# HUMAN CAPITAL ATTAINMENT, UNIVERSITY QUALITY, AND ENTRY-LEVEL WAGES FOR COLLEGE TRANSFER STUDENTS

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**Abstract:** This paper examines the returns to institutional quality for college transfer students and asks whether the additional information provided by such students provides insight into the role of human capital accumulation in determining a college graduate's entry-level earnings. The quality of university from which a transfer student graduates has a positive effect on his or her future earnings. However, the quality of university initially attended has an insignificant negative effect. Such evidence suggests that a student's entry-level earnings depend only on graduation quality and not on the quality of education received throughout college and are thus more consistent with the screening theory ("sheepskin effects") than with human capital theory.

Keywords: University Quality, Human Capital Theory, Sheepskin Effects.

JEL Classification: I20, J24

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## 1. Introduction

The U.S. higher education population is highly mobile. Tinto (1987) finds that roughly thirty-five percent of college graduates from the National Longitudinal Study of the High School Class of 1972 graduate from a different institution than one they first attend. Recent evidence suggests that the percentage of college attendees choosing to transfer is on the rise. For instance, a U.S. Department of Education survey of 1992 college graduates finds that over half of the roughly 11,000 students interviewed had attended more than one institution during their college careers (National Center for Education Statistics 1996). Despite their obvious place in American higher education, very little is known about college transfer students. The economics of higher education literature has devoted much attention to the economic returns to college attendance and the causes and consequences of college dropouts. Within the vast literature, however, the transfer student has largely been neglected.

This is particularly regrettable as transfer students present the researcher with additional, potentially valuable information that non-transfers do not. In particular, transfer students will have taken courses at more than one quality institution. This fact can possibly be exploited to provide insight into the role of human capital accumulation in determining a student's post-graduation earnings. A common problem in the economics of higher education literature is that the well-known positive return to the quality of university from which a student graduates is predicted by both the human capital and screening theories (for a more detailed discussion see Weiss 1995). Much of this confusion may be based on the fact that previous studies have only focused on graduation quality. While such an approach is accurate for non-transfers it is not accurate for transfer students. Transfer students clearly complete courses at institutions that are of different qualities. The human capital theory has strict implications for the predicted returns to initial quality and tenure for transfer students while the screening theory does not. Thus, the returns to initial quality and tenure may be used to generate some idea which model more accurately describes the role of educational attainment in determining a student's entry-level earnings.

This study is one of the first to separately examine the economic returns to college attendance for transfer students. In particular, we focus on the returns to quality and educational tenure at institutions other than the one from which a transfer student graduates and ask what implications such values have for human capital theory. A theoretical discussion describes how the educational experiences of college transfer students can be used to address the role of human capital accumulation in determining a college graduates entry-level earnings. Specifically, to be consistent with human capital theory the quality of institution initially attended should have a positive effect on future earnings while the length of time spent there should increase the future earnings of upward transfers and decrease the future earnings of downward transfers. Results are corrected for the potential of self-selection into attendance paths and find that, in general, these predictions do not hold for a sample of transfer students drawn from the High School and Beyond survey. Namely, we find a significant positive return to graduation quality but an insignificant negative return to initial quality. The fact that graduation quality has a significant effect on future earnings while initial quality does not suggests that potential employers only consider the institution from which a student graduates and is thus more consistent with screening theory than human capital theory.

## 2. Theory

To frame the empirical work below, we start by developing a simple model of college choice. In choosing a college, the prospective student has thousands of options to consider. This choice set will differ for each student because it is limited to only those colleges to which he or she is able to gain admission. Each college presents the student with a different combination of quality and cost. A college is an efficient option if no other college offers a higher quality at a lower cost. The student limits his or her search to these efficient options. From this efficient set, the student chooses the level of quality, and implicitly the particular university that results in the highest total utility. If this value exceeds that which

could be received in the labor market, the student chooses to attend the university. If it is less, he or she foregoes college attendance and enters the labor market directly.

To formalize the student's college choice, assume there are two distinct periods representing the college and post-college years.[1] The student's objective is to maximize the utility he or she receives from consumption in the two periods. Each student enters the first period with a fixed amount of family wealth, $M$, which is allocated between current consumption, $X_1$, and the cost of college attendance. Let $Q$ represent the quality of university from which the student graduates and let $C$ represent the cost per unit of quality.[2] Finally, if the student chooses not to exhaust his or her first period wealth, he or she saves the remainder, at interest rate $r$, for use in the second period.

The student is able to work for $\bar{k}$ years during the second period. A student's future earnings will depend on the quality of university he or she attends.[3] Let $f(Q)$ represent the student's post-graduation earnings function. In addition to earned income, the student receives interest payments on any money saved during the first period. The sum of these two incomes is spent on second-period consumption, $X_2$.

The optimization problem facing the university-bound student is:

$$\begin{aligned} \underset{X_1, X_2, Q}{Max} \quad & U(X_1, X_2) \\ \textit{subject to} \quad & X_1 + CQ \le M \\ & X_2 = f(Q) \cdot \bar{k} + (1+r)\left[M - C(Q) - X_1\right] \end{aligned} \tag{1}$$

The solution to this optimization problem yields a familiar system of Kuhn-Tucker conditions.[4] These conditions indicate that a student chooses his or her optimal institution by equating the marginal return to college quality to the marginal cost. As the marginal benefit of college quality depends on the effect that college quality has on a student's future earnings, the specification of the earnings function is of primary importance to a student's decision. Consequently, the work below focuses on the role that college quality plays on a student's future earnings.

Unfortunately, the student's problem is not necessarily as simple as specified in (1). Graduation from college is an uncertain event. Simply gaining admission and enrolling at a particular institution does not guarantee that a student will one day complete the requirements for a degree at that institution. Upon graduation from high school, neither colleges nor students are certain whether students have the ability and/or desire to persist to graduation. Thus, it is reasonable to assume that substantial mismatching exists between students and first-choice colleges. In a non-transfer world, students who decide to attend a particular institution must either persist to graduation at that institution or dropout without receiving a degree. In a transfer world, students who are initially overmatched and do not meet the requirements at their first-choice institutions can transfer to lower quality institutions rather than dropping out.[5] Likewise, students who are initially undermatched and far exceed the requirements at their first-choice institutions can transfer to higher quality institutions.

Consider the difference between the earnings function for a student who transfers from his or her initial quality institution to a different quality institution. This student will not have one fixed quality, as specified in (1), but rather he or she will have different qualities for all institutions attended. Let $Q^G$ represent the quality of university from which the student graduates and let $Q^T$ represent the quality of university from which the student transfers. In addition to the different qualities, the student will have different tenures at each institution. Assume the student spends $\alpha^D$ years pursuing his or her degree, with $\alpha^T$ of those years spent at the initial institution. The post-graduation earnings function for a transfer student is then

$$f(Q^G, Q^T, \alpha^D, \alpha^T) \tag{2}$$

as presumably the qualities and tenures of all institutions will affect a student's future earnings.

An important question is how the different qualities and tenures at each institution affect a student's future earnings. By only examining the quality of university from which a student graduates, previous studies (Rumberger and Thomas [1993], James, *et al.* [1989], Mueller [1989], Wise [1975],

Solmon and Wachtel [1975], and Wales [1973]) have implicitly treated the transfer student's earning function as specified in (1) rather than (2). As such, they have ignored the potentially important effect that initial quality and tenure may have on post-graduation earnings.

The additional information to be gained by controlling for a transfer student's entire educational background may provide insight into important economic questions. For example, human capital attainment is a cornerstone of much of the economics of education literature. According to the human capital theory of Becker (1964) the oft-cited positive return to a college education (recent examples include include Kane and Rouse [1995], Katz and Murphy [1992], and Murphy and Welch [1992]) results from the increased human capital attained through college attendance. A natural extension of this argument is that students who attend higher quality universities accrue higher levels of human capital and should receive higher wages upon graduation (this argument is supported by Psacharopolous 1974). Indeed, Rumberger and Thomas (1993), James, *et al.* (1989) and many others find a positive return to the quality of university from which a student graduates. If human capital increases with college quality then the quality of each institution attended should affect a student's future earnings and not just the quality of university from which the student graduates. This observation leads to testable hypotheses about the post-graduation earnings function of college transfer students.

For demonstration purposes, we will distinguish between three students who graduate from the same quality institution: those who transfer from a lower quality institution, those who transfer from a higher quality institution, and those who do not transfer. Contrasting the expected returns to quality and tenure for these students will demonstrate how transfer students might provide additional insight into the role of human capital accumulation in determining a student's future earnings.

Consider first the expected return to quality. Human capital theory implies that higher quality universities provide higher levels of human capital. Hence, the return to quality should always be positive, not only for the graduation institution, but for all institutions attended. In other words, holding graduation quality constant, the higher the quality of institution initially attended by a transfer student the

more human capital the student should have accumulated. This should be true regardless whether the transfer student increases or decreases quality. For example, consider students graduating from a university with an average SAT score (the quality measure used in this analysis) of 1,000. A student who transfers up from a college with an average SAT score of 800 should have accumulated more human capital than a student who transfers up from a college with an average SAT score of 600. Likewise, a student transferring down from a college with an average SAT score of 1,400 should have accumulated more human capital than a student transferring down from a college with an average SAT score of 1,200. Consequently, under human capital theory, we would expect a positive return to initial quality for transfer students regardless whether they transfer up or down in quality.

In addition to the different quality levels themselves, the lengths of time a student spends at different quality institutions should affect his or her human capital accumulation. Unlike the return to quality, however, the expected return to tenure does differ depending on the direction of transfer. Consider first transfer students who increase quality from their initial institutions ($Q^G > Q^T$). According to human capital theory, such students will be accumulating less human capital than students who attend the graduation university continuously without transferring. It follows that the longer the student spends at the initial, lower quality institution the less human capital he or she will accumulate. Thus, to be consistent with human capital theory, we would expect a negative return to the length of time spent at initial institutions for transfer students who increase quality. Contrast this to transfer students who decrease quality from their initial institutions ($Q^G < Q^T$). According to human capital theory, such students will be accumulating more human capital than non-transfers and the longer the student spends at the initial, higher quality institution the higher the accumulation. Thus, to be consistent with human capital theory, we would expect a positive return to the length of time spent at initial institutions for transfer students who decrease quality.

## 3. Empirical Model

The empirical work below attempts to test the predictions of the theoretical discussion by estimating entry-level wage functions for a sample of college graduates. To motivate the empirical work, we start by writing a general form of the wage function to be estimated. A student's future earnings are assumed to be a function of his or her experiences during college as well as individual and family background characteristics that may affect his or her productivity level. Let the student's future earnings be:

$$Y_i = Y(Z_i, A_i, J_i, P_i) \tag{3}$$

where $Y_i$ is the log annual earnings of student $i$, $Z_i$ is a vector of individual and family background characteristics, $A_i$ is a vector representing $i$'s academic performance in college, $J_i$ is the post-graduation job market experience of $i$, and $P_i$ is a vector of variables representing the attendance path $i$ followed while pursuing his or her degree.

Several aspects of a student's educational path are observable to a potential employer. As demonstrated in (2), a transfer student will have some combination of initial and graduation quality as well as some combination of lengths of time spent at those institutions. To account for these values, the student's educational path is considered:

$$P_i = P(Q_i^G, Q_i^T, \alpha_i^D, \alpha_i^T) \tag{4}$$

where $Q_i^G$ is the quality of university from which $i$ graduates, $Q_i^T$ is the quality of university from which $i$ transfers, $\alpha_i^D$ is the total number of years $i$ takes to receive a bachelor's degree, and $\alpha_i^T$ is the total number of years $i$ spends at initial institutions before transferring to the degree-granting institution.[6]

A general form of the wage function to be estimated is thus:

$$Y_i = B_0 + B_1 Q_i^G + B_2 Q_i^T + B_3 \alpha_i^G + B_4 \alpha_i^T + \delta Z_i + \eta A_i + \gamma J_i + \varepsilon_i \tag{5}$$

where the variables are defined as above and $\varepsilon_i$ is a normally distributed error term. Parameters to be estimated are $B_1, B_2, B_3, B_4, \delta, \eta,$ and $\gamma$.

To allow returns to quality to differ across educational paths, equation (5) should be estimated separately for Bachelor's degree recipients who attended the same university continuously, transferred from a lower to a higher quality university, transferred from a higher to a lower quality university, and transferred from a community college to a university. There is a potential problem with estimating equation (5) by OLS for each of those subsamples, however. As recent work by Brewer and Ehrenberg (1996) and Behrman et. al. (1996) discuss, such an estimation procedure would provide potentially biased parameter estimates because path-specific post-graduation wages are only observed for students choosing each specific path and not for the population as a whole. The basic problem is that students may non-randomly select educational paths and that a student's educational path choice might affect the quality of university from which he or she graduates, which may subsequently affect his or her future earnings. If so, OLS estimates will be potentially biased, as they will fail to separate the effect of university quality on earnings from the effect of attributes that determine the quality of the university that a students attends. This is the traditional self-selection bias problem of Heckman (1979).

To get unbiased estimates, steps must be taken to correct for the presence of this selection bias. The procedure used here is similar to that in Brewer and Ehrenberg (1996) and follows the two-stage methodology of Lee (1983).[7] The first stage involves estimating the student's college attendance decision. Students can broadly be grouped by their decision to attend no postsecondary institution, attend a postsecondary institution without graduating, or attend a postsecondary institution and persist to graduation. Among non-graduates, students are further divided as to whether they start at two-year or four-year colleges. Among graduates, students are divided as to whether they attend the same university, transfer from a lower to a higher quality university, transfer from a higher to a lower quality university, or transfer from a two-year college to a university. Assuming that students are expected utility maximizers, the college attendance decision is estimated as a multinomial logit with seven possible outcomes. The

estimation is straightforward (see Greene, 1993 pp. 666-668). This decision is assumed to be a function of individual and family background characteristics affecting the student's academic ability, academic performance in high school, and variables representing access to post-secondary institutions in the student's home state.

Following estimation of the student attendance decisions, selectivity correction terms are derived for graduates who attended the same university continuously, $\lambda_{cont}$, transferred from a lower to a higher quality university, $\lambda_{up}$, transferred from a higher to a lower quality university, $\lambda_{down}$, or transferred from a two-year college to a university, $\lambda_{2yr}$. These terms are then included in the second stage as regressors in the wage function to correct for the selectivity bias. The selectivity-corrected wage functions to be estimated are thus:

$$Y_{i,cont} = B_1 Q_i^G + B_2 \alpha_i^D + \delta Z_i + \eta A_i + \gamma J_i + \theta_i \lambda_{cont} + \varepsilon_i \tag{6}$$

$$Y_{i,up} = B_1 Q_i^G + B_2 \alpha_i^D + B_3 Q_i^T + B_4 \alpha_i^T + \delta Z_i + \eta A_i + \gamma J_i + \theta_i \lambda_{up} + \varepsilon_i \tag{7}$$

$$Y_{i,down} = B_1 Q_i^G + B_2 \alpha_i^D + B_3 Q_i^T + B_4 \alpha_i^T + \delta Z_i + \eta A_i + \gamma J_i + \theta_i \lambda_{down} + \varepsilon_i \tag{8}$$

$$Y_{i,2yr} = B_1 Q_i^G + B_3 \alpha_i^G + B_4 \alpha_i^T + \delta Z_i + \eta A_i + \gamma J_i + \theta_i \lambda_{2yr} + \varepsilon_i \tag{9}$$

An important issue in estimating such a two-stage model is identification. In order to be identified we must make identifying restrictions by including at least one variable in the attendance path estimation that is excluded from the wage function estimation. Ideally, the identifying restriction should be economically justifiable as affecting the attendance path decision but not the student's entry-level earnings. The variables used here to identify the model are state-level variables representing net attendance costs and relative access to postsecondary institutions in the student's home state. These variables are chosen for the following reason. A voluminous literature indicates that potential students respond to relative costs when making their attendance decisions (for example Kane [1994], Parker and Summers [1993], Leslie and Brinkman [1987], Heath and Tuckman [1987], Chressanthis [1986]). It is

unlikely, however, that those values affect a student's future earnings, as they have no clear effect on a student's productivity level.

## 4. Data

This study makes use of a unique data set constructed by merging individual-specific data from a longitudinal survey conducted by the U.S. Department of Education with state- and institution-specific data from published handbooks. The longitudinal survey chosen for this analysis is the High School and Beyond (HSB). The HSB survey began in 1980 and initially questioned a nationwide sample of roughly 15,000 high school sophomores and 11,000 high school seniors. Follow-up surveys were conducted in 1982, 1984, and 1986 for students in both the sophomore and senior cohorts and in 1992 for the sophomore cohort. The base-years survey collected extensive information on individual and family background characteristics and a student's experiences in high school. Follow-up surveys collected extensive information on a student's postsecondary education and labor market experiences. Based on the timing of the surveys, students in the senior cohort would be graduating from college around 1984 and thus the 1986 follow-up would provide labor market information at a point roughly two years after graduation. Students in the sophomore cohort would be graduating from college around 1986 and thus the 1992 follow-up would provide labor market information at a point roughly six years after graduation

The choice of the survey used merits some discussion. A potential shortcoming of longitudinal surveys started as high school students is that a majority of high school graduates never graduate from college. Indeed, of the HSB students who provided sufficient information to be included in the sample, less than one-third had graduated by the date of their last follow-up.[8] However, while they may result in smaller than desired samples of college graduates, such surveys provide the most detailed postsecondary information. A study of the economic returns to transfer students is faced with twin goals. To get precise estimates, we want as large a data set as possible, but at the same time, to identify and analyze transfer students, we need a wealth of detailed information about a student's postsecondary experiences. Based

on these twin goals, HSB is the most appropriate survey to use. While large-scale national data sets, such as the NLS, the Census, or the National Survey of College Graduates, provide much larger samples of college graduates, they fail to provide the detailed postsecondary information required to determine a student's attendance path. Consequently, HSB is more desirable as it provides the most extensive postsecondary information and while being smaller than ideal the samples analyzed are certainly large enough to provide accurate and informative results.[9]

State-level characteristics are drawn from the *Digest of Education Statistics* (1985). Students in the HSB survey graduated from high school and made their initial college attendance decisions in either 1980 or 1982. Accordingly, data on post-secondary fees and access to post-secondary institutions are collected for the 1982 academic year.

Institution-specific measures representing college quality are drawn from published college handbooks. Barron's *Profiles of American Colleges* and Cass and Birnbaum's *Comparative Guide to American Colleges* are semiannual publications detailing characteristics of American four-year colleges and universities. The quality measure used here is the average SAT score of entering freshmen at each institution.[10] Again, values are collected for the 1982 academic year.

The dependent variable in this analysis is the log of a student's real, annual earnings in the last year surveyed. Recall that the last survey was conducted in 1986 for the senior cohort and 1992 for the sophomore cohort. As the purpose of the study is to estimate the effect of quality and tenure on entry-level earnings, the difference in years should not matter. For consistency, however, earnings are converted to constant dollars (base year=1992).

The sample used here is restricted to students, both male and female, who participated in all waves of the survey, had adequate annual earnings and whose post-secondary attendance paths could be unambiguously identified.[11] There is some debate in the literature whether to group males and females (Manski and Wise [1983], Wales [1973]) or to examine the sexes separately (Rumberger and Thomas [1993], Belman and Heywood [1991]). We group the sexes for the following two reasons.[12] First, due to

the nature of the data set being analyzed, sample sizes become dangerously small for four-year transfers when separated by sex. Second, based on a Chow test (Greene pp. 211-213) we cannot reject that the coefficients are equal for males and females in the estimated wage function for college graduates.

Further restrictions were made to limit the sample to workers employed full-time at the date of the last survey. Ideally, we would have determined whether a worker was employed full-time based on the average weekly hours worked. Unfortunately, the 1992 survey does not include this information. We therefore assume that full-time workers are those with annual earnings in excess of $6,240. We arrived at this value because it represents the annual earnings of a person working 30 hours a week and earning $4.00 an hour. The resulting sample contains observations on 8,956 students. Of these, 2,495 had received a Bachelor's degree or higher by 1992. Among this sample of college graduates, 1,696 attended the same college continuously while 387 transferred from a four-year college and 412 transferred from a two-year college.[13] These attendance patterns compare favorably with observed national trends. Nearly one-third of the students who eventually graduate from college attend more than one institution, which is similar to the results in Tinto (1987).

Table 2 presents descriptive statistics for annual earnings, college qualities and tenures, and variables representing post-secondary experiences. The first column presents values for college graduates who attended the same university continuously without transferring. The second and third columns present values for college graduates who transferred from lower to higher quality universities and students who transferred from higher to lower quality universities, respectively. The final column presents values for students who transferred from a two-year college to a university. Average earnings for our sample of college graduates appear to be consistent with national data. According to 1990 census of population and housing, the average annual earnings of 18-24 year old college graduates employed year-round full-time were $23,430 for males and $20,229 for females (U. S. Bureau of the Census 1992).[14] Comparing across attendance paths suggests little difference between the average annual earnings of non-transfers, four-year transfers who decrease quality, and two-year transfers. Specifically,

the average annual earnings of those three groups are within $900 of each other. Four-year transfers who increase quality, on the other hand, have average annual earnings that are nearly $3,000 greater than the remaining groups. It does not appear that this difference is due strictly to differences in work experience, as all three transfer groups average nearly the same work experience, while non-transfers average nearly one-half year more work experience.

It is interesting to compare other factors that might influence entry-level earnings. There is a wide disparity in the average quality of university from which students graduate. On average, four-year transfers who increase quality graduate from the highest quality universities while four-year transfers who decrease quality graduate from the lowest. Given the positive relationship between quality and earnings (Rumberger and Thomas [1993], James, *et al.* [1989]) the higher average graduation quality for four-year transfers who increase quality may help explain why they receive the highest average earnings. The difference between transfer and graduation quality for the two groups of four-year transfers is potentially revealing. As mentioned above, a probable reason that a student chooses to transfer is a mismatching between his or her ability and/or motivation and the quality of institution initially attended. The entries in Table 2 suggest that this is indeed correct. Four-year transfers who decrease quality graduate from institutions that average roughly 115 SAT points lower in quality while those who increase quality graduate from institutions that average roughly 100 SAT points higher in quality. The fact that initial quality for upward transfers is similar to graduation quality for downward transfers, and vice versa, suggests that the students were initially mismatched with their institutions and that transferring helped alleviate the problem. Not surprisingly, students who transfer take longer to graduate than non-transfers. This may explain why non-transfers have more post-graduation work experience by the time of the final survey. Finally, four-year transfers who increase quality have the shortest average tenures at initial institutions while two-year transfers have the longest. This latter fact corresponds to conventional wisdom that community college attendees are likely to work and take smaller courseloads while

attending.[15] This may help explain why, despite graduating from lower average quality universities, two-year transfers have higher average entry-level earnings than non-transfers.

Turning to the values reflecting postsecondary experiences, there is not much difference in average grades across the different attendance groups. There is, however, a noticeable difference in college major choices, which may help account for the observed difference in average annual earnings. Four-year transfers who increase quality are by far the most likely to major in engineering. Studies of returns to college major have frequently documented that engineers observe the highest return to their degrees, which may provide additional explanation of their increased annual earnings in this sample. Likewise, non-transfers and downward transfers disproportionately choose relatively low-paying social science majors, which may help explain why they are the two groups with the lowest average earnings.

Table 3 presents mean values for individual and family background characteristics and state-level measures of relative attendance costs and access to postsecondary institutions. A few general trends are worth mentioning. Both two- and four- year transfers are more likely than non-transfers to be male. Non-graduates are nearly twice as likely to be Black as graduates. Students attending two-year colleges are more likely to be Hispanic, regardless whether they graduate than students attending four-year colleges. As with previous studies, (Behrman et. al. [1992], Ganderton [1992]), family background, high school performance, and innate ability appear to be great predictors of college attendance and completion. College graduates have the highest test scores, family incomes, and high school grades in addition to being the most likely to follow academic high school programs and have at least one parent who graduated from college.

An important question for the current study is what factors might influence a student's decision to transfer. Comparing the entries in Table 3 across attendance paths for college graduates provides some insight into this question. Four-year transfers who increase quality have the lowest high school grades and test scores but highest college grades (from Table 2) of all graduates who never attend a two-year college. This provides additional support for the mismatching story by suggesting that students who

transfer up are those who have worse records upon high school graduation but perform better at their initial institutions. Conversely, students who transfer down have better high school records but perform worse at their initial institutions than students who transfer up. Two-year transfers provide a different story. Those students have the lowest average family incomes and high school grades, but the highest average test scores of all college graduates. This suggests that two-year transfers are primarily two types of students: (1) those who lack the financial resources to attend a four-year college for four years and (2) those who are of high ability but perform poorly in high school and attend a two-year college to improve their academic records.

## 5. Results

The empirical work presented below focuses on estimating the wage functions given in equations (6)-(9). While estimation of the first-stage attendance equation is not our primary focus, it is interesting to discuss the results. The entries in Table 4 have been converted to marginal effects and should be interpreted as the effect that changes in the independent variables have on the probability of choosing one attendance path relative to choosing the base attendance path, holding all else constant. Most of the estimated effects in Table 4 are statistically significant. The family background and high school academic performance variables all have significant positive effects on the probability of graduating from college, regardless of whether one transfers or not. The college cost and access estimates suggest that students respond to relative net costs in expected ways. Increasing both four-year and two-year fees decreases the probability that a student initially attends that type of institution and increases the probability he or she initially attends the opposite type of institution. Increasing access to two- and four-year colleges tends to have exactly the opposite effect. Comparing the effects of increasing access to the effects of increasing fees suggests that students are more responsive to increases in the number of institutions than the direct costs of attendance. These results are similar to those in Hilmer (1998), Leslie and Brinkman [1987], and others.

Table 5 presents selectivity corrected results of estimating log annual earnings functions for the different subsamples of college graduates. The first column groups all graduates together without distinguishing between non-transfers and transfers, while the final four columns present estimates for each subset of students described in (6)-(9). Column (1) is included for the sake of comparing this sample with previous samples and indicates that the current results are consistent with the results of previous research. Specifically, increasing graduation quality by 100 SAT points increases annual earnings by roughly three and a half percent, which is similar to the estimates in Rumberger and Thomas (1993), James, *et al.* (1989), etc. A problem with the estimates in column (1), and with previous research using that specification, is that it requires the estimated coefficients to be constant across attendance paths. A Chow test rejects this restrictive assumption and suggests that the wage functions should be estimated separately.

It is interesting to discuss the selectivity correction terms. These terms are estimates of the covariance between the error terms in the log earnings functions and the error term in the attendance equation. In other words, the terms represent the correlation between unobserved variables that affect a student's college attendance decision and his or her entry-level earnings. These terms are only significant for two-year transfers, for whom the estimated relationship is positive. This suggests that unobserved characteristics that encourage a student to start at a two-year college before transferring to and graduating from a university are positively associated with his or her future earnings. This seems reasonable given the evidence discussed above that two-year transfers are more likely to be income-constrained students who are forced to work full-time while pursuing their degrees. Students who are willing to make such sacrifices may have higher motivation levels, a trait that is likely to be highly valued in the post-graduation labor market.

The top panel of Table 5 contains the estimates that are the focus of this study. It is interesting to first discuss the remaining estimates, however. Looking first at individual characteristics reveals some noticeable differences across attendance paths. Controlling for other factors, Hispanics observe a large

statistically significant earnings premium if they attend a community college and eventually transfer to and graduate from a university. This finding is particularly interesting as anecdotal evidence suggest that Hispanics disproportionately rely on community colleges for their first access to higher education. A similar result is observed for Blacks. At the same time, Hispanic and Black non-transfers, observe a positive but much smaller earnings premium, while Hispanics who transfer down observe a significant negative premium. The significant, positive return observed in column (1) for other race (primarily Asian) students appears to be significant only for non-transfers. Family income has a significant positive effect for non-transfers and a significant negative effect for transfers who decrease quality. It is unclear whether these differences are surprising, as there are no clear priors on the expected partial effect of family income.

Turning to labor market and postsecondary experiences, post-graduation work experience is only significant for non-transfers. This may be caused by the fact that such students graduate in less time and therefore are able to accrue more work experience by the last interview date. Perhaps, they are more likely to be in the "working" phases of their career where direct job experience is more important than initial on-the-job training. The well-known positive return to Engineering majors and negative return to Education and Letters majors (Eide and Grogger [1995], James *et al.* [1989]) are observed for non-transfers. Among all three sets of transfer students, the estimated returns to college major lack significance. This could be related to the small cell problem that results from dividing the samples of transfers into six different major categories. Notable exceptions are the extremely large negative return to Education and Letters majors for upward transfers and the positive return to Social Science majors for downward transfers.

The top panel of Table 5 suggests that a significant positive return to quality exists for all college graduates except those who initially attend a two-year college. Holding all else constant the expected return to a 100 SAT point increases in quality is roughly eleven percent for four-year transfers regardless of direction of transfer. Notice that this estimated return is nearly three times larger than the estimated

return for non-transfers. The total number of years required to graduate is only significant for two-year transfers. This might suggest that employers focus more on the institution from which students graduate than on the length of time required to complete the degree.

Turning to the additional information provided by transfer students, recall that he theoretical discussion made the following predictions. To be consistent with human capital theory transfer quality should have a positive effect on future earnings while the length of time spent at initial institutions should have a negative effect for upward transfers and a positive effect for downward transfers. In this light, the results generally provide little support for strict human capital theory. Transfer quality has little effect on future earnings, and further the estimated effect is negative rather than positive. Likewise, for upward transfers initial tenure is insignificant and positive which is opposite the predicted sign. The one result that is consistent with human capital theory is the significant positive effect of initial tenure on entry-level earnings of downward transfers. This suggests that holding the length of time required to obtain a degree constant, a student who transfers down earns roughly eight percent more for each year spent at the initial higher quality institution than the lower quality graduation institution. As noted above, this result may be attributed to the higher level of human capital that such a student will have accumulated.

The relative lack of support for human capital theory provided by the returns to quality and tenure for transfer students is in itself instructive. The screening model of Arrow (1973) provides an alternative to human capital theory. According to this theory, education itself is non-productive. Rather, because potential employers cannot determine a student's true productivity level they use his or her educational attainment as an indication of productivity. In other words, college graduates do not earn more because they possess more human capital but because they have signaled they possess higher productivity levels. Many previous studies have attempted to test job market screening, or so-called "sheepskin effects" (for example Belman and Heywood [1997], Heywood [1994], Patrinos [1996], and Hungerford and Solon [1987]). This study adds to the literature by suggesting that the positive return to quality only exists for the quality of institution from which a transfer student graduates and not for the quality of institution he

or she initially attends. Such evidence suggests that employers only consider the graduation institution when determining entry-level wages and as such may be taken as consistent with the screening theory rather than the human capital theory.

## 6. Conclusion

This paper examines the returns to quality and educational tenure for college transfer students. The results suggest that initial quality has an insignificant negative effect for both upward and downward transfers. Such evidence is inconsistent with human capital theory, which predicts that college quality should have a positive effect on future earnings for all courses taken during a student's college education. Moreover, the return to initial tenure provides mixed support for human capital theory. The length of time spent at initial institutions has a significant positive effect on entry-level earnings for downward transfers but an insignificant positive effect on entry-level earnings for upward transfers. While the first result is consistent with human capital theory the second is not. Thus, it appears that the returns to quality and tenure for transfer students are both, in general, inconsistent with human capital theory. Combined with the fact that graduation quality has a significant positive effect on entry-level earnings, the results can be interpreted as suggesting significant "sheepskin effects" and can thus be taken as more consistent with the screening theory.

## Notes

[1] This model is being developed for the purpose of framing the empirical work presented below. Thus, it is convenient to assume that the student's attendance decision is static during the first period. It is recognized that this decision may actually be dynamic in nature, as the student must decide each year whether to continue at his or her current institution or transfer to a different institution. Expanding the model to reflect such possible dynamics does not change the basic results in which we are interested. For an example of a dynamic model, see Altonji (1993).

[2] Attendance costs should be increasing in quality for two reasons. First, higher quality institutions tend to charge higher fees. Second, due to the small number of high quality universities, a student will have to move from home to attend one, so that the opportunity cost of attendance will be higher. The data set used in this analysis allows us to test this proposition as follows. Net costs are calculated as the difference between the self-reported total attendance costs (tuition, books, room and board, and living expenses) and total financial aid (loans, scholarships, etc.) for each student during the 1982-83 academic year. The average net costs for students by quartiles of university quality are $1,915.94, $3,320.33, $3,688.33, and $4,471.61. Moreover, a regression with net costs as the dependent variable indicates that university quality has a significantly positive affect on attendance costs. Specifically, a one-unit increase in the mean SAT score of entering freshmen increases attendance costs by $8.55.

[3] This is not a trivial assumption. However, empirical evidence abounds that graduation quality has a positive effect on future earnings. For example, see Rumberger and Thomas (1993), James, *et al.* (1989), Mueller (1989), Wise (1975), Solmon and Wachtel (1975), and Wales (1973).

[4] A complete discussion of the model is available from the author upon request.

[5] The concept that students may start attending a particular college to see if they have the ability and/or desire to complete the requirements of a degree is often referred to as the "option value" of college attendance. For a detailed discussion see Comay et al (1973), Manski (1989), and Altonji (1993).

[6] Transfer students can attend more than one different institution before transferring to their ultimate university. Four-year transfers in this sample attended an average of 1.36 before transferring while two-year college graduates attended an average of 1.44 before transferring. To account for this, different formulations of the initial quality measure were tried (i.e. average previous quality, time-weighted average pervious quality, etc.). The results did not differ significantly for any of the specifications.

[7] There are numerous other examples that use this type of model to correct for the potential of self-selection bias. For example, see Pagan and Davila (1997), Sa Aadu and Megbolugbe (1995) and Gyourko and Tracy (1988). The latter provides an excellent description of such models.

[8] Of the 8,956 students in the sample, only 2,495 or twenty-eight percent, had graduated from college by the date of the last follow-up.

[9] An alternative survey that does provide both larger sample sizes and extensive postsecondary attendance information is the Baccalaureate and Beyond (B&B), a survey of nearly 11,000 college graduates from the Class of 1992. The B&B survey only samples college graduates, however, and thus does not contain information on students who either never attend college or attend but never graduate. Consequently, much of the information on initial college choice that is vital to a study of the economic returns to a college education is not contained in the B&B.

[10] Alternative measures of college quality have been proposed. Examples of these are faculty salaries, the percentage of faculty possessing Doctorates or a school's Carneghie classification, among others. While each of these have merits, Tierney and Davis (1985) argue that mean SAT scores are the best proxy for a universities academic reputation as perceived by prospective students. Presumably, the same is true for potential employers.

[11] The HSB survey originally interviewed 14,825 sophomores and 11,995 seniors. Of these, 18,515 participated in all waves and provided adequate information to unambiguously identify their educational path. To get the sample analyzed, 3,667 students were eliminated for not provided adequate information individual and family background data and 5,892 were eliminated for having annual earnings that suggest they were part-time employees. To explore the possibility of sample bias, descriptive statistics were compared for the sample analyzed and the full sample. These values did not differ significantly between the two groups, and thus it is not suspected that sample bias exists.

[12] Within the sample there are 4,708 males and 4,248 females. Among male college graduates, 846 were non-transfers, 108 transferred to higher quality institutions, 107 transferred to a lower quality institution, and 218 transferred from a two-year college. Among females, the numbers were 850,104, 68, and 194, respectively.

[13] The 2,495 students in the sample graduated from 836 different institutions. The 387 four-year college transfers transferred from 278 different institutions. The 436 two-year college transfers transferred from 316 institutions. A majority of these institutions were represented by only one graduate. The maximum number of

students to graduate from one institution was 30 while the maximum number of students to transfer from one four-year college is five and the maximum number to transfer from one two-year college is 29.

[14] Among college graduates in this sample, the average annual earnings for males is $23,638.63 while the annual earnings for females is $20,917.88.

[15] Within the sample, two-year transfers averaged nearly one-half year more pre-graduation work experience than four-year transfers and nearly one full year more than non-transfers.

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Table 1
Descriptions of Variables Used in Analysis

| | |
|---|---|
| Annual Earnings | Continuous variable representing the student's self-reported annual earnings in the last follow-up. (1992 for sophomores and 1986 for seniors). Converted to 1992 dollars for seniors using CPI-U. |
| Graduation Quality, Transfer Quality | Continuous variables representing the average SAT score of entering freshmen in 1984 at the university from which the student graduated and at the last university attended before transferring, respectively. Imputed for institutions reporting only average ACT scores. |
| Years To Graduate, Years To Transfer | Continuous variables representing the number of years required to graduate and the number of years spent at institutions other than the student's graduation institution. |
| Work Experience | Continuous variable representing the number of years of work experience after college graduation. |
| College Grades, HS Grades | Categorical variable representing a student's self-reported college and high school grade point averages converted to a four-point scale. |
| Business, Engineer, Science, Social Science, Educ. & Letters, Other Major | Dummy variables indicating the major field in which the student received his or her bachelor's degree. |
| Master's, Ph.D. | Dummy variables indicating whether the student had received either degree by the interview date of the last follow-up. |
| Male, Black, Hispanic, Other Race, Parent College, Academic HS, Senior | Dummy variables indicating the student's sex, race and whether the student had at least one parent who graduated from college, followed an academic program in high school, or was part of the senior cohort. |
| Test Scores | Continuous variable representing the student's average score on mathematics and reading tests administered during the senior year in high school. |
| Family Income | Categorical variable indicating the income level of the student's family during high school. In 1980$ the categories are (1) less than $7,000; (2) $7,000 to $11,999; (3) $12,000 to $15,999; (4) $16,000 to $19,999; (5) $20,000 to $24,999; (6) $25,000 to $37,999; (7) $38,000 or more. |
| 4-Year Fees, 4-Year Access, 2-Year Fees, 2-Year Access | Continuous variables representing the average fees and number of institutions per 1,000 students at four- and two-year colleges in the student's home state in 1984. |

Table 2
Descriptive Statistics for College Graduates Wage Equations

| | Four-Year Non-Transfers | Four-Year Transfers | | Two-Year Transfers |
|---|---|---|---|---|
| | | Increase Quality | Decrease Quality | |
| Labor Market Variables: | | | | |
| Annual Earnings | 20,735.09 | 23,550.86 | 20,550.92 | 21,457.51 |
| | (18,607.67) | (16,986.73) | (12,785.55) | (24,576.17) |
| Work Experience | 3.315 | 2.813 | 2.628 | 2.761 |
| | (1.98) | (1.86) | (1.86) | (1.85) |
| College Quality Controls: | | | | |
| Graduation Quality | 986.05 | 1,010.72 | 917.37 | 942.65 |
| | (120.95) | (103.55) | (96.16) | (98.16) |
| Transfer Quality | --- | 912.83 | 1,031.01 | --- |
| | --- | (96.39) | (101.84) | --- |
| Years To Graduate | 4.106 | 4.415 | 4.341 | 4.560 |
| | (0.76) | (0.92) | (1.06) | (1.11) |
| Years To Transfer | --- | 1.604 | 1.740 | 1.821 |
| | --- | (0.96) | (1.18) | (0.93) |
| Postsecondary Experiences: | | | | |
| College Grades | 2.986 | 3.013 | 2.972 | 2.941 |
| | (0.51) | (0.52) | (0.53) | (0.48) |
| Major: | | | | |
| Business | .2705 | .2052 | .2781 | .3401 |
| Engineer | .1271 | .2326 | .1446 | .1365 |
| Science | .1551 | .1309 | .1187 | .1355 |
| Social Science | .2184 | .1790 | .2161 | .1507 |
| Educ. & Letters | .1394 | .1762 | .1394 | .1262 |
| Other Major | .0895 | .0762 | .1031 | .1111 |
| Postgrad Degree: | | | | |
| Master's | .0852 | .0573 | .0567 | .0318 |
| Ph.D. | .0036 | .0027 | .0001 | .0012 |
| Number of Observations | 1,696 | 212 | 175 | 412 |

Notes: Standard deviations where applicable in parentheses. Persons with missing values for a variable are excluded from the calculation of those means. Data are weighted.

Table 3
Descriptive Statistics for College Attendance Equation

| | Non-Graduates | | | College Graduates | | | |
|---|---|---|---|---|---|---|---|
| | Non Attendees | 2-Year College | 4-Year College | 4-Year Non-Transfer | 4-Year Increase | 4-Year Decrease | 2-Year Transfer |
| Male | .6357 | .5014 | .5382 | .5351 | .5860 | .5972 | .5612 |
| Black | .0983 | .0886 | .1224 | .0557 | .0384 | .0444 | .0455 |
| Hispanic | .1474 | .1241 | .1020 | .0463 | .0498 | .0517 | .0730 |
| Other Race | .0133 | .0235 | .0200 | .0223 | .0191 | .0340 | .0268 |
| Parent College | .0630 | .1199 | .1990 | .2970 | .3556 | .3229 | .2091 |
| Academic HS | .1468 | .3627 | .5762 | .8146 | .8383 | .8163 | .7252 |
| Senior | .6388 | .4941 | .5230 | .4530 | .4622 | .4988 | .3573 |
| HS Grades | 2.4001 | 2.6846 | 2.8589 | 3.3196 | 3.1959 | 3.2465 | 2.9944 |
| | (.7224) | (.6568) | (.6937) | (.5614) | (.6578) | (.6171) | (.5961) |
| Test Scores | .2506 | .3200 | .3111 | .3762 | .3446 | .3753 | .3886 |
| | (.2815) | (.2745) | (.2757) | (.2839) | (.2713) | (.3006) | (.2585) |
| Family Income | 3.9605 | 4.3370 | 4.5207 | 4.9749 | 5.0596 | 5.3537 | 4.6146 |
| | (1.7087) | (1.7171) | (1.8273) | (1.6598) | (1.6547) | (1.4359) | (1.7660) |
| State Variables: | | | | | | | |
| 4-Year Fees | 3,500.22 | 3,499.25 | 3,512.47 | 3,569.17 | 3,513.83 | 3,506.74 | 3,479.90 |
| | (507.89) | (454.85) | (502.02) | (496.02) | (494.81) | (468.04) | (465.09) |
| 4-Year Access | .2463 | .2065 | .2463 | .2562 | .2626 | .2348 | .2239 |
| | (.1191) | (.1135) | (.1165) | (.1183) | (.1184) | (.1084) | (.1097) |
| 2-Year Fees | 692.57 | 582.81 | 715.88 | 721.07 | 741.91 | 677.64 | 613.08 |
| | (295.18) | (460.93) | (452.64) | (298.32) | (265.44) | (265.28) | (315.75) |
| 2-Year Access | .1521 | .1373 | .1488 | .1524 | .1524 | .1478 | .1516 |
| | (.0691) | (.0647) | (.0686) | (.0693) | (.0569) | (.0626) | (.0734) |
| Number of Observations | 2,497 | 1,995 | 1,969 | 1,696 | 212 | 175 | 412 |

Notes: Standard deviations where applicable in parentheses. Persons with missing values for a variable are excluded from the calculation of those means. Data are weighted.

Table 4
Marginal Effects for College Attendance Equation

| | Non-Graduates | | College Graduates | | | |
|---|---|---|---|---|---|---|
| | 2-Year College | 4-Year College | 4-Year Non-Transfer | 4-Year Increase | 4-Year Decrease | 2-Year Transfer |
| Male | -.0792 | -0.151 | .0226 | -.0042 | .0040 | .0033 |
| | (-7.82) | (-4.11) | (-0.36) | (0.54) | (0.87) | (-1.19) |
| Black | -.0485 | .1387 | .0017 | -.0046 | -.0017 | -.0201 |
| | (0.83) | (6.23) | (1.89) | (-0.32) | (0.26) | (-1.38) |
| Hispanic | -.0134 | .0493 | -.0395 | -.0040 | -.0034 | -.0132 |
| | (-1.40) | (0.68) | (-3.04) | (-1.23) | (-1.20) | (-2.13) |
| Other Race | -.0127 | .0593 | .0247 | .0009 | .0079 | .0064 |
| | (1.43) | (2.21) | (1.99) | (0.81) | (1.94) | (1.39) |
| Parent College | -.0559 | .0914 | .0768 | .0153 | .0074 | .0097 |
| | (4.14) | (8.64) | (10.35) | (8.32) | (6.34) | (5.59) |
| Academic HS | -.0654 | .1436 | .1420 | .0217 | .0143 | .0371 |
| | (12.17) | (22.68) | (26.69) | (13.41) | (11.76) | (16.12) |
| HS Grades | -.0574 | .0398 | .1616 | .0132 | .0120 | .0200 |
| | (10.32) | (15.54) | (29.90) | (12.22) | (12.12) | (12.11) |
| Test Scores | .0125 | -.0165 | .0498 | -.0032 | .0076 | .0056 |
| | (1.84) | (1.02) | (3.60) | (-0.06) | (2.71) | (1.14) |
| Family Income | -.0054 | .0116 | .0155 | .0019 | .0029 | .0007 |
| | (4.15) | (6.61) | (9.20) | (4.59) | (6.05) | (3.20) |
| Senior | -.0425 | -.0351 | -.0769 | -.0099 | -.0031 | -.0351 |
| | (-11.34) | (-10.05) | (-13.40) | (-6.10) | (-5.05) | (-9.56) |
| State Variables: | | | | | | |
| 4-Year Fees | .0109 | -.0083 | -.0011 | -.0007 | -.0003 | .0001 |
| | (4.82) | (-3.46) | (-0.85) | (-3.05) | (-1.47) | (0.26) |
| 4-Year Access | -.4678 | .2353 | .1687 | .0333 | .0000 | -.0591 |
| | (-4.21) | (1.17) | (2.35) | (2.54) | (-0.32) | (-2.13) |
| 2-Year Fees | -.0244 | .0151 | .0039 | .0007 | .0004 | -.0016 |
| | (-7.66) | (2.82) | (0.90) | (1.71) | (0.52) | (-2.39) |
| 2-Year Access | .2052 | -.3812 | -.1105 | -.0330 | -.0004 | .1024 |
| | (-0.17) | (-3.28) | (-2.31) | (-2.24) | (-0.52) | (1.56) |
| Log Likelihood | -11,835.557 | | | | | |
| R-Square | .1828 | | | | | |
| Number of Observations | 8,956 | | | | | |

Notes: Non-attendees are the base group. Marginal effects are the derivatives of the probability function evaluated at the sample means for continuous variables, and the difference between 0 and 1 for dummy variables. Estimation also includes dummy variables that are equal to one if values for a variable are missing (in which case those variables are set to zero). Z-scores in parentheses. Data are weighted.

Table 5
Selectivity Corrected Log Wage Results

| | All Graduates | Four-Year Non-Transfers | Four-Year Transfers: Increase Quality | Four-Year Transfers: Decrease Quality | Two-Year Transfers |
|---|---|---|---|---|---|
| College Quality Controls: | | | | | |
| Grad. Quality/100 | .0367** | .0341** | .1102** | .1077* | .0419 |
| | (.0106) | (.0126) | (.0533) | (.0586) | (.0328) |
| Years To Graduate | -.0122 | .0144 | -.0651 | .0247 | -.0939** |
| | (.0163) | (.0220) | (.0585) | (.0494) | (.0372) |
| Transfer Quality/100 | --- | --- | -.0441 | -.0166 | --- |
| | --- | --- | (.0601) | (.0549) | --- |
| Years To Transfer | --- | --- | .0260 | .0823* | .0443 |
| | --- | --- | (.0504) | (.0488) | (.0373) |
| Labor Market Experience: | | | | | |
| Work Experience | .0245** | .0705** | .0218 | .0487 | -.0157 |
| | (.0125) | (.0172) | (.0402) | (.0464) | (.0292) |
| Postsecondary Experiences: | | | | | |
| College Grades | .0117 | .0156 | .0754 | -.1193 | -.0046 |
| | (.0250) | (.0299) | (.0956) | (.0937) | (.0701) |
| Major: | | | | | |
| Business | .0409 | .0759 | -.1969 | -.0202 | .0321 |
| | (.0417) | (.0506) | (.1724) | (.1584) | (.1046) |
| Engineer | .0908* | .1333** | -.1202 | .1714 | -.0365 |
| | (.0480) | (.0588) | (.1707) | (.1653) | (.1269) |
| Science | -.0036 | -.0126 | -.1550 | .1993 | .1475 |
| | (.0464) | (.0554) | (.1797) | (.1784) | (.1214) |
| Social Science | -.0662 | -.0833 | -.2599 | .2750* | .0998 |
| | (.0440) | (.0526) | (.1718) | (.1535) | (.1191) |
| Educ. & Letters | -.1220** | -.1356** | -.5566** | .1201 | .1267 |
| | (.0464) | (.0559) | (.1773) | (.1716) | (.1228) |
| Postgrad Degree: | | | | | |
| Master's | .0054 | .0557 | -.0601 | -.2441 | -.2838 |
| | (.0436) | (.0483) | (.1752) | (.1885) | (.1730) |
| Ph.D. | .1435 | .1973 | .2512 | 1.0238 | 1.1449 |
| | (.2057) | (.2215) | (.7534) | (3.5344) | (.8438) |

(continued)

Table 5
(Continued)

| | All Graduates | Four-Year Non-Transfers | Four-Year Transfers: Increase Quality | Four-Year Transfers: Decrease Quality | Two-Year Transfers |
|---|---|---|---|---|---|
| Individual Characteristics: | | | | | |
| Male | .0621** | .0662** | .1052 | .0865 | .0760 |
| | (.0243) | (.0287) | (.0964) | (.1042) | (.0668) |
| Black | .0766 | .1063* | -.0441 | .0863 | .2425* |
| | (.0508) | (.0586) | (.2223) | (.2096) | (.1450) |
| Hispanic | .1161** | .1196* | .0305 | -.3130* | .2848** |
| | (.0504) | (.0625) | (.1854) | (.1824) | (.1156) |
| Other Race | .1441** | .1857** | -.2151 | .1618 | .1614 |
| | (.0726) | (.0883) | (.2827) | (.2341) | (.1823) |
| HS Grades | .0249 | .0195 | .0160 | .1403 | .0988 |
| | (.0243) | (.0305) | (.0913) | (.0983) | (.0642) |
| Test Scores | -.0737 | -.0507 | .2400 | -.1317 | -.1247 |
| | (.0594) | (.0702) | (.3151) | (.1821) | (.1807) |
| Family Income | .0203** | .0413** | -.0190 | -.0593* | .0025 |
| | (.0076) | (.0092) | (.0295) | (.0336) | (.0197) |
| Parent College | -.0055 | -.0083 | .1048 | -.1360 | .0047 |
| | (.0347) | (.0313) | (.0909) | (.1038) | (.0828) |
| Academic HS | -.0546 | -.0635 | .1170 | -.1396 | .0422 |
| | (.0347) | (.0414) | (.1417) | (.1499) | (.0880) |
| Senior | .3300** | .5070** | .5050** | .5046* | -.0758 |
| | (.0566) | (.0750) | (.2334) | (.1925) | (.1471) |
| Selectivity Correction: | | | | | |
| $\lambda$ | -.0656 | -.1149 | -.3202 | -1.6854 | 1.4643** |
| | (.2845) | (.3360) | (1.2595) | (1.3889) | (.7185) |
| R-Square | .0946 | .1315 | .2404 | .3341 | .1307 |
| Number of Observations | 2,495 | 1,696 | 212 | 175 | 412 |

Notes: Dependent variable is the logarithm of real annual earnings in the first year after the student's highest degree. Standard errors in parentheses. Regression also includes dummy variables that are equal to one if values for a variable are missing (in which case those variables are set to zero). Data are weighted. *, ** significant at the five and ten percent levels.