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

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Abstract

Analysis of March CPS data for the period from 1964 through 2002 shows that white women overtook men in their rates of college completion, and that changes in the value of higher education are plausibly one of the causes of this phenomenon. White male and female college graduation rates rose through about the 1950 birth cohort and then stalled. Female rates resumed their climb after about five years, while male rates did not increase for the next fifteen cohorts. During the period when male graduation rates remained constant, the rate of white female graduation from college surpassed the male rate. White female returns to higher education in the form of personal income remained higher than male returns for the entire period, but the trends in these returns do not provide a plausible interpretation for the shape of the male and female trajectories. Rather, the combination of (1) a stable personal income premium to higher education after 1980, (2) increasingly favorable marriage rates for the more educated, (3) educational homogamy, and (4) increasing income returns to education for men caused the impact of higher education on the standard of living of young adult families to grow more rapidly for females than males during the period when female-favorable trends in higher education began to emerge. A gender gap also exists for the African-American population but precise comparisons with whites are difficult both because of sampling error and because of the complications stemming from the large number of young black males who are in jail or prison. A gender gap in the returns to higher education exists for African Americans, but the gap appears to be smaller for African Americans than for whites.

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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 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 1972, more males than females enrolled in post-secondary education (53% versus 46%); by 1997 the reverse was true, with 70% of females enrolling in college compared to 64% of males. 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., "The Male Minority" *Time Magazine* December 2, 2000; "The New Gender Gap" *Business Week* May 26, 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, DiPrete and Powell (2003) have found 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, an opposing 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. In other words, the period since roughly the 1965 birth cohort is characterized more by a form of sex-role socialization, where 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. 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. Walters (1986) used time-series models on aggregate data to argue that female gains in higher education enrollment between 1952 and 1980 were largely due to changes in the occupational distribution, but she reached the same conclusion about men's higher education gains, which were also substantial during this period. Walters did not attempt to explain the emerging *gap* in higher education.

A natural incentive-based hypothesis would be that a female-favorable trend in higher education was being driven at least in part by female-favorable advantages in the labor market linked to gains in employment opportunity to women that derive from the

women's movement. However, both Averett and Burton (1996) and Charles and Luoh (2002) analyzed trend data from the Current Population Survey 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. However, the same is true of male returns, which have increased even more rapidly because of the declining opportunity for high-paying (typically male) manufacturing jobs for high school educated workers.

Charles and Luoh argued that the rising female-favorable education gap may be instead a consequence of rising "uncertainty" in the returns to college education for men. However, their measure of uncertainty (the variance of earnings for college-educated males) amounts to an argument that rising inequality in male college-level earnings is depressing male 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,[1] their proposed explanation appears to be contradicted by data from other industrialized countries, which show the same emerging gender gap in many countries (Eurostat 2002) that have not experienced the same trends in wage inequality as the U.S. (Blau and Kahn 2002).

Arguably, however, the wage measure is too narrow a basis for evaluating the relative returns to higher education for men and women. For many years, it was argued that women's motivation to attend college stemmed in part from the marriage returns of higher education (Oppenheimer 1988; Mare 1991; Goldin 1992). This line of reasoning pointed to the high levels of assortative mating by education in the U.S. and elsewhere. Assortative mating by education remains strong and may even have increased in the U.S.

in recent years (Lewis and Oppenheimer 2000; Mare 1991). Goldin (1992) used this broader approach to study the relative experience of female cohorts that graduated from college in the 1900 to 1920 period with that of female graduates between 1945 and 1960. She found that college graduation depressed marriage rates and greatly depressed fertility rates among women. Female college graduates were 2.3 times more likely than non-college graduates to not have a husband and children. On the other hand, female college graduates who were 45-54 years old in 1940 were more than twice as likely to be in the labor force as those without college (the "vast majority being teachers." Goldin 1992, p. 11).

Those who graduated from 1945 to 1960, Goldin argued, differed from the first cohort in that they generally had a family first, and then a job. In contrast to the first cohort, Goldin reported that only 18% of the more recent cohort had either not married, not had children, or both by age 55-64. Furthermore, because of 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, p. 24). By measuring the total returns to college as the sum of own returns in the labor market plus the indirect returns from the income of the husband, Goldin estimated a rate of return to college in the second cohort in the 10-11% range as compared with 4-6% for the first cohort.

Goldin concluded her analysis with a brief study of women who graduated from college after 1980. At the time of her study, she argues, their life histories were still too short for measures of demographic and economic outcomes comparable to the earlier cohorts, though she noted that their probabilities of not being married by 25-34 and not having children were much higher than the second cohort and "moving back to the first

cohort," while at the same time their labor market experiences became more similar to those of men. Goldin speculated that the higher "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. However, she attempted no direct assessment of this possibility.

While increasing labor market opportunity for women may have become the prime motivation for women to attend college, marriage may still be an important motivation. Qian and Preston (1993) analyzed data from the June supplement of the CPS for the years 1973, 1980, and 1988 to compare the rate of first marriages 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. Declines were smaller for better educated individuals and were largely confined to the period from 1972-79. Qian and Preston found that women with at least some college education actually had an increasing propensity to marry for the 1972 to 1987 period. They also found that marital homogamy increased in the 1979-1987 period. The implication of these trends was that the marriage returns to education increased over this period. Given that the economic returns to education were also rising during this period, this suggests that the total (marriage + labor market) returns to education were rising even more sharply than were the labor market returns alone. Their analysis says nothing about the *relative* returns to education for men and women over this period, but it does demonstrate the incentive women had to secure college education during this period.

Qian and Preston's analysis focuses 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. In addition, an incentives theory would reasonably include attention to the insurance aspects of education for men and women who, because of a marital dissolution, must rely on their own labor earnings for their standard of living, possibly in a situation where they are single parents taking care of dependents.

The impact of education on union dissolution has received extensive attention in the demographic literature (Faus 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. Higher educated women are more likely to marry higher educated men, and college educated men have substantially lower rates of divorce than do high school educated men, perhaps because these men are less likely to initiate divorce, or perhaps because women find this men to be more desirable partners and thus are less inclined to initiate divorce themselves. Higher levels of education in women actually imply greater divorce risks, but Teachman found that the divorce suppressing effects of higher education via marital homogamy are bigger than the divorce-enhancing effects of a women's education. Teachman also found no evidence of a trend in these educational effects. So the combination of higher marriage rates and lower divorce rates would suggest a strong marital return to higher education.

In addition to the returns it provides via the labor market and marriage, a third benefit of higher education for women is the insurance it provides against income deprivation following a possible union dissolution. The poverty literature overwhelmingly shows both that higher education protects against poverty and that being female and a single parent is a strong indicator for poverty (Cancian and Reed 2001). Among female single-parent households, however, poverty rates are significantly higher among women who have less than a college education. These results suggest that higher education provides insurance against a poverty risk of motherhood through two mechanisms; it reduces the divorce risk (through educational homogamy) and it reduces the risk of poverty, given union dissolution and the presence of children.

These findings, however, do not necessarily imply trends in these benefits of higher education. In order to determine whether the incentive for women to attain higher education has been rising faster than the incentive for men, one needs to determine whether the value of higher education with respect to both labor market and family returns has been rising faster for women than for 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 analyzed data from the March Supplement to the Current Population Survey (CPS) for calendar years from 1964 through 2002. We used the March series provided by Unicon. Our primary sample consisted of men and women between 25 and 34 years old who identified themselves either as white or as African American.

This paper focuses on comparisons between respondents who completed a high school diploma and those who completed four years or more of college; in other words, we measure the value of college against the baseline value of a high school diploma. Because we do not expect trends either in college completion or 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 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 for a given year or birth cohort between those with at least college graduation and those who had only a high school diploma. For 1964-1991, education is measured in the CPS as the highest grade completed, while thereafter the CPS uses a mixture of years of education and certification to measure educational attainment.[2] For the analyses of this paper, respondents in survey years before 1992 are coded as having a high school education if they report that they completed 12 years of education, and 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," while respondents are coded as being college graduates if they report having a bachelor's degree, master's degree, professional school degree, or a doctorate. In the discussion below, we will 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 defined several distinct outcome variables which we use to assess the value of higher education. These outcome variables were defined as follows:

Personal Income in the previous calendar year: This variable is the sum of income from wages and salaries, self-employment, farm income, and unearned income before taxes.[3] Income was deflated by the Consumer Price Index for all urban consumers (CPI-U) that is published by the Bureau of Labor Statistics.

Marital status at the time of the survey: By using marital status at the time of the survey (regardless of the year of the marriage), we measure the combined impact of educational differentials on the probability of getting married and on the probability of staying married.

Gross Family Income in the previous calendar year: This variable is the sum of the total gross incomes for all family members, 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.[4]

Number of persons in the family as of the time of the survey.

Family (gross) standard of living: This is defined as the 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. (Ruggles 1990; Citro and Michael 1995). In its most common form, the Buhmann et al. approach amounts to dividing 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 Michaels 1995).

"Not Income Deprived": A family was defined as "not income deprived" if it had at least a standard of living value of $9000 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 $9300 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 that we use in this paper 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.

In this paper, we estimate the relationship between education and personal income rather than focus on the relationship between education and wages. We recognize that wages are arguably closer to the "market" value of education, while personal income is a function of the combination of one's market wage and hours of work, which are partly a result of voluntary choice, as well as other forms of income. Nonetheless we use the personal income measure for two reasons. First, other papers (Averett and Burton 1996; Charles and Yuoh 2002) already contain estimates of the gender-specific wage returns to higher education. Secondly, the purpose of our analysis is to explore the *incentive* effects of the perceived relative value of college education and high school education on educational decisions. We think it highly plausible that teenagers and early "twenty-somethings" can observe differences in the standard of living and the likelihood of avoiding "income deprivation" between college educated and high school educated individuals. If young people also are able to also perceive differences in the working

hours of these two groups, we think it likely that they see any differences in working patterns as part of the package deal that one gets (in terms of job, timing of marriage, occupational status of partner, stability of marriage etc.) when one chooses to get more or less education. The alternative argument, which amounts to an assertion that young people recognize that hours of work as a choice variable, imagine that they can independently choose both their level of education and their pattern of working hours, and therefore focus on wage rates when assessing the value of college is to our mind less plausible; it puts too great an information and computational burden on real people living in the real world. In any case, we will show below that the trends using personal income as the outcome variable are similar to published results using wages as the outcome variable.

One problem in using 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 99th 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. After smoothing the top code, we deflated income using the CPI-U. We should further note that our analysis of the probability of being

above the "not-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 subsamples and computed the difference between each of the outcomes described above for respondents with a bachelor's degree or more compared with high school graduates (in separate analyses, we also compared those with exactly a bachelor's degree against high school graduates – the results of these second analyses are very similar and are available upon request). Our sample sizes are large even at the subgroup level (see table 1); we have over 230,000 cases for whites age 25-29 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 our sample sizes are so large, our focus here is not on the statistical significance of differences or of trends in these differences. Any trend that is 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 and whether they would be sufficiently large to be noticeable in the population, and therefore serve as plausible gender-specific incentives for higher education.

Specifically, we computed the difference in the log of personal income, the difference in the log of family income, and 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 the difference in the proportion married as of the time of the survey, and the difference in the proportion who were "not income deprived," as defined above. In order

to account for the possibly nonlinear character of these trends, we analyzed the data nonparamterically, by simply plotting the above-defined differences by either survey year or birth cohort. In order to moderate the influence of fluctuations in measured trends that are generated by sampling-error, we first smoothed the data with an equally-weighted moving average of the lagged, current, and forward values. We then plotted these smoothed differences between the average outcomes for college graduates and high school graduates as a function either of survey year or year of birth.

Results

We first use the CPS data to assess the shape of trends in the college graduation rate for white and black men and women, defined as the proportion who are college graduates.[5] Figure 1 displays these trends for respondents aged 25-29 and aged 30-34 for whites, while Figure 2 displays the corresponding information for African-Americans. 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 excluded from the CPS sampling frame). 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.[6] The top panel of figure 1 plots trends for whites in terms of birth cohort, while the bottom panels plot trends in terms of survey year. For the case of African-Americans, we display only the results by survey year in order to accommodate the incarceration adjustment.

The CPS data are consistent with other data sources (Bae et al. 2000; Buchmann, DiPrete, and Powell 2003) in showing that 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. For whites, the CPS data show that men and women born between 1940 and 1950 increased their rate of college graduation at about the same rate. Rates of college completion for men peak with the 1950 cohort and then drop. This drop is probably in part a consequence of the end of the draft, which had enhanced levels of college attendance among young men as a strategy to avoid military service in Vietnam (Freeman 1976; Card and Lemiux 2001). 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). Figure 1 shows that white female graduation rates dipped at the same time that male rates declined but that the drop for women was not as large (women of course were not subject to the Vietnam war draft). However, 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, female college graduation rates 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 the return to positive growth 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 graduate 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.

The data presented in figure 2 further show that – if attention is limited to the CPS sample, -- African American male and female graduation rates were roughly equal. But both male and female African Americans graduated from college at much lower rates than did whites. Graduation rates rose slowly for blacks born between 1940 and the early 1950s. Growth subsequently stopped and may have reversed slightly. After about 10 cohorts, rates resumed a slow rise. When the incarceration adjustment is taken into account, the charts show that female rates of college completion are higher than male rates. The data further suggest that the gender gap has been widening in favor of women during the 1990s, though data limitations prevent a definitive conclusion about this trend.

Next we examine the gender-specific pattern of returns to college. The results in figure 3 show that females generally had higher incentives to complete college than males, but that trends in the returns to college should have actually provided strengthening incentives for males to increase their higher education relative to females. In the 25-29 year old age group the gender gap is very large. As Mincer (1974) showed, a comparison of income by education for this age range gives a misleading impression of

the long-term value of education for males in particular, both because amount of education has a strong negative correlation with years of work experience at these ages, and because males at this time had higher returns to labor force experience than did females (Corcoran and Duncan 1979; Duncan and Hoffman 1979; Lillard and Tan 1986). High school educated males have been on the job for several years and (at this time) were gaining pay raises with tenure that were offsetting the higher value of college education. Over the career, however, the higher value of college education plus increasing years of experience caused college educated men to overtake high school educated men in earnings, and the right side of figure 3 shows this to be true in the 1970s. For more recent periods, the value of education to males grew at a substantial pace. This growth occurred even at young ages, partly because the wage returns to education were rising (Katz and Autor 1999), but also partly because the returns to tenure were falling over time (DiPrete, Maurin and Goux 2002), so that the returns to education were dominating the returns to tenure for less educated men in the younger age group. Compared to men, however, women received a much greater return to higher education in the early career. While this relative return fell over the life course, it was still larger than the return for males in the 30-34 year old age range. But in both age ranges, the gender advantage was declining over time. These graphs suggest that women had strong incentives to pursue higher education throughout this period of time, but that the *trends* in the personal income returns to education were not responsible for the trend gap in the relative educational attainment of men and women that began developing in the 1970s.

We next examine the impact of higher education on the probability of being currently married for whites. In Figure 4, the zero point on the vertical axis indicates no

different between a BA and a high school diploma. The figure shows that having a BA implied a lower probability of being married at ages 25-29 than if one had only a high school diploma, but that this education "penalty" reached a trough in the early 1980s. Of course, much of this penalty is the delayed timing of marriage that comes with higher education. The penalty is smaller for the 30-34 age range and was reversed in the early to middle 1990s. The transformation of a higher education marriage penalty to a higher education marriage premium occurred for both men and women starting in the early 1980s.

Figure 5 shows the trends in the impact of higher education on the family standard of living, measured as family income adjusted for family size. Here the double benefit of marriage to women (in the labor market and the marriage market) is clearly at work. Women gained more from higher education than did men throughout the period, and the female-favorable gain began to increase in size in the early 1980s, reaching a peak at the present day. This more strongly rising return to women stems from four factors: (1) the large and stable returns to higher education for women during the 1980s, combined with (2) their rising probability of being married, and (3) the rising economic value of highly educated males, who (4) were more likely to be the spouses of highly educated women, due to educational homogamy.[7]

Figure 6 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 one conceptualizes the returns to higher education in terms of size-adjusted family income, or in terms of the probability of remaining above the income-deprivation threshold, the CPS data show that the family-

level returns of higher education in the age range 25-29 were trending up faster for women than for men during this period of time. Figure 7, meanwhile, shows that the trends in returns both to family standard of living and to the probability of being above the income deprivation threshold where more strongly positive for women after 1980 when we focus on the experience of 30-34 year olds instead of 25-29 year olds.

Next we turn to the trends in the value of education for African Americans. Recalling from figure 2 that black female rates of college completion have not been rising faster than black male rates, we examine the trends in the value of college for black Americans. Because we have only about 40,000 total cases to assess the trends for the two age groups for African Americans (as opposed to about 380,000 cases for whites), it is not surprising that the observed trend lines are noisier for African Americans even after smoothing. Nonetheless, the sample sizes are large enough to tell a reasonably clear story. The trend pattern for personal income is similar for blacks and whites. For both racial groups, the value of college completion relative to high school completion was greater for women than for men, and the female advantage was gradually disappearing over time. The main racial difference is that the black female advantage in personal income eroded faster than did the white female advantage over these years. By the mid to late 1980s the difference was small for 25-29 year olds, and male and female trends were crossing for 30-34 year olds.

The gender-specific standard of living trends are also similar for blacks and whites. As with whites, African-American females received larger total 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 at both age 25-29 and at age 30-34. 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.

Discussion

While the type of data analyzed in this paper cannot by its nature prove the case, the results described in the previous section do 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 acknowledge, however, that the increase in the "total" returns to college for females may not have been 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. Figure 6 shows that the increase in the impact of college completion on the probability of being above the "income deprivation" threshold began to rise for 25-29 year olds around 1974. Around 1978, the return from college completion on household standard of living began to rise. The timing is similar when 30-34 women 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 enrollment of college by 18 year olds

(which would have occurred in the 1970-1974 range) and increased rates of completing college (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 25-29 year olds was arguably 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 income, household 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 period of time.

The data reveal evidence of female-favorable returns to higher education among African-Americans. There is no comparable female-favorable trend in rates of college completion for African Americans within the CPS samples, but 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 have doubtless had a strong impact on educational trends.

Second, a minimum level of family resources may be required before a teenager is 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 behaviors 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 likely to provide only a partial 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 can nonetheless have a powerful affect on the margin, and thus could very well be an important cause of the emerging gender gap. Additional tests of the incentives hypothesis are therefore desirable and perhaps even practical to implement with available

data. For example, the emerging gender gap 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.

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[1] 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.

[2] 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.

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

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

[5] Changing the definition to limit the base to respondents with at least a high school diploma yields plots that look very similar in terms of trends, and are available upon request from the authors.

[6] 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. In order to do the adjustment, we make the assumption that no one in the incarcerated population earned a B.A. or equivalent.

[7] We do not directly analyze the effect of educational homogamy as it is well-documented by prior research.

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Table 1. Sample size by Year, Age Group, and Race for CPS Respondents with a High School Diploma or at Least Four Years of College (or a College B.A. or B.S.)

Year	Age 25-29		Age 30-34	
	Race			
	White	Black	White	Black
1964	2,250	183	2,307	145
1965	2,183	199	2,326	167
1966	4,706	390	4,530	362
1967	4,708	407	4,160	367
1968	4,972	420	4,366	340
1969	5,453	403	4,523	377
1970	5,257	396	4,343	378
1971	5,328	419	4,471	377
1972	5,449	467	4,385	379
1973	5,628	448	4,586	365
1974	5,566	489	4,820	394
1975	5,638	524	4,784	415
1976	6,146	614	4,975	413
1977	7,310	681	6,332	470
1978	7,082	637	6,309	479
1979	7,162	660	6,384	516
1980	8,576	796	8,017	648
1981	8,987	777	8,183	652
1982	8,006	762	7,332	674
1983	8,141	802	7,296	687
1984	8,054	811	7,559	683
1985	7,895	826	7,682	698
1986	7,799	822	7,743	760
1987	7,606	793	7,659	792
1988	7,469	817	7,763	736
1989	6,829	724	7,379	716
1990	7,132	775	7,617	744
1991	6,892	715	7,731	707
1992	6,274	697	6,948	651
1993	5,728	665	6,789	647
1994	5,229	642	6,291	618
1995	4,956	591	6,288	604
1996	4,383	477	5,174	519
1997	4,434	520	4,967	533
1998	4,255	477	5,038	543
1999	4,136	449	5,027	502
2000	4,201	460	4,848	542
2001	3,792	467	4,491	482
2002	5,765	826	7,600	987
TOTALS	231,377	23,028	229,023	21,069

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

Figure 1

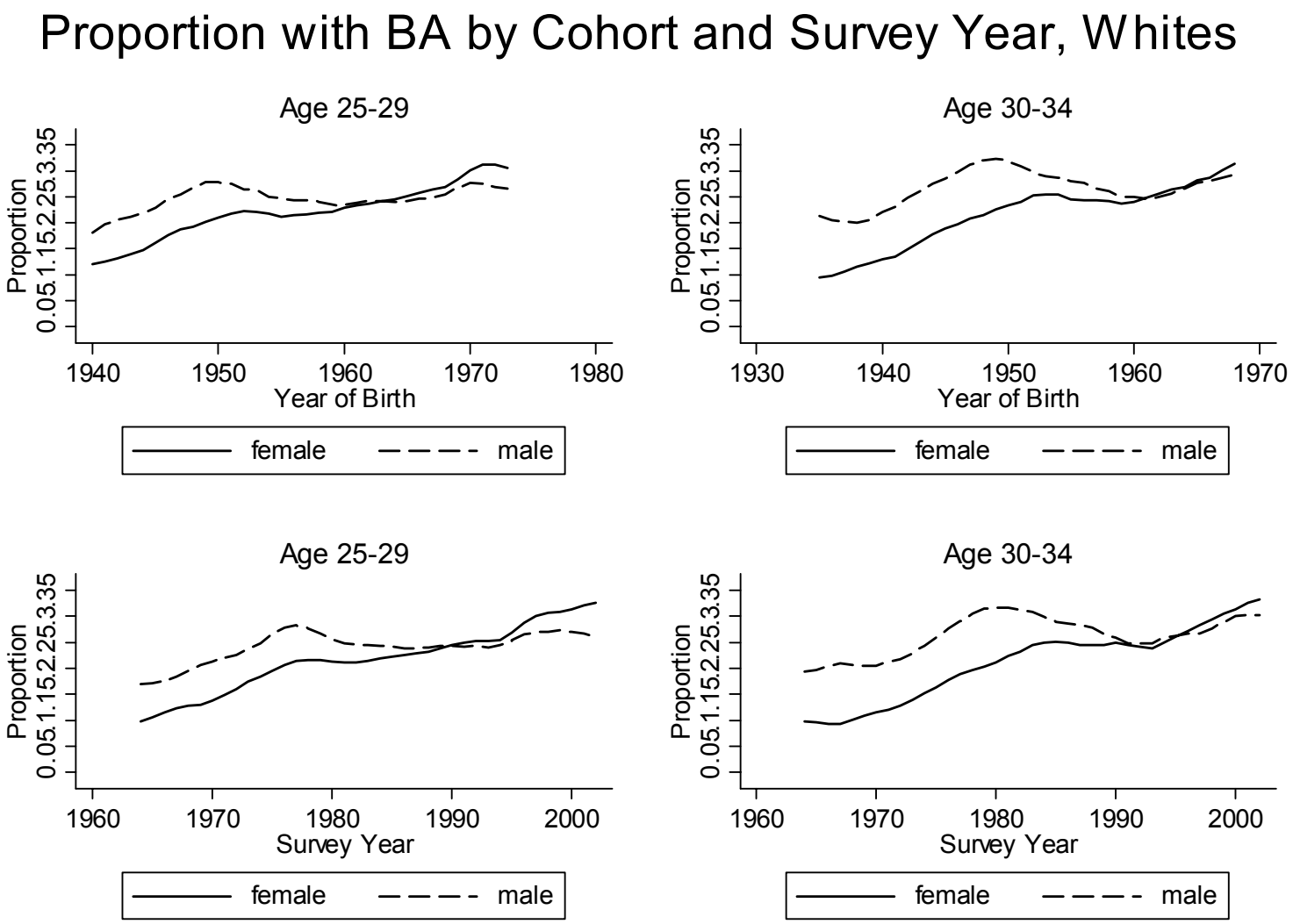

Proportion with BA by Cohort and Survey Year, Whites
Age 25-29
Proportion
0.05 1.15 2.25 3.35
1940 1950 1960 1970 1980
Year of Birth
female
male
Age 30-34
Proportion
0.05 1.15 2.25 3.35
1930 1940 1950 1960 1970
Year of Birth
female
male
Age 25-29
Proportion
0.05 1.15 2.25 3.35
1960 1970 1980 1990 2000
Survey Year
female
male
Age 30-34
Proportion
0.05 1.15 2.25 3.35
1960 1970 1980 1990 2000
Survey Year
female
male

Figure 2

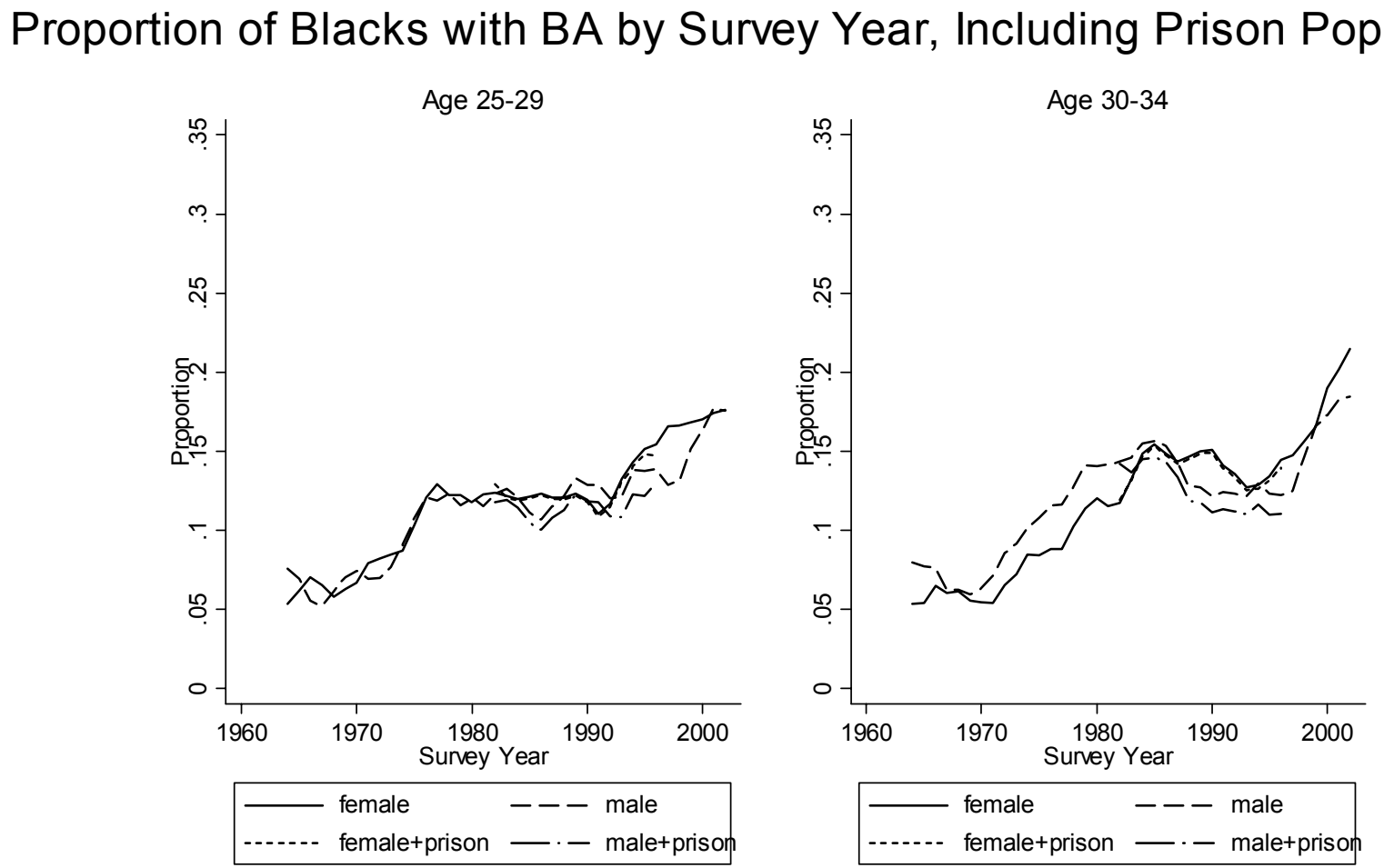

Proportion of Blacks with BA by Survey Year, Including Prison Population
Age 25-29
Age 30-34
Proportion
0
.05
.1
.15
.2
.25
.3
.35
1960
1970
1980
1990
2000
Survey Year
female
male
female+prison
male+prison

Figure 3

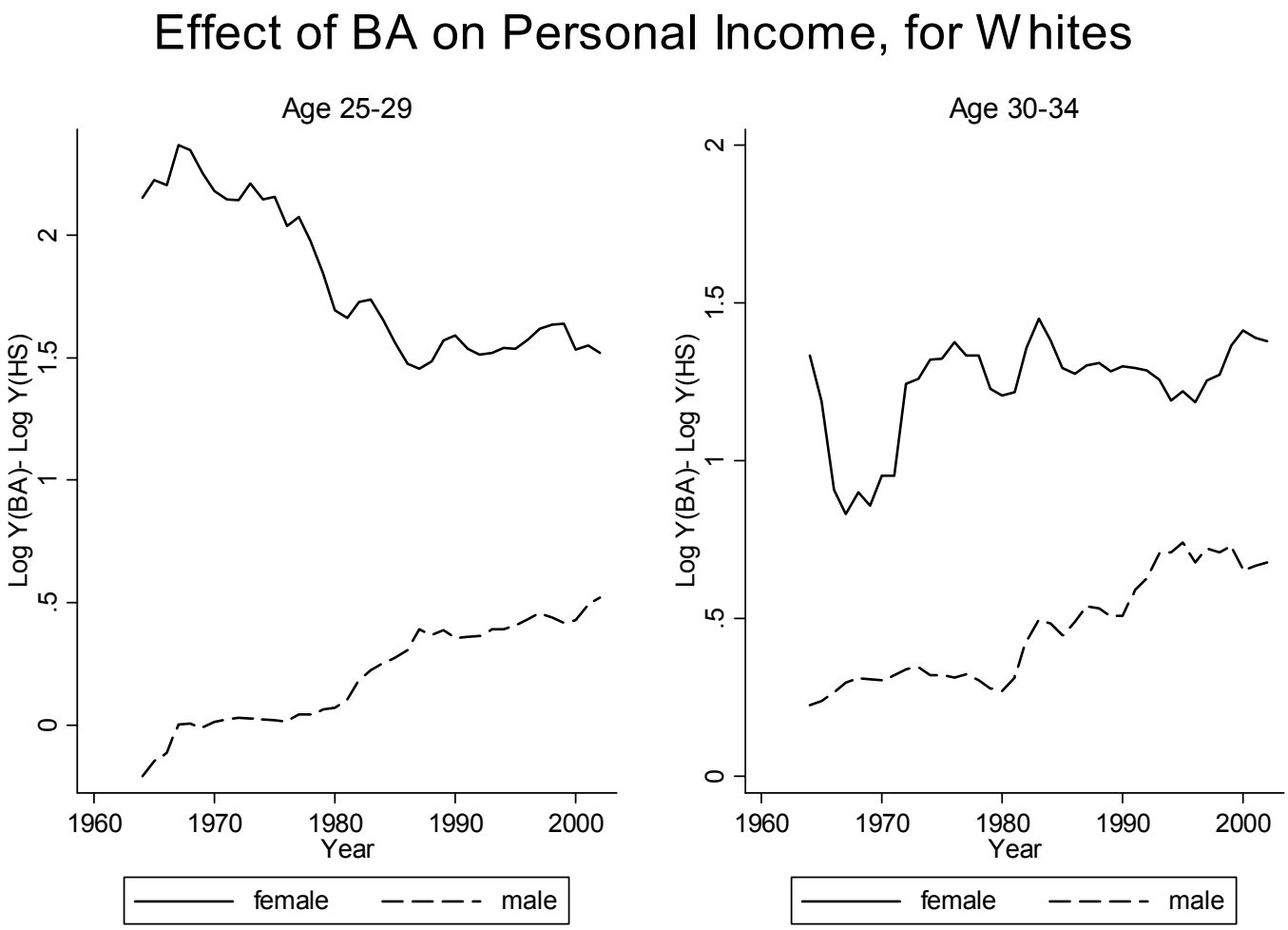

Effect of BA on Personal Income, for Whites
Age 25-29
Age 30-34
Log Y(BA)- Log Y(HS)
0
.5
1
1.5
2
1960
1970
1980
1990
2000
Year
female
male

Figure 4

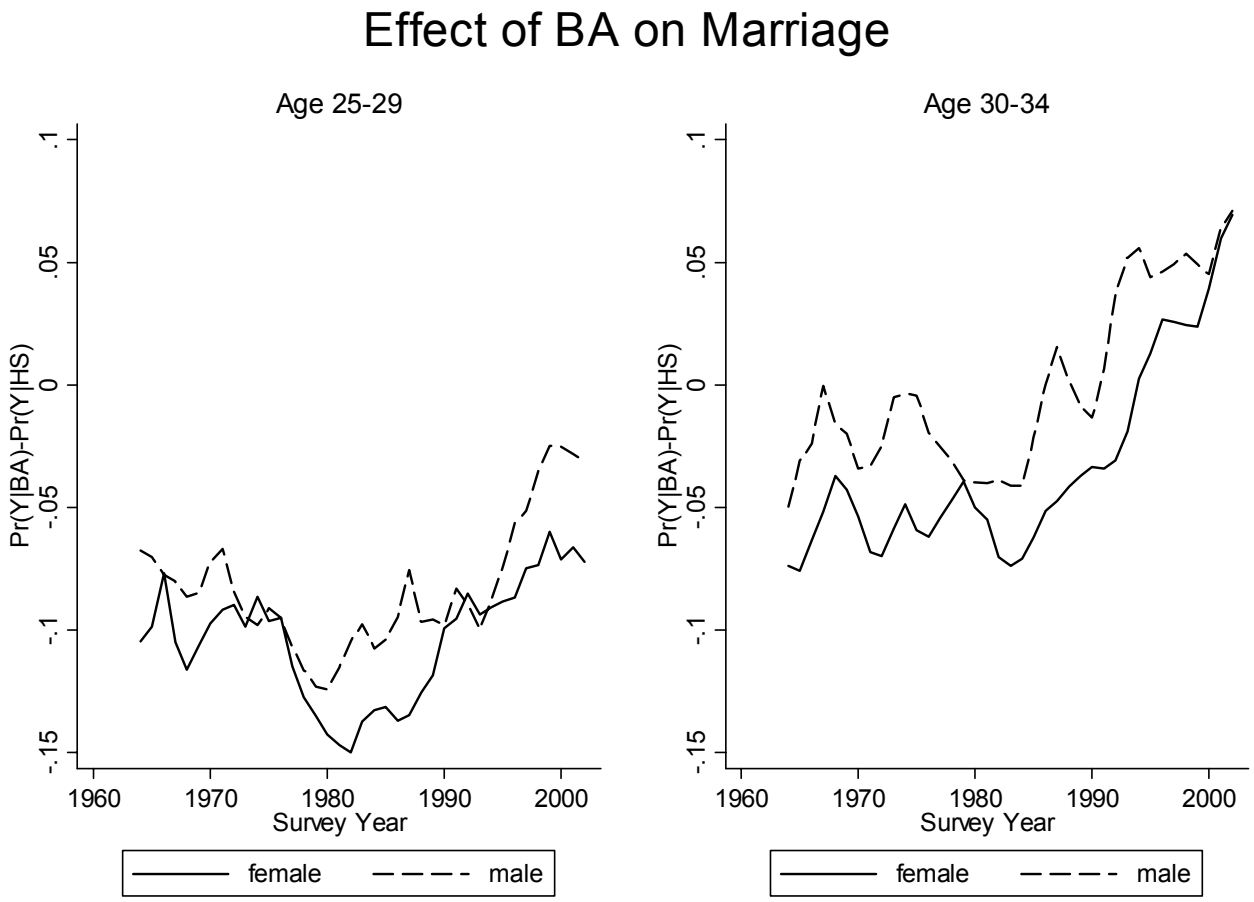

Effect of BA on Marriage
Age 25-29
Age 30-34
Pr(Y|BA)-Pr(Y|HS)
-.15
-.1
-.05
0
.05
.1
1960
1970
1980
1990
2000
Survey Year
female
male

Figure 5

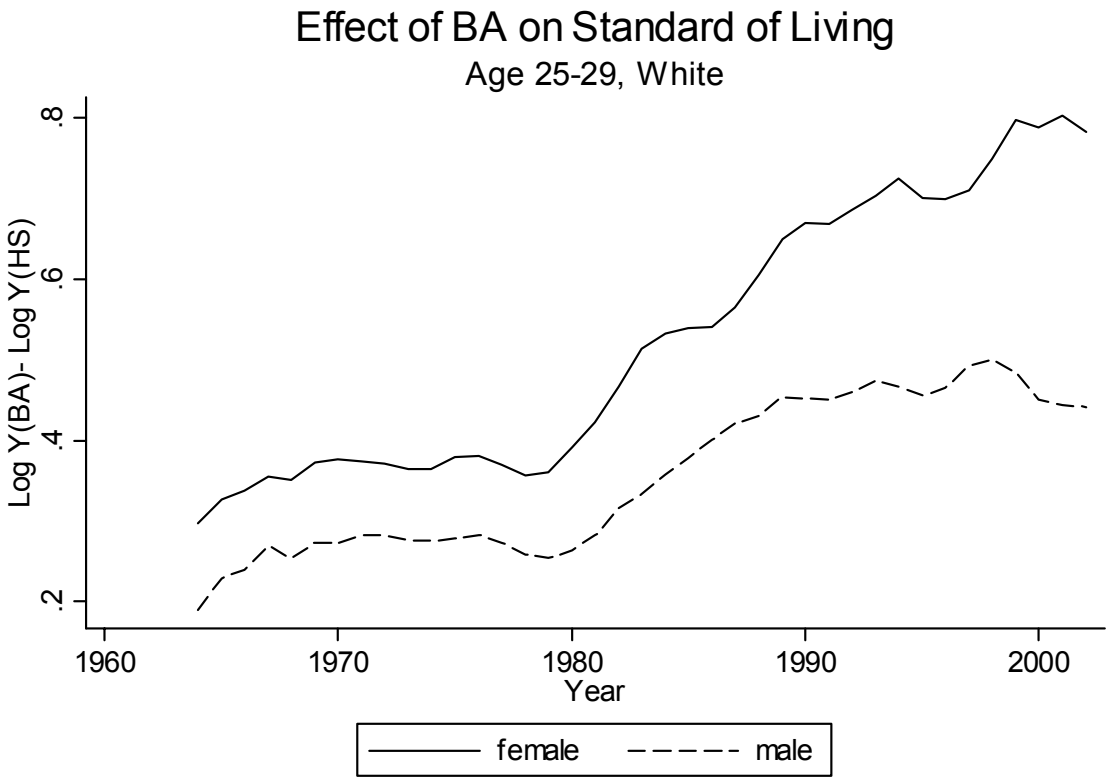

Effect of BA on Standard of Living
Age 25-29, White
Log Y(BA)- Log Y(HS)
.2
.4
.6
.8
1960
1970
1980
1990
2000
Year
female
male

Figure 6

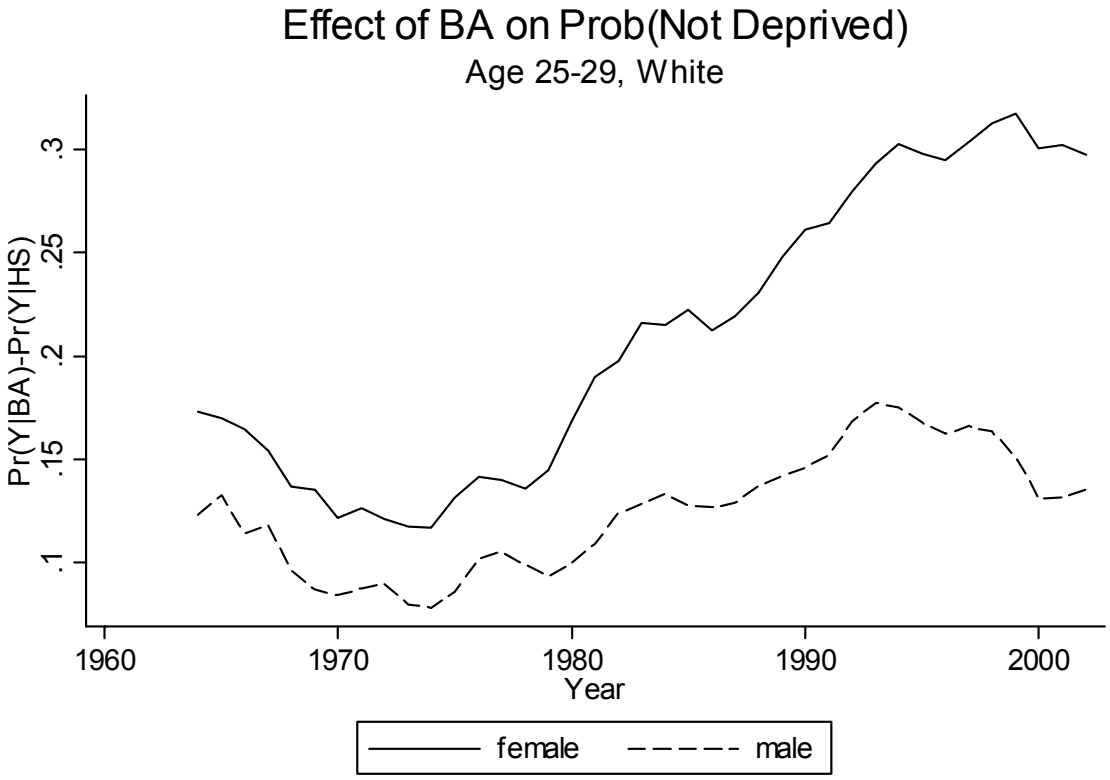

Effect of BA on Prob(Not Deprived)
Age 25-29, White
Pr(Y|BA)-Pr(Y|HS)
.1
.15
.2
.25
.3
1960
1970
1980
1990
2000
Year
female
male

Figure 7

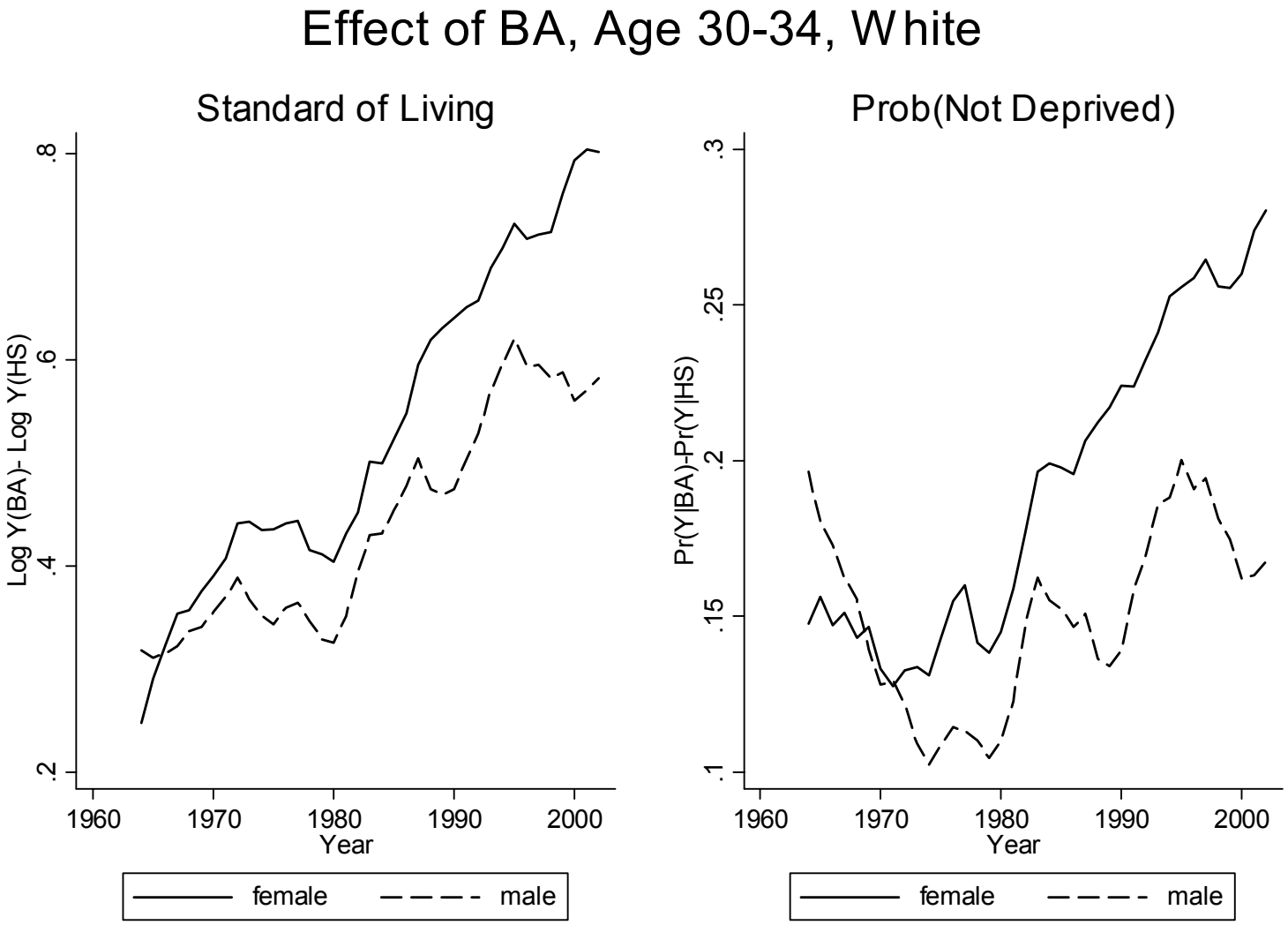

Effect of BA, Age 30-34, White
Standard of Living
Log Y(BA)- Log Y(HS)
.2
.4
.6
.8
1960
1970
1980
1990
2000
Year
female
male
Prob(Not Deprived)
Pr(Y|BA)-Pr(Y|HS)
.1
.15
.2
.25
.3
1960
1970
1980
1990
2000
Year
female
male

Figure 8

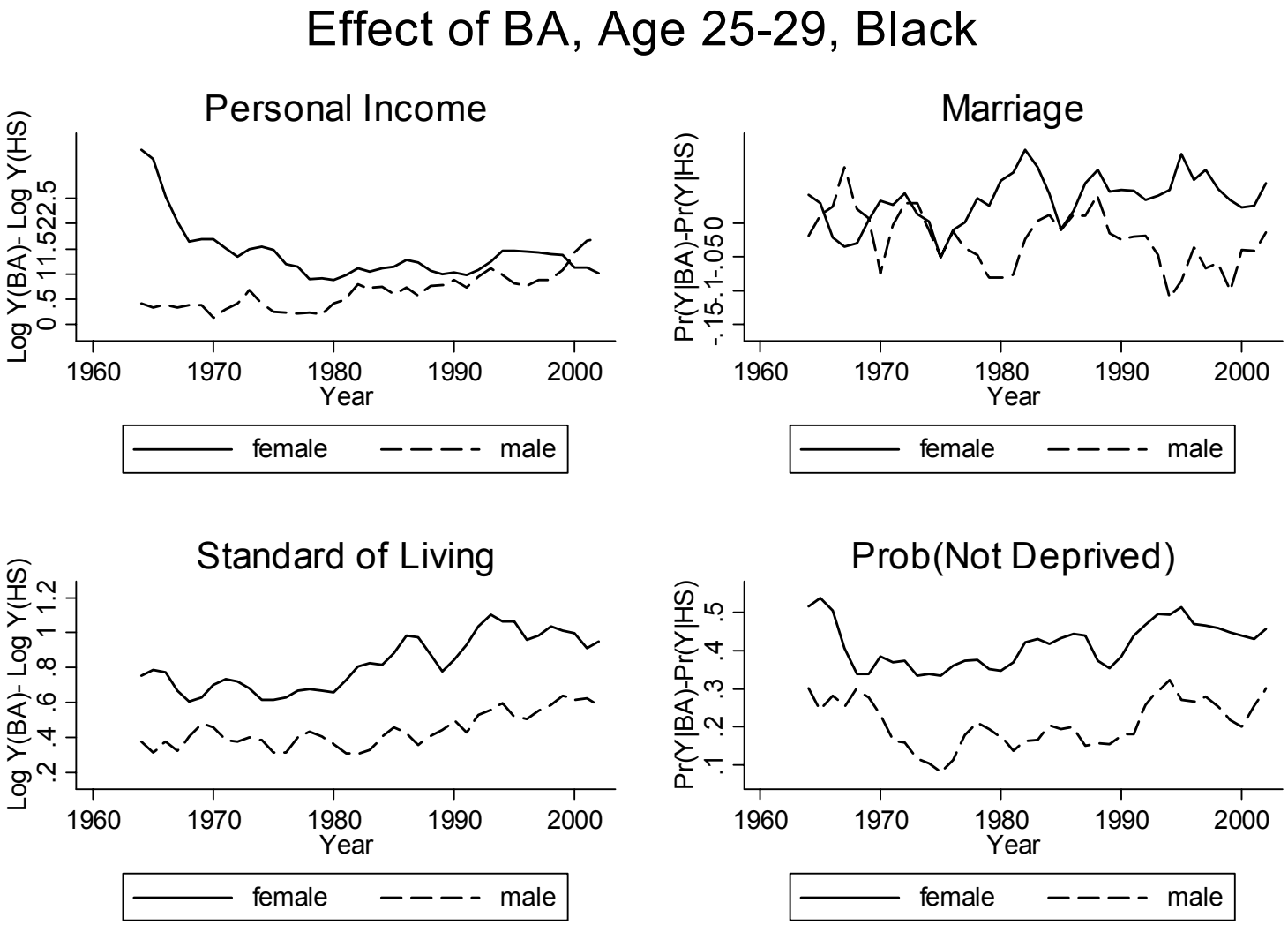
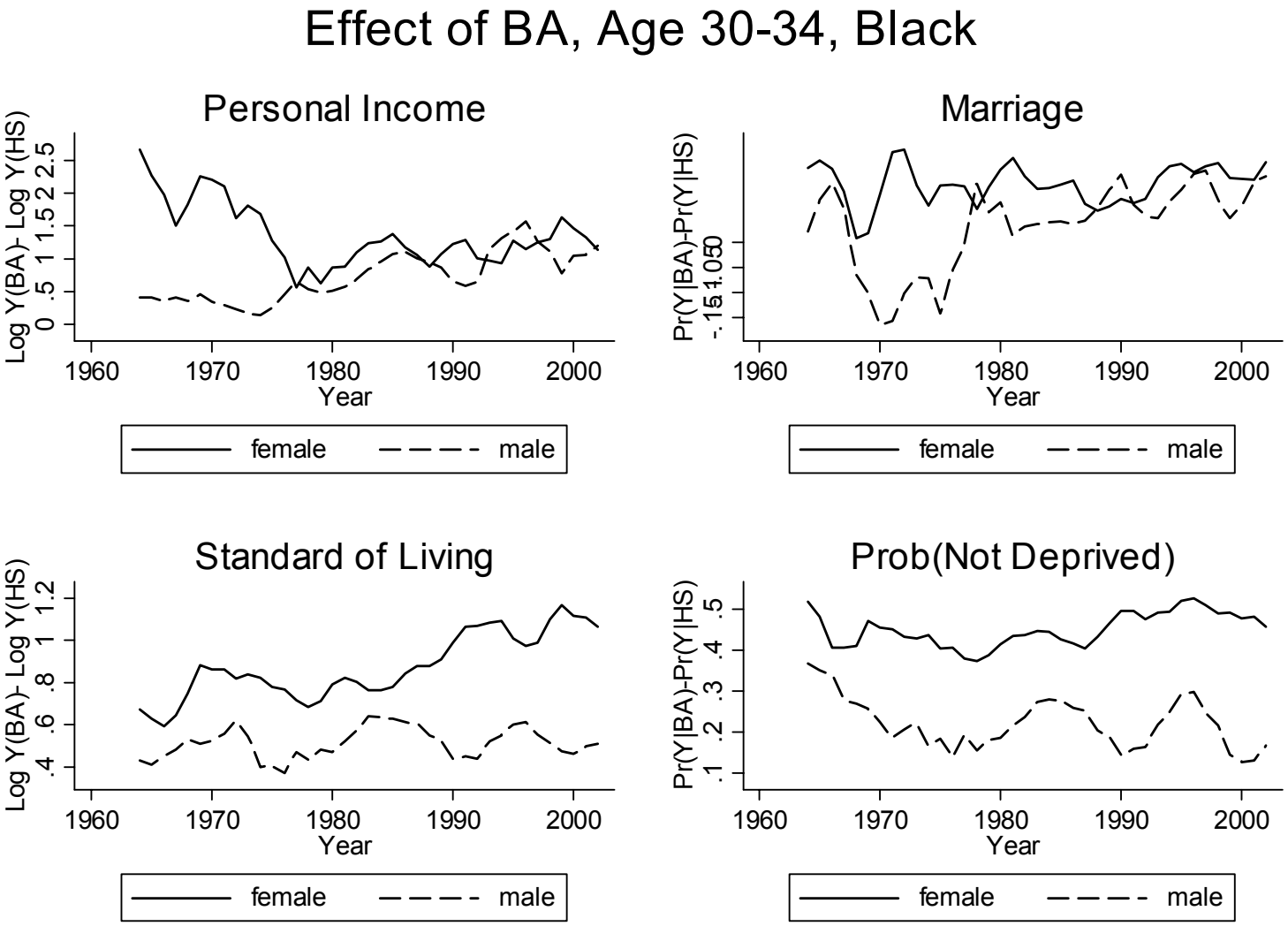

Effect of BA, Age 25-29, Black
Personal Income
Log Y(BA)- Log Y(HS)
0 .5 1 1.5 2
1960 1970 1980 1990 2000
Year
female male
Marriage
Pr(Y|BA)-Pr(Y|HS)
-.1 -.05 0 .05 .1 .15
1960 1970 1980 1990 2000
Year
female male
Standard of Living
Log Y(BA)- Log Y(HS)
.2 .4 .6 .8 1 1.2
1960 1970 1980 1990 2000
Year
female male
Prob(Not Deprived)
Pr(Y|BA)-Pr(Y|HS)
.1 .2 .3 .4 .5
1960 1970 1980 1990 2000
Year
female male

Figure 9


Effect of BA, Age 30-34, Black
Personal Income
Log Y(BA)- Log Y(HS)
0 .5 1 1.5 2 2.5
1960 1970 1980 1990 2000
Year
female male
Marriage
Pr(Y|BA)-Pr(Y|HS)
-.15 -.1 -.05 0
1960 1970 1980 1990 2000
Year
female male
Standard of Living
Log Y(BA)- Log Y(HS)
.4 .6 .8 1 1.2
1960 1970 1980 1990 2000
Year
female male
Prob(Not Deprived)
Pr(Y|BA)-Pr(Y|HS)
.1 .2 .3 .4 .5
1960 1970 1980 1990 2000
Year
female male