Marrying Down:
The Gender Gap in Post-Secondary Completion & Educational Hypogamy between 1960 and 2010

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Abstract

A reverse gender gap has developed in post-secondary completion with women now exiting post-secondary institutions at higher rates than men. Men and women use educational homogamy as a primary characteristic in assortative mating; the gender gap in post-secondary completion has created a shortage of men with bachelor’s degrees, relative to women. The magnitudes of these differences vary by race and will impact racial marriage markets differently given current rates of racial endogamy. Using decennial Census data, I find that a trend in hypogamy, relative to homogamy, has increased for women with bachelor’s degrees between the ages of 26 and 35 from 1960 to 2010. White women and Hispanic women have increased their rates of hypogamy the most, while the trend for black women has been flat. Asian women are the only racial sub-group whose likelihood of hypogamy has decreased relative to homogamy, while their likelihood of hypergamy has increased. These findings are significant as the formation of the marital unit has other consequences for labor markets, fertility, and gender norms.
Introduction

Women are currently exiting post-secondary institutions at much higher rates than men in the United States. This gender gap has grown with relative consistency since post-secondary graduation rates between men and women reached equilibrium in the early 1980s (Buchmann and DiPrete 2006b; Charles 2003; Goldin and Katz 2008; Goldin, Katz, and Kuziemko 2006). Scholars are still coming to a consensus about the causes of this trend, though in recent years it has garnered more attention because it continues to increase across all social backgrounds (Attewell and Lavin 2007; Bowen, Chingos, and McPherson 2011). A reversal of a “once persistent pattern of stratification” (Buchmann and DiPrete 2006b) will have far reaching social consequences, though without fully understanding its causes, it is difficult to predict its consequences. Though much of the literature on educational advantage has focused on the positive impacts of education in earnings, health, and socioeconomic advantage, a reversal in the gender gap, will not necessarily mirror these trends because it does not represent a classic situation of stratification.

As women’s access to higher education and the value of a bachelor’s degree have increased since 1960 the relative importance of marriage to their social and economic standing has changed (Buchmann and DiPrete 2006b; Charles 2003; Goldin and Katz 2008; Goldin, Katz, and Kuziemko 2006). Education has become both a resource and a social signal. Education is a primary characteristic used by actors selecting partners on the marriage market and educational homogamy has increased over time (Blackwell 1998; Mare 1991; Qian and Preston 1993; Schwartz and Mare 2005) as women have exited post-secondary institutions at higher rates. The gender gap in post-secondary
completion represents a problem in supply and demand for marriage markets. With education being a primary factor in assortative mate selection, a decrease in men with bachelor’s degrees relative to women will produce an imbalance in marriage markets changing the availability of matching options for women with a bachelor’s degree or higher. Using decennial data from the U.S. Census and the American Community Survey, this paper seeks to establish women’s increased educational achievement relative to men and its correlation with patterns in educational homogamy.

The Gender Gap in Post-Secondary Completion

Though the reversal of the gender gap in post-secondary completion rates is significant, it is not the first time in the history of the United States that women have outpaced men in educational achievement. In the beginning of the nineteenth century, women enrolled in and graduated from high school at greater rates than men. (Goldin and Katz 2008). Men and women enrolled in undergraduate institutions at equitable rates between 1900 and 1930, but did not complete four-year degrees at the same rate, in large part due to the educational demands of potential careers. At this point, men overtook women until about 1947 when female enrollment continued to increase at a larger rate relative to male enrollment (Goldin and Katz 2008; Goldin, Katz, and Kuziemko 2006). The gains made by men, first due to labor shortages during the Great Depression and then because of changes in post-World War II labor market demands were reversed by women in the cohorts of the 1960s as women closed the gap with men in educational achievement and overtook them in the early 1980s (Buchmann and DiPrete 2006b; Charles and Luoh 2003; Goldin and Katz 2008; Goldin, Katz, and Kuziemko 2006).¹

Both men and women have increased their overall educational attainment relative to the

¹ The exact year of the reversal depends on the sources and sampling of the data set used, but most are
general population since 1960, though women still complete bachelor’s degrees at higher rates than men (Charles 2003; Goldin and Katz 2008).

Scholars have not yet determined the causes of the reversal in the gender gap though many contributing factors have been examined including:

1. increased rates of return to degree attainment;
2. less security through marriage markets because of increased rates of divorce;
3. changing opportunities in the labor force;
4. changing gender roles and attitudes;
5. changing family dynamics;
6. increased availability of contraception
7. the “marriage squeeze”\(^2\); and
8. women’s higher achievement in primary and secondary education (Buchmann and DiPrete 2006a; Clark, Lee, Goodman, and Yacco 2008; Heer and Grossbard-Shechtman 1981). With the exception of changing family dynamics (Buchmann and DiPrete 2006b), each explanation lacks enough evidence to prove causation. Though it is possible that these returns have propelled women to increasingly value a bachelor’s degree, it is unlikely that they caused the reversal of the gender gap as many of them emerged around the same time period as the reversal (Buchmann and DiPrete 2006a). Despite scholars’ lack of consensus, the gender gap exists in many industrialized countries, suggesting common causal factors and trends (Goldin and Katz 2008).

Part of what is so significant about the post-secondary completion gap is that it is

\(^2\) Heer and Grossbard-Shecter argue that the marriage market is affected by the number of births in each year. Since men tend to marry slightly younger women than them, an imbalance between years in a within the same birth cohort provided a shortage of men (1991).
persistent across all races and socio-economic backgrounds in the United States. Women outperform males across all races at every stage of the schooling process and are even more likely to earn bachelor’s degrees within Hispanic and black populations. Black and Hispanic men take more time to graduate out of any other sub-demographic, being more likely to graduate in five or six years than four. Additionally, when controlling for standard demographic characteristics and academic preparation, black and Hispanic women are more likely to graduate than white men (Attewell and Lavin 2007; Bowen, Chingos, and McPherson 2011). The gender gap has proven to be consistent and widespread, and has changed women’s access to resources over time.

**Women and Education**

Stratification of any kind produces differentiated access to resources and the gains of women in education have produced many changes in family structure, gender norms, gender roles, fertility, and labor markets over time. However, the reversal in access to education has not produced a complete reversal of earnings or family structure, showing that the reverse in stratification of post-secondary completion will not necessarily create an equal and opposite stratification of men in the resources accessed through increased levels of education.

A great deal of literature has documented the impact of increased levels of women’s education on the formation of family units. Though higher levels of educational achievement tend to delay marriage and cohabitation (Thornton, Axinn, and Teachman 1995), women with higher levels of education are more likely to eventually marry than their less-educated peers (Cherlin 2004; Lichter, McLaughlin, Kephart, and Landry 1992; Mare and Winship 1991) and are less likely to divorce (Tzeng 1992).
Higher education amongst women is also linked to lower birthrates because their delay of first marriage and firstborn child. Women with higher levels of education also tend to have fewer children overall (Kaufman 2000; Oppenheimer 1994).

As with men’s income, education raises women’s wages, though not to the same level as men’s wages. In the 1980s, women’s earnings became more diversified, indicating their integration into positions and earnings levels formerly held by men (Bernhardt 1995). Yet, despite women’s increased rates of post-secondary completion they continue to earn less relative to men. Academic major (Attewell and Lavin 2007; Thomas and Zhang 2005) and the selectivity of the university attended (Hoxby 1998; Thomas and Zhang 2005) have been shown to have the greatest impact on earnings for college graduates. Differentiation in decisions made while attending college including selection of major (Attewell and Lavin 2007; Jacobs 1995; Jacobs 1999; Turner and Bowen 1999), selectivity of institution, and full or part-time status (Jacobs 1999) have been identified as factors contributing to women’s lesser earnings, relative to men in addition to wage penalties largely associated with motherhood due to shorter work hours and career discontinuity (Bertrand, Goldin, and Katz 2010; Budig and England 2001; Thomas and Zhang 2005). However, even when controlling for these factors, men still out earn women (Bobbitt-Zeher 2007).

Higher levels of education and access to employment are also linked with more egalitarian attitudes, causing gender norms within the traditional family structure to change (Thornton, Alwin, and Camburn 1983; Thornton and Freedman 1979). Scholars have investigated the consequences of the traditional family dynamic in earnings and found that increased earnings and education neither reverse the power balance between
couples (Tichenor 1999) nor decrease the desirability of marriage for women (Oppenheimer 1997).

The effects of increased education for women resemble a complex system with employment, wages, family structure, gender norms, and fertility all interacting. Each of these intersect through marital selection, with education having a large impact on the timing and sorting of marriage and spouses. As access to education has increased for both men and women, education has become increasingly important in assortative mating.

**Homogamy and Education**

Marriage is an evolving social function that responds to social trends and norms over time (Bianchi and Casper 2000; Cherlin 2004; Kalmijn 1998). Many scholars believe that rates of marriage have declined since the 1960s (Heer and Grossbard-Shechtman 1981; Qian 1998), however others argue that this estimation is due to a limiting of the data examining younger women and a reflection of later ages of entry into first marriage over time (Goldstein and Kenney 2001). Some argue that the decline in marriage rates have been offset by increasing rates of cohabitation, which is more common among couples with less education (Bumpass, Castro Martin, and Sweet 1991; Bumpass and Sweet 1989; Bumpass, Sweet, and Cherlin 1991; Schoen and Weinick 1993). The average age of first marriage for men and women has increased significantly between 1960 and 2010 (Bianchi and Casper 2000; Goldstein and Kenney 2001; Heer and Grossbard-Shechtman 1981; Mare 1991). Whereas educated women were less likely to marry in 1960 (Goldstein and Kenney 2001), that trend has now reversed (Cherlin 2004; Lichter, McLaughlin, Kephart, and Landry 1992; Mare and Winship 1991).
Marriage results from “both preferences and opportunity” (Kalmijn 1998), and the process of marital selection involves the process of sorting out candidates with preferable characteristics from a marriageable pool. Much of the literature on marital selection has focused on the practice of “homogamy,” or selecting a mate with traits similar to your own. Hypergamy is considered “marrying up,” when a mate has more desirable social characteristics than your own, and hypogamy is referred to as “marrying down,” when your mate has less desirable social traits than what you bring into the marital bargain.

Much of the literature on marital selection in recent decades has emphasized the growing importance of educational homogamy. While religion has decreased as a characteristic of marital selection (Kalmijn 1991a), education has increased as a main factor in forming homogamous unions (Arum, Roksa, and Budig 2008; Cherlin 2004; Kalmijn 1991b; Oppenheimer 1994; Oppenheimer 1997). Some have suggested that education has increased in importance in marital selection because it can be used as a proxy for economic potential, particularly with more women entering the marriage market with degree credentials (Schoen and Weinick 1993; Schwartz and Mare 2005).³ Many scholars have demonstrated that educational homogamy has increased since the mid-20th century (Blackwell 1998; Mare 1991; Qian and Preston 1993; Schwartz and Mare 2005).⁴

³ The importance of economic status homogamy has been identified as being more important than cultural homogamy (Kalmijn 1994). This could also be related to education’s proxy for increased economic potential. Kalmijn, Matthijs. 1994. "Assortative Mating by Cultural and Economic Occupational Status." American Journal of Sociology 100:422-454.

⁴ Fu and Heaton did not find concurrent results, instead finding an “overall flat or slightly declining trend” of educational homogamy more consistent with Rockwell, but acknowledged that this could be due to “substantial differences in rules for data inclusion” or could be due to a rise in the percentage of the population with bachelor’s degrees. I align my argument with the majority of the literature supporting the conclusion of an increase in educational homogamy. Fu, Xuanning and Tim B. Heaton. 2008. "Racial and Educational Homogamy: 1980 to 2000." Sociological Perspectives 51:735-758, Rockwell, Richard C.
(Blackwell 1998) and a decreased likelihood of intermarriage between those at both ends of the educational distribution (Fu and Heaton 2008; Schwartz and Mare 2005). Being older increases the odds of crossing an educational barrier with time spent out of school (Blackwell 1998; Mare 1991) with the availability of partners for educated women over 25 decreasing (Qian and Preston 1993). Age also increases the importance of economic status homogamy at the expense of cultural status homogamy (Kalmijn 1994). A decreased likelihood of educational homogamy with increased age could also be due to a tendency to marry someone who attended the same collegiate institution or one geographically nearby (Mare 1991; Nielsen and Svarer 2008). If this opportunity is missed, older women may be more likely to come into contact with a more diverse pool of marriageable men after they exit college. When college educated women do marry heterogamously, they are more likely to seek a man with higher levels of education (Blackwell and Lichter 2004).

While education has become increasingly important in spousal selection, racial homogamy has declined, but remains the most common characteristic matched in spousal selection (Fu and Heaton 2008; Qian 1997). Education is an important mediating factor in interracial marriages with those who intermarry by race having higher levels of education (Fu and Heaton 2008; Qian 1997). When racial intermarriage happens with whites, it is most common first with Asian Americans, then with Hispanics, and is least likely with African Americans (Qian 1997). However, among educationally heterogamous marriages, spouses from lower social status racial groups are more likely to be the partner with a higher level of education (Qian 1997). Most notably, Asian

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women are more likely to marry hypergamously when marrying across racial lines (Qian 1997) and, white men and Asian women are a more common pairing than any other interracial match (Fu and Heaton 2008; Sung 1990).

Marriage markets function differently within different racial groups (Espenshade 1985). Overall, black women are less likely to marry and cohabit (Mare and Winship 1991; Schoen and Kluegel 1988; Schoen and Weinick 1993), and when they do marry, are more likely to marry hypogamously (Qian 1997) and divorce (Philips and Sweeney 2005; Sweeney and Philips 2004). While matches formed heterogamously by race and religion are more likely to be educationally homogamous (Fu and Heaton 2008; Kalmijn 1991a; Qian 1997), women’s increased post-secondary attainment relative to men’s will decrease the supply of educationally homogamous matches available. With these gaps being even larger for black and Hispanic women, scholars have suggested that given low existing rates of interracial marriage, marriage and fertility patterns will have to change to accommodate the increasing demand relative to the lack of supply (Massey, Charles, Lundy, and Fischer 2008).

Marriage has often been a force for social and cultural change (Kalmijn 1998), and if women continue to earn bachelor’s degrees at higher rates than men, opportunities for homogamous marriages will diminish, either increasing the demand for educated men within the marriage market or resorting the most significant factors in spousal selection. Though Lichter, Anderson, and Hayward found that constraints on marriage markets do not alter women’s willingness to marry heterogamously (Lichter, Anderson, and Hayward 1995), others have found constraints can induce hypogamous marriage. Marriage markets with a shortage in quantity and quality of available men delay entry
into first marriage (Lichter, McLaughlin, Kephart, and Landry 1992). Given an educationally less favorable marriage market, residents will be more likely to marry down and their chance of doing so increases with age (Lewis and Oppenheimer 2000), with white women being more likely to marry hypergamosly, while black women are more likely to marry hypogamosly (Schoen and Kluegel 1988).

A shortage in supply of educationally homogamous mates for women with bachelor’s degrees could have an important influence on family structure, gender norms, and socio-economic stratification. An increase in educationally, and therefore economically, desirable women will increase competition amongst men for high earning wives (Mare 1991; Oppenheimer 1994). Whereas scholars have worried that educational homogamy could increase socio-economic stratification, isolating those with high earning potential in their own family units, an increase in hypogamous marriage for women with bachelor’s degrees could reverse this trend. An increase in educationally heterogamous marriage could impact the divorce rate, as educationally homogamous couples are less likely to divorce (Schwartz 2010; Tzeng 1992) with hypergamous marriages having lower divorce rates than hypogamous marriages (Bitter 1986; Bumpass, Castro Martin, and Sweet 1991; Heckert, Nowak, and Snyder 1998).\(^5\)

With the gender gap in post-secondary completion creating widening gap in the supply and demand of educationally homogamous men and women with bachelor’s degrees, practices of assortative mating will have to shift. Barring a drastic change in

\(^5\) Heckert, Nowak, and Snyder also found that couples that had hypogamous relationships with the wife contributing more income to the household were more likely to divorce. Couples with wives’ earnings contributing 50-75% of the total household income were more likely to divorce, while couples with wives’ earnings contributing 75-100% of total household income were less likely to divorce. The magnitude in the difference of the coefficients was not large, leading them to argue that the social context in which a wife contributes more in earnings than the husband in a marriage could have different influences on the stability of the marriage. Heckert, D. Alex, Thomas C. Nowak, and Kay A. Snyder. 1998. "The Impact of Husbands' and Wives' Relative Earnings on Marital Disruption." Ibid.60:690-703.
social norms towards polygamy or homosexual partnerships\textsuperscript{6} or in preferences of marriage for educated women (Cherlin 2004; Lichter, McLaughlin, Kephart, and Landry 1992; Mare and Winship 1991), women will be forced to marry hypogamously as the gender gap increases. Using decennial data from the Census and the American Community Survey from 1960-2010, I will conduct a trend analysis using a multinomial logistic regression model to examine the changes in college educated women’s likelihood to marry hypogamously over time in the general population, and by race. This paper will make two significant contributions to the literature: first, whereas the majority of the literature has considered changing rates of educational homogamy over time, this paper will look specifically at the change in hypogamy relative to homogamy; second, this paper will compare rates of hypogamy amongst four different racial categories of women: white, black, Hispanic, and Asian.

Data

I use decennial Census data and American Community Survey data from the Integrated Public Use Microdata Series (Ruggles, Alexander, Genadek, Goeken, Schroeder, and Sobek 2010) to examine patterns in the post-secondary completion gender gap and educational homogamous selection of marital partners from 1960 to 2010, using a 1% high precision cross-sectional sample from each decennial year made available

\textsuperscript{6} Massey, Charles, Lundy, and Fischer already suggested the unlikely event of either of these possibilities when observing the even starker divide in post-secondary completion between men and women for blacks and Hispanics: “The demographics of the black student population, however, have rather strong implications for patterns and processes of mating and dating and inevitably for issues of racial identity. Given their two-to-one numerical superiority to black males, in the absence of black male polygamy, cross-class pairing, or racial exogamy at least half of college-educated black women will remain single. If they have any hope of forming a romantic partnership with a member of the opposite sex, roughly half of all black women will have to date someone who is nonblack or someone who is much less educated (given that polygamy is illegal).” Massey, Douglas S., Camille Z. Charles, Garvey Lundy, and Mary J. Fischer. 2008. The Source of the River: The Social Origins of Freshmen at America's Selective Colleges and Universities: Princeton University Press.
through IPUMS. All IPUMS samples are stratified cluster samples using geography, household size, race, and group quarters to create representative strata. Person weights are available for both weighted samples and unweighted samples. Each respondent in the sample is assigned a weight to indicate how many persons in the U.S. population are represented by a given person in their sample. The samples I use for 1960-2000 are unweighted, and the sample from 2010 is weighted. I use the person weights in my regression analysis in order to achieve a more accurate analysis (Ruggles et al. 2010).7

Respondents’ ages range between 15 and 100 years and were surveyed through the census long form every ten years between 1960 and 2000 and through the American Community Survey in 2010. Neither homosexual marriage nor domestic partnerships are currently recognized in the Census or American Community Surveys. All variables concerning marital status and spousal characteristics are only representative of heterosexual couples.

I limit my sample to married8 women with bachelor’s degrees or higher9 in order to model the correlation between post-secondary completion and marital selection

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7 Person weights are automatically applied in regression equations for unweighted samples, but not for weighted samples.
8 Married women were identified using the marital status variable available in each of my six cross-sectional panels. The census provides six categories for each respondent to choose from: single/never married, married/spouse present, married/spouse absent, separated, divorced, and widowed. I only keep those in the sample who responded as “married/spouse present” in order to avoid differences in classification of those who were separated or married with spouse absent and resulting endogenous relationships with my main variable of interest.
9 In the 1960-1980 samples, the educational attainment level of all respondents was classified according to the highest year of school completed. Beginning with the 1990 census, this was only used for respondents who did not complete high school. All high school graduates were classified according to their highest degree earned. To create a constant measure throughout each cross-sectional panel, I created four categories: less than high school (0), high school or GED equivalency (1), bachelors (2), and graduate or professional degree (3). Increasingly scholars argue that those with bachelor’s degrees take longer than four years to complete their degree (Bowen, Chingos and McPherson 2011; Attewell and Lavin 2007), however, I have recoded the first three cross sections in accordance with IPUMS prescribed comparability (Ruggles et al. 2010) and, assigned each degree the number of years it typically took to attain in or prior to 1980: “4 years of college” for a bachelor’s degree, and “5+ years of college” for graduate and professional degrees. I limit the sample by degree because previous research has found barriers to marriage across the
specifically for women with at least a bachelor’s degree. I calculate a measure of educational homogamy relative to women’s degree attainment, and drop men from the sample as their level of educational homogamy is represented relative to their wives. I further limit the sample to respondents between the ages of 26 and 35 in each cross-section to approximate the marriage market of those with bachelor’s degrees who are most likely to be married in each decennial year.

Limiting the data by age is complex. Taking into account the average age of marriage in 1960 and 2010, I set my window at 26-35. Based on the literature, this is the range that allows enough time for women to complete their post-secondary and graduate degrees\(^{10}\) while still capturing them during the time they are most like to marry.\(^{11}\) Limiting the age window to ten years also ensures that the trend analysis will not pick up repeated observations\(^{12}\) representing the same cohort when they are entering the marriage

**High school diploma and bachelor’s degree categories (Schwartz and Mare 2005; Fu and Heaton 2008).** Many others modeling rates of homogamy and heterogamy make comparisons using the same categories, but including a category for “some college” to account for those who started, but did not finish (Schwartz and Mare 2005; Fu and Heaton 2008; Blackwell and Lichter 2004; Qian 1997). I have omitted this category because of difficulty in creating a standard comparison across all six cross-sections of the census data.

\(^{10}\) Scholars disagree on the percentage of those who go on to obtain bachelor’s degrees who are able to graduate in four years, placing them at the age of 22 (Bowen, Chingos and McPherson 2011; Attewell and Lavin 2007). Women who do obtain bachelor’s degrees and graduate degrees tend to delay marriage (Thornton, Axinn and Teachman 1995) and thus those who would potentially continue their education through a doctoral degree would finish between the ages of 28 and 30.

\(^{11}\) As evidenced later in the descriptive tables, homogamy is influenced by cohort because marriage is an event that (generally) happens a limited number of times in each person’s life and later cohorts who have already selected into a hypergamous, homogamous, or hypogamous marriage dilute the population average. The marriage market is also subject to time trends with the average age of marriage for women having changed by almost a decade in the last sixty years. The mean age of marriage for women in the sample with bachelor’s degrees or higher was 25.94 in 1960 and 29.34 in 2010. Other researchers have found similar changes over time (Heer and Grossbard-Shechtman 1981; Mare 1991; Bianchi and Casper 2000; Goldstein and Kenney 2010). Because of the limitations of information collected in the surveys, I am only able to capture the educationally homogamous selections of those married at each time point in the 1960 and 2010 cross-sections of the data. The differences of those who married at the time of observation in these two cross-sections will be examined in subsequent drafts of this paper.

\(^{12}\) Most scholars examining existing rates of educational homogamy/heterogamy set their age limits using a variation of a window close to 16-40 for men and women (Schwartz and Mare 2005; Mare and Winship 1991; Mare 1991; Kalmijn 1994; Blackwell and Lichter 2004; Lewis and Oppenheimer 2000) however most do not use up to six waves of cross-sectional panel data. This limit will help with preliminary
market in one decade and preparing to exit in the following decade. One significant weakness of the data is that it does not represent the level of education of spouses at the time they married. The data only captures their relative educational levels at the time the Census was administered, and thus I cannot control for effects of degrees obtained after marriage.

Educational Attainment is used as a covariate in the multinomial logistic regression models and also as a base to calculate the measure of educational homogamy. Respondents are categorized by their highest degree obtained: less than high school (0), high school or GED equivalency (1), bachelors (2), and graduate or professional degree (3).

I utilized Census measures of both race and Hispanic origin to create a composite variable representative of race as considered in sociological literature of both educational and homogamous outcomes (Attewell and Lavin 2007; Bowen, Chingos, and McPherson 2011; Fu and Heaton 2008; Qian 1997; Qian 1998; Schwartz 2010). Using the general version of the Census variable defining race, I recoded all previous race responses to Hispanic if respondents reported being of “Hispanic origin” (Ruggles et al. 2010). I also collapsed “American Indian/Alaska Native” and “Other race, non-Hispanic” into a single “other” category. My resulting categories are as follows: white (0), black (1), Hispanic (2), Asian/Pacific Islander (3), other (4).

Table 1. Percent of bachelor’s degrees held by each sex

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<tbody>
<tr>
<td>Men</td>
<td>60.40</td>
<td>58.73</td>
<td>57.16</td>
<td>53.4</td>
<td>50.37</td>
<td>48.10</td>
</tr>
<tr>
<td>Women</td>
<td>39.60</td>
<td>41.27</td>
<td>42.84</td>
<td>46.6</td>
<td>49.63</td>
<td>51.90</td>
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</table>

analysis to be compared with subsequent models using the age distribution of those just married in 1960 and 2010 and the more precise data available from other sources.

13 See footnote #10 for full explanation on recoding for consistency by cross-section.
Table 1 shows the percentage of bachelor’s degree holders relative to the opposite sex and clearly shows the reversal of the gender gap. In the overall cross-section, men represented 60.40% of those with bachelor’s degrees and women only represented 39.60%. By 2010, that had reversed to men holding 48.10% and women holding 51.90%. These figures include those of all ages with bachelor’s degrees who dilute the figures because they received their degrees before the reversal of the gender gap in the early 1980s. When I limit the sample further to those aged 26-35, the reversal of the relative percentages become more pronounced in each cross-section, with the those in the sample reaching parity in 1990 and women continuing to complete at higher rates in 2000 and 2010. The percent of bachelor’s degrees held by each sex within the sample between the ages of 26-35 is also displayed below in Figure 1.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|c|c|}
\hline
Ages (26-35) & 65.64 & 60.73 & 56.55 & 49.79 & 46.82 & 42.98 \\
\hline
Men & 34.36 & 39.27 & 43.45 & 50.21 & 53.18 & 57.02 \\
Women & & & & & & \\
\hline
\end{tabular}
\caption{Percentage of bachelor’s degree holders relative to the opposite sex.}
\end{table}

14 See footnote #11-13 for a detailed explanation.
15 Though, as previously stated, most scholars argue that the reversal of the gender gap happened in the early 1980s, those in the 1980 cross-sectional sample would have graduated from college between 1967 and 1976, if they had completed a bachelor’s degree in four years, which explains why the trend is not shown in the 1980 cross-section. In 1990, those in the sample would have graduated between 1986 and 1977 (if they completed in four years), which is why the gap has almost closed, but not completely. Assuming that others in the sample took longer than four years to complete a bachelor’s degree, given the debate about what percentage of college graduates finish in four years, it is not surprising that the reversal of the completion gap is not reflected precisely in this data sample.
16 See (Goldin and Katz 2008; Charles and Luoh 2003; Buchmann and DiPrete 2006a).
17 Additional descriptive maps demonstrating the reversal of the post-secondary completion gap by state are shown in Appendix 2.
Figure 1 reflects the parity in the gender gap reached in 1990 by women in the cross-section between the ages of 26 and 35. This graph will be used as a comparison for trends in the reversal of the gender gap by race, displayed in Table 2 below.

Table 2. Percent of bachelor's degrees held by each sex by race

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<tr>
<td>White (26-35)</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>66.53</td>
<td>61.5</td>
<td>57.31</td>
<td>50.35</td>
<td>47.32</td>
<td>43.66</td>
</tr>
<tr>
<td>Women</td>
<td>33.47</td>
<td>38.5</td>
<td>42.69</td>
<td>49.65</td>
<td>52.68</td>
<td>56.34</td>
</tr>
<tr>
<td>Black (26-35)</td>
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</tr>
<tr>
<td>Men</td>
<td>43.41</td>
<td>44.77</td>
<td>46.72</td>
<td>40.81</td>
<td>38.38</td>
<td>35.88</td>
</tr>
<tr>
<td>Women</td>
<td>56.59</td>
<td>55.23</td>
<td>53.28</td>
<td>59.19</td>
<td>61.62</td>
<td>64.12</td>
</tr>
<tr>
<td>Hispanic (26-35)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>69.41</td>
<td>64.07</td>
<td>59.22</td>
<td>50.64</td>
<td>45.86</td>
<td>40.38</td>
</tr>
<tr>
<td>Women</td>
<td>30.59</td>
<td>35.93</td>
<td>40.78</td>
<td>49.36</td>
<td>54.14</td>
<td>59.62</td>
</tr>
<tr>
<td>Asian (26-35)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>64.53</td>
<td>56.64</td>
<td>51.25</td>
<td>49.80</td>
<td>49.29</td>
<td>44.53</td>
</tr>
<tr>
<td>Women</td>
<td>35.47</td>
<td>43.36</td>
<td>48.75</td>
<td>50.2</td>
<td>50.71</td>
<td>55.47</td>
</tr>
</tbody>
</table>

Table 2 breaks down the figures in Table 1 by race. Percentages for whites are consistent with the overall population. The figures for blacks show that women were already completing at higher rates than men in 1960, and after a slight narrowing of the
gap in 1970 and 1980, the gap between black men and women increased even further. The reversal for both Asians and Hispanics showed a much more exaggerated reversal than for whites, with completion rates being much higher for men than for women in 1960 and much higher for women than men in 2010. The figures for blacks and Hispanics, particularly in later decades are consistent with previous findings (Attewell and Lavin 2007; Bowen, Chingos, and McPherson 2011). Figures 2-5 show these changes in graphical form and portray the different trends by race more clearly.

![Figure 2. Whites: Percent of Bachelor's Degrees Held by Each Sex (26-35)](image-url)
Figure 2 and 3 show the reversal in the gender gap for whites and Hispanics mirroring the trend of the overall sample of men and women between the ages of 26 and 35. Though the overall curve of the lines is similar in both graphs, the gap between Hispanic men and women was slightly more pronounced in 1960 and in 2010 showing a more pronounced reversal than with other races.
Figure 4 shows the reversal of the gender gap between Asian men and women. The gap in 1960 started off slightly lower than that of the overall population and closed more quickly than for those of other races, almost reaching parity in 1980, staying very close in 1990 and 2000, before diverging significantly in 2010. The graph shows very clearly that the gap between Asian men and women is smaller than that of any other race.

![Figure 5. Blacks: Percent of Bachelor's Degrees Held by Each Sex (26-35)](image)

Finally, Figure 5 shows the gap in post-secondary completion between black men and women. Unlike trends with other races, black women have received a larger percentage of bachelor’s degrees than black men throughout each cross-section. The difference between the two began to converge slightly until 1980, after which it grew to be more pronounced than any other race.

Table 1, Table 2, and Figures 1-5 demonstrate the reversal of the gender gap in post-secondary degree attainment between 1960 and 2010 and are consistent with previous findings in the literature (Attewell and Lavin 2007; Bowen, Chingos, and McPherson 2011; Buchmann and DiPrete 2006b; Charles and Luoh 2003; Goldin and
Descriptive statistics showing the percent of bachelor’s degrees held by each sex show a reversal of the gender gap in completion in earlier decades and subsequent widening when the sample is limited to ten years. This further supports how I have limited my data by age to avoid picking up the effects from previous cohorts in more than one cross-section.

In order to calculate the change in marital selection by education, I computed a measure for educational homogamy. This is a measure in the level of educational matching between women and their husbands. This variable was calculated using the detailed educational variable for respondents and the corresponding variable for educational attainment with the same measures for their spouses. Spousal educational attainment was recoded according to the same process as respondents’ educational attainment and subtracted from respondents’ educational attainment indicating a difference in degree. The final measure was collapsed into three categories on a scale from 0 to 2 indicating the level of marital matching relative to women: hypergamy (0), homogamy (1), hypogamy (2). Those engaged in hypergamy were married to a man with a higher degree than them; those engaged in homogamy were married to a man with the same level of degree as them; those engaged in hypogamy were married to a man with a lower degree than them.

---

18 Degrees used to difference between spouses include a high school diploma, a bachelor’s degree, or a graduate degree. Associates degrees were not used because of problems with matching coding between decennial samples of census data. See footnote #10 for a more detailed description.
Table 3. Descriptive Summaries of Educational Hypogamy for Women

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelors or Higher</td>
<td>1.2629</td>
<td>1.1912</td>
<td>1.152</td>
<td>1.2374</td>
<td>1.2755</td>
<td>1.2828</td>
</tr>
<tr>
<td></td>
<td>(0.7216)</td>
<td>(0.7362)</td>
<td>(0.7325)</td>
<td>(0.7321)</td>
<td>(0.7156)</td>
<td>(0.7105)</td>
</tr>
<tr>
<td>Age 26-35</td>
<td>1.1263</td>
<td>1.0711</td>
<td>1.1107</td>
<td>1.2619</td>
<td>1.3245</td>
<td>1.3421</td>
</tr>
<tr>
<td></td>
<td>(0.7086)</td>
<td>(0.7269)</td>
<td>(0.7196)</td>
<td>(0.7073)</td>
<td>(0.6804)</td>
<td>(0.6779)</td>
</tr>
</tbody>
</table>

Notes: Standard errors are in parenthesis

Table 3 provides descriptive statistics of the measure of educational hypogamy for women. An average of 1 indicates complete homogamy within the sample or subsample. An average closer to 0 shows a trend towards hypergamy and an average closer to 2 shows a trend towards hypogamy. In 1960, women with a bachelor’s degree or higher tended to marry homogamously, marrying men with comparable levels of education, on average. Consistent with previous findings for the general population (Qian and Preston 1993; Schwartz and Mare 2005), women in the sample trended toward higher levels of homogamy in 1970 and 1980 before rebounding to higher levels of hypogamy in 1990, 2000, and 2010. The trend is more exaggerated amongst women ages 26-35.

Table 4. Descriptive Summaries of Educational Hypogamy for Women by Race

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>White (26-35)</td>
<td>1.1051</td>
<td>1.0459</td>
<td>1.0901</td>
<td>1.2581</td>
<td>1.3357</td>
<td>1.3607</td>
</tr>
<tr>
<td></td>
<td>(0.7041)</td>
<td>(0.7221)</td>
<td>(0.7181)</td>
<td>(0.7043)</td>
<td>(0.6756)</td>
<td>(0.6738)</td>
</tr>
<tr>
<td>Black (26-35)</td>
<td>1.4411</td>
<td>1.4782</td>
<td>1.4540</td>
<td>1.5152</td>
<td>1.5293</td>
<td>1.5107</td>
</tr>
<tr>
<td></td>
<td>(0.6953)</td>
<td>(0.6571)</td>
<td>(0.6683)</td>
<td>(0.6372)</td>
<td>(0.6346)</td>
<td>(0.6487)</td>
</tr>
<tr>
<td>Hispanic (26-35)</td>
<td>1.1364</td>
<td>1.1444</td>
<td>1.2712</td>
<td>1.3924</td>
<td>1.4293</td>
<td>1.4691</td>
</tr>
<tr>
<td></td>
<td>(0.7600)</td>
<td>(0.7631)</td>
<td>(0.7217)</td>
<td>(0.6959)</td>
<td>(0.6736)</td>
<td>(0.6533)</td>
</tr>
<tr>
<td>Asian (26-35)</td>
<td>1.2899</td>
<td>1.1056</td>
<td>1.0358</td>
<td>1.0256</td>
<td>1.0531</td>
<td>1.0967</td>
</tr>
<tr>
<td></td>
<td>(0.6881)</td>
<td>(0.7560)</td>
<td>(0.6949)</td>
<td>(0.7243)</td>
<td>(0.6735)</td>
<td>(0.6754)</td>
</tr>
</tbody>
</table>

Notes: Standard errors are in parenthesis
Table 4 shows average levels of hypogamy for women in the sub-sample by race in each cross-section. White respondents mirror the overall population trend more closely than women of other races. Black women began in 1960 with a much higher average toward hypogamy with a marginal increase in the average between 1960 and 2010. Black women showed the smallest relative change of all women. Hispanic women’s average of hypogamy increased more between 1960 and 2010 than women of any other race. Asian women are the only race that decreased their average of hypogamy over time. The trends in Table 4 and Table 5 are also displayed in Figure 6 below.

![Figure 6. Average of Educational Hypogamy by Race](image)

Using the selected sample represented by the black line as a reference, it is clear that white women’s average measure of educational hypogamy most closely mirrors the overall trend than women of any other race. While the curve for Hispanic women parallels the line for the overall sample, it shows that Hispanic women had a consistently higher average than white women and the overall sample. The curve for black women is
relatively flat over time, reflecting little change in their average of hypogamy. The curve for Asian women is drastically different than for women of any other race and reflects their overall decreased trend in hypogamy over time.

Table 3, Table 4, and Figure 6 show an increase in hypogamy for women between the ages of 26 and 35 over time and support previous findings of different patterns in educational assortative mating by race (Espenshade 1985; Qian 1997). The averages in hypogamy do not change consistently with the reversal of the gender gap in post-secondary completion, however, with the exception of Asian women, they do increase with time, overall in the same direction.

**Methods**

I use a multinomial logistic regression model to conduct a trend analysis by decade to estimate the risk of women marrying hypergamously or hypogamously relative to marrying homogamously over time. A multinomial model is preferable to compare these categories of marriage because there are multiple outcomes (more than two) and they are not “inherently ordered” (Borooah 2001). Though individuals may have preferences on the level of education they would like their spouse to have, there is no way to assign a “stronger” outcome and therefore “higher” value to one category or another, particularly given that the social context of a spouse’s education has changed over time. Taking this into account, the multinomial regression will estimate the probability of women being in one of the three categories based on their own “choice” without assigning a rank to one of their choices (Borooah 2001).

The probabilities of being in one of the three categories all add up to one, allowing the probability of only one category to be expressed at a time. Consequently,
the results for the model will be expressed in terms of the risk ratio and will express the risk of women choosing one category versus a base category (Agresti and Finlay 2008; Wooldridge 2008). With homogamy having been the most common trend of spousal selection over time (Arum, Roksa, and Budig 2008; Cherlin 2004; Kalmijn 1991b; Oppenheimer 1994; Oppenheimer 1997), it is preferable to model women’s risk relative to homogamy to show a change in preferences over time. This will also allow for me to model a change in hypogamy as an alternative to homogamy given the increasing lack of supply of educationally homogamous men.

My primary independent variable is decade. I recoded the year of each cross-section to represent the corresponding number of decades from 1960. Decades are coded on an ordinal scale from 0 to 5 representing the time trend in each regression. To control for educational attainment, I use a dichotomous variable differentiating between bachelor’s degree and graduate degree level. The Duncan Socioeconomic Index (SEI) is also included as a control for socioeconomic status. SEI is a constructed measure that assigns a score to each occupation using the Duncan Socioeconomic Index. The index number is the weighted sum of occupational education and occupational income and ranges from 0 to 100.19 I also include age as a control for women’s relative place in their respective marriage markets in each decade.20 Race is also included as a covariate in the general model. I will later run separate multinomial logistic models for women in each of my four main racial categories.

---

20 Age could have an impact on the model in two different ways. Previous literature has found that women with more education tend to delay marriage (Thornton, Arland, Axinn, and Teachman) and are less likely to marry homogamously (Mare 1991; Blackwell 1998; Qian and Preston 1993). However, it is possible that the rapid change in the gender gap could influence selection even for women and the beginning and of the age range in each decade.
Using these models, I will try to confirm three hypotheses: (1) an increase in educational hypogamy will correlate with the reversal and widening of the gender gap in post-secondary completion; (2) younger women will be more likely to marry hypogamously than older women in each decade because of the rapidly decreasing pool of educationally comparable men; (3) educational hypogamy will be more pronounced with Hispanic and black women.

Results

The multinomial logistic model using the sub-sample of women of all races with bachelor’s degrees or higher between the ages of 26 and 35 yields statistically significant results confirming my primary hypotheses. Table 5 lists the relative risk ratios of the multinomial logistic model.
Table 5. Risk of Hypergamy and Hypogamy relative to Homogamy for women with Bachelor's degrees between the ages of 26 and 35

<table>
<thead>
<tr>
<th></th>
<th>Hypergamy</th>
<th>Hypogamy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RRR</td>
<td>RRR</td>
</tr>
<tr>
<td>Level of Degree (Bachelor's or Graduate)</td>
<td>0.0000</td>
<td>1.6137***</td>
</tr>
<tr>
<td></td>
<td>(0.0000)</td>
<td>(0.02128)</td>
</tr>
<tr>
<td>Decade</td>
<td>0.9177***</td>
<td>1.1265***</td>
</tr>
<tr>
<td></td>
<td>(0.0049)</td>
<td>(0.0047)</td>
</tr>
<tr>
<td>SEI</td>
<td>0.9956***</td>
<td>0.9973***</td>
</tr>
<tr>
<td></td>
<td>(0.0003)</td>
<td>(0.0003)</td>
</tr>
<tr>
<td>Age (26-35)</td>
<td>1.0578***</td>
<td>0.9914***</td>
</tr>
<tr>
<td></td>
<td>(0.0030)</td>
<td>(0.0021)</td>
</tr>
<tr>
<td>Black</td>
<td>0.7212***</td>
<td>2.0396***</td>
</tr>
<tr>
<td></td>
<td>(0.0341)</td>
<td>(0.0556)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.9413</td>
<td>1.4661***</td>
</tr>
<tr>
<td></td>
<td>(0.0408)</td>
<td>(0.0398)</td>
</tr>
<tr>
<td>Asian</td>
<td>1.4847***</td>
<td>0.4811***</td>
</tr>
<tr>
<td></td>
<td>(0.0416)</td>
<td>(0.0113)</td>
</tr>
<tr>
<td>Pseudo R2</td>
<td>0.0703</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Black, Hispanic, and Asian categories represent race dummy variables relative to being white. Two-tailed t-tests where ***p<0.001 *p<0.01 *p<0.05. Coefficients are given in relative risk ratios with standard errors in parentheses.

Women’s odds of entering a hypogamous marriage are increased between earlier and later decades by 13%, while their odds of marrying hypergamously decrease from decade to decade, relative to marrying homogamously, net of other time-varying factors. Older women have slightly lower odds of marrying hypogamously and both black and Hispanic women have higher odds of marrying hypogamously, compared to white women, relative to those who marry homogamously, net of other variables. Consistent with the descriptive statistics in hypogamy averages, those in the “Asian” racial category have higher odds of marrying hypergamously and lower odds of marrying hypogamously relative to marrying homogamously. Though this is consistent with the literature
documenting educational homogamy in interracial marriages (Fu and Heaton 2008; Qian 1997; Sung 1990), given a widening in the gender gap in post-secondary completion even between Asian women and their male peers, the magnitude of the odds of Asian women marrying hypogamously relative to white women are still surprising. The results for the same model for each individual racial category are listed below in Table 6.

<table>
<thead>
<tr>
<th>Table 6. Risk of Hypergamy and Hypogamy relative to Homogamy for women with Bachelor's degrees between the ages of 26 and 35 by Race</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Race</strong></td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>Degree</td>
</tr>
<tr>
<td>Decade</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>SEI</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Pseudo-Rsq</td>
</tr>
</tbody>
</table>

**Black** | **Hypergamy** | **Hypogamy** | **Hypergamy** | **Hypogamy** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree</td>
<td>0.0000</td>
<td>1.3941***</td>
<td>0.0000</td>
<td>0.8331</td>
</tr>
<tr>
<td></td>
<td>(0.0000)</td>
<td>(0.0872)</td>
<td>(0.0000)</td>
<td>(0.0906)</td>
</tr>
<tr>
<td>Decade</td>
<td>1.0157</td>
<td>1.0157</td>
<td>1.0105</td>
<td>0.9715</td>
</tr>
<tr>
<td></td>
<td>(0.0189)</td>
<td>(0.01897)</td>
<td>(0.0261)</td>
<td>(0.0354)</td>
</tr>
<tr>
<td>SEI</td>
<td>1.0009</td>
<td><strong>0.9951</strong>*</td>
<td><strong>0.9930</strong>*</td>
<td>0.9979</td>
</tr>
<tr>
<td></td>
<td>(0.00242)</td>
<td>(0.0013)</td>
<td>(0.0009)</td>
<td>(0.0012)</td>
</tr>
<tr>
<td>Age</td>
<td><strong>1.1101</strong>*</td>
<td>1.0009</td>
<td>1.0098</td>
<td>1.0053</td>
</tr>
<tr>
<td></td>
<td>(0.0191)</td>
<td>(0.0097)</td>
<td>(0.0006)</td>
<td>(0.0092)</td>
</tr>
<tr>
<td>Pseudo-Rsq</td>
<td><strong>0.0365</strong>*</td>
<td><strong>0.0514</strong></td>
<td><strong>0.0365</strong>*</td>
<td><strong>0.1079</strong>*</td>
</tr>
</tbody>
</table>

Notes: Two-tailed z-tests where ***p<0.001**p<0.01 *p<0.05 Coefficients are given in relative risk ratios with standard errors in parentheses.

The results of the multinomial logistic models with the sub-sample narrowed by race listed in Table 6 confirm trends seen in the descriptive statistics of the data. For white women, the odds of marrying hypogamously relative to marrying homogamously increase by 14% from one decade to the next, net of other factors. The magnitude of the odds ratios for decades is highest amongst white women. The odds ratio for age is small,
though still statistically significant showing a higher likelihood of younger women to marry hypogamously than older women. Having a graduate degree increases white women’s odds of marrying hypogamously more than women of any other race.

Though compared with the general population, black women were more likely to marry hypogamously than any other race, their odds ratios for the independent variables in the model have overall smaller magnitudes than some of the other racial sub-groups. The magnitude of the odds ratio for decade is smaller than for other races, reflecting that black women’s trends in educational homogamy have not changed as much as those for white and Hispanic women between 1960 and 2010. Age is not a statistically significant predictor for black women who marry hypogamously, though black women who marry hypergamosly have statistically significant increased odds of 10% relative to those who marry homogamously, being one year older.

Hispanic women show the greatest difference in relative odds ratios between hypergamy and hypogamy as influenced by decade. Hispanic women had diminished odds by 15% of marrying hypergamosly from one decade to the next, whereas their odds of marrying hypogamosly increased by 12% from one decade to the next. A woman one year older than the next had increased odds of marrying hypergamoslyy by 5% compared to decreased odds by 1% of marrying hypogamosly (with both odds ratios relative to marrying homogamously).

As with the descriptive statistics, the results for Asian women are perhaps the most compelling. None of the odds ratios for hypogamous marriage were statistically significant, whereas the ratios for decade and SEI were both statistically significant in predicting hypergamous marriage relative to homogamous marriage. This indicates a
stronger trend of Asian women to marry hypergamously, showing a trend opposite that of the overall population.

**Discussion**

The gender gap in post-secondary completion creates a shortage of men with whom women with bachelor’s degrees can marry homogamously. Given the increasing (or at least steady) trend in educational hypogamy and continually strong trend of racial endogamy, the shortage of college educated men relative to women should correlate with an increase in educationally hypogamous marriages, particularly for black and Hispanic women who complete at much higher rates than black and Hispanic men. The results of this paper confirm both of these trends.

*Women, ages 26-35.* With each passing decade, relative to homogamy, women have become more likely to marry hypogamously and less likely to marry hypergamously. This is unsurprising based on the decreasing supply of men with equivalent bachelor’s degrees. My results show, contrary to previous findings (Blackwell 1998; Lewis and Oppenheimer 2000; Mare 1991; Qian and Preston 1993), that older women are less likely to marry hypogamously and are more likely to marry hypergamously. It is generally thought that the longer women wait to marry after leaving their educational institution, the more they are exposed to men of other backgrounds (Mare 1991; Nielsen and Svarer 2008). I suspect that the difference of my results show the correlation of the effects of the gender gap within women in the same decade in the data. This is most likely due to the constant growth in the gender gap, which leaves younger women within each decade with a smaller pool of men with bachelor’s degrees, even given typical age differences for men and women at first marriage. More work
should be done to attempt to control for differences in marriage markets within cohorts and the relative effects of the supply and demand of men and women created by the gender gap.

*White women.* The overall difference in the percentage of white women and men who complete bachelor’s degrees is almost as high as the difference between Hispanic men and women. White women constitute the largest sub-population of bachelor’s degree holders, and therefore have fewer opportunities to achieve an educationally and racially homogamous match. Within the general model sample, both black and Hispanic women were more likely to marry hypogamously relative to white women. However, comparing the magnitude of the decade variable in each individual model by race shows that white women’s odds of marrying hypogamously have changed more than for any other race between 1960 and 2010. More research is needed to understand how the higher population of white, female bachelor’s degree holders could be driving a trend in interracial and hypogamous marriage, therefore making their increased odds of marrying hypogamously over time even higher than Hispanic women, despite a greater reversal of the gender gap with Hispanic women than white women.

*Black women.* The story of both racial and educationally homogamous marriage is much more complex for black women (Espenshade 1985; Qian 1997). In 1960, black women already married hypogamously at a higher average than women of other races. They are the only racial category for which the decade trend is not statistically significant in either model. Black men are the lowest demographic of bachelor’s degree holders (Attewell and Lavin 2007; Bowen, Chingos, and McPherson 2011) and therefore create the smallest supply of racially and educationally homogamous matches for black women.
The pseudo R-squared for the model for black women is the lowest out of the racial sub-categories indicating that there are more factors that are necessary to explain the minor increase in hypogamy amongst black women.

*Hispanic women.* Hispanic women have experienced a larger reversal in magnitude in the post-secondary completion gap than women from any other racial group. The magnitude of their trend by decade of hypergamy is also the strongest of any other racial group and, and their magnitude for hypogamy by decade is very close to white women. Their example strongly supports the argument of this paper that a decrease in available men with equivalent education levels increases hypogamy.

*Asian women.* The results for Asian women are different from the overall trend for women in this paper. Though Asian women have also experienced a steep reversal in the gender gap in post-secondary completion, their average level of hypogamy has decreased over time. The model for Asian women showed us that the time trend was only significant for an increase in hypergamy relative to homogamy over time. Additionally, the magnitude for the Pseudo R-squared of the entire model was much higher for Asian women than any other race, despite many of the variables not being significant. The results of this model could be due to Asian women’s higher likelihood to marry interracially than women of other races (Fu and Heaton 2008; Qian 1997; Sung 1990). It is possible that this has allowed them to decrease their average of hypogamous marriages despite a widening in their gender gap with Asian men. Asian women also have the smallest post-secondary completion gap relative to the men of their own racial group than women of any other race, which could be another driving factor in their differentiation from the trends of women of other races.
Conclusion

Kalmijn says that marriage “bears the potential of cultural and socioeconomic change and is a measure of the “openness” of societies. A large social change that restructures the supply and demand of marriage markets is likely to have a significant effect on the ways that college educated men and women select their spouses. With educational homogamy being significantly related to the prediction of stable marriages (Bumpass, Castro Martin, and Sweet 1991; Heckert, Nowak, and Snyder 1998; Schwartz 2010; Tzeng 1992), the increasing trend in hypogamy for women with bachelor’s degrees and its influence on the stability of marriage will most likely influence trends in divorce. Unchanging or decreased divorce rates despite an increase in hypogamy could also indicate changing gender norms and a shift of norms within the family unit. With income being closely correlated with educational attainment, (Attewell and Lavin 2007; Bernhardt 1995; Thomas and Zhang 2005) (Hoxby 1998; Thomas and Zhang 2005) women’s increased educational attainment relative to their husbands could impact expected labor earnings within the family unit and even affect childcare.21 Historically women were more likely to take time off from their careers to raise their children (Budig and England 2001). If women earn more relative to their husbands, it could become more rational for men to take time off from their careers, which could cause a shift in social policy and traditional family gender roles.

The higher likelihood of younger women to marry hypogamously can indicate several things. The gender gap has changed quickly, and women at the younger end of a decade could face a very different marriage market than those at the older end. It is also possible that younger women are not as concerned with the idea of finding a husband

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21 See footnote #5 for work related to income hypogamy for women and its impact on marital stability.
with the same or higher level of education because changing social norms have influenced them. More research should be done on a micro-level within smaller cohort distinctions to find what could be driving this trend.

Duncan’s socio-economic index seems to indicate that those with higher sei are marginally less likely to marry both hypergamously and hypogamously. This could indicate that educational homogamy is an ideal standard of matching because of stability or other economic outcomes for the family. It is likely that the measure is either an incomplete fit for the model or could display a much stronger trend by class. Either case warrants more research. This paper does not include controls for the overall trend of marriage in the general population, nor does it control for geographic variation between rural and urban areas and variation by state or region. Future work should try to account for these factors to determine the overall impact of the trend in educational hypogamy for college-educated women over time.

Finally the differentiation in hypogamy by race reflects startling trends of sorting as a result of different access to education as a resource. An increase in hypogamy could reverse the impact of educational homogamy on socioeconomic and family stratification (Mare 1991), however if white and Asian women seek educationally homogamous matches through racial heterogamy (Fu and Heaton 2008; Qian 1997), increased acceptance of interracial marriage could contribute to further stratification of families headed by black and Hispanic women and have an impact on their fertility in a scenario where white and Asian women deplete the already dwindling pool of college educated black and Hispanic men in marriage markets. More research must be done to identify how this trend will change social norms.
Appendix 1: Supplementary Descriptive Statistics

Table 7 and Table 8 provide supplementary descriptive statistics showing the reversal of the gender gap in post-secondary completion relative to those within the general population of each cross-section and each sub-sample.

Table 7. Percent of Men and Women with Bachelors or Higher

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Men</td>
<td>8.32</td>
<td>11.37</td>
<td>16.03</td>
<td>18.84</td>
<td>20.89</td>
<td>25.57</td>
</tr>
<tr>
<td>Women</td>
<td>5.12</td>
<td>7.26</td>
<td>10.96</td>
<td>15.01</td>
<td>19.12</td>
<td>25.52</td>
</tr>
<tr>
<td>Difference</td>
<td>3.20***</td>
<td>4.11***</td>
<td>5.07***</td>
<td>3.83***</td>
<td>1.77*</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Ages 26-35

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Men</td>
<td>14.78</td>
<td>19.37</td>
<td>27.07</td>
<td>22.35</td>
<td>24.48</td>
<td>29.62</td>
</tr>
<tr>
<td>Women</td>
<td>7.39</td>
<td>11.92</td>
<td>20.23</td>
<td>21.83</td>
<td>27.42</td>
<td>38.13</td>
</tr>
<tr>
<td>Difference</td>
<td>7.40***</td>
<td>7.45***</td>
<td>6.85***</td>
<td>0.51***</td>
<td>-2.95***</td>
<td>-8.51***</td>
</tr>
</tbody>
</table>

Notes: Two-tailed t-tests where ***p<0.001**p<0.01 *p<0.05

Table 7 displays the percentage of the population with bachelor’s degrees or higher by sex and the difference in percentage between men and women in each cross-section of the data. These percentages were obtained by finding the total number of those in the cross-section who held a bachelor’s degree or higher relative to those of their own sex. The first category represents percentages of the entire cross-section in each decade. The total percentage of the women and men with bachelor’s degrees increased between 1960 and 2010. Though a larger percentage of men than women obtained bachelor’s degrees in 1960 through 2000, women closed the gap and had the same level of attainment as men by 2010. Though this category reflects women’s gain in completion on men, the reversal of the completion gap is not apparent because these averages are from the general population and include older cohorts who received their bachelor’s degrees prior to the early 1980s. Next, I limit the sample to men and women between the
ages of 26 and 35.\textsuperscript{22} This shows figures consistent with the literature on the reversal in the post-secondary completion gap. Though completion rates increased for men and women relative to the general population as a whole, women reached parity with men in 1990 and overtook them.

Table 8. Percent of Men and Women in Sample with Bachelor's Degree or Higher by Race

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>White</td>
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</tr>
<tr>
<td>Men</td>
<td>16.32</td>
<td>21.15</td>
<td>30.00</td>
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<td>28.54</td>
<td>34.39</td>
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<tr>
<td>Women</td>
<td>7.93</td>
<td>12.88</td>
<td>22.17</td>
<td>23.87</td>
<td>31.42</td>
<td>43.38</td>
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<tr>
<td>Difference</td>
<td>8.39***</td>
<td>8.27***</td>
<td>7.83***</td>
<td>0.77***</td>
<td>-2.87***</td>
<td>-8.99***</td>
</tr>
<tr>
<td>Black</td>
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<td></td>
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<tr>
<td>Men</td>
<td>4.06</td>
<td>6.35</td>
<td>11.85</td>
<td>11.07</td>
<td>12.23</td>
<td>15.32</td>
</tr>
<tr>
<td>Women</td>
<td>4.44</td>
<td>6.38</td>
<td>11.61</td>
<td>13.27</td>
<td>16.63</td>
<td>24.67</td>
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<td>Difference</td>
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<td>-0.02</td>
<td>0.24</td>
<td>-2.20***</td>
<td>-4.40***</td>
<td>-9.36***</td>
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<tr>
<td>Hispanic</td>
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<tr>
<td>Men</td>
<td>6.74</td>
<td>8.63</td>
<td>10.75</td>
<td>9.84</td>
<td>8.77</td>
<td>12.11</td>
</tr>
<tr>
<td>Women</td>
<td>3.08</td>
<td>4.43</td>
<td>7.33</td>
<td>10.13</td>
<td>11.58</td>
<td>18.55</td>
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<tr>
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<td>3.66***</td>
<td>4.20***</td>
<td>3.42***</td>
<td>-0.29</td>
<td>-2.82***</td>
<td>-6.44***</td>
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<td>Asian</td>
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<td></td>
</tr>
<tr>
<td>Men</td>
<td>10.57</td>
<td>13.24</td>
<td>14.61</td>
<td>8.44</td>
<td>11.17</td>
<td>13.81</td>
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<tr>
<td>Difference</td>
<td>6.47***</td>
<td>6.79***</td>
<td>5.22***</td>
<td>1.48</td>
<td>-2.15*</td>
<td>-5.80***</td>
</tr>
</tbody>
</table>

Notes: Two-tailed t-tests where ***p<0.001**p<0.01 *p<0.05

Table 8 displays the averages of post-secondary completion between men and women relative to the general population further limited by the major race categories in my regression analysis including white, black, Hispanic, and Asian/Pacific Islander. Though white women, Hispanic women, and Asian women mirror the direction of the overall trend of the reversal of the gap in post-secondary completion, black women had already reached parity in completion with black men in 1960, 1970, and 1980 and continued to complete at higher rate than men through 2010. Table 7 and Table 8 demonstrate the overall increase in the percentage of both men and women obtaining

\textsuperscript{22} See footnote #11-13 for a detailed explanation.
bachelor’s degrees between 1960 and 2010. All subgroups, except for blacks, reflect the
trend of higher male post-secondary completion in 1960, men and women achieving
relative parity in 1990 and an increase in women’s completion, relative to men’s through
2010 and reinforce the conclusions presented in Table 2. Table 7 and 8 provide a
supplementary reference demonstrating the reversal of the gender gap in post-secondary
completion despite overall growth of educational attainment within the general
population of men and women.
Appendix 2: Supplementary Geographic Descriptive Statistics

Further descriptive statistics are shown in this appendix to demonstrate the reversal of the gender gap in post-secondary education visually by state. To obtain the percentage of bachelor’s holders in each state that were held by women, I aggregated the number of observations of total bachelor’s degree holders in each state and calculated the percent in each state by dividing the total number of women with bachelor’s degrees and dividing it by the total number of individuals with a bachelor’s degree or higher.

Figures 1.1-1.6 show the percentage of women in each state from 1960 through 2010, respectively relative to the total population. The states with fewer than 45% of the bachelor’s degree holders are represented by shades of blue. States with 45%-55% of total bachelor’s degree holders being female are represented in shades of purple. Those with a percentage of female bachelor’s degree holders exceeding 55% are represented in shades of pink.

Figure 1.1 shows the greatest variation of the decennial maps showing the percentage of female bachelor’s degree holders. The map is also the bluest on the scale of the six years. In 1970 (Figure 1.2), the map transitioned closer to a 50% completion rate, but all states still had a majority of male bachelor’s degree holders. Figure 1.3 shows some states reaching the lower side of the 50% mark for females with eight states transitioning to purple, however at this point the majority of the map was still blue, indicating a male percentage of 55% or more. By 1990 (Figure 1.4), all states but Nevada had turned purple with two states reaching a higher majority of the female bachelor’s degree holding population of 55% or more. By 2000, all but three states showed a majority of bachelor’s degree holders being female, and by 2010, all but four
states had super majorities of female bachelor’s degree holders at 55% or more with three states having at least 60%. These maps show a clear transition in the gender gap in post-secondary completion by state. Though the data began in 1960 with greater geographic variation, by 2010, 41 out of 48 states represented were in the same category.
Figure 1.1, 1960: Percent of female bachelor’s degree holders

Figure 1.2, 1970: Percent of female bachelor’s degree holders

Data for Delaware, Idaho, Montana, North Dakota, South Dakota, Vermont, and Wyoming was unavailable for the 1970 due to sampling complications and therefore is represented in white.

Legend:

Figures 1.1-1.6
% of female bachelor’s degree holders by state
Figure 1.3, 1980: Percent of female bachelor’s degree holders

Figure 1.4, 1990: Percent of female bachelor’s degree holders
Figure 1.5, 2000: Percent of female bachelor’s degree holders

Figure 1.6, 2010: Percent of female bachelor’s degree holders

Legend:
Figures 1.1-1.6
% of female bachelor’s degree holders by state

0.000000 - 0.250000
0.250001 - 0.300000
0.300001 - 0.350000
0.350001 - 0.400000
0.400001 - 0.450000
0.450001 - 0.500000
0.500001 - 0.550000
0.550001 - 0.600000
0.600001 - 0.650000
Works Cited


