# Gender-Specific Trends in the Value of Education and the Emerging Gender Gap in College Completion

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# Abstract

Analysis of March Current Population Survey data from 1964 through 2002 shows that white women overtook men in their rates of college completion, and that this phenomenon occurred during a period in which female standard of living gains from college completion grew at a faster rate than those for males. We assess whether these trends are related to changes in the value of education for males and females in terms of earnings returns to higher education, the probability of getting and staying married, education-related differences in family standard of living, and the value of higher education as insurance against living in poverty. While returns to a college education in the form of earnings remained higher for women than men over the entire period, trends in these returns do not provide a plausible explanation for gender-specific trends in college completion. But when broader measures of material well-being are taken into account, women's returns to higher education appear to have risen faster than those for men.

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## INTRODUCTION

Recent evidence suggests that females have made substantial gains in all realms of education and now generally outperform males on several key educational benchmarks. According to a recent study commissioned by the United States Congress, "in school and in college, females are now doing *as well as or better than* males on many of the indicators of educational attainment, and the large gaps in educational attainment that once existed between men and women have in most cases been eliminated" (Bae et al. 2000:2). In 1970, males comprised the majority of college students (58%); but by 2000 56% of all college students were female (Freeman 2004:70). Women are also more likely than men to persist in college, obtain degrees, and enroll in graduate school (Bae et al. 2000:7-8). While this trend toward female advantage in higher education has attracted the attention of college administrators, policymakers and the media (e.g., "Colleges Look for Ways to Reverse a Decline in Enrollment of Men" *Chronicle of Higher Education* November 26, 1999; "The Male Minority" *Time Magazine* December 2, 2000; "The New Gender Gap" *Business Week* May 26, 2003; "Male Students' College Achievement Gap Brings Concern" *The Washington Post* August 31, 2003), existing empirical studies do not provide a sufficient explanation for this trend.

Some efforts to date have focused on the impact of trends in parental resources on the female-favorable trend in higher education. Buchmann and DiPrete (2005) find that in the first decades following the Great Depression, a form of "educational egalitarianism" was influencing the educational gender gap, at least for the white

population. Girls were able to achieve rough parity with boys only in families where both parents were college educated. In contrast, parents with less education appeared to favor their sons over their daughters. Beginning with the 1940 birth cohort female rates of college completion rose faster than male rates partly because of the rise in the proportion of families with college educated parents and partly as a strong residual trend. More recently, however, a different trend appears to have emerged whereby the educational disadvantage experienced by daughters in less educated families gradually diminished. Their education levels reached parity and then eventually exceeded those of sons. The period since roughly the 1965 birth cohort is characterized by higher education returns from the same-sex parent, so that sons and daughters do equally well from college educated households, sons do better in households where fathers have more education than mothers, and daughters do better in households where fathers have a high school education or less or were absent from the family during the early teenage years.

These trends in parental resources and investment patterns, while important, do not provide a full explanation for the gender-specific trends in higher education. In this paper we assess whether these trends might be related to changes in the returns to higher education for women and men in terms of earnings, the probability of getting married and staying married, the family standard of living, and insurance against poverty. We conduct a trend analysis of the value of higher education for each of these outcomes measured against the baseline value of a high school education using 39 years of data from the Current Population Survey (CPS). We find that standard of living and insurance-against-poverty returns to higher education for women appear to have risen faster than those for men. Thus it is plausible that the female-favorable trend in college

completion may be related at least in part to gender-specific changes in the value of higher education.

## PRIOR RESEARCH

Human capital theory argues that education is an investment decision. Positive returns to education provide the incentive to make an educational investment. This theory implies that trends in educational returns should produce trends in educational investments. Along these lines, Walters (1986) used time-series models on aggregate data to argue that female gains in college enrollment between 1952 and 1980 were largely due to changes in the occupational distribution, but she reached the same conclusion about men's college enrollment gains, which were also substantial during this period. Walters did not attempt to explain the emerging *gap* in higher education. Other scholars have addressed the question of whether trends in the value of higher education might be a cause for gender-specific trends in educational attainment. A natural incentive-based hypothesis following from human capital theory is that a female-favorable trend in higher education would likely arise from women's growing labor market opportunities in recent decades. However, both Averett and Burton (1996) and Charles and Luoh (2003) analyzed trend data from the Current Population Survey (CPS) and found no evidence of a female-favorable trend in the wage returns to higher education. Women's wage returns to higher education have indeed increased, but male returns have increased even more rapidly, due to declining opportunities for high-wage, male-dominated manufacturing jobs for high-school educated workers.

Charles and Luoh (2003) argued that the rising female advantage in college completion may be instead a consequence of rising "uncertainty" in the returns to college

education for men. They measure uncertainty as the variance of earnings for college-educated males and essentially argue that rising inequality in male college-level earnings is depressing male rates of higher education and generating a gender gap in educational attainment. Aside from questions about: 1) whether adolescents can make rational decisions about college on the basis of estimates about the variance of returns to education, and 2) whether a simple variance measure is the right way to measure uncertainty,[i] their proposed explanation appears to be contradicted by data from other industrialized countries that witnessed an emerging female-favorable gap in higher education (Eurostat 2002) but have not experienced the same trends in wage inequality as the U.S. (Blau and Kahn 2002).

Arguably, wage returns comprise too narrow a basis for evaluating the relative returns to higher education for men and women. For many years, scholars have argued that women's motivation to attend college stemmed in part from the marriage returns of higher education (Goldin 1992; Mare 1991; Oppenheimer 1988). This line of reasoning called attention to the high levels of educational assortative mating in the U.S. and elsewhere. The tendency for individuals to choose spouses with similar levels of education remains strong and may even have increased in the U.S. in recent decades (Lewis and Oppenheimer 2000; Mare 1991; Schwartz and Mare 2004).

Goldin (1992,1997) used this broader approach to compare the experiences of four cohorts of women that graduated from college between 1900-1919, 1920-1945, 1946-1965, and 1966-1979. She found that for the first cohort of women, college graduation depressed marriage rates and greatly depressed fertility rates. Female college graduates were 2.3 times more likely than non-college graduates to have no husband and

children. Later, in their 40s and 50s, college graduates in this cohort were also more than twice as likely to be in the labor force as those without college, with the "vast majority being teachers" (Goldin 1992:11). Those who graduated between 1946 and 1965 differed from earlier cohorts in that they generally had a family first, and then a job. Only 18% of this more recent cohort had not married or had not had children by age 55-64, compared to 50% of the first cohort. Furthermore, due to assortative mating, a college educated woman's probability of marrying a college graduate was much higher than that of a non-college educated woman (Goldin 1992:24). By measuring the total returns to college as the sum of a woman's own returns in the labor market plus the indirect returns from the income of her husband, Goldin estimated a rate of return to college in the 10-11% range for the 1946-1965 cohort as compared with 4-6% for the first cohort (1997:41). She speculated that rising "total returns" to college of the women graduating between 1945 and 1960 may have been a reason for the rising college enrollment of younger women, but she did not assess this possibility directly. Most recently, Goldin (2004) extended her analysis to include cohorts of women who graduated from college between 1980 and 1990. Compared to earlier cohorts of women, more women in this cohort (21 to 27%) succeeded in achieving both "career and family" by age 40.

While increasing labor market opportunity for women may have become a prime motivation for women to attend college, marriage may still be an important motivation. Using data from the June supplement of the CPS for the years 1973, 1980, and 1988, Qian and Preston (1993) compared the rates of first marriage for white women aged 18-44 by age and by education during the two years prior to each survey date. They found that rates of marriage declined sharply among poorly educated males and females at all

ages over the years 1972-1987. For better educated individuals, declines were smaller and largely confined to the period from 1972-1979. According to Qian and Preston, women with at least some college education actually had an increasing propensity to marry between 1972 and 1987. They also found that marital homogamy increased between 1979 and 1987. The implication of these trends was that the marriage returns to education increased during the 1970s and 1980s. Given that the economic returns to education were also rising during this period, the total (marriage + labor market) returns to education likely were rising even more sharply than were the labor market returns alone. While their analysis does not address the *relative* returns to education for men and women, it does demonstrate the incentive women had to secure college education during this period.

Qian and Preston(1993) focused on first marriage rates, which can only be part of the incentives story. Given the rising instability of marriage during this period, an incentives theory must focus on the probability of *staying* married, as well as the probability of *getting* married. The impact of education on union dissolution has received extensive attention in the demographic literature (Faust and McKibben 1999; Teachman, Teadrow and Crowder 2000; Teachman 2002). Many studies have shown that divorce is less likely in educationally homogamous marriages. Teachman (2002) further shows that the bivariate relationship between a woman's education and divorce is negative: her risk drops 6% for each additional year of schooling. This is largely accomplished via marital homogamy. College educated women are more likely to marry college educated men, who have substantially lower rates of divorce than high-school educated men, perhaps because men with a college education are less likely to initiate divorce, or perhaps

because women find college educated men to be more desirable partners and thus are less inclined to initiate divorce themselves. Higher levels of education for women actually imply greater divorce risks, but Teachman found that the divorce-suppressing effects of women's higher education via marital homogamy are larger than the divorce-enhancing effects of a women's education. He found no evidence of different trends in divorce by educational level. Martin (2004) likewise reported similar trends of increasing divorce rates for college- and non-college-educated women through 1980; but he found that after 1980 the trends diverged; divorce rates fell among college-educated women while they continued to rise for less-educated women. In sum, the combination of higher marriage rates and lower divorce rates for college-educated women suggests strong marital returns to higher education.

Beyond the question of returns to education via the labor market and marriage, a sound incentives theory should attend to the role of education as "insurance" against poverty, especially for women who must rely on their own labor earnings for their standard of living and, when dependents are involved, the standard of living of their children. The importance of higher education as insurance against living in poverty for women has likely risen in recent decades, because the risk of living in poverty for females relative to males has grown over this time. McLanahan, Sorenson and Watson (1989) examined the trend in the ratio of female to male poverty rates between 1950 and 1980 and concluded that female/male poverty ratios increased during the period. Among whites, women's poverty rates were 10 percent higher than men's in 1950, but almost 50 percent higher in 1980. Using CPS data to plot three-year moving averages of the female-to-male poverty ratio for whites from 1968 to 1996, Bianchi (1999) reported that

this upward trend in the feminization of poverty peaked in 1978; the ratio dropped during the 1980s but women's poverty rates remained between 50 and 60 percent higher than men's poverty rates in the 1990s.

A primary reason for the gender difference in poverty rates is the greater tendency for women to be single parents (Bianchi 1999; Cancian and Reed 2001). Non-marital childbearing has become an increasingly common path to single parenting for women, and the likelihood of non-marital childbearing is strongly related to a woman's education (Ellwood and Jencks 2004; McLanahan 2004). Between 1960 and the early 1990s, the proportion of female householders who had never married and who had children increased from 4% to 31% (Bianchi 1995). While never-married mothers have seen increases in their receipt of child support in recent decades, by 2000 only about one-fifth were receiving child support (Sorensen and Hill 2002:136). Among divorced women, child support receipt rates are higher, but their likelihood of receiving child support has declined slightly since 1970 (Hanson et al. 1996; Sorenson and Hill 2002).

In sum, higher education provides a woman insurance against living in poverty through three mechanisms: higher wages, lower rates of out-of-marriage childbearing, and (because of educational homogamy) lower risks of divorce. The well-documented trends in the relationship between gender and poverty may have created a growing incentive for women to pursue higher education to protect themselves against this risk.

The above studies provide evidence for the beneficial effects of higher education for women's wage labor opportunities, rates of marriage, standard of living, and protection against divorce and poverty. These findings, however, do not necessarily imply trends in these benefits of higher education. In order to determine whether

incentives to attain higher education have been rising faster for women than men, we need to determine whether the value of higher education with respect to both labor market and family returns has been rising faster for women than men. In the next section, we address this question by conducting a trend analysis of the value of higher education using 39 years of data from the Current Population Surveys.

## METHODS AND DATA

We analyze data from the March Supplement to the CPS for calendar years from 1964 through 2002 using the series provided by Unicon Research Corporation (http://www.unicon.com). Our primary sample consists of men and women between 25 and 34 years old who identified themselves either as white or as African American. We focus on the value of college as measured against the baseline value of a high school diploma by comparing respondents who completed a high school diploma and those who completed four or more years of college. Because we do not expect trends in college completion or trends in the value of college to be linear over this period of time, we take advantage of the large sample sizes available in the 39 CPS annual samples to analyze the data using nonparametric methods. Our measure of the value of college is operationalized as the average difference in a particular outcome between those with at least a college degree and those with only a high school diploma for a given year or birth cohort. For the years 1964-1991, education was measured as the highest grade completed, thereafter the CPS uses a mixture of years of education and certification to measure educational attainment.[ii] In the analyses, respondents in survey years before 1992 are coded as having a high school education if they report that they completed 12 years of education; respondents are coded as graduating from college if they report that

they completed 16 or more years of education. From 1992 through 2002, respondents are coded as having a high school education if they responded that they had a "high school diploma or equivalent." They are coded as college graduates if they report having a bachelor's degree, master's degree, professional school degree, or a doctorate. In the discussion below, we refer to these two groups as "college graduates" and "high school graduates." It is important to keep in mind that the "high-school graduate" subsample in this paper *excludes* individuals who have some college education but less than a bachelor's degree.

We use several distinct outcome variables to assess the value of higher education. These outcome variables are defined as follows:

Earned income: This variable is the sum of income from wages and salaries, self-employment, and farm income before taxes for full-time, full-year workers, defined as respondents who worked 50 or more weeks and 35 or more hours per week in the previous calendar year[iii] Income was deflated by the Consumer Price Index for all urban consumers (CPI-U) published by the Bureau of Labor Statistics.

Marital status: Because marital status is measured at the time of the survey, regardless of the year of the marriage, it captures the combined impact of educational differentials on the probability of getting married and on the probability of staying married.

Gross family income: This variable is the sum of the total gross incomes for all family members in the previous calendar year, where the CPS defines a family as a group of two or more people living together and related by birth, marriage, or adoption. Income was deflated by the CPI-U.[iv]

Number of persons in the family: This variable is measured at the time of the survey.

Gross family standard of living: This variable is defined as gross family income adjusted for family size. We use the adjustment formula proposed by Buhmann et al. (1988) that has often been used to study inequality and poverty in the U.S. (Citro and Michael 1995; Ruggles 1990). In its most common form, the Buhmann et al. approach amounts to dividing family income by the square root of the number of persons in the family and is therefore equal to the equivalence scale that was earlier proposed by Watts (Citro and Michael 1995).

Not income deprived: A family was defined as "not income deprived" if it had at least a standard of living value of $9,000 in 1983-1984 dollars. This is about $16,000 in 2002 pre-tax dollars, which implies a family income of at least $16,000 for one person, $23,000 for two persons, $28,000 for a family of three, and $32,000 for a family of four. For comparison, the official poverty level thresholds in 2002 were $9,300 for a family of one, $12,000 for a family of two, $14,500 for a family of three, and $18,200 for a family of four. The threshold we use corresponds to a household income at roughly the $20^{th}$ percentile for a single person, and at roughly the $40^{th}$ percentile of the household income distribution for a family of four. Thus, it might be loosely characterized as the threshold for a middle-class standard of living.

One problem in using earnings and income measures from the CPS to do trend analysis is that the top code for income variables varied over time and (in particular) jumped considerably in 1996. To avoid the possibility that trends in the top code would create artificial trends in income, we adopted two strategies. First, we used the $99^{th}$

percentile personal income as the top code for years before 1996. We then estimated a linear regression of the 99th percentile personal income on year for years between 1985 and 1995 and extrapolated the results of this regression for the subsequent years. Finally, we used the resulting series as the top code for personal income. We followed the same procedure for family income. The results, which are shown in Appendix Table 1, created a top code that increases more smoothly across the 39 years of CPS data than does the actual top code found in the data.[v] After smoothing the top code, we deflated income using the CPI-U. Note that the analysis of the probability of being above the "income deprived" threshold is completely unaffected by the treatment of top-coded income variables in the CPS.

In order to analyze the returns to higher education, we combined the 39 CPS annual samples and for each of the outcomes described above computed the difference between respondents with at least a bachelor's degree and respondents with only a high school diploma. In separate analyses, we compared respondents with *exactly* a bachelor's degree to high school graduates and found very similar results (available upon request) to those reported below. The sample sizes are large even for each subgroup (see Appendix Table 2); the sample of whites age 25-29 contains over 230,000 cases and nearly the same number for whites age 30-34, even when we restrict the sample to those who are either high school graduates or college graduates. These same restrictions yield samples of 23,000 and 21,000 cases, respectively, for African Americans. Because the sample sizes are large, our focus here is not on the statistical significance of differences or trends in these differences. Any trend that is clearly visible to the eye will be statistically significant at conventional levels with samples of this size. Rather, we focus on whether

gender-specific trends exist, whether they would be sufficiently large to be noticeable in the population, and whether they serve as plausible gender-specific incentives for higher education.

Specifically, we computed: (1) the difference in the log of earned income, (2) the difference in the log of family income, and (3) the difference in the log of standard of living as defined above for men and women in the age groups 25-29 and 30-34. We also computed (4) the difference in the proportion married as of the time of the survey, and (5) the difference in the proportion who were "not income deprived," as defined above. In order to moderate the influence of fluctuations in measured trends that are generated by sampling-error, we first smoothed the data with a moving average of the twice-lagged, lagged, current, forward, and twice-forward values. We then plotted these smoothed differences between the average outcomes for college graduates and high school graduates as a function of survey year and year of birth. These alternative time axes provide very similar results and so we generally restrict attention to the relationship between the outcome and survey year.

If the goal were to estimate the causal effect of education, one would seek to estimate the effects of education on outcomes in the presence of control variables such as family structure when growing up, father's occupation, ability, and other such factors. It is not possible to do trend analyses of estimated causal effects from such models with CPS data because of the lack of information on these control variables. Our principal goal, however, is not to estimate causal effects, but rather to determine whether there is a link in the apparent effect of education on outcomes –measured most simply as the difference between the outcomes of college and high school educated individual -- and

gender-specific educational trends. We would expect incentive effects to arise from trends in simple associations such as those between earnings and education, marriage rates and education, or the earnings of spouse and own education, not from trends in causal effects that are only revealed through sophisticated data analysis. As a practical matter, it would hardly be surprising if trends in simple associations and in the underlying causal effects moved in the same direction, but this question is not the focus of the present paper. For convenience, we sometimes use causal imagery (i.e. the "effect of" or "returns to" education) in the discussion of our results below, but these terms are to be interpreted as referring to differences in the outcome variable for men or women with a BA or higher education and those who are high school graduates.

## RESULTS

We first assess the shape of trends in the cohort proportion who have at least a bachelor's degree for white and black men and women.[vi] Figure 1 displays these trends for white respondents aged 25-29 and 30-34. The top panel of Figure 1 displays these trends in terms of birth cohort the bottom panel displays results in terms of survey year. Figure 2 displays trends for African-Americans in terms of survey year.

FIGURE 1 ABOUT HERE

The CPS data are consistent with other data sources (Bae et al. 2000) in showing that white women have increased their rate of college graduation more rapidly than men. The large samples of the CPS also allow us to explore the nonlinear character of these trends. White men and women born between 1940 and 1950 increased their rate of college graduation by about the same amount. Rates of college completion for men peak with the 1950 cohort. The decline that follows this peak is probably due in part to the

end of the Vietnam war-related draft, which had enhanced levels of college attendance among young men as a strategy to avoid military service in Vietnam (Card and Lemiux 2001; Freeman 1976). The timing of the drop also coincides with the decline in the wage premium to college that labor economists have attributed to the large supply of new college-educated job seekers from the early baby boom cohorts (Freeman 1976). White female graduation rates dipped at the same time that male rates declined but the decline for women, who were not subject to the Vietnam-war draft, was not as large.

The trends for males and females diverge in subsequent years. Starting with the cohorts born around 1955, whose members were 22 years old in 1977, the female cohort proportion graduating from college resumed the steady rise that characterized the birth cohorts from 1940 through the early 1950s. In contrast, male rates of college completion remained on a plateau for about ten years, only beginning to rise again with the birth cohorts of the early 1960s. The differing trajectories beginning around the 1953 cohort caused the female graduation rate to pass the male graduate rate for the cohort of females born in the middle 1960s. Despite increasing graduation rates for the most recent male cohorts, the female advantage continued to grow through the most recent cohorts observable in the CPS data.

The bottom panels of Figure 1 tell the same story using survey year rather than birth cohort as the time clock. These panels show the peak graduation rate was realized for both males and females around 1976 for 25-29 year olds. After the fallback for both sexes, the female rate resumed its positive growth in the early 1980s and passed the male graduation rate around 1990. The male rate resumed positive growth for the 25-29 year olds around 1993, but the female advantage continued to grow to the present day.

Generating trends for the African-American male population with CPS data is somewhat problematic, because of the high proportion of young black males who are in jail or prison, and therefore are excluded from the CPS sampling frame. Incarceration rates in the United States held stable between 1925 and 1975 at roughly 100 per 100,000 of the resident population; but after 1975 the incarceration rate increased such that by 2001 it was 472 per 100,000, nearly 5 times its historical average. In 2002, around 12 percent of black men in their 20s were in prison or jail (Pettit and Western 2004). It is important to adjust for incarceration because blacks in prison are disproportionately likely to have low levels of education (Western and Pettit 2000).

To address this issue, we made rough calculations of the impact of the incarcerated population on the trend in graduation rates by combining data on incarceration rates for black males from Western and Pettit (2000) with data from Bureau of Justice statistics on the gender composition of the jail and prison population. These data are available for the 1982 to 1996 period, so for these years, we display both unadjusted and adjusted (for incarceration) trends.[vii] Figure 2 displays only the results by survey year for blacks in both age groups in order to accommodate the incarceration adjustment.

FIGURE 2 ABOUT HERE

In Figure 2, the trend lines that are unadjusted for incarceration show that African American male and female graduation rates were roughly equal and both male and female African Americans graduated from college at much lower rates than whites. Graduation rates rose slowly for blacks born between 1940 and the early 1950s, as indicated by the trend lines from the earliest survey years in the mid-1960s through the

late 1970s. Growth subsequently stopped and may have reversed slightly. After about 10 cohorts, rates resumed a slow rise in the early 1990s. When the incarceration adjustment is taken into account, the trend lines show female rates of college completion that are higher than male rates. The data further suggest that among African Americans the gender gap has been widening in favor of women during the 1990s, though data limitations prevent a definitive conclusion about this trend.

## Gender-Specific Returns to College for Whites

Next we examine the gender-specific pattern of returns to college. In these figures we report only the results for 30-34 year olds by survey year. Results for 25-29 year olds and trends by birth year instead of survey year (available from authors) were similar to those for 30-34 year olds by survey year and thus are not presented in this paper. The similarity of the results for 25-29 year olds reinforces the conclusions that we report about the 30-34 year old subsamples.

Figure 3 compares the earnings of college- and high school-educated women and men. The education gap for women is large and by the middle 1980s is clearly trending up over time. The education gap for women was also clearly larger than the gap for men throughout the 39 years of CPS data analyzed here. However, Figure 3 also makes clear that the female-favorable gender-gap in returns to higher education are not increasing over time; it was essentially constant from the early 1970s until 1980. During the 1980s until some time in the early 1990s the gender gap shrank, and from then until 2002 it shows no clear trend.

FIGURE 3 ABOUT HERE

Figure 4 examines the association between higher education and the probability of being currently married for whites. Figure 4 shows that having a BA or more implied a lower probability of being married at ages 30-34 than if one had only a high school diploma through the early-1990s. Of course, at least some of this penalty is due to the delayed timing of marriage that comes with higher education. After about 1990, the higher education marriage penalty transformed into a higher education marriage premium for both men and women in the age 30-34 range.

FIGURE 4 ABOUT HERE

Figure 5 shows the trends in the association between own education and the family standard of living, and on the probability of remaining above the threshold between "income deprivation" and a "middle class" standard of living for 30-34 year old whites. Here the double benefit of marriage to women (in the labor market and the marriage market) is clearly at work. Panel A of Figure 5 shows that women gained a greater return to their standard of living from higher education than did men throughout the period, and the female-favorable gain began to increase in size in the early 1980s and continued through 2000. Panel B of Figure 5 shows similar benefits of higher education to the probability of remaining above the threshold between "income deprivation" and a "middle class" standard of living. Regardless of whether the returns to higher education are conceptualized in terms of size-adjusted family income or in terms of the probability of remaining above the income-deprivation threshold, the family-level returns of higher education were trending up faster for women than for men during this time period, and especially after 1980.

FIGURE 5 ABOUT HERE

The more strongly rising college education returns to standard of living for women stems potentially from three factors: (1) own earnings returns to higher education, (2) the association between own education and the earnings of others (primarily the husband) in the family, which arises from the combination of (a) the relationship between own education and the probability of getting and staying married, and (b) educational homogamy, and (3) the association between own education and family size, which scales down family income to produce standard of living. Recall that the measure of standard of living (SOL) that we use can be expressed as follows:

$$\ln(SOL) = \ln\frac{x+y}{\sqrt{z}}$$

where $x$ = own income, $y$ = other family income, and $z$ = family size. While the formula for SOL is fairly simple, it is not a linear function of these variables and is resistant to straightforward decomposition. Therefore, we first adopt an indirect strategy to investigate how the gender-gap trend in standard of living returns to education is related to the major components of standard of living. For simplicity, we focus on the time points of 1980, 1990, and 2000 with the rationale that clarifying the reasons for change between 1980 and 1990, and between 1990 and 2000 will provide much of the story for the continuous change reported in Figure 5.

Table 1 displays the means of own income, other family income, family size, SOL, and ln(SOL) in 1980, 1990, and 2000 as well as the proportion married for 30-34 year-old females and males with either a BA or more, or a high school diploma. The third row of each panel provides the difference in the means of the college-educated versus high school-educated groups. The fourth row shows this difference as a percent of the mean outcomes for high school-educated respondents. Finally, the row labeled

"DelFem – DelMale" displays the difference between the educational gain for female and male college-educated respondents. The change in the size of this gain is provided for 1990 compared with 1980 and then for 2000 compared with 1990.

TABLE 1 ABOUT HERE

The statistics in Table 1 show how the mechanisms behind the female-favorable trend differ between the first and second decades. Between 1980 and 1990, the difference in personal income between college- and high school-educated female workers increased substantially (from 77% to 105%). In both years, the female gap was considerably larger than the male gap. However, the gender gap itself did not increase between 1980 and 1990, and therefore trends in the personal income returns to education did not contribute to the rising gender gap in SOL returns to college education. Rather, the female-favorable trend in total SOL returns to education in this decade was driven by a rising gap between the income from other family members for college and for high school educated women. College-educated women were less likely than high school-educated women in the 30-34 year old age range to be married in both 1980 and 1990. However, the education gap in marriage rates shrank by two percentage points during these years. Meanwhile, other family income, which largely comes from husbands, rose from $21,996 to $23,991 in constant dollars for college-educated women. In contrast, other family income for high school-educated women declined in this decade. College-educated men did not experience a gain in other family income relative to high school-educated men. The gender difference in the effect of own education on other family income largely accounts for the 10% gap favoring women in the standard-of-living gain from college completion between 1980 and 1990.

Between 1990 and 2000 the dynamic shifted. The education-related growth in personal income continued, and for these years the growth was slightly larger for women than for men. Also, as others have reported (e.g., Ellwood and Jencks 2004; Qian and Preston 1993), higher education became positively associated with marriage over this period, though women did not gain more than men in this regard. The relatively large female gain from education in other family income found between 1980 and 1990 ceased to be a female advantage in the 1990-2000 period. Note that the tendency for the college educated to have smaller families was greater for women than for men in these years. This fact plus the larger return to education in own income for women led to the standard-of-living gain from a college degree to be 13% larger for women than men between 1990 and 2000.

A second approach to understanding the sources of the female-favorable trend is to compute an approximate decomposition. While ln(SOL) cannot be decomposed directly, an approximate decomposition can be obtained by applying a multi-variable Taylor expansion to ln(SOL). A multi-variable function can be expanded via a Taylor series as

$$f(\mathbf{x}) = f(\mathbf{a}) + \nabla f(\mathbf{a})'(\mathbf{x} - \mathbf{a}) + \frac{1}{2}(\mathbf{x} - \mathbf{a})'\nabla^2 f(\mathbf{a})(\mathbf{x} - \mathbf{a}) + \ldots$$

where $f(\mathbf{x}) = \ln(SOL)$, and where $\mathbf{x} = (x, y, z) =$ (own income, other income, family size), and where $a = (x_0, y_0, z_0)$, which is some set of specific values of own income, other income, and family size. If we just take the first two terms of this series, we get a linear expression in terms of own income, other income, and family size, namely

$$f(\mathbf{x}) = \ln(SOL) \approx f(\mathbf{a}) + \frac{\partial f}{\partial x}(\mathbf{a})(\mathbf{x} - \mathbf{x}_0) + \frac{\partial f}{\partial y}(\mathbf{a})(\mathbf{y} - \mathbf{y}_0) + \frac{\partial f}{\partial z}(\mathbf{a})(\mathbf{z} - \mathbf{z}_0)$$

Using the linear terms only as an approximation to ln(SOL) we can express changes in growth rates of ln(SOL) across education groups for each gender as the sum of changes and differences in changes in average personal income, average other income, and average family size. Table 2 shows the results of this decomposition for a = (10,000, 10,000, 3.2) for whites and blacks (see discussion of black results in next section). Not surprisingly, the trend size reported using the linear approximation is not identical to that computed as the average ln(SOL). This follows directly from our dropping of the quadratic and higher order terms from the Taylor expansion. But the widening of the gender gap is clearly visible in the linear terms. The second, third, and fourth rows in each panel of Table 2 show the components of the linear trend (these three components necessarily sum to the total).

TABLE 2 ABOUT HERE

The interpretation of this decomposition follows closely that provided by Table 1. In the first decade, gender differences in trends in the personal income returns to education worked against the rising gender gap for whites, but this fact was more than offset by the female favorable trend in the impact of own education on the size of other family income. In the second decade, the gender gap continued to rise in favor of women, but in these years the increase came from the female-favorable trend in own income returns to education and from the faster reduction in family size with education for women than for men.

## Gender-Specific Returns to College for Blacks

Next we turn to the trends in the value of education for African Americans. Recall that the trend lines unadjusted for incarceration in Figure 2 indicate that black female rates of college completion have not been rising faster than black male rates. Because the size of the African-American sample is much smaller than is the sample for whites (see Appendix Table 2), the observed trend lines are noisier for African Americans even after smoothing. As with whites, however, the value of college completion relative to high school completion for earnings appears greater for women than for men, with no clear trend over time. There also does not appear to be a clear trend in the gender-gap in the marriage returns to higher education.

FIGURES 6 AND 7 ABOUT HERE

A gender-specific standard of living trend does appear to be present for African-Americans, however, and it takes the same form as for whites. African-American females received larger standard-of-living returns to higher education than did African-American males, and the gender gap generally was larger in the 1980s and 1990s than it was in the 1970s. The value of higher education for achieving a threshold middle-class living standard was similarly greater for black females than for black males, although the threshold analysis does not show the gender-trend gap in the case of blacks that is clearly visible in the graph for whites.

FIGURE 8 ABOUT HERE

In order to examine the relative contribution of the factors responsible for the larger benefit to a college degree for the standard-of-living of Black women, we conducted the same analysis for Blacks as that for whites reported in Table 1, and present the results in Table 3. It is clear that the basis for the female-favorable trend for black

women is considerably different from that for white women. Table 3 shows that the black-female relative gain came from the strong growth in the relationship between education and own income for women. This female-favorable trend offset an unfavorable trend for women in the education returns to other-family income. In the second decade, the amount of other family income for college-educated women increased considerably while the other family income for high school-educated women declined. College-educated black men also gained relatively more other family income over these years than did high school-educated black men, but the education-related gain for men was not as large as for women. Meanwhile, family size reductions related to education were larger for women than for men and this gender gap in family size trends, combined with a gender gap in the effect of own education on other family income produced a larger gain in SOL from education for black women than for black men.

TABLE 3 ABOUT HERE

Using the approximate decomposition approach explained above, we see in Table 2 that the interpretation of the female favorable trend for black women in this second approach also closely follows the interpretation from Table 3. In the first period, the female favorable trend is due to the faster rise in own income returns to education for women than for men. In the second period, the continued female favorable trend is due to a combination of faster increases in other family income returns to education for women than men, and faster decreases in family size with education for women than for men. Overall, these results confirm our earlier assertions that the rising gender-gap in SOL returns to education arises through demographic processes -- i.e., marriage and

fertility -- as well as through changing relationships between education and labor force behaviors such as wage rates and hours worked.

## DISCUSSION

Our results indicate that the returns to higher education for women and men extend beyond returns in the labor market and include a higher probability of marriage, a higher standard of living, and insurance against poverty. For all of the outcomes considered above, with the exception of personal earnings, women's returns to higher education appear to have risen faster than those for men. While the type of data analyzed in this paper cannot by its nature prove the case, these results suggest a plausible connection between the white female-specific increase in college completion rates during the 1980s and the white female-specific rise in the returns to college around the same point in time. We believe, however, that the increase in the SOL returns to college for females were probably not the initial reason for the female-specific increase in college completion rates. It is unclear that the lag between the increasing returns to college and the increased enrollment patterns is big enough to conclude that the trend in outcomes was feeding back through the perceptions of young people to affect their enrollment decisions at the outset of the gender-specific trend. According to our results, the increase in the association between college completion and the probability of being above the "income deprivation" threshold began to rise for 25-29 year olds around 1974 (results available upon request). Around 1978 the return from college completion on household standard of living began to rise. The timing is similar when 30-34 year olds are used as the basis for the classification. Meanwhile, the proportion of 25-29 year old women who had completed college began to rise around 1981. It is difficult to pinpoint the age range

when female enrollment behavior would have begun to change, because increased college completion rates of 25-29 year olds in 1981 could have resulted from a combination of increased rates of college enrollment by 18 year olds (which would have occurred in the 1970-1974 range) and increased rates of college completion (which could have occurred anytime between 1971 and 1981). It seems reasonable to assume that a gender-specific trend in the value of education would have to persist for some time before it was noticed and became the basis for educational decisions. Such a presumption suggests that the initial female-specific rise may have had other causes.

Nonetheless, the near simultaneous rise in the value of higher education to women arguably was a stimulus that strengthened and maintained the female-favorable trend which led to women overtaking men in their rates of college graduation. Furthermore, as we have noted above, the returns to college completion in terms of personal earnings, family standard of living, or the probability of avoiding income deprivation have remained higher for women than for men since the early 1960s for 25-29 year olds, and since the late 1960s for 30-34 year olds. Thus, regardless of the timing of the turnaround in the female-specific trend, the higher *relative* value of college completion for women provided a higher incentive for women than for men to complete college throughout this time period.

The data also provide evidence of female-favorable returns to higher education among African-Americans. While there is no comparable female-favorable trend in rates of college completion for African Americans within the CPS samples, adjustment for incarceration suggests that a female advantage exists within the African-American population. The role of incentive effects from returns to education on educational

behavior is more complicated for blacks, however. First, broader historical forces related to the civil rights movement undoubtedly had a strong impact on educational trends. Second, black youths may require a minimum level of family resources before they are in a position to make decisions about higher education on the basis of rational incentives. Lower family resources among African-American families, and high levels of social disorganization in the neighborhoods of many black teen-agers might inhibit them from responding to labor market and family-based incentives to the same extent as whites, both because poverty increases outcomes such as teen-age pregnancy or incarceration that interfere with the possibility of completing higher education, and because higher education is facilitated by family-level resources, which are less available to black teenagers. Gains from the civil rights movement, trends in the socioeconomic standing of blacks, and trends in behaviors that interfere with college attendance will have important impacts on trends in gender-specific college completion rates, and these impacts are probably only weakly related to trends in the returns to higher education.

Even for whites it is clear that gender-specific incentives are only part of the explanation for the female-favorable trend in higher education. Furthermore, there is no reason to believe that the same explanation would apply across the socioeconomic hierarchy, or across different racial, ethnic or regionally-defined groups. The literature has demonstrated that many individual factors predict the likelihood of college attendance. Many of these factors begin shaping an individual's educational career at an early age, before he or she is aware of even the gross characteristics of labor or marriage markets, let alone trends in these markets. Trends in incentives nonetheless can have a powerful affect on the margin, and thus could very well be an important cause of the

emerging gender gap in higher education. Therefore, additional tests of the incentives hypothesis are desirable and should be practical to implement with available data. For example, the emerging gender gap in higher education is a phenomenon that is occurring throughout much of the industrialized world (Eurostat 2002). Attention to the question of whether countries with an emerging gender gap also have female-favorable trends in the value of higher education would supply additional useful evidence on this question. A second strategy would involve tests at the individual level. If gender-specific changes in the value of education are driving the emerging gender gap, one would expect the awareness of these trends to be reflected in the aspirations of students. Thus, trend data on aspirations may also play a useful role in the further testing of the incentives hypothesis.

## Notes

[i] Uncertainty should be a function of the probability of making *less* money with a college degree than with a high school degree, which has gone down for males even as the variance in college-level earnings has gone up.

[ii] In this case and for other variables used in this study where possible, we made use of the Unicon recodes of CPS variables, which are designed to increase comparability across the range of survey years studied in this paper.

[iii] Data for survey years 1964-1967 does not allow us to distinguish between full-year and part-year workers.

[iv] This variable is defined as "_faminc" in the Unicon release of the March CPS series.

[v] Another problem with CPS earnings data, namely item non-response, is handled by the census bureau through the use of imputation procedures. A complete discussion can be found in U. S. Department of Labor (2002).

[vi] Changing the definition to limit the base to respondents who had at least a high school diploma (and therefore were eligible to attend college) yields plots that look very similar in terms of trends, and are available upon request from the authors.

[vii] Because of the lack of information on race by sex trends in the prison population, we assume that the gender composition is the same for whites as for blacks. We further assume that Western and Pettit's (2000) counts for age 20-35, when divided by three, give roughly correct counts for our two five-year age groups. Western and Pettit report from unpublished Bureau of Prisons data on the number of men in prison by year. In order to do the adjustment, we make the assumption that no one in the incarcerated population earned a bachelor's degree or equivalent.

# References


Averett, Susan and Mark L. Burton. 1996. "College Attendance and the College Wage Premium: Differences by Gender." *Economics of Education Review* 15:37-49.

Bae, Yupin, Susan Choy, Claire Geddes, Jennifer Sable, and Thomas Snyder. 2000. *Trends in Educational Equity of Girls and Women.* Washington, D.C.: National Center for Education Statistics.

Bianchi, Suzanne M. 1995. "Changing Economic Roles of Women and Men." Pp. 107-54 in *State of the Union, Vol 1. Economic Trends*, edited by R. Farley. New York: Russell Sage.

Bianchi, Suzanne M. 1999. "Feminization and Juvenilization of Poverty: Trends, Relative Risks, Causes and Consequences." *Annual Review of Sociology* 25:307-33.

Blau, Francine and Lawrence M. Kahn. 2002. *At Home and Abroad: U.S. Labor-Market Performance in International Perspective*. New York: Russell Sage Foundation.

Buchmann, Claudia and Thomas A. DiPrete. 2005. "The Growing Female Advantage in Higher Education: Do Gains in Parental Resources Explain the Trend?" Working Paper. The Ohio State University, Department of Sociology.

Buhmann, Brigitte, Lee Rainwater, Guenther Schmaus, and Timothy Smeeding. 1988. "Equivalence Scales, Well Being, Inequality, and Poverty: Sensitivity Estimates Across Ten Countries Using the Luxembourg Income Study (LIS) Database." *The Review of Income and Wealth* 34:115-42.

Cancian, Maria and Deborah Reed. 2001. "Changes in Family Structure and Implications for Poverty and Related Policy." Pp. 69-161 in *Understanding Poverty,* edited by Sheldon H. Danziger and Robert H. Haveman. Cambridge, MA: Harvard University and Russell Sage Foundation.

Card, David and Thomas Lemieux. 2001. "Draft Avoidance and College Attendance: the Unintended Legacy of the Vietnam War." *American Economic Review (Papers and Proceedings)* 91:97-102.

Charles, Kerwin Kofi and Ming-Ching Luoh. 2003. "Gender Differences in Completed Schooling." Review of Economics and Statistics 85:559-77.

Citro, Constance F. and Robert T. Michael (eds.). 1995. *Measuring Poverty: A New Approach.* Panel on Poverty and Family Assistance: Concepts, Information Needs, and Measurement Methods. Washington, DC: National Research Council.

Ellwood, David T. and Christopher Jencks. 2004. "The Uneven Spread of Single-Parent Families: What do We Know? Where do We Look for Answers?" Pp. 3-77 in *Social Inequality*, edited by Kathryn Neckerman. New York: Russell Sage Foundation.

Eurostat. 2002. *The Life of Women and Men in Europe: A Statistical Portrait.* Luxembourg: Eurostat.

Faust, K, and J. McKibben. 1999. "Marital Dissolution: Divorce Separation, Annulment, and Widowhood." Pp. 475-99 in *Handbook of Marriage and the family, 2nd edition,* edited by M. Sussman, S. Steinmetz, and G. Peterson. New York: Plenum.

Freeman, Catherine E. 2004. *Trends in the Educational Equity of Girls and Women: 2004*. Washington, D.C.: National Center for Education Statistics

Freeman, Richard. 1976. *The Overeducated American.* New York: Academic Press.

Goldin, Claudia. 1992. "*The Meaning of College in the Lives of American Women: The Past 100 Years*." National Bureau of Economic Research Working Paper 4099. Cambridge, MA: NBER.

Goldin, Claudia. 1997. "Career and Family: College Women Look to the Past." Pp. 20-58 in *Gender and Family Issues in the Workplace*, edited by Francine D. Blau and Ronald G. Ehrenberg. New York: Russell Sage Foundation.

Goldin, Claudia. 2004. "The Long Road to the Fast Track: Career and Family." *Annals of the American Academy of Political and Social Science* 596:20-35.

Hanson, Thomas L. Irwin Garfinkel, Sara S. McLanahan and Cynthia Miller. 1996. "Trends in Child Support Outcomes." *Demography* 33:483-96.

Lewis, Susan K. and Valerie K. Oppenheimer. 2000. "Educational Assortative Mating across Marriage Markets: Non-Hispanic Whites in the United States." *Demography* 37:29-40.

Mare, Robert D. 1991. "Five Decades of Educational Assortative Mating." *American Sociological Review* 56:15-32.

Martin, Steven P. 2004. "Growing Evidence of a Divorce Divide? Education and Marital Rates Since the 1970s." Working Paper. Russell Sage Foundation. New York.

McLanahan, Sara S. 2004. "Diverging Destinies: How Children are Faring under the Second Demographic Transition." *Demography* 41:607-27.

McLanahan, Sara S., Annemette Sorenson and Dorothy Watson. 1989. "Sex Differences in Poverty, 1950-1980." *Signs* 15:102-22.

Oppenheimer, Valerie K. 1988. "A Theory of Marriage Timing." *American Journal of Sociology* 94:563-91.

Pettit, Becky and Bruce Western. 2004. "Mass Imprisonment and the Life Course: Race and Class Inequality in U.S. Incarceration." *American Sociological Review* 69: 151-69.

Qian, Zhenchao and Samuel H. Preston. 1993. "Changes in American Marriage, 1972 to 1987: Availability and Forces of Attraction by Age and Education." *American Sociological Review* 58:482-95.

Ruggles, Patricia. 1990. *Drawing the Line: Alternative Poverty Measures and Their Implications for Public Policy*. Washington, DC: Urban Institute Press.

Schwartz, Christine R. and Robert D. Mare. 2004. “The Effects of Marriage, Marital Dissolution, and Educational Upgrading on Educational Assortative Mating.” California Center for Population Research Online Working Paper 02603. Los Angeles, CA: CCPR.

Sorensen, Elaine and Ariel Hill. 2002. “Single Mothers and Their Child Support Receipt: How Well is Child-Support Enforcement Doing?” *Journal of Human Resources* 39:135-54.

Teachman, Jay. 2002. "Stability across Cohorts in Divorce Risk Factors." *Demography* 39:331-51.

Teachman, Jay, L. Tedrow, and Kyle Crowder. 2000. "The Changing Demography of America's Families." *Journal of Marriage and the Family* 51:259-67.

U.S. Department of Labor. 2002. *Current Population Survey: Design and Methodology*. Technical Paper 63RV.

Walters, Pamela B. 1986. “Sex and Institutional Differences in Labor Market Effects on the Expansion of Higher Education, 1952-1980.” *Sociology of Education* 59:199-221.

Western, Bruce and Becky Pettit. 2000. "Incarceration and Racial Inequality in Men's Employment." *Industrial and Labor Relations Review*. 54: 3-16.

Table 1 Gender-Specific Change in Components of Total Return to College Education--Whites

| Year | | | Own Income | Proportion Married | Other Family Income | Family Size | SOL | Ln(SOL) | Freq |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | Female | College | 11,578 | 0.75 | 21,996 | 2.96 | 20,457 | 9.78 | 1345 |
| | | HS | 6,544 | 0.79 | 19,293 | 3.72 | 13,865 | 9.36 | 2727 |
| | | Diff | 5,034 | -0.04 | 2,703 | -0.76 | 6,591 | 0.42 | |
| | | %Diff | 77% | -5% | 14% | -20% | 48% | | |
| | Male | College | 25,341 | 0.73 | 7,048 | 2.88 | 20,322 | 9.78 | 1950 |
| | | HS | 20,184 | 0.78 | 5,708 | 3.43 | 14,870 | 9.46 | 1995 |
| | | Diff | 5,157 | -0.05 | 1,340 | -0.55 | 5,453 | 0.33 | |
| | | %Diff | 26% | -7% | 23% | -16% | 37% | | |
| | DelFem - DelMale | | 51% | 2% | -9% | -5% | 11% | 0.09 | |
| 1990 | Female | College | 17,045 | 0.71 | 23,911 | 2.82 | 25,711 | 10.00 | 1447 |
| | | HS | 8,328 | 0.73 | 17,157 | 3.50 | 14,100 | 9.35 | 2464 |
| | | Diff | 8,718 | -0.02 | 6,754 | -0.68 | 11,612 | 0.65 | |
| | | %Diff | 105% | -3% | 39% | -19% | 82% | | |
| | Male | College | 29,480 | 0.63 | 10,145 | 2.63 | 26,271 | 10.01 | 1427 |
| | | HS | 18,476 | 0.66 | 8,792 | 3.20 | 16,220 | 9.51 | 2279 |
| | | Diff | 11,004 | -0.03 | 1,353 | -0.57 | 10,052 | 0.50 | |
| | | %Diff | 60% | -4% | 15% | -18% | 62% | | |
| | DelFem - DelMale | | 45% | 0% | 24% | -2% | 20% | 0.15 | |
| 1990 Gender Gap - 1980 Gender Gap | | | -6% | -1% | 33% | 3% | 10% | 0.06 | |
| 2000 | Female | College | 20,229 | 0.72 | 25,281 | 2.77 | 28,844 | 10.08 | 1198 |
| | | HS | 9,271 | 0.68 | 15,932 | 3.46 | 14,100 | 9.27 | 1225 |
| | | Diff | 10,959 | 0.04 | 9,349 | -0.69 | 14,744 | 0.81 | |
| | | %Diff | 118% | 6% | 59% | -20% | 105% | | |
| | Male | College | 30,357 | 0.65 | 12,650 | 2.56 | 28,755 | 10.07 | 1130 |
| | | HS | 18,004 | 0.60 | 8,978 | 2.95 | 16,788 | 9.52 | 1295 |
| | | Diff | 12,353 | 0.05 | 3,672 | -0.39 | 11,967 | 0.55 | |
| | | %Diff | 69% | 8% | 41% | -13% | 71% | | |
| | DelFem - DelMale | | 50% | -2% | 18% | -7% | 33% | 0.26 | |
| 2000 Gender Gap - 1990 Gender Gap | | | 4% | -3% | -6% | -5% | 13% | 0.11 | |

Table 2
Decomposition of Trend in Gender Gap, Using Linear Approximation to ln(SOL)

| | 1990-1980 | | 2000-1990 | |
|---|---|---|---|---|
| Whites | ln(SOL) | linear appr. | ln(SOL) | linear appr. |
| Total | 0.064 | 0.078 | 0.11 | 0.088 |
| Own Income component | | -0.108 | | 0.045 |
| Other family income component | | 0.202 | | 0.014 |
| Family size component | | -0.016 | | 0.029 |
| | | | | |
| Blacks | | | | |
| Total | 0.254 | 0.245 | 0.165 | 0.115 |
| Own Income component | | 0.317 | | -0.042 |
| Other family income component | | -0.020 | | 0.131 |
| Family size component | | -0.052 | | 0.026 |

Table 3 Gender-Specific Change in Components of Total Return to College Education--Blacks

| Year | | | Own Income | Proportion Married | Other Family Income | Family Size | SOL | Ln(SOL) | Freq |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | Female | College | 14,459 | 0.64 | 18,353 | 3.05 | 19,457 | 9.75 | 95 |
| | | HS | 8,673 | 0.43 | 8,821 | 3.84 | 9,307 | 8.89 | 296 |
| | | Diff | 5,786 | 0.21 | 9,532 | -0.79 | 10,150 | 0.86 | |
| | | %Diff | 67% | 48% | 108% | -20% | 109% | | |
| | Male | College | 22,936 | 0.62 | 9,350 | 2.93 | 20,432 | 9.75 | 76 |
| | | HS | 13,993 | 0.49 | 14,445 | 2.76 | 12,081 | 9.20 | 181 |
| | | Diff | 8,942 | 0.12 | -5,095 | 0.17 | 8,350 | 0.55 | |
| | | %Diff | 64% | 25% | -35% | 6% | 69% | | |
| | DelFem - DelMale | | 3% | 23% | 143% | -27% | 40% | 0.31 | |
| 1990 | Female | College | 19,248 | 0.49 | 14,445 | 2.76 | 21,776 | 9.78 | 121 |
| | | HS | 7,853 | 0.38 | 7,032 | 3.53 | 8,239 | 8.71 | 334 |
| | | Diff | 11,395 | 0.12 | 7,413 | -0.77 | 13,537 | 1.07 | |
| | | %Diff | 145% | 32% | 105% | -22% | 164% | | |
| | Male | College | 20,187 | 0.52 | 10,279 | 2.34 | 20,931 | 9.69 | 69 |
| | | HS | 11,985 | 0.37 | 9,504 | 3.12 | 12,483 | 9.19 | 220 |
| | | Diff | 8,202 | 0.15 | 775.07 | -0.78 | 8448.13 | 0.51 | |
| | | %Diff | 68% | 40% | 8% | -25% | 68% | | |
| | DelFem - DelMale | | 77% | -9% | 97% | 3% | 97% | 0.56 | |
| 1990 Gender Gap - 1980 Gender Gap | | | 74% | -32% | -46% | 30% | 57% | 0.25 | |
| 2000 | Female | College | 20,205 | 0.42 | 18,547 | 2.59 | 24,916 | 9.92 | 99 |
| | | HS | 8,277 | 0.37 | 6,289 | 3.30 | 8,345 | 8.72 | 187 |
| | | Diff | 11,927 | 0.05 | 12,258 | -0.71 | 16,571 | 1.20 | |
| | | %Diff | 144% | 15% | 195% | -21% | 199% | | |
| | Male | College | 25,301 | 0.42 | 12,431 | 2.42 | 25,773 | 9.96 | 78 |
| | | HS | 15,728 | 0.32 | 9,425 | 2.96 | 16,150 | 9.49 | 178 |
| | | Diff | 9,573 | 0.10 | 3,007 | -0.55 | 9,623 | 0.47 | |
| | | %Diff | 61% | 31% | 32% | -18% | 60% | | |
| | DelFem - DelMale | | 83% | -17% | 163% | -3% | 139% | 0.73 | |
| 2000 Gender Gap - 1990 Gender Gap | | | 7% | -8% | 66% | -6% | 42% | 0.17 | |

Fig. 1. Proportion with BA by Cohort and Survey Year, Whites

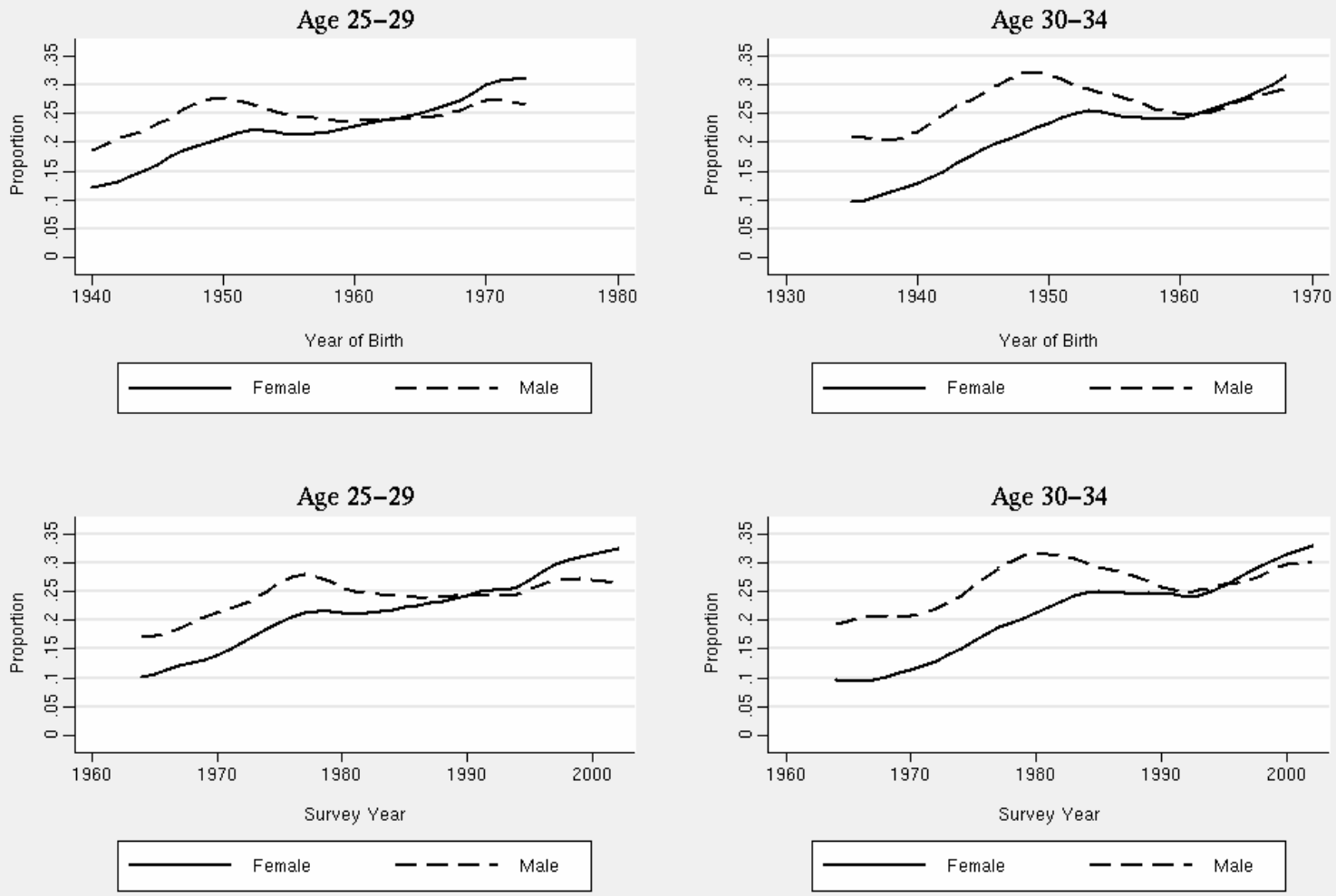


Fig. 2. Proportion of Blacks with BA by Survey Year, Including Prison Population

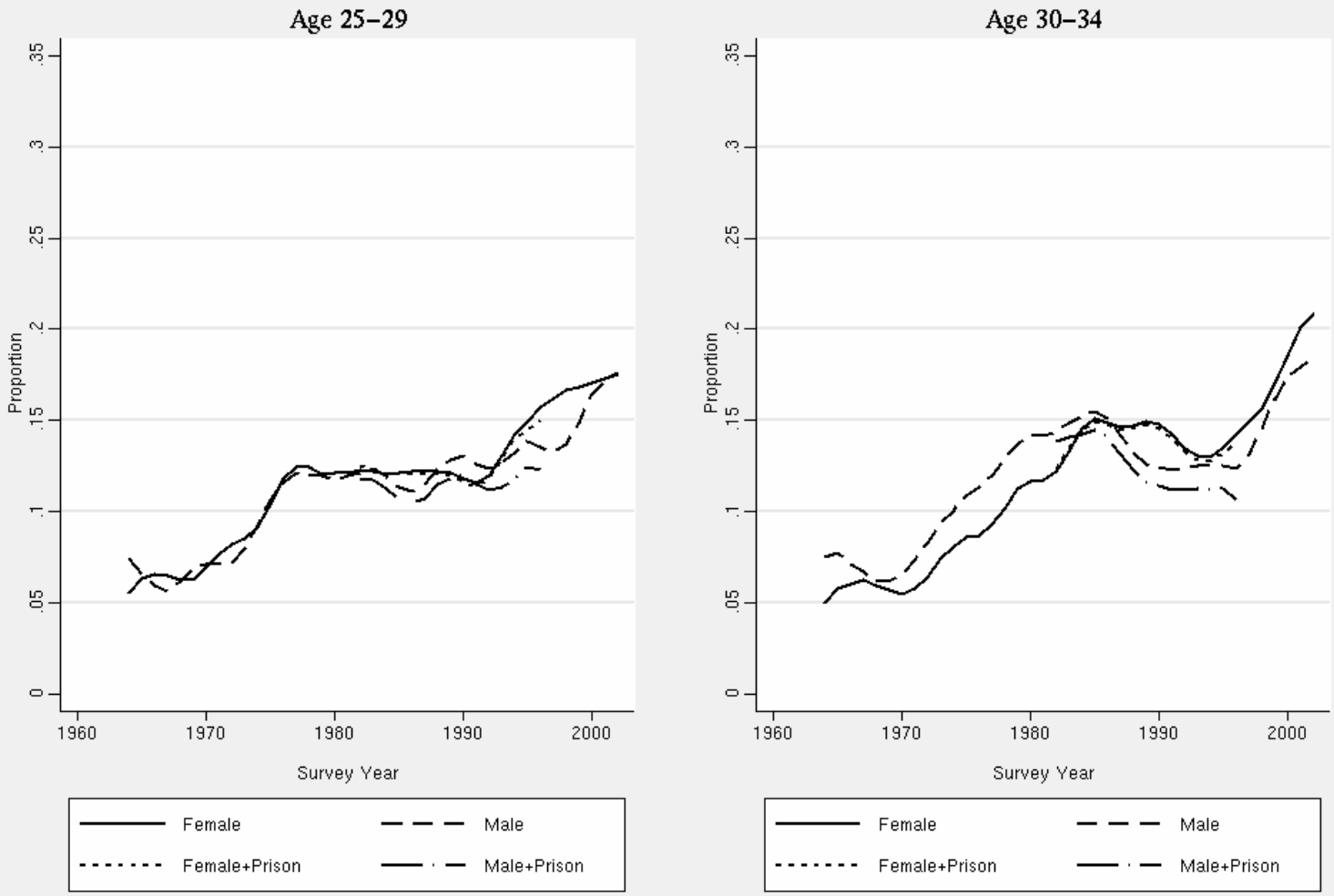


Fig. 3. Effect of BA on Earnings, Full-Time/Full-Year Whites

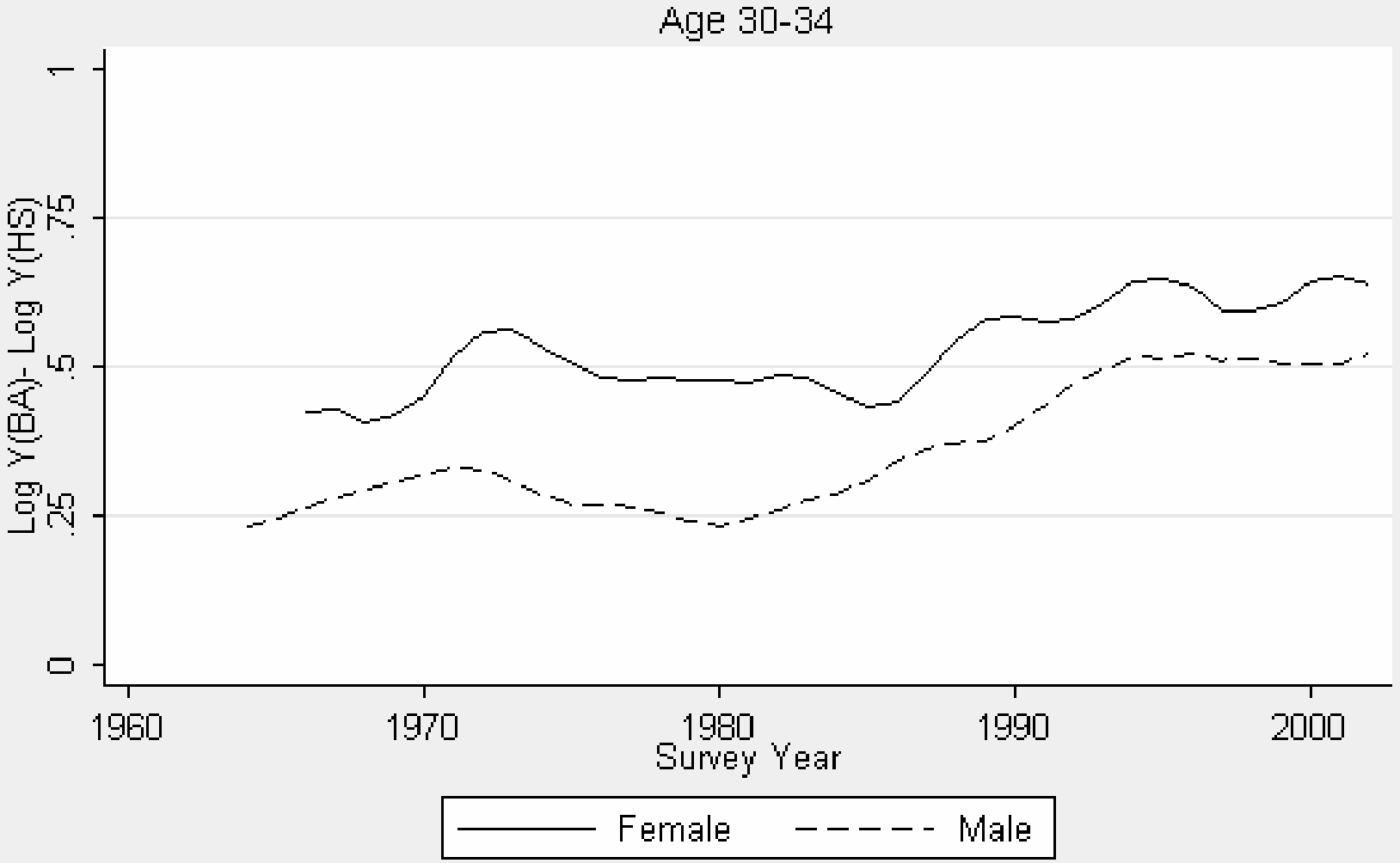


Fig. 4. Effect of BA on Marriage, Whites

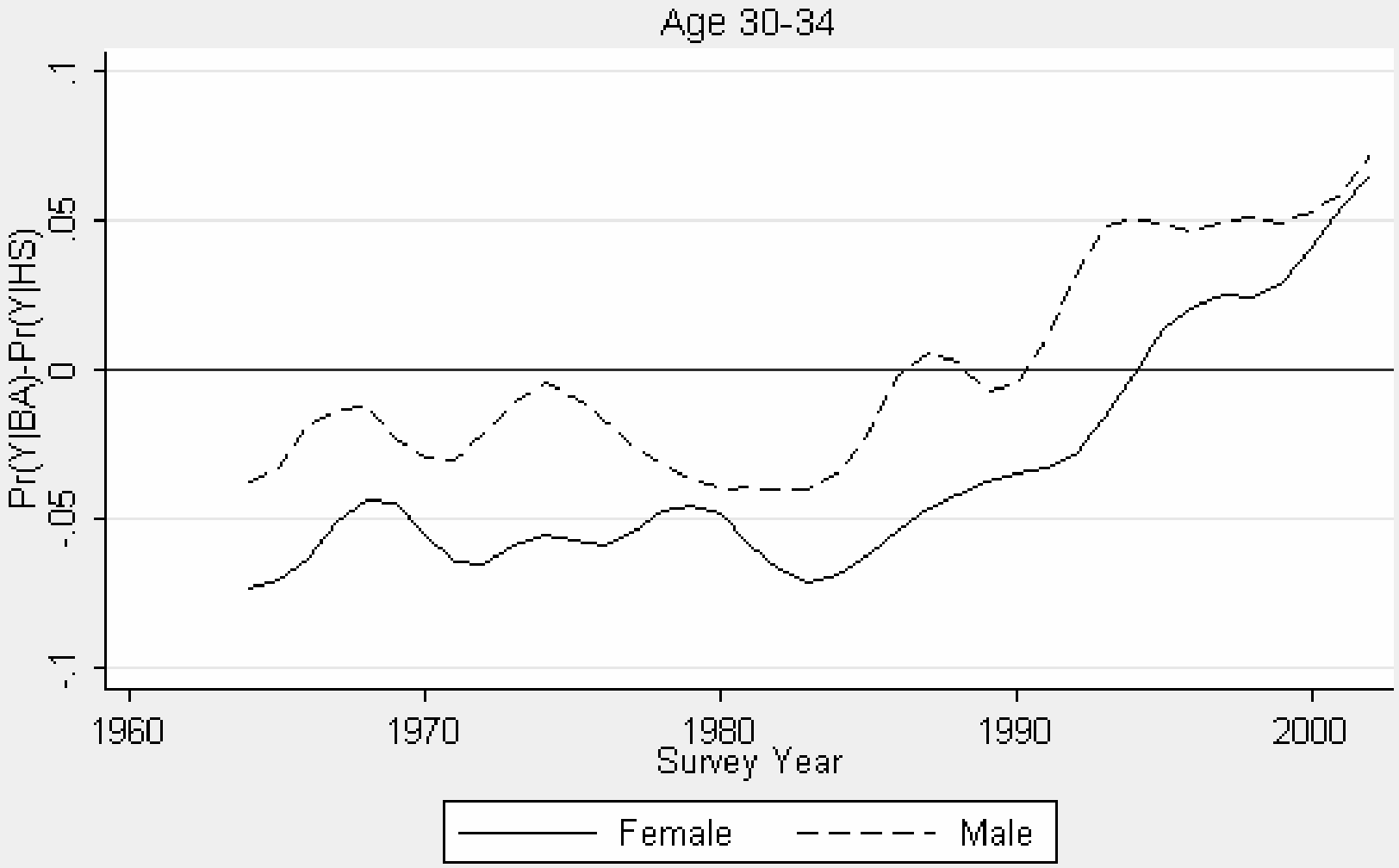
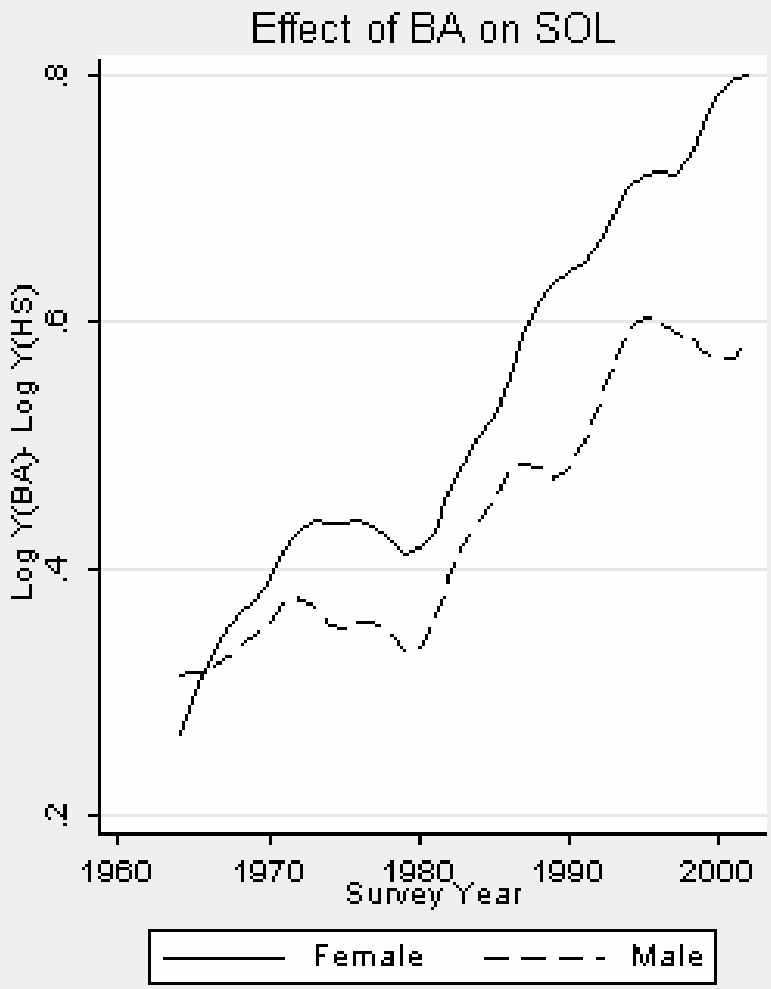
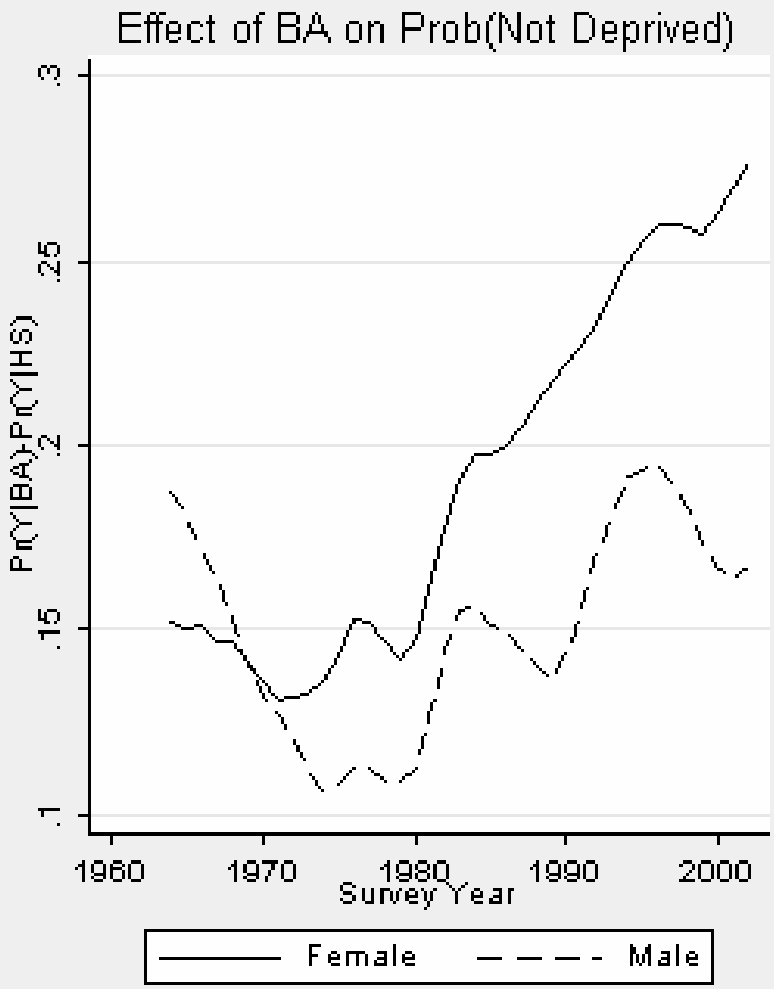
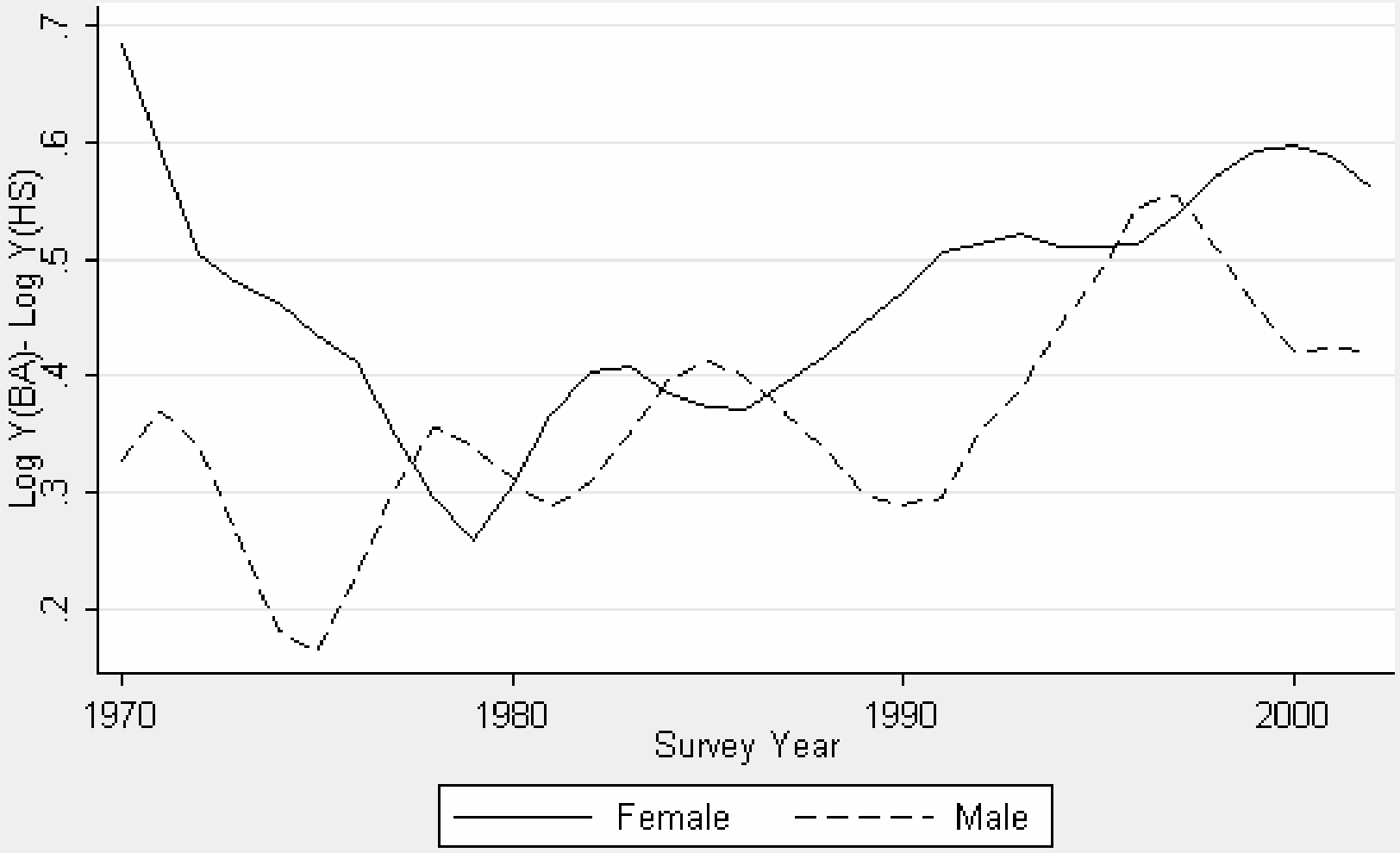


Fig. 5. Effect of BA on Standard of Living and Probability of Not Being Deprived, Whites, Age 30-34



## Fig 6. Effect of BA on Earnings, Full-Time/Full-Year Blacks



## Figure 7. Effect of BA on Marriage

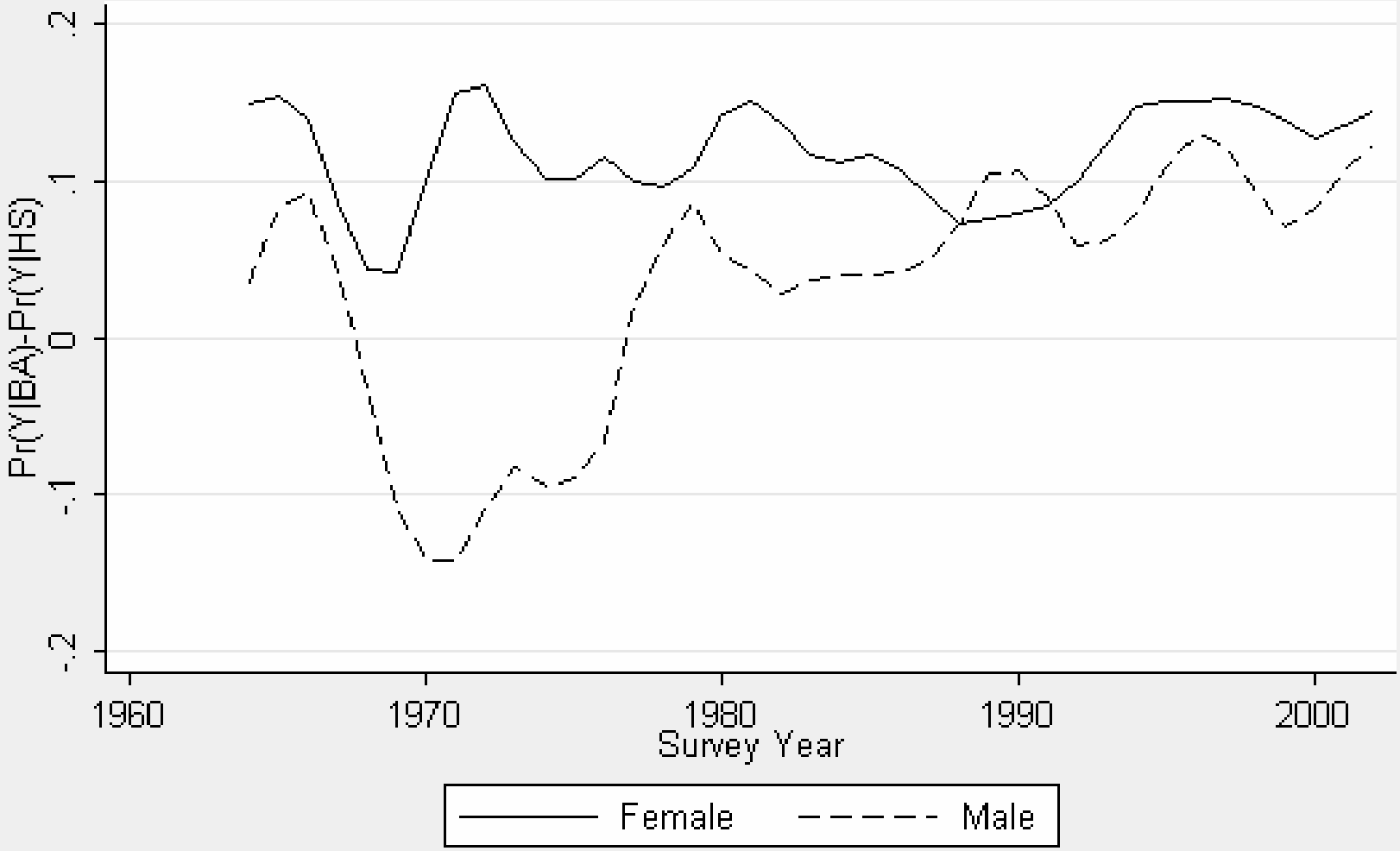
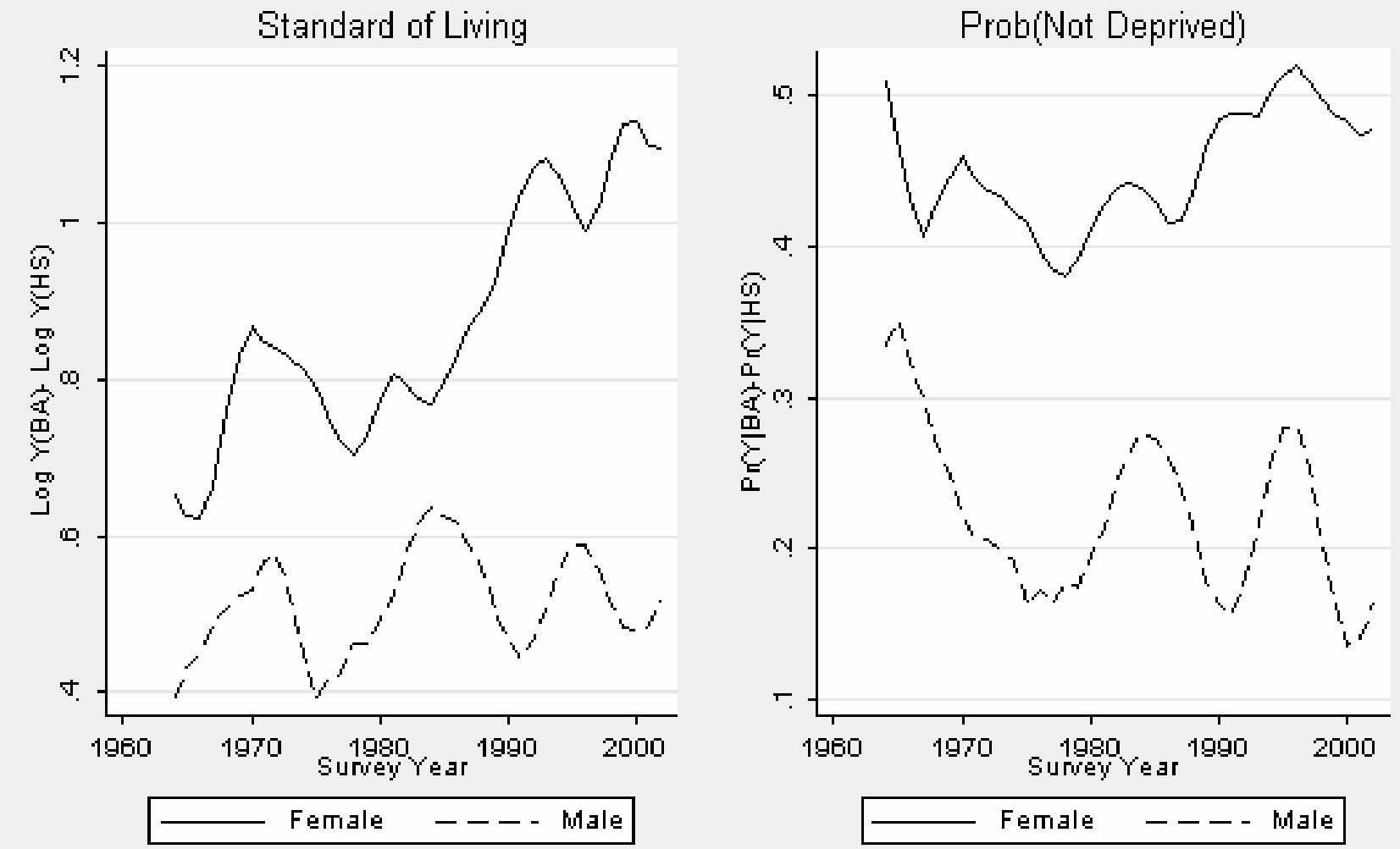


Fig. 8. Effect of BA on Standard of Living, Age 30-34, Black



Appendix Table 1: Revised Topcodes for Trend Analysis (Before Deflation)

| | Family Income | | Personal Income | |
|---|---|---|---|---|
| Year | Revised Topcode | 99th Percentile | Revised Topcode | 99th Percentile |
| 1964 | 25673 | 25673 | 17500 | 17500 |
| 1965 | 26000 | 26000 | 19130 | 19130 |
| 1966 | 28000 | 28000 | 20000 | 20000 |
| 1967 | 30025 | 30025 | 21100 | 21100 |
| 1968 | 32100 | 32100 | 22418 | 22418 |
| 1969 | 35000 | 35000 | 24400 | 24400 |
| 1970 | 39020 | 39020 | 26300 | 26300 |
| 1971 | 41000 | 41000 | 28585 | 28585 |
| 1972 | 43804 | 43804 | 30000 | 30000 |
| 1973 | 48350 | 48350 | 33771 | 33771 |
| 1974 | 50000 | 50000 | 35500 | 35500 |
| 1975 | 50000 | 50000 | 36200 | 36200 |
| 1976 | 52482 | 52482 | 40000 | 40000 |
| 1977 | 56034 | 56034 | 43456 | 43456 |
| 1978 | 60280 | 60280 | 47500 | 47500 |
| 1979 | 63598 | 63598 | 50030 | 50030 |
| 1980 | 68393 | 68393 | 50300 | 50300 |
| 1981 | 72000 | 72000 | 50820 | 50820 |
| 1982 | 86210 | 86210 | 62224 | 62224 |
| 1983 | 91598 | 91598 | 70198 | 70198 |
| 1984 | 96400 | 96400 | 72260 | 72260 |
| 1985 | 112422 | 112422 | 79650 | 79650 |
| 1986 | 118161 | 118161 | 83000 | 83000 |
| 1987 | 122450 | 122450 | 90000 | 90000 |
| 1988 | 125500 | 125500 | 91211 | 91211 |
| 1989 | 131570 | 131570 | 99999 | 99999 |
| 1990 | 142404 | 142404 | 100999 | 100999 |
| 1991 | 143999 | 143999 | 100804 | 100804 |
| 1992 | 146481 | 146481 | 100699 | 100699 |
| 1993 | 150321 | 150321 | 101087 | 101087 |
| 1994 | 154399 | 154399 | 102650 | 102650 |
| 1995 | 163170 | 163170 | 104800 | 104800 |
| 1996 | 166626.8 | 303233 | 109939.5 | 143379 |
| 1997 | 171505.8 | 327145 | 112279.4 | 150600 |
| 1998 | 176384.9 | 337965 | 114619.3 | 167755 |
| 1999 | 181264 | 324099 | 116959.3 | 152500 |
| 2000 | 186143 | 262191 | 119299.2 | 179004 |
| 2001 | 191022 | 347393 | 121639.1 | 196136 |
| 2002 | 195901.1 | 352196 | 123979 | 320718 |

Appendix Table 2. Sample Sizes for CPS Analyses

| | Year | High School | BA+ | Total |
|---|---|---|---|---|
| | | Age 25-29 | | |
| White | 1964-1970 | 21,976 | 7,553 | 29,529 |
| | 1971-1980 | 41,618 | 22,267 | 63,885 |
| | 1981-1990 | 50,963 | 26,955 | 77,918 |
| | 1991-2002 | 33,661 | 26,384 | 60,045 |
| | | Age 30-34 | | |
| | 1964-1970 | 19,817 | 6,738 | 26,555 |
| | 1971-1980 | 35,973 | 19,090 | 55,063 |
| | 1981-1990 | 46,027 | 30,186 | 76,213 |
| | 1991-2002 | 40,141 | 31,051 | 71,192 |
| | | Age 25-29 | | |
| Black | 1964-1970 | 2,055 | 343 | 2,398 |
| | 1971-1980 | 4,586 | 1,149 | 5,735 |
| | 1981-1990 | 6,213 | 1,696 | 7,909 |
| | 1991-2002 | 5,086 | 1,900 | 6,986 |
| | | Age 30-34 | | |
| | 1964-1970 | 1,806 | 330 | 2,136 |
| | 1971-1980 | 3,559 | 897 | 4,456 |
| | 1981-1990 | 5,331 | 1,811 | 7,142 |
| | 1991-2002 | 5,237 | 2,098 | 7,335 |