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Why Have College Completion Rates Declined: Marginal Students or Marginal Colleges?

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Abstract

Substantial increases in the college wage premium have not brought about uniform increases in the likelihood of degree attainment. Comparing two cohorts from the high school classes of 1972 and 1992, we show eight-year college completion rates declined nationally, and this decline was localized among students beginning college at less-selective public 4-year schools and community colleges. Our analysis focuses on both demand-side determinants, including student preparation, and supply-side factors, such as institutional resources, in understanding changing completion rates over the past several decades. We also emphasize the increased stratification in outcomes across higher education sectors occurring over this time period.

Why Have College Completion Rates Declined: Marginal Students or Marginal Colleges?

The substantial increase in the college wage premium since 1980 has been met with a significant shift in the number and composition of students attending college. But the rising tide of benefits to a college education has not brought about uniform increases in the likelihood of degree attainment. The skills that students bring to college combined with resources of the institutions they first attend are more important predictors of graduation than they were for high school graduates from the early 1970s. Understanding the changing determinants of college completion in terms of student characteristics and institutional resources is integral to the formulation of public policies designed to increase the supply of high-skilled workers in the labor market.[1]

The sustained expansion of the college-high school wage differential in recent decades places upward pressure on collegiate attainment. Increased economic returns to education induce some students to enter college who might have terminated education after high school, while others who would have left college without receiving a degree persist to a BA. The result is that increases in the returns to education produce a compositional shift in the pool of students attending college, and the impact on the college completion rate is theoretically ambiguous.

In addition to changes in student composition, the supply-side of post-secondary education is an important determinant of the likelihood of college completion. Colleges and universities rely on substantial public subsidies, and these providers are largely public and non-profit institutions. In this type of market, increased demand for collegiate attainment may not be fully accommodated on the supply-side of the market. For example, reductions in resources per

[1] The factors impacting postsecondary persistence and graduation have received considerable attention in recent policy and press reports. One of the findings of the recently released Spellings Commission report was "While educators and policymakers have commendably focused on getting more students into college, too little attention has been paid to helping them graduate. The result is that unacceptable numbers of students fail to complete their studies at all" (U.S. Department of Education, 2006).

student at the institutional level may limit the availability of course offerings and can lower the rate at which students are able to complete the requirements for a baccalaureate degree. To the extent these resource declines have occurred unevenly among colleges and universities, there will be larger differences among students in college completion associated with initial college choice.

Comparing two cohorts from the high school classes of 1972 and 1992 using the National Longitudinal Study of the High School Class of 1972 and the National Educational Longitudinal Study of 1988, respectively, we show eight-year college completion rates declined nationally by almost 6 percentage points, from 51.1% to 45.3%. These declines are concentrated among those who began their post-secondary careers in a non-top 50 ranked public school or a community college. Among those students who began college at a private school or at a top-50 ranked public university, completion rates actually increased over this time period. Furthermore, we show completion rates declined more for men than for women and more for blacks than for whites.

One of the dominant trends in the data is a significant shift over time in the composition of college attendees. We find a sizeable increase in the proportion of students from lower in the academic achievement distribution attending college over this interval. These additional students from the 1992 cohort were no more likely to obtain a BA than similar students from the 1972 cohort, as academic preparedness is a substantial predictor of collegiate attainment. Indeed, we find that the changes in the pre-collegiate academic preparation of incoming students can account for a significant share of the drop in college completion rates between these cohorts. Over the same period, the parental education of students enrolling in college also increased. With a strong link between parental education and college completion, this shift is in the wrong direction to explain reductions in the completion rate.

Beyond changes in individual preparedness, our analysis emphasizes the importance of increased stratification in U.S. higher education and reductions in collegiate resources outside the top-tier of institutions as a partial explanation for the changes in the college completion rates – both in aggregate and by type of institution. Given the nature of the available data and the complexity of the education production process, sharp identification of the effect of changing resources available to students on attainment is not possible; instead, we marshal available evidence from different sources to establish the strong plausibility of this line of reasoning. Not only has the distribution of students across colleges shifted away from college types with relatively high completion rates, but there also have been substantial changes in the level and dispersion of resources per student within sectors. In the private sector and at the top-ranked public schools, the distribution of student-faculty ratios shifted downward and per-student subsidies and expenditures per student increased, while at non-top ranked public schools and community colleges resources per-student declined. We show these resource changes can account for a large portion of the aggregate drop in completion rates across surveys as well as for the variation in the changes across the different sectors of higher education.

The rest of this paper is organized as follows: Section 1 describes the changes in completion rates found in the data. Section 2 outlines the potential explanations for these trends that inform our empirical analysis. Section 3 presents the results from our empirical analysis, and Section 4 concludes.

Section 1. Trends in College Completion Rates

Evidence of fluctuations in college completion conditional on enrollment can be found in a range of data sources. The U.S. Census provides a broad overview of these trends in collegiate attainment. Figure 1 shows the likelihood of obtaining a BA conditional on having completed "some college" dropped from over 45% among U.S. born 25-year olds in 1970 to under 40% among U.S. born 25-year olds in 1990.[2] While there was a small increase in the completion rate between 1990 and 2000, the reduction in the likelihood of completing college conditional on having completed some college has unambiguously declined since the 1970s.[3]

Though the Census is useful for examining long-run trends, it lacks information on which schools each student attended, the timing of attendance and graduation outcomes, as well as measures of pre-collegiate academic achievement that are necessary to document and explain the relevant trends in completion rates. Our analysis utilizes the National Longitudinal Survey of the High School Class of 1972 (NLS72) and the National Educational Longitudinal Study (NELS:88), which allow us to observe such information. These surveys draw from nationally representative cohorts of high school and middle school students, respectively, and track the progress of students longitudinally through collegiate and early employment experiences. To align these surveys, we define the completion rate as the proportion of students who attend college within two years of cohort high school graduation and obtain a BA within eight years of

[2] Note that trends in college completion rates are inherently difficult to calculate. First, prior to the 1990s, most national surveys asked about educational attainment in terms of completed years of schooling, where completing four years of college is only an imperfect proxy for BA degree attainment. Second, distinguishing immigrants from those born in the United States is important in time series analysis as the number of immigrants with at least a college degree has increased dramatically in the last 15 years.

[3] One complication with this comparison, analyzed in more detail in Bound, Lovenheim and Turner (2007), is that time to degree has increased. Thus, the completion rate of 25-year olds may understate the eventual completion rate among each birth cohort. Data from cross-sections of recent college graduates assembled by the Department of Education from the Recent College Graduates and Baccalaureate & Beyond surveys corroborate the lengthening of degree time. For example, from 1970 to 1993, the share of graduates taking more than six years rose from less than 25% to about 30%, while the share finishing in four years or less fell from about 45% of degree recipients in 1977 to only 31% in the 1990s (see McCormick and Horn, 1997 and Bradburn et al., 2003).

cohort high school graduation. The completion rate is thus the graduation rate conditional on initial college enrollment.[4] One point of note is that there may well be some further closure in aggregate college completion rates measured with a longer lag from high school graduation.[5]

Table 1 shows the college enrollment rate for the full sample and the distribution of enrollment and completion by each respondent's initial collegiate institution type across the two surveys. Throughout this analysis, we split post-secondary institutions into 5 sectors, which are reflected in Table 1: non-top 50 public 4-year schools, top 50 public 4-year schools, less selective private 4-year schools, highly selective private 4-year schools, and community colleges.[6] Together, these sectors constitute the universe of all post-secondary institutions, excluding private 2-year schools. We employ the rankings assembled by U.S. News and World Report in 2005 to classify schools into one of the 5 divisions. The top 50 public schools are all public colleges and universities ranked in the top 50 in that year, and the highly selective private schools are composed of the top 75-ranked private universities and the top 50-ranked liberal arts

[4] Cohort high school graduation is June 1972 for NLS72 respondents and June 1992 for NELS:88 respondents. See the Technical Appendix for detailed discussion of the NLS72 and NELS:88 datasets used in this analysis. Restricting the analysis to those who attend college within 2 years of cohort high school graduation has little effect on the results. In NLS72, only 5% of college attendees delayed entry by more than 2 years, and in NELS:88 7% delayed entry by more than 2 years. Among BA recipients within eight years of cohort high school graduation, less than 1 percent in both surveys had first entered college more than 2 years after high school. Changes in the timing of first entry cannot explain the shifts over time in completion rates between the two surveys.

[5] Bound, Lovenheim, and Turner (2007) show that while there has been a substantial elongation of time to degree that has occurred between these two surveys, much of this change is shifts within the eight-year window of observation; the proportion of eventual college degree recipients receiving their degrees within eight years does not appear to have changed appreciably. Using The National Survey of College Graduates (2003), which allows us to examine year of degree by high school cohort, we find the share of eventual degree recipients finishing within eight years holds nearly constant at between 0.83 and 0.85 for the high school classes of 1960 to 1979. Focusing on more recent cohorts (and, hence, observations with more truncation) we find that in the 1972 high school graduating cohort, 92.3% of those finishing within twelve years had finished in eight years, with a figure of 92.4% for the 1988 cohort.

[6] All references to two-year schools and community colleges refer to public institutions only. We exclude private two-year schools as they are often professional schools with little emphasis on eventual BA completion. In the NLS72 cohort, 1.7% attended a private two-year school, and 1.1% of the NELS:88 sample attended such an institution.

colleges.[7] We truncate the highly selective private schools at a different point in the ranking distribution than for the public schools because private universities further down in the rankings have more resources than public universities higher in the respective rankings.

As Table 1 illustrates, the college attendance rate among high school graduates from the NLS72 and NELS:88 microdata increased substantially over the two decades of analysis. For the high school class graduating in 1972, 47.7% entered college within two years, with this rate rising to 71.8% for those graduating in 1992. Although the size of the college graduating cohort was smaller in 1992 than in 1972, the increased attendance rate led to growth in the number of students attending college, from 1.4 to 1.8 million, with most of the increases occurring at two year and the less highly ranked four year schools.[8]

The distribution of students across initial college type has changed substantially over this time period as well. In the 1972 cohort, 51.2% of college attendees began college at a public 4-year school, with 41.2% at a non-top 50 school and 8.9% at a top 50 university. In the 1988 cohort, only 43.9% of students began at a public school, and all of the decline came from the non-top 50 sector. There was also a small decline in the likelihood of beginning college at a less-selective 4-year private school between the two cohorts. The largest change over this time has been the almost 10 percentage point increase in the likelihood of entering college at a 2-year school. Turning to the distribution of initial institutions among college graduates (columns (iii)

[7] Other metrics, such as resources per student or selectivity in undergraduate admissions, give similar results. While these divisions are admittedly somewhat arbitrary, on the whole they capture the differences across the different types of post-secondary schools. The U.S. News rankings of institutions are highly correlated over time and there are few changes across the large groupings we use to categorize schools. Thus, our use of the 2005 rankings when we are studying earlier periods will not affect our results.

[8] Institutional total undergraduate enrollment counts from IPEDS show enrollment between 1972 and 1992 in non-top 50 public schools increased by 31.5% (from 3.0 to 3.9 million) and grew by over 107% at community colleges (from 2.6 to 5.3 million). In contrast, enrollment at top 50 publics increased by only 11.5% (from 0.7 to 0.8 million), enrollment at less selective privates increased by 39.3% (from 1.2 to 1.7 million) and enrollment at highly selective privates increased by 3.6% (from 0.49 to 0.50 million).

and (vi)), the shift from initial entry at public 4-year schools to community colleges is attenuated, while the share of BA recipients beginning at private institutions actually increases modestly.

Though the two data sets show unambiguous increases in the likelihood of attending college over time, these increases were not translated fully into higher college completion. Table 2 presents college completion rates for the full sample and by sector, illustrating that the change in college completion rates have not been uniform across sectors. Beyond the overall decline in the completion rate, from 51.1% in the NLS72 cohort to 45.3% in the NELS:88 cohort, Table 2 also shows the dramatic differences in the likelihood of BA completion associated with type of first institution. Students starting at community colleges are considerably less likely to complete than students starting at four-year institutions in the public and private sectors. For the high school cohort of 1992, the BA completion rate among those starting at public two-year institutions slipped to 17.4% from 23.2% for those graduating in the high school class of 1972. However, the decline in completion rates outside of the community college sector is also evident. Between the NLS72 and NELS:88 cohorts, the completion rate fell by 7.4 percentage points, from 57.4% to 50.0%, among students beginning college in public non-top 50 institutions. In contrast, completion rates increased in the top 50 public schools and in both highly selective and less selective private schools, so the aggregate drop in completion rates can be attributed fully to the 2-year and public non-top 50, 4-year sectors. However, it is important to note these sectors comprise the majority of both college attendees and college graduates in both surveys. Our results are consistent in showing the reduction in the likelihood of college completion is isolated to the least resource-intensive public universities (see Section 3.2.2.).

Section 2. Theoretical Explanations For Changes in College Completion Rates

In this section, we consider multiple theoretically plausible explanations for the changing rate of college completion as a framework for guiding our empirical methodology and interpreting our results. The explanations on which we focus can be split into demand-side changes brought about by increased enrollment among students with lower pre-collegiate achievement and supply-side institutional constraints in higher education.

Our demand-side analysis focuses on the changing characteristics of the student body: if the characteristics of entering students have shifted over time, aggregate completion rates may be affected.[9] A simple selection model illustrates the connection between changes in the pool of students entering college and college completion rates. When the returns to a college education increase, as has occurred in the U.S. over the past three decades, more high school graduates will be induced to attend college, thereby changing the composition of enrolled students. The addition of marginal students who are likely to be less academically prepared than the infra-marginal student can work to decrease completion rates. At the same time, increased rewards to obtaining a BA will put pressure on students to finish college. The net effect on the college completion rate, defined as the ratio of college degree recipients to college entrants, is thus theoretically ambiguous.

The supply-side of the market for higher education, defined in terms of the quantity and quality of enrollment opportunities at any point in time, is another potentially important

[9] It is also likely students face some limits in access to capital markets (Becker, 1993) that induce them to drop out of college. With relatively modest availability of federal aid and limited institutional financial aid funds outside the most affluent colleges and universities, it is plausible that an increasing number of students are credit constrained and unable to borrow to finance full-time attendance. In the context of the Becker-Tomes (1979) model of intergenerational transfers (see also Solon, 2004 and Brown, Mazzocco, Scholz, and Seshadri, 2006), rising tuition charges and falling family income lead to the expectation that students will shoulder a higher fraction of college costs, thus reducing the optimal level of collegiate attainment. However, due to poor information on working behavior in the NLS72 and NELS:88 surveys combined with the inherent endogeneity of student labor supply, we are unable to analyze the empirical relevance of working or binding credit constraints on college completion.

determinant of completion rates. With colleges and universities receiving considerable subsidies from state, federal, and private sources, consumers pay a small fraction of the cost of production; student fees cover only about 12 percent of total educational costs at public colleges and universities in the U.S. (Winston, 1999). Moreover, total resources and public subsidies are highly stratified across institutions, with educational expenditures per student in public universities more than double those in community colleges (Courant, McPherson and Resch, 2006). There also exists considerable variation across states and within states over time in the level and distribution of public subsidies. College characteristics affect completion on two margins. First, the type and scheduling of collegiate offerings, combined with academic support services, may simply make it easier (lower cost) to complete college at resource-rich institutions. Secondly, to the extent that students at resource-intensive colleges receive higher labor market returns to collegiate attainment, they will have stronger pecuniary incentives to complete college.

One point that is clear in the economics and policy literature is the stratification among colleges and universities has increased markedly both over the last half century and, in terms of measures of institutional wealth, particularly sharply in the most recent decade. The increased national and regional integration of the higher education market brought about increased competition and, in turn, greater between-college variation in subsidies and other measures of resources per student (Hoxby, 1997). Significantly, Hoxby (1997) shows that increases in per-student subsidies (along with tuition) are concentrated among relatively selective private colleges and universities.

While private colleges operate in increasingly national markets that cross state borders, the majority of public schools rely on substantial state subsidies and differential pricing for in-state students. These cross-sector differences imply public and private universities will respond

differently to changes in local student demand (Bound and Turner, 2007). First, non-tuition revenues and capital stock – including state appropriations, donations from private sources, and campus infrastructure – are likely not to respond in full to short run changes in demand. In addition, tuition charges, particularly at public institutions under significant political pressure, are unlikely to increase such that enrollment is regulated through the price mechanism. The adjustment of public colleges and universities to demand increases takes somewhat different forms across the strata of higher education. For top-tier colleges and universities in both the public and private sectors, there is little adjustment in degree (or enrollment) outcomes to demand shocks. To the extent these institutions use selectivity in admissions (which increases with increases in student demand) to regulate enrollment, completion rates are likely to improve with increased demand, which is consistent with our findings in Table 2. At the same time, enrollment is relatively elastic among public universities outside of the most selective few. Here, we expect higher demand to lead to increased enrollment and consequent reductions in resources per student (Bound and Turner, 2007).[10]

In addition to changes in outcomes linked to the availability of public subsidies within institutions, increases in collegiate demand shift the distribution of college enrollment within a state to open-access four-year institutions and community colleges. Increasing enrollment at these types of institutions relative to private and selective public universities will tend to reduce the overall resources per college student within a state. Estimating the causal impact of type of collegiate experience on attainment and earnings is difficult given the endogeneity of college

[10] Bound and Turner (2007) emphasize that direct assessment of the effect of year-to-year changes in resources per student on degree outcomes using measures of current expenditures or state appropriations is difficult because only part of any observed change in current expenditures is likely to be exogenous, and expenditures translate into resources with long lags. They use variation in the size of the college-age cohort within states to generate plausibly exogenous variation in the availability of higher education resources per student. They find that the elasticity of undergraduate enrollment with respect to cohort size is close to 0.2 at flagship public universities, and the corresponding elasticities are 0.8 at community colleges and about 0.6 at "non-flagship" public universities.

choice, with students likely to be systematically different across college type. However, available evidence on community colleges suggests that, *ceteris paribus*, for a student intending to obtain a BA, starting at a two year school lowers the probability of BA attainment.[11]

Queuing and enrollment constraints in response to limited resources in the public sector may also affect the likelihood of college completion. Despite nominal claims of "open enrollment," there is ample evidence of enrollment limits and course closings, particularly in high growth states.[12] Such institutional barriers increase the costs (and reduce the net return) to degree attainment, while also contributing to student dissatisfaction with the collegiate process. While queuing and shortages of courses are inefficient, such limitations may result from the absence of adjustments in tuition and enrollment at public universities when appropriations per student decrease, leading to decreases in completion rates. With substantial state subsidies and below market tuition that may insulate public colleges and universities from some competitive pressures, it is also possible some of the queuing on the supply-side is indicative of the failure of public institutions to reallocate resources in response to changes in demand (Smith, 2007).

In sum, student demand-induced shifts in the characteristics of new college entrants and students at the margin of college completion interact with changes in the supply-side of higher education to affect the rate at which students move from college entrance to college completion.

[11] Researchers have consistently found college students starting at two-year schools are less likely to complete the BA than their peers beginning at four-year schools. Reynolds (2007) uses matching estimators to approach this question, while earlier work uses regression techniques to adjust for observable differences between those starting at two and four-year schools (Rouse, 1995, Leigh and Gill, 2003 and Gonzales, Hilmer, and Sandy 2006).

[12] In addition to the quantitative work presented in the text linking expansions in cohort size to reductions in resources per student, we systematically searched regional newspapers for evidence of crowding effects in three high-growth states: California, North Carolina and Utah, finding evidence and examples consistent with this hypothesis. To illustrate, one report from Riverside, California noted: "… high school graduates are being turned away every year from overcrowded community college classes" and then linked delays in collegiate attainment to attrition, noting "Educators say many of the students who do not get in will never come back. 'They get jobs, they get apartments and then have bills to pay,' said Billie Rogers, a veteran counselor at Corona High School. 'It is easy for them to get off track, and hard to get back on.'" (Peoples, 1995)

In the empirical evidence that follows we evaluate how the role of increased dispersion in student achievement and the expanded stratification in resources among colleges and universities explains the observed aggregate decline in college completion rates and the variation across the different sectors of higher education.

Section 3. Empirical Analysis of Changes in Completion Rates

3.1. The Role of Changing Student Attributes

3.1.1. Methodology to Assess the Role of Changing Student Attributes

Our methodological approach begins with the investigation of the relationship between changes in the pre-collegiate characteristics of college students and college completion. The motivation is similar to the Blinder-Oaxaca decomposition in that our objective is to determine the extent to which changes in the distribution of student attributes can explain the observed changes in completion rates. We re-weight the NELS:88 completion rate using the characteristics of students from the NLS72 survey.[13] This calculation leads to a counterfactual completion rate in which the proportion of students with a given characteristic or a given set of characteristics has not changed between the two surveys. By comparing the observed NELS:88 outcomes and the re-weighted NELS:88 outcomes, we can determine the proportion of the change in completion rates that is due to changes in the mix of students with a given attribute attending college. The remainder, or the difference between the re-weighted outcomes and the observed outcomes for NLS72, reflects changes in other determinants of degree completion. We perform re-weighting calculations separately for specific characteristics such as ethnicity, family income and pre-collegiate achievement and for all characteristics together. What we are estimating is the

[13] Re-weighting estimators have a long history in statistics dating back at least to the work of Horvitz and Thompson (1952) and have become increasingly popular in economics (see, for example, Dinardo, Fortin and Lemieux , 1996; Heckman, Ichimura and Todd , 1997 and 1998; and Barsky, Bound, Charles and Lupton , 2002).

change in completion rates conditional on various observable characteristics, integrating this change over the distribution of characteristics (see Barsky, Bound, Charles and Lupton (2002) for a further discussion).

The validity of our counterfactual calculations (e.g., what would the college completion rate for those attending college in the 1990s been had they been as academically prepared for college as those who attended in the 1970s) depends crucially on the cross-sectional association between background characteristics and college outcomes reflecting a causal relationship not seriously influenced by confounding factors. For example, we simulate completion rates under a counterfactual distribution of test scores. For this simulation to accurately represent the counterfactual, it must be the case that the cross-sectional relationship between test scores and the likelihood of college completion reflects the impact of pre-collegiate academic preparedness on this outcome. Regardless of whether the re-weighting calculation produces the true counterfactual, the results present a clear accounting framework for assessing the descriptive impact of the change in the composition of students and the institutions they attend on collegiate attainment.

3.1.2. Data Used in the Re-weighting Analysis

The student attributes we analyze are high school math test quartile, high school reading test quartile,[14] father's education level, mother's education level, real parental income levels, gender, and race. The Technical Appendix to this paper contains detailed information on the

[14] The math and reading tests refer to the NCES-administered exams that were given to all students in the longitudinal surveys in their senior year of high school. Because the tests in NLS72 and NELS:88 covered different subject matter, were of different lengths, and were graded on different scales, the scores are not directly comparable across surveys. Instead, we construct the quartiles of the score distributions for each test type and for each survey. The comparison of students in the same test quartile across surveys is based on the assumption overall achievement did not change over this time period. This assumption is supported by the observation that there is little change in the overall level of test scores on the nationally-representative NAEP over our period of observation. Similarly, examination of time trends in standard college entrance exams such as the SAT provides little support for the proposition that achievement declined appreciable over the interval within test quartiles.

construction of our data set. For the measurement of family income, we are interested in assessing parents' ability to finance college, so the variable of interest is the real income level, not one's place in the income distribution. We align the income blocks representing responses to categorical questions across the two surveys using the CPI.

The NLS72 and NELS:88 datasets contain a significant amount of missing information on test scores, parental education and parental income brought about by item non-response. While a small share of observations are missing all of these variables (in NLS72 and NELS:88, respectively, 0.60% and 1.26% have no information on any of these variables), a substantial number of cases are missing either test scores, parental education or parental income. For example, in NLS72, 40% of those who enroll in college and 39% of those receiving a BA within eight years of cohort high school graduation are missing information on at least one of these background characteristics. These percents are 51 and 43, respectively, in NELS:88. Because the data are not missing completely at random, case-wise deletion of observations with missing variables will bias the unconditional sample means of completion rates. We use multiple imputation methods (Rubin, 1987) on the sample of all high school graduates to impute missing values using other observable characteristics of each individual.[15] Because the surveys contain good supplementary predictor variables, such as high school GPA, standardized test scores from earlier survey waves, and parental income reports, we are able to use a great deal of information about each respondent to impute ranges of missing data points.

Table 3 presents the changes in background characteristics and measured academic preparedness of college attendees and graduates across the NLS72 and NELS:88 surveys. The

[15] Under the assumption that the data are missing conditionally at random, multiple imputation is a general and statistically valid method for dealing with missing data (Rubin, 1987; Little, 1982). The relative merits of various approaches for dealing with missing data have been widely discussed (e.g. Little and Rubin, 2002; Schafer, 1997). See the Technical Appendix for complete details of the imputation procedure.

table shows the substantial shift in background characteristics of students entering college over time to include those from lower on the high school test score distribution and an increase in Asian and Hispanic students. For example, the percent of college attendees from the highest math test quartile dropped from 40.6 to 32.5 and from the lowest math test quartile increased from 11.2 to 16.2. For reading tests, the percent in the top quartile dropped from 35.0 to 31.4, and the percent in the bottom quartile increased from 14.5 to 18.0. Similarly, the percent of college attendees with race classified as white decreased from 85.8 to 73.8.

Table 3 also illustrates that these changes in the demographics of college attendees were not translated fully into changes among college graduates. Among BA recipients, changes in attributes with a presumed effect on degree completion are small. For example, the proportion in the highest math quartile decreased by less than 2 percentage points, and the share of BA recipients from the highest reading quartile increased. That the test distributions of college attendees shifted significantly more than the distributions of college graduates suggests those with lower academic preparation for college were less likely to attain a BA. In addition, the growth in the college enrollment of Hispanic and black students – who are traditionally underrepresented at the college level – is appreciably larger among all college attendees than among college graduates, suggesting that changing demographic composition is likely to be an important explanatory variable for explaining the drop in completion rates. The implication of comparisons across columns in Table 3 is that many of the students who were pulled into the higher education system between 1972 and 1992, including minorities and students with relatively weak test scores, did not complete college.

In Table 4, we report the probability that high school graduates attended or completed college as a function of performance on the math and reading tests survey respondents were

given. While there was a marked increase in the likelihood of attendance for high school graduates with below median math or reading scores, the probability of obtaining a BA for students in these groups changed little. For example, the percent of high school graduates in the lowest math quartile attending college increased from 21.2 to 46.4 across the two cohorts, but only 6.1 and 5.0 percent received a BA in the NLS72 and NELS:88 samples, respectively. For the top math quartile, where 79.4 percent attended college in NLS72 and 93.3 attended in NELS:88, the percent earning a BA increased across the two cohorts, from 55.0 to 68.3. The gains over the past 30 years in college attendance among lower-achieving students were largely offset by low completion rates conditional on college enrollment and thus not followed by large increases in earned degrees. Among those who obtain a BA, the achievement distribution has changed little between the two cohorts, as shown in the last two columns of Table 3.

A natural interpretation of the evidence on college enrollment and completion in relation to test scores presented in Tables 3 and 4 is that growth in the college completion rate has been limited by reductions in pre-collegiate academic achievement; high school graduates in the bottom half of the test score distribution simply may not be prepared to finish college. Note the sectors that experienced reduction in completion rates also experienced reductions in the pre-collegiate preparation of entering students (Appendix Table 1 presents the same descriptive information as Table 3 disaggregated by type of higher education institutions). However, these students also are concentrated at colleges where resources and completion rates were relatively low in the initial period, with some further declines in resources apparent in the intervening years (see Section 3.2.2). In both sets of private 4-year schools as well as in public top 50 schools, there was an upward shift in both test score distributions. So, it remains ambiguous how much of

the low completion rates among these students has to do with the academic preparation of the students and how much has to do with the effect of attending lower-resource institutions.

For both college attendees and graduates, Table 3 shows parental education became more favorable among both college attendees and graduates.[16] Echoing the general increase in educational attainment during the post-war period, the proportion of college attendees whose father (mother) had at least a BA increased by 8.1 percentage points (12.9 percentage points) for all college attendees and 15.6 percentage points (20.8 percentage points) for BA recipients. Such shifts implicitly go in the "wrong direction" to explain the observed changes in completion rates.

3.1.3. Results from Multivariate Re-weighting using Individual Characteristics

To understand how the change in the distribution of individual characteristics affected collegiate attainment, we generate weights by running logistic regressions of a dummy variable equal to 1 if an observation is in the NLS72 cohort on the observable student characteristics presented in Table 3. The weights used in the re-weighting analysis are $\frac{W_i}{1-W_i}$, where the W_i are the predicted probabilities from the logistic regressions. These weights are used to generate the re-weighted NELS:88 distributions shown in Table 5, reflecting the distribution of completion in the NELS:88 cohort expected if the distribution of individual characteristics in 1992 resembled the distribution of individual characteristics in 1972. As with all re-weighting analyses, the choice of indexing is arbitrary. We chose to re-weight the NELS:88 distribution due to ease of interpretation. Given the fact that the strength of the association between test scores, family

[16] While parental education tended to increase over the period of observation, it is well-known that the overall likelihood of growing up in a two-parent family declined over this period of observation. For example, Census Bureau tabulations show the proportion of all children living with two parents falling from 83% to 73% between 1972 and 1992. While we are able to observe family structure in the NELS:88 survey (and the relationship with collegiate outcomes), this variable is not observed for NLS72. Yet, because changes in family structure measured in the CPS among those enrolling in college are quite modest, we conclude that changes in this variable cannot be a primary determinant of changes in completion rates.

income, parental education and educational outcomes all have increased over time, if anything, re-weighting the NLS72 outcomes using the distribution of observable characteristics in NELS:88 accounts for less of the NLS72/NELS:88 shift in completion rates than if we had reversed the indexing.[17]

Table 5 presents estimates of the completion rate that would have been expected to prevail if individual attributes among students had remained at their 1972 level. When we employ test scores as the only variables in the re-weighting scheme, we explain a considerable share of the change in the completion rate over time.[18] As shown in Table 5, re-weighting the NELS:88 distribution with the distribution of test scores observed in NLS72 among those enrolled in college leads to a predicted completion rate of 49.5%.[19] However, when we re-weight NELS:88 to reflect the distribution of all of the observable characteristics in the NLS72, we find no net effect of the compositional shift in students documented in Table 3 on completion rates. This result arises from the fact that increases in parental education among college attendees (as shown in Table 3) more than offset the negative effect of reduced academic preparation on completion rates between the two samples.

The interpretation of these results depends crucially on the nature of the cross sectional relationship between test scores and completion rates, on the one hand, and parental education and completion rates, on the other. There is good reason to believe that the test score results represent the actual effect of academic preparation mediated by the current institutional framework of higher education in the U.S. on college completion rates. In addition, we believe

[17] Results from reversing the indexing are available from the authors upon request**.**

[18] We also conducted a sensitivity analysis in which we used quartics of the percentiles of the math and reading test score distributions in the re-weighting analysis in order to allow a more flexible relationship between changes in academic preparedness and changes in college completion. Results were virtually identical to those reported in Table 5.

[19] Of note, reversing the indexing (adjusting NLS72 to reflect the distribution observed in NELS:88) produces less powerful effects for test scores, reflecting the observation that test scores are more closely linked with completion likelihood in the later cohort.

that the changes in the distribution of test scores among those who attend college reflect changes in the academic preparedness of the typical college student. As a result, the simulated counterfactual using only test scores represents a reasonable approximation for the actual (unobserved) counterfactual of college completion among NELS:88 respondents with the academic preparedness of NLS72 respondents.

Whether the inclusion of parental education, as well as other observable factors that may differ across cohorts, in the re-weighting improves the estimation of the counterfactual depends on the determinants of the association between parental education and college completion. The link between parental education and college completion may reflect a number of different factors, including a greater familiarity with collegiate institutions that improves the capacity of children to negotiate the collegiate experience or the level of resources within the home – both financial and intellectual – contributing to college preparation. To the extent that the measured increase in the educational attainment of parents did not increase household resources facilitating collegiate attainment, the simulated counterfactual utilizing parental education may overstate the causal effect of the change in parental education on college completion rates. All in all, we suspect that our re-weighting using just test scores overestimates the full effect of compositional change in the college going population on completion rates because of the correlation between pre-collegiate academic achievement and student background. However, the multivariate re-weighting using all available observable characteristics including parental education underestimates the full effect, so these estimates can be interpreted as bounds of the true impact of compositional changes on the drop in college completion rates observed in the data.

In the additional columns of Table 5, we perform the re-weighting analysis separately by initial school type. Similar to the results for the full sample, we find that changes in the test score

quartiles of college attendees explain about half of the decline in completion rates among students attending public non-top 50 schools and community colleges. However, re-weighting by all individual characteristics explains none of the drop in completion rates for the public non-top 50 sample and explains about 47% of the decrease in the completion rate for the two-year sample. For the other 3 sectors, shifts in test scores explain little of the increase in completion rates observed over time. However, when we include all characteristics in the re-weighting analysis, shifts in the demographics of attendees explain 40% of the increase in the public top 50 sector, 38.8% of the increase in the less selective private sector, and 54.7% of the increase in the highly selective private sector. These changes are reflected in the shifts in characteristics of individuals in these samples reported in Appendix Table 1. There is substantial erosion in academic preparedness of those entering community colleges and non-top 50 public schools. In the latter sector, this erosion is offset by higher parental education and income, while it is not for the community college students. In contrast, test scores, parental education and income all improve across surveys in the private sectors and the top 50 public universities, and these changes are associated with a significant fraction of the completion rate increases in these sectors.

3.1.4. Results from Multivariate Re-weighting using Individual Characteristics by Race and Gender

Table 6 presents completion rate changes and multivariate re-weighting results separately by race and gender.[20] Focusing first on gender differences in completion rates, Table 6 shows completions rates for men dropped from 52.5% to 42.6% (a 9.9 percentage point decline), and completion rates for women decreased by only 1.8 percentage points, from 49.7 to 47.9. The latter decrease was not statistically significant. That the collegiate performance of women

[20] The race-specific results are presented for blacks and whites only because the composition of Asians and Hispanics changed significantly over this time period due to immigration.

increased relative to men in the last three decades has been documented previously (Goldin, Katz, and Kuziemko, 2006). For both men and women, test scores explain the majority of the completion rate drop when we employ the multivariate re-weighting technique, though changes in the distribution of student achievement are simply much more muted for women than for men over this interval.[21] For example, the proportion of male college attendees with math test scores in the top quartile decreased from 48.6% to 35.8%, while for women the percent in the top quartile only dropped from 32.2% to 29.3%. Similar trends are exhibited for reading test scores. When we examine changes in completion rates by gender and type of institution (Appendix Table 2), a striking result is the very large increases in completion rates for women at top-ranked private and public institutions, with completion rates rising 14.7 percentage points and 15.6 percentage points for women at these institutions.

Blacks experienced much larger completion rate decreases over this period relative to whites: completion rates among blacks fell by 9.6 percentage points (from 40.0% to 30.4%) and completion rates among whites fell by 3.1 percentage points (from 53.0% to 47.9%). Both reductions are statistically significant. The final two columns of Table 6 show completion rate changes by gender for blacks. While black men experienced a larger decline than black women (11.5 and 7.7 percentage points, respectively), the completion probability in both populations declined significantly.

Among whites, test scores explain over 100 percent of the observed completion rate decline, but for blacks, re-weighting with test scores only reduces the counterfactual completion rate. For black men, however, re-weighting by test scores alone explains over 31% of the completion rate decline. The explanation for these result is that achievement levels improved

[21] Goldin, Katz, and Kuziemko (2006) show the clear increase in the twelfth grade math and reading test scores of girls relative to boys over this interval and argue that much of the change in the female to male ratio of collegiate graduates occurring between the 1970s is tied to this relative shift in high school achievement.

somewhat for African American college students on average between the two surveys: while 27% of black students had above median math test scores in NLS72, over 36% had math scores above the median in NELS:88. The aggregate changes for blacks mask the large increases in test scores among black women and the decreases among black men.[22]

3.2. The Role of Institutional Type and Resources at Public Universities

3.2.1. Initial Institution Type Re-weighting Results

As discussed in Section 2, the supply-side of the market in higher education may contribute to the observed decreases in completion rates for students at public universities if there have been declines in resources per student that reduce the likelihood of degree completion. Suppose the class entering college from the high school class of 1992 was distributed among collegiate institutions in the same way as the class of 1972. How would this re-weighting predict completion? Results from re-weighting by initial school type, both with and without additional controls for variation in individual characteristics, are shown in the last rows of Tables 5 and 6. With a predicted completion rate of 48.1% and 49.2% under the prior distribution of institutional type when individual covariates are included and excluded, respectively, the shift in type of institution – largely the shift toward entry at two-year schools – explains between 49.2% and 68.9% of the observed aggregate decline in completion rates. Because shifts in the type of institution that first-time college students select reflect both individual characteristics and supply-side adjustments in the higher education market, these estimates likely over-estimate the causal effect of the shift on completion rates. However, as long as there is an effect on the

[22] Among black men, 29.6% were in the lowest math quartile in 1972 and 40.4% were in the lowest quartile in 1992. For black women, the percent of college attendees in the bottom quartile shifted from 42.7 to 26.8 across the two surveys. Similarly, the percent of black men in the top quartile went from 15.0 to 8.2 across the cohorts, and for black women these percents increased from 7.9 to 14.2.

probability of completing college of starting at a two-year school, these estimates suggest the shift towards two-year schools has contributed to declining completion rates.[23]

Results within race and gender groups are largely similar to those for the full sample. Among men, school type alone explains 51.5% of the completion rate decline and school type with background characteristics explains 42.4%. For women, both re-weighted estimates explain about 100% of the total drop in completion probabilities. While school type changes explain more than the total completion rate decline for whites, adding background characteristics reduces the explained percent to 54.8. For blacks, re-weighting by initial school type explains only 30.2% of the change in the completion rate, and most of this effect is coming from the effect on black men. Initial school type combined with background characteristics explain none of the observed completion rate decline for blacks.

3.2.2. Institutional Resource Constraints and College Completion

The concentration of the decline in completion rates among students attending non-top 50 public universities and community colleges leads to the question of whether declines in resources within these sectors over the period of observation might adversely affect the educational attainment of students. Taken as a whole, resources either increased or held constant on a number of widely reported scales. To illustrate, constant dollar current expenditures per student at public colleges and universities have risen from $14,610 in 1970-71, to $17,606 in 1990-91, to $22,559 in 2000-01 (Snyder, Tan, and Hoffman, 2006, Table 339). Such measures miss two fundamental changes occurring over this period: first, the stratification in resources across institutions increased, with dramatic increases in resources at private and selective public institutions combined with stagnation and decline in resources at other institutions; and secondly,

[23] While it is possible that some students enter community colleges for sub-baccalaureate vocational training, the majority (64.12%) of community college entrants in the NELS:88 cohort intended to complete at least a BA degree.

changes in spending per student combine changes in the price of educational inputs with changes in quantities. While the employment of a price index specific to the overall mix of inputs employed by colleges and universities (e.g., Higher Education Price Index) reduces the constant dollar growth in expenditures, it is likely faculty salaries and the cost of laboratory equipment at research universities have outpaced this general index.

If declining resources are an explanation for the reduced completion rates observed in our data, we also should observe resources declining in the sectors that experienced the completion rate decreases. We use institutional-level data from the HEGIS-IPEDS institutional surveys to examine trends across sectors in student-faculty ratios, expenditures and subsidies per student.[24]

Table 7 presents average undergraduate student-faculty ratios, expenditures per student, and per-student subsidies at the initial institution for the full sample and by initial school type, weighted by student enrollment. A clear pattern emerges from these tabulations: student faculty ratios became much larger in the non-top 50 public and 2-year sectors and increased less significantly or decreased in the private sector and the top 50 public universities. For example, while mean student-faculty ratios increased by 4.8% in the top 50 public sector, they increased by 41.4% in the public non-top 50 sector and by 107.7% in community colleges. Even larger relative increases occurred at below median institutions.

A similar story emerges from the per-student subsidy and expenditures per student results in Table 7. At the mean, there was a 36.4% increase in expenditures per student and a 32.0% increase in per-student subsidies at top 50 public schools. In the highly selective private sector,

[24] Per-student subsidies are the difference between total expenditures per student and total tuition revenues per student. Note in Table 7 the student-faculty ratios are relative to undergraduate enrollment while the subsidies are relative to total enrollment. Our measures of expenditures include only operating expenditures and do not include capital expenditures for land, buildings and equipment. Had we been able to include measures of the resources flows from capital, the gaps in total resources would likely exceed the gap in operating expenditures, as available evidence is clear in showing that capital expenditures grew more rapidly over this interval at private institutions than at public institutions (see, *Digest of Education Statistics*, 2000, Table 352).

expenditures per student rose by 66.1% and per-student subsidies increased by 59.7%. In contrast, mean per-student subsidies declined by 9.3% in non-top 50 public schools and declined by 5.4% in community colleges. Mean expenditures per student decreased by 5.7% in the non-top 50 public sector and rose slightly by 2.8% at community colleges, though median expenditures per student decreased by 3.7% in the 2-year sector. These per-student subsidy and expenditure changes are consistent with the importance of the supply-side of higher education in explaining completion rate declines because the sectors experiencing the largest reductions in resources were those that experienced the largest erosion in completion rates. These data suggest that the growth in the variance of resources per student among institutions of higher education, with a particularly prominent divergence between the most highly ranked public and private universities and public sector universities outside this elite group, can explain much of the divergence in collegiate outcomes by institution type.[25]

To understand the empirical relevance of this shift for completion rates, we employ the same multivariate re-weighting technique used in Sections 3.1 and 3.2.1., including student-faculty ratios and per-student subsidies in the weighting logits.[26] Re-weighting the NELS:88 completion rates using the distribution of resources in NLS72 gives a counterfactual estimate of what the completion rates would have been in the NELS:88 cohort if respondents had attended institutions with the same resource levels as respondents in NLS72. Results from this re-weighting exercise are presented in Table 8. We show results for the full sample and separately by school type. Furthermore, we conduct the re-weighting analysis using resources only, test

[25] This emphasis on the role of the "intensive" dimension of collegiate production is consistent with outcomes reported in Hoxby and Long (1999). These authors find unambiguous increases over time in the dispersion of resources per student across colleges, with these within-college changes accounting for a substantial portion of the increase in the variance in the return to collegiate attainment.

[26] Because per-student subsidies are highly correlated with expenditures per student, we include only the former in the re-weighting analysis. Results are similar if we employ per-student expenditures rather than subsidies.

scores and resources, test scores, background characteristics and resources, as well as test scores, background characteristics, initial school type and resources. While controlling for observable student characteristics helps alleviate the endogeneity of institutional resource levels, to the extent students of higher unobserved ability sort into higher-resource institutions, this exercise will overstate the effect of institutional resources on completion rates. Our results should therefore be interpreted as upper bounds of the true effect.

Table 8 shows re-weighting using institutional resource levels explains a good deal of the completion rate changes across the two surveys. For the full sample, resources alone explain 63.8% of the completion rate drop, while resource levels and test scores explain over 100% of the change. When including student background characteristics, re-weighting accounts for 65.5% of the completion rate drop, which increases to 91.4% when initial school types are included in the analysis.

The next 5 columns of Table 8 show re-weighting results separately by initial school type. For the public non-top 50 sample, while resources alone explain 91.9% of the change in completion rates across cohorts, including all student observable characteristics reduces the explained percent to 39.2. In the public 2-year sector, we find the opposite trend: changing resources across time account for 39.7% of the completion rate drop, while including background characteristics increases the explained percent to 69.0. Furthermore, we find resource changes at private universities and within public top 50 institutions explain a non-trivial fraction of the increase in completion rates within these sectors.[27] These results are consistent with the notion that changes in student resources between the two surveys, which occurred

[27] One might object to our use of both student-faculty ratios and per-student subsidies in the re-weighting analysis because these measures are likely highly correlated in the data. Panels B and C show results from re-weighting using each variable separately to address this issue. While results are largely similar across panels, student-faculty ratios have more power in explaining completion rate changes than per-student subsidies.

differentially across sectors, are an important factor in explaining the differential trends in completion rates observed across these sectors.

Given that our re-weighting analysis using resource levels may not resolve fully the endogeneity of school choice driven by student selection based on institutional resource levels, we consider other evidence linking changes in the completion rate to plausibly exogenous changes in the level of collegiate resources. Because states are the governmental level of control for public universities and state of residence determines access for in-state tuition and fees, we take advantage of within-state changes in the college-age population that generate variation in the level of public higher education subsidies per student. In short, absence of full adjustment of public subsidies means that relatively large cohorts face diluted resources per student at state colleges and universities in what Bound and Turner (2007) describe as "cohort crowding."

Regressing the state and birth cohort share of the population with at least some college attaining a BA degree on birth cohort size provides a reduced form indication of the effects of changes in resources per student on collegiate attainment; the basic approach parallels Bound and Turner (2007) though is distinguished in the focus on completion relative to college attendance. We employ data from the 1940-1975 birth cohorts using the 2000 decennial Census, which has the advantage of providing sufficient sample sizes for state-level observations while also measuring collegiate degree attainment. We include both state and year fixed effects and specify both the collegiate completion rates and the cohort size measures in logs, so the coefficients can be interpreted as elasticities of college completion with respect to cohort size. We also present specifications that include state-specific linear trends and population weights.

Our findings, presented in Table 9, show within-state increases in cohort size of 10% lead to declines in the share of BA recipients among those starting college of between 1.12% and

1.85%. The separate outcomes for men and women, shown in the final two rows of Table 9, are similar in magnitude, though slightly more pronounced for men than for women. Our results support the hypothesis that increases in the number of students attempting to enroll in colleges and universities, particularly in public institutions, reduce both the rate of college entry and the rate of completion conditional on college entry. Overall, the results using the Census data provide further evidence of the empirical relevance of supply-side constraints in determining completion rates.[28] Taken together with the results from Tables 7 and 8 that show the direct changes in resources across different types of institutions and the link to college completion, these results suggest that institutional adjustments to growth in the number of students pursuing a college degree may foster increased stratification, with an increasingly smaller portion of the student body receiving an increasingly larger fraction of the resources. The observed reductions in completion rates concentrated in the public sector of higher education are a consequence, to some degree, of this increased stratification.

Section 4. Discussion

Focusing analysis on the inter-cohort comparison afforded by NLS72 (the high school class of 1972) and NELS:88 (the high school class of 1992), declines in high school preparation – particularly among men – combine with reductions in resources per student at many colleges

[28] An alternative explanation is that changes in the demand for college may be reduced among relatively large cohorts if college preparation is also linked to cohort size. Two related concerns surface. First, relatively large cohorts may be distinguished by adverse demographic or economic shocks that have direct effects on collegiate attainment. For example, if big cohorts are distinguished by low parental education or large family size, such "compositional effects" might account for reduced college completion rather than crowding out on the supply side of the market. Secondly, membership in a relatively large birth cohort may dilute educational resources at the elementary and secondary levels, which would also reduce college preparedness. Bound and Turner (2007) present evidence that neither of these effects is likely to account for much of the association between cohort size and college completion rates. In particular, using Census data, they found, at best, only a modest association between cohort size and the demographic composition of the college age population. They also found only a very modest effect of cohort size on the college preparedness of high school graduates.

and universities to reduce college completion rates. By looking at the type of college at which individuals begin their postsecondary careers, it is clear the decrease in degree completion is largely concentrated among students beginning at non-top 50 public universities and two-year colleges. As such, the progression from college enrollment to BA receipt over the last three decades has become much more stratified as the differences in resources per student have grown both between sectors and within sectors.

We find increased enrollment among students from lower in the pre-collegiate math and reading test score distributions can explain about 50 percent of the drop in college completion rates. However, there has been a concurrent increase in the parental education level of college attendees across the two cohorts that substantially attenuates this measured effect. The drop in completion rates has not occurred equally across race and gender groups. We find large decreases among males but not females. Furthermore, while blacks experienced larger reductions in completion rates than whites, the completion probability of both groups dropped significantly between the two surveys. Among whites and for both men and women on average, changes in the distribution of test scores explain a significant portion of the drop in completion rates, but similar to the sample as a whole, the inclusion of background characteristics negates this effect. Among African Americans, the change in academic preparedness for college, as reflected in pre-collegiate test scores, explains much of the completion rate decline for men but not for women. This difference reflects the upward shift in the test score distribution among black women and the downward shift in test scores among black men across the two cohorts.

Our analysis also focuses on the supply-side of higher education, which has not received much attention in previous literature. Changes in resources per student, as measured by student-faculty ratios and per-student subsidies at the institution where a student begins college, account

for nearly 70 percent of the observed aggregate decline in the college completion rate. Similarly, we find the shift in the distribution of students' initial college, largely the shift away from non-top 50 publics and less selective privates to community colleges, explains a significant portion of the observed decrease in completion rates. Changes in resources per student also have some power in explaining declines in completion rates within the non-top 50 publics and community colleges.

We argue one reason for the importance of the initial institution type in explaining reductions in completion probabilities is the increased stratification across sectors that has occurred over the time period covered by our analysis. This increased stratification in resources is likely a response to demand shocks combined with increased market integration that has produced more differentiation, leading to declines in resources per students outside the selective public and private universities where rationing occurs through selective admissions. Thus, while "access" or initial college enrollment has increased dramatically over the past three decades, many of the new students drawn to higher education (likely to take advantage of the increased returns to a BA) are attending institutions with fewer resources and are not graduating. The mechanisms by which this is occurring, however, deserve more attention in future research.

That decreases in college completion rates are concentrated among students attending public colleges and universities outside the most selective few suggests a need for more attention to the budgets of these institutions from state appropriations and tuition revenues. These institutions may face tradeoffs between fulfilling an open access mission by increasing enrollment at low tuition with reduced resources per student and either raising tuition, which may reduce "access", or limiting enrollment in order to increase resources per student. In drawing attention to changes in the composition of students as well as the supply-side of the

market for higher education as partial explanations for declining completion rates, we emphasize that improving the understanding of the factors determining the level of collegiate attainment has substantial implications for the expected trend in the college wage premium and long-run economic growth.

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Table 1. Changes Over Time in Type of First Institution for All Attendees and For Those Obtaining a BA Within Eight Years of Cohort High School Graduation

	NLS72 Cohort			NELS:88 Cohort		
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Initial Institution Type	Percent of High School Graduates Attending College	Percent College Attendees	Percent Eight Year BA	Percent of High School Graduates Attending College	Percent College Attendees	Percent Eight Year BA
Total Four-Year Public	24.4	51.2	60.2	31.5	43.9	54.9
Non-top 50 Public	20.2	42.3	47.5	25.2	35.2	38.8
Top 50 Public	4.3	8.9	12.7	6.3	8.8	16.2
Total Four-Year Private	9.5	20.0	26.7	12.6	17.5	30.3
Less Selective Private	7.0	14.7	18.3	9.2	12.8	20.7
Highly Selective Private	2.5	5.3	8.5	3.4	4.8	9.6
Total Community College	13.8	28.8	13.1	27.7	38.5	14.8
Total	47.7	100	100	71.8	100	100

[1] Source: Authors' calculation from the NLS72 and NELS:88 surveys. NLS72 calculations were made using the fifth follow-up weights included in the survey. Fourth follow-up weights were used for the NELS:88 survey calculations. Only those participating in these follow-ups are included in the tabulations.

[2] The NLS72 and NELS:88 samples are restricted to those who attend college within 2 years of cohort high school graduation. Cohort high school graduation is defined as June 1972 for the NLS72 sample and June 1992 for the NELS:88 sample.

Table 2. College Completion Rates (in Percent) within 8 Years of Cohort High School Graduation for the Full Sample and by First Institution Attended

Sample	NLS72	NELS:88	Difference
Full Sample	51.1	45.3	-5.8**
			(1.6)
Initial Institution Type			
Total Four-Year Public	60.1	56.7	-3.4
			(2.2)
Non-top 50 Public	57.4	50.0	-7.4**
			(2.4)
Top 50 Public	72.7	83.7	10.9**
			(2.8)
Total Four-Year Private	68.4	78.3	9.8**
			(2.8)
Less Selective Private	63.6	73.4	9.8**
			(3.5)
Highly Selective Private	81.6	91.1	9.5**
			(3.0)
Total Community College	23.2	17.4	-5.8**
			(1.8)

[1] Source: Authors' calculation from the NLS72 and NELS:88 surveys. NLS72 calculations were made using the fifth follow-up weights included in the survey. Fourth follow-up weights were used for the NELS:88 survey calculations. Only those participating in these follow-ups are included in the tabulations.

[2] The NLS72 and NELS:88 samples are restricted to those who attend college within 2 years of cohort high school graduation. Cohort high school graduation is defined as June 1972 for the NLS72 sample and June 1992 for the NELS:88 sample.

[3] The difference between NELS:88 and NLS72 is in the final column. The standard error of this difference is in parentheses and is clustered at the high-school level, which is the primary sampling unit: ** indicates significance at the 5% level.

Table 3. Means of Selected NLS72 and NELS:88 Variables

	All College Attendees		College Graduates Who Obtain a BA With Eight Years of Cohort High School Graduation	
Variable	**NLS72**	**NELS:88**	**NLS72**	**NELS:88**
Reading Test Quartile				
Lowest	0.145	0.180	0.088	0.081
Second	0.212	0.229	0.173	0.162
Third	0.293	0.277	0.297	0.289
Highest	0.350	0.314	0.441	0.468
Math Test Quartile				
Lowest	0.112	0.162	0.059	0.037
Second	0.216	0.233	0.149	0.152
Third	0.266	0.280	0.251	0.288
Highest	0.406	0.325	0.541	0.522
Father's Education				
No HS Diploma	0.222	0.123	0.171	0.059
HS Diploma	0.262	0.307	0.222	0.207
Some College	0.242	0.216	0.248	0.219
BA	0.162	0.187	0.200	0.251
Graduate School	0.112	0.168	0.159	0.264
Mother's Education				
No HS Diploma	0.181	0.114	0.133	0.052
HS Diploma	0.391	0.348	0.368	0.261
Some College	0.267	0.249	0.283	0.262
BA	0.118	0.173	0.154	0.247
Graduate School	0.043	0.117	0.063	0.178
Parental Income				
<3000/<10000	0.040	0.067	0.024	0.031
6000/20000	0.070	0.108	0.048	0.061
7500/25000	0.070	0.077	0.067	0.062
10500/35000	0.200	0.134	0.188	0.101
15000/50000	0.270	0.213	0.267	0.200
15000+/50000+	0.350	0.400	0.406	0.544
Race/Ethnicity				
Asian	0.014	0.047	0.019	0.059
Hispanic	0.029	0.097	0.016	0.052
African American	0.093	0.109	0.073	0.073
White	0.858	0.738	0.890	0.812
Native American	0.006	0.008	0.003	0.003
Male	0.509	0.482	0.523	0.453
Number of Observations	7107	8417	4284	4179

[1] Source: Authors' tabulations from the NELS:88 and NLS72 surveys. Standard deviations are in parentheses. NLS72 calculations were made using the fifth follow-up weights included in the survey. Fourth follow-up weights were used for the NELS:88 survey calculations. Only those participating in these follow-ups are included in the tabulations.

[2] The NLS72 and NELS:88 samples are restricted to those who attend college within 2 years of cohort high school graduation. Cohort high school graduation June 1972 in NLS72 and June 1992 in NELS:88.

[3] Parental income in NLS72 and NELS:88 are given in discrete ranges in both surveys. We group the income ranges into 6 income categories in each survey that correspond to the same real income across surveys using the CPI. In NLS72, the real income ranges are less than $3,000, $3000-$6000, $6001-$7500, $7501-$10500, $10501-$15000, and greater than $15000. In NELS:88, the real income ranges are less than $10,000, $10000-$20000, $20001-$25000, $25001-$35000, $35001-$50000, and greater than $50000.

Table 4. College Attendance and Graduation Rates (in Percent), by Math and Reading Test Quartiles

Panel A: Math Test Quartiles				
	College Attendance Rate of All High School Graduates			
Survey	Bottom Quartile	Second Quartile	Third Quartile	Top Quartile
NLS72	21.2	38.0	54.9	79.4
NELS:88	46.4	66.9	80.5	93.3
	Eight-year College Completion Rate of All High School Graduates			
Survey	Bottom Quartile	Second Quartile	Third Quartile	Top Quartile
NLS72	6.1	14.0	27.4	55.0
NELS:88	5.0	19.9	38.0	68.3
	Eight-year College Completion Rate of All College Attendees			
Survey	Bottom Quartile	Second Quartile	Third Quartile	Top Quartile
NLS72	26.6	35.3	48.4	68.1
NELS:88	10.4	29.6	46.6	72.9
Panel B: Reading Test Quartiles				
	College Attendance Rate			
Survey	Bottom Quartile	Second Quartile	Third Quartile	Top Quartile
NLS72	24.7	41.9	55.9	73.4
NELS:88	51.5	65.7	79.5	90.3
	Eight-year College Completion Rate of All High School Graduates			
Survey	Bottom Quartile	Second Quartile	Third Quartile	Top Quartile
NLS72	8.0	18.2	29.8	48.2
NELS:88	10.6	21.2	38.0	61.4
	Eight-year College Completion Rate of All College Attendees			
Survey	Bottom Quartile	Second Quartile	Third Quartile	Top Quartile
NLS72	31.2	41.6	51.9	64.4
NELS:88	20.3	32.1	47.3	67.5

[1] Source: Authors' tabulations from the NELS:88 and NLS72 surveys. NLS72 calculations were made using the fifth follow-up weights included in the survey. Fourth follow-up weights were used for the NELS:88 survey calculations. Only those participating in these follow-ups are included in the tabulations.

[2] The NLS72 and NELS:88 samples for the college attendance rate and college graduation rate are restricted to those who graduate from high school at the time of their cohort's high school graduation. The NLS72 and NELS:88 samples for the college completion rate are restricted to those who attend college within two years of their cohort's high school graduation. Cohort high school graduation is defined as June 1972 for the NLS72 sample and June 1992 for the NELS:88 sample.

[2] Eight-year college graduation rates refer to the proportion of high school graduates who obtain a BA within 8 years of their cohort's high school graduation. College completion rates refer to the proportion of those who enroll in college who obtain a BA within 8 years of their cohort's high school graduation.

Table 5. Multivariate Re-weighting of NELS:88 Completion Rates (in Percent) using NLS72 Individual Background Characteristics for the Full Sample and by Initial School Type

Cohort	Full Sample	Public 4-Yr Non Top 50	Public 4-Yr Top 50	Private 4-Yr Less Selective	Private 4-Yr Highly Selective	Community College
NLS72	51.1	57.4	72.7	63.6	81.6	23.2
NELS:88	45.3	50.0	83.7	73.4	91.1	17.4
NELS:88 Re-weighted Using Test Scores	49.5	53.2	82.0	72.5	89.7	20.9
NELS:88 Re-weighted Using All Observables	45.0	48.8	79.3	69.6	85.9	20.1
NELS:88 Re-weight Using Initial School Type	49.2					
NELS:88 Re- weight Using Initial School Type & Background Characteristics	48.1					

[1] Source: Authors' calculations as described in the text from the NLS72 and NELS:88 surveys. NLS72 calculations were made using the fifth follow-up weights included in the survey. Fourth follow-up weights were used for the NELS:88 survey calculations. Only those participating in these follow-ups are included in the regression.

[2] The NLS72 and NELS:88 samples are restricted to those who attend college within 2 years of cohort high school graduation. Cohort high school graduation is defined as June 1972 for the NLS72 sample and June 1992 for the NELS:88 sample.

[3] School type samples refer to first institution attended.

Table 6. Multivariate Re-weighting of NELS:88 Completion Rates (in Percent) using NLS72 Individual Background Characteristics, by Race and Gender

Cohort	Male	Female	White	Black	Black Men	Black Women
NLS72	52.5	49.7	53.0	40.0	37.1	41.6
NELS:88	42.6	47.9	49.9	30.4	25.6	34.0
Difference	-9.9	-1.8	-3.1	-9.6	-11.5	-7.7
	(1.2)	(1.8)	(0.9)	(2.6)	(4.2)	(3.4)
NELS:88 Re-weighted Using Test Scores	48.7	49.7	53.4	28.3	29.2	24.2
NELS:88 Re-weighted Using All Observables	43.1	46.6	48.6	23.7	19.6	28.1
NELS:88 Re-weighted Using Initial School Type	47.6	50.6	53.7	33.2	30.2	35.6
NELS:88 Re-weighted Using Initial School Type & Background Characteristics	46.8	49.0	51.7	27.4	24.5	28.5

[1] Source: Authors' calculations as described in the text from the NLS72 and NELS:88 surveys. NLS72 calculations were made using the fifth follow-up weights included in the survey. Fourth follow-up weights were used for the NELS:88 survey calculations. Only those participating in these follow-ups are included in the tabulations.

[2] The NLS72 and NELS:88 samples are restricted to those who attend college within 2 years of cohort high school graduation. Cohort high school graduation is defined as June 1972 for the NLS72 sample and June 1992 for the NELS:88 sample.

[3] The standard errors of the difference between NELS:88 and NLS72 are given in parentheses and are clustered at the high school level, which is the primary sampling unit.

Table 7. Undergraduate Student-Faculty Ratios and Total Expenditures Per Student and Per-Student Subsidies, by Initial School Type

Panel A: Full Sample

	Student-Faculty Ratios					Expenditures Per Student		Per-Student Subsidy	
		Percentile							
Survey	Mean	25th	50th	75th	90th	Mean	Median	Mean	Median
NLS72	20.8	15.1	18.3	23.1	31.5	$16,360	$13,262	$12,283	$9,043
NELS:88	34.7	18.3	25.4	48.7	69.8	$18,151	$11,729	$13,058	$7,656

Panel B: Public 4-Year Non-top 50

	Student-Faculty Ratios					Expenditures Per Student		Per-Student Subsidy	
		Percentile							
Survey	Mean	25th	50th	75th	90th	Mean	Median	Mean	Mean
NLS72	19.8	16.2	18.9	22.0	26.6	$16,952	$14,178	$13,509	$11,451
NELS:88	28.0	20.0	23.6	30.7	43.2	$16,041	$13,007	$12,257	$9,794

Panel C: Public 4-Year Top 50

	Student-Faculty Ratios					Expenditures Per Student		Per-Student Subsidy	
		Percentile							
Survey	Mean	25th	50th	75th	90th	Mean	Median	Mean	Median
NLS72	16.4	14.5	15.8	17.4	21.3	$27,538	$26,937	$23,908	$23,626
NELS:88	17.2	14.8	17.1	19.2	20.5	$37,563	$31,692	$31,570	$26,192

Panel D: Private 4-Year Less Selective

	Student-Faculty Ratios					Expenditures Per Student		Per-Student Subsidy	
		Percentile							
Survey	Mean	25th	50th	75th	90th	Mean	Median	Mean	Median
NLS72	18.9	14.9	16.7	20.8	27.2	$17,775	$16,438	$8,677	$6,362
NELS:88	23.3	15.3	19.6	25.1	36.1	$21,434	$18,908	$10,304	$7,864

Panel E: Private 4-Year Highly Selective

	Student-Faculty Ratios					Expenditures Per Student		Per-Student Subsidy	
		Percentile							
Survey	Mean	25th	50th	75th	90th	Mean	Median	Mean	Median
NLS72	12.6	10.0	12.7	15.2	19.0	$39,552	$28,983	$27,799	$15,109
NELS:88	12.0	9.6	11.7	14.0	17.3	$65,705	$51,082	$44,383	$25,748

Panel F: 2-Year

	Student-Faculty Ratios					Expenditures Per Student		Per-Student Subsidy	
		Percentile							
Survey	Mean	25th	50th	75th	90th	Mean	Median	Mean	Median
NLS72	25.8	15.9	22.7	31.1	47.3	$7,001	$6,338	$5,946	$5,204
NELS:88	53.6	37.3	55.6	68.3	82.5	$7,196	$6,105	$5,626	$4,925

Source: Authors' calculations as described in the text from the NLS72 and NELS:88 surveys. NLS72 calculations were made using the fifth follow-up weights included in the survey. Fourth follow-up weights were used for the NELS:88 survey calculations. Only those participating in these follow-ups are included in the regression. Data on faculty, enrollment, expenditures and revenues are from the HEGIS/IPEDS surveys from the Department of Education. Per-student subsidies are total expenditures per student minus total tuition revenue per student. All financial figures are in real $2007 and are deflated by the Higher Education Price Index (HEPI).

Table 8. Multivariate Re-weighting of NELS:88 Completion Rates (in Percent) using NLS72 Individual Background Characteristics and School-Level Resources for the Full Sample and by Initial School Type

Cohort	Full Sample	Public 4-Yr Non Top 50	Public 4-Yr Top 50	Private 4-Yr Less Selective	Private 4-Yr Highly Selective	Community College
NLS72	51.1	57.4	72.7	63.6	81.6	23.2
NELS:88	45.3	50.0	83.7	73.4	91.1	17.4
Panel A: Re-Weights Using Student/Faculty Ratios and Per-Student Subsidies						
NELS:88 Re-weighted Using Resources	49.0	56.8	84.0	75.0	89.9	19.7
NELS:88 Re-weighted Test Scores and Resources	53.4	56.9	83.1	74.0	88.3	22.4
NELS:88 Re-weight Using Background Characteristics, Test Scores and Resources	49.1	52.9	80.7	71.3	85.9	21.4
NELS:88 Re-weight Using Background Characteristics, Test Scores, Resources and Initial School Type	50.6					
Panel B: Re-Weights Using Student/Faculty Ratios Only						
NELS:88 Re-weight Using Test Scores and Resources	54.4	57.3	83.1	74.6	88.4	22.2
Panel C: Re-Weights Using Per-Student Subsidies Only						
NELS:88 Re-weight Using Test Scores and Resources	50.3	55.2	81.0	73.5	88.1	23.0

[1] Source: Authors' calculations as described in the text from the NLS72 and NELS:88 surveys . NLS72 calculations were made using the fifth follow-up weights included in the survey. Fourth follow-up weights were used for the NELS:88 survey calculations. Only those participating in these follow-ups are included in the regression. School type samples refer to first institution attended.

[2] The NLS72 and NELS:88 samples are restricted to those who attend college within 2 years of cohort high school graduation. Cohort high school graduation is defined as June 1972 for the NLS72 sample and June 1992 for the NELS:88 sample.

[3] Data on faculty, enrollment, expenditures and revenues are from the HEGIS/IPEDS surveys from the Department of Education. Per-student subsidies are total expenditures per student minus total tuition revenue per student. All financial figures are in real $2007 and are deflated by the Higher Education Price Index (HEPI).

Table 9. State-level Estimates of the Effect of Crowding on Completion Rates, 1940-1975 Birth Cohorts Observed in the 2000 U.S. Census

Independent Variable: Log of State Birth Cohort Population				
Dependent Variable: ln (BA / Some College)	**Un-weighted**		**Weighted**	
All	-0.112**	-0.165**	-0.125**	-0.185**
	(0.019)	(0.045)	(0.023)	(0.034)
Males	-0.120**	-0.230**	-0.137**	-0.191**
	(0.026)	(0.072)	(0.022)	(0.057)
Females	-0.101**	-0.104	-0.109**	-0.177**
	(0.021)	(0.063)	(0.030)	(0.037)
State-Specific Trends?	No	Yes	No	Yes

[1] Source: 1940-1975 birth cohorts of non-immigrants from the 2000 U.S. Census. Each table entry reflects a separate regression. Each regression includes 1728 state x year cells.

[2] All regressions are at the state level and include state and birth cohort fixed effects. Alaska, Hawaii, and Washington, DC are excluded from the analysis.

[3] Standard errors are in parentheses and are clustered at the state level: ** indicates significance at the 1% level and * indicated significance at the 5% level.

[4] Weighted regressions are weighted with the average cohort size in each state across the 1940-1975 birth cohorts.

Appendix Table 1. Means of Selected NLS72 and NELS:88 Variables, by Initial School Type

	Public Non-top 15		Public Top 15		Private Less Selective		Private Highly Selective		Community College	
Variable	**NLS72**	**NELS:88**	**NLS72**	**NELS:88**	**NLS72**	**NELS:88**	**NLS72**	**NELS:88**	**NLS72**	**NELS:88**
Lowest Reading Quartile	0.136	0.160	0.056	0.045	0.133	0.104	0.043	0.027	0.209	0.272
Second Reading Quartile	0.195	0.220	0.167	0.120	0.203	0.201	0.138	0.102	0.270	0.289
Third Reading Quartile	0.303	0.300	0.277	0.288	0.297	0.271	0.233	0.171	0.292	0.268
Highest Reading Quartile	0.366	0.320	0.500	0.547	0.368	0.424	0.586	0.700	0.228	0.171
Lowest Math Quartile	0.106	0.138	0.035	0.017	0.088	0.077	0.030	0.000	0.174	0.265
Second Math Quartile	0.205	0.217	0.125	0.111	0.182	0.197	0.093	0.036	0.301	0.312
Third Math Quartile	0.259	0.308	0.240	0.214	0.308	0.294	0.237	0.163	0.268	0.281
Highest Math Quartile	0.431	0.337	0.601	0.658	0.422	0.431	0.640	0.801	0.257	0.143
Father -- No HS Diploma	0.236	0.118	0.114	0.046	0.190	0.073	0.097	0.047	0.273	0.170
Father -- HS Diploma	0.261	0.313	0.217	0.198	0.241	0.220	0.170	0.064	0.307	0.385
Father – Some College	0.248	0.229	0.213	0.173	0.235	0.216	0.271	0.116	0.239	0.227
Father -- BA	0.153	0.194	0.273	0.236	0.206	0.253	0.201	0.315	0.110	0.131
Father -- Graduate School	0.102	0.146	0.184	0.347	0.128	0.238	0.261	0.458	0.070	0.087
Mother -- No HS Diploma	0.190	0.112	0.098	0.031	0.153	0.063	0.080	0.017	0.225	0.163
Mother -- HS Diploma	0.403	0.342	0.334	0.234	0.352	0.295	0.284	0.103	0.432	0.427
Mother – Some College	0.270	0.264	0.328	0.248	0.270	0.247	0.309	0.204	0.235	0.241
Mother -- BA	0.098	0.169	0.183	0.278	0.182	0.250	0.227	0.344	0.074	0.105
Mother -- Graduate School	0.039	0.112	0.056	0.209	0.042	0.145	0.100	0.330	0.034	0.064
Income <3000/<10000	0.042	0.063	0.027	0.035	0.049	0.044	0.025	0.020	0.040	0.092
Income 6000/20000	0.073	0.121	0.048	0.046	0.055	0.094	0.040	0.013	0.086	0.126
Income 7500/25000	0.073	0.081	0.060	0.074	0.071	0.058	0.025	0.032	0.076	0.086
Income 10500/35000	0.211	0.144	0.135	0.073	0.179	0.104	0.127	0.050	0.229	0.160
Income 15000/50000	0.270	0.215	0.257	0.144	0.266	0.223	0.202	0.139	0.287	0.233
Income 15000+/50000+	0.331	0.375	0.472	0.628	0.380	0.477	0.582	0.746	0.281	0.302
Asian	0.009	0.038	0.028	0.076	0.008	0.047	0.018	0.087	0.018	0.044
Hispanic	0.023	0.087	0.016	0.056	0.010	0.065	0.018	0.056	0.053	0.131
African American	0.106	0.145	0.042	0.058	0.110	0.127	0.055	0.024	0.089	0.093
White	0.856	0.723	0.908	0.806	0.869	0.757	0.901	0.833	0.834	0.718
Native American	0.005	0.006	0.006	0.003	0.003	0.004	0.009	0.000	0.007	0.014
Male	0.510	0.469	0.523	0.508	0.485	0.421	0.603	0.504	0.496	0.505
Number of Observations	3041	2940	716	809	1035	1097	416	552	1899	3020

[1] Source: Authors' tabulations from the NELS:88 and NLS72 surveys. Standard deviations are in parentheses. NLS72 calculations were made using the fifth follow-up weights included in the survey. Fourth follow-up weights were used for the NELS:88 survey calculations. Only those participating in these follow-ups are included in the tabulations.

[2] The NLS72 and NELS:88 samples are restricted to those who attend college within 2 years of cohort high school graduation. Cohort high school graduation is defined as June 1972 for the NLS72 sample and June 1992 for the NELS:88 sample.

[3] Parental income in NLS72 and NELS:88 are given in discrete ranges in both surveys. We group the income ranges into 6 income categories in each survey that correspond to the same real income across surveys using the CPI. In NLS72, the real income ranges are less than $3,000, $3000-$6000, $6001-$7500, $7501-$10500, $10501-$15000, and greater than $15000. In NELS:88, the real income ranges are less than $10,000, $10000-$20000, $20001-$25000, $25001-$35000, $35001-$50000, and greater than $50000.

Appendix Table 2: Completion Rates (in Percent) and Completion Rate Re-Weights by Race and Gender and by Initial School Type

Panel A: Public Non-Top 50

Cohort	Male	Female	White	Black
NLS72	56.6	52.5	59.2	49.1
NELS:88	47.2	58.2	55.8	30.7
NELS:88 Re-weighted Using Test Scores	51.5	54.0	58.4	29.4
NELS:88 Re-weighted Using All Observables	48.2	51.7	54.7	24.5

Panel B: Public Top 50

Cohort	Male	Female	White	Black
NLS72	73.0	72.5	72.8	62.2
NELS:88	79.4	88.1	85.3	71.9
NELS:88 Re-weighted Using Test Scores	81.3	88.1	85.9	71.6
NELS:88 Re-weighted Using All Observables	79.3	86.2	83.2	73.5

Panel C: Private Less Selective

Cohort	Male	Female	White	Black
NLS72	65.8	61.5	65.5	49.2
NELS:88	72.9	73.8	78.0	62.9
NELS:88 Re-weighted Using Test Scores	75.9	74.7	80.0	60.9
NELS:88 Re-weighted Using All Observables	74.9	75.2	77.5	58.0

Panel D: Private Highly Selective

Cohort	Male	Female	White	Black
NLS72	83.7	78.5	83.1	50.2
NELS:88	89.1	93.1	91.6	78.8
NELS:88 Re-weighted Using Test Scores	90.4	93.0	91.8	77.8
NELS:88 Re-weighted Using All Observables	84.3	93.2	89.1	90.5

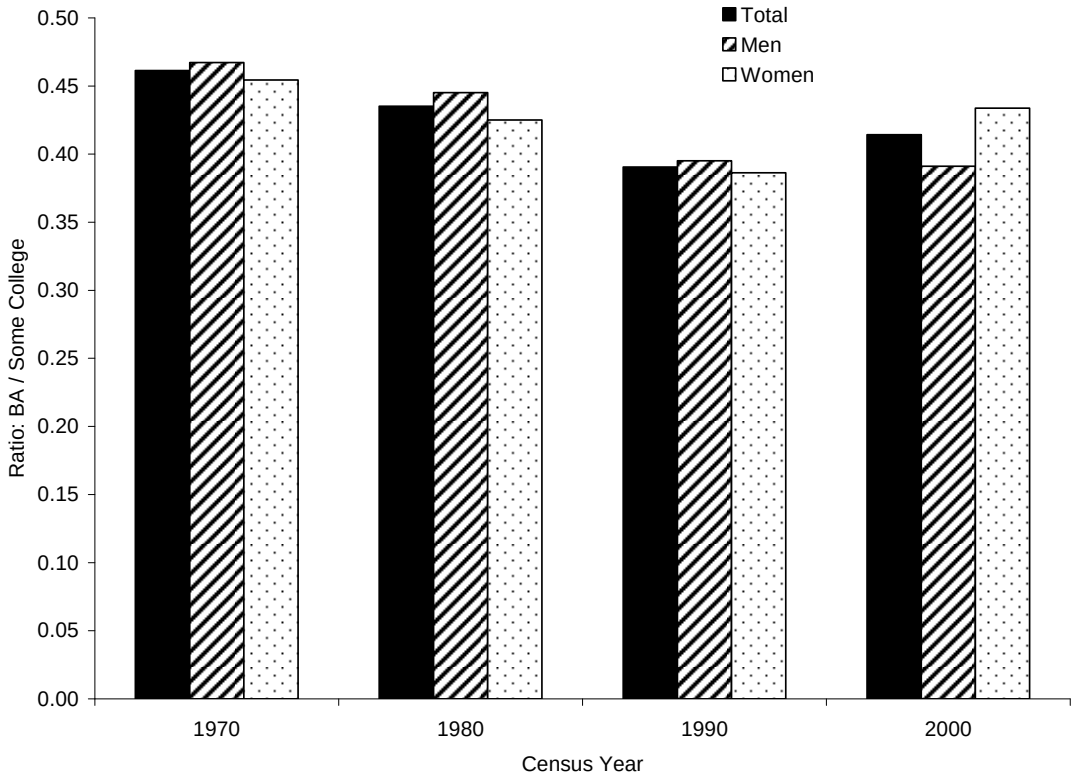
Panel E: Community College					
Cohort	**Male**	**Female**		**White**	**Black**
NLS72	25.9	20.5		24.4	13.6
NELS:88	16.1	18.7		19.5	8.0
NELS:88 Re-weighted Using Test Scores	18.7	19.5		21.3	7.1
NELS:88 Re-weighted Using All Observables	16.3	19.8		20.2	9.80

[1] Source: Authors' calculations as described in the text from the NLS72 and NELS:88 surveys. NLS72 calculations were made using the fifth follow-up weights included in the survey. Fourth follow-up weights were used for the NELS:88 survey calculations. Only those participating in these follow-ups are included in the tabulations.

[2] The NLS72 and NELS:88 samples are restricted to those who attend college within 2 years of cohort high school graduation. Cohort high school graduation is defined as June 1972 for the NLS72 sample and June 1992 for the NELS:88 sample.

[3] School type samples refer to first institution attended.

Figure 1. Trends in the Ratio of BA recipients to those with Some College or More



Source: Authors' calculation from Integrated Public Use Microdata Series: Version 3.0 [Machine-readable database http://usa.ipums.org/usa/] Following Jaeger (1997) 74.5% of those who attended but did not complete the 13th year of schooling are allocated to the "Some College" category for 1970 and 1980 when educational attainment was reported in terms of completed years of schooling.