# Online Appendix
# College Quality and Attendance Patterns: A Long-Run View

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# Online Appendices: Not for Publication

# A National Longitudinal Survey of Youth Details

This appendix describes the 1979 National Longitudinal Survey of Youth (NLSY79) data used to replicate the historical studies (Bureau of Labor Statistics, 1979-2016). Our sample of NLSY79 respondents is obtained by taking the universe of respondents (including the supplementary oversamples) and first dropping individuals with missing data on birth year, Armed Forces Qualifying Test (AFQT) score, or those who have not completed high school by May 1 of the year following their 19th birthday.

We measure family background using either income or socioeconomic status (SES). In the case of income, we use total net family income during the calendar year the respondent turned age 18. If individuals are missing the income variable for this year, but at least two other observations of the same variable are available, then we impute family income by regressing total net family income on the child's age and interpolating or extrapolating to age 18. If income data is missing and cannot be imputed, then we drop those individuals. All income variables are inflation adjusted to 1978 dollars.

We measure socioeconomic status by creating an index from parental income, mother's and father's years of education, and father's occupation. Our index closely follows the procedure of Herrnstein and Murray (1994), Appendix 2. Parental income is average net family income in 1978 and 1979 if both are available, or in 1978 if only it is available. If neither is available, then we impute income in 1978 as described above. Each parent's education is measured as the highest grade completed. For father's occupation, we take Duncan's socioeconomic index score associated with the three-digit occupation code as shown in the NLSY79 codebook supplement. For each of these variables, we calculate a z-score and construct an SES index as an equally weighted average of all non-missing z-scores. We prefer this approach over principal component analysis because it allows us to include more students who are otherwise dropped because they miss some components of the index. Nonetheless, we have verified that we obtain similar results if we measure socioeconomic status as the first principal component extracted from the same four variables.

As with other studies, estimates of sorting by family background $\beta_p$ are stronger if we use indices of socioeconomic status as compared to family income. We adjust for the level difference between the two in all replications, just as we do in the main analysis (see Section 2). For the NLSY79, the conditional estimate of $\beta_p$ is 0.30 lower when using family income,

while the unconditional estimate is 0.42 lower.

We measure student ability using either standardized test score or class rank. In the former case, we take the respondent's percentile score on the AFQT. In the latter case, we compute the class rank percentile from the respondent's rank in class and the class size, both of which come from the NLSY transcript survey.

We measure college attendance as either prospective or actual attendance. For prospective attendance, we utilize responses to the survey question that reads: "As things now stand, what is the highest grade or year you think you will actually complete?" This question was asked in 1979, 1981, and 1982. We check responses up to age 20 and count individuals as planning to attend college if they answer more than 13 years (i.e., completing at least one year of college). For actual attendance, we utilize the longitudinal aspect and check each respondent's highest grade completed for the requisite number of years following their 19th birthday. Individuals are counted as attending if they complete at least 13 years of education.

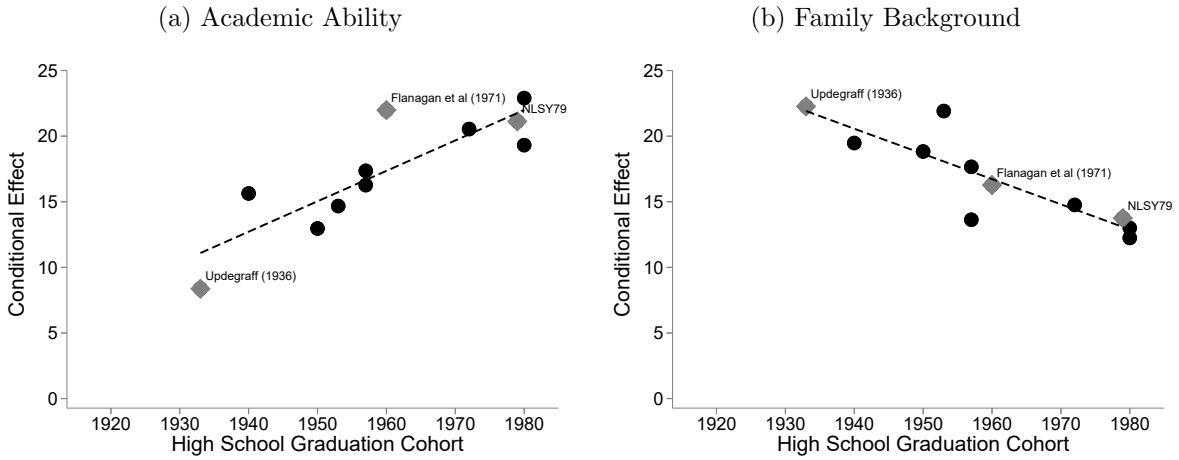
Finally, when calculating the college attendance rates, we weight the individual observations. In each case, we obtain custom weights corresponding to the survey years that we use for that particular replication. For example, replicating a historical study with a seven-year follow-up to check college attendance would require six years of additional data compared to a replication that used a one-year follow-up. Custom weights are obtained from the NLSY79 at https://www.nlsinfo.org/weights/nlsy79.

# B Additional Empirical Results

This appendix contains extra figures with empirical results and robustness checks. Figure B1 is similar to Figure 2 in the text. The only difference is in how we estimate $\beta_s$ and $\beta_p$. In the baseline analysis, we regress $C(s,p)$ on the midpoint of the percentile range of $s$ and $p$, which treats college-going as a linear function of the percentile of test score. For Figure B1 we instead regress $C(s,p)$ on the inverse normal CDF of the midpoint of the percentile range. For example, if college-going is reported by quartile, the former uses $(0.125, 0.375, 0.625, 0.875)$ while the latter uses $(\Phi^{-1}(0.125), \Phi^{-1}(0.375), \Phi^{-1}(0.625), \Phi^{-1}(0.875))$. Doing so does not substantially alter the underlying trends.

Figure B2 shows the trend in sorting by family background separately for studies that use family income or an index of socieconomic status to measure family background. The

**Figure B1: Changing Patterns of College Attendance: Standard Normalized Variables**




two suggest similar trends, whether measuring the conditional effect (after controlling for academic ability, as in Figure 2) or the unconditional effect (as in Figure 3). There is a clear level difference between the two. We adjust for this level difference in all other figures and tables in the paper.

**Figure B2: Changes in Patterns of College Attendance by Family Background Measure**

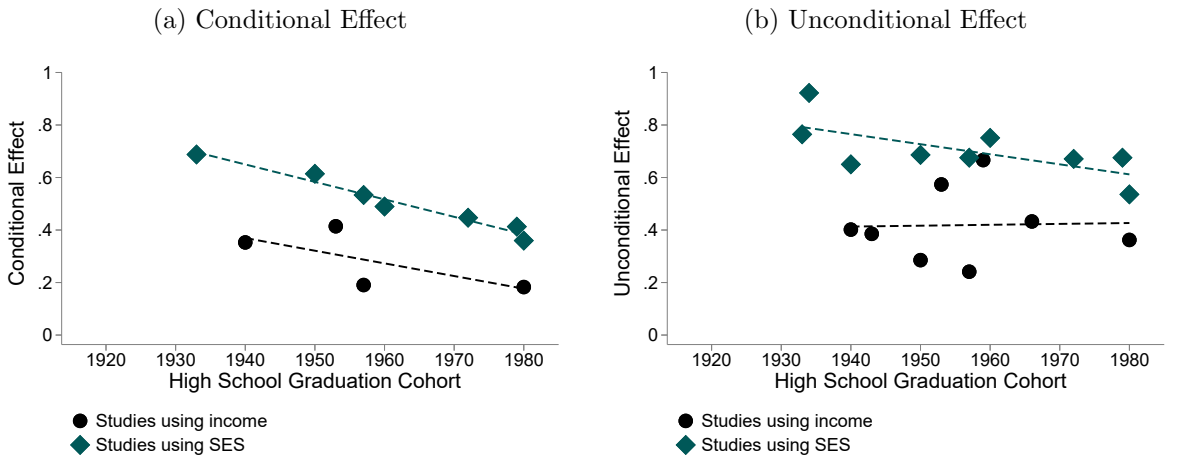
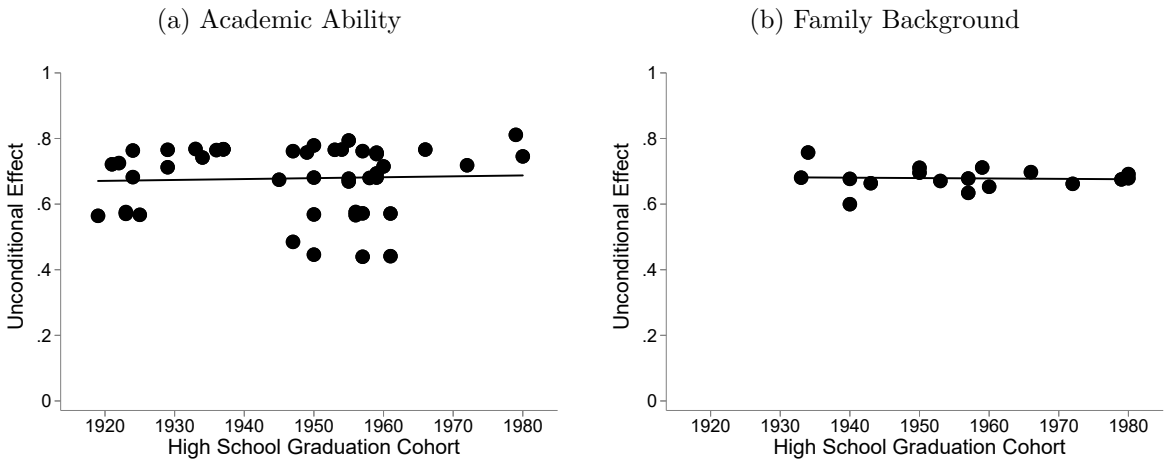



Figure B3 is the companion to Figure 5; it shows what happens if we replicate only the unconditional study results within the NLSY79 and plot the time series. As with Figure 5,

there is no discernible time trend, suggesting that study design details do not systematically bias our results.

**Figure B3: Counterfactual Changes in Patterns of College Attendance**




# C Changes in College and College Financing

This appendix summarizes some of the relevant history of college financing and changes in the nature of college.

## C.1 College Attendance

Figure 6 in the text showed the time series of college attendance taken from aggregate educational records. Figure C1 shows the same information using data from the U.S. Census Bureau, taken from Ruggles et al. (2010). Using the census has two advantages. First, we can measure the high school graduation rate consistently over time. Second, we can consistently measure the rate of high school graduation and college entry by high school graduation cohort, whereas enrollment-based statistics may misdate students who graduated or start college after a delay.

The U.S. Census has used two educational attainment questions over time; we explore each. In the 1980 census, respondents were asked about their years of schooling. We define the high school graduation rate as the fraction of each high school graduation cohort (birth

year plus 18) that had 12 or more years of schooling. Similarly, we define the college entry rate as the fraction of those with 12 or more years of schooling that had 13 or more years of schooling. In the 1990 census, respondents were asked about their highest educational attainment. We define the high school graduation rate as the fraction of each cohort with a high school diploma or GED, and the college entry rate as the fraction of high school graduates with some college. These two questions show very similar patterns overall.

**Figure C1: College Attendance: Census Data**

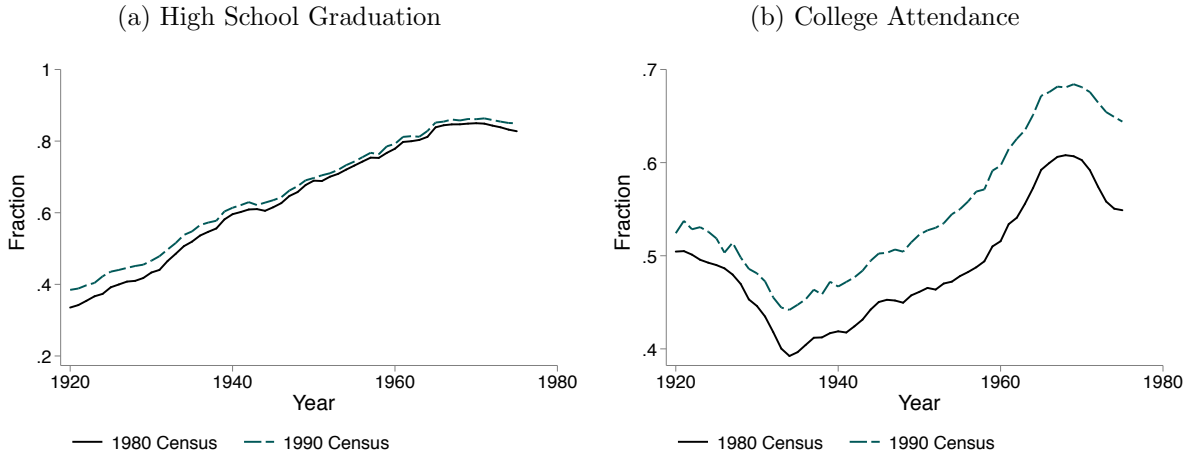



Figure C1a shows that high school graduation rates rose almost uniformly from the 1920 to the 1970 cohorts, from 40 to 90 percent, where it leveled off. This figure motivates us to explore the importance of allowing for time-varying composition of high school graduates in Section 6.1. Figure C1b shows the fraction of high school graduates that attempted college. It looks very similar to Figure 6b constructed from enrollment data, except that the drop and increase in college entry from the Great Depression through the 1950s is more pronounced.

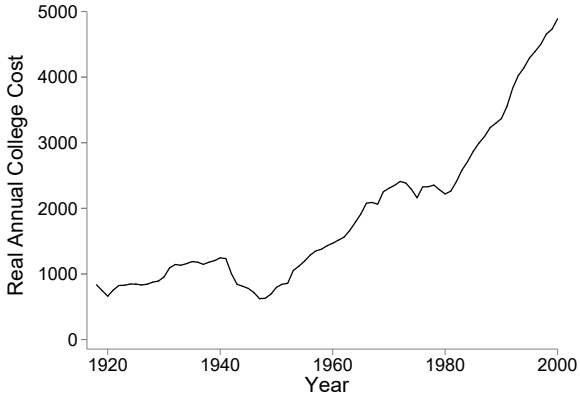
## C.2 College Cost

We list several mechanisms that may in turn have explained the rise in college attendance. One is the decline in relative college costs after World War II. We present the details here. Our approach follows Donovan and Herrington (2019), which contains data sources and details. College cost is measured as the total tuition revenue of public colleges and universities divided by total enrollment at the same colleges and universities. This series

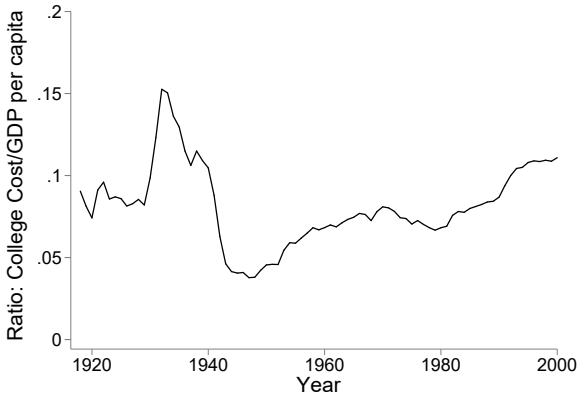
has two desirable properties. First, tuition revenue is an improvement on reported tuition because it accounts for any grants or other financial aid provided by the university. Second, we focus on public universities because our paper is about access to college. We have little to say about the separate question of why some students choose to pay a higher price in order to attend private colleges.

**Figure C2: College Cost Time Series**

(a) CPI Adjusted




(b) Relative to GDP per capita




We consider two methods of converting the nominal cost series to real, both of which are shown in Figure C2. Figure C2a shows the real tuition cost, adjusted to constant 2010 dollars using the Consumer Price Index (CPI) (Bureau of Labor Statistics, 1913-2019) The inflation-adjusted cost of college showed no trend between 1920 and 1950, but started rising afterwards. Annual inflation was 2.4% from 1960–1979 and 3.7% from 1980–2000. Figure C2b shows the ratio of college costs to GDP per capita, which we take to be a measure of college affordability. College affordability was similar in the 1920s and the 1990s, but with dramatic swings between. College cost by this metric bottoms out at 3.8% in the 1950s, precisely during the period of the reversal; Harris (1962) notes that "college instruction became a bargain item." Low college costs were in part a matter of public policy, as policy-makers limited the rate of tuition rises in most states (Harris, 1962). Notably, these cost data *exclude* direct tuition payments to colleges for veterans under the G.I. Bill, which we discuss in the next section. Although costs subsequently rose modestly, the large increases in costs happen after 1980.

**Table C1: Federal Role in College Financing Pre-1958**

| | Year | | | | |
|---|---|---|---|---|---|
| | 1919–1920 | 1929–1930 | 1939–1940 | 1947–1948 | 1957–1958 |
| Federal gov. share of college income | 7.4 | 4.3 | 6.7 | 34.1 | 18.9 |
| Veterans' tuition and fees | 0.0 | 0.0 | 0.0 | 23.6 | 0.1 |
| Other | 7.4 | 4.3 | 6.9 | 10.5 | 18.8 |

*Note:* Share measured as receipts from federal government relative to educational and general income of colleges. Data above taken from the 1956–1958 *Biennial Survey of Education*, "Historical Summary of Higher Education Finance Statistics."

## C.3 Federal Support for College

We now turn to the changing role of the federal government in college financing. We focus on the federal government because most state and local government support for colleges takes the form of direct budget support. This form of support affects the tuition that (especially public) universities charge students, but we have already accounted for this in our cost of college series above. The main point of this section is to show that most federal support for colleges worked similarly before 1960. Direct federal support for students through loans and grants, which are not accounted for in our cost series, became widespread only after the mid-1960s. This fact implies that it cannot explain the changes we observe between 1933 and 1960 and leads us to abstract from changes in college financing in the model.

Table C1 summarizes federal financial involvement in higher education through 1958. Prior to World War II, the federal government provided little income to college, accounting for less than 10 percent of the educational and general income collected by institutions of higher education. This funding was generally directed toward specific non-instructional activities, such as support for agricultural research (Conlan, 1981). Federal funding increased after World War II, but it remained tied to research programs. The main exception was a large but short-lived spike associated with the GI Bills, particularly the one following World War II.

The available evidence does suggest that the maximal effects of the GI Bill were large for men; both Stanley (2003) and Bound and Turner (2002) estimate that veterans in peak cohorts increased attendance by roughly 20–50 percent. However, this effect was confined to male veterans of a narrow range of cohorts, roughly the "high school graduation" cohorts of 1941–1946 (although not all graduated high school). Those born earlier were too old to have been affected; those born later were more strongly influenced by the Korean War. The Korean War policies changed incentives by allowing drafted men to defer service to attend college, making college a substitute for rather than a complement to service in the armed

**Table C2: Federal Role in College Financing Post-1958**

| | Year | | | |
|---|---|---|---|---|
| | 1959–1960 | 1969–1970 | 1979–1980 | 1999–2000 |
| Real spending per pupil for aid (2010 $) | 703 | 2,361 | 2,672 | 4,545 |
| Share of aid designated "general" | 0.28 | 0.48 | 0.68 | 0.95 |
| Share of aid in form of loans | 0.15 | 0.39 | 0.40 | 0.70 |

*Note:* Spending figure for 1960 from the 1965 edition of the U.S. Census Bureau (various years); for remaining years, they are from College Board (various years). Federal aid spending is deflated by the CPI to 2010 dollars. The second row gives the share of aid that is general, meaning available to all students rather than specific subpopulations such as veterans. The third row gives the share available as loans (Perkins, Stafford, and so on) versus other (grants, veterans' payments, work-study, and tax benefits).

forces for many young men.

We do not model the GI Bill directly because it affected a narrow range of cohorts of men, whereas the trends we observe appear to be general across cohorts and also affect women. Further, Stanley (2003) finds no evidence that men from lower socioeconomic status backgrounds increased their postsecondary education in response to the GI Bill. This evidence suggests that it is unlikely that the GI Bill directly generated the change in college attendance patterns we observe through its effect on financing, although as noted in the text, it certainly played a part in generating a large surge in college attendance and helping to reform college admissions.

The first explicit, generally available aid for college was introduced in 1958 through the National Defense Education Act.[1] This act brought about the first federally sponsored student loans (Perkins loans), which were initially directed toward students who would study subjects of national interest, which included particularly science, math, and engineering (Conlan, 1981). Federal support expanded dramatically with the Higher Education Act of 1965 and the 1972 Higher Education Amendments. These pieces of legislation expanded the National Defense Education Act; introduced subsidized loans for college students; transferred control of work-study programs to the Department of Education; and introduced programs to provide financial assistance to students with limited financial means, including particularly Pell grants.

In Table C2 we summarize how these changes affected direct federal support for students between 1960 and 2000. We highlight three main changes. First, real federal spending per pupil has seen tremendous growth. While the (inflation-adjusted) figure was just $700 per

[1]With the exception of subsidies to work-study programs as part of the National Youth Administration between 1935 and 1939. This program started two years after the 1933 cohort graduated high school and so had little effect on our cohorts of interest.

pupil in 1960, it more than tripled by 1970, largely as a result of the new legislation passed in 1965. The figure has continued to grow since. Underlying this aggregate figure were two important changes in the composition of aid. First, while nearly three-quarters of aid was targeted to specific groups in 1960 (largely veterans), the share of aid that was available to the general student body subsequently rose. Second, the federal government offered many more loans; while loans were only 15 percent of total aid in 1960, they rose to more than two-thirds of total aid by 2000. These findings are consistent with government reports on how students financed college described in Section 3.

## C.4 College Admissions Exam Costs

Figure 7 in the text shows the dramatic growth of standardized college admissions tests after World War II. Here, we explore the three main driving forces that generated the growth in testing. Although the names of the college admissions exams and the entities responsible for them have changed numerous times over the years, we fix terminology for ease of exposition: the College Board refers to the entity responsible for the SAT test; its competitor is the ACT test.

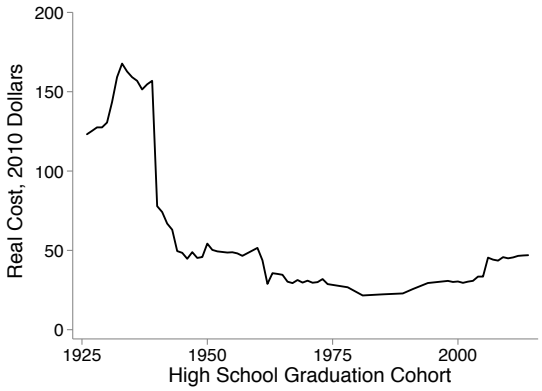
The first driving force was a drastic decline in the cost of administering standardized admissions tests. Figure C3 shows the cost of the SAT, indexed either for inflation or by nominal GDP per capita, as we did for college costs.[2] The cost measured in 2010 dollars fell from roughly $150 to $50 over the course of a decade. Measured relative to income, it declined from roughly a week's to less than a day's wage over the same period. The major innovation was the introduction of automatic scoring machines for standardized tests in 1937. Labor shortages during the war made standardized tests even more attractive relative to the previous written exams that had to be graded by professionals.

At the same time, results from a large-scale experiment in college admissions as well as the general experience with veterans attending college on the GI Bill suggested that detailed subject requirements offered little value as admissions tools (Aikin, 1942; Jencks and Riesman, 1968). Finally, the College Board used its leverage as a provider of admissions services and distributor of an influential college guide to pressure schools to require the SAT for admissions in the 1950s (Bowles, 1967). Although midwestern colleges generally resisted, most signed up for the competing ACT exam during or shortly after 1959.

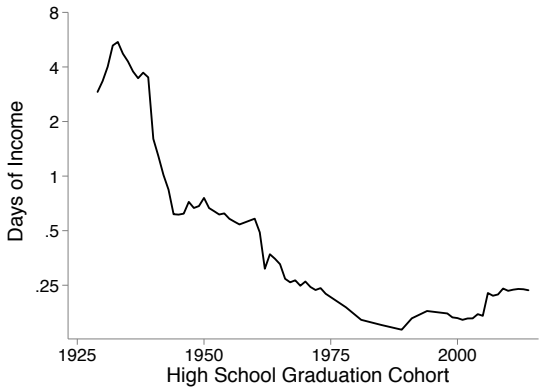
[2]The cost of the SAT is taken from various college guides for early years and from College Board (Educational Testing Service) brochures for later years.

**Figure C3: College Admissions Exam Cost Time Series**

(a) CPI Adjusted




(b) Relative to GDP per capita




## C.5 Changes in College

One complication with studying changes in college attendance patterns is that college itself has changed. This raises the potential concern that what it means to "attend college" or who is counted as "attending college" may have changed over time. Broadly, our principal goal is to construct the most consistent series possible that includes students who acquire a broad education in a wide range of subjects but excludes those who acquire a shorter, narrower education that is specific to a particular vocation or occupation. Here we explain how we apply this principle to construct measures of college attendance given three important changes in college over the 20th century.

First, American colleges used to be dedicated more narrowly to the liberal arts education. Students who wanted training for a specific profession often acquired that elsewhere, either through apprenticeships or at schools dedicated to the teaching of a single subject. Over the course of the 20th century, these specialized schools were abolished, and their teaching functions moved into colleges and universities. These changes generally predate our period of interest for engineering and agriculture (Grayson, 1977). Teacher's colleges (also called normal schools) were slowly transitioned into regional state universities that offered a full range of degrees; these included UCLA and Arizona State University (Labaree, 2008). Given that this education is broad and general, we include those who enroll in normal schools as attending college when they are separately enumerated.

For business, two distinct types of institutions went by the name "business school." The

first was the business school attached to a university, as in the modern sense. While such schools were rare before 1910, they became increasingly common over the next few decades (Pierson, 1959). Since students who attend these schools necessarily attend college, they are correctly included in our figures. The second was a stand-alone institute that specialized in teaching particular business skills, including secretarial, accounting, or trade courses. In some cases, we have reports of the number of students intending to attend these institutes, but we exclude them from our college enrollment figures given the short duration and specialized, vocational nature of their training. Finally, the education of nurses changed during this period. Before 1964, most nurses were trained in three-year programs housed in hospitals that focused on "ward management, medical diagnosis and treatment, and sanitation" (Lynaugh, 2008). Reforms initiated in 1964 moved most nurse training to the university setting as a part of four-year programs. We chose to exclude the small numbers of students who report enrolling in nursing schools in the pre-reform period because the education provided, while lengthy, is narrowly focused on a particular vocation.

The second change in American colleges was specific to medical and legal training. In the 19th century, students of these two subjects acquired their training in apprenticeships or by enrolling in specialized schools, often directly from high school. Reform efforts in the early 20th century gradually pushed both subjects into universities as post-graduate subjects to be studied after exposure to or graduation from an undergraduate program. These changes generally happened before our period of interest. The great majority of medical schools required at least two years of prior college studies by 1920 (Hiatt and Stockton, 2003). The American Bar Association worked to enact similar standards in each state; by the 1930s they had succeeded in passing them in all states outside of the South (Harno, 1953; Shafroth, ed, 1939). Very few of our data points are from before 1920 or the South, so it is unlikely that changes in the location and requirements for medical or law school affect our trends.

The third and final change in American colleges is the growth of junior colleges or community colleges, institutions that specialize in granting two-year degrees. Although institutions of this type first arose in the 19th century, their popularity expanded greatly in the first half of the 20th century. In fact, from 1920 to 1940, the number of junior colleges grew nearly tenfold, from 52 to 457, and their share of total resident college enrollment increased from 1.4 percent of students to over 10 percent.[3] Today, roughly 40 percent of college students are enrolled in junior or community colleges (Horn and Nevill, 2006).[4] The expansion of

[3]These figures were collected from tables in the 1956–1958 *Biennial Survey of Education*.

[4]Currently, the term "community college" refers to public two-year institutions and "junior college" to

junior colleges explains part of the decline in college costs after the Great Depression.

Community colleges are challenging to categorize because they enroll two types of students: those who are engaging in terminal vocational training and those who are pursuing a broader college degree. We include community college and junior college students in our figures because the majority of students who enroll there intend to transfer to a four-year institution (43 percent with definite plans) or receive a general associate's degree (30 percent) rather than receive an applied associate's degree or certificate (27 percent) (Horn and Nevill, 2006). Lovenheim and Reynolds (2011) build on the work of Belley and Lochner (2007) to document changes between the NLSY79 and NLSY97 in selection between 2 and 4-year colleges by academic ability and family background and finds interesting changes, but data limitations prevent us from showing similar trends back in time.

# D Additional Quantitative Results

This appendix includes details for the model and experiments. Appendix D.1 contains further details of model fit and sensitivity checks. Appendix D.2 provides information on the empirical studies that lead to the scholarship function used in Section 6.1.

## D.1 Model Fit and Sensitivity

The model is calibrated to fit 64 moments. The fit of the model is mostly described in Section 5, particularly Figure 8. Here we give the fit of the remaining moments, which describe the distribution of students by $(s, p)$ quartiles. Figure D1 shows that the fit is generally good.

We also conduct a sensitivity analysis to highlight what parameters and model features are important for generating our results. Table D1 shows the results of these experiments in the same format as Tables 5–7 in the text. The second column gives the baseline results again for comparison, while the remaining columns summarize the results of various sensitivity analyses.

The third column shows the results of an experiment where the model is held fixed as in the baseline, but capacity is allowed to double between 1933 and 1960. The results are overall very similar to the "constant quality" experiment in Table 6: fewer colleges

the private equivalent, but this was not always the case. Nonetheless, the distinction is not important for our purposes, so we lump the two terms together.

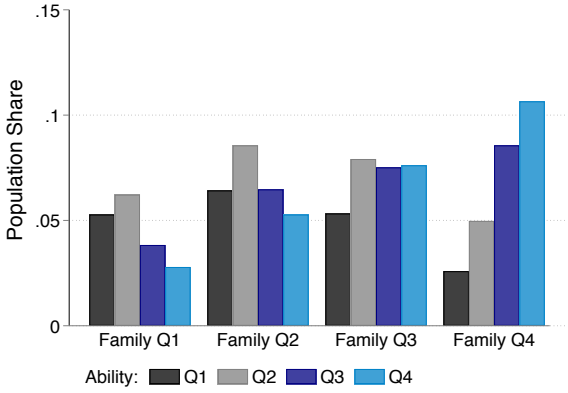
**Table D1: Sensitivity**

| | Data | Model | | | | | |
|---|---|---|---|---|---|---|---|
| | | Baseline | Capacity doubles | Substitutes | Precise Tests | Costly Quality | Falling Costs |
| College attendance | 0.24 | 0.22 | 0.27 | 0.23 | 0.22 | 0.22 | 0.23 |
| Local college attendance | -0.34 | -0.34 | -0.32 | -0.33 | -0.31 | -0.34 | -0.33 |
| $\beta_s$ | 0.48 | 0.49 | 0.40 | 0.54 | 0.63 | 0.49 | 0.48 |
| $\beta_p$ | -0.21 | -0.07 | 0.02 | -0.08 | -0.10 | -0.06 | -0.07 |
| Access to first choice | - | -0.44 | -0.42 | -0.45 | -0.37 | -0.44 | -0.43 |
| Fraction selective | - | 0.78 | 0.22 | 0.76 | 0.74 | 0.78 | 0.78 |

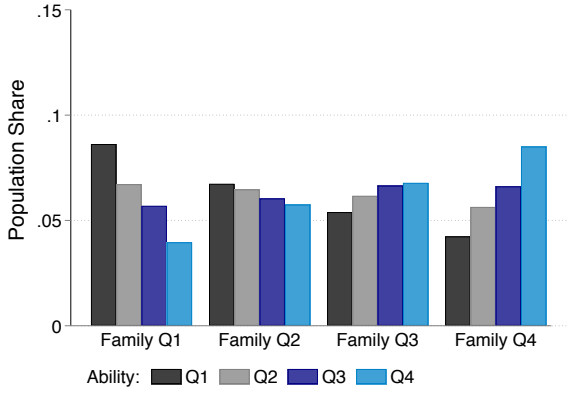
*Note:* Columns compare results from the data (where available), the baseline model, and several alternative models that explore the sensitivity of the results to various assumptions made. See the text for further details. The rows give the difference in each moment $m_{1960} - m_{1930}$, where the moments $m$ are: the share of graduates who attend college; the share of college students who attend a local college; the importance of test scores and family background for determining who attends college; the share of students who can attend their first-choice college; and the share of colleges that are selective.

**Figure D1: Student Distribution by Ability & Family**

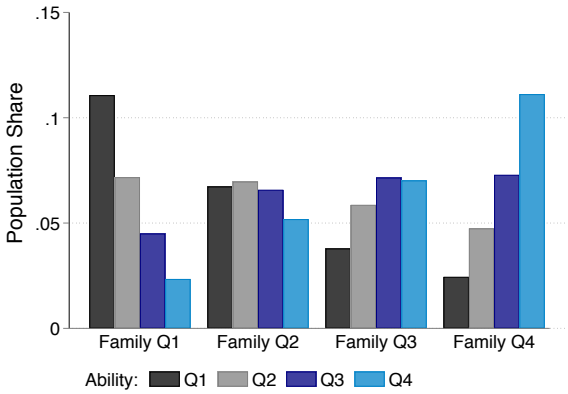
(a) 1933 Data



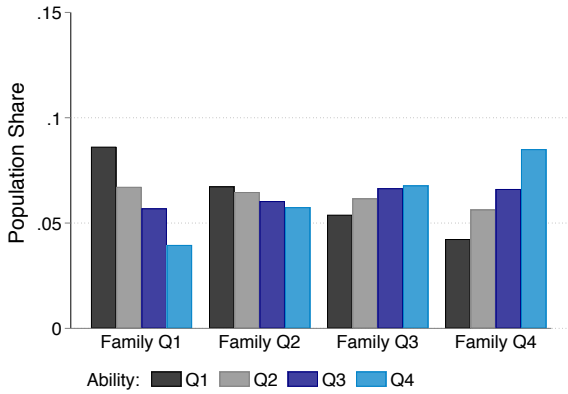

(b) 1933 Model




(c) 1960 Data




(d) 1960 Model




become selective, more students attend college, and we generate none of the decline in the importance of family background. The intuition is also the same: stratification of students by colleges is an important mechanism for generating our results.

The fourth column shows what happens if we force college quality and student ability to be substitutes in the human capital production function, instead of complements as in the baseline model. Specifically, we choose an elasticity of substitution between college quality and student ability of 1.5 ($\gamma = 0.33$) and recalibrate the remaining parameters. The model is able to generate nearly as good a fit, although it generates too large of an increase in sorting on test scores.

The fifth column shows what happens if we force the model to have half the noise in test

scores, recalibrating the remaining parameters. The model generates far too much sorting on test scores after they are revealed, which manifests itself as a counterfactually large rise in $\beta_s$. This experiment demonstrates that the model requires test scores to be fairly noisy to explain why students are so poorly sorted by test scores after they are widely available – an observation that holds even in more modern datasets such as the NLSY79.

Costly quality allows tuition to depend on college quality. We choose a quadratic function form for tuition as a function of $q$ and calibrate the parameters. Doing so does not notably change the model's ability to fit the data, suggesting that modeling institutional arrangements such as private versus public colleges is unlikely to affect our results much.

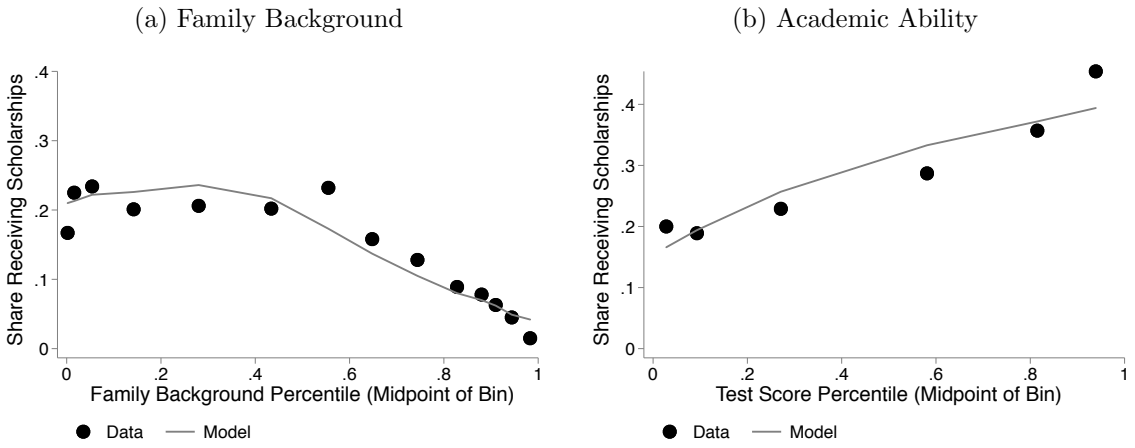
Finally, falling costs allow for $\kappa_t$ to vary over time in the model. This experiment is motivated by Hoxby (2009), which suggests that declining costs of applying to and attending non-local colleges (driven by declines in communication and transportation costs) may be a driving force for the national integration of college. We treat $\kappa_t$ as a free, time-varying parameter, and calibrate its values for 1933 and 1960 to fit the data as well as possible. When we do so, we find that the calibrated search cost remains essentially constant at $\kappa_t = 0.41$, as in the baseline calibration. Not surprisingly, the model results do not change much. We have also considered experiments where $\kappa_t$ replaces $V_t^C$ as the main driving force, but we found that calibrated versions of that model could not generate much of the rise in college attendance, which is a crucial part of the mechanism of interest. We conclude that while application and travel costs fell during this period, they do not appear to be responsible for the reversal in sorting patterns we have documented.

## D.2 Approximating the Scholarship & Grant Function

This appendix details how we combine information from a number of sources to arrive at an approximation of the scholarship and grant function used in the experiment in Section 6.1. We build mostly on studies of how students financed college for various years. These studies rarely asked about scholarships or grants before World War II, likely because they were rare and small. The only source with figures for this era is Zook (1947), who reports that 5 percent of student received scholarships shortly before the War. This figure is much smaller than the 15–25 percent typically reported in the late 1940s and 1950s, so we ignore scholarships before the War.

Surveys of financing regularly included information on scholarships and grants after World War II. Two studies conducted by cooperating research teams give details on how schol-

**Figure D2: Scholarships**




arships were distributed for roughly the 1950 cohort. Hollis (1957) reports the fraction of college students receiving scholarships and the median dollar value of the scholarships by family income bin. Iffert (1958) reports the share of college students receiving scholarships and the share of expenses paid by scholarships by test score bin. Both studies find that the dollar value of scholarships conditional on receiving one varies little with family income or test score, so we focus on the extensive margin: whether or not students receive a scholarship. Figure D2 shows the share receiving scholarships as a function of family income or test score percentiles (recorded as the midpoint of the relevant bin). This figure suggests that the probability of receiving a scholarship is decreasing in family background (particularly past the 60th percentile of the income distribution) and increasing in academic ability.

The importance of scholarships is magnified by the fact that their importance was growing steadily over time. While they were apparently negligible before World War II, they account for 4.8 percent of total income/expenses for the 1950 cohort, 8.4 pecent for the 1957 cohort, and 11 percent for the 1968 cohort (Hollis, 1957; Lansing et al., 1960; Haven and Horch, 1972). These findings motivate us to experiment with including scholarships in our model.

Scholarships reduce tuition payments and increase consumption in college. In the context of our model, this maps into family background $p$, which in this case captures income and transfers minus tuition payments. Our scholarships experiment replaces the baseline distribution of family background $p$ in 1960 with $\log(p') = \log(p + \iota g(s,p))$. $\iota g(s,p)$ is the share of income in college that comes from scholarships. The function $g(s,p)$ allows us to vary this share with observable student characteristics, in line with Figure D2. Experimentation

suggests that a piecewise linear function in $s$ and $p$ is necessary to deliver a good fit. The parameter $\iota$ is used to fit the average share of scholarships in income; we focus on the data point closest to the 1960 cohort, which is 8.4 percent for the 1957 cohort.

We re-calibrate the model, adding as targets the share of student income coming from scholarships and the data on how scholarship receipts vary with student ability and family background. Figure D2 shows the resulting model scholarships as a function of student characteristics against the data. The level in each figure is normalized in the model, because the model is calibrated to fit the share of income from scholarships rather than the share of students who receive scholarships. The shape of the functions is unaffected by this normalization and shows that the model delivers a reasonable approximation to the available evidence on how scholarships were targeted to low family income, high test score students.

# E Historical Studies on College Attendance

The central empirical claim of our paper is that the importance of family background in determining who attends college has declined throughout the 20th century, while the importance of academic ability has risen. The evidence for this claim is derived from studies performed throughout the 20th century, primarily from the Great Depression onward. For studies that predate the 1960s, the underlying raw data are no longer extant. Instead, the figures in this paper rely on the results of the original studies as reported in published journal articles, books, technical reports, and dissertations.

The original studies were conducted by researchers in a variety of fields, including psychology, economics, and education. This appendix gives a brief description of the methodology used in each study. Table E1 summarizes the basic details. After the reference, the second and third columns summarize the location (typically a city or state) and the sample size used in the tabulations of interest, which may be smaller than the total sample size if variables are missing. The fourth and fifth columns give the high school graduation cohort and the way college attendance was measured, prospectively (asking about plans before graduation) or via follow-up (at variable lengths).

The second part of the table provides the measures of family background and academic ability used, as well as the number of bins used to describe the data.[5] In some studies, the

[5] Hendricks and Schoellman (2014) conducted robustness checks showing that several other dimensions were unimportant in replicating these results, including the identity of the state studied or the test used to measure academic ability, as well as how or when college attendance was measured.

underlying data were reported in score ranges, with very few observations at the bottom and the top of the test score distribution. In these cases, we aggregate bins somewhat to ensure that we have enough observations. We note this in the descriptions below and give in Table E1 the number of bins after aggregation.

The third part of the table gives the actual coefficients $\beta_s$ and $\beta_p$ constructed from each study and plotted in Figures 2 and 3. For some studies it is possible to construct multiple coefficients. For example, a study might cover multiple cohorts, or include patterns by multiple measures of academic ability. In these cases we include all possible estimates.

## E.1 Underlying Studies

This section gives further details on the sampling and variables of the studies used in the paper. Table E1 at the end summarizes the basic details of the studies in a single location.

### E.1.1 Book (1922)

Book (1922) arranged for more than 6,000 high school seniors throughout the state of Indiana to fill out a short questionnaire and complete an aptitude test, the Indiana University Intelligence Scale. The questionnaire asked about the student's family background (including their assessment of their family's income in five groups) as well as their plans for college. Published tabulations are based on schools that returned their reports on time. Unfortunately, the reported findings do not contain tabulations of college-going as a function of family background.

### E.1.2 OBrien (1928)

OBrien (1928) arranged for more than 4,000 high school juniors and seniors throughout the state of Kansas to complete an aptitude test, the Terman Group Test of Mental Ability. He used continued communication with school officials at most schools to track the progress of students as late as six years after graduation. He provides figures on college enrollment by test score for 3,780 of the students in the initial study (for the rest, the school officials dropped out of the program). We aggregate some bins at the top and bottom of the score distribution with very few students.

### E.1.3 Mann (1924)

Mann (1924) studied results from nearly 900 high school seniors enrolled in volunteering high schools throughout the state of North Carolina who filled out a short questionnaire and completed an aptitude test, the Mentimeter. The questionnaire asked about the student's college plans, including if available the specific college where the student planned to enroll. We aggregate some bins at the top and bottom of the score distribution with very few students.

### E.1.4 Colvin and MacPhail (1924)

Colvin and MacPhail (1924) arranged for a sample of 3,000 high school seniors in Massachusetts to fill out a short questionnaire and complete an aptitude test, the Brown University psychological examination. The high schools were chosen to cover about one-fifth of all graduating students and to represent the state in terms of geography, school size, and economic conditions. The questionnaire asked about the student's family background (including their assessment of their family's income in five groups) as well as their plans for college. The study is closely modeled after Book (1922), and like that study, the reported findings do not contain tabulations of college-going as a function of family background.

### E.1.5 Odell (1927)

Odell (1927) arranged for more than 12,000 high school seniors in Illinois to fill out a short questionnaire and complete an aptitude test, the Otis Test of Mental Ability. The sample covers more than half of the high schools and seniors of the state, although the author does not specify how they were chosen. The questionnaire asked about the student's family background (including their father's occupation), the student's grades, and their plans for college. The author was also the first to subsequently follow up on students' plans, by first asking students to list the colleges where they planned to enroll and then following up at those colleges the next year. He also checked whether students remained enrolled at the end of that year, providing a measure of one-year attrition at college. Some colleges did not cooperate, leading to an undercount of those entering college. We use the number known to have entered college by test score grouping and by self-reported average grades; similar results obtain if we instead use the number planning to enter college.

### E.1.6 Ames (1926)

Ames (1926) arranged for 1,400 Montana high school seniors to fill out a questionnaire and complete an aptitude test, the Otis Test of Mental Ability. The study covered one-third of high schools and just under one-half of students, chosen to represent the state geographically. The questionnaire asked about the student's plans for college. The author collected a number of other potentially useful pieces of information (family income, class rank, and so on) but unfortunately did not produce usable tabulations from these data. We aggregate some bins at the top and bottom of the score distribution with very few students.

### E.1.7 Benson (1942)

Benson (1942) followed up on an earlier study that administered an aptitude exam (the Haggerty Intelligence Examination) to sixth-grade students in Minneapolis. She followed their school records to determine whether they had dropped out or graduated high school and, for graduates, whether they had their credits transferred to a college. For those who did so, she followed up with the colleges to learn whether or not they had graduated. Her results give academic progress by original test score, which we use to compute the probability of high school graduates attending college and the probability of college entrants graduating as a function of test score.

### E.1.8 Henmon and Holt (1931)

Henmon and Holt (1931) arranged for nearly 17,000 high school seniors representing 95 percent of the state of Wisconsin to fill out a short questionnaire and complete an aptitude test, the Ohio Psychological Test. The questionnaire asked about the student's plans for college. The authors also secured the assistance of high school and college officials to check which students actually enrolled during the subsequent fall, which is the basis for the figures used here. We aggregate some bins at the top and bottom of the score distribution with very few students.

### E.1.9 Updegraff (1936)

Updegraff (1936) conducted an intensive survey of roughly 12 percent of the students who were on the sixth-grade class rosters in Pennsylvania in 1926. Using a number of college students and other employees organized under the guidance of faculty, they proceeded to

locate and interview as many students as possible in the fall of 1934, by which time students should have graduated high school if they were to do so. The interview covered family background and academic progress, including high school graduation and enrollment in college. For the students whose answers were sufficiently complete, Updegraff constructed a measure of socioeconomic status based on replies to questions about ownership of household durables, father's occupation, mother's and father's education, and language spoken at home. Test scores come from school records on an intelligence test taken before the sixth grade. We aggregated categories for the college-going by socioeconomic status and test score exercise to ensure sufficiently large cell sizes.

#### E.1.10 Barker (1937)

Scott (1935) administered a questionnaire to a subsample of more than 4,000 high school seniors throughout the state of Iowa who also took the Iowa Every-Pupil Exam. The included schools were dispersed throughout the state, but larger schools are overrepresented because the author found that small schools were more likely to be closed by the time the materials arrived. The questionnaire asked students about their college plans. Barker (1937) followed up with the school administrators of most of the schools to determine whether or not the students had enrolled in college within two years.

#### E.1.11 Gardner et al. (1942)

Gardner et al. (1942) collected data on college attendance in Natchez, Mississippi, as part of an intensive sociological study in the tradition of W. Lloyd Warner's Yankee City studies (e.g., Warner and Lunt (1941)).[6] The authors collected pooled data on high school graduation and college-going from five cohorts directly from the school principal. They organized the students' families into socioeconomic classes based on their own observations from two years of living in the city. We have aggregated their "upper-upper" and "lower-upper" classes because the former (three students) is too small to be useful for analysis.

[6] As was common for such studies, the city is given a pseudonym in the original manuscript. The names were never a particularly well-kept secret and are openly mentioned in recent versions and discussions of the research (Davis et al., 2009).

#### E.1.12 Livesay (1942)

Livesay (1942) arranged for more than 2,000 high school seniors in the state of Hawaii (93 percent of all seniors) to fill out a short questionnaire and complete an aptitude test, the American Council Psychological Examination. The questionnaire asked about the student's plans for school. The author followed up during the subsequent year to find out whether the students enrolled in college as planned. Although the original study included 20 test score bins, we collapse that number to 16 bins because the very top and bottom bins have few observations.

#### E.1.13 Manuel (1938)

Manuel (1938) arranged for many high schools in the state of Texas to administer the American Council Psychological Examination to high school seniors in the spring before graduation. He subsequently corresponded with school officials to learn about the college enrollment or other activities of seniors in the following fall. The study covers 900 students from 36 Texas high schools whose principals replied; the status of less than 10 percent of the sample is listed as unknown. The author corresponded with some of the high-scoring students who did not attend college to learn why they did not. We aggregated categories for the college-going by test score to ensure sufficiently large cell sizes.

#### E.1.14 Manuel (1939)

Manuel (1939) is a direct successor to Manuel (1938). The author noted in the 1938 study that responding high schools tended to be smaller and so arranged for high schools in the Dallas area to participate in a similar study. The study covers 800 students from 4 high schools that provided information on students' subsequent college attendance. The status of around one-third of the students is unknown. Because this follow-up was conducted one year later (1937 instead of 1936) the high schools used a different edition of the American Council Psychological Examination. Test norming at that time was not sufficiently advanced to guarantee that the results from different versions of the same test could be merged, so we treat the two studies separately. We aggregated categories for the college-going by test score to ensure sufficiently large cell sizes.

### E.1.15 Sibley (1948)

Sibley (1948) utilized administrative data from schools and tax records for a sample of 1940 high school graduates from the state of New York. The sampling framework was designed to represent 10 percent of students throughout the state, although slightly different methodologies were employed in New York City versus the rest of the state. Principals were asked to furnish their students' graduating class rank, college enrollment status for the subsequent year, and parental names and addresses. Students whose college enrollment was unknown to the principal were excluded from the analysis. The names and addresses were used to link parents to New York State tax records and thereby to determine family income.[7]

### E.1.16 Junker (1940)

Junker (1940) collected data on the college attendance plans of high school students of Dowagiac, Michigan, as part of an intensive sociological study along the same lines as Gardner et al. (1942).[8] The author collected all high school students' plans for attending college. He organized the students' families into socioeconomic classes based on his own observations from two months of living in the city. We have disregarded data from the highest class, which has no students in high school anyway.

### E.1.17 Lansing et al. (1960)

Lansing et al. (1960) conducted a survey of a nationally representative sample of families about family characteristics, including income as of the time of the survey and the education of all children, including adult children. The reported results include college attendance for children 20–29 and 30–39 years old as of the time of the survey. We keep the data for these two groups separate and date them according to the midpoint of the age range, which makes them the 1943 and 1953 high school cohorts. Income is reported as of the survey

[7] Sibley (1948) does not report directly the number of cases in each of the relevant bins. We use the 1944–1945 edition of the U.S. Census Bureau's *Statistical Abstract*, which reports the distribution of family income for families of two or more persons in 1941, to approximate the distribution of families by income. We correct for the difference between 1943 New York average income and 1941 U.S. average income using national and state per capita income figures from the same volume, which suggest roughly doubling income. The correspondence between adjusted bins in the *Statistical Abstract* and bins in Sibley are close but not exact.

[8] The original study was authored under a pseudonym and called the city "Hometown." The author's other writings of the time, under his real name, all concern Dowagiac and its school system.

year, not the year of high school graduation.

#### E.1.18 Keller et al. (1950)

Keller et al. (1950) arranged for a follow-up study of the 1945 class of Minnesota high school graduates. High school principals and superintendents were surveyed in the spring of 1946 and asked for basic information about the previous year's graduates, including demographic information, rank in class, and current activity. Responses for 83 percent of the state's graduates were received. Principals of urban schools were less likely to furnish all the necessary information, probably because they were less likely to know the current status of all their graduates.

The 1945 class graduated toward the end of World War II, so the majority of men had enlisted by the spring of 1946. The figures given are for women and for civilian men; the total figures refer to the unweighted sum of the two. Enlisted and civilian men showed little variation in class rank, which is the main variable of interest here.

#### E.1.19 Phearman (1948)

Phearman (1948) utilized test score data from Iowa high schools that administered the Iowa Tests of Educational Development to seniors in the fall. He requested that the principals of high schools administering the exam furnish additional details about the seniors a year later, including whether they had graduated and enrolled in college, as well as their addresses. Roughly half of the principals participated. The researchers used the addresses to mail questionnaires to the students, which allowed them to collect information on family background such as father's occupation. More than half of the students replied to the questionnaires.

#### E.1.20 Roper (1949)

Roper (1949) arranged for interviews of a nationally representative sample of 10,000 high school seniors. The sample was designed to be nationally representative: it spanned the country and sampled communities of different sizes by design. The interviewers collected data on class rank from the high school principal and asked students about their plans for college. The survey distinguished between those who had applied and been accepted and those who had applied but had not (yet) been accepted. The interviewers followed up with

the latter group to find out their enrollment status in the next fall. Interviewers also asked about other family characteristics, including father's occupation.

A second volume, Davis and Roper (1949), reports more findings from the same underlying study. We use any novel tabulations or those that include more detail.

#### E.1.21 Morehead (1950)

Morehead (1950) collected data from selected high school superintendents scattered throughout the state of Arkansas to report on the activities of 1,727 high school graduates from the class of 1949. Most of these schools had also participated in the administration of the American Council Psychological Examination, allowing the author to cross-tabulate college attendance with test scores.

#### E.1.22 Berdie (1954)

Berdie (1954) arranged for 93 percent of high school seniors in the Minnesota class of 1950 to fill out a short questionnaire and complete an aptitude test, the American Council Psychological Examination. The questionnaire asked about the student's family background, including their assessment of family background in broad groups ("frequently have difficulty making ends meet," "sometimes have difficulty in getting the necessities," "have all necessities but not many luxuries," "comfortable but not well-to-do," "well-to-do," and "wealthy"), as well as their plans for college. A follow-up questionnaire was conducted by mail with a sample of students the next year to determine whether they had actually enrolled in college or not. Three-fourths of selected students responded to the follow-up questionnaire.

The authors report plans for attending college by class score and test rank, but report actual college attendance by family income groups from the follow-up. We use both sources of data.

#### E.1.23 White (1952)

White (1952) selected 37 of the 60 high schools in northeast Ohio and then interviewed over 1,000 seniors at those high schools shortly before graduation. The researchers created an index of socioeconomic status based on replies about father's occupation, source of family income, and neighborhood of residence. Students were asked about their intention to go

to college. The researchers recorded scores on an unspecified IQ test from the students' transcripts. The researchers also followed up with all transcript requests made to the high school to discern whether students had applied to and were enrolled in any colleges. Most of the necessary tabulations are provided using actual college attendance, but tabulations by gender are only given for intention to go to college.

#### E.1.24 Wiegman and Jacobson (1955)

Wiegman and Jacobson (1955) arranged for a sample of more than 1,000 high school seniors from throughout the state of Oregon to fill out a short questionnaire that included information on their class rank and chances of attending college. A follow-up survey was mailed to the principals of their high schools the next year to determine who had actually enrolled in college.

#### E.1.25 State University of New York (1955)

State University of New York (1955) arranged for more than 20,000 high school seniors in three geographic subregions of the state of New York to fill out a short questionnaire. The questionnaire asked about the student's family background and plans for college. Students who were not sure as to their plans were resurveyed in the fall to determine whether or not they had enrolled in college. Students' class rank and standardized test scores (on an unspecified IQ test) were collected from administrative records at the school. Finally, the researchers collected data on family income from the New York Department of Taxation and Finance for 7,988 students above a minimum score cutoff on the standardized test.

The tabulations give two sets of results. First, they give college-going as a function of test score for all students. Second, they give college-going as a function of family income and test score, but only for students whose test scores put them roughly in the top 30 percent of the test score distribution. We repeat this procedure in the NLSY by first selecting only the top-scoring students on the AFQT, and then classifying the remaining sample based on family income and studying college-going as in the original study.

#### E.1.26 Jones (1956)

Jones (1956) used data from Arkansas' statewide testing program, which administered the American Council Psychological Examination to more than 98 percent of the Arkansas

high schools. The author questioned principals about whether the graduating seniors had enrolled in college during the subsequent fall. Notably, this is the first study in a southern state to present results separately for black and white students. We aggregated categories for the college-going by test score to ensure sufficiently large cell sizes.

#### E.1.27 Daughtry (1956)

Daughtry (1956) collected data in the fall of 1955 on student class rank in terciles and college plans of the previous spring's graduates from high school principals covering 94 percent of Kansas' graduating class.

#### E.1.28 French et al. (1957)

French et al. (1957) describe the results from a study of more than 35,000 high school seniors at a sample of schools chosen to be nationally representative of public high schools. Students took a very brief (20 question) ability test and then filled out a questionnaire about their plans for college and their family background. School principals provided details on students' grades. A follow-up with a sample of about one-fifth of schools the following fall was used to provide data on actual enrollment as well as plans for college. We use the results based on actual enrollment for the subsample of students in the follow-up.

#### E.1.29 Cowen (1957)

Cowen (1957) arranged for a representative sample of more than 65,000 high school seniors in the state of New York to fill out a short questionnaire and complete an aptitude test, the New York State Scholastic Ability Test. The questionnaire asked about the student's plans for college and the certainty of those plans. The results are split into two because the sample includes roughly one-sixth of New York City school seniors but more than half of the upstate seniors, and the author cautions against combining results.

#### E.1.30 Little (1958)

Little (1958) arranged for 36,000 high school seniors representing almost 95 percent of seniors in the state of Wisconsin to fill out a short questionnaire and complete an aptitude test, the Henmon-Nelson Test of Mental Ability. The questionnaire asked about the student's family background (including self-assessed family income) and plans for college. The

author also asked school officials to provide each student's class rank. Results of this study concern only a working subsample of approximately one-sixth of the total. A questionnaire was sent to the parents of the students in this subsample the next fall to find out whether students had followed up on their plans. About one-half of the parents replied to this questionnaire. Reported tabulations use only plans for attending college. Sewell and Shah (1967) subsequently built on this study (see below).

In a separate phase of the study, Little collected data on the 1953 Wisconsin high school graduates who enrolled in Wisconsin high schools and their subsequent progress as of 1957. Tabulations include students who had left college, who were still enrolled, and who had graduated at the end of the fourth year, as a function of class rank and test score category.

#### E.1.31 Sewell and Shah (1967)

Sewell and Shah (1967) report results from a follow-up with one-third of the sample used in Little (1958); this subsample formed the basis for the ongoing Wisconsin Longitudinal Survey. The authors sent a follow-up questionnaire to the parents of the subsample of students seven years later using both mail and phon;. 87.2 percent of parents of the subsample replied. Sewell and Shah (1967) report findings by socioeconomic status of the family, which is constructed using a weighted combination of father's occupation, parental education, estimates of funding available to pay for college, and approximate family wealth and income. College attendance and college graduation by gender were reported as a function of this socioeconomic status and scores on the Henmon-Nelson Test of Mental Ability.

#### E.1.32 Stroup and Andrew (1959)

Stroup and Andrew (1959) administered a questionnaire to the 88 percent of high school seniors enrolled at schools that administered the American Council Psychological Examination in the state of Arkansas. The survey included questions about the student's family income in broad categories (such as "difficulty making ends meet" or "wealthy") and college plans, including specific institutions. The authors followed up with high school principals and colleges to verify the enrollment or non-enrollment of students at the colleges they had indicated they had planned to attend. Test scores were collected from administrative records for the testing program.

Basic statistics on college attendance rates are available separately for black and white students. These statistics indicate that a little more than 11,000 students in the sample

were white and 1,300 were black, with 3,000 white students continuing on to college and 300 black students continuing on to college. All other tabulations are for the two groups combined.

#### E.1.33 Jennings (1960)

Jennings (1960) reports results from data collected on the 1958 graduates of Montana high schools. Data were collected from high school guidance personnel on the number of graduates, their class rank, whether or not they had enrolled in college, and the location of the college, if any. Substantial effort was made to cross-check this information with the records of the relevant college admissions officers or registrars. College registrars were contacted again after a year to check on the reenrollment of students at the start of the second year.

#### E.1.34 Nam and Cowhig (1962)

Nam and Cowhig (1962) administered a supplement to the Current Population Survey in October of 1959 that collected data on family background and college plans of high school seniors, in addition to the standard CPS questions on demographics, work, and income of household members. The authors also administered a follow-up survey to principals of the students' high schools the following fall to collect data from school records and actual college attendance. A total of 1,170 usable replies were received, which were then reweighted to be nationally representative. The authors collected scores from a wide variety of tests and harmonized them using equivalence tables. They also collected class rank from principals. Family income was measured using parental responses to the usual CPS questions.

#### E.1.35 Medsker and Trent (1965)

Medsker and Trent (1965) arranged for an intensive study of more than 10,000 high school students from 16 selected communities in the Midwest and California. Students took a short aptitude test and responded to a questionnaire. Data on class rank and intelligence test scores were collected, presumably from administrative records. The scores were from a number of different exams and were equated to a common scale, the School and College Ability Test. Students were mailed a questionnaire the October after their graduation to learn whether they had enrolled in college; more than 90 percent replied.

Preliminary results on one-year college persistence are available in the original study (Medsker and Trent, 1965). The authors also conducted a four-year follow-up study in 1963. More than half of the original sample responded to the questionnaire from this study, and responses were used to determine whether the college students had graduated, were still enrolled in (any) college, or had left college. Results of this study are given in Trent and Medsker (1968) by gender and for three academic ability groups.

#### E.1.36 Flanagan et al. (1971)

Flanagan et al. (1964) report the results from Project Talent, a nationally representative survey of 440,000 high school students in 5 percent of the nation's high schools. Students took an extensive battery of aptitude and ability tests. They also filled out lengthy surveys about their backgrounds, plans, interests, and activities. Flanagan et al. (1964) report results from a one-year follow-up with high school seniors. Tabulations provided include college attendance by the test scores and the student's estimate of family income. Flanagan et al. (1971) report results from a five-year follow-up to the initial study. Although response rates were somewhat low (roughly one in three), the authors undertook an intensive effort to locate and secure information from about 4 percent of non-respondents. They then reweighted respondents and non-respondents in constructing final statistics. Tabulations provided include college attendance by test scores and an index of socioeconomic status, where the index is created using value of home, family income, books in home, appliance and durable good ownership, whether the child had his or her own room, father's occupation, and parental education. The two studies give broadly similar results; we give preference to those from the later study because we prefer to use indices of socioeconomic status whenever possible.

#### E.1.37 Berdie and Hood (1963)

Berdie and Hood (1963) arranged for a second study that was very similar in design and execution to Berdie's 1954 study (see above). The authors arranged for 97 percent of high school seniors in the Minnesota class of 1950 to fill out a short questionnaire that asked about the student's family background, including their assessment of family in broad groups ("frequently have difficulty making ends meet," "sometimes have difficulty in getting the necessities," "have all necessities but not many luxuries," "comfortable but not well-to-do," "well-to-do," and "wealthy"), as well as their plans for college. The students' test

scores were taken from a junior year administration of the Minnesota Scholastic Aptitude Test, while class rank was taken from administrative records. A follow-up study was conducted to learn the post-graduation activities of a sample of students. Tabulations cover only academic ability (grades and test scores) and only for the students' plans for college attendance, not their actual activity.

#### E.1.38 Tillery (1973)

Tillery (1973) reports the results from the SCOPE Project, which was a large survey of students in the ninth and twelfth grades of high school. In this survey, 34,000 seniors from four states (California, Illinois, Massachusetts, and North Carolina) took an aptitude exam, the Academic Ability Test, and filled out a questionnaire about their family background and college intentions. The key background indicator is family income relative to the national average (which they were given) in five groupings. For college plans, they were also asked for details on where they were applying. This information was used in an intensive follow-up the next year to determine which students had actually enrolled in college.

#### E.1.39 Eckland and Henderson (1981)

Eckland and Henderson (1981) analyze the National Longitudinal Study of the High School Class of 1972 (NLS72), a nationally representative sample of about 21,000 high school seniors from the spring of 1972. Students were administered a battery of tests and then filled out a questionnaire that asked about a number of family background characteristics. The test score is a composite derived from vocabulary, reading, letter groups, and mathematics test scores. Socioeconomic status is an index derived from information on father's and mother's education, parental income, father's occupation, and an index for ownership of various household items.

The NLS72 involves substantial efforts to follow up with students to measure their post-graduation education and work. This study presents results from 4.5 years after graduation. We focus on results for those who have ever attended college as a function of socioeconomic status and family background. The authors break down these results by race at several points.

### E.1.40 Gardner (1987)

Gardner (1987) analyzes the High School and Beyond Survey, a nationally representative sample of 28,000 high school seniors from the spring of 1980. Seniors were administered a battery of tests, the scores of which were combined into a composite test score rating. They, or in a subsample of cases their parents, were asked to report family income. Students reported income in seven broad categories, while parents reported any dollar value. The dollar values of parents were recoded into the seven broad categories given to students. Students also reported the education and occupation of each parent; several variables on the learning environment in the home; and several variables on the household possession of consumer durables. These variables were combined with income to form a socioeconomic status variable. Two years later, 11,500 seniors were randomly chosen for follow-up, at which time data on college enrollment were collected.

For most of our analysis, we define college-going as someone who attended any school. The reported tabulations for college-going by family income and test score report only those who went to college at least six months instead of those who had ever attended college.

## Table E1: Basic Sample Details, Part A

| No. | Source | Location | Sample Size | Cohort | Type |
|---|---|---|---|---|---|
| 1 | Book (1922) | Indiana | 5,748 | 1919 | Prospective |
| 2 | OBrien (1928) | Kansas | 3,264 | 1921 & 1922 | Follow-up (6 years) |
| 3 | Mann (1924) | North Carolina | 703 | 1923 | Prospective |
| 4 | Colvin and MacPhail (1924) | Massachusetts | 2,799 | 1923 | Prospective |
| 5 | Odell (1927) | Illinois | 11,321 | 1924 | Follow-up (1 year) |
| 6 | Ames (1926) | Montana | 1,189 | 1925 | Prospective |
| 7 | Benson (1942) | Minneapolis | 820 | 1929 | Follow-up (10 years) |
| 8 | Henmon and Holt (1931) | Wisconsin | 16,488 | 1929 | Follow-up (1 year) |
| 9 | Updegraff (1936) | Pennsylvania | 2,009 | 1933 | Follow-up (2 years) |
| 10 | Barker (1937) | Iowa | 3,767 | 1934 | Follow-up (2 years) |
| 11 | Gardner et al. (1942) | Natchez, MS | 191 | 1934 | Follow-up (1–5 years) |
| 12 | Livesay (1942) | Hawaii | 2,255 | 1936 | Follow-up (1 year) |
| 13 | Manuel (1938) | Texas | 825 | 1937 | Follow-up (1 year) |
| 14 | Manuel (1939) | Dallas | 556 | 1938 | Follow-up (1 year) |
| 15 | Sibley (1948) | New York | 5,262 | 1940 | Follow-up (1 year) |
| 16 | Junker (1940) | Dowagiac, MI | 281 | 1940 | Prospective |
| 17 | Lansing et al. (1960) | National | 1,685 | 1943 & 1953 | Follow-up (2–21 years) |
| 18 | Keller et al. (1950) | Minnesota | 19,331 | 1945 | Follow-up (1 year) |
| 19 | Phearman (1948) | Iowa | 2,616 | 1947 | Follow-up (1 year) |
| 20 | Roper (1949) | National | 10,063 | 1947 | Prospective |
| 21 | Morehead (1950) | Arkansas | 1,727 | 1949 | Follow-up (1 year) |
| 22 | Berdie (1954) | Minnesota | 22,516 | 1950 | Prospective & follow-up (1 year) |
| 23 | White (1952) | Northeast Ohio | 1,053 | 1950 | Prospective & follow-up (1 year) |
| 24 | Wiegman and Jacobson (1955) | Oregon | 1,320 | 1950 | Follow-up (1 year) |
| 25 | State University of New York (1955) | New York | 20,784 | 1953 | Prospective & follow-up (1 year) |
| 26 | Jones (1956) | Arkansas | 12,058 | 1954 | Follow-up (1 year) |
| 27 | Daughtry (1956) | Kansas | 15,801 | 1955 | Follow-up (1 year) |
| 28 | French et al. (1957) | National | 6,248 | 1955 | Prospective & follow-up (1 year) |
| 29 | Cowen (1957) | New York | 54,705 | 1956 | Prospective |
| 30 | Little (1958) | Wisconsin | 31,137 | 1957 | Prospective |
| 31 | Sewell and Shah (1967) | Wisconsin | 9,007 | 1957 | Follow-up (7 years) |
| 32 | Stroup and Andrew (1959) | Arkansas | 12,706 | 1957 | Follow-up (1 year) |
| 33 | Jennings (1960) | Montana | 2,682 | 1958 | Follow-up (1 year) |
| 34 | Nam and Cowhig (1962) | National | 1,170 | 1959 | Follow-up (1 year) |
| 35 | Medsker and Trent (1965) | Midwest/California | 9,778 | 1959 | Follow-up (1 year) |
| 36 | Flanagan et al. (1971) | National | 32,527 | 1960 | Follow-up (5 years) |
| 37 | Berdie and Hood (1963) | Minnesota | 42,142 | 1961 | Prospective |
| 38 | Tillery (1973) | Four States | 33,965 | 1966 | Follow-up (1 year) |
| 39 | Eckland and Henderson (1981) | National | 20,092 | 1972 | Follow-up (4 years) |
| 40 | Gardner (1987) | National | 9,955 | 1980 | Follow-up (2 years) |

*Note:* Each row is a historical study on college attendance patterns. Columns provide the reference, geographic scope of the study, sample size, high school graduation cohort, and when college attendance was tracked.

## Table E1: Basic Sample Details, Part B

| No. | Background | Number | Ability | Number |
|---|---|---|---|---|
| 1 | | | Test score (Indiana University Intelligence) | 10 |
| 2 | | | Test score (Terman Group) | 15 |
| 3 | | | Test score (Mentimeter) | 15 |
| 4 | | | Test score (Brown University) | 3 |
| 5 | | | Test score (Otis) & class rank (student) | 11 & 12 |
| 6 | | | Test score (Otis) | 9 |
| 7 | | | Test score (Haggerty Intelligence) | 15 |
| 8 | | | Test score (Ohio Psychological) | 32 |
| 9 | Socioeconomic status (constructed) | 10 | Test score (unknown) | 7 |
| 10 | | | Test score (Iowa Every-Pupil) | 8 |
| 11 | Socioeconomic status (researcher) | 5 | | |
| 12 | | | Test score (American Council) | 16 |
| 13 | | | Test score (American Council) | 27 |
| 14 | | | Test score (American Council) | 25 |
| 15 | Family income (tax records) | 4 | Class rank (administrative) | 3 |
| 16 | Socioeconomic status (researcher) | 5 | | |
| 17 | Family income (parents) | 5 | | |
| 18 | | | Class rank (administrative) | 3 |
| 19 | | | Test score (Iowa Tests of Educational Development) | 11 |
| 20 | | | Class rank (administrative) | 5 |
| 21 | | | Test score (American Council) | 4 |
| 22 | Family income (student) | 6 | Test score (American Council) & class rank (administrative) | 21 & 20 |
| 23 | Socioeconomic status (researcher) | 5 | Test score (unspecified IQ test) | 3 |
| 24 | | | Class rank (uncertain) | 4 |
| 25 | Family income (tax records) | 3 | Test score (unspecified IQ test) | 3–4 |
| 26 | | | Test score (American Council) | 13 |
| 27 | | | Class rank (administrative) | 3 |
| 28 | | | Test score (unnamed) & class rank (administrative) | 4 & 10 |
| 29 | | | Test score (New York State Scholastic) | 6 |
| 30 | | | Test score (Henmnon-Nelson) & class rank (administrative) | 10 & 10 |
| 31 | Socioeconomic status (researcher) | 4 | Test score (Henmon-Nelson) | 4 |
| 32 | Family income (student) | 5 | Test score (American Council) | 3 |
| 33 | | | Class rank (administrative) | 5 |
| 34 | Family income (parents) | 5 | Test score (various) & class rank (administrative) | 4 & 4 |
| 35 | | | Test score (various) & class rank (administrative) | 5 & 5 |
| 36 | Socioeconomic status (researcher) | 4 | Test score (unnamed) | 4 |
| 37 | Family income (student) | 6 | Test score (Minnesota Scholastic) & class rank (administrative) | 10 & 10 |
| 38 | Family income (student) | 5 | Test score (Academic Ability Test) | 8 |
| 39 | Socioeconomic Status (student) | 3 | Test score (composite) | 3 |
| 40 | SES and Family income (student) | 4 | Test score (composite) | 4 |

*Note:* Each row is a historical study on college attendance patterns. Columns provide how family background was measured and how many bins were used, as well as how academic ability was measured and how many bins were used.

## Table E1: Basic Sample Details, Part C

| | Unconditional estimates | | Conditional estimates | |
|---|---|---|---|---|
| No. | $\beta_s$ | $\beta_p$ | $\beta_s$ | $\beta_p$ |
| 1 | 0.11 | | | |
| 2 | 0.29 (1921) & 0.42 (1922) | | | |
| 3 | 0.28 | | | |
| 4 | 0.35 | | | |
| 5 | 0.22 (test) & 0.19 (class rank) | | | |
| 6 | 0.22 | | | |
| 7 | 0.33 | | | |
| 8 | 0.27 | | | |
| 9 | 0.43 | 0.76 | 0.26 | 0.69 |
| 10 | 0.45 | | | |
| 11 | | 0.92 | | |
| 12 | 0.73 | | | |
| 13 | 0.40 | | | |
| 14 | 0.59 | | | |
| 15 | | 0.40 | 0.44 | 0.35 |
| 16 | | 0.65 | | |
| 17 | | 0.39 (1943) & 0.57 (1953) | | |
| 18 | 0.50 | | | |
| 19 | 0.61 | | | |
| 20 | 0.50 | | | |
| 21 | 0.54 | | | |
| 22 | 0.59 (test) & 0.53 (class rank) | 0.29 | | |
| 23 | 0.49 | 0.69 | 0.38 | 0.61 |
| 24 | 0.50 | | | |
| 25 | 0.58 | | 0.69 | 0.41 |
| 26 | 0.48 | | | |
| 27 | 0.79 | | | |
| 28 | 0.61 (test) & 0.55 (class rank) | | | |
| 29 | 0.70 (NYC) & 0.74 (Upstate) | | | |
| 30 | 0.62 (test) & 0.60 (class rank) | | | |
| 31 | | 0.68 | 0.53 | 0.53 |
| 32 | 0.50 | 0.24 | 0.48 | 0.19 |
| 33 | 0.69 | | | |
| 34 | 0.71 (test) & 0.62 (class rank) | 0.67 | | |
| 35 | 0.58 (test) & 0.68 (class rank) | | | |
| 36 | 0.82 | 0.75 | 0.67 | 0.49 |
| 37 | 0.76 (test) & 0.73 (class rank) | | | |
| 38 | 0.38 | 0.43 | | |
| 39 | 0.79 | 0.67 | 0.62 | 0.45 |
| 40 | 0.73 | 0.54 (SES) & 0.36 (income) | 0.58 (SES) & 0.68 (income) | 0.36 (SES) & 0.18 (income) |

*Note:* Each row is a historical study on college attendance patterns. Columns provide the unconditional and conditional estimates of $\beta_p$ and $\beta_s$ shown in Figures 2 and 3 of the main paper for each study where they can be computed. Here we report the unadjusted $\beta_p$ coefficients for studies that measure family background using income rather than socioeconomic status. As described in the main text, however, we adjust these coefficients in Figures 2 and 3 to account for the systematic differences in $\beta_p$ values between studies using income and socioeconomic status. We also note that the conditional coefficients shown here for Updegraff (1936) and Flanagan et al. (1971) differ slightly from the coefficients in Table 2 because those in Table 2 were calculated for exact quartiles, whereas these are calculated for the number and size of bins given in the original study.

# References


**Aikin, Wilford M.**, *The Story of the Eight-Year Study*, Vol. 1 of *Adventure in American Education*, New York: Harper & Brothers, 1942.

**Ames, Walter Ray**, "Intelligence of High School Seniors in Montana." PhD dissertation, University of Wisconsin–Madison 1926.

**Barker, Richard W.**, "The Educational and Vocational Careers of High School Graduates Immediately Following Graduation in Relation to Their Scholastic Abilities," Master's thesis, State University of Iowa 1937.

**Belley, Philippe and Lance Lochner**, "The Changing Role of Family Income and Ability in Determining Educational Achievement," *Journal of Human Capital*, 2007, *1* (1), 37–89.

**Benson, Viola E.**, "The Intelligence and Later Scholastic Success of Sixth-Grade Pupils," *School and Society*, 1942, *55*, 163–167.

**Berdie, Ralph F.**, *After High School – What?*, Minneapolis, MN: University of Minnesota Press, 1954.

_ **and Albert B. Hood**, *Trends in Post-High School Plans Over an 11-Year Period*, Minneapolis, MN: Student Counseling Bureau, University of Minnesota, 1963.

**Book, William F.**, *The Intelligence of High School Seniors as Revealed by a Statewide Mental Survey of Indiana High Schools*, New York: Macmillan, 1922.

**Bound, John and Sarah Turner**, "Going to War and Going to College: Did World War II and the GI Bill Increase Educational Attainment for Returning Veterans?," *Journal of Labor Economics*, 2002, *20* (4), 784–815.

**Bowles, Frank**, *The Refounding of the College Board, 1948-1963*, New York: College Entrance Examination Board, 1967.

**Bureau of Labor Statistics**, "Consumer Price Index - All Urban Consumers," 1913-2019. https://www.bls.gov/cpi/data.htm (accessed August 21, 2019).

_ , "National Longitudinal Survey of Youth, 1979," 1979-2016. https://www.nlsinfo.org/investigator/pages/login.jsp (accessed June 9, 2015).

**College Board**, "Trends in Student Aid," various years.

**Colvin, Stephen S. and Andrew H. MacPhail**, *Intelligence of Seniors in the High Schools of Massachusetts*, Washington, DC: Government Printing Office, 1924.

**Conlan, Timothy J.**, *The Evolution of a Problematic Partnership: The Feds and Higher Education*, Vol. 6 of *The Federal Role in the Federal System: The Dynamics of Growth*, Washington, DC: Advisory Commission on Intergovernmental Relations, 1981.

**Cowen, Philip A.**, *Needs and Facilities in Higher Education in New York State*, Albany: University of the State of New York and the State Education Department, 1957.

**Daughtry, Alex A.**, *A Report on the Post-Graduation Activities of the 1955 Kansas High School Graduates*, Emporia, KS: Graduate Division of the Kansas State Teachers College, 1956.

**Davis, Allison, Burleigh B. Gardner, and Mary R. Gardner**, *Deep South: A Social Anthropological Study of Caste and Class*, Columbia: University of South Carolina Press, 2009.

**Davis, Helen E. and Elmo B. Roper**, *On Getting Into College: A Study Made for the Committee on Discriminations in College Admissions*, Washington, DC: American Council on Education, 1949.

**Donovan, Kevin and Christopher Herrington**, "Factors Affecting College Attainment and Student Ability in the U.S. since 1900," *Review of Economic Dynamics*, 2019, *31*, 224–244.

**Eckland, Bruce K. and Louise B. Henderson**, *College Attainment Four Years After High School* Washington, DC, National Center for Education Statistics, 1981.

**Flanagan, John C., Frederick B. Davis, John T. Dailey, Marion F. Shaycoft, David B. Orr, Isadore Goldberg, and Clinton A. Neyman Jr.**, *The American High-School Student: The Identification, Development, and Utilization of Human Talents*, Pittsburgh, PA: Project TALENT Office, University of Pittsburgh, 1964.

**_ , Marion F. Shaycoft, James M. Richards Jr., and John G. Claudy**, "Five Years After High School," Technical Report, American Institutes for Research and University of Pittsburgh 1971.

**French, John W., M. Clemens Johnson, William G. Mollenkopf, and Glen Stice**, *Background Factors Relating to College Plans and College Enrollment Among Public High School Students*, Princeton, NJ: Educational Testing Service, 1957.

**Gardner, Burleigh B., Mary R. Gardner, and Martin B. Loeb**, "Social Status and Education in a Southern Community," *School Review*, 1942, *50* (3), 179–191.

**Gardner, John A.**, *Transition from High School to Postsecondary Education: Analytical Studies*, Washington, DC: Center for Education Statistics, Office of Educational Research and Improvement, U.S. Department of Education, 1987.

**Grayson, Lawrence P.**, "A Brief History of Engineering Education in the United States.," *Engineering Education*, 1977, *68* (3), 246–264.

**Harno, Albert J.**, *Legal Education in the United States: A Report Prepared for the Survey of the Legal Profession*, San Francisco: Bancroft-Whitney, 1953.

**Harris, Seymour Edwin**, *Higher Education: Resources and Finance*, New York: McGraw-Hill, 1962.

**Haven, Elizabeth W. and Dwight H. Horch**, *How College Students Finance Their Education: A National Survey of the Educational Interests, Aspirations, and Finances of College Sophomores in 1969–1970*, Princeton, NJ: College Scholarship Service of the College Entrance Examination Board, 1972.

**Hendricks, Lutz and Todd Schoellman**, "Student Abilities During the Expansion of US Education," *Journal of Monetary Economics*, 2014, *63*, 19–36.

**Henmon, Vivian A.C. and Frank O. Holt**, *A Report on the Administration of Scholastic Aptitude Tests to 34,000 High School Seniors in Wisconsin in 1929 and 1930*, Madison, WI: Bureau of Guidance and Records of the University of Wisconsin, 1931.

**Herrnstein, Richard J. and Charles Murray**, *The Bell Curve: Intelligence and Class Structure in American Life*, New York: Free Press, 1994.

**Hiatt, Mark D. and Christopher G. Stockton**, "The Impact of the Flexner Report on the Fate of Medical Schools in North America after 1909," *Journal of American Physicians and Surgeons*, 2003, *8* (2), 37–40.

**Hollis, Ernest V.**, *Costs of Attending College: A Study of Student Expenditures and Sources of Income*, Washington, DC: U.S. Government Printing Office, 1957.

**Horn, Laura and Stephanie Nevill**, "Profile of Undergraduates in U.S. Postsecondary Education Institutions, 2003-04: With a Special Analysis of Community College Students

(NCES 2006-184)," U.S. Department of Education. Washington, DC: National Center for Education Statistics. 2006.

**Hoxby, Caroline M.**, "The Changing Selectivity of American Colleges," *Journal of Economic Perspectives*, 2009, *23* (4), 95–118.

**Iffert, Robert E.**, "Retention and Withdrawal of College Students," Technical Report 1, U.S. Department of Health, Education, and Welfare 1958.

**Jencks, Christopher and David Riesman**, *The Academic Revolution*, Garden City, NY: Doubleday, 1968.

**Jennings, Dolf**, *A Report On the Activities of the 1958 Montana High School Graduates Enrolling in College, Autumn 1958*, Helena, MT: Montana State Department of Public Instruction, Guidance and Counseling Services, 1960.

**Jones, Tom Morris**, "Comparisons of Test Scores of High School Graduates of 1954 who Go to College with Those who Do Not Go: And a Study of Certain Factors Associated with Going to College." PhD dissertation, University of Arkansas 1956.

**Junker, Buford H.**, *Hometown; A Study of Education and Social Stratification* 1940.

**Keller, Robert J., R. A. Kehl, and T. J. Berning**, "The Minnesota Public High School Graduates of 1945 - One Year Later," in Ruth E. Eckert, ed., *Higher Education in Minnesota*, Minneapolis, MN: University of Minnesota Press, 1950.

**Labaree, David F.**, "An Uneasy Relationship: The History of Teacher Education in the University," in Marilyn Cochran-Smith, Sharon Feiman-Nemser, and D. John McIntyre, eds., *Handbook of Research on Teacher Education: Enduring Issues in Changing Contexts*, Washington, DC: Routledge, 2008, chapter 18.

**Lansing, John B., Thomas Lorimer, and Chikashi Moriguchi**, *How People Pay for College*, Ann Arbor, MI: Survey Research Center, Institute for Social Research, University of Michigan, 1960.

**Little, J. Kenneth**, "A Statewide Inquiry into Decisions of Youth about Education Beyond High School," Technical Report, School of Education, University of Wisconsin 1958.

**Livesay, Thayne M.**, "Test Intelligence and College Expectation of High School Seniors in Hawaii," *Journal of Educational Research*, 1942, *35* (5), 334–337.

**Lovenheim, Michael F. and C. Lockwood Reynolds**, "Changes in Postsecondary Choices by Ability and Income: Evidence from the National Longitudinal Surveys of Youth," *Journal of Human Capital*, 2011, *5* (1), 70–109.

**Lynaugh, Joan E.**, "Nursing the Great Society: the Impact of the Nurse Training Act of 1964," *Nursing History Review*, 2008, *16* (1), 13–28.

**Mann, G. W.**, "Selective Influence of Desire to Attend College," *High School Journal*, 1924, *7* (1), 8–9.

**Manuel, Herschel T.**, *Abilities of College Freshmen, 1937 and Other Studies* Research Bulletin Number 7, University Station, Austin, TX: Administrative Board of the Texas Commission on Coordination in Education, 1938.

_ , *Youth of College Age in Texas* Research Bulletin Number 9, University Station, Austin, TX: Administrative Board of The Texas Commission on Coordination in Education, 1939.

**Medsker, Leland L. and James W. Trent**, *The Influence of Different Types of Public Higher Institutions on College Attendance from Varying Socioeconomic and Ability Levels* Cooperative Research Project, No. 438, Berkeley, CA: Center for the Study of Higher Education, University of California, 1965.

**Morehead, Charles G.**, "What's Happening to Our High-School Seniors?," *Journal of Arkansas Education*, 1950, *23*, 12–27.

**Nam, Charles B. and James D. Cowhig**, *Factors Related to College Attendance of Farm and Non-farm High School Graduates, 1960* Series Census-ERS (P-27) No. 32, Washington, DC: Bureau of the Census, 1962.

**OBrien, Francis P.**, "Mental Ability with Reference to Selection and Retention of College Students," *Journal of Educational Research*, 1928, *18* (2), 136–143.

**Odell, Charles W.**, *Are College Students a Select Group?*, Urbana, IL: University of Illinois, 1927.

**Phearman, Leo T.**, "Comparisons of High School Graduates Who Go to College with Those Who Do Not Go to College." PhD dissertation, State University of Iowa 1948.

**Pierson, Frank C.**, *The Education of American Businessmen: A Study of University-College Programs in Business Administration*, New York: McGraw-Hill, 1959.

**Roper, Elmo Burns**, *Factors Affecting the Admission of High School Seniors to College: A Report by Elmo Roper for the Committee on a Study of Discriminations in College Admissions*, Washington, DC: American Council on Education, 1949.

**Ruggles, Steven, Trent J. Alexander, Katie Genadek, Ronald Goeken, Matthew B. Schroeder, and Matthew Sobek**, "Integrated Public Use Microdata Series: Version 5.0 [Machine-readable database]," Minneapolis, MN: Minnesota Population Center [producer and distributor] 2010. Available online at http://usa.ipums.org/usa/.

**Scott, Don A.**, "The Scholastic Ability of Iowa High School Graduates in Relation to Their Intended Educational, Vocational, and Professional Careers and to the Institutions of Higher Education They Plan to Attend." PhD dissertation, University of Iowa 1935.

**Sewell, William H. and Vimal P. Shah**, "Socioeconomic Status, Intelligence, and the Attainment of Higher Education," *Sociology of Education*, 1967, *40* (1), 1–23.

**Shafroth, Will, ed.**, *Annual Review of Legal Education for 1938*, Chicago, IL: American Bar Association, 1939.

**Sibley, Elbridge**, "The Relation Between College Attendance and Economic Status," in "Matching Needs and Facilities in Higher Education," Albany, NY: Williams Press, 1948, chapter Appendix, pp. 113–126.

**Stanley, Marcus**, "College Education and the Midcentury GI Bills," *Quarterly Journal of Economics*, 2003, *118* (2), 671–708.

**State University of New York**, *Crucial Questions about Higher Education*, Albany: State University of New York, 1955.

**Stroup, Francis and Dean C. Andrew**, *Barriers to College Attendance: The Report of a Study of Factors Related to Eductional Discontinuance of High-School Graduates* 1959.

**Tillery, Dale**, *Distribution and Differentiation of Youth: A Study of Transition from School to College*, Cambridge, MA: Ballinger, 1973.

**Trent, James W. and Leland L. Medsker**, *Beyond High School: A Study of 10,000 High School Graduates*, San Francisco: Jossey-Bass, 1968.

**Updegraff, Harlan**, *Inventory of Youth in Pennsylvania*, Washington, DC: American Youth Commission of the American Council on Education, 1936.

**U.S. Census Bureau**, *Statistical Abstract of the United States*, Washington, DC: U.S. Government Printing Office, various years.

**Warner, W. Lloyd and Paul S. Lunt**, *The Social Life of a Modern Community*, New Haven, CT: Yale University Press, 1941.

**White, Reuel C.**, *These Will Go to College: A Study of Future Demand for Admission to College by Secondary School Graduates in the Cleveland-Akron-Lorain Area*, Cleveland: Press of Western Reserve University, 1952.

**Wiegman, Robert R. and Paul B. Jacobson**, "How Well Did They Know?," *Journal of Higher Education*, 1955, *26* (5), 267–270.

**Zook, George Frederick**, *Higher Education for American Democracy: A Report*, Vol. 2, US Government Printing Office, 1947.