Baccalaureate Success of Transfers and Rising Four-Year College Juniors

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Abstract

The main objective of this study is to compare the effect of being a successful community college "transfer" student instead of a "rising junior" in a four-year college on bachelor's degree attainment (247 transfers and 787 rising juniors). Logistic regression is used to estimate the effect of being a transfer student after controlling for academic preparation, postsecondary institutional characteristics and financial aid. The effects and interplay of factors such as socioeconomic background and institutional selectivity on bachelor's degree completion are estimated for transfer and rising juniors in a sample of students with consistent bachelor's degree aspirations. The results indicate that the negative effect of being a transfer student declines after controlling for differences in socioeconomic status and disappears when accounting for state-level characteristics. The study contributes to growing evidence of a smaller diversion effect than previously estimated.

There has been a continuous expansion of the American postsecondary system over the last three decades. Currently, over 17 million students enroll in one of over 4,000 postsecondary institutions every year. From 2000 to 2004 the total enrollment of undergraduates increased by almost two million (US Department of Education 2005, table 170). The enrollment patterns of students have been also changing. The most recent estimates indicate that today almost 50 percent of students are choosing the community college as a port of entry (Adelman, 2005; Bailey, Jenkins & Leinbach, 2005), compared with 36.9 percent in the early 1970s. This percentage exceeds 60 percent in states like California, Florida, Illinois and New Jersey (Adelman, 2005; Ehrenberg & Smith, 2004). This expansion has created a more socio-economically diverse population of college students (Carey, 2004; Horn & Berger, 2004). Carey (2004), for example, analyzing Census data, reported an increase of about 17 percentage points between 1975 and 2001 of the rate of low-income students enrolling in college immediately after high school.

Despite the increase in access to postsecondary education, the data suggest that sizeable disparities persist in terms of educational outcomes for low-income students. Low-income students have the lowest college completion rates (Cabrera, Burkum & La Nasa, in press; Carey, 2004; Choy, 2000) and the lowest transfer rates (Author, 2006a; Dougherty & Kienzl, 2006; Lee & Frank, 1990). The percentage of low-income students who graduate within six years is 54 percent compared to 77 percent for high-income students and 64 percent at the mean (Carey, 2004). Although it appears community college transfer rates have increased in the last decade (Adelman, 2006; Author, 2006a; Peter & Forrest Cataldi, 2005), low-income students are less likely to transfer than their more affluent peers. At a time when multi-institutional attendance is the norm (Goldrick-Raab, forthcoming; Peter &

Forrest Cataldi, 2005) and nearly 60 percent of students attend more than one institution (Adelman, 2004, p. v), transfer is increasingly a necessary step towards bachelor's degree completion. For low-income students, who are overrepresented in the two-year sector (Bailey, Jenkins & Leinbach, 2005), it is often a critical step. The fact that transfer opportunities are stratified by socioeconomic status is particularly problematic at a time when many states are restricting access by adopting more stringent admissions criteria for the four-year sector (Long, 2005).

A longstanding debate continues concerning whether community colleges democratize education by expanding enrollment or divert students from attaining a bachelor's degree (Alfonso, 2006; Cohen & Brawer, 1982; Dougherty, 1987; Gonzalez & Hilmer, 2006; Karabel, 1972; Leigh & Gill, 2003, Medsker, 1960; Rouse, 1995). The extant evidence is contradictory, but recent findings suggest that community colleges are serving to democratize education without a sizeable diversion effect preventing students from ultimately earning the bachelor's degree. The diversion effect appears to be much smaller than previously stated (Gonzalez & Hilmer, 2006; Leigh & Gill, 2003; Rouse, 1995). This debate is important because the transformative potential of community colleges to expand educational opportunity for low-income students and racial-ethnic minorities depends not only on initial enrollment access, but on the provision of effective pathways to the bachelor's degree as well.

The main objective of this study is to compare the bachelor's degree completion of community college students who transferred to a four-year institution, "transfers," with a comparable sample of individuals who completed their first two years of postsecondary education at a four-year college, whom we will refer to as "rising juniors."

This study examines the effect of socioeconomic status and institutional selectivity on the bachelor's degree completion of transfer students and rising four-year college juniors. It has two interrelated goals: 1) to test for differences in baccalaureate attainment between community college transfer students and rising juniors, and 2) to identify differences in college completion between low-income transfer and low-income rising juniors. We analyze the National Education Longitudinal Study (NELS:88/2000) high school senior class of 1992 using logistic regression to compare the degree completion outcomes of two samples of transfer and rising junior students with equivalent degree aspirations.

We contribute to the "democratization versus diversion effect debate" by focusing on the bachelor's degree attainment rates of students who did transfer in comparison to an appropriate group of their peers, rising four-year college juniors, instead of comparing bachelor's degree completion among all students who enrolled in a community college and all who enrolled at a four-year college. This comparison tests the diversion effect of community college attendance among students with clear bachelor's degree goals without confounding the results with the effects of community college attendance on those whose degree goals were uncertain. In addition, we test differences in the relationship between socioeconomic status and baccalaureate attainment among students who successfully transferred and rising junior students. Our study builds on and extends previous analyses by investigating the diversion effect in a very selective sample of community college students (successful transfers). It also highlights the need for empirical investigations of the causal effects of community college attendance on educational attainment among students with a broad range of educational aspirations.

This paper is organized as follows: section II presents the literature review, followed by the analytical framework and discussion of the data, sample, and models in section III. The results are presented in section IV. Section V provides a discussion of the results and policy implications and an agenda for further research.

II. Literature Review

Democratization versus diversion The "democratization versus diversion" debate concerns the impact of community colleges on the educational outcomes and overall attainment of students. From the earliest days of their founding, supporters have argued that community colleges expand and therefore *democratize* education by providing opportunities for higher education, technical occupational training, and social mobility at a low cost to students (Cohen & Brawer, 1982; Medsker 1960). However, critics of community colleges have argued that the expansion of higher education in the United States through the growth of the two-year sector perpetuates class stratification by *diverting* socio-economically disadvantaged students from the four-year sector, where they would have otherwise earned bachelor's degrees (Brint & Karabel, 1989; Dougherty, 1992; Karabel, 1972; Labaree, 1997) .

There are a substantial number of studies that have analyzed national data to test for the diversion and democratization effect of community colleges. These studies compare the educational outcomes of students who first attended a community college and those who first attended a four-year college. The majority of studies tested for the diversion effect by comparing years of education and/or rates of bachelor's degree attainment between the two groups (Alfonso, 2006; Anderson, 1981; Cabrera, Burkum, & La Nasa, in press; Christie & Hutcheson, 2003; Ganderton & Santos, 1995; Lee, Mackie-Lewis, & Marks, 1993; Nunley

& Breneman, 1988; Velez, 1985). More recently the diversion and democratization hypotheses have been tested simultaneously to examine which of the two prevails (Gonzalez & Hilmer, 2006; Leigh & Gill, 2003; Rouse, 1995), and a subset of the literature has explored the relationship between community college attendance and access to selective four-year institutions (Eide, Goldhaber & Hilmer, 2003; Hilmer, 1997; Yang, 2003).

Diversion effect and socioeconomic status While a key issue is whether community colleges serve to stratify education and society by diverting lower class students from four-year institutions, only a few studies focused explicitly on poor and working class students in comparison to more affluent students. Studying transfer itself as an educational outcome, these studies find that transfer rates are relatively low overall, below 25 percent in national longitudinal data of high school graduates, and there is a positive and statistically significant relationship between higher socioeconomic status (SES) and the likelihood of transfer (Cabrera, Burkum, & LaNasa, in press; Lee & Frank, 1990; Dougherty & Kienzl, 2006). The range in transfer rates by SES is sizeable, with one recent study showing the most affluent students in the top 10 percent of the SES distribution transferring at 55 percent and the poorest (in the lowest decile) transferring at a rate of only 10 percent (Dougherty & Kienzl, 2006). Even in samples where a student's academic performance in the community college was the strongest predictor of transfer, family socioeconomic status still exerted important indirect effects (Lee & Frank, 1990). In terms of bachelor's degree attainment, the net benefit of attending a four-year college rather than a community college appears to be more pronounced for low socioeconomic students, yielding a 69 percent increase in the likelihood of graduating within a decade Cabrera, Burkum, & La Nasa (in

press). The results of these studies suggest that low-income students are better off if they begin postsecondary education at a four-year college.

Addressing Self-Selection Bias The majority of early studies found a f of varying magnitude depending on the demographic characteristics of the samples analyzed (see Dougherty, 1992 and Pascarella, 1999 for reviews of the literature). However, Rouse (1995) then re-conceptualized the debate concerning the impact of community colleges on the educational outcomes of students by estimating the democratization and diversion effects simultaneously. She also corrected for the statistical problem of self-selection bias created by the fact that students "self-select" into particular types of institutions, a problem most earlier and some subsequent studies did not address (see for example Anderson, 1981; Cabrera, Burkum, & La Nasa (in press); Ganderton & Santos, 1995; Lee, Mackie-Lewis, & Marks, 1993; Nunley & Breneman, 1988; Velez, 1985). Rouse's work and that of researchers and methodologists concerning this statistical issue in relation to a range of higher education policy topics (Alon, 2005; DesJardins, Ahlburg, & McCall, forthcoming; Titus, forthcoming) imply that earlier results providing evidence of a diversion effect of community college attendance were statistically biased.

These statistical issues have brought early evidence of a community college diversion effect into doubt. Recent studies explicitly attempt to correct for self-selection bias and the effects of unobservable student characteristics on educational attainment, using "instrumental variable" and other models (Barnow, Cain, & Goldberger, 1981; Heckman, 1979; Lee, 1983). Rouse (1995) corrected for self-selection by using variation in the physical distance from a student's high school to community and four-year colleges and in tuition as instrumental variables to address self-selection into different types of colleges.

Analyzing the senior sample of the High School & Beyond data, she found that those who start in community colleges receive one to one-and-one-half more years of education that those who do not attend college. Her results also showed that students who first attend a community college lag their four-year college counterparts in total years of education obtained by only a year or less, a negative effect much smaller than previously estimated by others. The relationship between community college attendance and bachelor's degree completion was negative but not significant. Therefore, Rouse argued that attending a community college does not alter the probability of attaining a bachelor's degree because those who start in a community college have lower initial probabilities of completion in any case. Rouse concluded that, taken as a whole, these results indicate community colleges are serving to democratize education.

Building on Rouse's (1995) model, Leigh and Gill (2003) analyzed a sample of students from the National Longitudinal Study of Youth (NLSY) and attempted to correct for the selection problem by controlling for students' educational aspirations. They found that for individuals desiring a bachelor's degree, community colleges increase average educational attainment by between 0.4 and 1.0 years. They concluded that policymakers should not be overly influenced by diversion-effect arguments when designing the role of community colleges in state-level master plans. Similarly, Gonzalez and Hilmer (2006) recently used Rouse's methodological strategy to analyze the HS&B data and showed that after correcting for self-selection bias, the negative estimates associated with community college attendance decrease substantially and are no longer significant. In prior work, Author (forthcomingb) used sample restrictions to compare two cohorts of transfer and

rising juniors of Hispanic origin in the early 1980s and 1990s. The results also show a decreasing negative effect of being a transfer student.

Among these more recent studies, Alfonso's findings (2006) stand in contrast. Analyzing the NELS:88 sample, she found that even after controlling for educational aspirations and using the instrumental variable approach to correct for self-selection, the likelihood of earning the baccalaureate decreased substantially for those who started at a two-year college compared to those who started at a four-year college. She concluded that community college students see their probability of attaining a bachelor's degree reduced by 21 to 32 percent, holding all else constant. However, the sample of students in this study included experimenters and the author only accounted for the diversion effect.

On balance, then, these recent studies of the "democratization versus diversion" debate indicate that community colleges are democratizing education and provide access to the bachelor's degree.

Purpose Our study contributes to the democratization versus diversion debate by drawing on the literature above to employ a number of quasi-experimental techniques designed to approximate an experimental comparison and reduce self-selection bias. First, following Lee, Mackie-Lewis and Marks (1993), we exclude college "experimenters" by limiting the transfer student sample to those who had consistent expectations of attaining a bachelor's degree and who did, in fact, successfully transfer to a four-year college. To create a fair comparison, we similarly limit the sample to "rising juniors," students who entered the four-year sector directly and persisted until their junior year. Second, the study addresses omitted variable problems by using the "selection on observables" approach developed by Barnow, Cain and Goldberger (1981), which, in this study, consists of using

proxy variables for student motivation. Finally, the problem of self-selection bias is addressed by estimating an instrumental variables model (Heckman, 1979).

III. Data and Methodology

Data and Sample This study analyzes the National Center for Education Statistics' (NCES): *National Educational Longitudinal Survey Class of 1992* (NELS:88/2000), a nationally representative sample of the graduating high school Class of 1992. To examine the factors affecting the bachelor's degree completion of community college transfers in comparison to an appropriately matched cohort of students who initially enrolled in four-year colleges, the sample for the study includes only students who were "bachelor's degree aspirants." The sample is limited to students who had consistent expectations of attaining a bachelor's degree throughout their participation in the national postsecondary transcript study of the NELS:88/2000 survey. Students who had degree attainment aspirations lower than a bachelor's degree or whose aspirations wavered were excluded from the sample.

Following Adelman (2005), successful transfer students are defined as those who (a) begin in a community college, (b) earn more than 10 credits that count towards a degree at the community college before attending a four-year college and (c) subsequently earn more than 10 credits from four-year colleges. The population of rising juniors is defined as those who (a) attend a four-year college right after high school, (b) enroll for more than 10 credits the first semester, and (c) earn more than 70 credits by the time at which they would traditionally be expected to start their junior year and (d) report being enrolled in a postsecondary institution at the start of their junior year. For four-year college students, this definition includes students who attended more than one four-year institution or who then transferred or alternated between a two-year and a four-year institution[1].

The sample is further restricted to individuals in the NELS:88/2000 who were either early or on-time high school graduates by 1992 and who entered postsecondary education any time between their high school graduation and the time of the fourth follow-up, 8.5 years later. The original sample of early or on-time high school graduates with postsecondary transcript information[2] included 9,602 individuals. Of these 1,034 fit our sample selection criteria and had complete information for all the variables included in the models. The transfer sample included 247 students and the rising junior sample included 787 students. The results of this study can only be generalized to either early or on-time high school graduates who attended a four-year institution before the time of the last follow-up.

Theoretical Model The following model was developed to account for the impact on college attainment of first attending a community college and then transferring to a four-year institution. The conceptual framework is an extension of the human capital model (Becker, 1967; Mincer, 1974). In recent years, economists extended this model in order to account for the impact of attending specific types of institutions on student college completion (Bowen & Bok, 1998; Dale & Krueger, 2002; Gonzalez & Hilmer, 2006; Kane, 1998; Author, 2003b; Rouse, 1995). College completion is conceptualized as influenced by a variety of factors, recognizing that students enter college with different skills gained at home and in high school and vary in their cognitive abilities, their aspirations, and their motivation levels.

The model includes four sets of variables that correspond to four possible sources of variance in the bachelor's degree completion of community college transfers and rising juniors: first attending a community college and transferring (T), background student

characteristics (S), pre-college achievement and academic characteristics (AH), and institutional selectivity and financial aid received by the student (I).

The appropriate method of analysis for a dichotomous dependent variable is logistic regression. This model utilizes Maximum Likelihood (ML) estimators.

The logit expression for this model is:

$$P(C_i \mid T_i, S_i, AH_i, I_i) = \frac{e^{(\beta^T T_i + \beta^S S_i + \beta^{AH} AH_i + \beta^I I_i + \varepsilon_i)}}{1 + e^{(\beta^T T_i + \beta^S S_i + \beta^{AH} AH_i + \beta^I I_i + \varepsilon_i)}}$$

(1) The dependent variable is whether the student (i) completed college in the maximum amount of time available in this study, 8.5 years, or not. While four-year college graduation rates are conventionally calculated over six years (150% of traditional time to degree), transfer student graduation rates are very sensitive to the time allowed. Within a six-year period, transfers will lag significantly behind their native four-year college counterparts, but given more time to degree they essentially close this graduation gap (Adelman, 2004, p. 21 and p. 50). By allowing both groups the maximum time to degree available in the NELS:88/2000 (8.5 years), this study examines ultimate bachelor's degree completion. This outcome measure is appropriate given that the diversion versus democratization debate focuses on whether community college attendance diverts students from the bachelor's, not on whether they earn the degree in the traditional time frame.

The coefficient for the variable *transfer student* (T) is the primary focus of the analysis. The students' background (S), pre-college achievement and academic characteristics (AH), as well as controls for institutional selectivity and financial aid (I), are included.

This model was also estimated including an interaction term, which is the product of the variables measuring SES and transfer status. The interaction term was included in

order to capture differences in probabilities of completion between transfer and rising juniors by different levels of SES. The only difference between models (1) and (1a) is the interaction term (IT).

$$P(C_i \mid T_i, S_i, AH_i, I_i, IT_i) = \frac{e^{(\beta^T T_i + \beta^S S_i + \beta^{AH} AH_i + \beta^I I_i + \beta^{IT} IT_i + \varepsilon_i)}}{1 + e^{(\beta^T T_i + \beta^S S_i + \beta^{AH} AH_i + \beta^I I_i + \beta^{IT} IT_i + \varepsilon_i)}} \quad (1a)$$

Following advances in statistical graphing described by Long and Freese (2006) and a previous application by Author (2006c), the interaction effect is presented graphically. The different effect of increasing SES on the probability of degree completion for transfers and rising juniors is illustrated by allowing the slopes to differ.

The coefficients in the logistic regression results are reported as marginal effects and the effects of significant variables are calculated and discussed using the delta-p, change in probability, statistic. The marginal effect is estimated by holding all variables at their mean and computing the marginal change for each observation in the sample and then averaging across all values. With the delta p statistic, these effects can also be computed for specified values holding other variables at their mean or modal values (Long & Freese, 2006, p. 169).

The above estimations could be biased because of student self-selection into the two sectors under study or an omitted variable problem resulting from omitted individual characteristics. The most widely used corrections for these problems include using a two-stage estimation procedure (Heckman, 1979; Lee, 1983), or adding proxy variables for the omitted variables or (Barnow, Cain & Goldberger, 1981). The models developed for this study include proxy variables in order to minimize the omitted variable bias due to potential differences in community and four-year college student motivation. The effects of selection bias in equation (1a) are also tested using a two-stage selection correction model.

The final model tests for unobserved institutional characteristics associated with state-level transfer policies.

The self-selection correction involves first estimating the predicted probability of transferring to a four-year college using an instrumental variable and subsequently entering the coefficient of the predicted probability of transfer into the structural equation. Following Author (2003b), average state tuition in the state where the student finished high school was used as the instrument for the two-step model. More specifically, implementing Heckman's (1979) two-step selection bias correction, equation (1a) was modified in equation (2) by adding the coefficient "λ_i", which corresponds to the estimated probability of transferring to a four-year college, as shown in (2).:

$$P(C_i \mid T_i, S_i, AH_i, I_i, IT_i) = \frac{e^{(\beta^T T_i + \beta^S s_i + \beta^{AH} AH_i + \beta^I I_i + \beta^{IT} IT + {}_i \lambda_i \theta + \varepsilon_i)}}{1 + e^{(\beta^T T_i + \beta^S s_i + \beta^{AH} AH_i + \beta^I I_i + \beta^{IT} IT + \lambda_i \theta \varepsilon_i + \varepsilon_i)}} \quad (2)$$

The coefficient λ_i, the probability of transferring into a four-year college, is estimated by:

$$E^*_i = Z_i\gamma_i + \nu_i \quad (3)$$

Where E*i is a latent variable, Z_i is a vector of variables determining transfer for student i, which includes all the variables in the first model plus the variable average state tuition used to identify the equation, and "λ_i" is the estimated probability of transfer.

It is important to understand the benefits and limitations of selecting average state tuition as the instrumental variable in equation (3), given it is rather difficult to come up with a "good" instrument for this type of analysis (Bound, Jaeger & Baker, 1995; Rouse, 1995). The variable is a good candidate for an instrument because it satisfies the following two key assumptions of instrumental variables correction. First, it is uncorrelated with the

error term (u), (that is, Cov (z,u) = 0), and second, it is correlated with the endogenous variable, transfer (that is, Cov (z,x) ≠ 0) (Wooldridge, 1999). For the first assumption, the claim is that the error term is uncorrelated with the endogenous variable, because motivation is uncorrelated with the state where the student graduated from high school. In other words, one would find a random distribution of motivated students in all states, because students are located where their parents choose to live.

For the second assumption, the claim is that average state tuition is correlated with being a transfer student. This is expected because students are sensitive to the cost of tuition and the availability of lower cost postsecondary opportunities in the state (Author, 2007a). In these data, the two variables were significantly correlated at -.27. Given that the two main assumptions for an instrument are satisfied, it is reasonable to estimate the model using average state tuition to instrument for selectivity. However, average state tuition has a known limitation as an instrument for this purpose. It may also be correlated with any number of other differences that exist between states that may also determine the probability of transfer. These differences are not included in the model and would, therefore, be present in the error term.

Finally, to adjust for unobserved institutional characteristics related to the state where the institution is located, a model including a state-level dummy variable indicating those that have strong transfer and articulation systems (Ignash & Towsend, 2000) is estimated to more fully control for state characteristics. (The total number of states in which students attended college was 43). After controlling for the state, the estimates are no longer affected by between-state differences and only represent within-state differences

in student outcomes. Therefore, the model controls for the relative effectiveness of transfer and articulation policies in different states.

The estimation of this model is shown by the following equation:

$$P(C_i \mid T_i, S_i, AH_i, I_i, IT_i, ST_i) = \frac{e^{(\beta^T T_i + \beta^S S_i + \beta^{AH} AH_i + \beta^I I_i + \beta^{IT} IT + \beta^{ST} ST_i + \varepsilon_i)}}{1 + e^{(\beta^T T_i + \beta^S S_i + \beta^{AH} AH_i + \beta^I I_i + \beta^{IT} IT + \beta^{ST} ST + \varepsilon_i)}} \quad (4)$$

The only difference between equation (1a) and equation (4) is that the model includes a control for the states with strong transfer and articulation policies (*ST*), according to the state in which a student's first postsecondary institution is located.

The NELS:88/2000 is a complex survey sample with a stratified sampling design and unequal probabilities of selection for representative cases. The findings are appropriately weighted using the weight F4F2P2WT. To correct for stratification and clustering in the survey data, robust methods were employed for variance estimation whenever possible. The analyses were conducted in Stata, version 9 using the "svy," and other functions. Lacking the necessary statistical functions, the instrumental variable and fixed effects models were estimated without correcting for variance estimation under complex survey sampling. Typically standard errors in samples from complex survey data are estimated using formulas adjusted for the clustering of cases, because the clustering violates regression assumptions that the cases are independent. Such robust variance estimation functions are not available for instrumental variable and fixed effects models, so we do not obtain estimates robust to the clustering of students in colleges. The typical impact of analyzing complex survey data under assumptions of a simple random distribution is an increase in Type I errors, or false findings of significant difference.

By using these statistical methods, we build on and address the limitations of previous research in several ways. Most studies of the democratization and diversion effect

of community colleges, although intending to estimate the impact of college type, have not used methods necessary to isolate the treatment effect of attending a community college. The limitations of previous research stem from a mixture of inappropriate sample specification, which fail to establish fair comparison groups, and the predominant use of single-stage rather than two-stage regression techniques, which control for a student's initial probability of enrolling in different educational settings (Heckman, 1979; Lee, 1983; Willis & Rosen, 1979). Examples of common sample misspecification include observing only those who attended a community college (and not their four-year counterparts) and leaving "experimenters" in the sample. Students who would not have enrolled in college at all without the availability of a community college cannot be said to have been diverted from a bachelor's degree.

Studies have typically controlled for observable student characteristics, such as test scores, family background, and educational aspirations, thereby addressing some of the self-selection issues. However, other important but unobservable personality and motivation characteristics that affect both college choice decisions and higher education outcomes were not measured. Therefore, these factors were present in the error term of the statistical model, violating the assumption of a random distribution. The problem of self-selection bias is exacerbated in comparative studies of community college and four-year college student outcomes, because four-year college admissions committees select students based on positive personality and behavioral characteristics (unobserved by researchers analyzing secondary data), while open admissions community colleges do not. If highly motivated students self-select themselves into a particular type of institution, those institutions would seem to be doing a better job of graduating students, even though the

true determinant of those higher graduation rates is the institution's ability to attract students who are more likely to graduate. The comparatively positive effects, observed in the early empirical literature, of four-year colleges on degree completion may in fact have been the result of unobserved student characteristics rather than the institutional characteristics of four-year colleges.[3]

While recognizing these contributions of the study, it is also important to recognize the limitations of these statistical techniques in establishing causal effects. This study examines the relationships between community or four-year college attendance and bachelor's degree completion (what the literature has referred to as the "diversion effect"), but cannot support causal claims of the effects of community college attendance as would be the case based on an experimental design with random assignment. We address these limitations more fully below in establishing the need for an expanded research agenda.

Variables The dependent variable in this study is college completion, a dichotomous variable indicating whether the student completed a bachelor's degree. The primary explanatory variables predict the likelihood of degree completion. These include whether the student first attended a two-year college (*transfer student)* or a four-year institution*;* a continuous composite index of the student's socioeconomic status (*SES*), which also took a categorical form to identify the students from the two lowest quintiles of the SES distribution (*Low socioeconomic status*). The SES variable, which was constructed by the National Center of Education Statistics (NCES), is based on the father's occupation and education, the mother's education, family income, and material possessions. It is calculated as a simple average of the non-missing components after each component score has been standardized. A continuous variable based on the average SAT score of an

institution's freshman class, as reported in the *Barron's Profiles of American College and Universities*[4] functions as a proxy for institutional selectivity (*selectivity)*.

Variables measuring pre-college academic preparation, curriculum, and achievement control for ability. These include 12th grade test scores (*test scores)* and a dummy variable for those students who took an academic preparatory program in high school (*academic program)* compared to a general or vocational program. Two dummy variables related to participation in high school extra-curricular activities are included: participation in *school government* and/or in an *honorary club*. These variables have previously been used in studies of educational attainment (Kane, 1998) and are included here as controls for students' motivation in an attempt to address the omitted variables bias of prior studies lacking controls for student motivation. A dummy variable controls for gender (*female)*, with the comparison group being male.

Finally, the model controlled for the financial aid students received during the first two years of college, between 1992 and 1994, by including two dummy variables (*received a grant* and *received a loan).* The financial aid information is self-reported and, therefore, is subject to greater measurement error than aid information from institutional and government sources.

IV. Analysis

This analysis focuses on a select group of community college transfer bachelor's degree aspirants and rising juniors, two groups of students considered comparable to each other in terms of their degree aspirations and the time they have already invested in higher

education. Yet, as shown by the descriptive statistics in Table 1, when the degree completion of transfers and rising juniors is compared a gap of 30 percent is observed, with 53 percent of transfers and 83 percent of rising juniors earning bachelor's degrees within 8.5 years of the high school graduation. (See Table 1.)

Several characteristics of transfers might explain their lower levels of timely degree completion. In particular, transfer students tend more often to be of low socioeconomic status, to enroll at institutions of lower selectivity levels than their rising junior peers, and to have lower scores on measures of academic preparation. In this sample of bachelor's degree aspirants, for example, 34 percent of transfers are from the highest SES quintile in contrast to 55 percent of rising juniors. The SAT scores of students at institutions attended by transfers are lower on average, 1,071 compared to 1,131 for rising juniors, indicating a concentration of transfers at colleges of lower prestige. (See Table 1.)

Comparing the academic preparation of the two groups, the transfer students in this bachelor's aspirants group scored about three-quarters of a standard deviation lower than rising juniors on standardized mathematics and verbal tests administered in twelfth grade. They were less likely to complete academic preparatory programs in high school (56 percent vs. 77 percent) and much less likely to participate in honors programs (14 percent vs. 51 percent), factors that may reflect either the students' academic motivation or the quality of schools they attended. In addition, transfer students in this sample were half as likely to enroll in the private sector. (See Table 1.)

Financial concerns also affect timely degree completion. Community college students use college financing strategies that differ from four-year college students because it is much more possible, given the relatively low tuition and fees in community colleges,

to pay for college primarily through earnings. Though the NELS:88/2000 data set has very limited financial aid information, indicating only whether students received a grant or a loan in the first two years of college, the expected financing pattern is evident. About half as many transfers than rising juniors received grants in their first two years (30 percent vs. 57 percent) and about a third as many took loans (14 percent vs. 39 percent). When transfers enter the more expensive four-year sector, they may not adjust their financing strategies in ways necessary to ensure timely degree completion.

<<Table 1>>

Factors associated with college completion

The results of the initial logistic regression estimated using equation (1) show that when the differences in these characteristics among transfers and rising juniors are taken into account, the effect of transfer from a community college on bachelor's degree completion is much reduced. Being a transfer still has a negative and significant effect, but the reduced probability of degree completion indicated by the delta p statistic is only 0.07. (See Table 2A for standard errors of estimates and Table 2B for the magnitude of effects reported as delta p statistics.) The other statistically significant factors that account for the overall baccalaureate gap are gender (with a 0.07 increase in the probability of degree completion for females), participation in an honors program in high school (a 0.09 increase in probability), and attending an institution of greater selectivity. An increase of 100 points in the average SAT scores at an institution is associated with a 0.05 increase in a student's probability of degree completion. The chances of degree completion increase by 0.26 for students at the highest level of institutional selectivity over those at the lowest level.

<<Tables 2A and 2B>>

Figure 1 illustrates the results of the model including the interaction term between SES and transfer status estimated by equation 1a. The McFadden's R-square statistics for models 1 and 1a indicate that the models are significant and the goodness of fit increases with the inclusion of the interaction term. Among both transfers and rising juniors, as SES increases the probability of degree completion increases. The increase is distinctly steeper for rising juniors, however, and the interaction term is statistically significant, which indicates SES has a stronger effect on the bachelor's degree completion of those enrolling directly in the four-year sector.

While high socioeconomic status bestows advantages on transfers and rising juniors alike, the lower left hand corner of Figure 1 indicates that low-SES students are not disadvantaged in their chances of degree completion by starting at a community college. The lines of the graph curve close together at SES levels one standard deviation below the mean and even cross, which indicates that transfers at the lowest SES levels are slightly more likely to obtain a degree than their rising junior low-SES peers.

<<Figure 1>>

The results of the interaction model also show that when the effects of SES are allowed to vary based on transfer and rising junior status, the effect of institutional selectivity on degree attainment remains strong. As illustrated in Figure 2, at average institutional SAT score levels above 1300, the gap between transfers and rising juniors is quite narrow and the probability for degree completion exceeds 75 percent for both groups. The larger degree completion gap at lower average SAT scores demonstrates that transfers are at a greater disadvantage in degree completion at colleges of lesser selectivity.

<<Figure 2>>

Alternative Specifications: Testing the Robustness of the Findings

The results of the model adjusting for self-selection bias estimated by equation 2 indicate that unobserved differences in the characteristics of community college and four-year college students in the single-stage regression model of equation 1a may lead to an overestimate of the effect of transfer and an underestimate of the effects of institutional selectivity on bachelor's degree completion. The results no longer indicate that the probability of degree completion is lower for transfers relative to rising juniors. In other words, once the probability of enrolling at either a community college or a four-year college is controlled for, the negative effect of being a transfer is no longer significant. The effect of institutional selectivity doubles relative to the estimate of the previous model (10 percent versus 4 percent given an increase of 100 points in average institutional SAT scores) The results also support the interpretation that institutional selectivity has a greater effect than SES on degree attainment, as selectivity remains a significant predictor, while SES does not. (See Table 3.) However, as is typical of statistical models of this type, the results are not precisely estimated. Therefore, these results indicate the findings of the previous model are subject to self-selection bias, but do not provide a clear estimate of the magnitude of that bias.

As demonstrated by the results of the state fixed effects model (equation 4), the negative effect of transfer student status observed in the initial model may also stem from differences in bachelor's degree attainment rates among students in different states across the U.S., where the concentration of community college and rising junior four-year students differs. The results of this alternative model, which show no difference in degree

attainment between transfers and rising juniors, also indicate that the negative effect of transfer is overestimated in our original model. (See Table 3.) In combination with the results of the model controlling for self-selection bias (equation 3), these results lend support to the interpretation above that there are critical factors such as selectivity of institution attended or specific state-level transfer and articulation policies that are stronger determinants of bachelor's degree completion than whether a student was a transfer from a community college or a direct entrant to the four-year sector. The McFadden's R-square statistics indicate a goodness of fit of 0.13 slightly higher than the 0.12 of the model with the interaction term of equation 1a. This suggests that the additional predictors in this model contribute to explaining baccalaureate attainment.

<<Table 3>>

V. Conclusions

This study compared the impact of being a community college transfer student as opposed to a rising junior at a four-year college on bachelor's degree attainment. Of special interest was the impact of being a transfer student on individuals coming from low socioeconomic backgrounds, as well as the effect of the selectivity of the four-year institution attended on the graduation rates of all students. Three main findings emerge from this inquiry. First, the negative effect of being a transfer as opposed to a rising junior *diminishes* substantially after controlling for differences in socioeconomic status. The negative effect "*disappears,"* in the sense of not being statistically significant, after corrections for self-selection bias and the addition of variables controlling for transfer policies in the state where the student attended college. Second, and consistent with prior research (Alon & Tienda, 2005; Author, 2003b; Author, forthcominga), degree completion

rates increase with selectivity of the four-year institution attended. In addition, the bachelor's degree gap between transfers and rising juniors observed in our initial models substantially diminishes with higher levels of selectivity.

Third, the results show that when we allow the effects of community college attendance to vary by SES by introducing an interaction term, there are no statistically significant differences between the completion rates of low-SES transfer and low-SES rising junior students. Because prior studies have not modeled the interaction of SES and transfer status, this result demonstrating varying effects of community college attendance on students of different socioeconomic backgrounds and a lesser effect on low-income students is new.

These findings are in line with those of Rouse (1995) and Gonzalez and Hilmer (2006) who report a negative gap in the probability of graduation between two-year and four-year attendees ranging between 17 to 25 percent before correcting for self-selection bias, and between 3 to 7 percent after accounting for the selection problem. The magnitude of our estimated effects showing community college transfers having a lower probability of graduation of 7 percent before self-selection correction are in the range of their lower estimates obtained after selection correction. The consistency of results among these studies suggest that by using a narrowly tailored sample specification (transfers with consistent bachelor's degree aspirations) and selection on observables to introduce proxy variables for student motivation, we were able to minimize the selection bias problem inherent in the single-stage model. We find no difference in graduation rates between transfers and rising juniors in the self-selection model, a finding that must be qualified by

the imprecision of the estimates, which is a typical limitation of selection correction models.

Therefore, our main conclusion is that previous estimates have overstated the diversion effect. Alongside other recent contributions to the "democratization versus diversion" effect debate, this study provides an additional piece of evidence demonstrating that the diversion effect is much smaller than was previously estimated. Researchers should be wary of referring to the results of earlier studies and meta-analyses of this literature without noting the effects of self-selection bias on the conclusions. Collectively, and with growing awareness of the self-selection problem, these findings demonstrate the need for additional research using experimental and rigorous quasi-experimental designs (Rossi et al., 2004; "WWW study review standards," 2006) and analyzing samples representing a variety of community college student populations.

Given that the sample of this study is limited to community college students who had already transferred successfully and who had consistent bachelor's degree aspirations throughout the entire period of the longitudinal NELS survey, it is important to distinguish the particular nature of the diversion effect observed in these results. Specifically, these results provide support for the argument that community colleges do not divert highly motivated, academically prepared students who begin their postsecondary education at community colleges from successfully earning a bachelor's degree. The findings provide support for state policies that provide incentives for some academically prepared students to choose community colleges at the beginning of their postsecondary career. The state benefits from an efficient system that provides a lower cost college education and students benefit from an effective pathway to the bachelor's degree, supported by transfer and

curriculum articulation between the two sectors. The findings show that traditional-age students who do transfer succeed in earning the bachelor's degree at rates similar to their counterparts who entered four-year colleges directly.

Due to the fact the sample was limited to students with consistent degree aspirations, it is important to emphasize that the results do not indicate whether community colleges democratize higher education by raising students' aspirations for a bachelor's degree or by validating the goals of students who are uncertain of their degree prospects. Our findings do not provide evidence that community colleges democratize higher education by raising student aspirations to attain the baccalaureate or by ensuring that all who aspire to a bachelor's degree can successfully transfer. The efficiencies of the community college pathway evident in our findings may not pertain to these students.

Further, the findings of this study do not indicate that community colleges are democratizing higher education by enabling large numbers of low-SES students to obtain bachelor's degrees. In general, transfer rates are low (around 20 to 25 percent) (Wassmer, Moore & Shulock, 2004), and low-SES students are a small proportion of the transfer population (Author, 2006d; Dougherty & Kienzl, 2006). This proportion has not increased over the past several decades (Author, 2006e). We also know from separate analyses of these and other national data that community college transfer primarily serves middle-income and affluent students as a route to obtaining the bachelor's degree, whether at selective or non-selective institutions, and it serves affluent students nearly exclusively as a route to gaining entry to selective institutions (Author, 2006d). Elite institutions enroll very small numbers of community college transfer students and, among those transfers, few are low-income students (Author, 2006d).

It is also uncertain to what extent the successful transfers in our sample benefited from compensatory education at the community college or entered postsecondary education with advanced academic preparation. The fact that our initial models show low-SES students are not disadvantaged by starting at a community college whereas high SES students are suggests community college attendance may confer greater benefit on low-SES students. This may be due to college cost savings or to the relative lack of access of low-SES students to high quality secondary schools, in terms of both the curriculum and college advising. The more supportive "learning college" (O'Banion, 1997) environment of the community college may be even more valuable for the postsecondary transition of students who experienced inadequate college preparation in high school.

For the community college to be viewed as an institution that contributes to the democratization of higher educational opportunity, students with baccalaureate aspirations must be able to proceed from community colleges to four-year colleges and successfully earn their bachelor's degree. Our results indicate that traditional-age students who arrive at four-year colleges through community colleges are not at a disadvantage in completing their bachelor's degree. As a matter of practice, this finding is informative because there are a number of obstacles that might be expected to reduce completion rates of community college students, low-income students in particular, including the substantially higher costs of four-year colleges and the experience of "transfer shock" (Laanan, 1996) in what is often a substantially different collegiate environment. Community college practitioners should feel confident in counseling traditional-age students who want to earn the bachelor's degree to transfer, because the evidence shows they are as likely to succeed as their four-year college counterparts.

The study also provides evidence to elite institutions that they can turn to community colleges to increase their socioeconomic diversity without decreasing their institutional effectiveness in graduating students. Gutmann (1987) argued that the obligation of elite institutions to provide compensatory education to students disadvantaged in their early schooling depends on their capacity to educate those students successfully (see also Author, 2006d). Our findings that transfers are as successful as rising juniors at highly selective colleges in obtaining the bachelor's degree indicate that selective colleges do, indeed, have that capacity. The uniformly high graduation rates observed at selective institutions may be due to greater levels of financial resources (Gansemer-Topf and Schuh, 2006, Middaugh, Graham, & Shahid, 2003) to the positive peer effects of a highly capable and motivated student body (Winston & Zimmerman, 2004), or to other factors, but it is clear that transfers benefit from these factors in the same way as students who enroll directly after high school.

There are other benefits of attendance at an elite college, including better access to professional and graduate study and to leadership positions in business and civic organizations, that transfer students may be able to access. Elite colleges will contribute to the public good (and their own public service mission) by graduating low-income transfer students and thereby reducing the inequities of elite college access. The students themselves may realize the private benefits of higher earnings and greater social mobility, and society more generally may benefit from a cadre of highly educated professionals with experience of and commitments to disadvantaged populations living in poor communities. However, further study is needed to determine if such benefits are realized.

Our study provides evidence to policy makers that transfer can play a role in an efficient higher education system that educates students at lower cost community colleges prior to advancing them to more costly four-year institutions for advanced study towards the baccalaureate. Structured transfer and articulation policies at the state level may be creating effective systems in which two-year and four-year colleges work together to provide programs, institutional support, and counseling conducive to successful transfer for students who enter college aspiring to earn a bachelor's degree. Community colleges may be more beneficial to the ultimate baccalaureate attainment of socio-economically disadvantaged students than to their more affluent peers. The nature of those benefits, whether financial, academic, or cultural (in the sense of providing academic acculturation and socialization to higher education), is not shown by our analyses. However, other studies indicate that community colleges can be of particular benefit to low-SES students by remedying shortcomings in academic preparation (e.g. Astin, 1977), boosting confidence (e.g. Newman and Riesman, 1980), and providing cost savings (e.g. Lee, Mackie-Lewis & Marks, 1993).

Limitations There are a number of limitations that restrict the generalization of our findings and constrain causal inferences. First, our selection of a narrowly tailored sample of bachelor's degree aspirants is intended to reduce variation in student goals in order to test the effectiveness of the transfer pathway to the baccalaureate specifically for those students who enter community colleges with the intention of earning a bachelor's degree. The factors affecting bachelor's degree completion are examined only among those community college bachelor's aspirants who did, in fact, transfer and completed at least ten credits at a four-year institution, thereby excluding four-year college experimenters and

those who do not persist beyond the first semester after transfer. Therefore, our results can only be generalized to this select group and not to the entire population of community college students.

Second, even though this study sheds light on the democratization versus diversion debate, it is not possible to make any causal claims without doing an empirical study that uses randomized trials or regression discontinuity design. Third, the variables used to measure motivation are only indirect measures, and other variables such as students' beliefs and self-perception of learning were not included. Fourth, confounding variables such as marital status or rural/urban classification of schools were not included.

Finally, despite our efforts to correct for the self-selection problem, we recognize the limitations of these methods for reaching conclusions about causal effects. The ideal way to estimate causal effects is through an experimental design where students are randomly assigned to educational settings. (Rossi, Lipsey, & Freeman, 2004; "WWW study review standards," 2006). For example, if the number of qualified applicants for a state's flagship university exceeded the available places, in an idealized experiment a lottery might be used to assign some to the university and the others to community colleges in order to test the effects of community college attendance on baccalaureate attainment. Six years later, the graduation rates of the two groups could be compared and any difference in completion attributed to the effect of attending a community college rather than a university and not to any individual characteristics.

However, there is little public support for distributing access to higher education using a lottery (Carnevale & Rose, 2004). Therefore, in reality such an approach would face political opposition and be very difficult to implement. This is borne out by a case in

which, to achieve savings in the 2004-05 California state budget, the University of California (UC) system was asked to redirect 10 percent of its admitted freshmen to community colleges where they would alternatively be enrolled and provided access to the UC under the "Guaranteed Transfer Option." While this approach would have created a potentially valuable policy experiment to test the effects of starting in a community college, the plan was met by opposition and never implemented (CPEC, 2005). When experiments are not feasible, "quasi-experimental" designs are the next best option to investigate causal effects. The National Research Council emphasizes that such studies "must attempt to ensure fair comparisons" by including background variables as controls, taking advantage of naturally occurring variation, or examining differences in outcomes of students at the margins of eligibility for educational benefits (e.g. using regression discontinuity techniques) (NRC, 2002).

Future Research Given that community colleges appear to be a feasible route to the baccalaureate, including elite college degrees, for the students in our sample, it is possible they can also function effectively for students with less clear bachelor's degree aspirations. However, further research using different samples of students would be required to reach this conclusion. In addition, although we attempted to mimic an experimental design by selecting narrowly defined transfer and rising junior samples and to reduce self-selection bias by using an instrumental variables model and selection on observable indicators of motivation, causal claims based on these results are not as strongly warranted as they would be if the results had been obtained with a carefully designed and implemented experiment with random assignment.

Our study both contributes to and highlights the limitations of a scholarly literature that has struggled to identify whether a diversion or democratization effect prevails on students who begin postsecondary education at community colleges. Our study demonstrates the importance of modeling the interactions between student characteristics, in this case socioeconomic status, and educational environments. Recognizing the diversity of student characteristics and goals, future research will move beyond attempts to estimate a universal effect of community colleges on an aggregated population. Large and small experiments with random assignment and quasi-experiments that take advantage of changes in community college populations brought about by new state and institutional admissions policies will isolate the effects of particular educational environments on particular groups of students. These studies will be grounded in contextualized understanding of how these environments facilitate or inhibit student academic progress through the use of a variety of ethnographic methods, including classroom observations, instructor logs, interviews, and document analysis. In addition, detailed statistical portraits will characterize the enrollment patterns that promote transfer and degree attainment (e.g. Adelman, 2006; Horn & Berger, 2004; Peter & Forrest Cataldi, 2005).

For example, the Opening Doors project examined the effects of counseling and aid on low-income student persistence in Louisiana using random assignment to special and regular counseling and financial aid programs (Brock & Richburg-Hayes, 2006). The National Center for Postsecondary Research (NCPR) will examine the effectiveness of high school and community college dual enrollment programs by studying the City University of New York's College Now program. Preliminary findings from the program suggest that students who took at least one course from the College Now program were more likely to

pursue a bachelor's degree, had higher first semester grade point averages, and earned more credits during the first three years of postsecondary education. Using a number of methods including random assignment, the Center will test the robustness of these findings (Hughes, Calcagno, Wathington & Bryan, 2007).

The recent creation of a number of philanthropic scholarship programs such as the Gates Millennium Scholars (St. John & Chung, 2005) and The Kalamazoo Promise (2006) that make long-term funding commitments to students will enable studies of the effects of various forms of financial aid and counseling on educational outcomes, including transfer and degree attainment. At the state level, there are new initiatives such as Virginia's community college transfer grant program which guarantees a place at a university for successful community college graduates at the same tuition they paid at the community college. This initiative may well increase the number of low-income students who transfer to Virginia's universities, providing the opportunity to study the effects of particular institutions on transfer student degree attainment (see e.g. Ehrenberg and Smith, 2004).

Given the logistical and ethical challenges, randomized experiments will continue to constitute a relatively small share of studies of the effectiveness of educational practices in two- and four-year college settings. Richer data on student characteristics and educational environments may enable better modeling using a variety of quasi-experimental techniques, including regression discontinuity and propensity score matching (cite Titus, forthcoming; Author, 2006f; Author, 2007b). For example, the Washington State Achievers program used non-cognitive criteria developed by Sedlacek and colleagues (2004) such as positive self-concept, ability to negotiate educational systems, long-range goals, leadership, community service, and nontraditional knowledge to select the grant

recipients. Such rich data will expand the ability to use regression analysis to model causal effects while controlling for student aspirations and goals. These characteristics may also be better predictors of desirable outcomes beyond bachelor's degree completion, such as graduate and professional study as well as public service.

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Table 1. Descriptive Statistics for Transfers and Rising Juniors

(Standard Errors)

Variable name and definition	Transfers[a]	Rising Juniors[b]
Attained a bachelor's degree or higher 8.5 years after high school graduation (degree=1, no degree=0)	0.53	0.83
	(0.07)	(0.02)
Socioeconomic status (continuous variable, the index is based on parental education and occupation)	0.43	0.63
	(0.12)	(0.03)
Socioeconomic quintiles		
Lowest	0.02	0.03
	(0.01)	(0.01)
Mid Low	0.14	0.07
	(0.03)	(0.01)
Mid	0.17	0.1
	(0.03)	(0.01)
Mid High	0.33	0.25
	(0.07)	(0.02)
Highest	0.34	0.55
	(0.08)	(0.02)
Female (female=1, male=0)	0.45	0.57
	(0.07)	(0.03)
Combined math and verbal 12th grade test scores (normalized)	0.04	0.86
	(0.13)	(0.03)
Academic preparatory program in high school (academic preparatory program=1, vocational or general program=0)	0.56	0.77
	(0.07)	(0.02)
Participated in honors program in high school (participated in honors program=1, did not participate in honors program=0)	0.14	0.51
	(0.03)	(0.02)
Participated in student government in high school (participated in student government=1, did not participate in student government=0)	0.11	0.24
	(0.02)	(0.02)

Table 1. (Cont.) Descriptive Statistics for Transfers and Rising Juniors (Standard Errors)

Variable name and definition	Transfers[a]	Rising Juniors[b]
Selectivity of postsecondary institution attended (average SAT of freshman class) (/100)	10.71	11.31
	(0.11)	(0.07)
Received a grant between 1992 and 1994 (received a grant=1, did not receive a grant=0)	0.3	0.57
	(0.06)	(0.02)
Received a loan between 1992 and 1994 (received a loan=1, did not receive a loan=0)	0.14	0.39
	(0.04)	(0.03)
Private four-year institutions (omitted category public four-year)	0.2	0.43
	(0.06)	(0.03)
N	247	787

[a] A transfer is defined as a student who (a) begins in a community college, (b) earns more than 10 credits that count towards a degree at the community college before attending a four-year college and (c) subsequently earns more than 10 credits from the four-year college (Adelman, 2004).
[b] A rising junior is defined as a student who (a) begins in a four-year institution, (b) earns more than 60 credits at the four-year college and c) earns at least 10 credits during their junior year.
Notes: Weighted Ns for all with known first institution of attendance: Class of 1992: transfers= 68K rising junior=171K. Flags and weights: The weight used is F4F2P2T.
Source: National Education Longitudinal Study of 1988/2000 (NCES 2003-402)

Table 2.A Factors Affecting Bachelor's Degree Attainment

	Completion model	Interactions model
	Marginal Effects	
Transfer student[a] (omitted category rising junior[b])	-0.190**	-0.121*
	(0.08)	(0.07)
Individual Characteristics		
Socioeconomic status	0.024	0.083**
	(0.04)	(0.04)
Female (female=1, male=0)	0.087*	0.082*
	(0.04)	(0.04)
High School Academic Preparation		
Combined math and verbal 12th grade test scores	0.043	0.033
	(0.04)	(0.03)
Academic preparatory program in high school (academic preparatory program=1, vocational or general program=0)	-0.018	-0.008
	(0.05)	(0.05)
Participated in honors program in high school (participated in honors program=1, did not participate in honors program=0)	0.125**	0.121**
	(0.05)	(0.05)
Participated in student government in high school (participated in student government=1, did not participate in student government=0)	-0.02	-0.029
	(0.05)	(0.04)
Financial Aid		
Received a grant between 1992 and 1994 (received a grant=1, did not receive a grant=0)	-0.043	-0.041
	(0.05)	(0.05)
Received a loan between 1992 and 1994 (received a loan=1, did not receive a loan=0)	-0.049	-0.042
	(0.05)	(0.05)

Table 2.A (Cont.) Factors Affecting Bachelor's Degree Attainment

	Completion model Marginal Effects	Interactions model Marginal Effects
Institutional Characteristics		
Selectivity of postsecondary institution attended (average SAT of freshmen class) (/100)	0.048**	0.050**
	(0.02)	(0.02)
Private four-year institutions (omitted category public four-year)	0.036	0.022
	(0.05)	(0.05)
Interaction	NO	YES
Transfer*Socioeconomic Status		-0.135*
		-0.07
McFadden's Rsquared	0.11	0.12
Adjusted McFadden's Rsquared	0.098	0.096
LR chi2(df)	130,936(11)	131,620(12)
Prob>LR	0	0
N	1,034	1,034

Logit regression (standard errors)

[a] A transfer is defined as a student who (a) begins in a community college, (b) earns more than 10 credits that count towards a degree at the community college before attending a four-year college and (c) subsequently earns more than 10 credits from the four-year college (Adelman, 2004).

[b] A rising junior is defined as a student who (a) begins in a four-year institution, (b) earns more than 60 credits at the four-year college and c) earns at least 10 credits during their junior year..

Notes: Weighted Ns for all with known first institution of attendance: Class of 1992: transfers= 68K rising junior=171K. Flags and weights: The weight used is F4F2P2WT.

Source: National Education Longitudinal Study of 1988/2000 (NCES 2003-402)

Table 2.B Change in Probability, "Delta P," of Bachelor's Degree

Variable (1/0)	Minimum to Maximum		
	from:	to:	Delta P
	X=0	X=1	0->1
Transfer	0.83	0.76	-0.07
Female	0.77	0.85	0.07
Honors program in high school	0.77	0.87	0.09

Variable (delta)	Change(d) Centered at Mean			Minimum to Maximum		
	from:	to:	Delta P	from:	to:	Delta P min->max
	x-d/2	x+d/2	-+d/2	X=min	X=max	
Selectivity (100)	0.79	0.83	0.04	0.65	0.91	0.26

Notes: Only the coefficient of significant variables are included.
The magnitude of the effect of the predictor variable is reported as "delta p" or change in the probability. The delta p values are reported for a change from the minimum to the maximum for the dummy variables and of 100 percentage points at the mean of SAT selectivity index.

Table 3. Factors Affecting Bachelor's Degree Completion, Correcting for Self-Selection of Students into College Type and Control for State of Institution Attended			
	IV	Fixed Effects	
	Marginal Effect		
Transfer Student[a] (omitted category rising junior[b])	0.288	-0.11	
	(1.58)	(0.06)	
Individual Characteristics			
Socioeconomic status	0.376	0.09**	
	(0.33)	(0.04)	
Female (female=1, male=0)	0.274**	0.11**	
	(0.10)	(0.04)	
High School Academic Preparation			
Combined math and verbal 12th grade test scores	0.172	0.04	
	(0.23)	(0.02)	
Academic preparatory program in high school (academic preparatory program=1, vocational or general program=0)	0.092	-0.01	
	(0.16)	(0.04)	
Participated in honors program in high school (participated in honors program=1, did not participate in honors program=0)	0.418**	0.1*	
	(0.15)	(0.04)	
Participated in student government in high school (participated in students government=1, did not participate in students government=0)	-0.135	-0.03	
	(0.13)	(0.04)	
Financial Aid			
Received a grant between 1992 and 1994 (received a grant=1, did not receive a grant=0)	0.055	-0.02	
	(0.13)	(0.04)	
Received a loan between 1992 and 1994 (received a loan=1, did not receive a loan)	-0.21	-0.06	
	(0.32)	(0.04)	

	IV	Fixed Effects	
	Marginal Effect		
Institutional Characteristics			
Selectivity of postsecondary institution attended (average SAT of freshmen class) (/100)	0.094*	0.04*	
	(0.05)	(0.02)	
Private four-year institutions (omitted category public four-year)	0.347**	0.03	
	(0.12)	(0.04)	
Interaction			
Transfer*Socioeconomic Status	-0.35	-0.16*	
	(0.72)	(0.07)	
Correction for Self-Selection (Instrument=Avg state tuition of first institution attended)			
Average 2-year and 4-year colleges state tuition	YES	NO	
Controlling for states that had strong transfer and articulation agreements in the early 1990s[c].			
	NO	YES	
Wald Chi2(12)	109.46		
Prob>Chi2	0.000		
McFadden's Rsquared		0.13	
Adjusted McFadden's Rsquared		0.08	
LR chi2(df)		148.99	
Prob>LR		0	
N	1,034	1,034	
Probit regression (standard errors)			
* Significant at 5%; ** significant at 1%			
[a] A transfer is defined as a student who (a) begins in a community college, (b) earns more than 10 credits that count towards a degree at the community college before attending a four-year college and (c) subsequently earns more than 10 credits from the four-year college (Adelman, 2004).			
[b] A rising junior is defined as a student who (a) begins in a four-year institution, (b) earns more than 60 credits at the four-year college and c) earns at least 10 credits during their junior year.			
[c] According to Ignash & Townsend (2000) the states that had strong transfer and articulation agreements in the early 1990s included: Alabama, Arkansas, Connecticut, Georgia, Hawaii, Idaho, Illinois, Kentucky, Louisiana, Maryland, Missouri, Montana, New Mexico, North Dakota, Ohio, Oklahoma, Rhode Island, Utah, West Virginia.			
Source: National Education Longitudinal Study of 1988/2000 (NCES 2003-402)			

Figure 1 Predicted probabilities of transfer and rising junior students' bachelor's degree attainment by SES

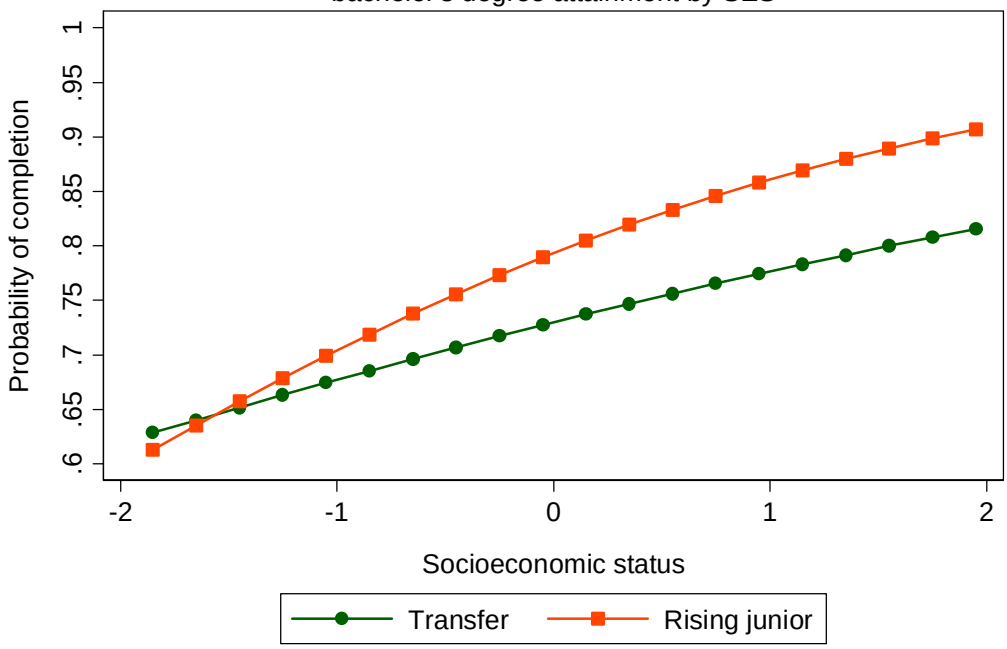
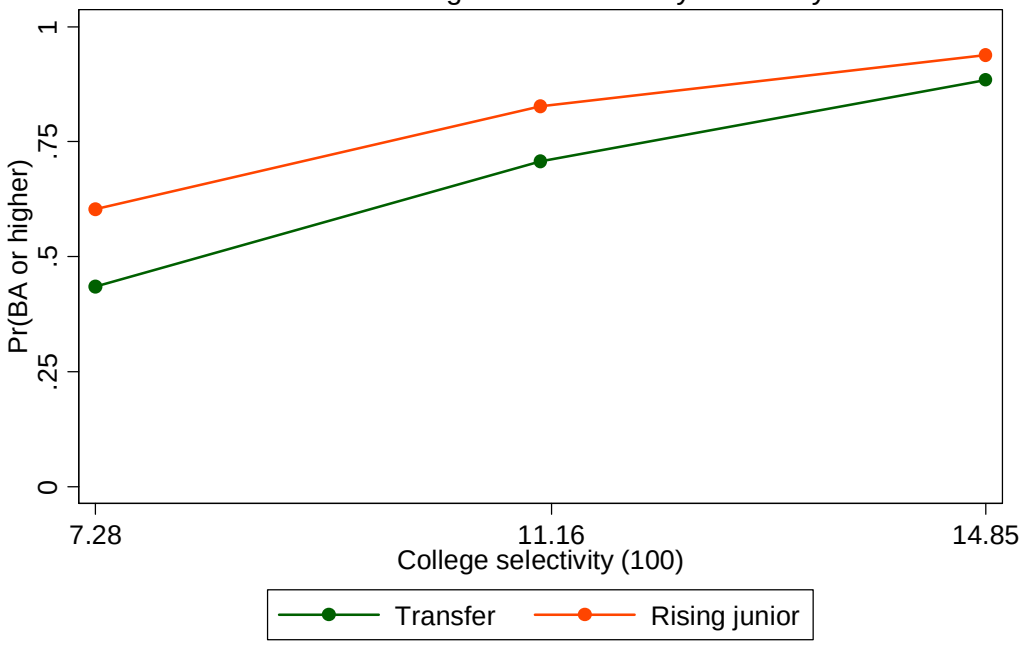


Figure 2 Predicted probabilities of transfer and rising junior students' bachelor ' s degree attainment by selectivity



[1] As an additional robustness check we estimated the models with a more restricted sample of rising juniors limited to those individuals who had attended only one four-year institution. The results do not change substantially and they are available from the authors upon request.

[2] See Curtin, Wu, Adelman, Daniel & Scott (2004) for a technical description of the postsecondary transcript study.

[3] For a technical description of the self-selection problem related to empirical estimations of schooling transition models, refer to Cameron and Heckman (1998).

[4] For more detailed description of Profiles of American Colleges, see Barron's 1999.