

IS THERE A FUTURE EARNINGS PENALTY FOR BACHELOR'S DEGREE RECIPIENTS WHO INITIALLY ATTEND TWO-YEAR COLLEGES?

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Abstract- We examine early labor market outcomes for baccalaureate degree recipients who transferred from a two-year college relative to those attended the same four-year college or who transferred from a different four-year college. Selectivity corrected results for a sample of students drawn from the High School and Beyond survey suggest that annual earnings for women and non-white two-year college transfers are not statistically different from those of similar direct four-year attendees and four-year college transfers. Such findings, combined with the lower two-year attendance costs suggest that initial two-year college attendance may be a good investment for students who persist to graduation..

Keywords- Higher Education, Community College, Bachelor's Degree.

I. INTRODUCTION

The rising cost of college attendance is an important concern for many families. Given the great disparity between the cost of two- and four-year college attendance (in 2006, tuition and room and board was 253% higher at four-year than at two-year colleges, Digest of Education Statistics 2008), "for many students, the single easiest way to cut the first two years of college costs is to attend a community college (U.S. News.com, 2005)." As a result, two-year colleges are increasingly becoming the entry point to higher education for American students, even those who plan on persisting to a Baccalaureate degree. That many Baccalaureate degree aspirants are choosing to start their careers at two-year colleges begs the question whether they are making privately optimal investment decisions. While initial two-year attendance saves money in the short-term, accurately determining whether initial two-year attendance is a good lifetime investment also requires some idea of the effect that such attendance has on a student's labor market future. The existing evidence concerning the post-baccalaureate labor market performance of two-year transfers relative to non- and cross-university transfers is unclear. Light and Strayer (2004) find no statistical difference across various transfer groups in the likelihood of receiving a degree but find conflicting evidence in terms of future earnings. Monk-Turner (1990) finds that two-year transfers do not score lower than direct attendees on the Duncan dissimilarity index, but the degree to which such indices translate to potential future earnings differences is not obvious. The current study adds to the literature by estimating the effect that initial two-year college attendance has on the entry-level earnings of female and non-white students who eventually receive Baccalaureate degrees. Selectivity-corrected results suggest that two-year transfers do not observe statistically significant differences in entry-level earnings from what they would have

earned had they initially attended a four-year college. Given that two-year colleges are significantly cheaper than four-year colleges, this suggests that the average college attendee may be making a wise investment decision by initially attending a two-year college before transferring to a four-year college.

II. EMPIRICAL MODEL

The ideal experiment for asking whether the early-career earnings of baccalaureate degree recipients who attend two-year colleges differ from those of observably similar students who attend only four-year colleges (either as direct attendees or cross-college transfers) is to (1) select a student at random from the population of potential college attendees, (2) assign him or her to each of the potential attendance paths, and (3) compare the post-baccalaureate earnings he or she receives under each attendance path. We are obviously unable to conduct such an experiment. We must instead try to make the desired comparison based on the observed outcomes of student attendance decisions. This is potentially problematic, as the subsets of students observed choosing each attendance path are not randomly selected from the population of potential students. In such situations, as demonstrated by Heckman (1979) and others, ordinary least squares (OLS) approaches are biased because they fail to account for the non-randomness of the student's college attendance decision. To see this, consider two potential students who possess identical values for all observable characteristics, but differ in the value of an unobservable characteristic, such as motivation. Based solely on the values of their observable characteristics, both students would be expected to choose the same attendance path and receive the same post-baccalaureate annual earnings. In reality, however, because one student is more motivated than the other, the two may actually choose distinctly different attendance paths. For example, the more motivated student may choose to persist

through graduation while the less motivated student may choose to never attend a university. As a result, regular OLS estimates for the post-baccalaureate earnings of such students are potentially biased and corrective measures must be taken.

To correct for potential self-selection bias for those who choose different college attendance paths in estimating, we employ a selection correction similar to that found in Brewer, Eide, and Ehrenberg (1999). We start by recognizing that according to economic theory, students self-select their observed college attendance paths by choosing the path that provides the highest lifetime expected utility, a decision defined by the latent selection equation

$$P_i^* = \lambda Z_i + u_i$$

where Z_i is a vector of individual characteristics associated with the expected utility of each college attendance path and u_i is an error term. According to this formulation, we observe that

$$P_i^* = 1 \quad \text{if} \quad \lambda_{2yr} Z_i + u_{2yr,i} > \lambda_{4yr} Z_i + u_{4yr,i}$$

and

$$P_i^* = 0 \quad \text{if} \quad \lambda_{4yr} Z_i + u_{4yr,i} > \lambda_{2yr} Z_i + u_{2yr,i}$$

where $P_i^* = 1$ represents initial two-year college attendance and $P_i^* = 0$ represents initial four-year college attendance.

Our two-stage procedure then consists of estimating the latent selection equation as a maximum likelihood probit and using those estimates to calculate the predicted probability a student will attend a two year institutions as regressors in the log annual earnings equation

$$\log W_i = \beta_s X_i + \delta \hat{P}_i + u_i.$$

In theory, including the predicted probability accounts for the correlation between the unobservable factors influencing both a student's attendance path decision and his or her future earnings, and thus including them in the second-stage log annual earnings function corrects those estimates for the potential selection bias associated with estimating $\hat{\delta}$ in equation (1) by OLS. As such, if δ is statistically significant, then we would conclude that those unobservable factors causing Bachelor's degree recipients to self-select into initial two-year college attendance also cause them to earn significantly different future log annual earnings than otherwise similar Bachelor's degree recipients who self-select into initial four-year college attendance.

The model is identified by including at least one variable in the first-stage college attendance path estimation that is omitted from the second-stage log annual earnings estimation. Ideally, this exclusion restriction should be theoretically justifiable as being correlated with the self-selected attendance path choice, P_i^* , and uncorrelated with future log annual earnings. Following Brewer, Eide, and Ehrenberg (1999), the exclusion restriction we use here is to

include measures of the number of "slots" available in two-year and four-year colleges in the student's home state, two-year slots and tuition and four-year slots and tuition. As those authors argue, such measures of college accessibility should be correlated with a student's college attendance path decision, as greater accessibility should increase the likelihood of college attendance and vice versa..

III. DATA

Data for this analysis are drawn from the High School and Beyond (HSB) survey. The HSB is a nationally representative U.S. Department of Education survey of high school students from the classes of 1980 and 1982 (National Center for Education Statistics, 1986). Students were first interviewed about their family background, individual characteristics, and educational experiences in 1980 as either high school seniors or sophomores. Follow-up interviews concentrating on postsecondary and labor market experiences were conducted in 1982, 1984, 1986 (both cohorts) and 1992 (sophomores only). The longitudinal nature of the surveys make them ideal for this analysis as they provide detailed information about the student's college entire college attendance and labor market experiences in the first 6 to 10 years after high school completion. Moreover, as the data set provides information on both college graduates and non-graduates, we are able to improve the controls for potential selection-bias in the student's college attendance choice by controlling for students who do not graduate from college (including those who never attend college). Variables used in this analysis are chosen to reflect factors that might influence a student's early postgraduate earnings. As mentioned above, these factors can be broadly defined as student-specific, college performance, and institutional characteristics. Detailed descriptions of the variables used are contained in Table 1.

We analyze a sample of 12,305 students who provided adequate data to uniquely identify their attendance paths, were not pursuing a postgraduate degree in 1992, worked an average of thirty or more hours a week, and had an hourly annual earnings greater than \$1. According to table 2, roughly 30 percent of the students in our sample went on to receive at least a baccalaureate degree. Among the 8,846 students who never received a degree, roughly 63 percent attended either a two- or four-year college for some period while the remaining 37 percent never attended any postsecondary institution. These overall numbers are roughly similar to national data for the same time period. Among degree recipients, nearly 40 percent attended a different institution than the one from which they graduated, with 17 percent moving up from a two-year and 21 percent moving from a different four-year.).

Comparing mean annual earnings across the different attendance paths indicates that while college

graduates average higher annual earnings than non-graduates there are potentially large differences across the potential paths to graduation, with four-year transfers averaging roughly \$1,200 more than direct attendees and roughly \$2,500 more than two-year transfers. Among college graduates slim majorities of direct attendees and two-year transfers are male while a slim majority of four-year transfers are female. Regardless of attendance path, the percentages of Blacks and Hispanics in each non-graduate path are more than twice the percentages in each graduate path. College graduates perform better on standardized tests, receive better grades, are more likely to follow college preparatory programs and come from families with higher wealth and with parents who were more likely to receive at least a Baccalaureate degree. At the same time, among college graduates two-year transfers have lower average high school GPAs, lower average family incomes, and are less likely to follow a college preparatory high school program and have a parent who graduated from college. That they possess lower observed high school performance and socio-economic values might suggest that two-year transfers are being strategic in their college attendance decisions.

Turning to our college experience measures, the percentage of direct attendees earning a postgraduate degree by the date of the last survey is almost twice that of the percentage of two- and four-year transfers doing likewise. This may result from students following the transfer paths taking longer to complete the undergraduate degrees and therefore having less time to be observed receiving an advanced degree. Direct attendees graduate from colleges with the highest average median SAT and receive the highest average GPA while two-year transfers graduate from colleges with the lowest average median SAT and receive the lowest average GPA. Finally, relatively larger percentages of two-year transfers are business majors, larger percentages of four-year transfers are engineering and social science majors and larger percentages of direct attendees are science majors. These trends may well relate to the types of courses offered at two-year colleges, as courses in non-technical fields are likely easier to transfer to four-year colleges than courses in more technical fields that require sophisticated work that a two-year college may not be able to supply.

Comparing the home state cost measures that will identify our two-stage empirical model, indicates that two-year transfers come from states with lower average two-year fees and higher average two-year access, while four-year transfers come from states with the highest average relative four-year access. In other words, it appears that students are sensitive to the relative attendance costs when making their attendance decisions.

According to table 3 among Blacks and Hispanics, college dropouts average significantly lower annual

earnings than two-year transfers, with the differences being roughly five to six thousand dollars a year. Among white and other race students the differences in average annual earnings between dropouts and two-year transfers are not statistically significant. Focusing on college graduates, white four-year transfers and direct attendees average statistically significant premiums of roughly \$2,300 and \$3,500 over white two-year transfers while Black four-year transfers average a statistically significant penalty of roughly \$4,300 relative to Black two-year transfers. It should be noted that these differences are only averages and thus do not control for the potentially important effects that independent characteristics might have on difference in annual earnings.

Table2: Marginal Effects for Second-Stage Log Annual Earnings Equations

Variable	Definition
Annual Earnings	Student's self-reported annual earnings in 1996.
Individual and Family Background Measures:	
Male	Dummy variable equal to 1 if student is male
Black, Hispanic, Other Race, White	Dummy variables equal to 1 if student is that given race/ethnicity
Test Scores	Continuous variable equal to student's sum on standardized math and vocabulary exams converted to a 100 point scale.
HS GPA	Categorical variable indicating student's high school grades on a four point scale.
Family Income	Categorical variable indicating income of student's family during student's senior year in high school.
Parent College	Dummy variable equal to 1 if at least one of student's parents graduated from college.
Academic Program	Dummy variable equal to 1 if student followed an academic/college prep program in high school.
Rural HS	Dummy variable equal to 1 if student attended high school in a rural area.
College Experience Measures:	
Receive MA, Receive Ph.D.	Dummy variable equal to 1 is student had received a MA or Ph.D. by date of 1996 questionnaire.
College GPA	Continuous variable indicating student's overall GPA in college coursework on a four point scale.
Median SAT / 100	Median SAT /100 of the college from which the student graduated. Source: <i>Barron's Profiles of American Colleges</i> .
Business, Engineering, Science, Social Science, Educ & Letters	Dummy variable equal to 1 is student graduated with a given major.
Home State Relative Cost Measures:	
Two-Year Fees, Four-Year Fees	Mean two-year and four-year fees in student's home state.
Two-Year Access, Four-Year Access	Ratio of number of two-year and four-year colleges per 100,000 high school graduates in student's home state.

IV. RESULTS

The selectivity correction terms our second-stage annual earnings functions provide estimates of the difference in earnings between a student who self-selected a particular attendance path and a student chosen at random and assigned to that path. For this application, the estimated terms are positive and statistically significant for the four-year transfer and direct attendance path, suggesting that the unobserved factors that are positively associated with the decision to choose one of those paths are also positively related to higher observed annual earnings.

The second-stage results suggest that among direct attendees, males earn roughly 13 percent more than observably similar females while among the remaining attendance groups there are not statistically significant differences. All else equal, Hispanic two-year transfers observe a statistically significant

premium of roughly 29 percent relative to otherwise similar white students (the omitted white race/ethnicity category). Among the remaining individual characteristics, measured innate ability, and family income have significantly positive effects in almost all cases, while rural students earn significantly less than otherwise similar urban students if they are either direct attendees or four-year transfers. At the same time, several aspects of a student's performance while in college are significant determinants of his or her early-career annual earnings. The estimated returns to college major are similar to those in James et. al. (1989), Loury and Garman (1995), Daymont and Andrisani (1984) and many others, with Business, Engineering and science majors earning positive annual earnings premia, all else constant, and Education and Letters majors earning significant, negative premia. The interesting difference revealed here is that the observed patterns are not the same across all three attendance paths. Rather, the positive return to a Business major is not observed for four-year transfers while the positive return for Science majors is only observed for two-year transfers and the negative return to Education and Letters is only observed for four-year transfers.

While these results provide insight into factors that affect a college graduate's entry-level earnings, they do not directly address the central question of this study, as they only indicate the effects that certain characteristics have on post-baccalaureate annual earnings for students within a specific path. To better examine whether there is an earnings penalty associated with two-year college attendance, table 2 presents predicted earnings for the average two-year transfer under each of the three attendance paths. The values are calculated by inserting the sample average values for two-year transfers into the three estimated second-stage log annual earnings functions. The results therefore approximate the experiment of taking the average two-year transfer, assigning him or her to each of the three attendance paths, and observing the resulting entry-level annual earnings. Comparing the predicted earnings for the two-year transfer path relative to the predicted earnings for the other two paths should then indicate whether there is an earnings penalty associated with initial two-year attendance for eventual Baccalaureate degree recipients. To explore whether the predictions differ across gender and ethnic groups, predicted values are calculated for students possessing average sample values for each gender and ethnicity type. The left panel of table 2 presents the predicted log annual earnings and standard error of the predicted log annual earnings, respectively, for each gender and ethnic group while the bottom panel presents the difference between predicted earnings under the two-year transfer path and the other paths and the standard errors associated with those differences.

The right panel of table 2 presents the central results for answering the question posed in this study. The

entries suggest that there are only statistically significant predicted cross-path differences for whites, for whom a student with average two-year characteristics would be predicted to observe annual earnings that are 10.7 percent higher under the direct attendance and four-year transfer paths. For the remaining gender and race/ethnicity groups, while most are predicted to earn slightly less under the two-year transfer path, the standard errors are nearly an order of magnitude larger the differences indicating that we fail to reject the equality of the cross-path predictions. In other words, the small predicted differences appear to be nothing more than statistical noise. This finding is encouraging for most students with Bachelor's degree aspirations who are considering initial two-year college attendance, as it suggests they need not fear performing worse in the post-baccalaureate labor market than their peers who attend four-year colleges for all four years. Indeed, the results suggest that the decision to start at a two-year college and take advantage of the significant reduction in attendance costs is likely a good investment for women and non-white students.

Table2: Predicted Log Annual Earnings for Average College Graduates

	Predicted Values for Average Two-Year Transfer			Differences Relative to Predicted Values for Average Two-Year Transfer		
	Two-Year Transfers	Four-Year Transfers	Direct Four-Year	Two-Year Transfers	Four-Year Transfers	Direct Four-Year
Male	9.4753 (.0585)	9.5455 (.0502)	9.5480 (.0256)	---	.0702 (.0771)	.0727 (.0639)
Female	9.3623 (.0610)	9.4439 (.0479)	9.4179 (.0265)	---	.0815 (.0776)	.0555 (.0685)
Black	9.5987 (.1795)	9.5950 (.1358)	9.5514 (.0680)	---	-.0037 (.2251)	-.0473 (.1920)
Hispanic	9.6251 (.1390)	9.5860 (.1414)	9.5507 (.0734)	---	-.0392 (.1983)	-.0745 (.1572)
Other Race	9.4942 (.2244)	9.6276 (.1959)	9.5896 (.1053)	---	.1334 (.2979)	.0954 (.2479)
White	9.3400 (.0442)	9.4477 (.0340)	9.4471 (.0190)	---	.1076* (.0557)	.1071** (.0481)

Notes: Predictions are calculated based on sample average values for community college transfers. Entries in the top panel are the predicted log wage and standard error of the predicted log wage (in parentheses). Entries in the bottom panel are the difference in predicted log wage between the community college transfer path and the remaining attendance paths with standard errors of the differences in parentheses.

CONCLUSIONS

Controlling for sample-selection bias:

1. Male, Female, Black, Hispanic, and Other Race Baccalaureate degree recipients who initially attend a two-year college observe statistically similar annual salaries to Baccalaureate degree recipients who initially attend a four-year college.

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