Selective Chances: Identifying the Causal Effect of College Selectivity on Bachelor's Degree Completion

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Abstract:
Low-income students who pursue postsecondary education predominantly attend less selective or nonselective colleges, where less than half of enrollees finish a degree. Scholars have argued that qualified students should enroll in more selective colleges because they have better resources that facilitate higher graduation rates. However, the higher graduation rates at these institutions may be due to the ability of students who meet selective admissions criteria, not college quality. Previous work examining college selectivity focuses on the earnings effects of attending highly selective private universities, overlooking both college graduation and the public institutions that serve most students. This paper identifies the causal impact of selective public universities on the probability of bachelor's degree completion. I use distance to the nearest selective public university as an instrumental variable for attendance to identify causal effects. Using restricted-access data from the National Longitudinal Study of Youth 1997, I find that attendance at state flagships and other selective public colleges increases the probability of graduation by 50-60 percentage points, controlling for student grades and demographic characteristics. This research contributes to the literature by providing strong evidence on the causal effect of college selectivity on degree completion and the benefits of attending public universities, which account for the majority of students enrolled in four-year institutions. The findings suggest students should be encouraged to enroll in the most selective colleges they are qualified to attend. Students who undermatch by enrolling in less selective colleges than they are qualified for, may be harmed by attending these institutions.

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I. Introduction

Income inequality in higher education is a growing concern among scholars and policymakers. Children raised in high-income families are much more likely to attend college and earn a degree than students from low-income backgrounds (Haveman and Wilson 2007). Although college participation among low-income students has increased over time, the gains are overshadowed by much larger increases in enrollment and degree completion among high-income students (Bailey and Dynarski 2011). Income gaps in degree attainment can reinforce and perpetuate overall income inequality through the college wage premium.

Low-income students who pursue postsecondary education often enroll in less selective colleges than students from wealthy families. Individuals from low socioeconomic status (SES) families are less likely to attend highly selective colleges and colleges that spend more per student, compared to high SES students (McPherson and Schapiro 2002; Hearn 1991; Davies and Guppy 1997; Hearn 1984). Further, the negative relationship between SES and selectivity of college attended has persisted since 1960 (Karen 1991; 2002). Sociologists have noted that the growing divide between low income and high-income students within the same tiers of higher education is leading to horizontal stratification (Gerber and Cheung 2008).[1]

Even academically qualified low-income students attend less selective colleges, a phenomenon called undermatching (Roderick et al. 2008; Bowen et al. 2009; Dillon and Smith 2009). For example, over 60% of Chicago public school students enrolled in postsecondary institutions that are less selective than the colleges to which they likely would have been accepted based on their high school academic performance (Roderick et al. 2008). In North

[1] In contrast, vertical stratification refers to income segregation across levels of education, e.g. community colleges vs. four-year colleges.

Carolina, more than 40% of highly qualified students (who have a combination of high school grades and standardized test scores that result in admission for 9 out of 10 applicants) do not attend the most selective state universities (Bowen et al. 2009). Nationwide, the majority of high-achieving, low-income students who go to college attend institutions that are rated as less selective or nonselective (Wyner et al. 2009).

Educators are concerned about rising enrollment in less selective colleges because these institutions typically have fewer resources to support successful student outcomes, in particular degree completion. At less selective four-year colleges, i.e. colleges that accept 75% or more of applicants, half of the students who enroll will not complete a degree (College Board 2011). On average, only one-in-four students will graduate if they attend four-year colleges with open admissions standards, where the graduation rate can dip as low as 8% (College Board 2011; Hess et al. 2009). The extremely low chances of graduating at less selective colleges prompted one analyst to label these institutions "failure factories" (Schneider 2008).

Previous research on the effects of college selectivity wrestles with selection bias problems, focuses on the impact of attendance on earnings, and is limited to a narrow slice of extremely selective private universities. Early work observes a strong association between selective college enrollment and positive financial and social outcomes (e.g. Bowen and Bok 1998). However, selective college attendance is endogenous. More motivated students may choose to attend more selective colleges, which could be driving the results. A long line of literature notes that students who attend more selective colleges go on to earn more money than those who attend less selective colleges (e.g. Weisbrod and Karpoff 1968; Brewer et al. 1999), but relatively few studies have examined the effects of attendance on college degree completion.

Finally, almost all prior studies are confined to the most highly selective private universities that serve a small fraction of the postsecondary population.

My research fills these gaps by identifying the causal impact of selective public universities on the probability of bachelor's degree completion. Using data from the National Longitudinal Study of Youth 1997, I find that attending a selective public college results in a 0.5-0.6 increase in the probability of completing a bachelor's degree. To address selection bias arising from students choosing to attend certain colleges, I employ instrumental variables estimation and use distance to the nearest selective public college as an instrument for college attendance. As a result, the estimates are interpretable as the causal effect of selectivity on graduation. The findings are robust to alternative specifications and estimation strategies.

This research contributes to the literature by providing strong evidence of the causal effect of college selectivity on degree completion. In addition, I show that the positive effect applies to public universities, which account for the majority of all students and low-income students enrolled in four-year institutions. The findings suggest that students wishing to earn a degree should be encouraged to apply to and enroll in the most selective colleges they are qualified to attend. These institutions improve individuals' chances of graduating from college, independent of student characteristics. Students who undermatch, i.e. their high school performance is well above the average of admitted students at the college attended, may have a lower chance of earning a degree by enrolling in less selective colleges.

Importance and Timeliness

This research has major policy implications because college choice influences individual and societal outcomes. A number of studies find that attendance at selective colleges is associated with higher future earnings (James et al. 1989; Loury and Garman 1995; Daniel et al.

1997; Bowen and Bok 1998; Brewer et al. 1999; Monks 2000; Zhang 2005; Hoekstra 2009; Andrews et al. 2012).[2] Further, the positive effect on wages of attending highly selective colleges has increased over time, from the 1970s to the 2000s (Brewer et al. 1999; Long 2010). The earnings effect is independent of individual endowments, as demonstrated in studies using twins (Behrman et al. 1996). Other work suggests that minority students and those students whose parents have low levels of education receive the biggest future earnings benefit from attending highly selective private institutions (Dale and Krueger 2011; 2002).

In addition, elite college attendance is associated with better individual outcomes that are important for society. Students who enroll in highly selective colleges exhibit better health characteristics after college, including physical functioning and perceived health (Ross and Mirowsky 1999). Selective college attendance is also correlated with reduced tobacco and marijuana use (Fletcher and Frisvold 2011).[3] Students who go to elite colleges are less likely to get divorced (Bowen and Bok 1998). College quality has positive effects on delay of marriage and childbearing; these effects have increased over the past 40 years (Long 2010).

The rest of this paper proceeds as follows. In the next section, I present previous theoretical and empirical work on the educational effects of college quality and present my research questions. The following section describes the national data and quasi-experimental methods used in my analysis. Then, I present my findings and discuss the results. The final section concludes.

II. Theoretical and Empirical Work on College Quality

Economic and Sociological Theory

[2] Students who enroll in a highly selective college are also more likely to attend graduate school (Eide et al. 1998), which is associated with higher earnings.
[3] However, college selectivity has a small positive relationship with binge drinking (Fletcher and Frisvold 2011).

Theories in economics and sociology posit that the quality of the college attended can both directly and indirectly influence students' labor market and educational outcomes. Several theories predict that college selectivity has a positive effect on future earnings. The human capital model predicts this relationship on the basis of greater resources and investment. Higher quality colleges have better instructors and facilities, and spend more money on the educational process, which combine to increase student learning. As a result, students who attend high quality institutions build up more human capital than other students who attend low quality colleges. The increased human capital is rewarded with higher wages from employers in the labor market. A variant of the signaling model also predicts higher earnings due to selective college attendance, but the reasons are very different. According to this model, selective colleges do not necessarily perform a better job of educating students. Instead, attendance at an elite institution sends a signal to potential employers that the student possesses superior qualities by virtue of meeting stringent college admissions criteria. Consequently, employers will reward these students for perceived qualities, as opposed to the knowledge acquired at the high quality college. Finally, social capital theory also predicts a positive relationship between college selectivity and earnings but on the basis of networks and stratification. Students who attend selective institutions may be introduced to a new set of social circles from which they were previously excluded. This exposure can enhance their social capital, defined as the networks, relationships, and connections in which social interactions are embedded. These relationships are important for gaining access to people in positions of power, like employers, particularly for high paying jobs.

College selectivity is also theorized to have an important effect on degree attainment but the sign is unclear *a priori*, i.e. the effect could be positive or negative. On the one hand, more

selective colleges may have positive effects on student chances of graduation because these institutions have more resources and higher peer quality. An education production function approach suggests that better inputs will lead to better outputs. For example, greater financial resources may enable colleges to attract better teachers, provide more individualized attention by reducing student-faculty ratios, spend more on student instructional tools, provide more and better academic counseling support, and offer more financial aid so students need not hold a job while going to school (e.g. see Alon and Tienda 2005). Also, more selective colleges may surround students with more motivated peers, who help cultivate a strong academic culture that encourages success. High peer quality is also beneficial because an important component of learning during college occurs outside of the classroom (Winston 1999).

On the other hand, student chances of graduation may be harmed by attending selective colleges due to rigorous academic standards and social isolation. Intuitively, it should be harder to graduate from colleges with strict admissions criteria because these institutions demand more from their students. Selective colleges may establish a high bar for acceptable academic performance, which makes it more difficult for students to succeed than if they attended institutions with lower passing standards. The potential negative effect of stringent academic criteria can be exacerbated if there is a serious mismatch between individual achievement and the average level of performance of other students (Alon and Tienda 2005). College mismatches can have the psychological effect of demoralizing students and lowering their self-esteem when they feel they do not measure up. Exclusive social circles at selective colleges can lead some students to feel socially isolated, which can harm the chances of degree completion (Tinto 1987). This isolation can be especially difficult for low income students attending elite private universities that have historically catered to wealthy families (Espenshade and Radford 2009). Finally,

highly selective colleges may foster a hyper competitive academic culture that values individual achievement more than helping each other. Consequently, some students may fall behind their peers and never catch up.

To summarize, standard economic and sociological theories agree that college quality should have a positive relationship with future earnings but the impact on graduation is uncertain. High quality colleges may provide more resources to support student success. Or, the tough academic standards at selective colleges may make it more difficult for students to finish. Empirical research is needed to resolve this question.

Empirical Studies of Selectivity Effects

Empirical work in education and economics has begun to look more closely at the educational effects of selective college proximity and enrollment. Early research on the effects of education focused on years of schooling but even then scholars recognized the importance of school quality (Weisbrod and Karpoff 1968).[4] Studies have examined the relationship between college selectivity, application, attendance, and degree completion.

Application

Research indicates that the presence of a selective college can influence students' interest in postsecondary institutions. Living close to a selective college shows a positive relationship with the quality of colleges to which students apply. Based on National Longitudinal Study of Youth 1997 (NLSY97) data, students are less likely to apply to a selective four-year college the farther away they live from this type of institution: an increase in distance of 75 miles (0.5 s.d.) is associated with a two percentage point decrease in the probability of application (Griffith and Rothstein 2009). Perhaps counter intuitively, low-income students do not exhibit greater

[4] Weisbrod and Karpoff (1968) also highlighted the important effects on postsecondary earnings of unobserved individual characteristics like motivation and ambition, whose effects could be wrongly attributed to years of schooling.

sensitivity to distance than similar high income students. The authors use a bivariate probit model with selection to account for two stages of the higher education decision process: 1) application to a four-year college, and 2) application to a selective vs. a non-selective four-year college. College selectivity is determined by *Barron's Guide* rankings of colleges as "most competitive" or "highly competitive." The major limitation of this work is that the analysis does not adequately control for students with certain characteristics choosing to attend more selective or less selective colleges.

Other research confirms the relationship between proximity and college applications using different data. Based on the National Education Longitudinal Study of 1988 (NELS88), students who live closer to more four-year colleges are more likely to apply to four-year colleges (Turley 2009). Proximity is measured using student commuting distance to college (12 miles for urban settings, 24 miles for suburban or rural areas). The average effect is small: each additional college within commuting range is associated with a 1% increase in the odds of applying. Although this study provides evidence on the importance of geography for college applications, there is a concern about omitted variables. In other words, the effects attributed to college proximity might actually be due to other variables that are correlated with proximity.

Attendance

Living near a selective college also appears to have a positive effect on the quality of colleges that students eventually attend.[5] More recent studies build on earlier work (Card 1993; Rouse 1995; Kling 2000; Currie and Moretti 2003) that used distance to the nearest college or the local concentration of colleges as instrumental variables and found that proximity to colleges increases attendance and years of education. Controlling for family income, parental education,

[5] A recent study finds that distance to the nearest university also influences the choice of field of study (Denzler and Wolter 2011).

and demographic variables, students who live closer to universities are far more likely to attend than students who live farther away (Frenette 2006). In the context of college quality, evidence from High School and Beyond 1980 data indicates that living near a top tier public university is associated with increases in the quality of college attended (0.27 standard deviations), but only for students from low socioeconomic status backgrounds (Do 2004). Living near a low tier university (public or private) is associated with decreases in the quality of college attended for low-income students. In this study, college quality is measured using ratings from the Gourman Report. The results suggest that high quality colleges have positive spillover effects. These institutions may provide role models and information about postsecondary education to local residents.

Completion

Relatively few studies have examined the relationship between college selectivity and degree completion, while controlling for the influence of confounding factors. Nearly all of these studies raise concerns about selection bias.

Initial work suggests that the effect of college selectivity on postsecondary degree completion depends on the match between observed student ability and institutional standards for academic performance. The probability of graduation rises with college quality as long as college quality closely aligns with student ability, as measured by scores on the Armed Forces Qualification Test (AFQT) (Light and Strayer 2000). In this context, college quality is measured by the median SAT of entering freshman and total expenditures per student. Although the probability of graduation rises with student AFQT scores at institutions in the top three quartiles of college quality, the relationship does not hold for bottom quartile colleges. Instead, higher ability students exhibit a lower chance of earning a degree if they attend a bottom quartile

college. This finding suggests that institutional quality or peer effects can harm students, even if they have demonstrated strong ability. The primary concern with this work is that it is an observational study that does not adequately control for selection bias. As the authors note, unobserved variables affect the college attendance decision, which also affects the chances of college completion. In other words, the impact on graduation may be inaccurately attributed to college quality, instead of to differences in unobserved student variables.

Other work finds that college quality has a positive effect on bachelor's degree attainment, but these results are sensitive to the type of model used. Long (2008) conducts multiple analyses and compares the results of using ordinary least squares regression (OLS), instrumental variables estimation (IVE), selection on observables, and propensity score matching (PSM). Based on NELS88 data, the average SAT scores of incoming students have a positive relationship with degree completion in the OLS ($\beta = 0.104$, $p < 0.01$), IVE ($\beta = 0.218$, $p < 0.05$), and PSM ($\beta = 0.104$, $p < 0.01$) models. The work examines several different measures of college quality: 1) median freshman SAT/ACT score, 2) average net tuition, 3) full professor salary, 4) faculty-student ratio, and 5) an index of the above measures. One limitation of this study is the choice of instrument: the average quality of colleges within a certain radius of the student's home is used as an instrument for the quality of college attended.[6] Areas with few colleges could have the same average quality as dense college areas, but students would face very different choice sets. The large radius used, 176 miles, raises questions about its applicability, especially for sample respondents who live in urban areas.[7]

[6] As Long (2008) explains, "Because there is a cost to the student of attending college far away from home, students are more likely to attend nearby. Nearby high-quality colleges lower the cost of obtaining a high-quality college education. Even if students do not care about quality, if they choose to attend a nearby college and if colleges nearby are high quality, they are more likely to attend a high-quality college by default" (592).

[7] Additionally, the instrument would imply that the existence of institutions like Georgetown University in Washington, DC would influence the college decisions of students in Allentown, PA and Trenton, NJ, which seems unlikely.

Recent work indicates that enrolling in a lower quality public university significantly reduces the chances of earning a degree (Cohodes and Goodman 2012). Further, the negative effect is attributed to high performing students who could have attended higher quality colleges. The authors use a compelling research design based on a merit aid program that offers state college tuition waivers to students scoring above certain thresholds. However, the regression discontinuity and state dataset limit the range of student ability and institutional selectivity under study.

Research examining the effects of college quality on degree completion for minority students yields mixed results. Conditional on college attendance, blacks and Hispanics are more likely to graduate than whites, controlling for demographics (age, gender), family characteristics (income, number of siblings, and mother's education), and local variables (unemployment rate and the proportion of residents who go to college) (Light and Strayer 2000). Minority students in Texas appear to benefit from attending more selective colleges, thanks to the state's top 10% plan, which guarantees college admission to students finishing in the top decile of their high school class (Cortes and McFarlin 2008).

However, closer analysis indicates that college selectivity can have a negative effect on the probability of degree completion for minority groups. Based on National Longitudinal Study data of 1972, black students with low SAT scores are less likely to graduate if they attend more selective colleges, as opposed to less selective ones (Loury and Garman 1995). Within selective colleges, black students with low SAT scores have a lower probability of obtaining a degree than white students with similar scores (Loury and Garman 1995). The findings suggest that mismatches between low student test scores and high levels of selectivity can be harmful for minority students. Also, a recent study of the Texas plan uses a more robust local average

treatment effect (LATE) framework and finds selectivity has negative effects on the probability of graduation for minority students (Furstenberg 2010).

Selection Bias Problem

The primary concern with most of these studies is that selective college attendance is endogenous. Students with certain characteristics may choose to enroll in more selective colleges, in which case the observed effects would be incorrectly attributed to college quality, instead of selection bias. Similarly, highly selective institutions may only admit students who possess certain unobserved characteristics that would lead to educational outcomes regardless of the college attended. In other words, these estimates of college quality are likely to be upwardly biased.

For example, assume that student motivation, which is unobserved, is the key factor that determines bachelor's degree completion. Consider the case where more motivated students mostly enroll in selective colleges and less motivated students mostly enroll in non-selective colleges. In this situation, the graduation rate at selective colleges would be very high and at non-selective colleges it would be low. If we did not account for student motivation, we might incorrectly attribute the higher graduation rate to college selectivity.

III. Data and Methods

I use the restricted-access version of the National Longitudinal Survey of Youth 1997 (NLSY97), which consists of a nationally representative sample of 8,984 individuals born between 1980 and 1984. Households were randomly selected for participation in the survey. Individuals were first surveyed in 1997, when they were between the ages of 12 and 16. Follow up surveys were conducted on an annual basis thereafter. In 2010, 7,561 individuals participated in follow up interviews for a retention rate of 84%. The dataset is more comprehensive than

other surveys as it includes individuals who usually reside in the household but were away at school, hospitals, correctional facilities, or other institutions.

For the main analysis, I define the sample as respondents who enrolled in either two-year or four-year colleges. I include two-year college attendees because many students initially enroll in community colleges before transferring to a four-year college to obtain a bachelor's degree. Community colleges can be especially attractive to low-income students because the low cost of attendance means they can effectively save two years of tuition en route to a four-year degree. In addition, many state university systems have developed well-articulated transfer agreements with local community colleges. The results are qualitatively similar whether they are based on two-year and four-year college enrollees, four-year college enrollees only, or all individuals (see below).

NLSY97 contains a wide range of information on schooling experience, including high school performance, postsecondary institutions attended, and type of degree received. In addition, the dataset contains family background and demographic information, including mother's education, race, and gender. The restricted-access version also includes information about respondents' geographic location.

Methodology

For students attending college, I model degree completion as a function of college qualities, attendance costs, individual student characteristics, and family background:

$$Y_{ij} = f(Q_j, C_{ij}, X_i, F_i)$$

where for each individual i and college j, Y is an outcome like bachelor's degree attainment, Q is a vector of college qualities like selectivity, C is the student's cost of attending a given college, X is a vector of student characteristics, and F is a vector of family characteristics.

A simple regression of graduation rates on college and student variables cannot distinguish between the effects of institutional factors and unobserved student characteristics. Academically qualified students who pursue postsecondary education often enroll in less selective colleges, which have fewer resources to support student success. However, the lower graduation rates attributed to these colleges could be due to the students who choose to enroll there.

Instrumental Variables Estimation

To isolate the causal effect of college selectivity on graduation, I use residential distance to the nearest state flagship or other selective public university (see below) as an instrument for attendance. To be a valid instrument, distance must be correlated with student attendance at a selective college but uncorrelated with degree completion, conditional on attendance. Based on prior research (e.g. Card 1993; Rouse 1995; Kling 2000; Currie and Moretti 2003), I argue that distance to the nearest state flagship or other selective public university affects students on the margin of attending a selective institution.

The intuition is that students who live close to the state flagship or other selective public university will be more likely to enroll there because of: 1) increased awareness, 2) lower costs, and 3) social ties. First, selective public universities often play prominent social, community engagement, and economic development roles in their regions, so students are more likely to hear about them (Do 2004). Second, the lower tuition rate charged for in-state residents can make nearby public universities a more attractive option than private or out-of-state public institutions (Kane 2007). Students are also more likely to attend nearby colleges because it may be cheaper to live at home (Card 1993) or travel home during holidays and vacations. Third, attending a nearby college makes it easier to maintain social relationships and provide care for

siblings, grandparents, or other relatives (NCES 1998). The key identifying assumption is that student ability does not systematically vary based on relative distance to the state flagship or other selective public university.

The distance instrument captures the effect of college selectivity based on students who are less likely to attend faraway colleges. Therefore, the findings should be interpreted as applying to students whose college choices are sensitive to distance to the state flagship or other selective public university. Students whose decisions are most affected by distance may possess other qualities that negatively affect degree completion. For example, students may stay closer to home because they have a job, provide care for relatives, or fulfill other family responsibilities that make it more difficult to finish college. In this case, my results will underestimate the positive effects of college selectivity on degree completion.

I categorize public universities as selective if the average SAT or ACT scores for admitted students (at both the 75th and 25th percentiles) are in the top quartile of all public universities.[8] State flagships are typically the most selective and most prominent public universities in each state. Well known examples include the University of California at Berkeley, University of Virginia at Charlottesville, and University of Michigan at Ann Arbor. In addition to the top flagships, the categorization includes institutions like UCLA, William and Mary, and Georgia Tech, for a total of 85 selective public universities (see Appendix A).

Selective college enrollment may be correlated with ability or other unobserved qualities that affect degree completion, so I use geographic distance between the student and the nearest state flagship or other selective public university as an instrumental variable for attendance. I

[8] Other measures of selectivity are more vulnerable to gaming by universities. For example, admissions offices may encourage applications from underqualified students to lower the university acceptance rate, which is a commonly used factor in rankings by U.S. News and World Report and others.

calculate the log distance using students' residential location during high school and the locations of selective public universities (see Technical Appendix).

Individual characteristics can influence the likelihood of completing a bachelor's degree, so I attempt to control for these differences using the rich set of variables in the NLSY97 data. Students who enroll in selective universities likely possess stronger academic records than their peers attending less selective colleges. To account for individual differences in academic performance and ability, I include variables for student grade point average in high school and Armed Services Vocational Aptitude Battery (ASVAB) scores.[9] In addition, I control for family and demographic characteristics, like mother's education, race, and gender.

Estimation Strategy

Given that degree completion is a binary outcome, logit or probit models are the preferred estimation strategy but neither lends itself to instrumental variables estimation in this case. For probit models, instrumental variables estimation is possible if the endogenous regressor is a continuous variable. For logit models, reliable instrumental variables estimations have not been developed.[10]

In the analysis that follows, I primarily use linear probability models. Estimations from linear probability models are similar to those from probit and logit models with the added benefit of straightforward interpretation (Angrist and Pishke 2008). Further, linear probability models can be used with instrumental variables estimations when endogenous regressors are dichotomous or count data (Baum 2007; Angrist 2001).

[9] NLSY97 includes college admissions test score information (self-reported SAT or ACT scores) for less than half of the sample of college enrollees. I do not include standardized test scores in the models because they would sharply reduce the sample size. SAT and ACT scores are highly correlated with high school GPA and ASVAB scores, which are included in the models.

[10] In other models (e.g. probit and tobit), maximum likelihood estimators assume joint normal distribution for the error term of the endogenous regressor in the structural and reduced-form equations. It is unclear how one would determine the appropriate bivariate distribution to use for the error terms in an instrumental variables estimation logit model (Poi 2006).

Statistical Model

I estimate the following models using Two-Stage-Least-Squares (2SLS) regression analysis, with clustered standard errors. The first stage uses distance from a respondent's location to the nearest selective public university as an instrumental variable for college attendance. The first stage model is:

$$\Pr\left(y_i^{ATTEND} = 1\right) = \alpha_0 + \alpha_1 D_i + \alpha_2 A_i + \alpha_3 X_i + \varepsilon_i \quad (1)$$

where for each individual i, y^{ATTEND} equals 1 if the individual attended a state flagship or other selective public college, 0 otherwise; D is log distance to the nearest selective public university from the centroid of the individual's county of residence before she or he entered college; A is ability, including high school grade point average and score on the Armed Services Vocational Aptitude Battery; X consists of family background and demographic characteristics, including mother's education, the level of urbanization in the respondent's location, race, and gender; and ε is a random error term.

The second stage uses the predicted attendance from the first stage to determine the impact of selective college attendance on students' probability of graduating. The second stage model is:

$$\Pr\left(y_i^{BA} = 1\right) = \beta_0 + \beta_1 \widehat{ATTEND}_i + \beta_2 A_i + \beta_3 X_i + \nu_i \quad (2)$$

where for each individual i, y^{BA} equals 1 if the individual obtained a bachelor's degree or higher by the time respondents were between 26 and 30 years old, 0 otherwise; $\widehat{\text{ATTEND}}$ is the predicted attendance from the equation above; and ν is a random error term. (All other terms are the same as in the equation above.)

IV. Findings

Descriptive Statistics

Unweighted descriptive statistics for respondents in the NLSY97 cross-sectional sample who enrolled in two-year or four-year colleges (n = 3194) show that about 80% of students attended public colleges or universities and the same proportion enrolled in institutions in their state of residence. In other words, the majority of students who pursue postsecondary education enroll in nearby public institutions. More than half of college enrollees are female; 75% are white. Over 40% earn at least a bachelor's degree; just over 10% attended a selective public university (see Table 1). Average distance to the nearest flagship or selective public university is 100 km, or about 62 miles.

A comparison of students who enrolled in selective public colleges (n = 330) and other colleges (n = 2864) reveals important differences between these two groups. On average, selective public college enrollees have a higher grade point average (3.56 vs. 3.03), ASVAB score (79.9 vs. 57.6), and mother's level of education (14.9 years vs. 13.4 years) than students who attend other colleges (see Table 2). As a result, we must control for these observed differences between groups.

OLS Regression Estimates

OLS regressions provide baseline results showing that attendance at a selective public university is positively associated with the probability of earning a bachelor's degree, controlling for other variables (see Table 3). Attendance has a strong relationship with degree completion when holding constant race, gender, level of urbanization, and mother's education (Column 1). Student high school performance is also an important factor affecting postsecondary degree attainment; it has an independent positive effect (Column 2). Controlling for high school GPA (Model 3), selective public college attendance still has a strong relationship with degree completion (β = 0.298, p<0.001). Similarly, with the inclusion of ASVAB scores as another

measure of student ability (see Columns 4 and 5) the coefficient on selective public college attendance remains positive and statistically significant ($\beta = 0.258$, $p<0.001$). Women are more likely to complete a bachelor's degree, even controlling for selective public college attendance, academic performance, and demographic characteristics. Interestingly, white students are not more likely to earn a degree than minority students, when controlling for these same variables. The sign and level of significance of selective college attendance and control variables are consistent across linear probability, probit, and logit models (see Appendix Table A1). However, these estimates likely overestimate the impact of college selectivity on bachelor's degree completion because of selection bias.

Instrumental Variables Estimation

Instrumental variables (IV) estimates show that attendance at selective public universities has a positive causal effect on bachelor's degree completion, controlling for individual student characteristics (see Table 4). In the first stage, distance has a negative association with attendance at selective public universities ($\alpha = -0.041$, $p<0.001$), as expected. Students who live farther away from selective public universities are less likely to enroll in these institutions. The second stage shows that students who enroll in selective public universities raise their chances of earning a degree. Predicted attendance results in a 0.607 increase in the probability that a student will complete a bachelor's degree.

The coefficient on attendance in the IV model is higher than in the simple biased linear probability models. The magnitude of the coefficient is likely inflated by a linear model applied to a binary outcome, so these coefficients can be interpreted as upper-bound estimates. The coefficients on the control variables in the IV model are similar to the coefficients in the simple regression model, in terms of size, direction, and statistical significance, which supports the

results. The *F* statistic for the instrumental variable is 23.09, which exceeds the threshold of 10 recommended for a variable to be considered a valid instrument (Bound et al. 1995).

The instrumental variables estimates are robust to the inclusion of additional control variables. For example, students who initially enroll in two-year colleges differ in important ways from students who attend four-year colleges, so including the former group could skew the results. If I control for attending a two-year or four-year college, the coefficient on selective public college attendance is slightly higher and more precisely estimated. When I add state dummy variables to control for differences in education systems, college-going rates, and other factors across states, the coefficient decreases slightly. If both college type and state dummy controls are included in the model, the coefficient on selective public college attendance remains statistically significant ($\beta = 0.550$, $p<0.05$, $F=18.89$). Enrolling in a selective public college results in a 55 percentage point increase in the probability of completing a bachelor's degree.

An analysis of subgroups provides suggestive evidence that women receive a bigger benefit from selective public college attendance than men. Controlling for academic and demographic variables, women ($\beta = 0.800$) are more likely to complete a degree if they enroll in a selective public college than men ($\beta = 0.451$), but the coefficients are not precisely estimated (s.e. = 0.420 and 0.249, respectively). An Oaxaca-Blinder decomposition reveals that gender differences in degree completion are approximately equally explained by differences in observed characteristics ($\beta = -0.049$, s.e. = 0.009) and estimated coefficients ($\beta = -0.041$, s.e. = 0.018). I do not find strong evidence of differences in the impact of selective college attendance on whites vs. minorities.

Threats to Validity

There are three main threats to the exclusion restriction: 1) endogenous sorting of families to locations, 2) institutions selecting students, and 3) other factors associated with proximity that affect completion. In addition, the results could be affected by the chosen sample and estimation strategy.

The primary threat is that individual residential location is not randomly assigned with respect to the locations of state flagship and other selective public universities. Families choose to live in certain areas based on local amenities, which may include the presence of a high quality public institution of higher education. If smart families tend to live near selective public universities, then distance to the nearest college will be endogenous. To check this threat to validity, I estimate regressions that use distance to the nearest selective public college to predict various measures of cognitive ability (see Table 5). The results show that distance does not have a statistically significant effect on high school GPA, ACT, or SAT scores, but does have an effect on ASVAB scores. In any case, I include controls for high school GPA and ASVAB scores in my models, which weakens this potential threat to validity.

A related concern is that families with a greater taste for education may choose to live close to selective public colleges. For example, professors at selective public colleges are likely to live near their place of work, send their children to these colleges because of tuition benefits, and place a high value on higher education. Similarly, families may be attracted to college towns because they have strong high schools, thanks in part to well-educated graduates who work as school teachers. Under these circumstances, distance may not be a valid instrument.

Unfortunately, the data does not include information about high school attended or parents' occupation but I conduct several tests to examine the possibility that local schools or the children of college professors are driving the results. First, I recheck the results after excluding

respondents who live closest[11] to selective public colleges, in order to eliminate the effect of local high quality schools. Second, I examine the results after excluding respondents whose mothers have completed more than two years of graduate education, as a proxy for mothers who are college professors or are likely to be married to professors because of assortive mating. Third, I test the results by excluding respondents who live closest to colleges *and* have highly educated mothers, given that families of professors at selective public universities likely live near these institutions. In all three cases, attendance at selective public colleges continues to have a positive, statistically significant effect on degree completion (see Table 6).

As their children reach college age, families who put a high value on college education may strategically move closer to state flagship and other selective public universities. This is unlikely given that families enjoy the benefits of in-state tuition subsidies regardless of where they live relative to the public university, as long as they maintain state residency.[12] In any case, I limit the influence of strategic moves by using respondent's residential location when they were as young as 12 years old. At such an early age, it is unlikely that parents would move in anticipation of potential college attendance at a nearby selective public institution.

A second threat is that selective colleges attract certain types of students because of their institutional reputation. Prominent state flagship universities receive many applications from highly motivated out-of-state residents, who are seeking a high quality education without a private college sticker price. Indeed, some flagships have recently been criticized for sidestepping their state mission by admitting larger proportions of out-of-state students, because they pay higher tuition than in-state residents. Although I cannot directly address this concern, I try excluding respondents who live farthest from selective public colleges and obtain

[11] I use the 5th and 10th (results not shown) percentiles for distance.
[12] Card (1993) explores and rejects the possibility that families of high achieving students relocate to be closer to college campuses.

qualitatively similar results (see Table 6). In addition, some selective public universities offer specialized programs and training that might appeal to success-oriented students, which could bias the results. For example, military service academies and colleges focusing on technology or mining may be more likely to attract students who are extremely focused on completing a degree. However, including controls for these types of institutions does not change the basic results (see Table 7).

Similarly, selective institutions may admit students based on variables that are unobserved by researchers but affect degree completion. For example, admissions officers at selective public colleges may look beyond grades and standardized test scores to place more weight on non-cognitive skills, like motivation and persistence, that are revealed through personal statements, reference letters, and extracurricular activities. Of course, unobservable differences are, by definition, beyond measurement. However, non-cognitive differences between students would need to systematically vary with distance to the nearest selective public college to bias the results. In any case, NLSY97 does contain some information that can be used to address this potential threat to validity. The survey included questions about whether respondents were organized, dependable, agreeable, cooperative, flexible, conscientious, thorough, and trustful.[13] Not all respondents answered these questions, so including these variables in the model sharply reduces the sample size. Nonetheless, attendance at selective public colleges continues to have a positive effect on degree completion when controlling for non-cognitive skills (see Table 7).

[13] The survey language is: "Please use this list of common human traits to describe yourself as accurately as possible. Describe yourself as you see yourself at the present time, not as you wish you might be in the future. Describe yourself as you are generally or typically, as compared with other persons you know of the same sex and of roughly the same age. How much do you feel that disorganized describes you as a person?...." All questions were rated on a scale of one to five.

A third class of threats is that living near a selective public college could affect completion through other channels that are not controlled for in the models. For example, areas with a high concentration of universities tend to have strong local economies, so families living in these areas may be in a good financial position to pay for college and avoid the need for student loans or employment during school. Controlling for the local unemployment rate, as a proxy for local economic conditions, does not change the results (see Table 7). Further, proximity to selective colleges may affect students' outcomes even if they do not enroll in these colleges. For example, college density could affect the local supply and demand for labor, which would influence the wages of college students who are employed in the area. However, the concentration of colleges should not affect the results of this study. Individual degree completion is specific to the institution that a student attends, so this outcome should not be affected by the presence of other colleges.

A different set of concerns revolves around sampling choices and methodological issues. The decision to attend college and the choice of college sector are potentially endogenous to distance to the nearest selective public college. When I use the sample of a) four-year college enrollees only, or b) all respondents, I obtain substantively similar results (see Table 8 and Appendix).

If there are relatively few observationally equivalent students who attend selective public universities and other colleges, the regression results could be due to a lack of common support. To check this possibility, I use propensity score matching to compare 330 "treated" students attending selective public colleges with 274 observationally equivalent "controls" from enrollees in other two-year and four-year colleges, and 256 observationally equivalent "controls" from enrollees in other four-year colleges only. The results show that the average effect of the

treatment on treated (ATT) is significant using both the sample of two-year and four-year college enrollees (t=3.54) and the sample of four-year college enrollees only (t=2.12).

Other issues include the impact of transferring to a different college. This analysis is based on the college or university in which students initially enroll, which need not be the same institution from which they complete a degree. Given that most students who transfer move to more academically rigorous institutions[14] (e.g. from two-year colleges to four-year colleges, or from less selective four-year colleges to more selective four-year colleges), the results may overstate the impact of selective public college attendance.

V. Discussion

The results indicate that enrolling in a selective public university increases the chances of earning a degree, independent of students selecting into different institutions based on unobserved variables. As a result, the instrumental variables estimates can be interpreted as the causal effect of college selectivity on degree completion.

As Hoxby (2004) observed, "The action is not in *whether* a student attends, but *which college* he attends" (1). The analysis suggests that students who wish to complete a bachelor's degree should be encouraged to enroll in the most selective public universities that they are qualified to attend. Otherwise, qualified students may be missing out on an opportunity to accumulate more human capital or benefit from the selectivity signal. Degree attainment is particularly important because of the strong college wage premium.

Disseminating information about the benefits of selective public university attendance should become an important component of the college guidance process. Student information about specific colleges can be inconsistent and individual decisions about where to apply are often haphazard. High achieving, low-income students exist in the population but often do not

[14] "Reverse transfers" from four-year to two-year colleges are rare.

apply to or attend selective colleges (Hoxby and Avery 2012; Pallais and Turner 2007; Hill and Winston 2006). Providing students with information and application fee waivers for selective colleges can improve application and enrollment decisions (Hoxby and Turner 2012). In addition, there are promising programs that assign recent college graduates to advise students on college applications and choices (Bettinger et al. 2012; Sherwin 2012).

One issue to consider is alternative counterfactuals: students who enroll in selective public colleges may be reducing their chances of obtaining a degree if they are passing up opportunities at highly selective private colleges. Selective private universities have extremely large endowments that enable them to spend tens of thousands of dollars per student (Hoxby 2009; Upton and Schnaars 2012; Hopkins 2011). Further, the gap in spending between private and public universities has risen over the past decade (Desrochers and Wellman 2011). However, few low-income students are deciding between attending a selective public or highly selective private college, despite efforts by private universities to expand their outreach (Avery et al. 2006).

Another question that arises from the findings is what specific aspect of selective public universities is driving the higher probability of completing a degree. The selectivity measures are based on SAT and ACT scores of incoming students, which suggests that peer environment plays an important role in the positive effects. Enrolling in a university with high achieving classmates may have strong positive spillover effects on the probability of degree completion. This could be due to high performing students who fuel a strong academic culture that values and supports success in college. Of course, this measure of selectivity may be correlated with other college quality characteristics that influence degree completion, including faculty quality and student-faculty ratio (see Black and Smith 2006; Long 2008; Zhang 2005).

Finally, the effect of selective college attendance may not be unambiguously positive on all student outcomes. Students who attend selective colleges may receive lower grades, incur more debt, and choose easy majors that are associated with lower future earnings. Additional research is needed to examine these other possible effects.

VI. Conclusion

In higher education, low-income students are more likely to attend less selective colleges than students from wealthy families, even controlling for prior academic performance. The phenomenon of undermatching, i.e. low-income students enrolling in less selective colleges than they are qualified to attend, has raised concerns among educators because these institutions exhibit extremely low graduation rates. Previous research examining the effects of college selectivity on degree completion is limited to a small number of extremely selective private universities that serve very few students. My research determines the causal effect of selectivity at public universities, which account for the majority of postsecondary students, including low-income students. I employ instrumental variables estimation and use distance to the nearest selective public college as an instrument for college attendance to identify causal effects. Using data from the National Longitudinal Study of Youth 1997, I find that college selectivity increases the probability of completing a bachelor's degree, controlling for academic performance, family background, and demographic characteristics. The findings have important implications for college counseling and student decisions: students wishing to earn a degree should be encouraged to apply to and enroll in the most selective colleges they are qualified to attend.

Table 1
Unweighted descriptive statistics (means and standard deviations) for cross-sectional sample of NLSY97 respondents who enrolled in two-year or four-year colleges.

Variable	Number of Observations	Mean	Standard Deviation
BA degree or higher	3194	0.410	0.492
AA degree or higher	3194	0.508	0.500
Attend four year	3194	0.575	0.494
Attend two year	3194	0.425	0.494
Attend in state	3194	0.798	0.402
Attend public	3194	0.798	0.402
Attend flagship	3194	0.069	0.253
Attend selective public	3194	0.103	0.304
High school GPA	3194	3.09	0.74
ASVAB	3194	59.9	26.5
Mother's Education	3194	13.6	2.6
Urban	3194	0.716	0.451
Male	3194	0.480	0.500
White	3194	0.750	0.433

Table 2
Unweighted descriptive statistics (means and standard deviations) for cross-sectional sample of NLSY97 respondents comparing those who attended selective public colleges and other two-year or four-year colleges.

	Attend selective public (*n*=330)		Attend other 2 or 4-year (*n*=2864)	
Variable	Mean	S.D.	Mean	S.D.
BA degree or higher	0.779	0.416	0.367	0.482
AA degree or higher	0.806	0.396	0.474	0.499
High school GPA	3.56	0.48	3.03	0.74
ASVAB	79.9	18.2	57.6	26.4
Mother's Education	14.9	2.5	13.4	2.6
Urban	0.770	0.422	0.710	0.454
Male	0.524	0.500	0.475	0.499
White	0.879	0.327	0.735	0.441

Table 3
Parameter estimates and approximate p-values for survey weighted linear probability models describing the relationship between selective public college attendance and the probability of completing a bachelor's degree, for students who enrolled in two-year or four-year colleges, controlling for grade point average, ASVAB score, attending a private college, mother's education, living in an urban area, gender, and race.

	Earn bachelor's degree				
	(1)	(2)	(3)	(4)	(5)
Selective public	0.412***		0.298***		0.258***
	(0.028)		(0.028)		(0.027)
High school GPA		0.238***	0.205***	0.184***	0.164***
		(0.012)	(0.012)	(0.012)	(0.012)
ASVAB				0.004***	0.003***
				(0.000)	(0.000)
Private	0.360***	0.216***	0.273***	0.191***	0.244***
	(0.019)	(0.021)	(0.020)	(0.022)	(0.022)
Mother's Education	0.036***	0.035***	0.030***	0.028***	0.025***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Urban	0.002	0.033	0.021	0.023	0.014
	(0.022)	(0.020)	(0.020)	(0.020)	(0.019)
Male	-0.105***	-0.029	-0.043**	-0.045**	-0.054***
	(0.015)	(0.017)	(0.016)	(0.016)	(0.015)
White	0.080***	0.042*	0.033	-0.003	-0.004
	(0.022)	(0.020)	(0.020)	(0.018)	(0.019)
Constant	-0.181***	-0.875***	-0.725***	-0.792***	-0.674***
	(0.052)	(0.048)	(0.051)	(0.048)	(0.049)
N	3194	3194	3194	3194	3194
R^2	0.200	0.245	0.276	0.273	0.296

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 4
Parameter estimates and approximate p-values for survey weighted linear probability models using instrumental variables estimation to describe the relationship between selective public college attendance and the probability of completing a bachelor's degree, for students who enrolled in two-year or four-year colleges, controlling for grade point average, ASVAB score, attending a private college, mother's education, living in an urban area, gender, and race. Models 2-4 also control for type of college attended (four-year vs. two-year) and/or state of residence prior to entering college. Log distance to the nearest selective public institution is used as an instrument for attendance at a selective public institution.

	Earn bachelor's degree			
	(1)	(2)	(3)	(4)
Selective public	0.607*	0.612*	0.578*	0.550*
	(0.250)	(0.242)	(0.272)	(0.279)
High school GPA	0.137***	0.119***	0.146***	0.128***
	(0.025)	(0.020)	(0.026)	(0.019)
ASVAB	0.003***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.000)
Private	0.316***	0.270***	0.300***	0.246**
	(0.057)	(0.070)	(0.062)	(0.081)
Mother's Education	0.020***	0.017***	0.020***	0.017***
	(0.005)	(0.004)	(0.005)	(0.004)
Urban	0.002	0.005	0.015	0.013
	(0.021)	(0.021)	(0.019)	(0.018)
Male	-0.067***	-0.068***	-0.065***	-0.065***
	(0.017)	(0.017)	(0.019)	(0.018)
White	-0.004	0.002	-0.008	0.003
	(0.019)	(0.019)	(0.021)	(0.021)
Constant	-0.515***	-0.467***	-0.544***	-0.496***
	(0.125)	(0.109)	(0.160)	(0.137)
College type controls	X	✓	X	✓
State controls	X	X	✓	✓

F-statistic	23.09	24.45	19.07	18.89
N	3194	3194	3194	3194
R^2	0.254	0.266	0.281	0.302

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 5
Parameter estimates and approximate p-values for survey weighted poisson and regression models describing the relationship between various measures of academic ability and distance to the nearest selective public college, for students who enrolled in two-year or four-year colleges,, controlling for mother's education, living in an urban area, gender, and race.

	HS GPA	ASVAB	ACT	SAT Math
	(1)	(2)	(3)	(4)
Log Distance	0.001	-1.273*	-0.001	-0.006
	(0.007)	(0.539)	(0.007)	(0.007)
Mother's Education	0.014***	2.605***	0.015***	0.017***
	(0.002)	(0.192)	(0.003)	(0.002)
Urban	-0.025*	1.254	0.031*	0.023
	(0.011)	(1.169)	(0.015)	(0.013)
Male	-0.096***	-0.321	0.014	0.068***
	(0.008)	(0.813)	(0.011)	(0.010)
White	0.090***	15.512***	0.106***	0.088***
	(0.013)	(1.649)	(0.021)	(0.016)
Constant	0.913***	26.804***	2.821***	6.005***
	(0.083)	(6.831)	(0.096)	(0.087)
N	3194	3194	1190	1357

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 6
Parameter estimates and approximate p-values for survey weighted linear probability models using instrumental variables estimation to describe the relationship between selective public college attendance and the probability of completing a bachelor's degree, for students who enrolled in two-year or four-year colleges, controlling for grade point average, ASVAB score, attending a private college, mother's education, living in an urban area, gender, and race. Model 1 excludes respondents who live closest to selective public institutions. Model 2 excludes respondents whose mothers have completed more than 2 years of graduate education. Model 3 excludes both groups from 1 and 2. Model 4 excludes respondents who live farthest from selective public institutions. Log distance to the nearest selective public institution is used as an instrument for attendance at a selective public institution.

	Earn bachelor's degree			
	(1)	(2)	(3)	(4)
Selective public	0.699**	0.541*	0.644*	0.835*
	(0.266)	(0.264)	(0.279)	(0.367)
High school GPA	0.132***	0.143***	0.137***	0.119***
	(0.026)	(0.025)	(0.026)	(0.035)
ASVAB	0.002**	0.003***	0.002**	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
Private	0.336***	0.300***	0.323***	0.366***
	(0.059)	(0.059)	(0.061)	(0.084)
Mother's Education	0.018***	0.022***	0.020***	0.017**
	(0.005)	(0.005)	(0.005)	(0.006)
Urban	-0.003	0.004	-0.002	-0.008
	(0.022)	(0.022)	(0.023)	(0.024)
Male	-0.064***	-0.062***	-0.060**	-0.071***
	(0.018)	(0.017)	(0.018)	(0.021)
White	-0.001	-0.004	-0.001	-0.009
	(0.022)	(0.020)	(0.022)	(0.021)
Constant	-0.465***	-0.567***	-0.514***	-0.406*
	(0.129)	(0.133)	(0.138)	(0.190)
F-statistic	23.07	19.61	21.86	13.26

N	3033	3111	2955	3023
R^2	0.225	0.266	0.239	0.180

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 7
Parameter estimates and approximate p-values for survey weighted linear probability models using instrumental variables estimation to describe the relationship between selective public college attendance and the probability of completing a bachelor's degree, for students who enrolled in two-year or four-year colleges, controlling for grade point average, ASVAB score, attending a private college, mother's education, living in an urban area, gender, and race. Models include controls for institutional focus (attending technical colleges or military academies), non-cognitive skills, and local economic conditions (unemployment rate). Log distance to the nearest selective public institution is used as an instrument for attendance at a selective public institution.

	Earn bachelor's degree				
	(1)	(2)	(3)	(4)	(5)
Selective public	0.609*	0.641*	0.645*	0.710*	0.642*
	(0.258)	(0.264)	(0.274)	(0.297)	(0.283)
High school GPA	0.137***	0.136***	0.136***	0.108***	0.129***
	(0.025)	(0.025)	(0.026)	(0.030)	(0.028)
ASVAB	0.003***	0.003***	0.002***	0.002*	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Private	0.316***	0.318***	0.318***	0.337***	0.324***
	(0.059)	(0.058)	(0.060)	(0.071)	(0.062)
Mother's Education	0.020***	0.020***	0.020***	0.024***	0.019***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
Urban	0.002	0.000	0.000	0.005	0.005
	(0.021)	(0.021)	(0.021)	(0.026)	(0.020)
Male	-0.067***	-0.063***	-0.063***	-0.071**	-0.061***
	(0.017)	(0.017)	(0.017)	(0.023)	(0.018)
White	-0.004	-0.003	-0.003	-0.004	0.002
	(0.019)	(0.020)	(0.020)	(0.027)	(0.021)
Constant	-0.514***	-0.511***	-0.510***	-0.775***	-0.687***
	(0.128)	(0.127)	(0.130)	(0.159)	(0.127)
Other Controls	military	technical	mil. + tech.	non-cog	economy

F-statistic	20.73	21.06	18.85	17.84	19.90
N	3194	3194	3194	1853	3194
R^2	0.254	0.252	0.251	0.219	0.270

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 8
Parameter estimates and approximate p-values for survey weighted linear probability models using instrumental variables estimation to describe the relationship between selective public college attendance and the probability of completing a bachelor's degree, controlling for grade point average, ASVAB score, attending a private college, mother's education, living in an urban area, gender, and race. Model 1 is limited to respondents who attended four-year colleges. Model 2 includes respondents who enrolled in some form of postsecondary education. Model 3 includes all respondents. Log distance to the nearest selective public institution is used as an instrument for attendance at a selective public institution.

	Earn bachelor's degree		
	(1)	(2)	(3)
Selective public	0.506*	0.660*	0.640*
	(0.204)	(0.256)	(0.267)
High school GPA	0.157***	0.133***	0.112***
	(0.033)	(0.024)	(0.019)
ASVAB	0.002*	0.002***	0.003***
	(0.001)	(0.001)	(0.001)
Private	0.235***	0.327***	0.358***
	(0.064)	(0.058)	(0.055)
Mother's Education	0.018**	0.020***	0.020***
	(0.006)	(0.005)	(0.004)
Urban	-0.000	0.005	0.004
	(0.029)	(0.020)	(0.015)
Male	-0.071**	-0.064***	-0.056***
	(0.023)	(0.017)	(0.013)
White	0.011	-0.004	-0.007
	(0.029)	(0.019)	(0.014)
Constant	-0.431**	-0.507***	-0.482***
	(0.143)	(0.124)	(0.099)
F-statistic	29.01	22.43	21.06
N	1837	3343	4592

R^2	0.132	0.248	0.339

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Appendix

List of selective public universities.
Note: public universities are categorized as selective if the SAT or ACT scores of incoming students in the 25th and 75th percentiles are in the top quartile for all public universities.

Name	City	State
Auburn University	Auburn	AL
California Polytechnic State University-San Luis Obispo	San Luis Obispo	CA
Christopher Newport University	Newport News	VA
Clemson University	Clemson	SC
College of Charleston	Charleston	SC
College of William and Mary	Williamsburg	VA
Colorado School of Mines	Golden	CO
Eastern Washington University	Cheney	WA
Florida State University	Tallahassee	FL
Georgia Institute of Technology-Main Campus	Atlanta	GA
Indiana University-Bloomington	Bloomington	IN
Iowa State University	Ames	IA
James Madison University	Harrisonburg	VA
Louisiana State University	Baton Rouge	LA
Miami University-Oxford	Oxford	OH
Michigan State University	East Lansing	MI
Michigan Technological University	Houghton	MI
Missouri University of Science and Technology	Rolla	MO
New College of Florida	Sarasota	FL
New Mexico Institute of Mining and Technology	Socorro	NM
North Carolina State University at Raleigh	Raleigh	NC
Ohio State University-Main Campus	Columbus	OH
Oklahoma State University-Main Campus	Stillwater	OK
Pennsylvania State University-Main Campus	University Park	PA
Purdue University-Main Campus	West Lafayette	IN
Rutgers University-New Brunswick	New Brunswick	NJ
South Dakota School of Mines and Technology	Rapid City	SD
St Mary's College of Maryland	St. Mary's City	MD
Stony Brook University	Stony Brook	NY
SUNY at Binghamton	Vestal	NY
SUNY at Fredonia	Fredonia	NY
SUNY at Geneseo	Geneseo	NY
SUNY Institute of Technology at Utica-Rome	Utica	NY
Tennessee Technological University	Cookeville	TN
Texas A & M University-College Station	College Station	TX
The College of New Jersey	Ewing	NJ
The University of Tennessee	Knoxville	TN
The University of Texas at Austin	Austin	TX
The University of Texas at Dallas	Richardson	TX
Truman State University	Kirksville	MO
United States Air Force Academy	USAFA	CO
United States Coast Guard Academy	New London	CT
United States Military Academy	West Point	NY

United States Naval Academy	Annapolis	MD
University at Buffalo	Buffalo	NY
University of Arkansas	Fayetteville	AR
University of California-Berkeley	Berkeley	CA
University of California-Davis	Davis	CA
University of California-Irvine	Irvine	CA
University of California-Los Angeles	Los Angeles	CA
University of California-San Diego	La Jolla	CA
University of California-Santa Barbara	Santa Barbara	CA
University of California-Santa Cruz	Santa Cruz	CA
University of Central Florida	Orlando	FL
University of Colorado Boulder	Boulder	CO
University of Connecticut	Storrs	CT
University of Delaware	Newark	DE
University of Florida	Gainesville	FL
University of Georgia	Athens	GA
University of Illinois at Urbana-Champaign	Champaign	IL
University of Iowa	Iowa City	IA
University of Kansas	Lawrence	KS
University of Kentucky	Lexington	KY
University of Mary Washington	Fredericksburg	VA
University of Maryland-Baltimore County	Baltimore	MD
University of Maryland-College Park	College Park	MD
University of Massachusetts Amherst	Amherst	MA
University of Michigan-Ann Arbor	Ann Arbor	MI
University of Minnesota-Morris	Morris	MN
University of Minnesota-Twin Cities	Minneapolis	MN
University of Missouri-Columbia	Columbia	MO
University of Missouri-Kansas City	Kansas City	MO
University of Missouri-St Louis	Saint Louis	MO
University of Nebraska-Lincoln	Lincoln	NE
University of North Carolina at Asheville	Asheville	NC
University of North Carolina at Chapel Hill	Chapel Hill	NC
University of Oklahoma Norman Campus	Norman	OK
University of Pittsburgh-Pittsburgh Campus	Pittsburgh	PA
University of South Carolina-Columbia	Columbia	SC
University of Vermont	Burlington	VT
University of Virginia-Main Campus	Charlottesville	VA
University of Washington-Seattle Campus	Seattle	WA
University of Wisconsin-La Crosse	La Crosse	WI
University of Wisconsin-Madison	Madison	WI
Virginia Polytechnic Institute and State University	Blacksburg	VA

Technical Appendix

I use ArcGIS mapping software to plot students' residential location during high school, i.e. prior to college entry. The restricted-use NLSY97 dataset provides respondent geographic location information at the state, metropolitan statistical area (MSA), and county levels. Some respondents live in rural areas or otherwise have missing MSA information, so I use counties to identify geographic location. I calculate the longitude and latitude of the centroid of each county of residence and use this point as the respondent's location.

I also use ArcGIS mapping software to plot the locations of state flagship and other selective public universities. The Integrated Postsecondary Education Data System (IPEDS) Data Center, maintained by the National Center for Education Statistics, provides street address, longitude, and latitude information for all accredited postsecondary institutions, including the colleges in this study. I calculate the log distance between the student's location and the location of the nearest university based on longitude and latitude coordinates.

Table A1
Comparison of survey weighted parameter estimates and approximate p-values for linear probability, probit, and logit models describing the relationship between selective public college attendance and the probability of completing a bachelor's degree, for students who enrolled in two-year or four-year colleges, controlling for grade point average, ASVAB score, attending a private college, mother's education, living in an urban area, gender, and race.

	Earn bachelor's degree		
	LPM	Probit	Logit
Selective public	0.258***	0.726***	1.212***
	(0.027)	(0.092)	(0.159)
High school GPA	0.164***	0.571***	0.968***
	(0.012)	(0.047)	(0.082)
ASVAB	0.003***	0.011***	0.018***
	(0.000)	(0.001)	(0.002)
Private	0.244***	0.707***	1.183***
	(0.022)	(0.069)	(0.121)
Mother's Education	0.025***	0.083***	0.143***
	(0.004)	(0.012)	(0.022)
Urban	0.014	0.033	0.059
	(0.019)	(0.065)	(0.112)
Male	-0.054***	-0.175***	-0.298***
	(0.015)	(0.051)	(0.088)
White	-0.004	0.005	0.004
	(0.019)	(0.067)	(0.116)
Constant	-0.674***	-3.960***	-6.735***
	(0.049)	(0.212)	(0.382)
N	3194	3194	3194
R^2 or Pseudo R^2	0.296	0.248	0.248

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table B1
Unweighted descriptive statistics for all NLSY97 respondents.

Variable	Number of Observations	Mean	Standard Deviation
BA degree or higher	4592	0.291	0.454
AA degree or higher	4592	0.363	0.481
Attend four year	4592	0.400	0.490
Attend two year	4592	0.296	0.456
Attend in state	4592	0.563	0.496
Attend public	4592	0.561	0.496
Attend flagship	4592	0.048	0.213
Attend selective public	4592	0.072	0.258
High school GPA	4592	2.87	0.82
ASVAB	4592	51.3	29.0
Mother's Education	4592	13.0	2.7
Urban	4592	0.704	0.457
Male	4592	0.510	0.500
White	4592	0.717	0.451

Table B2
Unweighted descriptive statistics for all NLSY97 respondents.

	Attend selective public (*n*=330)		All other respondents (*n*=4262)	
Variable	Mean	S.D.	Mean	S.D.
BA degree or higher	0.779	0.416	0.253	0.435
AA degree or higher	0.806	0.396	0.329	0.470
High school GPA	3.56	0.48	2.82	0.81
ASVAB	79.9	18.2	49.0	28.4
Mother's Education	14.9	2.5	12.9	2.6
Urban	0.770	0.422	0.699	0.459
Male	0.524	0.500	0.509	0.500
White	0.879	0.327	0.704	0.456

Table B3
Linear probability models for all respondents.

	Earn bachelor's degree				
	(1)	(2)	(3)	(4)	(5)
Selective public	0.488***		0.368***		0.318***
	(0.028)		(0.027)		(0.027)
High school GPA		0.202***	0.171***	0.149***	0.130***
		(0.009)	(0.009)	(0.009)	(0.008)
ASVAB				0.004***	0.003***
				(0.000)	(0.000)
Private	0.438***	0.278***	0.339***	0.241***	0.299***
	(0.019)	(0.021)	(0.020)	(0.021)	(0.021)
Mother's Education	0.039***	0.037***	0.031***	0.027***	0.024***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Urban	0.007	0.031*	0.020	0.019	0.011
	(0.016)	(0.016)	(0.015)	(0.015)	(0.015)
Male	-0.096***	-0.029*	-0.040**	-0.040**	-0.048***
	(0.011)	(0.013)	(0.012)	(0.012)	(0.012)
White	0.055***	0.040**	0.031*	-0.006	-0.006
	(0.015)	(0.014)	(0.014)	(0.013)	(0.013)
Constant	-0.300***	-0.836***	-0.684***	-0.704***	-0.594***
	(0.042)	(0.041)	(0.039)	(0.040)	(0.038)
N	4592	4592	4592	4592	4592
R^2	0.271	0.304	0.345	0.340	0.369

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table B4
Instrumental variables estimation for all respondents.

	Earn bachelor's degree			
	(1)	(2)	(3)	(4)
Selective public	0.640*	0.684**	0.655*	0.652*
	(0.267)	(0.260)	(0.329)	(0.330)
High school GPA	0.112***	0.082***	0.115***	0.086***
	(0.019)	(0.013)	(0.022)	(0.014)
ASVAB	0.003***	0.002***	0.003***	0.002***
	(0.001)	(0.000)	(0.001)	(0.000)
Private	0.358***	0.298***	0.356***	0.285**
	(0.055)	(0.073)	(0.065)	(0.092)
Mother's Education	0.020***	0.014***	0.019***	0.014***
	(0.004)	(0.003)	(0.005)	(0.004)
Urban	0.004	0.001	0.007	0.006
	(0.015)	(0.015)	(0.014)	(0.013)
Male	-0.056***	-0.053***	-0.056***	-0.053***
	(0.013)	(0.013)	(0.015)	(0.015)
White	-0.007	0.003	-0.008	0.005
	(0.014)	(0.013)	(0.015)	(0.015)
Constant	-0.482***	-0.377***	-0.467**	-0.370***
	(0.099)	(0.073)	(0.144)	(0.106)
College type controls	X	✓	X	✓
State controls	X	X	✓	✓
F-statistic	21.06	22.88	15.81	16.46
N	4592	4592	4592	4592
R^2	0.339	0.352	0.349	0.373

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table B5
Predicting academic performance based on distance, for all respondents.

	HS GPA	ASVAB	ACT	SAT Math
	(1)	(2)	(3)	(4)
Log Distance	0.000	-1.055	-0.003	-0.006
	(0.008)	(0.595)	(0.007)	(0.006)
Mother's Education	0.026***	3.763***	0.015***	0.018***
	(0.002)	(0.173)	(0.003)	(0.002)
Urban	-0.020	2.088	0.034*	0.022
	(0.012)	(1.171)	(0.016)	(0.014)
Male	-0.116***	-1.895**	0.015	0.064***
	(0.007)	(0.645)	(0.011)	(0.010)
White	0.063***	14.665***	0.104***	0.088***
	(0.012)	(1.430)	(0.021)	(0.015)
Constant	0.745***	3.574	2.836***	5.988***
	(0.093)	(7.695)	(0.093)	(0.084)
N	4592	4592	1277	1488

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table B6
Instrumental variables estimation for all respondents. Models exclude respondents: (1) who live closest to selective public institutions, (2) whose mothers have completed more than 2 years of graduate education, (3) from both groups from 1 and 2, and (4) who live farthest from selective public institutions.

	Earn bachelor's degree			
	(1)	(2)	(3)	(4)
Selective public	0.691*	0.581*	0.641*	0.815*
	(0.281)	(0.286)	(0.300)	(0.393)
High school GPA	0.111***	0.115***	0.114***	0.102***
	(0.018)	(0.019)	(0.019)	(0.027)
ASVAB	0.002***	0.003***	0.003***	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
Private	0.366***	0.347***	0.357***	0.391***
	(0.057)	(0.057)	(0.059)	(0.081)
Mother's Education	0.019***	0.021***	0.020***	0.018**
	(0.004)	(0.004)	(0.004)	(0.006)
Urban	-0.001	0.004	-0.000	-0.001
	(0.016)	(0.016)	(0.016)	(0.018)
Male	-0.054***	-0.052***	-0.051***	-0.056***
	(0.013)	(0.013)	(0.014)	(0.016)
White	-0.006	-0.007	-0.006	-0.010
	(0.015)	(0.014)	(0.015)	(0.015)
Constant	-0.463***	-0.509***	-0.490***	-0.415**
	(0.100)	(0.104)	(0.105)	(0.152)
F-statistic	20.88	17.68	19.35	11.67
N	4339	4506	4258	4359
R^2	0.322	0.344	0.328	0.298

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table B7
Instrumental variables estimation for all respondents. Models include controls for technical and military colleges, non-cognitive skills, and local unemployment rate.

	Earn bachelor's degree				
	(1)	(2)	(3)	(4)	(5)
Selective public	0.642*	0.674*	0.678*	0.794*	0.721*
	(0.276)	(0.282)	(0.293)	(0.320)	(0.299)
High school GPA	0.112***	0.111***	0.111***	0.093***	0.105***
	(0.019)	(0.019)	(0.019)	(0.023)	(0.021)
ASVAB	0.003***	0.003***	0.003***	0.002**	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Private	0.358***	0.360***	0.360***	0.382***	0.372***
	(0.056)	(0.056)	(0.057)	(0.070)	(0.059)
Mother's Education	0.020***	0.020***	0.020***	0.022***	0.019***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)
Urban	0.004	0.002	0.002	-0.000	0.003
	(0.015)	(0.015)	(0.016)	(0.019)	(0.014)
Male	-0.056***	-0.053***	-0.053***	-0.059***	-0.051***
	(0.013)	(0.013)	(0.013)	(0.017)	(0.014)
White	-0.007	-0.006	-0.006	-0.007	-0.002
	(0.014)	(0.014)	(0.014)	(0.019)	(0.015)
Constant	-0.481***	-0.479***	-0.478***	-0.683***	-0.609***
	(0.102)	(0.101)	(0.103)	(0.125)	(0.105)
Other Controls	military	technical	mil. + tech.	non-cog	economy
F-statistic	18.90	19.21	17.19	14.94	17.91
N	4592	4592	4592	2617	4592
R^2	0.339	0.337	0.336	0.295	0.338

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table C1
Unweighted descriptive statistics for NLSY97 respondents who enrolled in four-year colleges.

Variable	Number of Observations	Mean	Standard Deviation
BA degree or higher	1837	0.596	0.491
AA degree or higher	1837	0.652	0.477
Attend in state	1837	0.733	0.442
Attend public	1837	0.682	0.466
Attend flagship	1837	0.119	0.324
Attend selective public	1837	0.180	0.384
High school GPA	1837	3.31	0.64
ASVAB	1837	68.3	23.9
Mother's Education	1837	14.1	2.6
Urban	1837	0.705	0.456
Male	1837	0.469	0.499
White	1837	0.788	0.409

Table C2
Unweighted descriptive statistics for NLSY97 respondents who enrolled in four-year colleges.

	Attend selective public (*n*=330)		Attend other 4-year (*n*=1507)	
Variable	Mean	S.D.	Mean	S.D.
BA degree or higher	0.779	0.416	0.555	0.497
AA degree or higher	0.806	0.396	0.618	0.486
High school GPA	3.56	0.48	3.25	0.66
ASVAB	79.9	18.2	65.8	24.3
Mother's Education	14.9	2.5	14.0	2.6
Urban	0.770	0.422	0.691	0.462
Male	0.524	0.500	0.457	0.498
White	0.879	0.327	0.768	0.422

Table C3
Linear probability models for students who enrolled in four-year colleges.

	Earn bachelor's degree				
	(1)	(2)	(3)	(4)	(5)
Selective public	0.249***		0.164***		0.143***
	(0.032)		(0.030)		(0.028)
High school GPA		0.253***	0.231***	0.205***	0.191***
		(0.019)	(0.020)	(0.022)	(0.022)
ASVAB				0.003***	0.003***
				(0.001)	(0.001)
Private	0.197***	0.094***	0.141***	0.086***	0.128***
	(0.027)	(0.024)	(0.025)	(0.024)	(0.025)
Mother's Education	0.032***	0.029***	0.026***	0.024***	0.023***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Urban	0.018	0.037	0.027	0.025	0.018
	(0.029)	(0.027)	(0.026)	(0.027)	(0.027)
Male	-0.104***	-0.025	-0.037	-0.041*	-0.049*
	(0.020)	(0.020)	(0.019)	(0.020)	(0.019)
White	0.104***	0.059*	0.050	0.022	0.019
	(0.030)	(0.029)	(0.029)	(0.028)	(0.029)
Constant	0.000	-0.740***	-0.651***	-0.683***	-0.612***
	(0.066)	(0.078)	(0.080)	(0.079)	(0.080)
N	1837	1837	1837	1837	1837
R^2	0.112	0.176	0.190	0.191	0.202

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table C4
Instrumental variables estimation for students who enrolled in four-year colleges.

	Earn bachelor's degree	
	(1)	(2)
Selective public	0.506*	0.404
	(0.204)	(0.284)
High school GPA	0.157***	0.174***
	(0.033)	(0.035)
ASVAB	0.002*	0.002*
	(0.001)	(0.001)
Private	0.235***	0.195*
	(0.064)	(0.092)
Mother's Education	0.018**	0.018**
	(0.006)	(0.006)
Urban	-0.000	0.016
	(0.029)	(0.025)
Male	-0.071**	-0.062*
	(0.023)	(0.028)
White	0.011	0.004
	(0.029)	(0.035)
Constant	-0.431**	-0.472*
	(0.143)	(0.196)
State controls	X	✓
F-statistic	29.01	21.14
N	1837	1837
R^2	0.132	0.202

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table C5
Predicting academic performance using distance, for students who enrolled in four-year colleges.

	HS GPA	ASVAB	ACT	SAT Math
	(1)	(2)	(3)	(4)
Log Distance	-0.001	-0.945	0.000	-0.005
	(0.007)	(0.592)	(0.008)	(0.007)
Mother's Education	0.010***	2.076***	0.014***	0.016***
	(0.002)	(0.242)	(0.003)	(0.002)
Urban	-0.007	3.346*	0.032	0.027
	(0.013)	(1.361)	(0.019)	(0.015)
Male	-0.084***	0.755	0.017	0.071***
	(0.008)	(1.057)	(0.013)	(0.012)
White	0.084***	15.800***	0.117***	0.087***
	(0.012)	(1.564)	(0.021)	(0.018)
Constant	1.038***	34.593***	2.839***	6.028***
	(0.087)	(8.405)	(0.117)	(0.099)
N	1837	1837	862	1029

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table C6
Instrumental variables estimation for students who enrolled in four-year colleges. Models exclude respondents: (1) who live closest to selective public institutions, (2) whose mothers have completed more than 2 years of graduate education, (3) from both groups from 1 and 2, and (4) who live farthest from selective public institutions.

	Earn bachelor's degree			
	(1)	(2)	(3)	(4)
Selective public	0.520*	0.443*	0.463*	0.589*
	(0.221)	(0.212)	(0.229)	(0.298)
High school GPA	0.160***	0.164***	0.167***	0.155***
	(0.034)	(0.033)	(0.034)	(0.042)
ASVAB	0.002	0.002*	0.002*	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Private	0.237***	0.212**	0.217**	0.260**
	(0.065)	(0.066)	(0.067)	(0.096)
Mother's Education	0.017**	0.021***	0.020**	0.017*
	(0.006)	(0.006)	(0.006)	(0.007)
Urban	-0.004	0.006	0.002	-0.004
	(0.029)	(0.029)	(0.030)	(0.033)
Male	-0.064**	-0.066**	-0.059*	-0.068*
	(0.024)	(0.023)	(0.024)	(0.028)
White	0.014	0.016	0.018	0.006
	(0.032)	(0.029)	(0.032)	(0.032)
Constant	-0.418**	-0.505***	-0.491**	-0.406*
	(0.147)	(0.149)	(0.155)	(0.194)
F-statistic	24.51	25.01	23.64	16.18
N	1742	1767	1677	1732
R^2	0.126	0.154	0.147	0.089

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table C7
Instrumental variables estimation for students who enrolled in four-year colleges. Models include controls for technical and military colleges, non-cognitive skills, and local unemployment rate.

	Earn bachelor's degree				
	(1)	(2)	(3)	(4)	(5)
Selective public	0.508*	0.539*	0.542*	0.672**	0.452*
	(0.210)	(0.214)	(0.221)	(0.248)	(0.214)
High school GPA	0.157***	0.155***	0.155***	0.118**	0.150***
	(0.033)	(0.033)	(0.034)	(0.043)	(0.032)
ASVAB	0.002*	0.002*	0.002*	0.000	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Private	0.235***	0.237***	0.238***	0.293***	0.217***
	(0.065)	(0.064)	(0.066)	(0.078)	(0.064)
Mother's Education	0.018**	0.018**	0.018**	0.023**	0.016**
	(0.006)	(0.006)	(0.006)	(0.008)	(0.005)
Urban	-0.000	-0.003	-0.003	0.020	0.016
	(0.029)	(0.029)	(0.029)	(0.035)	(0.026)
Male	-0.071**	-0.065**	-0.065**	-0.058	-0.067**
	(0.023)	(0.022)	(0.022)	(0.033)	(0.023)
White	0.011	0.013	0.013	0.037	0.032
	(0.029)	(0.030)	(0.030)	(0.037)	(0.032)
Constant	-0.431**	-0.427**	-0.427**	-0.727***	-0.709***
	(0.144)	(0.144)	(0.146)	(0.195)	(0.132)
Other Controls	military	technical	mil. + tech.	non-cog	economy
F-statistic	26.39	26.21	23.76	22.80	25.13
N	1837	1837	1837	1084	1837
R^2	0.132	0.128	0.127	0.044	0.204

Note: Calculations based on NLSY survey weights
Clustered standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

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