Where the Boys Aren't:

Recent Trends in U.S. College Enrollment Patterns

Patricia M. Anderson
Department of Economics
Dartmouth College

and

NBER

[patricia.anderson@dartmouth.edu]

November 2000

I thank Doug Staiger and Bruce Sacerdote for useful conversations. Research assistance was provided by Alka Singal through the Presidential Scholars program at Dartmouth College. Financial assistance from the Nelson A. Rockefeller Center at Dartmouth College is gratefully acknowledged.

According to statistics from the Department of Education, males made up just 44 percent of higher education enrollments in 1997 (National Center for Educational Statistics, 1999). As seen in Figure 1, this figure was about 56 percent in 1972, toward the end of the Vietnam War, and had fallen below 50 percent by the late 1970's. The decline in males as a fraction of full-time students was somewhat slower, not hitting 50 percent until the mid-1980's, and reaching just below 46 percent by 1997. While not shown, and perhaps not surprisingly, similar patterns exist in degrees awarded. Males received just over 56 percent of bachelor's degrees and associate's degrees awarded in 1972, while by 1997 males received about 44 percent of bachelor's degrees, and less than 40 percent of associate's degrees.

These trends have not gone unnoticed. Several articles have appeared in the popular press, including a front-page story in the New York Times and a cover story in U.S. News and World Report, which raise the issue of "where the boys are" if they aren't in college.[1] Such reports generally provide anecdotes of young men choosing to skip college for lucrative positions in technology fields.[2] Of course, anecdotal evidence is unlikely to be representative, leaving open the door for more careful research into the recent trends in college enrollment and completion.

In fact, a broad range of influences appears to play a role in determining these trends. For example, an important component of the increase in female enrollments is the behavior of older women, who enrolled less frequently than males when young, but who later make up for this lack of higher education. At the same time, today's young women

[1] See Lewin (1997) and Koerner (1998).
[2] Data from the October 1997 CPS on 18-22 year-olds not in college indicates that the industries in which males are disproportionately represented are construction and manufacturing, while both males and females are most likely to be found in trade and services. Thus, there is little evidence for this theory.

are much less likely to be married, and are accordingly more likely to enroll in school. Thus, this "backlog" effect of older women returning to school later is likely to taper off over time. Other important factors are that males are less likely than females to graduate from high school, are more likely to be in prison, and are more likely to be in the military. Thus, even with equal probabilities of enrollment among the eligible population, females will make up a majority of students. That said, it does appear that the fact that male high school graduates earn more than female high school graduates plays an important role. While male college graduates also earn more than female college graduates, an apparent increase in discount rates over time implies that this difference has become less important over time. All of these possibilities are explored in greater detail below.

In the next section, I briefly outline the basic model of human capital investment, and review the past literature. This is followed by an explanation of the data, along with some basic descriptive analysis. Regression models are then estimated and used to perform Oaxaca decompositions. The final section offers some conclusions and remaining puzzles.

I. Background

The decision whether to enroll in college can be explored in an economic framework through a simple model of human capital investment.[3] As is the case with an investment in physical capital, an individual should invest as long as the marginal cost is not greater than the marginal benefit, in present value terms. Thus, let Y^c and Y^{nc} be annual earnings with a college degree and without a college degree, let C be annual costs

associated with college attendance, and let r be the discount rate. Then for t =1 in the first year post high school and t=T in the last year of work, if $\sum_{t=1}^{T} \frac{Y_t^c - C_t}{(1+r)^t} \geq \sum_{t=1}^{T} \frac{Y_t^{nc}}{(1+r)^t}$ the individual should go to college.[4] One can alternatively think of this in terms of a positive net present value, i.e. attend if $\sum_{t=1}^{T} \frac{Y_t^c - C_t}{(1+r)^t} - \sum_{t=1}^{T} \frac{Y_t^{nc}}{(1+r)^t} \geq 0$.

While this framework is straightforward, it allows for several insights into the determinants of college attendance. First, the more years one works (i.e. the bigger is T), the more likely it is that the years of increased earnings will outweigh the costs. This helps to explain why, for example, as societal expectations of female roles have changed toward longer, less interrupted careers outside the home, more women would attend college. Second, the net present value is more likely to be positive when Y^c is larger and when Y^{nc} and C are smaller. Thus, if earnings for college educated females have gone up faster than for males, or if earnings for non-college educated males have gone up faster than for females, we would expect more women to attend college. While it is not clear that monetary costs should differ by gender, there may well be differences in nonmonetary costs, such as psychic costs. Finally, the larger is r, the more heavily discounted is the future and the less likely it is that the present value of future earnings will outweigh the current costs. Thus, if women are more patient and future-oriented, they would be more likely than men to attend college, all else equal.

While the above theory can be used to analyze individual behavior, to fully understand the aggregate trends one must also take into account the age distribution of

---

[3] For seminal works in this area, see Mincer (1958), Schultz (1961) and Becker (1964).

[4] Note that Y_t^c and C_t may be zero for t during and not during college attendance, respectively.

student enrollments and changing cohort sizes over time. One can think of several reasons why the age distribution of students might differ by gender. For example, in the Vietnam era, benefits under the GI bill lowered the cost of attending college for relatively older males that had served in the military. Similarly, increasing divorce rates and other social changes may have altered some older women's perception of their effective working lives, making a college degree a more attractive option. Since these cohorts are much larger than the ones that followed, changes in the enrollment patterns of older students could significantly affect overall enrollment patterns

A literature exists on the determinants of college enrollment, but very little of it focuses on gender differences or on changes over time, with no papers studying the two simultaneously. For example, Averett and Burton (1996) use a human capital model to examine gender differences in the college enrollment decision. Their work focuses on one cohort only (those age 14 to 22 in 1979) and thus cannot examine the trends discussed above. For this cohort, though, they find a significantly positive effect of the college wage premium on males, but a much smaller, statistically insignificant effect for females. Kane (1994) examines trends in the determinants of college enrollment, but his focus is on black youth age 18-19. He notes that higher levels of parental education increased enrollment, while rising tuition costs worked to counteract the increase. Jacobs and Stoner-Eby (1998) examine adult enrollments, but focus mainly on documenting the growth in adult enrollment over the 1970's and 1980's, with little analysis of the determinants of these trends. Card and Lemieux (2000) study trends in enrollment separately by sex, but do not focus on explaining the divergence. Thus, for a complete understanding of the issue, an analysis is necessary that will pull together these various

strands to look at changes in the determinants of college enrollment at different ages, across gender.

II. Descriptive Analysis

The October supplement to the Current Population Survey (CPS) asks questions about current school enrollment of the civilian, non-institutionalized population. Thus in each year the probability that a male or female is enrolled in college can be ascertained. Figure 2 uses October CPS data on individuals age 17 to age 50 who have not already graduated from college to recreate the trend in total college enrollment seen in Figure 1.[5] Allowing for sampling error, the basic trend in the fraction male of all college students is similar to that seen in the Department of Education data. In this case, the fraction has fallen from about 0.57 in 1972 to 0.45 in 1997. As before, we can see that the bulk of the decline occurred during the 1970's, with the fraction male falling from 57 percent in 1972 to 47 percent in 1980, while in recent years there has been some flattening.

By starting in 1972, I mostly avoid the complications of the Vietnam war era draft. Student deferments were ended in 1971, although they were phased out so that those already enrolled were unlikely to have been drafted.[6] Officially, the draft ended in July 1973, but the final lottery (from which no one was actually drafted) was held in February of 1972, allowing men to make plans at that time. Nonetheless, it is clear that the incentive to attend college provided by student deferments likely increased male enrollment in the 1960's to a level well beyond what would have obtained in the absence

[5] The data used was obtained from the CPS Utilities data collection.
[6] Information on the Vietnam era draft is from Selective Service Administration (1999).

of the draft. In fact, males born around 1946 and 1947, who would have been of college age at the peak of the draft in 1966 are almost 50 percent more likely to be college graduates than are women of that cohort. Those reaching college age after 1971, when student deferments ended, are only about 10 percent more likely than women of the same age to be college graduates.[7]

The importance of the age distribution of enrollees can be clearly seen in Figure 2. When the sample is restricted to those between the ages of 18 and 22 (inclusive), the fraction male declines much less steeply, from about 0.54 in 1972 to about 0.48 in 1997.[8] Further restricting the sample to those enrolled only in four-year colleges makes little additional difference.

The large decline in the total fraction male over the 1970's most likely reflects the lingering effect of the Vietnam war. While the cohorts with large incentives to enroll to avoid the draft are not included, it is possible that some individuals enrolling initially to avoid service continued in school for other reasons. More importantly, though, under the GI Bill returning veterans were eligible for educational subsidies. In the 1972 October CPS, 18 percent of males enrolled in college were Vietnam veterans (the number of female veterans was negligible), with about 57 percent of those over age 22 being Vietnam veterans. By the mid-1980's only 20 percent of enrolled males over age 22, and about 8 percent of all enrolled males, were veterans of any kind. Thus, we see a reduction in the fraction male of young college students relative to all college students in the early years.

[7] Based on calculations from the March CPS, 1993-1997.
[8] Note that information on enrollment for those over age 35 was not collected until 1976, so in the earliest years this is less of a restriction.

Beginning in the late 1970's, the total fraction male is below that of the younger students. This reflects important differences in the behavior of older males and females. In 1997, while males and females ages 23-27 were equally likely to be enrolled, for those ages 28-37 males were about a third less likely to be enrolled, and by ages 38-42 females were over twice as likely to be enrolled. About 4.5 percent of these older women were enrolled, compared to under 2 percent of older men. In 1976 (the first year individuals over 35 were asked about enrollment) 2.7 percent of females, and 1.4 percent of males, ages 38-42 were enrolled, while for all younger age groups males remained more likely to be enrolled.

Figure 3 sheds more light on the phenomenon of older women enrollees. By cohort, it compares the male/female ratio in the probability of enrollment in a 4-year college when age 18 to 22 with the male/female ratio in the probability of having obtained a bachelor's degree by the late 1990's. This latter ratio is relatively flat. Men born in the 1950's are about 10 percent more likely to have a degree than women of that cohort. For those born in the 1960's the probability is close to equal for the early cohorts, with males being about 7 percent less likely to have a degree for the youngest groups. By contrast, the male/female ratio in the probability of an 18 to 22 year-old being enrolled in a four-year college declines very sharply. For those born in the early 1950's, males were over 50 percent more likely to be enrolled when young, dropping to within 10 percent for those born in the late 1950's and early 1960's. Thus, for all but the early cohorts, eventual attainment and enrollment at a young age track quite closely. For these early baby-boomers, however, it is clear that women received their education after the prime college-going years. While not shown, the implications are similar when enrollment in

any college at age 18 to 22 is compared with the probability of having received some college by the late 1990's.

In the econometric analysis below, the focus will be on the probability of a given individual being currently enrolled. Thus, Figure 4 presents the male/female ratio in college enrollment rates over time. Overall, the story is similar to that seen in Figure 2. Here we can see that males were over 50 percent more likely than females to be enrolled in college in 1972. At that time, about 11 percent of all males between the ages of 17 and 50 were enrolled, while just 7 percent of females were. By 1997, males were over 15 percent less likely than females to be enrolled. It was still the case that about 11 percent of males were enrolled, but now almost 13 percent of females were enrolled. Note that after a steady decline in the male/female ratio during the 1970's, equal probabilities of enrollment were seen throughout most of the 1980's before another, smaller decline in the late 1980's to early 1990's. The ratio has remained fairly steady since 1992.

Again we can see that distinguishing between four-year colleges and all colleges is only of minor importance. There is only a small impact of more young women being in two-year colleges, implying that the male/female ratio in the probability of enrollment in a four-year college is slightly higher. Much more important, though, is the effect of being a high school graduate. Among 18 to 22 year-old high school graduates, the probability of being enrolled in a four-year college is almost identical for men and women. In fact, among this group, until the early 1990's males had remained more likely than females to be enrolled, even though overall enrollments first reached equality in the early 1980's.

Clearly, to the extent that males do not finish high school, they will be unable to

enroll in college, and will thus be underrepresented relative to females.[9] The trend in the male/female ratio of the probability that a 16 to 24 year old is a high school dropout is fairly noisy, but does shed some light on the issue. Males were less likely than females to be dropouts in the early 1970's, were 15 to 20 percent more likely to be a dropout by the 1980's, and by the early 1990's they were only about 5 percent more likely. It appears, though, that in the most recent years this ratio may be rising once again, with 1997 resembling the mid-1980's. The issue of why males are less likely to graduate from high school, while clearly related to the college enrollment decision, is beyond the scope of the current paper, however.

In addition to being more likely to be high school dropouts, males are also more likely to be outside of the civilian, non-institutionalized population that is sampled by the CPS. That is, young men are much more likely than females to be either in the military or in prison. While the fraction in prison has more than doubled since 1986, reaching 2 percent by 1998, the fraction in the military has steadily declined to under 4 percent.[10] Overall, then, the fraction of males who are not part of the CPS sampling frame has fallen from about 7.5 percent in 1986 to just under 6 percent in 1998. Thus, if males in the sample had maintained the same relative probability of enrolling in college over this time period, males would have increased as a fraction of college students. Instead, we saw in Figure 4 that while young males and females were equally likely to be enrolled in 1986, by 1997 the sampled males were 10 percent less likely to be enrolled.

[9] This brings to mind the following "elephant" joke, courtesy of Doug Staiger's children. Q: Why don't you see elephants going to college? A: Most don't finish high school.

[10] Numbers in the military for 1986-1998 are from various issues of *Selected Manpower Statistics.* Population figures from the *Statistical Abstract* are used to create fractions. Fractions in prison for 1990, 1996, 1997 and 1999 are from various issues of *Prisoners in 199x*. A linear regression through these years is used to predict the other years.

The fact that women make up a larger fraction of college students could simply imply that all types of males are less likely to enroll than their female counterparts. Alternatively, if one considers a distribution of potential students, ordered by say high school performance or socioeconomic status, it may simply be the case that the marginal female is further down this distribution than is the marginal male. It is true that women consistently do better than men in high school, perhaps suggesting that we would expect higher female enrollments. A continuing survey of freshman nationwide conducted by UCLA shows that the male-female ratio in the fraction of freshman with an A or A+ average is consistently below 1. However, this ratio increased from about 0.6 in 1972 to about 0.8 in 1988, before declining back to about 0.7 in the early 1990's. Over the 1970's and 1980's then, the quality of freshman females, as measured by high school grades, declined somewhat relative to males. This trend is even clearer in terms of socioeconomic status. Male freshman are increasingly of higher socioeconomic status than female freshman. In 1972, the male-female ratio in median parental income of freshmen was about 1, but rose to about 1.1 by 1988, and has hovered between 1.1 and 1.15 since. It appears then, that increasingly it is the case that the marginal female is further down the socioeconomic distribution than is the marginal male.

In addition to differences in college enrollment propensities, there may be differences between males and females in the probability of completing college. Figure 5 looks at male-female differences in transitions. Starting with all those who were enrolled in college last year, there are three possible transitions over the year. If the individual is no longer enrolled, but does not have a four-year college degree, they are classified as

having left school.[11] If they are no longer enrolled, but do have a college degree, they are classified as having graduated. If they are still enrolled, they are classified as having stayed in school. Figure 5 then presents the fraction of the risk group (all those enrolled last year) and of each transition group that are male. If a point is below that of the risk group, then males are underrepresented in that transition group, implying that they are less likely than females to make that transition. If a point is above that of the risk group, the opposite is true. Perhaps surprisingly, the line for leavers is consistently below that for the risk group, implying females are more likely to leave college than males. However, over time this difference has narrowed somewhat, so women are relatively less likely to leave than before. Note that some part of this male-female difference is due to women's higher propensity to enroll in associate's degree programs, and thus leave after 2 years with no bachelor's degree. The narrowing seen in Figure 5 could therefore be due to a combination of a reduction in the probability of dropping out, or in a reduction in the probability of earning a less than four-year degree.

While females are more likely than males to leave school, they are also somewhat more likely to graduate. As a result, then, males are a bit more likely to remain in school from one year to the next. A longitudinal survey following first-time freshman in the 1989-1990 academic year past their expected graduation date, to the spring of 1994 has similar implications. Of those initially enrolling in four-year institutions, 17 percent of males and 13 percent of females were still enrolled, while 64 percent of females and 57 percent of males had earned some degree. The rest were not enrolled and had no degree

[11] Note that those earning associate's degrees are classified as leavers by this method. After 1991 associate's degrees can be identified. In those years, the male fraction of leavers with no associate's degree averages about 1 percentage point above the fraction shown for all leavers.

(NCES, 1999). The fact that in this sample males were more likely to drop out is likely due to the fact that first-time freshman are mainly young, while our sample includes older students. Although the resulting sample sizes are quite small, calculations similar to those shown in Figure 5 can be done limiting the sample to those age 18 to 22. If this calculation is made, males are more likely to leave than females over the 1990's, but are still less likely to leave in previous years.

Taken together, Figures 1 through 5 present some basic outlines of the overall story behind the decline in male representation on U.S. college campuses. First, in the early 1970's males were clearly over represented. A combination of draft avoidance behavior and educational subsidies for returning Vietnam veterans likely inflated the college attendance of males, while social norms that restricted women's opportunities likely reduced the college attendance of females. As these social norms changed, not only did young women increasingly enroll in college, but older women returned as well. As a result, educational attainment for males and females born in the 1950's is closer than enrollments in the 1970's would imply. This backlog of educational demand resulted in larger fractions of enrollment being female than would otherwise be the case.

That said, there are clearly some differences between males and females of prime college age as well. First, these men are more likely to be in the army or in prison, and thus not be in our sample. When in our sample, men are less likely to graduate from high school, making them less likely to enroll in college, and they are less likely to graduate from college when they do enroll. The next section takes a closer look at these prime college age individuals, analyzing the determinants of enrollment in a four-year college for 20-year old males versus 20-year old females.

III. Determinants of Enrollment

A. Data and Methodology

For a more in-depth analysis of the enrollment decision, I focus on male-female differences both within and across cohorts for 20-year olds.[12] A cohort is defined as a set of individuals born within a 5-year period, so that the oldest cohort is made up of those born from 1953-1957, the second from 1958-1962, the third from 1963-1967, the fourth from 1968-1972, and the youngest from 1973-1977.[13] Thus, these groups were age 20 in 1973-1977, 1978-1982, etc.

For each group, a linear probability model is estimated by regressing a dummy variable equal to 1 if the individual is enrolled in a four year college and equal to 0 otherwise on a set of demographic characteristics and variables motivated by the basic human capital investment model. Along with a dummy equal to 1 for males, the demographic variables include controls for marital status, race, region, veteran status and high school graduation. State-level information on the unemployment rate and average in-state tuition was appended to the CPS data.[14]

In order to capture the economic returns to education, the March CPS was used to calculate weekly earnings by state, race, sex cells. Workers age 28 to 32 with a college degree were used to obtain expected weekly earnings for a college graduate, while workers age 23 to 27 with only a high school degree were used to obtain expected weekly

[12] Older ages were examined, but are not presented here.
[13] For ease of notation, these cohorts will be referred to by their central year, i.e. the 1955 cohort, the 1960 cohort, etc.
[14] State unemployment rates are obtained from the Bureau of Labor Statistics, tuition figures are from Kathy Raudenbush at the Washington State Higher Education Coordinating Board.

earnings for a non-college graduate. On the assumption that someone on the margin between attending college or not was likely to expect earnings below that of the average college graduate, the 25th percentile for the cell was used. Similarly, the 75th percentile high school earnings for the cell were used.[15]

Thus, given the *X*'s discussed above, for each cohort, *c*, the following model of the probability of being enrolled in a four-year college were estimated:

$$P_c = \alpha_c male + \beta_c X_c + \varepsilon_c .$$

Since regression lines fit exactly at the mean, and since male is always equal to zero for females, then given our estimates, $\hat{\alpha}, \hat{\beta}$, we know that:

$$\overline{P}_{mc} = \hat{\alpha}_c + \hat{\beta}_c \overline{X}_{mc} \text{ and } \overline{P}_{fc} = \hat{\beta}_c \overline{X}_{fc},$$

where $\overline{P}$ is simply the fraction enrolled and $\overline{X}$ is the mean of the characteristics, each computed separately for males, *m*, and females, *f*. A simple decomposition of the difference in enrollment rates can then be written as:

$$\overline{P}_{mc} - \overline{P}_{fc} = \hat{\alpha}_c + \hat{\beta}_c \left(\overline{X}_{mc} - \overline{X}_{fc} \right),$$

where the second term is the portion of the difference that is due to average differences across males and females in their characteristics. The first term remains "unexplained."[16]

This simple decomposition can be expanded to consider the change across cohorts in the male-female differential. First, let $\Delta\overline{P}_c = \overline{P}_{mc} - \overline{P}_{fc}$ and $\Delta\overline{X}_c = \overline{X}_{mc} - \overline{X}_{fc}$, so we can write the decomposition for each of two different cohorts as:

$$\Delta\overline{P}_c = \hat{\alpha}_c + \hat{\beta}_c \Delta\overline{X}_c \text{ and } \Delta\overline{P}_{c+t} = \hat{\alpha}_{c+t} + \hat{\beta}_{c+t} \Delta\overline{X}_{c+t} .$$

[15] The results are not qualitatively different if averages or medians are used.

[16] This is a simplification of the standard Oaxaca decomposition that allows for completely separate regressions for males and females. While there are some differences in coefficients when estimated separately, the implications of the decompositions are similar, so I opted for the simpler form.

A new decomposition can then be calculated for $\Delta\overline{P}_{c+t} - \Delta\overline{P}_c$, the change in the male-female differential.

Let $\Delta\overline{P}^*_{c+t} = \hat{\alpha}_c + \hat{\beta}_{c+t}\Delta\overline{X}_c$. That is, let it be the male-female differential that would have been obtained if the mean characteristics for males and females had not changed across cohorts. Thus, $\Delta\overline{P}_{c+t} - \Delta\overline{P}^*_{c+t}$ is the difference across cohorts that can be explained by changes in mean characteristics, and the portion left unexplained is $\Delta\overline{P}^*_{c+t} - \Delta\overline{P}_c$. The explained portion can then be written as:

$$\hat{\beta}_{c+t}\left(\Delta\overline{X}_{c+t} - \Delta\overline{X}_c\right) = \hat{\beta}_{c+t}\left[\left(\overline{X}_{mc+t} - \overline{X}_{fc+t}\right) - \left(\overline{X}_{mc} - \overline{X}_{fc}\right)\right].$$

B. Within Cohort Enrollment Decompositions

Table 1 presents the results from this exercise for 20 year olds, for the 1955, 1960, 1965, 1970 and 1975 cohorts. Before moving to the decompositions, it is worth looking first at the basic implications of the regressions. Looking first at the oldest cohort, we see that males were almost 4 percentage points more likely to be enrolled. Conditional on the covariates described above, however, males are actually less likely to be enrolled, although this difference is statistically insignificant. Marital status is an important predictor of enrollment status, as those never married are almost 27 percentage points more likely to be enrolled. Race is also important, with blacks being much less likely to enroll. At this age, being a veteran reduces the likelihood of enrollment by almost 15 percentage points. While not always significant, the economic variables inspired by the basic human capital investment model are generally of the expected sign. Higher expected earnings for college graduates lead to increases in the probability of enrollment, while higher expected earnings for high school graduates lead to decreases in the probability. Higher levels of tuition reduce enrollments as well. Finally, the importance

of conditioning on high school graduation is clear.

Results are fairly similar for the next cohort. Interestingly, the relative size of the coefficients on the earnings variables is somewhat different. For the 1955 cohort, they were close to being of equal magnitude (although with the expected opposite sign). Since the difference of logs is the same as the log of the ratio, this result is consistent with individuals responding simply to the returns to college as measured by the college/high school earnings ratio. For the 1960 cohort, though, the point estimate of the high school earning coefficient is twice the size of that for college earnings (although the hypothesis that they are equal cannot be rejected). By the 1965 and 1970 cohorts, the negative effect of higher high school earnings is even more negative, while the effect of college earnings is always insignificant (and wrong signed in one case). Here we can reject that they are of equal magnitude (and opposite sign) at the 13 and 8 percent level, respectively. Finally, for the youngest cohort, neither earnings measure is significant, although the point estimate on high school earnings remains larger than that on college earnings.

This change over time in the effect of expected high school versus college earnings points to the intriguing possibility that discount rates have increased over time.[17] Males earn more than females, both as college graduates and as high school graduates. To the extent, though, that the future is being increasingly discounted, the lure of higher wages now could dominate the male's decision. The increasingly negative effect of higher high school earnings and the disappearance of the positive effect of higher college earnings is entirely consistent with this theory. The decompositions will shed more light on this possibility.

Turning then to the results of the within cohort decomposition, we can see that a

[17] Bernheim (1990) notes that increases in discount rates may explain the decline in savings across cohorts.

major contributor towards explaining the male-female difference for the oldest cohort is the much higher fraction of males who are never married. Only 59 percent of 20-year-old females born in 1953 to 1957 are never married, compared with 80 percent of males. If that many females were single, their enrollment rate would be predicted to be almost 6 percentage points higher. The higher expected earnings of male college graduates increases enrollment by almost 4 percentage points, but this is mostly offset by the higher expected earnings of male high school graduates. The higher available wages in this case would decrease male enrollment by about 3 percentage points.

For the 1960 cohort, there is very little difference between the male and female propensities to enroll – just 0.6 percentage points, and conditioning on observable characteristics explains just 0.2 percentage points. Again the difference in marital status implies males are much more likely to attend – almost 4 percentage points in this case. The effect of higher earnings for male college graduates is much smaller in this case, implying a 2-percentage point increase, but higher earnings for high school graduates now imply an almost 5-percentage point decrease. As indicated above, together the change in the effect of earnings may reflect increasing discount rates over time, and all else equal it predicts a 3-percentage point higher enrollment rate for females. This is offset by their higher marriage rates, though, so that overall there is very little explained (although very little to explain).

Males are still more likely than females to be enrolled for the 1965 cohort, by almost 2 percentage points. Conditional on observable characteristics, however, they would be expected to be even more likely to be enrolled. The coefficient on male is now 0.043 and significant, implying that more than 100 percent of the male-female difference remains unexplained. This result appears mainly due to the significant negative effect of

higher high school graduate earnings, which is now not offset at all by the effect of higher college graduate earnings. In fact, the point estimate implies a negative effect. Taken together as an indication of increasing discount rates, this implies about a 5-percentage point higher female enrollment rate. Again, this is mostly offset by higher marriage rates, which imply over a 4-percentage point lower enrollment rate for females.

The 1970 cohort is the first for which we observe female enrollment rates to be above those for males. In this case, our covariates are capable of completely explaining the difference, even slightly over explaining, leaving males insignificantly more likely to be enrolled. Again, there is a significant negative effect of higher high school graduate earnings, which is now not offset by the very small positive effect of higher college graduate earnings, but which is still moderated by the higher marriage rates among females. In this case, earnings effects imply about a 4-percentage point higher enrollment rate for females, while the higher marriage rates imply a 3.5-percentage point decline. Finally, while for the 1975 cohort females are almost 2 percentage points more likely to be enrolled, our covariates are incapable of explaining this difference. However, the unexplained 2-percentage point lower enrollment rate for males is still not statistically significantly different from zero. Again, the higher marriage rate of females implies higher male enrollment rates – about 3-percentage points now. The effect of earnings has dropped here, implying just over a 1-percentage point lower male enrollment rate.

C. Across Cohort Enrollment Decompositions

As noted above, it is also possible to perform a decomposition across any two cohorts. Table 2 presents the results from this exercise. First, we can see that the male-female difference declined by 3 percentage points from the 1955 cohort to the 1960 cohort. Changes in the male-female difference in characteristics can explain just about

half of this decline. Perhaps not surprisingly, the biggest contributor is the change across cohorts in relative marriage rates, which explains just over 1 percentage point. The increasing gap between male and female high school graduation rates contributes another 0.6 percentage points. Across these cohorts, the narrowing of the male-female wage gaps for college and high school graduates are basically offsetting.

Between the 1960 cohort and the 1965 cohort, the male-female enrollment difference increased by 1.4 percentage points. Again about half of this change can be explained by changes in the male-female difference in characteristics. Most noticeably, the shrinking gap between male and female high school graduate's expected earnings explains 0.7 percentage points, with the narrowing of the marriage gap counteracting this change only slightly. By the 1970 cohort, females were more likely to be enrolled, representing a 3-percentage point drop in the male-female enrollment difference. Overall, none of this change can be explained by changes in the male-female difference in characteristics. Only the continued narrowing of the marriage gap contributes at all, and then less than 1-percentage point. Even this small explanation is offset by the continued decline in the male-female wage gap for high school graduates. Finally, there is very little change in the male-female enrollment gap between the 1970 and 1975 cohorts – just a 0.6 percentage point decline. All of this could be explained by the sustained narrowing in marriage rates, although it is offset somewhat by an increasing fraction of the female sample being black.[18] Still, almost all of this small change can be explained.

Overall, then, the formal decompositions are mainly suggestive. Because the

[18] Black males are disproportionately represented among the noncivilian, institutionalized population. Presumably, the increasing tendency for young black males to be in prison is behind this growth in the proportion of females who are black.

actual male-female differences in the probability of enrollment are relatively small in the sample, in all cases the unexplained difference is not significantly different from zero. Nonetheless, there is clear support for the idea that social changes, in the form of women delaying marriage for careers, have been an important contributor to the relative increase in female enrollments. Perhaps more surprising is the apparent role played by increasing discount rates over time. While males earn more than females with or without college degrees, the effect of higher male wages with a degree has dissipated as the future becomes more highly discounted, and thus been overwhelmed by the effect of higher male wages without a degree. While not presented here, decompositions for older individuals support the importance of the Vietnam War in the early decline, as a reduction in the number of male veterans explains most of the early drop in the older male-female enrollment difference.

IV. Conclusions and Directions for Further Research

Based on the descriptive analysis and the decomposition analysis some basic patterns emerge. First, a good part of the decline in the fraction male of college students over the past 30 years appears due to a one-time event. That is, the social changes that increased opportunities for women resulted in females delaying marriage and enrolling in college at the same rate as males. Women who had previously not entered college, then enrolled in higher education at older ages, which further decreased the male/female ratio in enrollment. Now that the propensity for young women to enroll in college is as high or higher than for young men, we can likely expect this "backlog" effect to taper off. Additionally, the very high male/female ratio in the early to mid 1970's was a result of the Vietnam War. As Vietnam-era veterans taking advantage of educational benefits

moved through the system, older male enrollments swelled.

The changes of the 1970's are unlikely to be repeated. Thus, of more interest is the slower decline in the late 1980's and early 1990's. While this continued decline is less easily explained, several contributors did emerge from the analysis. First, it appears that over time discount rates may have increased. While for cohorts born in the 1950's we observed both a positive effect of higher potential earnings with a college degree and a negative effect of higher potential earnings with just a high school diploma, for later cohorts the positive effect faded out. Additionally, the deterrent effect of immediate earnings possibilities generally grew larger. Because males earn more than females at all levels of education, this increased emphasis on current earnings suppressed college enrollment relatively more for males.

The analysis indicated that conditional on high school graduation, and conditional on being part of the civilian, noninstitutionalized population, young females were only slightly more likely to be enrolled in a four year college, although this difference is not statistically significant. However, given that males are more likely to be high school dropouts, in the military and in prison, females will remain a higher fraction of college enrollees even with equal enrollment propensities. While we generally expect higher fractions of males to join the military or to end up in prison, it is not clear that the effect this has on relative college enrollment rates has been considered. If relatively equal fractions of males and females are desired on college campuses, then it will be necessary to delve deeper into the distribution of males. Given that when measured by socioeconomic status, college males are better off than females, we are left with the question, then, of why these males do worse in high school and are less likely to graduate from college. A related question is why males are more likely to drop out of high school.

Finding an answer to these questions is likely to be difficult, but necessary to fully understand the current and future composition of college enrollments.

References

Astin, Alexander W., Sharon A. Parrott, William S. Korn and Linda J. Sax. *The American Freshman: Thirty Year Trends*. Los Angeles: Higher Education Research Institute, UCLA. 1997.

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

Becker, Gary. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, National Bureau of Economic Research, New York, 1964.

Bernheim, Douglas. *The Vanishing Nest Egg: Reflections on Saving in America*. New York, Priority Press. 1991.

Card, David and Thomas Lemieux. "Dropout and Enrollment Trends in the Post-War Period: What Went Wrong in the 1970's?" NBER Working Paper 7658, April 2000.

Current Population Surveys, October 1968-1997: School Enrollment [machine-readable data files]/conducted by the Bureau of Census for the Bureau of Labor Statistics. Washington: Bureau of the Census [producer and distributer], 1968-1997. Santa Monica, CA: Unicon Research Corporation [producer and distributor of CPS Utilities], 1999.

Current Population Surveys, March 1962-1998 [machine-readable data files]/conducted by the Bureau of Census for the Bureau of Labor Statistics. Washington: Bureau of the Census [producer and distributer], 1962-1998. Santa Monica, CA: Unicon Research Corporation [producer and distributor of CPS Utilities], 1999.

Jacobs, Jerry A. and Scott Stoner-Eby. "Adult Enrollment and Educational Attainment." *The Annals of the American Academy of Political and Social Science* 559 (September 1998): 91-108.

Kane, Thomas J. "College Entry by Blacks since 1970: The Role of College Costs, Family Background, and the Returns to Education." *Journal of Political Economy* 102 (October 1994): 878-911.

Koerner, Brendan I. "Where the boys aren't: Fewer are going to college*" U.S. News and World Report* (February 8, 1999).

Leigh, Duane E. and Andrew M. Gill. "Labor Market Returns to Community Colleges." *Journal of Human Resources* 32 (Spring 1997): 334-353.

Lewin, Tamar. "American Colleges Begin to Ask, Where Have All the Men Gone*?" New*

York Times (December 6, 1998): A1.

Mincer, Jacob. "Investment in Human Capital and Personal Income Distribution," *Journal of Political Economy* 66 (August 1958): 281-302.

National Center for Education Statistics, *Digest of Educational Statistics 1999*, Department of Education, 1999. Available at http://nces.ed.gov/pubs2000/Digest99/.

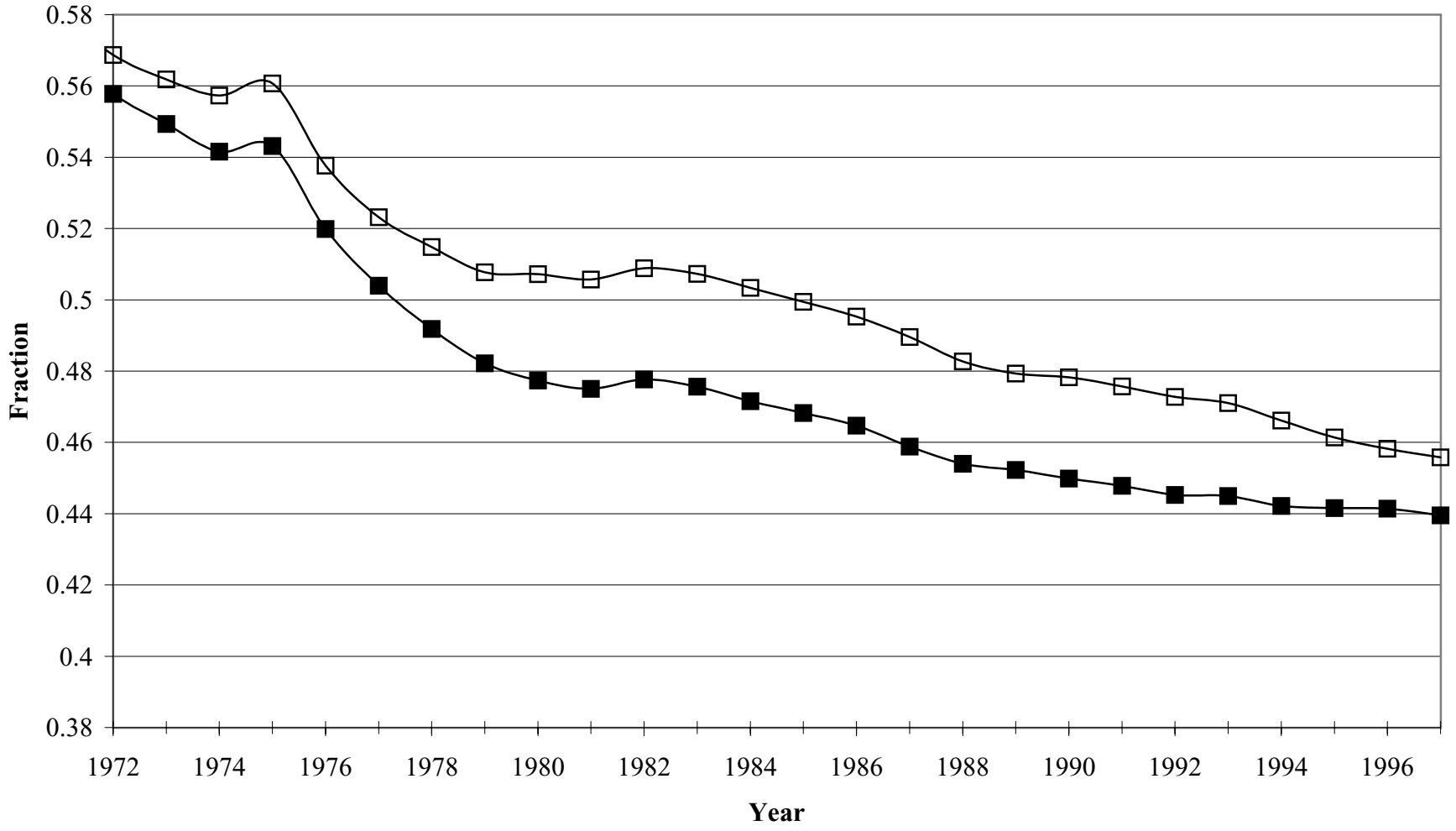
Schultz, T.W. "Investment in Human Capital," *American Economic Review* 51 (1961): 1-17.

Selective Service System, *History and Records*, revised December 23, 1999. Available at http://www.sss.gov/hist.htm

U.S. Department of Justice, Bureau of Justice Statistics, *Prisoners* (various years). Available at http://www.ojp.usdoj.gov/bjs/pubalp2.htm#Prisoners

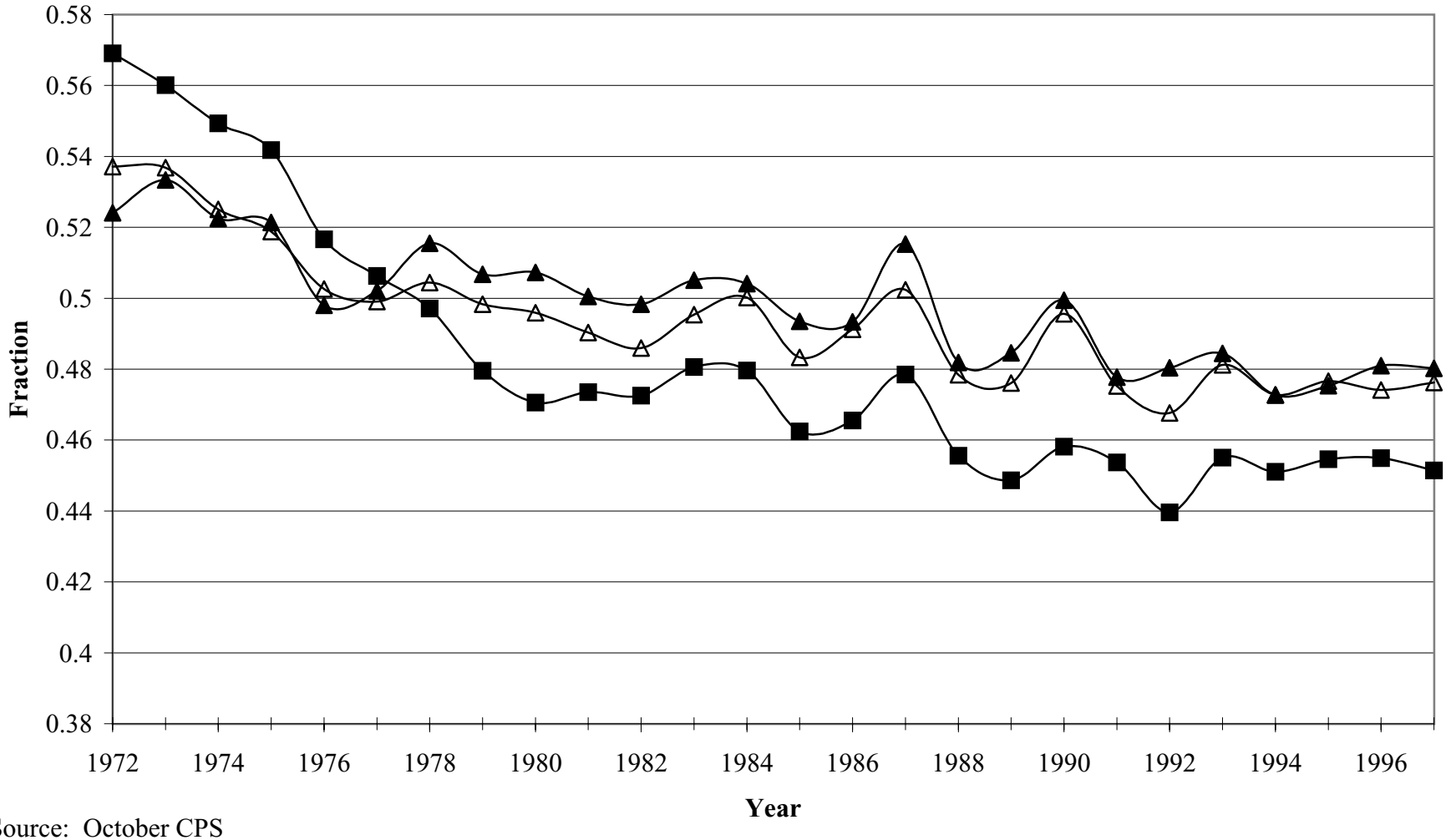
U.S. Department of Defense, *Selected Manpower Statistics* (various years). Available at http://web1.whs.osd.mil/MMID/PUBS.HTM#m01

Figure 1: Male Fraction of Enrollment at All Institutions



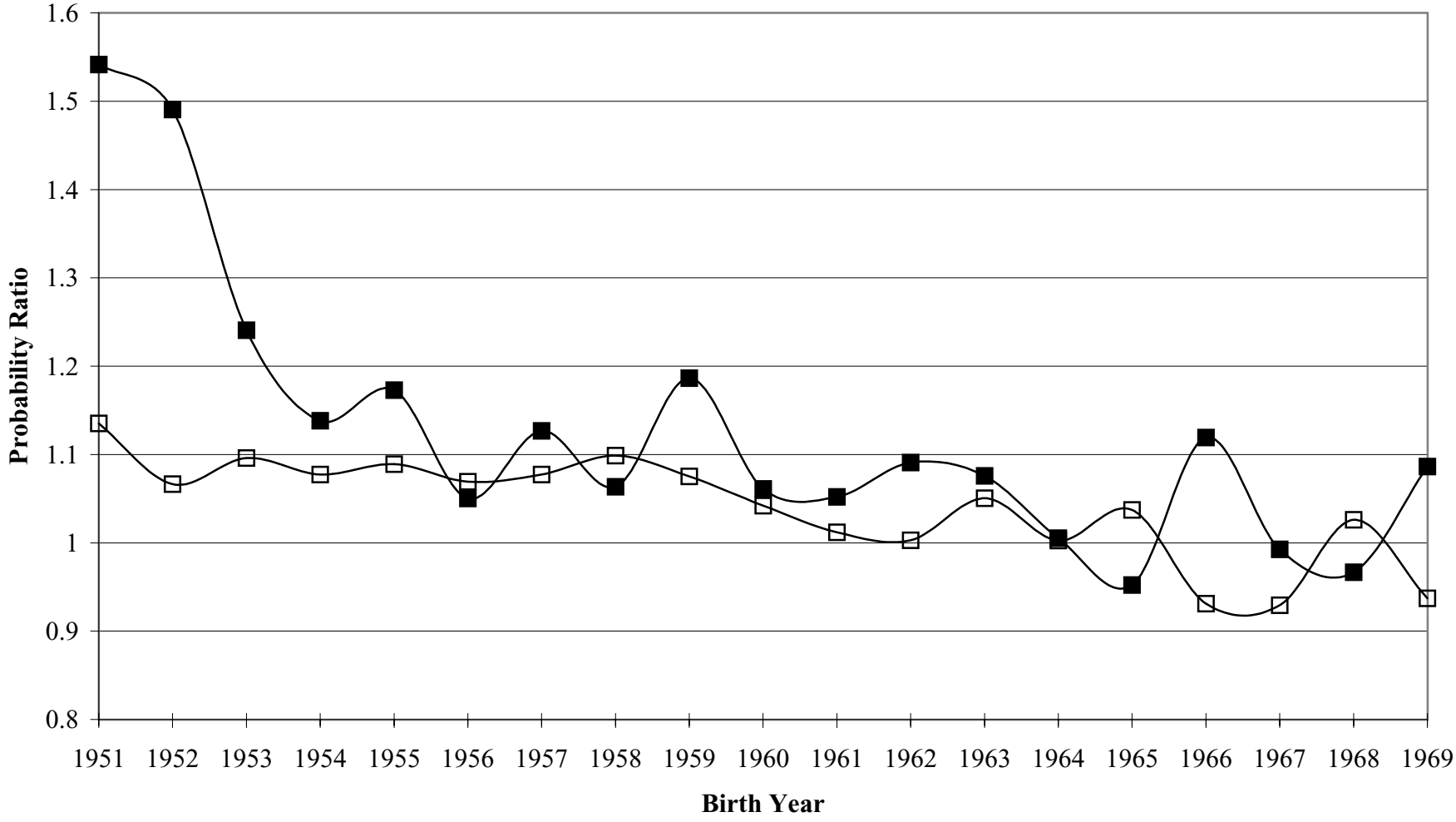
Source: Digest of Educational Statistics, Table 190

Figure 2: Fraction Male of Assorted Populations



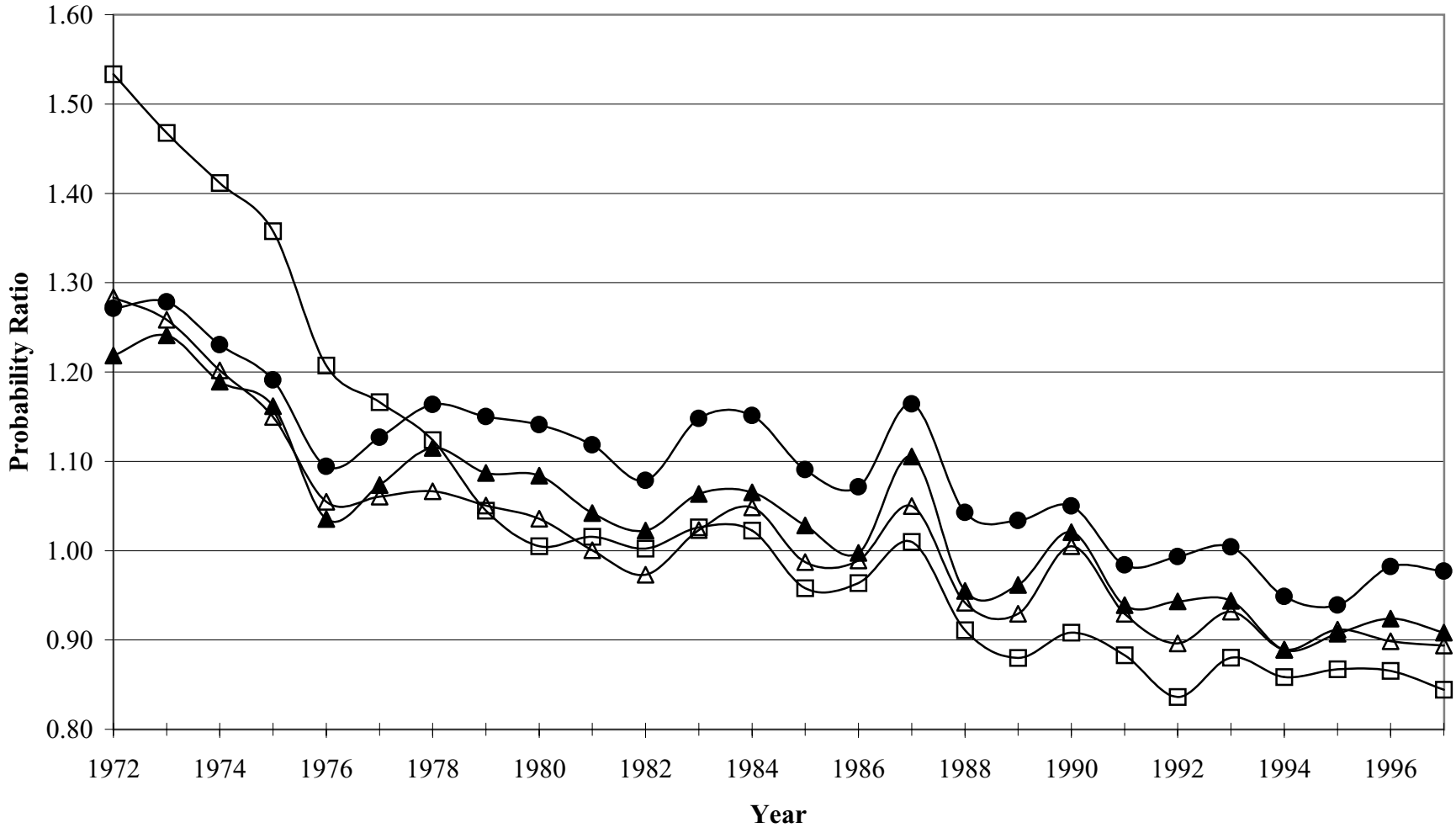
Source: October CPS

Figure 3: Male/Female Ratios in Enrollment and Attainment



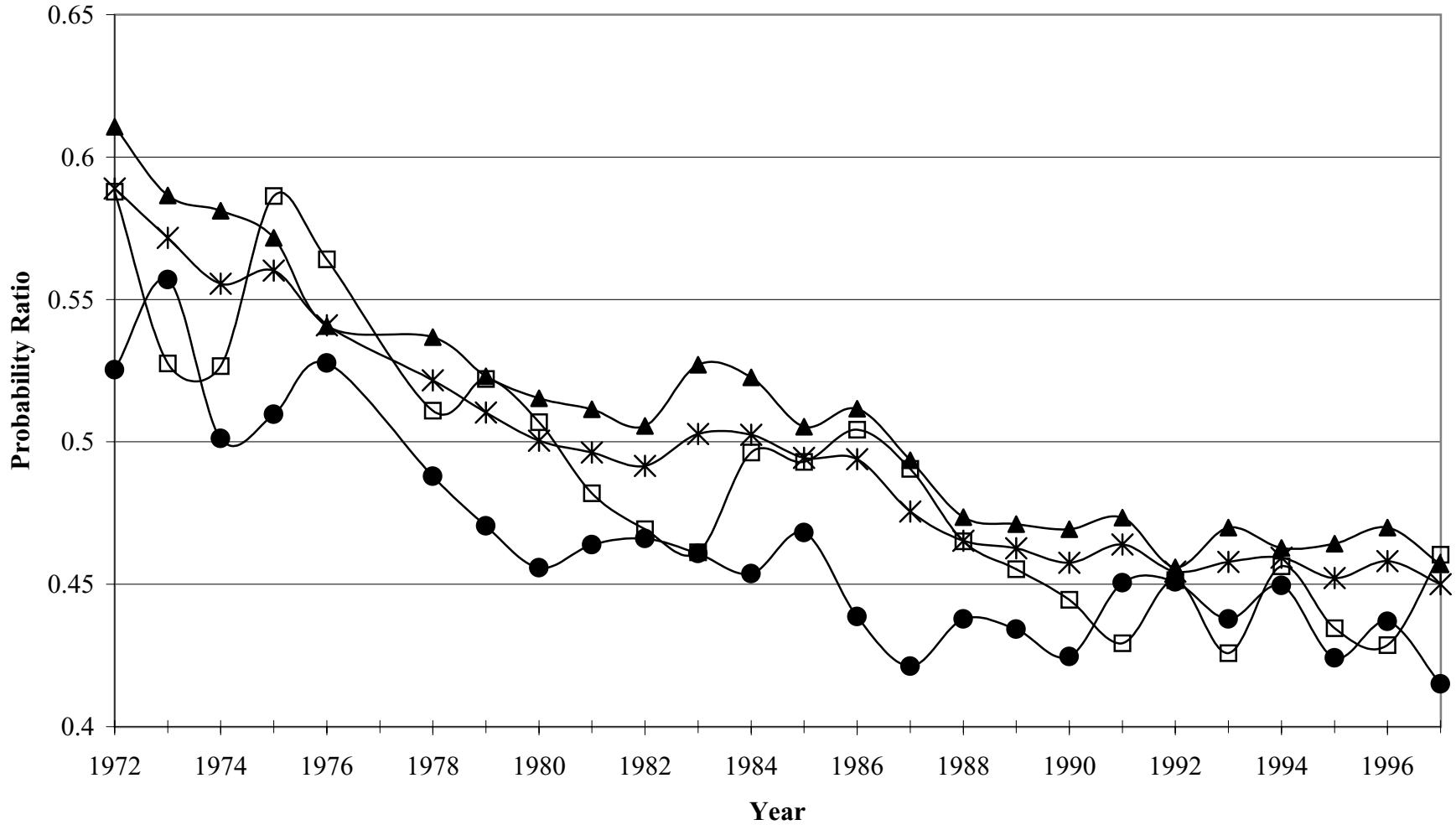
Source: October, March CPS

Figure 4: Male/Female Ratio in College Enrollment Rates



Source: October CPS

Figure 5: Male Fraction of Transitions & of Risk Group, All Ages



Source: October CPS

1955 cohort	means male	means female	male-female difference	coefficient (std error)	coefficient *difference
Difference in Enrollment Rate	***0.266***	***0.228***	***0.038***		
Unexplained					
(i.e. male dummy)	1.000	0.000	1.000	-0.019	-0.019
Explained by				(0.030)	
never married	0.804	0.593	0.211	0.268	0.056
				(0.012)	
spouse gone	0.013	0.047	-0.034	0.032	-0.001
				(0.016)	
black	0.115	0.133	-0.017	-0.100	0.002
				(0.039)	
white	0.868	0.858	0.010	-0.014	0.000
				(0.038)	
south	0.313	0.337	-0.025	0.009	0.000
				(0.019)	
veteran	0.041	0.000	0.041	-0.145	-0.006
				(0.020)	
ln(state tuition)	7.536	7.525	0.010	-0.033	0.000
				(0.028)	
ln(state UR)	1.852	1.848	0.005	-0.029	0.000
				(0.018)	
ln(weekly earnings) {25% for college grad}	6.380	5.710	0.670	0.058	0.039
				(0.019)	
ln(weekly earnings) {75% for HS grad}	6.739	6.105	0.635	-0.050	-0.031
				(0.046)	
high school graduate	0.821	0.826	-0.004	0.213	-0.001
				(0.012)	
intercept	1.000	1.000	0.000	0.188	0.000
				(0.309)	
Total Explained					***0.056***

1960 cohort	means male	means female	male-female difference	coefficient (std error)	coefficient *difference
Difference in Enrollment Rate	***0.243***	***0.237***	***0.006***		
Unexplained					
(i.e. male dummy)	1.000	0.000	1.000	0.004	0.004
Explained by				(0.030)	
never married	0.853	0.688	0.165	0.234	0.039
				(0.010)	
spouse gone	0.012	0.042	-0.030	0.005	0.000
				(0.011)	
black	0.119	0.136	-0.018	-0.092	0.002
				(0.031)	
white	0.860	0.846	0.014	0.002	0.000
				(0.025)	
south	0.322	0.346	-0.024	0.014	0.000
				(0.018)	
veteran	0.032	0.002	0.030	-0.163	-0.005
				(0.016)	
ln(state tuition)	7.415	7.404	0.011	-0.005	0.000
				(0.021)	
ln(state UR)	1.952	1.941	0.011	-0.010	0.000
				(0.016)	
ln(weekly earnings) {25% for college grad}	6.301	5.722	0.580	0.034	0.020
				(0.020)	
ln(weekly earnings) {75% for HS grad}	6.694	6.084	0.611	-0.076	-0.046
				(0.054)	
high school graduate	0.808	0.836	-0.029	0.230	-0.007
				(0.011)	
intercept	1.000	1.000	0.000	0.216	0.000
				(0.366)	
Total Explained					***0.002***

1965 cohort	means		male-female	coefficient	coefficient
	male	female	difference	(std error)	*difference
Difference in Enrollment Rate	***0.267***	***0.248***	***0.019***		
Unexplained					
(i.e. male dummy)	1.000	0.000	1.000	0.043	0.043
Explained by				(0.033)	
never married	0.903	0.748	0.155	0.232	0.036
				(0.015)	
spouse gone	0.010	0.035	-0.025	0.003	0.000
				(0.013)	
black	0.140	0.150	-0.011	-0.139	0.001
				(0.034)	
white	0.834	0.826	0.008	-0.017	0.000
				(0.033)	
south	0.337	0.353	-0.016	-0.002	0.000
				(0.019)	
veteran	0.023	0.001	0.022	-0.196	-0.004
				(0.023)	
ln(state tuition)	7.583	7.594	-0.012	-0.026	0.000
				(0.022)	
ln(state UR)	1.987	1.991	-0.004	-0.082	0.000
				(0.020)	
ln(weekly earnings) {25% for college grad}	6.320	5.791	0.529	-0.016	-0.009
				(0.020)	
ln(weekly earnings) {75% for HS grad}	6.654	6.133	0.521	-0.080	-0.042
				(0.059)	
high school graduate	0.823	0.852	-0.029	0.259	-0.008
				(0.011)	
intercept	1.000	1.000	0.000	0.833	0.000
				(0.405)	
Total Explained					***-0.024***

1970 cohort	means		male-female	coefficient	coefficient
	male	female	difference	(std error)	*difference
Difference in Enrollment Rate	***0.293***	***0.304***	***-0.011***		
Unexplained					
(i.e. male dummy)	1.000	0.000	1.000	0.005	0.005
Explained by				(0.019)	
never married	0.923	0.791	0.132	0.261	0.035
				(0.013)	
spouse gone	0.006	0.035	-0.029	0.037	-0.001
				(0.021)	
black	0.148	0.147	0.001	-0.109	0.000
				(0.032)	
white	0.815	0.818	-0.003	0.022	0.000
				(0.028)	
south	0.349	0.361	-0.012	-0.014	0.000
				(0.018)	
veteran	0.019	0.003	0.017	-0.195	-0.003
				(0.043)	
ln(state tuition)	7.775	7.785	-0.010	-0.024	0.000
				(0.021)	
ln(state UR)	1.787	1.792	-0.005	-0.024	0.000
				(0.020)	
ln(weekly earnings) {25% for college grad}	6.326	5.907	0.419	0.004	0.002
				(0.026)	
ln(weekly earnings) {75% for HS grad}	6.625	6.181	0.444	-0.094	-0.042
				(0.046)	
high school graduate	0.829	0.850	-0.021	0.305	-0.006
				(0.011)	
intercept	1.000	1.000	0.000	0.622	0.000
				(0.320)	
Total Explained					***-0.016***

1975 cohort	means		male-female	coefficient	coefficient
	male	female	difference	(std error)	*difference
Difference in Enrollment Rate	***0.327***	***0.344***	***-0.017***		
Unexplained					
(i.e. male dummy)	1.000	0.000	1.000	-0.023	-0.023
Explained by				(0.023)	
never married	0.928	0.819	0.109	0.268	0.029
				(0.018)	
spouse gone	0.012	0.030	-0.018	0.055	-0.001
				(0.025)	
black	0.138	0.156	-0.018	-0.136	0.002
				(0.030)	
white	0.808	0.795	0.014	-0.021	0.000
				(0.029)	
south	0.367	0.349	0.018	-0.040	-0.001
				(0.018)	
veteran	0.012	0.003	0.009	-0.141	-0.001
				(0.065)	
ln(state tuition)	8.021	8.024	-0.003	-0.016	0.000
				(0.035)	
ln(state UR)	1.730	1.728	0.001	-0.112	0.000
				(0.035)	
ln(weekly earnings) {25% for college grad}	6.314	5.917	0.397	0.002	0.001
				(0.031)	
ln(weekly earnings) {75% for HS grad}	6.603	6.185	0.418	-0.035	-0.014
				(0.047)	
high school graduate	0.834	0.859	-0.025	0.346	-0.009
				(0.017)	
intercept	1.000	1.000	0.000	0.398	0.000
				(0.481)	
Total Explained					***0.006***

Table 2: Across Cohort Decomposition of College Enrollment Rate

	Cohort Change			
	1960 - 1955	1965 - 1960	1970 - 1965	1975 - 1970
Change in Difference in Enrollment Rate	***-0.032***	***0.014***	***-0.030***	***-0.006***
Explained by				
never married	-0.011	-0.002	-0.006	-0.006
spouse gone	0.000	0.000	0.000	0.001
black	0.000	-0.001	-0.001	0.003
white	0.000	0.000	0.000	0.000
south	0.000	0.000	0.000	-0.001
veteran	0.002	0.002	0.001	0.001
ln(state tuition)	0.000	0.001	0.000	0.000
ln(state UR)	0.000	0.001	0.000	-0.001
ln(weekly earnings) {25% for college grad}	-0.003	0.001	0.000	0.000
ln(weekly earnings) {75% for HS grad}	0.002	0.007	0.007	0.001
high school graduate	-0.006	0.000	0.002	-0.001
Total Explained	*-0.016*	*0.008*	*0.002*	*-0.005*