (Dowd, 2002) The premise behind the *Times* article is that there is a need for women to "marry up" – i.e., there is a tendency for "hypergamy". As the number of successful women increases, the competition for successful husbands intensifies. In other words, the marriage market penalizes women for their achievements, and that penalty is growing over time.

I refer to the marriage market penalty associated with professional success as the "success gap." The gap is measured as the difference in the likelihood that a woman

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<sup>1</sup> These statistics are all reported in Blau, Ferber Winkler, Table 9.1 from various sources.

with exactly twelve years of education marries (or is married) minus the likelihood that a woman with more than sixteen years of education marries. For instance, my analysis will show that, in 1980, 83.2 percent of women age 40-44 with exactly 12 years of education were married, while 73.1 percent of women the same age with over 16 years of education were married. This implies in a success gap of  $83.2 - 73.1 = 9.9$  years.

However, economic theory is unclear that the changes in recent decades would, in fact, lead to an increase in the success gap. Moreover, for the population I study, there is little evidence as to whether hypergamy ever was, or continues to be, the norm. In this paper I develop approaches to testing these hypotheses, and carry out the tests using data from the US Census of Population.

Section II of the paper outlines the theory of marriage which is the backdrop for the analysis. Section III describes the variables used in the analysis and reviews trends in key variables over the analysis period, 1980-2000. I use data on individuals age 40-44, which is, for women, essentially the end of the childbearing years and also after most people have completed their education. I focus on the characteristic “education”, as it is less likely to be endogenous with respect to marriage outcomes than, say, income or wages. Section IV describes the methods. I (1) track education-marriage profiles; (2) estimate the success gap, and test for changes over time; (3) perform parallel analyses for men, and for the outcome “Mother”; (4) measure hypergamy, and track hypergamy over time. Section V reports the results. I find that the success gap, measured in terms of whether a woman is currently married, whether she was ever married, and whether she is a mother, declined significantly in each decade. There are marked sheepskin effects in terms of current marriage for women. Hypergamy declined overall. However, the

results vary over the education distribution. Declines in marriage were stronger among the less educated, and hypergamy increased at the lower end of the education distribution. Section VI concludes.

## **II. Theory**

Becker's work (1973, 1974, 1981, 1985) provides much of the foundation for the economic theory of marriage. An individual chooses a spouse by comparing the value of being married to him or her relative to the value of other options – marriage to other individuals, or staying single. Marriage markets are in equilibrium.

There are several respects in which the economic theories of marriage explain why the prevalence of marriage has fallen. Becker's (1973) specialization and exchange model provides one. Gains from marriage arise because men have a comparative advantage in market work and women have a comparative advantage in home production. Household well-being is maximized when spouses take on their traditional roles: each specializing in the area in which he or she has the comparative advantage. This explains why married men are more apt to be employed than married women.

But the last several decades have seen a narrowing in the comparative advantage, as women's labor market productivity has increased relative to men's. As Goldin (1990) and Smith and Ward (1989) point out, this is clearest when we consider selection corrected estimates of women's labor market earnings.<sup>2</sup> Oppenheimer's (1997) review

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<sup>2</sup> Blau and Kahn (2004) track these trends into the more recent period and note that there has been slowing convergence in women's and men's earnings, largely attributable to the

cites a number of social scientists who attribute the decline in marriage to the decline in comparative advantage and reduced scope for gains from specialization and exchange.

Grossbard-Shechtman (1993) develops a general equilibrium model of the markets for male and female market labor and spousal labor. One focus of her work is the marriage squeeze – marriage market conditions adverse to women born on the upswing of the baby boom – in explaining the decline in marriage. In terms of this model, the marriage squeeze reduced the price of women’s spousal labor. This combined with the increase in women’s relative wages to reduce equilibrium marriage rates and increase the supply of women’s labor to the formal market.

Other forces can be introduced into the framework. Akerlof et al (1996), Akerlof (1998) and Goldin and Katz (2002) focus on the role of improved birth control technology which weakened the link between sex and marriage and provided women greater control over their human capital accumulation paths. Debate (Murray 1984, Moffitt 1992) exists about the size of the incentives posed by the welfare system. Wilson (1987) emphasizes the role of the deteriorating labor market for less-skilled men, particularly within the black community. Changes in family policy such as the liberalization of divorce laws, as well as shifts in preferences and social norms, also shape the returns to marriage.

The question of “who marries whom” is addressed in the literature on marriage market matching, or assortative mating. “Positive assortative mating” is the degree of similarity of spouses with respect to an outcome and “negative assortive mating” is the degree of dissimilarity. Becker (1973) shows that positive assortative mating is the

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decreased narrowing of the unexplained portion of the wage gap.

equilibrium outcome of a matching model when spouses are complements in the household production process, and negative assortative mating is the outcome when gains from marriage arise from specialization and exchange. Lam (1988) adds that, to the extent the motivation for marriage is the consumption of household public goods, there will be more positive assortative mating. Grossbard-Shechtman's (1993) theory incorporates other characterizations of matching, such as the tendency to marry within (homogamy), or outside (heterogamy) one's group.

Mare (1991) and Pencavel (1998) find that there has been an increase in positive assortative mating with respect to education; i.e., spouses' education has become increasingly similar. These papers address the problem symmetrically – not considering whether women are more or less likely to “marry up” (or “marry down”).

This is a particular concern when we note that the distribution of education across the population has shifted considerably in the last several decades. Women have become substantially more educated relative to men. For instance, in 1960, 39 percent of bachelors degrees were awarded to women, but by 2000 the number swelled to 57 percent. The number of doctorates awarded to women grew fourfold over the same forty year period – from 11 percent in 1960 to 45 percent in 2000. Similar increases are reported across the entire educational spectrum.<sup>3</sup>

What are the implications for the marriage market when the distribution of women's, relative to men's education, shifts? To answer this question it is necessary to consider the issue of the *asymmetry* in marriage matching patterns, i.e., *hypergamy*.

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<sup>3</sup> Blau, Ferber, Winkler (2005) based on data from the U.S. Department of Education, *Digest of Education Statistics* 1995.

“Hypergamy” is the tendency for women to marry up with respect to some favorable characteristic, such as education, income, or social status. Hypergamy, in one form or another, is an empirical regularity over time and across cultures.

Work outside of economics which explains hypergamy as the result of fundamental social norms and preferences. For instance, anthropologist Barbara Miller (1981) studied areas of rural north India and found that strong social pressures for hypergamy implied a lack of suitable husbands for high caste girls. This created a disequilibrium that was resolved through female infanticide.

The Talmud, a set of Jewish writings originating in the second century on which Jewish law and practice are based, also comments on the practice. Yevamot, 63a contains advice for men to “go down a step to take a wife,” another states that “a woman from a more distinguished family than her husband may consider herself superior and act haughtily toward him” (Rashi).<sup>4</sup>

The notion that preferences are the fundamental source of this empirical regularity remains. For instance, in a 2002 *New York Times* column, Maureen Dowd stated: “Men veer away from ‘challenging’ women because they have an atavistic desire to be the superior force in a relationship.”

In contrast to the preference/norms explanations, hypergamy can be the outcome of a model of specialization and exchange. Specialization and exchange of the “traditional form” – in which the husband specializes in market work, the wife

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<sup>4</sup>I am grateful to Levis Kochin and David Twersky for helping to find the references from the Talmud.

specializes in home production and they combine resources and benefit from gains to trade – is the result of men’s comparative advantage in the labor market.

Given an initial degree of hypergamy in a market – determined by social norms, by preferences, or by comparative advantage - women at the top of the education distribution, will tend to be disadvantaged (i.e., less likely to marry). The “*success gap*” is the likelihood that a woman with twelve years of education (typically the median level of education) will marry minus the likelihood that a woman at the highest education level will marry.

All other things being equal, the increased concentration of women at the top of the education distribution which we have seen over the last several decades would be expected to increase the success gap, as it creates greater competition for educated men. However, hypergamy is endogenous, and will itself change in response to the shift in the education distribution, as well as to other external forces. Considering all these factors, theory alone cannot tell us whether the success gap has been increasing or decreasing.

Rather than estimate a full structural model in this paper, I test for changes in the success gap and hypergamy over time. Theory allows us to conjecture about how we would expect changes in comparative advantage, preferences and norms to affect each of the endogenous variables.<sup>5</sup> These relationships are outlined in Table 1.

The exogenous forces in this theoretical framework are the parameters driving matching patterns. The most relevant for the question of changes in hypergamy and success gaps are the parameters shaping comparative advantage and the seemingly

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<sup>5</sup>As Pollak (2000) points out, formal matching models typically do not account for non-marriage.

ubiquitous preferences/social norms for women to (at least weakly) marry up. Education is a strong correlate of market human capital, and is used here to proxy career success, which is one factor underlying comparative advantage.<sup>6</sup>

First (row 1), for a given tendency for hypergamy, the greater concentration of women relative to men at the top of the education distribution increases competition for more educated men. This will exacerbate the marriage market disadvantage faced by educated women - i.e., it will increase the success gap directly. It will also create some subsequent pressure for hypergamy to decline.

Table 1

	If:	Success Gap	Hypergamy
1	Concentration of Women vs. Men at the Top of the Education Distribution ? (Direct)	?	?
2	Comparative Advantage Changes so that Gains from Specialization & Exchange ?	?	?
3	Preferences/Norms for Hypergamy ?	?	?
4	Net Effect	Indeterminate	?

In the traditional specialization and exchange model, men have the comparative advantage in market work and women have the comparative advantage in home production. Gains from marriage will be greater for couples who are hypergamous with respect to labor market productivity, or characteristics associated with productivity.

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<sup>6</sup> Education also increases home productivity (Grossbard-Shechtman, 1983, hypothesis 17; Jepson, 2005). The presumption is that the effect on labor market productivity exceeds the effect on the value within the home. There are some issues with causality that are discussed in Section VI.

Factors such as a decline in discrimination, an increase in women's labor market human capital, or an increase in the demand for women's jobs increase women's earnings relative to men's. This reduces men's comparative advantage in market work, and the scope for traditional specialization and exchange type marriage <sup>7</sup> and impacts marriage market matching patterns. Whether due to shifts in the education distribution, or other exogenous parameter changes, the narrowing of the comparative advantage will reduce hypergamy and narrow the success gap (row 2).

Anecdotal evidence and literature from the social sciences in general, such as the examples in the introduction, focus on the roles of preferences and norms as the fundamental factor underlying the stylized fact of hypergamy. However social change characterized much of the period in which the women studied made their marriage (and divorce) decisions. Long run adjustments in preferences and social norms may have paved the way for more egalitarian attitudes for marriage. Whether they are exogenous, or in response to the shifting education distribution, we would expect these shifts in preferences and norms to reduce hypergamy and the success gap (row 3). <sup>8</sup>

On net, we would expect hypergamy to decline over the period, but the direction of the change in the success gap is indeterminate. On one hand, as Dowd and Hewlett

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<sup>7</sup> Empirical analyses indicating that specialization and exchange has declined include Lundberg and Rose (1999) and Gray (1997). Blau (1998) reports that women in 1988 spend significantly less, and men spend somewhat more, time on housework than in 1978.

<sup>8</sup> Goldstein and Kenney report that women with college education are more relatively more likely to be married in 1980 than in 1960.

imply, the concentration effect will tend to widen the success gap. On the other hand, changes in social norms and preferences, and comparative advantage, may mitigate or even reverse the concentration effect – and lead to a decline in the success gap over time.

While the focus of this paper is on the upper end of the education distribution, it is important to note that similar effects might operate at the lower end of the distribution. Less educated men, as well as highly educated women, are crowded out by the “concentration effect”. If the model described above holds uniformly throughout the education distribution, this would generate a decline in the proportion of less-educated men who are married.

We would also expect shifts in social norms and preferences to generate changes in the likelihood that less educated men would marry that mirror the effects on educated women.

Most salient, however, would be the change in comparative advantage. The decline in high school graduation rates since the 1970’s, and the deteriorating market for less-skilled male labor, combine to reduce the returns to market work for less-educated men. As Oppenheimer (1997), Oppenheimer et al (1997) and Ellwood and Jencks (2005) note, when men’s ability to contribute by “bring home the bacon” recedes, marriages motivated by specialization and exchange of may fail, or not arise in the first place.

As with the effects on women at the upper end of the distribution, the net result of these changes on marriage propensities cannot be predicted by theory alone. These questions must also be answered with empirical analysis.

### **III. Data**

The data are from the United States Census of Population Public Use Microdata Sample (PUMS) (5% sample) for 1980, 1990 and 2000. Unless otherwise specified, analyses pertain to individuals age 40-44. Table 2 reports characteristics of the sample in each year for men and women.

#### Education

The coding of education on the Census changed between 1980 and 1990. In 1980, each respondent reported the number of years of school attended and whether the final year was completed. The questions in 1990 and 2000 focused more on degrees attained. For 1980, some of the lower levels of education were grouped together because of small cell counts. The correspondence between the education measures is outlined in Appendix Table A.I-1.

The means by year in Table 2 indicate that women's education increased more than men's over the period. On average, women age 40-44 had 12.50 years of education in 1980, which increased to 13.35 in 2000. The education distributions plotted in Figure 1 indicate that the increase was driven by an increase in post-secondary education at several levels.

The education of men age 40-44 increased from 1980 to 1990, and declined in the subsequent decade. The distributions plotted in Figure 2 indicate that the spike is attributable to increased college attendance by men who would have been draft age in the peak years of the Vietnam War draft. This is consistent with Card and Lemieux's (2001) findings indicating that draft avoidance in the 1960's led to a surge in college education.

Interestingly, there was a small increase in college attendance by women of the comparable cohort which receded for the subsequent cohort. The data are also consistent with Card and Lemieux's findings (2000) regarding increasing high school dropout rates of males over the period.

Figure 3 plots the differences in the education distributions for men and women. For all levels of education above high school graduation, the difference between the percentage of women in the category and the percentage of men in the category increased over the twenty year period. For virtually every level from high school completion and below, the differences between the percentages declined. Clearly, there was a shift in the distribution of education across the population, with relatively more women with greater than high school education, and relatively more men with high school education or less.

### Marriage

For most of the analyses, the outcome is "marriage". Two measures of marital status are used: whether the individual is currently married ("Currently Married," or "Current" for short), and whether the individual has ever been married ("Ever Married," or "Ever"). "Current" is a dummy variable which equals one if the individual is currently married – whether living with spouse or separated. "Ever" equals one if "Current" equals one or if the individual is a widow or is divorced.

While there has clearly been a decline in marriage, the vast majority of both men and women have been married at some time in their lives by age 40-44. Even in 2000, 89 percent of all women, and 85 percent of all men had been married at some point. Due to the possibility of divorce (and to a minor extent, widowhood), fewer individuals report

being currently married than having ever been married. The percentage of women currently married fell from 81 percent in 1980 to 72 percent in 2000; the comparable numbers for men are 85 and 72 percent, respectively.

### Motherhood

One ancillary analysis tracks the outcome, motherhood, with respect to education. Unfortunately, only an imperfect measure of motherhood can be constructed consistently over the entire period. “Mother” is based on individuals residing within the household. Mothers of children residing elsewhere may be misclassified. This is further complicated by the fact that in some years it is not possible to distinguish step-children from biological children. In order to maintain comparability across years, “Mother” includes both biological and step-children. Appendix Table A.I-2 details the method used to develop “Mother”.

The statistics in Table 2 indicate that motherhood, as well as marriage, declined over the period. In 1980, 80 percent of women age 40-44 had a child co-residing, but the percentage fell to 70 percent by 2000. As women in this age group may have had children in their teens or early twenties that are no longer co-resident, I compute the proportions for women age 30-34 and 35-39. For each age category, the proportion of women who were mothers fell by about 10 percentage points over the twenty-year period.

## **IV. Methods**

The relationship between education and marriage is examined in two ways. First, graphically, I track education-marriage profiles in Figures 4-7 for the years 1980, 1990

and 2000 using the measures of education described above. The plots use the most precise data available, although (as described in Section III) I cannot construct exactly comparable education series across years.

Second, I report associated statistics in Tables 3-6. The percentages of women married, by level of education, for each year are in columns (1), (2) and (4) of each table. The education measures are aggregated into the following categories:

<i>E</i>	<i>Education</i>	<i>Census Definition</i>
1.	Educ_LT12	Less than twelve years of education (1980) Not high school graduate (1990-2000)
2.	Educ_12	Exactly 12 years of education (1980) High school graduate (1990-2000)
3.	Educ_GT12_LT16	More than Educ_12 but less than Educ_16
4.	Educ_16	Exactly 16 years of education (1980) College graduate (1990-2000)
5.	Educ_GT16	More than 16 years of education (1980) Master's Degree Professional Degree Doctorate (1990-2000)

For each year, the difference in these percentage for education category *E* minus the percentage for category *E-1* is “*Diff*”. The decade to decade changes in *Diff* are reported in columns (3) and (5), respectively.

The success gap for each year is reported in the bottom of the respective column. It is measured as the percentage with exactly 12 years of education who are married, minus the percentage with more than 16 years of education who are married. The changes in the success gap by decade are reported in columns (3) and (5).

Significance tests are derived from probit models using pooled data. (Greene, 1999). The model uses pooled data for 1980, 1990 and 2000 and is of the form:

$$\begin{aligned}
 \Pr(\text{Married}_{i,y}) = & \\
 & \mathbf{b}_{12,1980}D_{12,i,1980} + \mathbf{b}_{12,1990}D_{12,i,1990} + \mathbf{b}_{12,2000}D_{12,i,2000} \\
 & + \mathbf{b}_{12,16,1980}D_{12,16,i,1980} + \mathbf{b}_{12,16,1990}D_{12,16,i,1990} + \mathbf{b}_{12,16,2000}D_{12,16,i,2000} \quad (1) \\
 & + \mathbf{b}_{16,1980}D_{16,i,1980} + \mathbf{b}_{16,1990}D_{16,i,1990} + \mathbf{b}_{16,2000}D_{16,i,2000} \\
 & + \mathbf{b}_{GT16,1980}D_{GT16,i,1980} + \mathbf{b}_{GT16,1990}D_{GT16,i,1990} + \mathbf{b}_{GT16,2000}D_{GT16,i,2000} + \mathbf{e}_{i,y}
 \end{aligned}$$

$D_{E,i,y}$  is a dummy variable which equals one if individual “i” in year “y” had *at least* “E” years of education; where  $E = \{\text{Educ\_LT12}, \text{Educ\_12}, \text{Educ\_GT12\_LT16}, \text{Educ\_16}, \text{Educ\_GT16}\}$ . The test of whether the difference in the likelihood of marriage for an individual with “E” relative to “E-1” years of education in year “y” is a test of whether the incremental effect of  $D_{E,y}$  is significant. The p-value associated with this test reported below *Diff* in columns (1), (2) and (4). The p-value associated with the test of whether the success gap is significant is a test of whether the sum of the incremental effects of  $D_{3,y}, D_{4,y}$  and  $D_{5,y}$  is zero. This p-value is reported immediately below the estimate of the success gap.

The test of whether *Diff* changed from decade to decade is undertaken by comparing incremental effects for the two points in time. These are the p-values in columns (3) and (5). The test of whether the success gap changed between the year “y-10” and year “y” is a test of whether the sum of incremental effects of  $D_{3,y}, D_{4,y}$  and

$D_{5,y}$  minus the sum of the effects of  $D_{3,y-10}$ ,  $D_{4,y-10}$  and  $D_{5,y-10}$  is zero. This p-value is reported immediately below the estimate of the change in the success gap.

The methods for the outcome “Mother” in Figures 8-10 and Tables 7-9 are identical.

## **V. Results**

The results for the outcome “Currently Married” and “Ever Married” for women age 40-44 are described in Section V.A. The comparable results for men are in Section V.B. and the results for the outcome “Mother” are in Section V.C. Hypergamy results are discussed in Section V.D.

### **V.A. Women, Education and Marriage**

The relationship between education and the likelihood of marriage, by year, is plotted in Figure 4.

Figure 4 indicates that the percentage currently married is (weakly) increasing with each year of education up to twelve years, at which point there is a spike. There is a decline for each of the following levels of education, and then another spike at sixteen years of education, after which the slope of the profile becomes strikingly negative.

The profile shifts down at lower levels of education, in each of the two subsequent decades. For 1990, there are still spikes in the profile at twelve and sixteen years of education; otherwise the profile is flatter in the latter decades. In 2000, other than the two spikes, the profile appears to be essentially flat or increasing from high

school graduation forward. The three profiles actually cross between 18 and 19 years of education.

The spikes in the “Current” profile at twelve and sixteen years of education are reminiscent of Hungerford and Solon’s (1987) “sheepskin effects” in earnings which are found when estimating the relationship between education and earnings. Sheepskin effects in earnings are the significantly greater estimated increases in earnings at the twelfth and sixteen year of education relative to other years of education – indicating a premium for degree completion.

Table 3 presents results corresponding Figure 4. The last row in the table is the success gap. For a given year, it is computed as the difference between the percentage of women with 12 years of education ( $E=2$ ) who were married and the percentage with more than 16 years of education ( $E=5$ ) who were married. So, the gap for 1980 was 83.2% – 73.1.% or 9.3 percentage points, and the gap for 1990 was 77.7% – 72.7% or 5.1<sup>9</sup> percentage points. Column (3) indicates that the gap fell by 5.5 percentage points in the 1980’s.

The gap fell by another 5.7 percentage points in the 1990’s. By 2000, the success gap was -0.7 – women with higher levels of education were slightly *more* likely to be married.

The sheepskin effects were significant in each of the three years. Going from exactly twelve years of education (Educ\_12) to more than twelve but less than sixteen years of education (Educ\_GT12\_LT16) is associated with a significantly lower likelihood

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<sup>9</sup> Some differences are off by a tenth of a point due to rounding error.

of marriage, but proceeding to college completion (Educ\_16) is associated with a significantly greater likelihood of marriage ( $p < .001$  in all cases.)

The profiles for “Ever” are plotted in Figure 5 and, the associated data are reported in Table 4. The “Ever” profiles are similar to those for “Current”, but they are smoother – there are no spikes at twelve and sixteen years of education. For 1980, the likelihood of having ever been married is substantially lower at 19 years of education relative to that at 12 years of education. The difference reflects a success gap consistent with Dowd and Hewlett’s statements. However, this difference fell in each of the two subsequent decades. The compression in the profiles at high levels of education indicates that the widely noted decline in marriage, at least for women in this age group, was been driven mainly by women at lower levels of education.

Notably, there are no sheepskin effects in the “Ever” profile. The difference between the two profiles is that “Ever” includes divorced and widowed women, and “Current” does not. As widowhood in this age group is rare, the difference between the two profiles reflects divorced women and suggests that women who tend to drop out from college are more likely to “drop out” from marriage.<sup>10</sup> The unobservables associated

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<sup>10</sup> Another possibility is that women who are divorced are more likely to be attending college at the date of the interview. I examined this using the 1980, which asks whether the individual has completed the respective year of education, or is still attending or dropped out. The percentages currently attending women (men) in the sample were: 3.8 (2.9) percent of married, 4.7 (3.1) percent of widowed, 6.7 (3.3) percent of divorced, 4.9 (3.2) percent of separated and 6.0 (4.1) percent of never married. To the extent that interviews were conducted over the summer, the percentage currently attending do not

with degree completion are associated with marriage completion as well. The fact that degree completion, rather than educational attainment, reflects the social skills that carry over to career success provides support for a model in which education is a signal of ability (Spence, 1973).<sup>11</sup>

In summary, the success gap, as measured as the difference in the likelihood of marriage for women with 12 years of education and those with more than 16 years off education, was significant in each of the three years. However, the gap fell significantly in the 1980's and the 1990's. The "sheepskin" effects in terms of the outcome "Current" were significant in each year, but there were no sheepskin effects in terms of the outcome "Ever". But what about the other side of the market?

### **V.B. Men, Education and Marriage**

The education/marriage profiles for men are plotted in Figures 6 and 7.

For 1980, education appears to increase the likelihood a man is currently married for levels of education below high school completion. The profile is flat beyond that point, perhaps with some small declines between 12 and 15 years of education. The profiles shifted down and became steeper in each of the next two decades.

The 1980 and 1990 "Ever" profiles are relatively flat from twelve years of education. The profiles shifted downward in each of the subsequent decades, particularly for the lower levels of education. Overall, the figures suggest that, for men, the decline in

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reflect those still in school but between years in a program.

<sup>11</sup> I thank Ted Bergstrom for this point.

marriage over the last several decades reflects primarily a decline at the lower end of the education distribution.<sup>12 13</sup>

The results in Table 5 indicate that in 1980, beyond high school completion, marriage rates varied little by education – the range is 85.4 for greater than high school but less than college to 86.0 for exactly twelve years of education. There was also a small (0.5 percent, but borderline significant ( $p=.027$ )) success gap. By 1990 a “negative success gap” for men clearly emerged. Marriage rates for men with more than 16 years of education were 5.8 percent higher than for those with just twelve years of education. This increased to 12.2 percent in 2000. The 1990 and 2000 gaps, and the changes by decade were all highly significant ( $p<.001$ ).

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<sup>12</sup> Because cohabitation has become a partial substitute for marriage over the period (Bumpass et al, 1991), I also performed the entire analysis using the outcome “Partner” – whether an individual is currently married *or* cohabiting (living with an opposite sex partner). Cohabiting is relatively rare for individuals in their early 40’s. Therefore, for both men and women, the results for “Partner” were similar to those for “Current” (Rose, 2004).

<sup>13</sup> Education/marriage profiles for men and women were also estimated for whites and blacks separately and are reported in Rose (2004). The profiles for whites are similar to those for the overall sample, which is not surprising as whites comprise a majority of the population. The patterns for blacks were substantially different, however. There was no “success gap” in any year. The profiles for both black men and black women were approximately flat in 1980, but became more upward sloping in each of the subsequent decades.

In 1980, there is evidence of a quantitatively very small but statistically significant sheepskin effect. The marriage rate declines by about a half of a percentage point, when moving from 12 years of education to the next level ( $p < .001$ ), and then increases by nearly the same rate when proceeding to college completion ( $p = .079$ ). There are no sheepskin effect in the other years.

Marriage rates for the outcome “Ever Married” were also relatively constant over most of the range of education in 1980. Small declines in the top two education categories, however, combine to produce a significant success gap of 1.4 percent ( $p < .001$ ). The gap was not significant in 1990, and became negative (-3.0) in 2000. The marriage advantage associated with education is not nearly as pronounced for the outcome “Ever” as it is for “Current”.

### **V.C. The Motherhood Success Gap**

Because much of the popular concern regarding the success gap focuses on the fact that career success compromises women’s opportunities for motherhood, I also track the relationship between education and motherhood in Figures 8 through 10 and Table 7 through 9.

Figure 8 suggests that, at higher levels of education, there was indeed a negative relationship between motherhood and marriage for women age 40-44 – when childbearing is, by and large, completed. In 1980, 81.3 percent of women with exactly 12 years of education were mothers at age 40-44, while only 72.0 percent of women with more than a college education, yielding a “motherhood success gap” of 9.6 percentage points. However, as with women’s marriage success gap, the difference fell in each of

the subsequent two decades: to 8.0 percentage points by 1990 and 2.3 percentage points by 2000. These gaps and the subsequent declines in the gaps, were statistically significant.

As the measure of motherhood I use is based on coresident children, to the extent a woman's children will have left home, motherhood will be understated. Since more educated women have their first child later, this will tend to lead to greater understatement for less educated women, and understate the motherhood success gap. Rindfuss, Morgan and Offutt (1996) report that the tendency for educated women to delay childbearing increased during the period 1963-1989. This means that there will be a greater understatement of the gap over the period 1980-2000, or a spurious decline in the success gap.

As a check, I look at the relationship between education and motherhood for women age 30-34 and 35-39 in Figures 9 and 10, and Tables 8 and 9. While not as marked, there is a success gap for each of these groups, which declines significantly in the 1980's (and may increase at the highest level in the 1990's). The upshot is that, overall, for women, education is becoming less of an impediment to parenthood as well as to marriage.<sup>14</sup>

#### **V.D. Hypergamy**

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<sup>14</sup> A measure of motherhood based on children ever born can be calculated from the Census data for 1980 and 1990, but not 2000. Results using this measure reported in Rose (2004) also indicate a decline in the motherhood success gap.

In this section I examine marriage matching patterns for women age 40-44 and test for a shift in these patterns. I characterize married couples as “hypogamous” if the husband had less education than the wife, “same” if the spouses reported the same level of education, and “hypergamous” if the husband had more education than the wife. Results are reported in the top panel of Table 10, and graphed in bar charts in Figure 11.

In 1980, the largest category was “hypergamous” (37.6 percent), followed by “same education” (36.1 percent ) and “hypogamous” (26.3 percent). The difference of 12 percentage points between the proportion of couples in which the wife married up relative to the proportion who married down, indicates hypergamy overall. However, over the 20-year period, hypergamy fell, and hypogamy increased. The patterns for husbands are similar.

To compare the extent of asymmetry among various age groups and cohorts, and across the education distribution, I define “net hypergamy” as the percentage of couples in a particular group that are hypergamous minus the percentage that are hypogamous. Figure 12 plots this index along the education distribution.

Overall, the likelihood a woman marries up declines as her education increases. Net hypergamy is positive at the bottom of the education distribution and negative at the top of the distribution. Overall, there is a decline in net hypergamy – i.e., in the tendency for women to marry up. However, this differs across the education distribution. While there is a decline for couples with more educated wives there is an increase in net hypergamy at the bottom of the distribution.

The data in the bottom two panels of Table 10 are consistent with the relationships suggested by the figures. For women with less than twelve years of

education, net hypergamy is significantly positive in each year, and the degree of hypergamy increased significantly in the 1980's and the 1990's. However, at the top of the education distribution, net hypergamy fell significantly in each of the two decades.

## **VI. Conclusions**

Marriage and education patterns have shifted dramatically in the last several decades. At first glance one might expect that the increase in the concentration of women at the top of the education distribution would have disadvantaged more educated women, and less educated men, in the marriage market. In this paper, I explore this implication by tracking education/marriage profiles, and marriage matching patterns, from the 1980, 1990 and 2000 U.S. Census, for men and women age 40-44 in those years.

The success gap – defined as the likelihood a highly educated woman marries relative to a woman with twelve years of education – actually declined in the 1980's and 1990's. This was true whether the gap was measured in terms of whether a woman was currently married, was ever married, or has had any children. Hypergamy - the tendency to marry up - also declined over the period, perhaps in part to accommodate the changing education distribution, or, plausibly, due to a decline in specialization and exchange or a shift in norms or preferences.

However, disaggregating across the education distribution reveals a more complex pattern. The weakening economic prospects of men at the bottom of the education distribution have rendered many below the threshold of marriagiability. While marriage rates have plummeted for men and women with a less than high school education, the declines for those with a college degree or more have been modest.

Matching patterns are also not uniform throughout the education distribution. The decline in hypergamy has been concentrated at the top of the education distribution - hypergamy has actually *increased* among couples in which the wife has less than a high school degree. Less educated women have increasingly been reaching upward in the education distribution for husbands, if not opting out of marriage entirely. The findings in this paper accord with Oppenheimer's (1997) view that a model of declining returns to specialization and exchange best describes marriage patterns for lower-income individuals.

Several caveats regarding causality must be considered in evaluating these results. For instance, if later cohorts of more educated women are less negatively selected in terms of unobservables associated with marriage, the decline in the success gap could be attributed to a change in the pattern of selection into marriage. Alternatively, it may be that couples do not match on education, but on some characteristic associated with education, and matching on this characteristic remains more stable over time. Also, education may respond to marriage itself – with women in the later cohorts being more likely to remain in school while married. Outcomes such as earnings or income may better describe ultimate career success. However, using these measures would raise new levels of concern regarding endogeneity, as labor market outcomes for both women and men have been shown to respond to marriage and parenthood<sup>15</sup>. As the literature expands, more rigorous econometric techniques can be applied to all these problems in order to address these difficult issues of causality.

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<sup>15</sup> Waldfogel, 1991; Korenman and Neumark, 1991, 1992, 1994; Lundberg and Rose, 2000, 2002.

There are some important implications of these results. First, for women, higher education no longer appears to be a hindrance to marriage, and motherhood. The perception that women face a stark choice between career and family is becoming less accurate in each successive decade.

Second, the decline in marriage is overwhelmingly a phenomenon of the less educated segments of the population. Men's education-marriage profiles have gone from being relatively flat in 1980 to strongly steep in 2000. The worsening labor market opportunities for less-skilled men have severely limited their ability to contribute to marriage. In terms of policy, measures designed to encourage marriage are more likely to be successful when targeted towards improving the economic prospects of men at the bottom of the economic spectrum.

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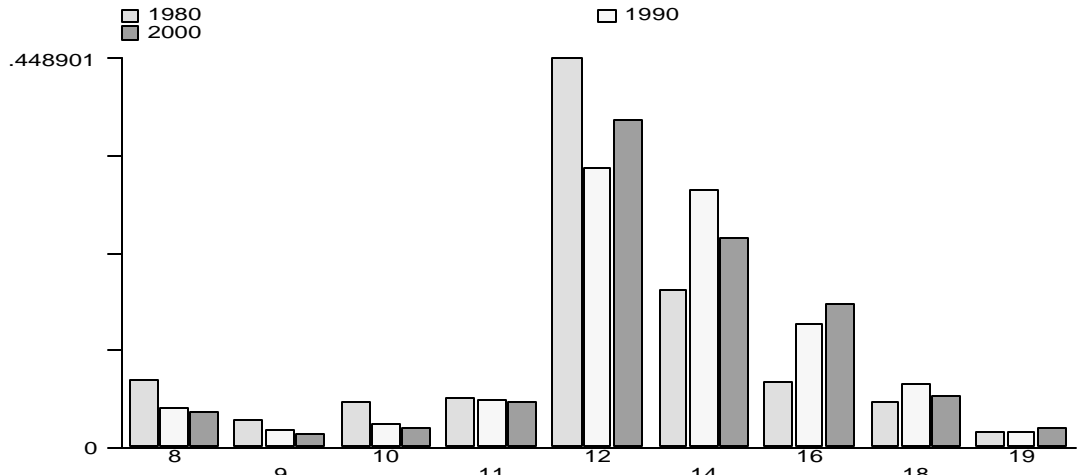


Figure 1: Education Distribution, Women Age 40-44, by Year

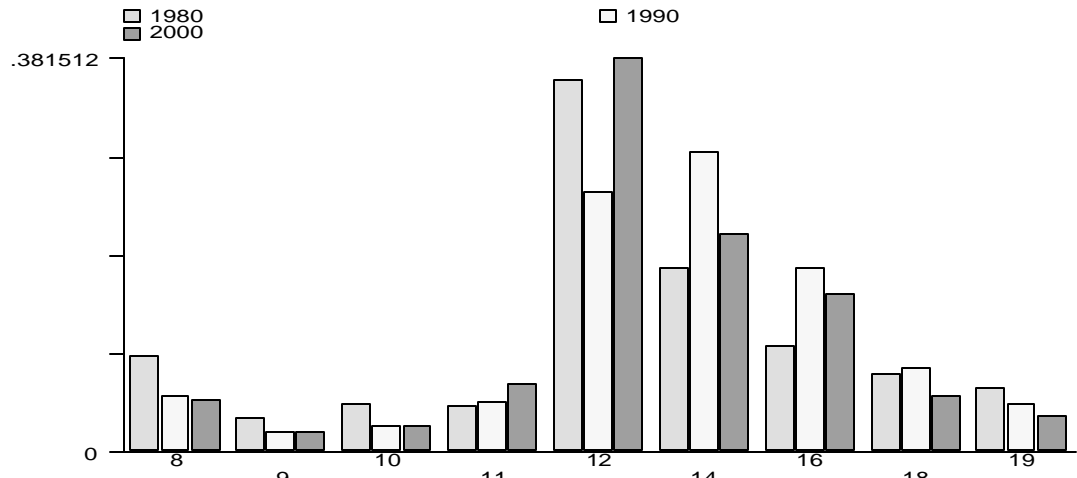


Figure 2: Education Distribution, Men Age 40-44, by Year

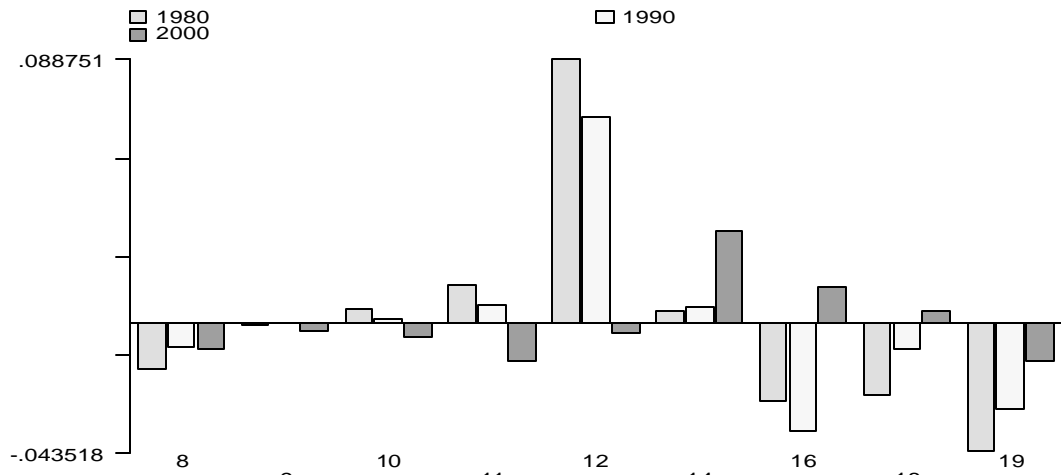


Figure 3: Education Distribution, Women-Men, Age 40-44, by Year

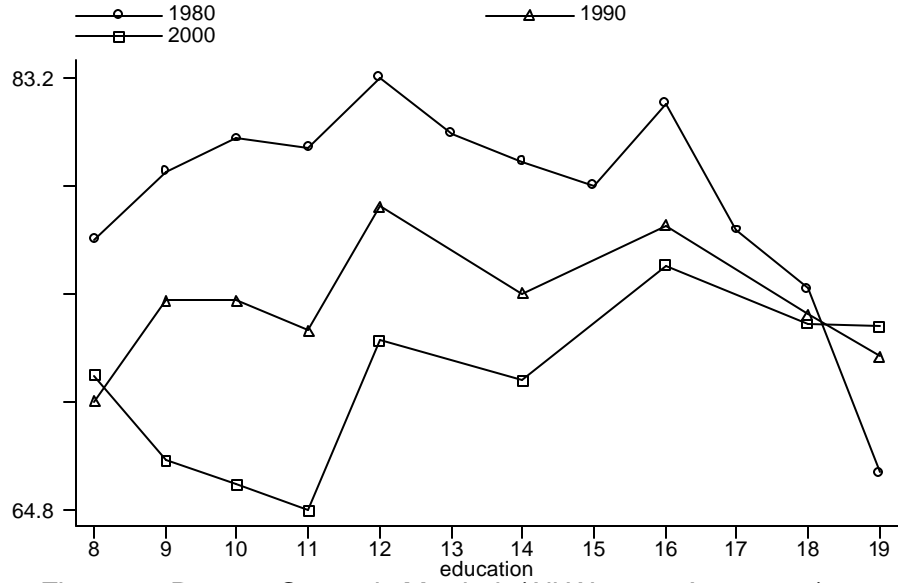


Figure 4: Percent Currently Married (All Women, Age 40-44)

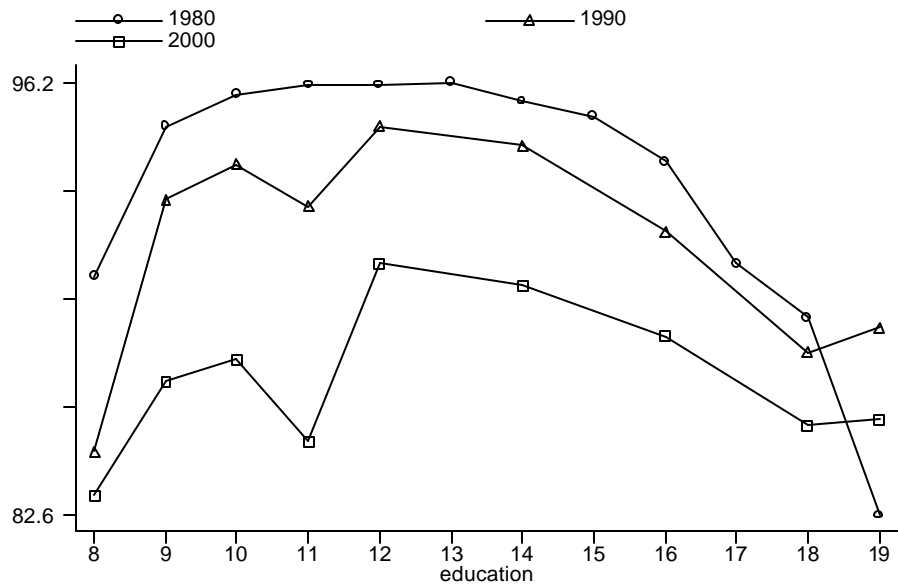


Figure 5: Percent Ever Married (All Women, Age 40-44)

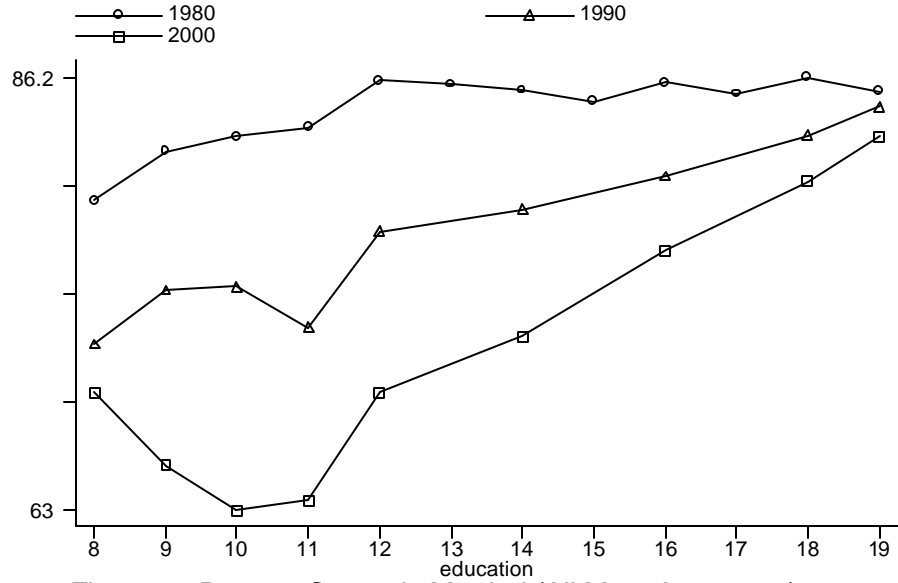


Figure 6: Percent Currently Married (All Men, Age 40-44)

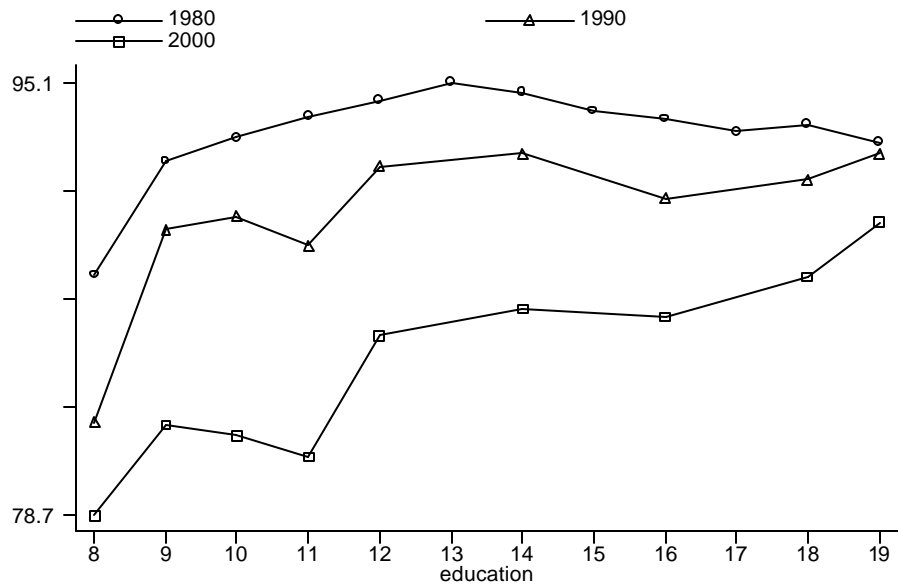


Figure 7: Percent Ever Married (All Men, Age 40-44)

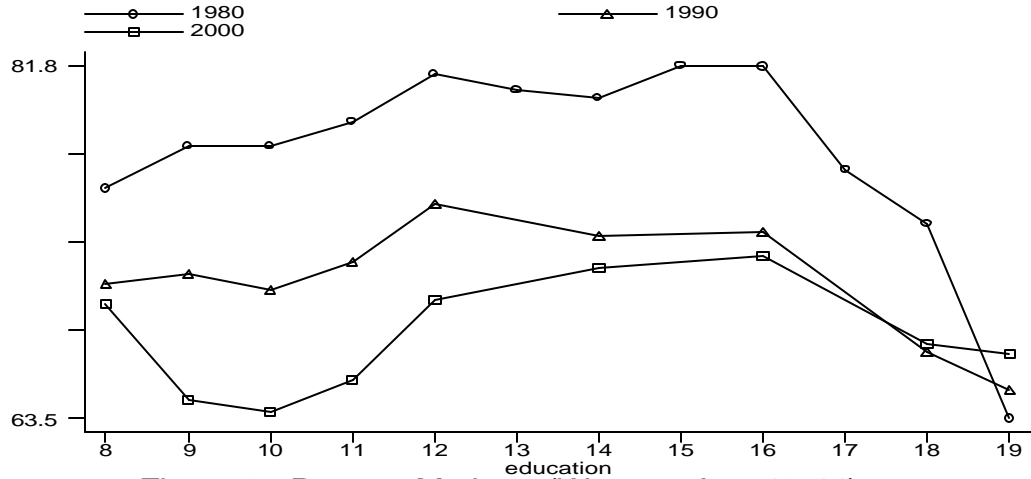


Figure 8: Percent Mothers (Women, Age 40-44)

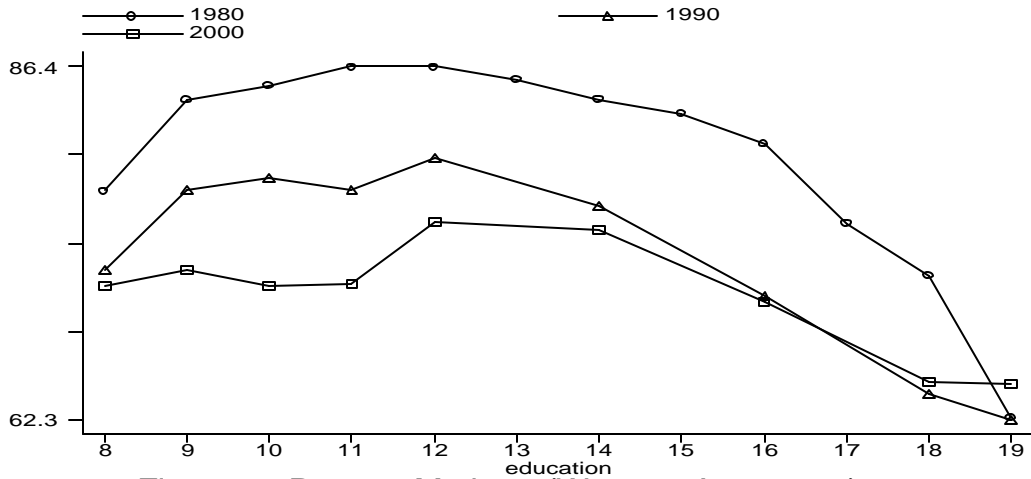


Figure 9: Percent Mothers (Women, Age 35-39)

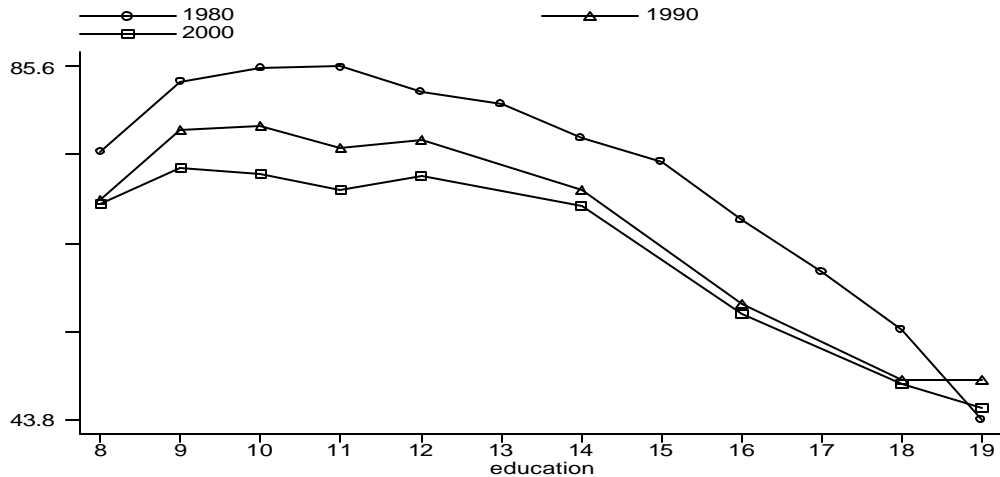


Figure 10: Percent Mothers (Women, Age 30-34)

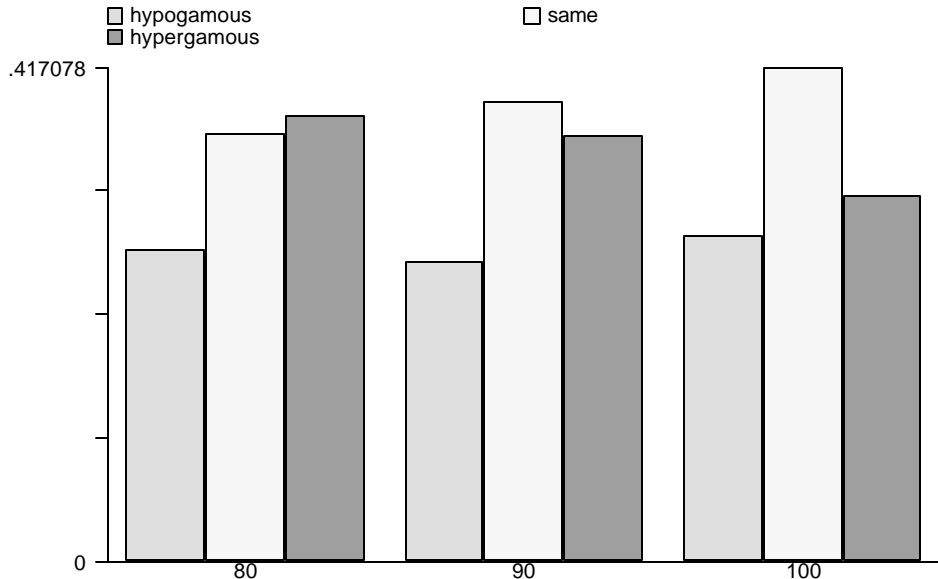


Figure 11: Percentage of Match Type : Wives Age 40-44

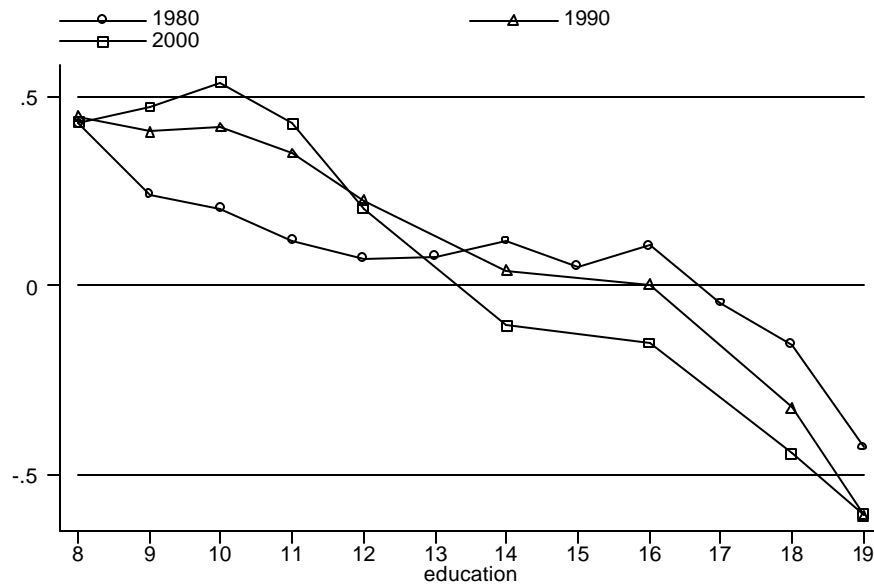


Figure 12: Net Hypergamy, Wives Age 40-44

**Table 2: Means (Standard Deviations)  
Individuals Age 40-44, Unless Otherwise Specified**

		Women			Men		
		1980	1990	2000	1980	1990	2000
All	Education	12.50 (2.5)	13.37 (2.5)	13.35 (2.4)	13.01 (3.0)	13.74 (2.7)	13.24 (2.6)
	Currently Married	0.81 (0.4)	0.75 (0.4)	0.72 (0.5)	0.85 (0.4)	0.79 (0.4)	0.72 (0.5)
	Ever Married	0.95 (0.2)	0.93 (0.3)	0.89 (0.3)	0.93 (0.2)	0.91 (0.3)	0.85 (0.4)
	N	298382	451241	566050	285184	433806	549878
All	Mother (Age 40-44) (a)	0.80 (0.4)	0.73 (0.4)	0.70 (0.5)			
	Mother (Age 35-39) (a)	0.83 (0.4)	0.76 (0.4)	0.73 (0.4)			
	N	357751	504186	567280			
	Mother (Age 30-34) (a)	0.76 (0.4)	0.70 (0.5)	0.66 (0.5)			
	N	448973	542553	496148			
(a) Measure based on co-resident children.							

<b>Table 3</b>									
<b>Percentage Currently Married and Success Gap , by Education Level</b>									
<b>All Women, Age 40-44</b>									
		<b>(1)</b>		<b>(2)</b>		<b>(3)</b>	<b>(4)</b>		<b>(5)</b>
<b>Education</b>		<b>1980</b>		<b>1990</b>		<b>1990 -1980</b>	<b>2000</b>		<b>2000 -1990</b>
		<i>Pct</i>	<i>Diff (p)</i>	<i>Pct</i>	<i>Diff (p)</i>	<i>Diff (p)</i>	<i>Pct</i>	<i>Diff (p)</i>	<i>Diff (p)</i>
<b>1.</b>	<b>Educ_LT12</b>	78.8		71.9			67.0		
<b>2.</b>	<b>Educ_12</b>	83.2	4.4	77.7	5.8	1.4	72.0	5.0	-0.9
			<.001		<.001	.04		<.001	<.001
<b>3.</b>	<b>Educ_GT12_LT16</b>	79.8	-3.4	74.0	-3.7	-0.3	70.3	-1.6	2.1
			<.001		<.001	.34		<.001	<.001
<b>4.</b>	<b>Educ_16</b>	82.1	2.3	76.9	2.9	0.6	75.2	4.9	2.0
			<.001		<.001	.55		<.001	<.001
<b>5.</b>	<b>Educ_GT16</b>	73.1	-9.0	72.7	-4.2	4.8	72.7	-2.5	1.6
			<.001		<.001	.31		<.001	<.001
<b>Success Gap</b>			10.0		5.0	-5.1		-0.7	-5.7
			<.001		<.001	<.001		<.001	<.001

<b>Table 4</b>									
<b>Percentage Ever Married and Success Gap , by Education Level</b>									
<b>All Women, Age 40-44</b>									
		<b>(1)</b>		<b>(2)</b>		<b>(3)</b>	<b>(4)</b>		<b>(5)</b>
<b>Education</b>		<b>1980</b>		<b>1990</b>		<b>1990 -1980</b>	<b>2000</b>		<b>2000 -1990</b>
		<i>Pct</i>	<i>Diff (p)</i>	<i>Pct</i>	<i>Diff (p)</i>	<i>Diff (p)</i>	<i>Pct</i>	<i>Diff (p)</i>	<i>Diff (p)</i>
<b>1.</b>	<b>Educ_LT12</b>	93.7		90.2			85.0		
<b>2.</b>	<b>Educ_12</b>	96.1	2.3	94.8	4.6	2.3	90.5	5.5	0.9
			<.001		<.001	<.001		<.001	<.001
<b>3.</b>	<b>Educ_GT12_LT16</b>	95.7	-.4	94.2	-.6	-0.2	89.8	-0.7	-0.1
			<.001		<.001	.58		<.001	.22
<b>4.</b>	<b>Educ_16</b>	93.7	-1.9	91.5	-2.7	-0.8	88.2	-1.7	1.1
			<.001		<.001	.26		<.001	<.001
<b>5.</b>	<b>Educ_GT16</b>	87.8	-5.9	87.9	-3.6	2.4	85.4	-2.7	0.8
			<.001		<.001	<.001		<.001	<.001
<b>Success Gap</b>			8.3		6.9	-1.4		5.1	-1.8
			<.001		<.001	<.001		<.001	<.001

<b>Table 5</b>									
<b>Percentage Currently Married and Success Gap , by Education Level</b>									
<b>All Men, Age 40-44</b>									
		<b>(1)</b>		<b>(2)</b>		<b>(3)</b>	<b>(4)</b>		<b>(5)</b>
<b>Education</b>		<b>1980</b>		<b>1990</b>		<b>1990 -1980</b>	<b>2000</b>		<b>2000 -1990</b>
		<i>Pct</i>	<i>Diff (p)</i>	<i>Pct</i>	<i>Diff (p)</i>	<i>Diff (p)</i>	<i>Pct</i>	<i>Diff (p)</i>	<i>Diff (p)</i>
<b>1.</b>	<b>Educ_LT12</b>	81.5		73.1			65.4		
<b>2.</b>	<b>Educ_12</b>	86.0	4.5	77.9	4.8	0.3	69.3	3.9	-0.9
			<.001		<.001	.002		<.001	<.001
<b>3.</b>	<b>Educ_GT12_LT16</b>	85.4	-0.6	79.1	1.2	1.8	72.3	3.0	1.8
			<.001		<.001	<.001		<.001	<.001
<b>4.</b>	<b>Educ_16</b>	85.9	0.5	80.9	1.8	1.3	76.9	4.5	2.8
			.079		<.001	<.001		<.001	<.001
<b>5.</b>	<b>Educ_GT16</b>	85.6	-0.3	83.7	2.8	3.1	81.5	4.7	1.8
			.256		<.001	<.001		<.001	<.001
<b>Success Gap</b>			0.5		-5.8	-6.2		-12.2	-6.4
			.027		<.001	<.001		<.001	<.001

<b>Table 6</b>									
<b>Percentage Ever Married and Success Gap , by Education Level</b>									
<b>All Men, Age 40-44</b>									
		<b>(1)</b>		<b>(2)</b>		<b>(3)</b>	<b>(4)</b>		<b>(5)</b>
<b>Education</b>		<b>1980</b>		<b>1990</b>		<b>1990 -1980</b>	<b>2000</b>		<b>2000 -1990</b>
		<i>Pct</i>	<i>Diff (p)</i>	<i>Pct</i>	<i>Diff (p)</i>	<i>Diff (p)</i>	<i>Pct</i>	<i>Diff (p)</i>	<i>Diff (p)</i>
<b>1.</b>	<b>Educ_LT12</b>	90.8		86.7			80.5		
<b>2.</b>	<b>Educ_12</b>	94.4	3.7	91.9	5.2	1.5	85.5	5.1	-0.1
			<.001		<.001	<.001		<.001	<.001
<b>3.</b>	<b>Educ_GT12_LT16</b>	94.7	0.2	92.4	0.6	0.4	86.5	0.9	0.4
			<.001		<.001	.582		<.001	.223
<b>4.</b>	<b>Educ_16</b>	93.7	-1.0	90.7	-1.7	-0.8	86.2	-0.3	1.4
			<.001		<.001	.260		<.001	<.001
<b>5.</b>	<b>Educ_GT16</b>	93.1	-0.6	91.8	1.0	1.6	88.6	2.4	1.3
			<.001		<.001	<.001		<.001	<.001
<b>Success Gap</b>			1.4		0.1	-1.2	-1.5	-3.0	-3.1
			<.001		.43	<.001		<.001	<.001

<b>Table 7</b>									
<b>Percentage of Women who are Mothers , by Education Level</b>									
<b>Women, Age 40-44</b>									
		<b>(1)</b>		<b>(2)</b>		<b>(3)</b>	<b>(4)</b>		<b>(5)</b>
<b>Education</b>		<b>1980</b>		<b>1990</b>		<b>1990 -1980</b>	<b>2000</b>		<b>2000 -1990</b>
		<i>Pct</i>	<i>Diff (p)</i>	<i>Pct</i>	<i>Diff (p)</i>	<i>Diff (p)</i>	<i>Pct</i>	<i>Diff (p)</i>	<i>Diff (p)</i>
<b>1.</b>	<b>Educ_LT12</b>	77.2		70.9			66.4		
<b>2.</b>	<b>Educ_12</b>	81.3	4.2	74.6	3.7	-0.5	69.6	3.2	-0.5
			<.001		<.001	<.001		<.001	.01
<b>3.</b>	<b>Educ_GT12_LT16</b>	80.6	-0.7	73.0	-1.6	-0.9	71.3	1.7	3.4
			<.001		<.001	.01		<.001	<.001
<b>4.</b>	<b>Educ_16</b>	81.7	1.1	73.2	0.2	-0.9	71.9	0.5	0.4
			<.001		.41	.01		.01	.22
<b>5.</b>	<b>Educ_GT16</b>	72.0	-9.6	66.6	-6.6	-6.6	67.3	-4.6	2.0
			<.001		<.001	<.001		<.001	<.001
<b>Motherhood Success Gap</b>			9.3		8.0	-1.2		2.3	-5.7
			<.001		<.001	<.001		<.001	<.001

<b>Table 8</b>									
<b>Percentage of Women who are Mothers , by Education Level</b>									
<b>Women, Age 35-39</b>									
		<b>(1)</b>		<b>(2)</b>		<b>(3)</b>	<b>(4)</b>		<b>(5)</b>
<b>Education</b>		<b>1980</b>		<b>1990</b>		<b>1990 -1980</b>	<b>2000</b>		<b>2000 -1990</b>
		<i>Pct</i>	<i>Diff (p)</i>	<i>Pct</i>	<i>Diff (p)</i>	<i>Diff (p)</i>	<i>Pct</i>	<i>Diff (p)</i>	<i>Diff (p)</i>
<b>1.</b>	<b>Educ_LT12</b>	83.0		76.5			71.6		
<b>2.</b>	<b>Educ_12</b>	86.4	3.4	80.1	3.6	0.2	75.8	4.2	0.6
			<.001		<.001	.022		<.001	.370
<b>3.</b>	<b>Educ_GT12_LT16</b>	84.4	-2.0	76.9	-3.2	-1.2	75.2	-0.6	2.6
			<.001		<.001	.008		<.001	<.001
<b>4.</b>	<b>Educ_16</b>	81.1	-3.4	70.8	-6.1	-2.8	70.3	-4.9	1.3
			<.001		<.001	<.001		<.001	<.001
<b>5.</b>	<b>Educ_GT16</b>	71.1	-10.0	63.6	-7.1	-7.1	64.8	-5.5	1.6
			<.001		<.001	<.001		<.001	<.001
<b>Motherhood Success Gap</b>			15.4		16.4	1.1		11.0	-5.5
			<.001		<.001	<.001		<.001	<.001

**Table 9**  
**Percentage of Women who are Mothers , by Education Level**  
**Women, Age 30-34**

		(1)		(2)		(3)	(4)		(5)
Education		1980		1990		1990 -1980	2000		2000 -1990
		<i>Pct</i>	<i>Diff</i> <i>(p)</i>	<i>Pct</i>	<i>Diff</i> <i>(p)</i>	<i>Diff</i> <i>(p)</i>	<i>Pct</i>	<i>Diff</i> <i>(p)</i>	<i>Diff</i> <i>(p)</i>
<b>1.</b>	<b>Educ_LT12</b>	82.1		75.2			71.2		
<b>2.</b>	<b>Educ_12</b>	82.6	0.5 .004	76.9	1.6 <.001	1.1 <.001	72.6	1.4 <.001	-0.3 .161
<b>3.</b>	<b>Educ_GT12_LT16</b>	77.7	-4.9 <.001	71.0	-5.8 <.001	-1.0 .483	69.0	-3.6 <.001	2.3 <.001
<b>4.</b>	<b>Educ_16</b>	67.4	-10.3 <.001	57.4	-13.6 <.001	-3.3 <.001	56.3	-12.7 <.001	0.9 <.001
<b>5.</b>	<b>Educ_GT16</b>	54.7	-10.7 <.001	48.5	-8.9 <.001	-8.9 <.001	47.2	-9.0 <.001	-0.1 <.001
<b>Motherhood Success Gap</b>			27.9 <.001		28.4 <.001	0.5 <.001		25.4 <.001	-3.0 <.001

**Table 10**  
**Percent of Marriages by Type**  
**Wives Age 40-44**

**Hypogamous (Husband's Education < Wife's Education)**  
**Same (Husband's Education = Wife's Education)**  
**Hypergamous (Husband's Education > Wife's Education)**

	Wives Age 40-44				
	1980	1990	1990-1980	2000	2000-1990
<b>Hypogamous</b>	26.3	25.2	-1.1	27.4	2.2
<b>Same</b>	36.1	38.8	2.7	41.7	2.9
<b>Hypergamous</b>	37.6	35.9	-1.7	30.9	-5
<b>Net Hypergamy (All)</b>	11.3	10.7	-0.6	3.5	-7.2
<b>(p: ?Hypergamy=0)</b>	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
<b>Net Hypergamy (Ed&lt;12)</b>	27.2	40.2	13	45.4	5.2
<b>(p: ?Hypergamy=0)</b>	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
<b>Net Hypergamy (Ed&gt;12)</b>	4.5	-4.1	-8.6	-18.7	-14.6
<b>(p: ?Hypergamy=0)</b>	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

**Appendix I**  
**Details of Data Transformations**

**Table A.I-1**  
**Measuring Education Using U.S. Census Data**

1980 Code (Highest year of school completed)	1990 Code: (Educational attainment)	2000 Code: (Educational attainment)	Edu1 (1980)	Edu2 (1990, 2000)
Never attended school Nursery school Kindergarten First grade Second grade Third grade Fourth grade Fifth grade Sixth grade Seventh grade Eighth grade	No school completed, Nursery school, Kindergarten, 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , or 4 <sup>th</sup> grade, 5 <sup>th</sup> , 6 <sup>th</sup> , 7 <sup>th</sup> , or 8 <sup>th</sup> grade	No school completed Nursery school to 4 <sup>th</sup> grade 5 <sup>th</sup> grade or 6 <sup>th</sup> grade 7 <sup>th</sup> grade or 8 <sup>th</sup> grade	8	8
Ninth grade	Ninth grade	Ninth grade	9	9
Tenth grade	Tenth grade	Tenth grade	10	10
Eleventh grade	Eleventh grade Twelfth grade, no diploma	Eleventh grade, Twelfth grade, no diploma	11	11
Twelfth grade	High School graduate: diploma or GED	High School graduate: diploma or GED	12	12
First year of college			13	14
Second year of college	Some college, but no degree, Associate degree in college (occupational or academic program)	Some college, but less than 1 year One or more years of college, no degree Associate degree	14	14
Third year of college			15	14
Fourth year college	Bachelor's degree	Bachelor's degree	16	16
Fifth year of college			17	16
Sixth year of college	Master's degree	Master's degree	18	18
Seventh year of college Eighth year of college	Professional degree Doctorate	Professional degree Doctorate	19	19

**Table A.I-2  
Measuring Motherhood Using U.S. Census Data**

	1980	1990	2000
If individual was head and household contained:			
Child of Head	Maybe <sup>a</sup>	Mother <sup>b</sup>	Mother <sup>b,d</sup>
Grandchild of Head	Maybe <sup>a</sup>	Maybe <sup>c</sup>	Maybe <sup>c</sup>
Child-in-Law of Head	Maybe <sup>a</sup>	Maybe <sup>c</sup>	Maybe <sup>c</sup>
Step-Child of Head	NA	Step	Step
If individual was spouse of head and household contained:			
Child of Head	Maybe <sup>a</sup>	Maybe	Maybe
Grandchild of Head	Maybe <sup>a</sup>	Maybe	Maybe
Child-in-Law of Head	Maybe <sup>a</sup>	Maybe	Maybe
Step-Child of Head	NA	Mother	Mother
If individual was a Mother in Mother/Child Subfamily <sup>e</sup>	Maybe	Maybe	Maybe
If individual was Mother, Grandmother, or Mother-in-Law <sup>f</sup> of Head	Maybe	Maybe	Maybe

<sup>a</sup> “Child” and associated variables do not distinguish step- vs. biological relationships with respect to head in 1980.

<sup>b</sup> Biological and step-children are distinguished in 1990 and 2000.

<sup>d</sup> 2000 Census data distinguish biological and adopted children; both are treated as children in here.

<sup>c</sup> Cannot distinguish grandchildren from step-grandchildren, and children-in-law from step children-in-law in 1990 and 2000.

<sup>e</sup> Biological and step-relationships are not distinguished for subfamilies in any year.

<sup>f</sup> Biological and step-relationships are not distinguished for parents, grandparents, and parents-in-law of head for any year.

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If individual had different relationships with respect to different children in household, he or she was assigned to a category pursuant to the following ranking:

Mother > Maybe > Step > Not Mother

“Mother-1” includes Mother and Maybe. “Mother-2” was used in the analysis, and includes Mother, Maybe and Step. This measures less accurate for the last two years, but comparable over all years.