# Time-of-Transfer and the Outcomes of Attending a Four-Year College: Evidence from SUNY

WORKING PAPER – DO NOT CITE

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ABSTRACT

This paper examines the relationships between time of transfer from community college to four-year college and three outcomes of attending four-year college: probability of baccalaureate, time to baccalaureate, and credits earned at baccalaureate. Using enrollment data from the State University of New York, I establish that transfer students from community colleges have a longer and more widespread time-to-baccalaureate distribution than do non-transfer ("native") students, are more likely to have taken time off than natives with the same number of terms completed, and also have fewer credits accumulated than equivalent natives. Multinomial Logit estimations show that "transferring up" after the first, second, and fourth semester of community college attendance is associated with the highest probability of eventual baccalaureate receipt. However, when I add controls for time taken off and credits accumulated, there is a "U-shaped" impact of time spent at a two-year college on the probability of earning a baccalaureate within eight years, with transferring after five semesters now yielding the *lowest* likelihood of 8-year baccalaureate. Those who transfer "early"—having completed fewer than four community college terms—and do not quickly attrite do not maintain the credit and enrollment statuses of equivalent natives; those who transfer "late"—after six or more semesters at community college—typically earn more credits in a semester than equivalent natives. Without controlling for pre-transfer attendance factors, transferring after four semesters appears to yield the shortest time-to-baccalaureate for those who eventually graduate; when controls for demographics and credits accumulated are added, transferring after exactly one semester yields a significantly higher time-to-baccalaureate for engineering and biological science majors. Transferring up after four or more semesters is associated with extra credits at baccalaureate receipt for students in both

math/science majors and majors in large occupational fields, though the impacts are not particularly large in important fields of study.

When William Rainey Harper, first president of the University of Chicago, originated the idea of a community college, he envisioned it exclusively as the equivalent of the first two years of a four-year college experience. According to Harper, students enrolling in a junior college would complete a two-year course of study and subsequently, if they so chose, finish the last two years of baccalaureate study at a four-year institution.[1] In the last century, community colleges have expanded beyond this narrow definition to include in their curriculum, for example, two-year terminal degree programs in occupational fields, training courses contracted by local firms, and high school equivalency courses, but Harper's idea of the college as a substitute for the first half of a four-year program—nowadays referred to as the community college "transfer function"—remains a major role of two-year colleges. For example, among students who graduated high school in 1992 and whose first postsecondary education enrollment was at a community college, 36.5 percent later attended a four-year college.[2]

With community colleges accounting for an increasing share of overall national postsecondary enrollment,[3] it is becoming ever-more important to determine their success in educating students. Critical to their success is their ability to prepare students for eventual baccalaureate receipt, and one way of analyzing the "transfer function" is to study the performance of community college transfer students after they transfer to four-year colleges. Eide, Goldhaber, and Hilmer (2003), for example, show that white and Hispanic transfer students who enroll at high-quality universities are less likely to earn baccalaureates than are non-transfer students, but no less likely at middle- or lower-

[1] See Kane and Rouse (1999) for an overview of research on two-year colleges.
[2] Adelman (2004), Table 4.4.
[3] Eide, Goldhaber and Hilmer (2003) calculate from a 2002 Department of Education survey that from 1976 to 2000, the share of postsecondary students enrolled in community colleges increased from 35 to 39 percent.

quality universities. Additionally, researchers have found that transfer students suffer an initial "shock" in the form of lower GPAs and higher attrition rates in the initial semester of four-year institution attendance. Nolan and Hall (1978) survey sixteen studies on the impact of transfers; eight of them found evidence of "transfer shock."

No study that I am aware of has, theoretically or empirically, explicitly examined the impact of *timing* of two-year transfer on the outcomes of attending a four-year college. The purpose of this paper is to examine whether *time of transfer*—specifically, the number of semesters spent at a two-year college before transferring to a four-year college—is indeed correlated with these outcomes. Community colleges may be primed to take an ever-larger role into America's higher education system, as evidenced by President Bush's 2004 advocacy of them in both the State of the Union address and the third presidential debate. Uncovering relationships between time-of-transfer and outcomes such as probability of baccalaureate receipt and time to degree may result in policy decisions that improve the overall efficacy of higher education. In this paper, I establish stylized facts concerning the characteristics of transfer students and the impact of time-of-transfer on four-year college outcomes. The impact of time-of-transfer on the outcomes of four-year attendance may be an important indicator of the avenue two-year colleges provide to higher national baccalaureate rates. I intend my findings to be a platform for further research and perhaps policy formation in the future.

It is theoretically ambiguous whether a two-year college student intending to maximize net economic benefits should transfer up "early," i.e., before having spent two years at a community college. Some evidence suggests that students indeed should transfer up "early." Hilmer (2002), for example, demonstrates that future earnings, in

accordance with the human capital model (Becker 1964), are impacted by the quality of *all* postsecondary schools attended by a transfer student. Transferring early to a higher-profile four-year campus—and minimizing the share of postsecondary credits taken at an unknown community college—may therefore increase lifetime earnings. Early transfer may also immerse students in a more academically rigorous environment, perhaps preventing the lowering of academic goals that is believed by some to be an unfortunate outcome of attending a two-year college.[4] Even the possible negative impacts of immersion in a difficult academic environment may aid transfer students, according to the experimentation hypothesis (Manski 1989). Though students who transfer to a four-year college probably do so with at least the vague intention of earning a baccalaureate degree (because of both the labor market returns to credits earned and the sheepskin effect of a four-year degree[5]), community college students may be wiser to transfer early, if their goal to graduate from a four-year college is uncertain. Doing so allows them to determine whether to further four-year attendance without incurring additional expenditures on two-year college enrollment.[6]

There are also common-sense reasons for community college students to *avoid* early transfer. Most obvious are the lower tuition and fees associated with community colleges: the mean unweighted sum of SUNY community colleges' tuition and fees in Fall 2001 was 63.9% of the mean four-year college sum of tuition and fees, for example.

[4] This problem, the "diversion effect," has long been a concern of researchers. Clark (1960) and Brint and Karabel (1989) accuse two-year colleges of "cooling out" the educational aspirations of would-be baccalaureate recipients. More recent econometric analyses find that although this effect seems to exist, it is counterweighed by the "democratization effect," in which the presence of two-year colleges allows students otherwise unlikely to attend college to increase educational aspirations (Rouse 1995 and 1998, Leigh and Gill 2000 and 2004, Grubb 1989).

[5] A substantial literature discusses the returns to college credits and degrees. See, for example, Kane and Rouse (1995), Card and Krueger (1992), Hungerford and Solon (1987), Jaeger and Page (1996).

[6] A difficulty with analyzing this hypothesis is that it effectively destroys the status of baccalaureate receipt as an inherently positive outcome.

Therefore, conditional on two-year credits being equal in value to those offered at a four-year college, transfer after completing a two-year degree minimizes education expenditures. Additionally, four-year colleges may design curriculum to meet the needs of traditional (non-early) transfer students, and a student transferring after at least two years spent at a four-year college may experience a smoother transition to the more-intensive university setting than one who transfers earlier.[7]

Some empirical evidence indirectly shows that delaying transfer increases the probability of baccalaureate receipt. Ehrenberg and Smith (2002), using SUNY grouped data, find that transfer students with an Associate of Arts (AA) or Associate of Science (AS) degree have a 20 percentage-point higher probability of earning a baccalaureate and a 13 percentage-point lower probability of dropping out within three years of enrolling at a four-year college than those transferring with no two-year degree; similarly, students transferring with an Associate of Applied Science (AAS) or Associate of Occupational Science (AOS) two-year degree are 15 percentage-points more likely to have earned a baccalaureate and 11 percentage-points less likely to have dropped out than transfer students with no degree.[8] Assuming early transfer is correlated with not having earned an associate's degree, these results may indicate that late transfer results in better four-year outcomes. Another potential benefit of late transfer is the well-established "sheepskin effect" of earning a two-year degree (Kane and Rouse 1995, Jaeger and Page 1996). The

[7] Cheslock (2001) finds that numerous campus-based factors, including non-transfer attrition rates, are associated with higher rates of transfer students, implying that certain schools may be oriented to receiving transfer students. Ehrenberg and Smith (2002) find that, controlling for six-year graduation rate of incoming freshmen, the ranking of SUNY students by their ability to graduate transfer students is directly correlated with the ranking according to percent of student body consisting of transfer students, implying that, *ceteris paribus*, schools with more transfer students may treat them more effectively.

[8] Ehrenberg and Smith, however, do not account for time spent and credits accumulated at two-year college before transfer. This could account for part of the lower probability of earning a baccalaureate, but not directly for causing the higher dropout rate among non-degree transfers.

documented labor market benefits of a community college degree may encourage a two-year college student who desires to attend a four-year college yet is unsure of his ability to earn a baccalaureate to complete a two-year college program prior to transferring.

Time-of-transfer may additionally impact outcomes of four-year attendance other than probability of baccalaureate receipt. Characteristics of degree receipt, specifically time-to-degree and credits earned at degree, may be affected. An increase in *time*-to-degree correlated with a specific time-of-transfer may represent unnecessary costs incurred by students, through both extra tuition payments and delayed labor market entry. An increase in *credits* at degree associated with time-of-transfer may, at low levels, not represent much of an additional expense for students, who can fit an extra class into a full-time schedule with little difficulty. It may, however, indicate that the university *system* is inefficient in its ability to merge transfer students into the four-year college mainstream. If a large number of transfer students require an extra one or two courses to earn a baccalaureate, campuses may be incurring expenses (e.g., hiring more instructors for these classes) it could avoid.

This purpose of this paper is to empirically determine the impact of time-of-transfer on three outcomes of attending a four-year campus: baccalaureate receipt, time-to-degree, and credits at baccalaureate using newly acquired enrollment data from the State University of New York (SUNY). Before estimating the impact of time-of-transfer on various outcomes, I spend a section describing differences between transfer and non-transfer students. In this section I also explain why this paper uses a different dependent variable than that typical of the economics of education literature.

Throughout this paper, my definition of "transfer student" is *a student at a SUNY four-year college who spent one or more terms at a community college before ever attending (transferring to) a four-year college*. I refer to students who are not "transfers" as "natives" or "direct attendees." In the literature, students transferring from a two-year to a four-year college are occasionally referred to as "upward transfers;" my definition thus implicitly classifies "lateral transfers"—students who move *between* four-year campuses—as four-year college natives. Students who attend a two-year college after having attended four-year college—so-called "downward transfers"—are treated as dropouts from four-year college.

The remainder of this paper is organized as follows: Section II describes SUNY and my dataset, the Student Data File. Section III looks at characteristics of transfer students vis-à-vis native students, and Section IV creates an estimation strategy based in part on the discoveries of Section III. Section V and VI discuss the impact time-of-transfer has on the likelihood of earning a baccalaureate degree, and Section VII shows its impact on characteristics of degrees received. Section VIII concludes.

## II. A Look at SUNY and the Student Data File

Table 1 lists the 64 different campuses that comprise the State University of New York (SUNY). There are four doctoral-granting University Centers, thirteen masters and liberal arts colleges (in SUNY parlance, "University Colleges"), four Health Science Centers, five doctorate-granting colleges of technology, five two-year colleges of technology, five statutory colleges located on private university campuses, and thirty community colleges in SUNY. In this paper I look only at SUNY's university centers, university colleges, and community colleges, eliminating from the analysis any students

with observations in a SUNY campus of a different nature. I additionally remove students who ever attended one university college, Empire State, which caters to non-traditional students,[9] and one community college, Manhattan's Fashion Institute of Technology, which for funding reasons is labeled a community college despite offering baccalaureate and advanced degree programs. My references to SUNY throughout this paper include these adjustments.

My data set consists of every student who, in a fall semester between 1990 and 1996, registered in SUNY as a student new to college. "New" students meet two critieria: they 1) list *higher education history*—a variable indicating whether a student is a first-time student, a transfer student from another campus, a continuing student, or a returning student[10]— as "first-time student;" and 2) they had never before enrolled as a SUNY student.[11] I follow each student in my dataset from his/her first semester in SUNY through Spring 2002.

The Student Data File (SDF) contains enrollment records and demographic information for each student enrolled in SUNY. For each term, the SDF records each

[9] The world wide web homepage of Empire State College (http://www.esc.edu) as of October 2004 states that "…all of [its students]…are busy adults, with jobs, families, and real lives that simply won't accommodate the conventional college experience."

[10] SUNY defines the higher education history cateogories thusly: a first-time student has never set foot on a college campus before; a transfer student is one whose last postsecondary school differs from her present one; a returning student has taken at least one semester off before returning to the same SUNY campus she last attended; a continuing student was enrolled at the same SUNY campus in the previous semester.

[11] Although "higher education history" is described as being registered officially under the ironclad rules of the previous footnote, there are inconsistencies in the actual data. For example, students who refrain from enrolling in one semester, then re-enroll at the same campus are supposed to be registered as "returning," but the SDF often records them as "continuing." To limit my sample to "first-time" students, I thus limit it to those two were never previously enrolled at a SUNY campus; having previously registered would seemingly preclude one from being a "first-time" student. This removes approximately 2% of all first-time students.

student's campus,[12] two-digit program of study (both field—e.g. architecture, humanities—and degree award—e.g. BA, BS, AA), enrollment status (full- or part-time), number of credits attempted, number of classes taken, credits accumulated, and incoming grade point average (GPA).[13] The demographic information included is race, gender, and date of birth. SUNY's Degree Historical File (DHF) records, for each degree awarded, program of study, degree type, date of award, and GPA.[14] Lastly, I use SUNY's Term Historical File (THF) to determine whether students in my dataset were enrolled in SUNY previous to the specific window of my data set. Those that were are removed from the analysis.

Because my dataset ends in Spring 2002, each incoming class of students has a different potential time-in-sample. Those who enter in Fall 1990 have twelve potential years of attendance, those who enter in Fall 1991 have eleven years, etc. My initial discussions of time-to-degree and baccalaureate will show that the asymmetry of potential time-in-sample has serious repercussions which my estimations take into account.

Unfortunately, the SDF does not follow students outside the SUNY system. Students who transfer to schools in another state, or private in-state schools, and earn

[12] I permit only one campus per student per semester. If a student happened to be enrolled at more than one campus in a semester, I retain the one at which he attempts the most credits; in the presence of a tie, one campus was randomly kept. Approximately 1 in 250 (0.4%) observations were dropped because of this.
[13] The SDF count of GPA is not used in this paper. When students change campuses in SUNY, their records frequently do not make the trip immediately, and in almost 97% of cases GPA of transfer students is left empty when students enroll at new schools. Since this paper purports to analyze transfer students versus natives, it would be difficult to incorporate GPA measurements when it is missing for so many relevant observations.
[14] Unfortunately the DHF assigns degrees awarded to a particular *calendar date* instead of a particular *semester*. Therefore I create artificial "semesters" of degrees awarded. Any degree awarded between May and November, inclusively, of year *x* is said to have been earned after the spring semester of year *x*. Alternatively, any degree awarded between December of year *x* and April of year *(x+1)* is said to have been earned in the fall semester of year *x*. Time-to-degree calculations, which are in half-year increments, are made using these definitions.

baccalaureate degrees, I register as dropouts, for example. Wellman (2002) reports that approximately 35% of students who transfer from New York state two-year institutions transfer out-of-state or to in-state private campuses.[15] If, as some have hypothesized, transfers from SUNY four-year campuses are more likely to earn baccalaureates from non-SUNY campuses than transfers from SUNY community colleges, this paper may imperfectly reflect the transfer-versus-native relationship.

## III. Characteristics of Transfers and Natives

Figure 1 shows the time-to-degree probability density functions, by original campus type, for baccalaureate recipients who were new SUNY students in Fall 1992 and earned degrees in ten years or less.[16] Table 2 displays the overall number of these students by time-to-degree. Over 26 percent of these SUNY graduates began at a SUNY community college and thus qualify as "transfers."

The modal time-to-degree for students who began at a four-year college is, reassuringly, four years: over 56 percent of baccalaureate-receiving students took exactly that long, and over three-fifths took no more than that long. The distribution for community college transfers, meanwhile, has a higher mode and wider spread than that of native students. The modal time-to-baccalaureate for students who originally enroll at a two-year college is five years, a full year longer than that of four year direct attendees. While the modal time-to-degree accounts for over half of all native baccalaureates, the transfer mode accounts for under one-quarter of all transfer baccalaureate recipients. The

[15] SUNY is not the only public university system in New York State. There is also the City University of New York (CUNY) system, and Wellman's calculation comes from the combination of these two systems, which are completely separate entities.

[16] To calculate time-to-degree, I first assign each semester a numerical value, incremented by 0.5. Spring semesters are assigned the value of the calendar year in which they fall; fall semesters are the calendar year plus 0.5. Degrees are assumed to have been earned at the end of a semester, so that 0.5 is added to determine time-to-degree. A student who enters SUNY in Fall 1995 and earns a baccalaureate in Fall 2000, for example, has a time-to-degree of (2000.5 – 1995.5) + 0.5 = 5.5 years.

share of transfer students earning baccalaureates noticeably crowns at the four-year, five-year, and six-year marks. Though there are local maxima at the five-year and six-year mark for native students, they are less pronounced than for transfers.

Table 2 and Figure 1 show that analyses of six-year baccalaureate rate, recently used as the most common indicator of campus success vis-à-vis likelihood of baccalaureate receipt,[17] fail to capture a very real difference in the graduation patterns of transfers versus natives. While over 95 percent of all direct attendees who earn a baccalaureate degree within ten years do so within six years, only 77.5 percent of transfers do. There is a substantial right-tail in the time-to-baccalaureate distribution for transfer students that simply does not exist for native students. Indeed, even though native students earn almost 74 percent of baccalaureate degrees of students who began in Fall 1992, Table 2 shows that in every single semester after five years have passed, the majority of baccalaureate degrees awarded to students who began in Fall 1992 are given to students who began at a community college.[18]

Table 3a demonstrates the raw probabilities of earning a baccalaureate for students who start at different types of SUNY campuses. Students beginning at two-year colleges are, on the whole, unlikely to earn a baccalaureate degree. Overall, slightly over one in twelve earn a baccalaureate. Fewer than one in fifteen do so within six years. The

[17] The traditional definition of "six year graduation rate" for a campus calculates the share of new students who graduate from the same campus within six calendar years. See, for example, Ehrenberg and Smith (2002) and Ehrenberg and Zhang (2004). I generalize this, permitting a student to graduate from a different campus than his first one attended. The six-year concept has become extremely controversial: see Adelman (2004) and Burd (2004).

[18] I also calculated the time-to-degrees of students who began at a four-year college, and earned a baccalaureate degree, but also spent at least one semester at a two-year college. These students are so-called "downward transfers" (Adelman 1992). The mode time-to-degree for these students is again four years, but only 30 percent of them earn their degrees in this short period of time, and 81.4 percent earn their baccalaureates within six years, compared to 96.6 percent for students who don't set foot on a two-year campus. In this paper, all estimation results omit "downward transfers."

percentage increases by over fifteen percent, though, when extending the potential time-to-degree from six to eight years.[19] Earning a baccalaureate degree is much more likely for students beginning at a four-year college. Over 60 percent of direct attendees in the full sample earn baccalaureate degrees. Over 57 percent do so within six years, and slightly under 60 percent within eight years. For transfer students, the likelihood of baccalaureate is smaller than that of native four-year college students, though not overwhelmingly so. Well over 50% earn a baccalaureate degree. However, there is a major difference between the six- and eight-year baccalaureate rates for transfer students compared to native students. The eight-year baccalaureate rate is over eight-and-a-half percentage points higher than the six-year rate for transfer students, while the difference is less than two percentage points for native students.

The transfer/native dichotomy in six- and eight-year baccalaureate rates can also be expressed through the percentage of baccalaureate recipients who began at two-year colleges (Table 3b). Only 21.2 percent of those who earned baccalaureate degrees within six years began at community colleges; when extending the potential baccalaureate time to eight years, the share increases to 23.8 percent.

Table 4 shows the distribution of "time-of-transfer," i.e. the number of terms spent by transfer students at community college before moving to a four-year college. The largest group—almost one-third of the total—transfers up after spending exactly two years (four terms) at a two-year college. Over thirty percent overshoot their stay at the two-year college and transfer up in the third year, with more leaving after six semesters than five. Of those students who transfer up "early"—before the fourth semester—the

[19] When extending the potential time-to-degree to eight years, only those students who have at least eight years between their first term at SUNY and the final semester in the sample (spring 2002) are measured. This accounts for the substantial (27.7%) decline in the listed population.

majority make the leap after two semesters, or one full academic year. Sixty percent more transfer up after one semester than after three semesters. The number of students transferring drops precipitously after eight semesters spent at a two-year college.

Table 5 shows semester of attendance and reported higher education history for new transfer students, sorted by number of pre-transfer terms at community college. After a given semester, with one exception, the majority of students who transfer begin attending a four-year college in the fall. This is hardly shocking: starting at a new school is perhaps easier if done after a long summer, and may also permit a smoother transition to participation in full-year academic sequences. But students who transfer up after an odd-numbered semester and begin four-year campus attendance in a fall semester must have taken at least one semester off before attending a four-year college. Such an action almost certainly delays baccalaureate receipt and perhaps reduces the overall chance of earning a baccalaureate.[20]

Figures 2a and 2b compare pre-transfer attendance patterns of transfer and native students who have completed the same overall number of college terms. For example, the share of students who transfer after semester 2 and start their third overall semester at a four-year campus is shown in the same column as the share of native students are also entering their third semester of college attendance, but have never set foot on a community college campus. Throughout this paper, I refer to these natives who have completed the same number of overall semesters as transfers new to a four-year college as "equivalent" natives.

[20] Interestingly, a majority of students who transfer up after one semester, and a sizable minority of those who transfer up after two semesters, are registered as "first-time students" when they enroll at a four-year campus. Contact the author for the specific percentages.

Transfer students are substantially more likely than "equivalent" four-year college students to have taken time off from school, irrespective of time of transfer. Over 82 percent of students who transfer up after exactly one semester take at least one term off before re-enrolling. The number drops considerably for students who transfer up after a full year at a two-year college, but even they are 6.6 times more likely to have taken time off, and over twelve times more likely not to have been enrolled the previous semester, than native students who have completed two terms at a four-year college. The smallest transfer/native difference in likelihood of having taken time off involves students beginning their fifth semester—where natives are compared to transfer students who have spent exactly two years at community college. But even among this group, transfer students are almost three times more likely (16.9%) than natives (6.0%) to have not been enrolled for at least one semester since beginning college.

Transfer students also differ from equivalent natives in credits accumulated towards degree. Two-year college students, even those who ultimately transfer to a four-year college, are far more likely to enroll as part-time students than are four-year students.[21] Table 6 shows that irrespective of specific semester of transfer, transfer students have fewer credits accumulated than equivalent natives. Figure 3a demonstrates the log difference in natives versus transfers credits accumulated, organized by time of transfer.[22] The difference is minimized among those who transfer up after semester four.

[21] In the full sample, 8.9% of four-year and 36.8% of two-year observations are part-time. When looking at two-year students who eventually enroll at four-year colleges, 21.6% of the observations are part-time.

[22] Though credits accumulated is ostensibly reported for each student in each term, there is a frequent lag in reporting this particular value for transfer students, and many transfers new to a four-year college officially have "0" credits accumulated. To combat this, I impute credits accumulated for term *n* in two directions: first, by taking credits accumulated in term *n+1* and subtracting credits attempted towards degree in term *n*. Second, by adding credits accumulated in term *n-1* to credits attempted towards degree in term *n-1*. The maximum of these two imputed values, and the actual reported credits accumulated, is the value I use.

Among students who transfer up "early" (before their fourth semester), those who transfer up after the second semester have the lowest credits relative to equivalent natives, despite being less likely to have taken time off than students transferring after semesters 1 or 3.

The log difference in average credits accumulated increases almost linearly among those transferring after semester four. Students who transfer up after the fifth through eighth semesters have credit totals approximately the same (roughly 60 credits) as those who transfer after the fourth semester. By contrast, native students entering their sixth, seventh, or eighth semesters add approximately 15 credits with each passing semester. It therefore seems reasonable to compare students who transfer up after having spent five or more semesters at community college to native students beginning their fifth *semester* instead of native students who have completed the same overall number of postsecondary terms.

To incorporate this finding into my estimations, and thus more appropriately study these "late" transfers, I develop the concept of a "quasi-term." A quasi-term is the overall higher education term number of a student attending a four-year college, adjusted to reflect the fact that that attendance at a two-year college limits him to the equivalent of no more than four four-year college terms. That is,

Quasi-term

$$= 4 + \textit{term number at four-year campus} \quad \text{if terms pre-transfer} \geq 4$$

$$= \textit{overall term number} \quad \text{otherwise.}$$

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When looking at credits at baccalaureate degree, I sum credits accumulated and credits attempted in baccalaureate-earning semester to reach the total.

Thus, a student who transfers after six semesters at a two-year college is said to be in his [(4 + 1) = 5] fifth quasi-term when he first enrolls at four-year college. Should he survive to the next semester at a SUNY four-year college, he is in quasi-term number [(4 + 2) = 6] six and his eighth semester of higher education overall. For natives and students who transfer having spent four or fewer terms at community college, quasi-term is equal to actual overall term.

Figure 3b recreates Figure 3a, but accounts for quasi-terms. The x-axis still represents the terms spent at community college pre-transfer, but for all transfers spending four or more terms at community college, the log difference is subtracted from the log average of natives entering their fifth term. With the adjustment, the linear increase in log credits accumulated difference becomes a slight decline.

To briefly summarize this section: the traditional unit of analyzing baccalaureate receipt of college students, six-year baccalaureate, fails to capture the tendency of transfer students to take longer in graduating from a four-year college; a plurality of students who transfer from a SUNY community college to a four-year college do so after exactly the fourth semester of enrollment, though many also transfer after the second, fifth, or sixth semester of enrollment; transfer students are much more likely than equivalent four-year students to have taken time off from school, especially if they transfer up after their first or third semester; transfers also have completed fewer credits towards degree than native students who have completed the same number of semesters, and this difference is minimized for transfers who complete four or more semesters at a two-year college, when they are compared to direct attendees entering their fifth semester of higher education.

## IV. Estimation Strategy

In this section I outline how I estimate the impact of time-of-transfer on three different outcomes: 1) the ultimate outcome (baccalaureate receipt, attrition, or continued enrollment) of attending a four-year college within a specified time frame; 2) time-to-degree for baccalaureate recipients; and 3) credits at baccalaureate for baccalaureate recipients. I make three crucial assumptions in my estimations. The first is that time-of-transfer is exogenous. The second is predicated on the notion that one semester at a community college is intended to be a substitute for one semester at a four-year college: I thus compare transfer students to native students who have completed the same overall number of postsecondary semesters (the "equivalent" natives discussed earlier). Lastly, I compare students who spend five or more semesters at community college to natives entering their fifth semester at a four-year college (the "quasi-terms" discussed earlier).

I use multinomial logit estimations to determine the impact of time-of-transfer on the ultimate student outcome of attending a four-year college. Each student in the dataset is assigned two dependent "outcome variables": six-year outcome (the typical unit of analysis) and eight-year outcome (the more appropriate unit of analysis). The variables represent three different outcomes: 1) earn baccalaureate within six (eight) years of first enrolling in a SUNY two-year or four-year college; 2) attrite within six (eight) years of entry; and 3) is still enrolled—having earned no baccalaureate—after six (eight) years.

I define $i$ as an individual SUNY student attending a four-year college. $q$ is $i$'s quasi-term number and $t$ her overall term number ($q$ and $t$ differ only if $t \geq 6$ and $i$ is a transfer student). I define $OUTCOME_i$ as variable equal to 1 if $i$ earns a baccalaureate within the determined time allotted (six years or eight years), 2 if the student drops out

within the determined time allotted, and 3 if *i* is still enrolled after the determined time has elapsed. $TRANSFER_i$ is a dummy variable indicating whether *i* began her postsecondary career at a two-year college, and $LEVEL_{i\tau}$ is *i*'s level of campus attended (two-year or four-year) in period $\tau$. I drop from any analysis students who spent nine or more semesters at a two-year college before transferring up.

I estimate, for each different time-of-transfer value, multinomial logit models of outcome on a combined population of a) transfer students in their first term of four-year study and b) native students who have completed an equivalent number of quasi-terms at a SUNY four-year campus (or campuses) without ever having set foot on a community college campus. That is, mathematically speaking, I estimate the following multinomial logits separately for values of *Q* from 2 through 5 and *t* from 2 through 9:

$$P(OUTCOME_{iQtc} = j \mid x) = \frac{\exp(TRANSFER_{iQt}\beta_{jQt})}{\sum_{h=1}^{3}\exp(TRANSFER_{iQt}\beta_{hQt})} \qquad (1)$$

such that $LEVEL_{iQt}$ = *"4YR"* for all *i*

and *t* =

$T_{transfer}$ if $TRANSFER_{iQt} = 1$

(where $LEVEL_{i1} = \ldots = LEVEL_{i(t-1)}$ = "2YR"), and

$T_{native} = Q$ if $TRANSFER_{iQt} = 0$

(where $LEVEL_{i1} = \ldots = LEVEL_{i(t-1)}$ = "4YR").

I also include controls for a student's first term in SUNY (an "entering-cohort" effect).[23] The vector of coefficients corresponding with outcome *j*=2 (attrite), is

[23] The nature of this estimation requires that I delete one year's worth of incoming classes from both the six-year and the eight-year estimations. Since my observations end in 2002, including the incoming Fall class of 1996 allows no possibility of determining whether a student attrites or continues enrollment after

normalized to zero. I also estimate versions of equation 1 that control for four-year campus, field of study,[24] and the demographic variables of age, race, and gender.

In each equation $Q$ takes the same value for every observation. $t$ is the same for all transfers in any one estimation, and is the same for all natives in any one estimation, but $t$ takes different values for the two groups if the transfer students in any one estimation spend five or more semesters at community college before transferring. The use of quasi-terms means that I compare multiple separate cohorts of transfer students—those that transfer after four, five, six, seven, or eight terms at community college—to the same group of natives: those entering their fifth semester at a four-year college.

$\hat{\beta}_{jQt}$ captures the impact, on outcome $j$, of being a transfer student, i.e., the impact of a student in quasi-term $Q$ having spent all previous semesters at a two-year college instead of a four-year college.

Since, as shown in the previous section, transfers enter four-year college with fewer credits toward baccalaureate and more time taken off than their four-year counterparts, I include in subsequent estimations controls for both time-from-first-term

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the six-year period. Including incoming-cohort effects, as I do, thus results in perfect classification problems, which makes deducing marginal effects impossible.

I also delete nonresident aliens from this part of the analysis. They form a very small part of the population (approximately 0.4% of all observations) and their results suffer from perfect classification problems.

[24] The Student Data File records seventeen different fields of study, plus two non-field enrollment statuses. The fields are Agriculture and Forestry, Applied Arts, Architecture, Arts, Biological Sciences, Business, Education, Engineering, Health Sciences, Home Economics, Humanities, General Studies/Liberal Arts, Mathematics, Physical Sciences, and Social Sciences. The two non-field statues are In Program, No Major Declared and Nonmatriculated.

Throughout this paper, I eliminate students who received a baccalaurete degree in Agriculture and Forestry, or indeed ever enrolled in such a program, from the sample. This removes only a tiny fraction (approximately one of ever 2,000) of all baccalaureate recipients from the analysis. Not only is this field mall, but it is largely concentrated in SUNY technical colleges and not the community colleges, university centers, and university colleges that are the subject of this study.

and credits accumulated.[25] Throughout this paper I refer to these two variables as "attendance variables."

I also study the impacts of time-of-transfer on probability of earning a baccalaureate degree when a transfer students continues her enrollment at four-year college. That is, for a group of transfers and natives matched by quasi-term, I determine whether the coefficient $\hat{\beta}$ changes when that matched group progresses towards a baccalaureate degree, all the way to the eighth quasi-term of enrollment.

I refer now to a group of transfer students with the same number of pre-transfer community college terms, plus natives in the same quasi-term, as a "cohort." Identifying each cohort with the subscript *C* and term of transfer with *t*, and combining all aforementioned controls (campus, field of study, demographics, and attendance) into the vector *X*, I estimate

$$\mathrm{P}(OUTCOME_{iQtC} = j \mid \mathrm{x}) = \frac{\exp(X_{iQt}\mu_{jQt} + TRANSFER_{iQtc}\beta_{jQtC})}{\sum_{h=1}^{3}\exp(X_{iQt}\mu_{hQtC} + TRANSFER_{iQtc}\beta_{jQtC})}$$

$$\mathrm{P}(OUTCOME_{i(Q+1)(t+1)C} = j \mid \mathrm{x}) =$$

$$\frac{\exp(X_{i(Q+1)(t+1)}\mu_{j(Q+1)(t+1)C} + TRANSFER_{i(Q+1)(t+1)c}\beta_{j(Q+1)(t+1)C})}{\sum_{h=1}^{3}\exp(X_{i(Q+1)(t+1)}\mu_{h(Q+1)(t+1)C} + TRANSFER_{i(Q+1)(t+1)}\beta_{j(Q+1)(t+1)C})}$$

…

[25] Time-from-first-term is equal to the time, in half-year increments, between the estimation term *t* and the student's first term in the sample.

$$P(OUTCOME_{i(Q+k=8)(t+k)C} = j \mid x) = \frac{\exp(X_{i8(t+k)}\mu_{j8(t+k)C} + TRANSFER_{i8(t+k)c}\beta_{j8(t+k)C})}{\sum_{h=1}^{3}\exp(X_{i8(t+k)}\mu_{h8(t+k)C} + TRANSFER_{i8(t+k)c}\beta_{j8(t+k)C})} \quad (2)$$

where, for each $Q + s$, $s > 0$ and $Q + s \leq 8$,

$LEVEL_{i(\tau=1)C} = LEVEL_{i(\tau=2)C} \ldots = LEVEL_{i(\tau=t-1)C}$, and

$LEVEL_{iQC} = LEVEL_{i(Q+1)C} = \ldots = LEVEL_{i(Q+s)C} =$ *"4YR."*

Each vector of coefficients corresponding with outcome $j$=2 (attrite) is again normalized to zero. Through Equation (2), I can determine two interesting results: the lagged impact of time-of-transfer on students who remain enrolled at a SUNY four-year campus and the impact of time-of-transfer on a cross-section of transfer students in the same overall quasi-term.

Equation (2) demonstrates estimations in which I control for attendance patterns at each quasi-term. If indeed terms taken off and credits accumulated between transfer and native students are equal at each point in the post-transfer environment, the coefficient from equation (2) captures the correct impact of time-of-transfer on baccalaureate degree in subsequent semesters. However, if transfers and natives have different four-year college attendance and enrollment characteristics, transfers' probability of graduation may not be correctly captured by equation (2). I therefore estimate equation (2) using, in all estimations for each cohort, the level of *A at the point of transfer only*. If, for example, a student transfers up after the second semester and survives to attend another semester at four-year college, I estimate equation (2), except instead of using the credits accumulated and time-from-first-term values from quasi-terms three, I use the students; values from quasi-term 2, the first term at the four-year

college for the matched transfers. This controls for cohort differences in *pre-transfer* attendance only, allowing transfer/native differences in post-transfer attendance.

I then examine the impact of time-of-transfer on time-to-baccalaureate and credits upon baccalaureate receipt. In both cases I estimate OLS regressions only on students who earn baccalaureate degrees. I first regress

$$TIME_i = \rho TERMSPRETRANS_i + \gamma X_i + \varepsilon_i, \text{ and} \quad (3)$$

where $TIME_i$ is time-to-degree in half-year increments, $TERMSPRETRANS_i$ is a vector of dummy variables indicating the number of semesters a student spent at a two-year college before transferring to a four year (it ranges from zero to eight, where zero represents natives and is omitted), $X_i$ is a series of campus, field of study, entering-cohort, and demographic controls, and $\varepsilon$ is a mean-zero error term. $\rho$ is an array of effects capturing the impact of each time-of-transfer on time-to-baccalaureate.

Time-to-degree is defined as semester of graduation minus semester of first four-year college enrollment plus one-half (the addition represents that a student earns a baccalaureate at the end of a term), and its analytic worth is complicated by students who transfer up having spent more than four semesters at a two-year college. If, as hypothesized earlier, these transfers are equivalent to native students entering their fifth semester at a four-year college, each additional semester spent at a two-year college beyond 4 semesters leads to, all else equal, an uninformative half-year increase in time to degree. I therefore construct a new dependent variable in place of time-to-degree to better characterize the impact of time-of-transfer. I call this variable "Post-Transfer Time Beyond Expected" (PTTBE) and base it on the assumption that students ideally earn a baccalaureate after exactly eight semesters of higher education. I assume that a new

direct attendee should graduate in four years, that a student who transfers up after one semester should graduate three-and-a-half years after enrolling in a four year college, one who transfers up after two semesters should graduate three years after enrolling, etc. If a student transfers up after four or more semesters at a two-year college, he can be expected to graduate after two years at the four-year college. PTTBE measures a student's time to degree minus this expected time-to-degree: a longer-than-expected time to degree results in a positive dependent variable, a quicker-than-expected degree results in a negative dependent variable. Mathematically,

*PTTBE* =

[(Graduation Term) – (First Term of Four-Year Enrollment) + 0.5] –

[4 – (0.5*Terms Pre-Transfer Up)], or

2, whichever is larger. (4)

I then estimate

$$PTTBE_i = \phi TERMSPRETRANS_i + \eta X_i + \varepsilon_i. \quad (5)$$

PTTBE implicitly imposes a restriction on time taken off pre-transfer, because I calculate the dependent variable from term of first four-year enrollment only. It may be impacted by the amount of credits at transfer: fewer credits at time-of-transfer may require, *ceteris paribus*, a longer stay at a four-year college to earn a baccalaureate. The finding, shown in Figure 3a, that semester 2 transfers have few credits relative to corresponding natives may result in a systemically longer PTTBE for students transferring after semester 2. I thus create a variable, called "credit percent," which is

*CREDIT PCT*

= [(Credits At Transfer) / (Mean Credits of Equivalent Natives]

if transfer student

= 1

if direct attendee.

In addition to controls mentioned in the multinomial logit estimations, I include in PTTBE estimations controls for ability, represented by GPA at graduation,[26] and whether a student, in her first semester of SUNY enrollment, was enrolled in the same field of study in which she eventually earned a baccalaureate (indicating expectations that may have made a smoother transition to baccalaureate receipt), or in no specific degree program at all.[27]

I estimate Equation (5) on two populations: those who earn a baccalaureate degree within eight years, and those who earn one within ten years. I do not report the findings for eight-year baccalaureate PTTBE, because they are, especially for seventh and eight semester transfers, strongly affected by the right-censoring of an eight-year time limit. I estimate PTTBE and Baccalaureate Credit total on time-of-transfer for graduates in each of 16 fields of study as well as for the overall sample. I also broaden field of study into three wide fields—math/science (biological sciences, engineering, math, and physical sciences), arts/letters (arts, humanities, general studies/liberal arts, and social sciences), and occupational (applied arts, architecture, business, education, health sciences, home

[26] Baccalaureate GPA is reported by 62.7% of all SUNY baccalaureate recipients who earned their degree within eight years and began in a Fall semester between 1990 and 1994, inclusive. That response rate hides that whether this is reported appears to be an all-or-nothing proposition according to which four-year college a student attends. Of the sixteen schools in the sample, five have response rates of under 3.5%, and the other eleven have response rates over 98.7%. Students without baccalaureate GPA reported are assigned a GPA of zero and given a unitary value for the variable "missing baccalaureate GPA."

[27] Students who begin at a four year college and are registered as either "no major chosen" or "nonmatriculated" are determined to have no specific major chosen as they enter. First-time community college students listed as "no major chosen" or "nonmatriculated" are also put in this category, as are community college students registered as "General Studies/Liberal Arts" students. The latter category comprises 40 percent of all community college first-time students and 50 percent of those that declare a program of study. When looking at community college students who eventually transfer to a four-year college, the numbers rise to 51 percent and 60 percent.

economics, and public services)—and estimate degree outcome estimations on these populations.

Lastly, I run OLS models of credits earned at baccalaureate, which takes the form

$$CREDITS_i = \omega TERMSPRETRANS_i + X_i + \varepsilon_i. \quad (6)$$

This is the application of Equation (5) to a different dependent variable. I run it on the same populations on which I run Equation (5).

## V. Time-of-Transfer and the Probability of Baccalaureate Receipt

Table 7 displays the marginal effects from Equation (1) six-year outcome and eight-year outcome multinomial logit estimations with and without controls for campus, field of study, and demographics.[28] I calculated marginal effects at the mean values of transfer students; thus the estimation represents the impact of having transferred *for transfer students only*. In all figures and tables, the omitted category is attrite; thus, for example, the -.236 in Panel A Column a shows that a student who transfers up after one semester has, all else equal, a 23.6% lower chance of earning a six-year baccalaureate than had he been a native student. Figure 4a-f displays the marginal effects on baccalaureate receipt in visual form.

All coefficients when not including attendance controls are strongly negative and significant at the 1% level. The six-year and eight-year results follow generally similar patterns. Transferring after the first, second, or fourth semester yields approximately the same marginal effect: it is -0.19 in the six-year estimations and -0.15 in the eight-year estimations when controlling for campus, field of study, and demographics. After the four-term mark, there is a monotonic downward trend in terms pre-transfer for both the

[28] When controlling for campus, the coefficients on campus are not reported for confidentiality reasons. But they are frequently large in absolute value and significant.

six-year and eight-year results, though it is more muted for eight-year outcome than six-year outcome. The most notable result for both estimations is the marginal effect of transferring after three semesters at community college. These students have a .346 lower chance of earning a six-year baccalaureate degree (.260 in the eight-year estimation) relative to dropping out than their native counterparts when including demographic, field of study, and campus controls; this is a noticeably more negative impact than those associated with transferring in nearby semesters.

The estimations including attendance controls are displayed in Figures 4c-d and are magnified in Figures 4e-f. The inclusion of linear controls for time from first term and credits at transfer result in the coefficient on the transfer dummy becoming far less negative and in some cases even positive, though never significantly positive when controlling for campus, field of study, and demographics. In the eight-year estimation including controls, the effect of transferring after one semester falls from -0.157 to -.020, over 87 percent of its value. The coefficients on semesters two, three, and five, in the eight-year estimations, fall by 82 percent, 70 percent, and 27 percent, respectively. The least-altered marginal effect is that on transferring after the fourth semester, which represents transfer students least likely to have taken time off and most likely to have maintained a full credit load; it falls from -.158 to -.140, losing 11.4 percent of its value. For "late" transfers (five semesters or more at a community college) the declines are massive: 46 percent for semester 6 transfers, 78 percent for semester 7 transfers, and 87 percent for semester 8 transfers.

Though the patterns resulting from these inclusions completely differ from those without the inclusions, the six-year and eight-year results including attendance variables

strongly resemble each other. For both, there is a "u-shape" relationship between number of pre-transfer terms spent at a two-year college and probability of baccalaureate receipt to attrition. With controls, the six-year baccalaureate marginal effect of being a transfer student drops monotonically from semester 1 transfer to semester four transfer, then increases monotonically from semester 4 transfer to semester 8 transfer. In the eight-year outcome estimations, the pattern is identical except the "u-shape" is lowest at semester 5 transfer, not semester 4 transfer. It is somewhat strange to see that students who spend four our five semesters at a community college before transferring—namely, those who come closest to outlining William Rainey Harper's vision of the two-year college—should have the lowest probability of graduating.

## VI. The Lagged Impact of Time-of-Transfer on Earning a Baccalaureate

Table 8 and Figures 5a-c show the marginal effect of time-of-transfer on probability of earning a baccalaureate of four-year college attendance through the eighth quasi-term of SUNY attendance. All coefficients represent estimations including controls for demographics, campus, field of study, and attendance factors.

Figure 5a demonstrates the eight-year outcome results for those students who transfer up having spent no more than four semesters at community college. For students who transfer after spending three or four semesters at a community college, the likelihood of baccalaureate receipt relative to attrition increases with each successive semester spent at a four-year college. Students who transfer after one semester have increases in the marginal effect through their fourth overall term, and slight monotonic decreases afterwards. The marginal effect for students who transfer after two semesters increases through the sixth overall semester, and is then followed by slight declines.

At any given semester through the sixth one overall, non-late transfers who have survived at a four-year college through semester *x* are more likely to earn an eight-year baccalaureate degree the earlier they transferred. In semester 5, for example, the marginal effect is largest for semester 1 transfers, next highest for semester 2, etc. In semester 6, the ordinal ranking is identical, though the effects on the first three semesters are almost indistinguishable. They remain indistinguishable through semester 8. Semester 4 transfers have a decidedly lower marginal effect than early transfers at all semesters of attendance.

Some transfer students who have spent long enough at a four-year college actually have higher probabilities of graduations than natives in their cohort, *ceteris paribus*. A student who transfers up after one semester and survives to his third overall semester has a significantly higher chance of earning an eight-year baccalaureate than an equivalent native student. Students who transfer up after two semesters have a significantly (at the 10% level) positive marginal effect if they survive one semester at a four-year college. Semester 3 transfers have a significantly positive coefficient in their sixth semester of overall SUNY attendance. The only non-late group that never has a positive marginal effect—indeed, it is always significantly negative—consists of students who transfer up after exactly four semesters at a community college. Recall that this is the largest overall group of transfer students, and the one that ostensibly uses community colleges exactly as they are to be used.

Figure 5b shows the results for students who transfer up after having spent no *less* than four semesters at a community college; those that transfer after semester 4 are included in this graph as well as the last. All these transfers are assigned the "quasi-

term" of 5, so that they are originally compared to native students in their fifth semester. The cohort coefficients are packed much more tightly in each semester than in the early transfer diagrams, and no one marginal effect is ever significantly positive. The marginal effects of semester 4, 5, and 6 transfers are very densely packed in every quasi-term. Semester 7 and 8 transfers have higher values in quasi-term 5 but increase at slower rates, and the coefficient on semester 7 transfer actually decreases slightly from quasi-term 7 to quasi-term 8.

Figure 5c combines early transfers with late transfers to emphasize the dynamic difference that time-of-transfer has on the probability of earning an eight-year baccalaureate.[29] There appears to be a split in the patterns between early (semester 1-3) transfers and the other transfers. Early transfers generally have higher values at the point of transfer, and their survival of a few semesters at four-year college brings about much increased marginal effects. However, their effects level off, at the latest, after quasi-term 6. Later transfers start later in the sample (in quasi-term 5, specifically),at lower levels, and never catch up to earlier transfers.

The preceding figures and tables show data obtained when I hold constant credits accumulated and time from first term with each successive semester. Table 9 shows the results from the estimations using the values of credits accumulated and time to term at the original merging of the transfers with the natives only, and Figure 6 visually displays how this alters eight-year outcome marginal effects. For the first three semesters of transfers, the marginal effect of community college transfer without the updated controls for time-to-term and credits accumulated is noticeably lower than that with the updated controls, indicating that transfer students do not maintain the levels of enrollment or

[29] I leave out the six-year baccalaureate rates for reasons outlined in the previous footnote.

credits taken of natives in the same cohort. Indeed, semester 1 transfers never have a significant marginal effect on probability of earning a baccalaureate. For semester 4 and 5 transfers, the original controls are almost identical to the updated controls, indicating attendance and credit accumulation similar to direct attendees in the same cohort. For those transferring after six or more semesters, their original controls result in higher marginal effects than the updated controls, showing that these late transfers not only have higher chances of earning a baccalaureate than semester 4 or 5 transfers, but accumulate credits and maintain enrollment at rates higher than natives in the same quasi-term.

Figures 7a-c reproduces Figures 5a-c for estimations lacking updated attendance controls. The flatter increases for early transfers and the steeper increases for later transfers combine to form a much more difficult-to-interpret pattern of marginal effects in the later quasi-terms (Figure 7c). Eighth-semester transfers, for example, now have the highest marginal effect in quasi-term 8 (though it is not statistically significant). In quasi-term 8, only 5.1 percentage points separate the highest and lowest marginal effect, down from 7.1 percentage points in the updated-controls model. Once again, transferring after semester 4 or 5 yields the lowest overall chance of earning a baccalaureate in each quasi-term.

## VII. The Impact of Time-of-Transfer on Baccalaureate Characteristics

Table 10 Column A shows the coefficients of time-of-transfer on time-to-degree for students who earned a baccalaureate degree in 10 or fewer years.[30] Among transfers, those who spent four semesters at community college have the shortest time-to-degree by

[30] Students *require* at least 10 potential years of attendance to be included in these estimations. For example, students who first enrolled in Fall 1993 and had only 9 potential years of enrollment before the data ends are deleted. Results when limiting the sample to those students who earned a baccalaureate in eight years or less are available from the author.

a significant margin, though it is still more than two-fifths of a year longer than natives' time to degree. Transferring after semesters 1 or 3 is associated with an approximately one-quarter year longer time to degree than transferring after semester 2. Beyond four semesters, each additional semester spent by a baccalaureate recipient leads to an average increase in time-to-degree of 0.65 years, though transfer after odd-numbered semesters (5 and 7) has much higher coefficients than transfer after even-numbered semesters.

Columns B-I display results for the estimations for Post-Transfer Time Beyond Expected (PTTBE) when controlling for demographics, four-year campus attended, GPA at baccalaureate receipt, and whether the student was enrolled in her eventual baccalaureate major (or no program at all) during the very first term of SUNY attendance. Credit controls are omitted in the columns B-E results and included in the columns F-I results. The p-values on the t-tests comparing the most frequent time-of-transfer coefficients are at the bottom of Table 10. When not including credit controls, transferring after one semester lengthens PTTBE significantly neither for the whole population nor for any broad field-of-study. Almost every other coefficient in columns B-E, though, is significantly positive. Transferring up after semester 2 lengthens PTTBE by over a full semester for math/science majors; that coefficient is significantly higher than those on semesters 4, 5, and 6 in the math/science estimation. Among arts/letters and occupational graduates, the dichotomy between semester 2 transfers and other frequent semesters of transfer is more muted, though occasionally still significant. For all transfers save those on semester 4, the coefficients in the occupational regression are much lower than those in the math/science and arts/letters estimations.

Columns F-I reproduce columns B-E, controlling for credits at time-of-transfer, and Figures 8a-d graphically demonstrates how including credit controls lower time-of-transfer's impact on PTTBE. Most all times-of-transfer still yield significantly positive coefficients. The coefficient on semester 1 transfer becomes significantly positive in both the full-sample estimation and the arts/letters estimation. There are no significant differences among times-of-transfer coefficients in either the broad arts/letters or occupational fields. In the math/science category, transferring after semester 2 yields a significantly higher PTTBE than transferring after semester 4 and an almost-significantly (p-value = .1066) higher PTTBE than transferring after semester 5. Transferring after semester 6, which yields a coefficient almost exactly equal to that on semester 2, has a significantly higher coefficient that transferring after semester 4 or 5. The occupational fields now have persistently lower coefficients than math/science or arts/letters at all times-of-transfer.

Table 11 and Figures 9a-d show the PTTBE results including credit controls for each two-digit field of study. The significance of many of the coefficients may be affected by small sample size. The only math/science field with a persistently significant coefficient is biological sciences. The significant difference between the semester 2 and semester 4 coefficient in the combined math/science population that was reported in Table 10 appears to be driven by the trends in engineering and the biological sciences. Coefficients on term of transfer are persistently significantly positive for both humanities and social science majors; they are not for arts and liberal arts majors, who together comprise only 12.8% of arts/letters majors. The coefficients on humanities and social sciences are also flat and, as Figure 10b demonstrates, are basically equal to each other,

separated by no more than .05 from semesters 2 through 8. The full figure for occupational degrees (Figure 9c) is quite anarchic, probably because of the larger number of fields included and the small sample sizes of some of the majors, which result in very few significant coefficients. I thus include Figure 9d, which includes only the three most populous fields-of-study in the occupational subset. The most popular occupational degree, education (41.9% of occupational baccalaureates), shows a fairly steady increase in PTTBE from semesters 2 through 7, all of which yield significantly positive coefficients. Its semester 2 coefficient (.143) is significantly smaller than both its semester 5 (.252) and 6 (.300) coefficients, and its semester 4 coefficient is significantly lower than its semester 6 coefficient. The time-of-transfer yielding the longest PTTBE in business, the second most popular occupational field (35.4% of occupational degrees) is semester 4; the coefficient steadily increases before that and steadily declines afterwards. Public services, the only field which awards a majority of its baccalaureates to former community college students,[31] starts with a negative coefficient and rises slightly with each passing semester spent at community college, but none of its time-of-transfer coefficients differ significantly from zero.

Table 12 displays the coefficients of time-of-transfer when the dependent variable is credits at baccalaureate receipt. In the overall sample, transferring after any semester is affiliated with a significantly higher credit total. The coefficients, though, are not particularly large. Early transfer results in at most 1.21 additional credits at baccalaureate, symbolizing about 40% of a typical college course. The coefficients on late transfer are higher, but the largest is 3.5, indicating slightly more than one extra

[31] Public services majors make up over 15.4% of ten-year occupational baccalaureates awarded to transfers, but only 6.4% of those awarded to natives.

course for transfer students. The differences among the coefficients appear to be significant, with the semester 2 coefficient lower than, and the semester 6 coefficient higher than, the coefficients on semesters 4 and 5.

The coefficients are especially small for the arts/letters population: they are insignificant for early transfers and represent only an extra half-class for semester 4, 5, or 6 semester transfers. They are fairly large, however—up to 5.91 credits for transferring after semester 8—for the math/science population, who more than students in other majors take courses of four or more credits. The coefficients on semester 6 and beyond are larger, sometimes significantly so, than earlier coefficients. For the combined occupational graduates, there is a near-monotonic increase between terms at community college and credits at baccalaureate. The largest coefficient is 5.30, which represents almost two extra courses taken for occupational baccalaureates who transfer after semester 6.

There are persistent and sizable positive coefficients for students in biological sciences. Every coefficient save the insignificantly negative one on semester 2 transfer is significantly positive and larger than 5, indicating more than one full additional course taken. Engineering coefficients, when significant, are very large. They are only significant, however, for semester 2 transfers and "late" transfers. Coefficients in the math and physical sciences estimations do not follow a strong pattern.

The coefficients for the two large arts/letters fields, humanities and social sciences, are generally significant if a students transfers after four or more semesters at community college. The social science coefficients are generally higher for late transfers than for semester 4 transfers, and are lower for early transfers than for semester 4

transfers. The humanities coefficients show no significant differences amongst themselves.

Education, the most popular occupational field, has significantly positive credits-at-baccalaureate coefficients that increase with the amount of time pre-transfer; in that they strongly resemble the pattern of its PTTBE coefficients. They also become relatively large—representing 2 or more extra classes taken—if a student transfers late. The coefficients for business majors are largely significant, and seem to follow a generally increasing trend that peaks in odd-numbered semesters. The public services coefficients, like its PTTBE coefficients, never differ from zero with statistical significance. Three of the smaller occupational fields—applied arts, architecture, and home economics—have persistently positive and large coefficients.

## VIII. Conclusion

The descriptive analyses in this paper show that, when not controlling for relevant pre-transfer attendance factors, a community college student may maximize his outcomes of attending four-year college by transferring "up" after exactly four terms. For transfer students, that is associated with the highest probability of eight-year baccalaureate receipt and, conditional on baccalaureate receipt, the shortest time-to-degree. (Some extra credit accumulation appears to result from delaying transfer until after the fourth term especially in occupational fields.) However, when accounting for crucial pre-transfer attendance characteristics as well as campus and demographics, the benefits of transferring after semester 4 prove illusory; it results in around the *lowest* overall probability of six-year graduation, the second-lowest probability of eight-year graduation, and its benefit with respect to time-to-degree relative to early transfer decreases

substantially. When controlling for relevant pre-transfer attendance factors, transferring either very early (first or second semester) or very late (seventh or eighth semester) is associated with the highest probability of earning a baccalaureate. However, "early transfers" attending a four-year campus are also more likely to take time off and pursue less-than-full credit loads than later transfers. Additionally, transferring after the second semester—the most popular route of "early" transfers—is correlated with a significantly higher time-to-degree for biological science and engineering students than transferring after four semesters.

Results from credits-at-baccalaureate estimations indicate that institutions may benefit from students' early transfers. Late transfers in numerous major fields—humanities, social sciences, and education—have much higher credit totals than early transfers, holding GPA, demographics, and campus constant. This is evidence deflating the hypothesis in Section I that universities may provide smoother transitions to traditional transfers than early transfers. Whatever accessories, if any, are made to late transfer students, it appears to be at the cost of an additional course or two taken. This incurs extra university expenses.

It appears, then, that a student may maximize four-year outcome by transferring *early*, especially after one semester, rather than after spending two full years at community college. But my generalized definition of transfer students in this paper—that is, anyone who attends a two-year campus and subsequently a four-year campus—does not necessarily match students who consider themselves transfers. Footnote 20 stated that a majority of semester 1 transfers and a large share of semester 2 transfers are labeled as "first-time" students. These students' two-year college attendance is perhaps

spurious and momentary, as compared to traditional transfer students who use the two-year college explicitly as a substitute for the first terms of a four-year postsecondary experience. Future research will limit the analysis to students whose higher education history is recorded as "transfer."

Although there are apparent benefits of late transfer—higher eight-year graduation rates and perhaps a shorter time-to-degree—it is implausible to advise a new student to transfer up after spending five or more semesters at a community college rather than four or less. The benefits accruing to those students who *do* spend five or more semesters at a community college before transferring are almost certainly the result of those students having formulated a stronger intent to earn a baccalaureate than students following the convention of transferring after four semesters. Future research should determine whether the apparent benefits of late transfer are the result of certain student characteristics.

Future research should also study whether the impact of time-of-transfer varies by demographic groups. Kane and Rouse (1995) shows that the labor market returns of an associate's degree are much higher for women than for men; this may create a different dynamic in the timing of transfer. Latinos are also substantially more likely to attend two-year colleges than four-year colleges,[32] and their decision to transfer may systemically differ from students in other racial categories.

In the remainder of my dissertation, I examine the ultimate outcome of attending a two-year college, including the timing of transfer, which can be used to examine the selection effects discussed in the previous paragraph. I also examine the impact of

[32] Fry (2002) finds that nationwide, 40% of Latinos in higher education are enrolled in two-year colleges, compared with approximately 25% of whites and African-Americans.

exposure to transfer students (i.e. peer effects) on the likelihood of baccalaureate receipt. That study is conducted on the population of students beginning the equivalent of their junior year (fifth quasi-term, in the parlance of this paper) at a four-year college. As shown when examining the lagged impact of time-of-transfer on baccalaureate probability, a rising junior's probability of earning a baccalaureate is not simply a function of *whether* he is a transfer, but also *when* he transferred, partly because of the increase in likelihood of baccalaureate receipt relative to natives associated with surviving at four-year college. Such factors will be incorporated into my work.

The relatively recent scholarly interest in community colleges and their impact on American higher education has encouraged universities to release large, previously unused student enrollment databases to economists. The SUNY Student Data File is a valuable database that can supply information for much further research into two-year colleges and transfer students, and hopefully this paper and my dissertation will show that.

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**Table 1**
**Campuses of the State University of New York (SUNY)**

**University Centers**
Albany
Binghamton
Buffalo
Stony Brook

**University Colleges**
Brockport
Buffalo State
Cortland
Empire State
Fredonia
Geneseo
New Paltz
Old Westbury
Oneonta
Oswego
Plattsburgh
Potsdam
Purchase

**Health Science Centers**
Brooklyn
Buffalo HSC
Stony Brook HSC
Syracuse

**Statutory Colleges**
***Alfred University***
Ceramics
***Cornell University***
Agriculture & Life Sciences
Human Ecology
Industrial & Labor Relations
Veterinary Medicine

**Doctoral Technology Colleges**
Environmental Science and Forestry
College of Technology at Farmingdale
Maritime College
Optometry
College of Technology at Utica/Rome

**Two-year Technology Colleges**
College of Technology at Alfred
College of Technology at Canton
College of Technology & Agriculture at Cobleskill
College of Technology at Delhi
College of Technology & Agriculture at Morrisville

**Community Colleges**
Adirondack
Broome County
Cayuga County
Clinton
Columbia-Greene
Corning
Dutchess
Erie
Fashion Institute of Technology
Finger Lakes
Fulton-Montgomery
Genesee
Herkimer County
Hudson Valley
Jamestown
Jefferson
Mohawk Valley
Monroe
Nassau
Niagara County
North Country
Onondaga
Orange County
Rockland
Schenectady County
Suffolk County
Sullivan County
Tompkins-Cortland
Ulster County
Westchester

**Table 2**

**Time-to-Baccalaureate of Students Entering SUNY in Fall 1992**

| Years | Native | Transfer |
|---|---|---|
| **1** | 0 | 1 |
| **1.5** | 2 | 0 |
| **2** | 9 | 2 |
| **2.5** | 13 | 4 |
| **3** | 132 | 19 |
| **3.5** | 288 | 21 |
| **4** | 6,124 | 709 |
| **4.5** | 1,316 | 419 |
| **5** | 1,775 | 949 |
| **5.5** | 282 | 329 |
| **6** | 419 | 533 |
| **6.5** | 112 | 130 |
| **7** | 145 | 241 |
| **7.5** | 48 | 96 |
| **8** | 83 | 152 |
| **8.5** | 32 | 65 |
| **9** | 55 | 93 |
| **9.5** | 15 | 38 |
| **10** | 24 | 53 |
| **Obs** | 10,874 | 3,854 |

**Table 3a**

**Probability of Earning a Baccalaureate, by Type of First Campus Attended**

**Begin at community college**

| | Obs | Mean |
|---|---|---|
| Earn Bacc | 295,316 | 0.085 |
| Six-Year Bacc | 295,316 | 0.067 |
| Eight-Year Bacc | 213,611 | 0.079 |

**Begin at four-year college**

| | Obs | Mean |
|---|---|---|
| Earn Bacc | 126,997 | 0.608 |
| Six-Year Bacc | 126,997 | 0.578 |
| Eight-Year Bacc | 90,993 | 0.597 |

**Start at community college, transfer up**

| | Obs | Mean |
|---|---|---|
| Earn Bacc | 42,364 | 0.579 |
| Six-Year Bacc | 42,364 | 0.466 |
| Eight-Year Bacc | 30,569 | 0.553 |

**Table 3b**

**Distribution of Bacclaureate Recipients, by Type of First Campus Attended**

**Overall Sample Baccalaurete Recipients**

| | Share |
|---|---|
| Start at Community College | 0.244 |
| Start at Four-Year | 0.756 |
| Obs | 102,214 |

**Baccalaureate Within Six Years**

| | Share |
|---|---|
| Start at Community College | 0.212 |
| Start at Four-Year | 0.788 |
| Obs | 93,215 |

**Baccalaureate Within Eight Years**

| | Share |
|---|---|
| Start at Community College | 0.238 |
| Start at Four-Year | 0.762 |
| Obs | 71,269 |

**Table 4**

**Distribution of Terms Pre-Transfer**

| | Share |
|---|---|
| **1** | 0.077 |
| **2** | 0.137 |
| **3** | 0.047 |
| **4** | 0.317 |
| **5** | 0.144 |
| **6** | 0.159 |
| **7** | 0.052 |
| **8** | 0.036 |
| **9** | 0.014 |
| **10** | 0.009 |
| **11** | 0.004 |
| **12** | 0.002 |
| **13** | 0.001 |
| **14** | 0.001 |
| **15** | 0.000 |
| **16+** | 0.000 |
| **Obs** | 42,364 |

**Table 5**

**Characteristics of New Transfer Students By Terms pre-Transfer**

| | Fall Enrollment |
|---|---|
| **1** | 0.747 |
| **2** | 0.923 |
| **3** | 0.532 |
| **4** | 0.925 |
| **5** | 0.436 |
| **6** | 0.843 |
| **7** | 0.581 |
| **8** | 0.790 |

**Table 6**

**Average Credits Accumulated by Semester of Merging**

| | Transfers | Natives |
|---|---|---|
| **2** | 14.7 | 16.7 |
| **3** | 22.7 | 31.2 |
| **4** | 35.3 | 46.3 |
| **5** | 59.9 | 61.2 |
| **6** | 61.6 | 77.0 |
| **7** | 61.5 | 91.7 |
| **8** | 64.7 | 105.6 |

**Table 7**

**Multinomial Logit Marginal Effects of Transfer in Estimations of Transfers New to Four-Year and Natives in Same Quasi-Term**
**t-statistics in Small Type, Shading Indicates Significance**
**Eight-Year Outcomes**

**Panel A: Baccalaureate Receipt**

| | | a | b | c | d | e | f | g | h |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | -0.2359 | -0.1927 | -0.2214 | -0.1577 | 0.0474 | 0.0098 | -0.0034 | -0.0199 |
| | | -24.66 | -18.76 | -18.05 | -11.58 | 3.83 | 0.83 | -0.21 | -1.24 |
| | 2 | -0.2002 | -0.1927 | -0.1689 | -0.1497 | 0.0351 | -0.0319 | 0.0316 | -0.0265 |
| | | -27.32 | -23.85 | -18.78 | -15.11 | 3.84 | -3.49 | 2.89 | -2.40 |
| | 3 | -0.3638 | -0.3462 | -0.2983 | -0.2600 | -0.0584 | -0.0935 | -0.0394 | -0.0772 |
| | | -30.45 | -27.01 | -20.09 | -15.54 | -4.37 | -7.07 | -1.97 | -3.90 |
| **Terms** | 4 | -0.1829 | -0.1838 | -0.1618 | -0.1583 | -0.1391 | -0.1654 | -0.1179 | -0.1399 |
| | | -38.96 | -36.05 | -29.5 | -27.10 | -24.52 | -28.63 | -18.92 | -22.16 |
| **Pre** | 5 | -0.3512 | -0.3072 | -0.2702 | -0.2176 | -0.1498 | -0.1498 | -0.1647 | -0.1597 |
| | | -49.86 | -37.78 | -31.67 | -22.09 | -14.31 | -13.69 | -14.40 | -13.53 |
| **Transfer** | 6 | -0.4254 | -0.3721 | -0.2977 | -0.2334 | -0.0973 | -0.0946 | -0.1361 | -0.1262 |
| | | -64.62 | -48.41 | -36.41 | -24.22 | -8.71 | -8.14 | -10.32 | -9.30 |
| | 7 | -0.6682 | -0.5551 | -0.4711 | -0.3750 | -0.0386 | -0.0333 | -0.1182 | -0.0835 |
| | | -81.74 | -62.58 | -35.78 | -24.66 | -6.33 | -5.58 | -5.37 | -3.75 |
| | 8 | -0.7252 | -0.5799 | -0.5078 | -0.3987 | -0.0342 | -0.0265 | -0.0915 | -0.0537 |
| | | -90.98 | -63.57 | -33.18 | -22.87 | -6.64 | -5.79 | -3.74 | -2.24 |
| **Six or Eight Year Outcome** | | Six | Six | Eight | Eight | Six | Six | Eight | Eight |
| **Campus/Demographic** | | No | Yes | No | Yes | No | Yes | No | Yes |
| **Attendance** | | No | No | No | No | Yes | Yes | Yes | Yes |

**Panel B: Still Enrolled**

| | | a | b | c | d | e | f | g | h |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 0.1461 | 0.1358 | 0.0838 | 0.0683 | 0.0077 | 0.0037 | 0.0085 | 0.0019 |
| | | 18.70 | 16.29 | 10.95 | 8.82 | 0.76 | 0.35 | 1.07 | 0.23 |
| | 2 | 0.1185 | 0.1052 | 0.0568 | 0.0420 | 0.0225 | 0.0317 | 0.0056 | 0.0086 |
| | | 21.62 | 18.79 | 11.71 | 9.52 | 3.47 | 4.82 | 1.25 | 1.97 |
| | 3 | 0.2127 | 0.1952 | 0.1028 | 0.0781 | 0.0353 | 0.0356 | 0.0017 | -0.0003 |
| | | 19.84 | 17.04 | 10.59 | 8.40 | 2.35 | 2.34 | 0.18 | -0.03 |
| **Terms** | 4 | 0.0843 | 0.0702 | 0.0391 | 0.0272 | 0.0481 | 0.0514 | 0.0156 | 0.0159 |
| | | 25.91 | 22.31 | 14.58 | 11.78 | 13.77 | 15.22 | 6.95 | 7.50 |
| **Pre** | 5 | 0.2248 | 0.1893 | 0.1075 | 0.0751 | 0.0691 | 0.0629 | 0.0271 | 0.0231 |
| | | 36.16 | 27.66 | 19.02 | 13.41 | 7.17 | 6.28 | 4.55 | 3.89 |
| **Transfer** | 6 | 0.3114 | 0.2781 | 0.1346 | 0.0974 | 0.0716 | 0.0657 | 0.0238 | 0.0184 |
| | | 48.86 | 38.83 | 23.09 | 16.25 | 6.08 | 5.28 | 3.09 | 2.34 |
| | 7 | 0.6064 | 0.5615 | 0.3113 | 0.2753 | 0.0750 | 0.0617 | 0.0635 | 0.0408 |
| | | 56.26 | 49.79 | 24.37 | 19.52 | 4.71 | 3.88 | 2.72 | 1.67 |
| | 8 | 0.7063 | 0.6460 | 0.3600 | 0.3232 | 0.0834 | 0.0637 | 0.0407 | 0.0158 |
| | | 60.51 | 54.10 | 22.88 | 18.52 | 5.37 | 4.27 | 1.36 | 0.50 |
| **Six or Eight Year Outcome** | | Six | Six | Eight | Eight | Six | Six | Eight | Eight |
| **Campus/Demographic** | | No | Yes | No | Yes | No | Yes | No | Yes |
| **Attendance** | | No | No | No | No | Yes | Yes | Yes | Yes |

**Table 8**

**Eight-Year Outcome Multinomial Logit Estimations**
**Baccalaureate Probability Marginal Effects of Transfer, Through Quasi-Term 8**
**Demographics, Campus, Field of Study, and Attendance Controls Included All Estimations**
**t-statistics in Small Type, Shading Indicates Significance**
**Using Updated Attendance Controls**

**Panel A: Baccalaureate Probability**

| | Terms pre-Transfer | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **Quasi-Term 2** | -0.0199 | | | | | | | |
| | -1.24 | | | | | | | |
| **Quasi-Term 3** | 0.0261 | -0.0265 | | | | | | |
| | 1.41 | -2.40 | | | | | | |
| **Quasi-Term 4** | 0.0631 | 0.0198 | -0.0772 | | | | | |
| | 3.58 | 1.78 | -3.90 | | | | | |
| **Quasi-Term 5** | 0.0626 | 0.0352 | -0.0347 | -0.1399 | -0.1597 | -0.1262 | -0.0835 | -0.0537 |
| | 3.92 | 3.48 | -1.56 | -22.16 | -13.53 | -9.30 | -3.75 | -2.24 |
| **Quasi-Term 6** | 0.0584 | 0.0497 | 0.0368 | -0.0878 | -0.1035 | -0.0964 | -0.0756 | -0.0319 |
| | 4.25 | 5.81 | 1.87 | -15.32 | -9.02 | -7.20 | -2.87 | -1.08 |
| **Quasi-Term 7** | 0.0485 | 0.0445 | 0.0573 | -0.0394 | -0.0469 | -0.0353 | -0.0421 | -0.0195 |
| | 3.78 | 5.85 | 3.56 | -8.44 | -4.59 | -2.92 | -1.43 | -0.57 |
| **Quasi-Term 8** | 0.0431 | 0.0437 | 0.0579 | -0.0212 | -0.0255 | -0.0178 | -0.0461 | 0.0025 |
| | 3.33 | 6.24 | 3.78 | -5.31 | -2.82 | -1.64 | -1.47 | 0.06 |

**Panel B: Still Enrolled after 8 Years**

| | Terms pre-Transfer | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **Quasi-Term 2** | 0.0019 | | | | | | | |
| | 0.23 | | | | | | | |
| **Quasi-Term 3** | -0.0035 | 0.0086 | | | | | | |
| | -0.45 | 1.97 | | | | | | |
| **Quasi-Term 4** | -0.0077 | 0.0064 | -0.0003 | | | | | |
| | -1.25 | 1.60 | -0.03 | | | | | |
| **Quasi-Term 5** | -0.0105 | 0.0014 | 0.0046 | 0.0159 | 0.0231 | 0.0184 | 0.0408 | 0.0158 |
| | -1.82 | 0.39 | 0.48 | 7.5 | 3.89 | 2.34 | 1.67 | 0.50 |
| **Quasi-Term 6** | -0.0118 | -0.0037 | -0.0057 | 0.0109 | 0.0153 | 0.0077 | 0.0350 | -0.0108 |
| | -2.44 | -1.39 | -0.78 | 6.07 | 2.74 | 0.98 | 1.29 | -0.31 |
| **Quasi-Term 7** | -0.0102 | -0.0038 | -0.0117 | 0.0055 | 0.0058 | 0.0000 | 0.0207 | -0.0178 |
| | -2.14 | -1.63 | -1.93 | 3.88 | 1.19 | 0.00 | 0.74 | -0.50 |
| **Quasi-Term 8** | -0.0110 | -0.0048 | -0.0098 | 0.0038 | 0.0007 | -0.0068 | 0.0130 | -0.0212 |
| | -2.26 | -2.29 | -1.52 | 3.09 | 0.16 | -1.05 | 0.44 | -0.54 |

**Table 9**

**Eight-Year Outcome Multinomial Logit Estimations**
**Baccalaureate Probability Marginal Effects of Transfer, Through Quasi-Term 8**
**Demographics, Campus, and Field of Study Included All Estimations**
**t-statistics in Small Type, Shading Indicates Significance**
**Using Attendance Controls only From Time-of-Transfer**

**Panel A: Baccalaureate Probability**

| | Terms pre-Transfer | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **Quasi-Term 2** | -0.0199 | | | | | | | |
| | -1.24 | | | | | | | |
| **Quasi-Term 3** | -0.0191 | -0.0265 | | | | | | |
| | -1.04 | -2.40 | | | | | | |
| **Quasi-Term 4** | -0.0168 | -0.0260 | -0.0772 | | | | | |
| | -0.95 | -2.39 | -3.90 | | | | | |
| **Quasi-Term 5** | 0.0008 | -0.0034 | -0.0583 | -0.1399 | -0.1597 | -0.1262 | -0.0835 | -0.0537 |
| | 0.04 | -0.34 | -2.65 | -22.16 | -13.53 | -9.30 | -3.75 | -2.24 |
| **Quasi-Term 6** | -0.0178 | 0.0057 | 0.0000 | -0.0902 | -0.1068 | -0.0812 | -0.0617 | -0.0099 |
| | -1.17 | 0.63 | 0.00 | -15.74 | -9.41 | -5.89 | -2.25 | -0.33 |
| **Quasi-Term 7** | 0.0070 | 0.0109 | 0.0374 | -0.0388 | -0.0406 | -0.0202 | -0.0237 | 0.0047 |
| | 0.48 | 1.32 | 2.14 | -8.15 | -3.88 | -1.55 | -0.75 | 0.13 |
| **Quasi-Term 8** | -0.0066 | 0.0155 | 0.0281 | -0.0211 | -0.0239 | 0.0070 | -0.0058 | 0.0501 |
| | -0.45 | 1.95 | 1.66 | -5.02 | -2.53 | 0.55 | -0.16 | 1.13 |

**Panel B: Still Enrolled after 8 Years**

| | Terms pre-Transfer | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **Quasi-Term 2** | 0.0019 | | | | | | | |
| | 0.23 | | | | | | | |
| **Quasi-Term 3** | -0.0010 | 0.0086 | | | | | | |
| | -0.12 | 1.97 | | | | | | |
| **Quasi-Term 4** | 0.0030 | 0.0084 | -0.0003 | | | | | |
| | 0.40 | 2.10 | -0.03 | | | | | |
| **Quasi-Term 5** | 0.0014 | 0.0047 | 0.0020 | 0.0159 | 0.0231 | 0.0184 | 0.0408 | 0.0158 |
| | 0.19 | 1.27 | 0.21 | 7.50 | 3.89 | 2.34 | 1.67 | 0.50 |
| **Quasi-Term 6** | 0.0041 | -0.0009 | -0.0079 | 0.0105 | 0.0146 | -0.0006 | 0.0158 | -0.0417 |
| | 0.62 | -0.30 | -0.98 | 5.65 | 2.56 | -0.07 | 0.56 | -1.14 |
| **Quasi-Term 7** | -0.0022 | -0.0012 | -0.0162 | 0.0048 | -0.0011 | -0.0172 | -0.0166 | -0.0738 |
| | -0.33 | -0.43 | -2.20 | 3.07 | -0.20 | -2.08 | -0.53 | -1.85 |
| **Quasi-Term 8** | 0.0044 | -0.0030 | -0.0112 | 0.0029 | -0.0040 | -0.0317 | -0.0405 | -0.0960 |
| | 0.67 | -1.16 | -1.42 | 2.00 | -0.77 | -3.65 | -1.16 | -2.10 |

**Table 10**
**Coefficients on Terms Pre-Transfer in Time-to-Degree/PTTBE Estimations**
**Ten-Year Baccalaureates**
**t-statistics in Small Type, Shading Indicates Significance**
**Controls for Campus, Field of Study, Demographics, and Baccalaureate GPA Included in All Estimations**

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| | Time to Deg All | PTTBE All | PTTBE Math/Sci | PTTBE Arts/Letters | PTTBE Occ | PTTBE All | PTTBE Math/Sci | PTTBE Arts/Letters | PTTBE Occ |
| 1 | 0.9029 | 0.0116 | 0.0390 | -0.0115 | 0.0349 | 0.0740 | 0.1008 | 0.1225 | 0.0152 |
| | 23.54 | 0.33 | 0.36 | -0.22 | 0.67 | 2.13 | 0.94 | 2.39 | 0.30 |
| 2 | 0.6732 | 0.3296 | 0.5514 | 0.3386 | 0.2789 | 0.1609 | 0.3925 | 0.1448 | 0.1290 |
| | 25.96 | 13.84 | 7.17 | 9.61 | 7.93 | 6.75 | 5.07 | 4.10 | 3.69 |
| 3 | 0.9862 | 0.2979 | 0.2103 | 0.4244 | 0.1874 | 0.1949 | 0.0833 | 0.2956 | 0.1101 |
| | 21.33 | 7.01 | 1.35 | 6.88 | 3.04 | 4.66 | 0.54 | 4.86 | 1.82 |
| Terms 4 | 0.4438 | 0.2532 | 0.2431 | 0.3006 | 0.2357 | 0.1827 | 0.2056 | 0.2025 | 0.1737 |
| | 24.31 | 15.10 | 4.01 | 10.75 | 10.72 | 11.01 | 3.42 | 7.31 | 8.01 |
| Pre 5 | 1.2685 | 0.2168 | 0.2263 | 0.2668 | 0.1949 | 0.1787 | 0.2168 | 0.2070 | 0.1626 |
| | 49.54 | 9.22 | 2.71 | 7.27 | 6.03 | 7.72 | 2.62 | 5.73 | 5.13 |
| Transfer 6 | 1.7000 | 0.2430 | 0.3787 | 0.2502 | 0.2161 | 0.2154 | 0.3989 | 0.1970 | 0.1919 |
| | 68.24 | 10.62 | 5.37 | 6.92 | 6.78 | 9.57 | 5.71 | 5.53 | 6.14 |
| 7 | 2.7175 | 0.1892 | 0.2912 | 0.2292 | 0.1500 | 0.1472 | 0.2519 | 0.1640 | 0.1229 |
| | 62.47 | 4.74 | 1.95 | 3.87 | 2.65 | 3.75 | 1.71 | 2.82 | 2.21 |
| 8 | 3.0245 | 0.1582 | 0.3263 | 0.0827 | 0.1943 | 0.1493 | 0.3607 | 0.0811 | 0.1606 |
| | 56.89 | 3.24 | 2.11 | 1.09 | 2.84 | 3.11 | 2.36 | 1.09 | 2.4 |
| **Credits at Transfer Control** | No | No | No | No | No | Yes | Yes | Yes | Yes |
| **Adj R-squared** | 0.3410 | 0.1216 | 0.1483 | 0.1143 | 0.1372 | 0.1530 | 0.1650 | 0.1453 | 0.1724 |
| **Observations** | 42,621 | 42,621 | 6,127 | 21,077 | 15,347 | 42,621 | 6,127 | 21,077 | 15,347 |
| **Transfers** | 10,597 | 10,597 | 913 | 4,769 | 4,915 | 10,597 | 913 | 4,769 | 4,915 |
| **2 vs 4** | 0.0000 | 0.0039 | 0.0008 | 0.3301 | 0.2619 | 0.4027 | 0.0419 | 0.1342 | 0.2388 |
| **2 vs 5** | 0.0000 | 0.0003 | 0.0029 | 0.1173 | 0.0631 | 0.5634 | 0.1066 | 0.1698 | 0.4502 |
| **2 vs 6** | 0.0000 | 0.0048 | 0.0831 | 0.0528 | 0.1605 | 0.0726 | 0.9494 | 0.2470 | 0.1543 |
| **4 vs 5** | 0.0000 | 0.1375 | 0.8561 | 0.3669 | 0.2241 | 0.8672 | 0.9025 | 0.9021 | 0.7374 |
| **4 vs 6** | 0.0000 | 0.6678 | 0.0934 | 0.1761 | 0.5528 | 0.1650 | 0.0160 | 0.8811 | 0.5737 |
| **5 vs 6** | 0.0000 | 0.3659 | 0.1273 | 0.7084 | 0.5991 | 0.1962 | 0.0661 | 0.8178 | 0.4581 |

**Table 11**
**Coefficients on Terms Pre-Transfer in Post-Transfer Time Beyond Expected (PTTBE) Estimations**
**Includes Controls for Demographics, Campus, GPA, First-Term Program of Study, at Credits at Transfer Time**
**10 year Baccalaureates**
**t-statistics in Small Type, Shading Indicates Significance**

| | Math/Science | | | | Arts/Letters | | | |
|---|---|---|---|---|---|---|---|---|
| | Bio Sci | Engineering | Math | Phys Sci | Arts | Humanities | Lib Arts | Social Sci |
| 1 | -0.0027 | -0.0049 | -0.0380 | 0.7757 | -0.0074 | -0.0445 | 0.0101 | 0.1614 |
| | -0.02 | -0.02 | -0.18 | 2.09 | -0.04 | -0.45 | 0.03 | 2.52 |
| 2 | 0.5229 | 0.5592 | 0.2687 | 0.2902 | -0.0257 | 0.1751 | -0.2781 | 0.1719 |
| | 4.75 | 2.91 | 1.73 | 1.34 | -0.19 | 2.62 | -1.37 | 3.88 |
| 3 | 0.1874 | 0.0568 | 0.2786 | -0.3412 | 0.2674 | 0.2884 | 0.2726 | 0.2519 |
| | 0.93 | 0.12 | 1.01 | -0.53 | 1.31 | 2.26 | 0.89 | 3.35 |
| Terms 4 | 0.2986 | 0.1857 | 0.0884 | 0.5779 | 0.3808 | 0.2042 | -0.0226 | 0.1694 |
| | 3.00 | 1.36 | 0.74 | 3.57 | 4.10 | 3.89 | -0.15 | 4.71 |
| Pre 5 | 0.4061 | 0.5350 | 0.0188 | 0.0502 | 0.1299 | 0.2000 | 0.1028 | 0.2215 |
| | 3.03 | 3.18 | 0.11 | 0.21 | 0.96 | 2.74 | 0.52 | 4.96 |
| Transfer 6 | 0.3124 | 0.5203 | 0.6096 | 0.1527 | 0.3916 | 0.2362 | -0.1099 | 0.1844 |
| | 2.62 | 3.77 | 4.14 | 0.72 | 3.02 | 3.30 | -0.72 | 4.02 |
| 7 | 0.6222 | 0.2059 | -0.0844 | 0.4619 | 0.1059 | 0.1470 | -0.1106 | 0.1902 |
| | 2.69 | 0.65 | -0.28 | 1.29 | 0.45 | 1.26 | -0.37 | 2.67 |
| 8 | 0.0527 | -0.3185 | 0.6879 | 0.7710 | -0.1414 | 0.1684 | -0.4683 | 0.1354 |
| | 0.20 | -0.96 | 2.50 | 1.86 | -0.47 | 1.13 | -1.57 | 1.45 |
| **Adj R-Squared** | 0.1804 | 0.1792 | 0.1796 | 0.1531 | 0.1954 | 0.1859 | 0.1113 | 0.1378 |
| **Observations** | 2,471 | 1,102 | 1,696 | 928 | 1,665 | 5,783 | 1,032 | 12,597 |
| **Transfers** | 287 | 1,102 | 1,696 | 928 | 382 | 1,213 | 280 | 2,894 |
| **2 vs 4** | 0.0885 | 0.0987 | 0.3273 | 0.2542 | 0.0058 | 0.6909 | 0.2621 | 0.9576 |
| **2 vs 5** | 0.4655 | 0.9218 | 0.2530 | 0.4392 | 0.3794 | 0.7814 | 0.1441 | 0.3664 |
| **2 vs 6** | 0.1586 | 0.8643 | 0.0957 | 0.6390 | 0.0162 | 0.4924 | 0.4628 | 0.8228 |
| **4 vs 5** | 0.4460 | 0.0583 | 0.7076 | 0.0388 | 0.0761 | 0.9543 | 0.5615 | 0.2406 |
| **4 vs 6** | 0.9150 | 0.0239 | 0.0019 | 0.0687 | 0.9377 | 0.6620 | 0.6227 | 0.7408 |
| **5 vs 6** | 0.5535 | 0.9362 | 0.0040 | 0.7260 | 0.1212 | 0.6840 | 0.3261 | 0.4830 |

| | Occupational | | | | | | |
|---|---|---|---|---|---|---|---|
| | Applied Arts | Architecture | Business | Education | Health Sci | Home Ec | Public Serv |
| 1 | -1.2110 | 0.3122 | 0.0380 | 0.0132 | 0.0532 | -0.3345 | -0.1510 |
| | -1.32 | 0.92 | 0.46 | 0.17 | 0.30 | -0.93 | -0.77 |
| 2 | 0.2931 | 0.3579 | 0.1161 | 0.1437 | 0.2050 | 0.0883 | -0.1795 |
| | 1.09 | 1.60 | 1.76 | 2.93 | 1.56 | 0.49 | -1.33 |
| 3 | -0.1527 | 0.4502 | 0.1589 | 0.1677 | 0.0971 | -0.2152 | -0.0926 |
| | -0.45 | 1.09 | 1.36 | 1.97 | 0.39 | -0.38 | -0.51 |
| 4 | 0.2266 | 0.2268 | 0.2088 | 0.1931 | 0.2072 | 0.2111 | 0.0146 |
| | 1.37 | 1.21 | 5.79 | 5.66 | 1.83 | 1.28 | 0.18 |
| 5 | 0.4565 | 0.1195 | 0.1406 | 0.2520 | 0.1976 | 0.3662 | -0.0307 |
| | 2.12 | 0.36 | 2.77 | 5.04 | 1.08 | 1.51 | -0.33 |
| 6 | 0.0808 | 0.2126 | 0.1926 | 0.3002 | 0.0858 | 0.2052 | -0.0462 |
| | 0.35 | 0.85 | 3.60 | 6.34 | 0.59 | 0.88 | -0.50 |
| 7 | -0.4857 | -0.2980 | 0.1383 | 0.3199 | 0.1854 | -0.3954 | 0.0295 |
| | -1.31 | -0.78 | 1.55 | 3.63 | 0.63 | -1.20 | 0.19 |
| 8 | 0.1539 | 0.3342 | 0.0895 | 0.1440 | -0.1670 | -0.1876 | 0.2261 |
| | 0.48 | 0.86 | 0.66 | 1.52 | -0.54 | -0.23 | 1.18 |
| **Adj R-Squared** | 0.2862 | 0.2143 | 0.1610 | 0.2333 | 0.1734 | 0.2775 | 0.1251 |
| **Observations** | 365 | 425 | 5,427 | 6,441 | 921 | 344 | 1,424 |
| **Transfers** | 110 | 90 | 1,355 | 2,223 | 264 | 114 | 759 |
| **2 vs 4** | 0.8235 | 0.6278 | 0.1945 | 0.3500 | 0.9891 | 0.5440 | 0.1534 |
| **2 vs 5** | 0.6198 | 0.5453 | 0.7594 | 0.0931 | 0.9723 | 0.3113 | 0.3081 |
| **2 vs 6** | 0.5254 | 0.6531 | 0.3496 | 0.0125 | 0.5190 | 0.6595 | 0.3645 |
| **4 vs 5** | 0.3640 | 0.7510 | 0.2089 | 0.2350 | 0.9600 | 0.5423 | 0.5950 |
| **4 vs 6** | 0.5776 | 0.9580 | 0.7766 | 0.0233 | 0.4456 | 0.9805 | 0.4894 |
| **5 vs 6** | 0.2078 | 0.8105 | 0.4329 | 0.4170 | 0.5980 | 0.5954 | 0.8787 |

**Table 12**
**Coefficients on Terms Pre-Transfer in Credits at Degree Recipiency Estimations**
**Includes Controls for Demographics, Campus, GPA, First-Term Program of Study, at Credits at Transfer Time**
**10 year Baccalaureates**
**t-statistics in Small Type, Shading Indicates Significance**

| | | Broad Categories | | | Math/Science | | | | Arts and Letters | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All | Math/Sci | Arts/Letters | Occupational | Bio Sci | Engineering | Mathematics | Phys Sci | Arts | Humanities | Lib Arts | Social Sci |
| 1 | 0.9198 | 4.0155 | 0.0401 | 1.3235 | 5.0065 | 4.4544 | 0.2792 | 3.1747 | -1.5479 | 0.4034 | -4.0344 | 0.9285 |
| | 1.78 | 2.30 | 0.06 | 1.74 | 2.01 | 1.10 | 0.10 | 0.54 | -0.53 | 0.32 | -1.34 | 1.08 |
| 2 | 0.6526 | 1.3752 | -0.0352 | 1.6138 | -0.8929 | 9.7597 | 1.0105 | -2.4270 | -1.2583 | 1.9231 | -6.6802 | 0.6945 |
| | 1.89 | 1.12 | -0.08 | 3.19 | -0.54 | 2.85 | 0.48 | -0.74 | -0.58 | 2.37 | -3.15 | 1.21 |
| 3 | 1.2057 | 0.0637 | 0.3042 | 3.6243 | 5.1188 | -3.8393 | 0.3069 | -10.2004 | 3.7288 | 1.6296 | -6.6993 | 0.6259 |
| | 1.95 | 0.03 | 0.37 | 4.06 | 1.64 | -0.44 | 0.08 | -1.00 | 1.13 | 1.01 | -2.09 | 0.62 |
| Terms 4 | 2.4345 | 3.3282 | 1.3074 | 3.7058 | 6.7397 | 3.9292 | 2.7012 | 7.1794 | 1.9018 | 3.1380 | -0.2893 | 1.7703 |
| | 10.48 | 3.58 | 3.84 | 12.09 | 4.92 | 1.58 | 1.71 | 3.06 | 1.38 | 5.19 | -0.18 | 4.02 |
| Pre 5 | 2.6787 | 3.6111 | 1.6752 | 4.2669 | 8.1055 | 6.2592 | 1.0736 | 3.3016 | 0.4352 | 3.1471 | -1.6886 | 2.9474 |
| | 7.97 | 2.71 | 3.59 | 9.25 | 4.03 | 2.03 | 0.47 | 0.90 | 0.2 | 3.52 | -0.8 | 5.14 |
| Transfer 6 | 3.4999 | 5.5415 | 1.4060 | 5.3002 | 5.3793 | 7.8483 | 8.3566 | 1.2100 | 2.7082 | 3.2305 | -0.8697 | 2.1273 |
| | 10.73 | 4.98 | 3.03 | 11.73 | 3.03 | 3.17 | 4.18 | 0.38 | 1.31 | 3.67 | -0.54 | 3.59 |
| 7 | 2.2784 | 4.2832 | 1.1991 | 3.7490 | 7.0091 | 10.2988 | 1.7753 | 6.8013 | 6.2546 | -0.0135 | -4.3376 | 2.6603 |
| | 3.92 | 1.80 | 1.54 | 4.58 | 1.95 | 1.79 | 0.43 | 1.23 | 1.66 | -0.01 | -1.37 | 2.8 |
| 8 | 2.8871 | 5.9083 | 0.4136 | 4.9911 | 10.0950 | 9.1468 | 0.5791 | 12.2865 | -6.3805 | 4.3369 | 2.0573 | 0.7842 |
| | 4.05 | 2.40 | 0.41 | 5.04 | 2.39 | 1.55 | 0.15 | 1.89 | -1.28 | 2.28 | 0.66 | 0.62 |
| **Adj R-Squared** | 0.1147 | 0.2207 | 0.1106 | 0.1261 | 0.1125 | 0.1754 | 0.1107 | 0.2356 | 0.1056 | 0.1441 | 0.0904 | 0.1155 |
| **Observations** | 42,621 | 6,197 | 21,077 | 15,347 | 2,471 | 1,102 | 1,696 | 928 | 1,665 | 5,783 | 1,032 | 12,597 |
| **Transfers** | 10,597 | 913 | 4,769 | 4,915 | 287 | 1102 | 1696 | 928 | 382 | 1,213 | 280 | 2894 |
| **2 vs 4** | 0.0000 | 0.1863 | 0.0097 | 0.0002 | 0.0002 | 0.1506 | 0.5044 | 0.0140 | 0.196 | 0.1911 | 0.0076 | 0.0940 |
| **2 vs 5** | 0.0000 | 0.2028 | 0.0051 | 0.0001 | 0.0003 | 0.4306 | 0.9832 | 0.2349 | 0.5642 | 0.2829 | 0.0681 | 0.0024 |
| **2 vs 6** | 0.0000 | 0.0093 | 0.0178 | 0.0000 | 0.0074 | 0.6352 | 0.0091 | 0.4188 | 0.1683 | 0.2470 | 0.0157 | 0.0582 |
| **4 vs 5** | 0.4989 | 0.8495 | 0.4617 | 0.2514 | 0.5433 | 0.4874 | 0.5227 | 0.3365 | 0.5334 | 0.9924 | 0.5376 | 0.0518 |
| **4 vs 6** | 0.0025 | 0.0883 | 0.8424 | 0.0009 | 0.5100 | 0.1450 | 0.0143 | 0.1043 | 0.7253 | 0.9213 | 0.7534 | 0.5643 |
| **5 vs 6** | 0.0538 | 0.2301 | 0.6480 | 0.0784 | 0.2794 | 0.6315 | 0.0099 | 0.6502 | 0.4188 | 0.9417 | 0.7194 | 0.2553 |

| | Occupational | | | | | | |
|---|---|---|---|---|---|---|---|
| | Applied Arts | Architecture | Business | Education | Health Sci | Home Ec | Public Serv |
| 1 | -6.37818 | 18.53724 | 0.58547 | 0.97849 | 0.29071 | 0.65803 | 1.83352 |
| | -0.52 | 3.79 | 0.56 | 0.82 | 0.11 | 0.11 | 0.87 |
| 2 | 7.05084 | 6.54468 | 2.38270 | 1.04725 | -2.05254 | 4.32971 | -1.33877 |
| | 1.95 | 2.1 | 2.85 | 1.44 | -1.04 | 1.39 | -0.92 |
| 3 | 3.98331 | 6.39582 | 4.05202 | 2.37989 | 5.86985 | 16.82444 | -0.98492 |
| | 0.87 | 1.06 | 2.7 | 1.84 | 1.57 | 1.64 | -0.49 |
| 4 | 7.95573 | 11.54078 | 2.96991 | 4.83070 | 2.75033 | 6.69531 | -1.17873 |
| | 3.55 | 4.54 | 6.47 | 10.91 | 1.69 | 2.34 | -1.4 |
| 5 | 7.39727 | 13.55956 | 4.60853 | 6.05206 | 1.02415 | 8.08017 | -0.50799 |
| | 2.52 | 2.84 | 7.12 | 8.34 | 0.38 | 1.86 | -0.5 |
| 6 | 5.52774 | 9.46236 | 3.69898 | 7.82283 | 1.81422 | 9.14923 | 0.82316 |
| | 1.77 | 2.67 | 5.43 | 11.4 | 0.83 | 2.21 | 0.81 |
| 7 | 6.68631 | 14.24542 | 5.18337 | 6.20607 | -0.54667 | 2.88950 | 0.31058 |
| | 1.32 | 2.57 | 4.54 | 4.62 | -0.12 | 0.49 | 0.18 |
| 8 | 12.36208 | 7.35501 | 1.65737 | 5.65438 | 3.24092 | -5.80053 | 0.55198 |
| | 2.9 | 1.29 | 0.95 | 3.9 | 0.69 | -0.4 | 0.26 |
| **Adj R-Squared** | 0.1979 | 0.1228 | 0.2072 | 0.1972 | 0.0750 | 0.1647 | 0.0694 |
| **Observations** | 365 | 425 | 5,427 | 6,441 | 921 | 344 | 1,424 |
| **Transfers** | 110 | 90 | 1,355 | 2223 | 264 | 114 | 759 |
| **2 vs 4** | 0.8229 | 0.1949 | 0.5205 | 0.0000 | 0.0458 | 0.5158 | 0.9148 |
| **2 vs 5** | 0.9376 | 0.2142 | 0.0292 | 0.0000 | 0.3444 | 0.4467 | 0.6054 |
| **2 vs 6** | 0.7357 | 0.5238 | 0.2064 | 0.0000 | 0.1708 | 0.3096 | 0.1808 |
| **4 vs 5** | 0.8713 | 0.6839 | 0.0186 | 0.1123 | 0.5545 | 0.763 | 0.4752 |
| **4 vs 6** | 0.4953 | 0.6006 | 0.3194 | 0.0000 | 0.7000 | 0.5693 | 0.0362 |
| **5 vs 6** | 0.644 | 0.4733 | 0.2862 | 0.0545 | 0.8073 | 0.8452 | 0.2371 |

**Figure 1: Time-to-Degree Probability Density Function of SUNY Baccalaureate Recipients, Fall 1992 Entrants**

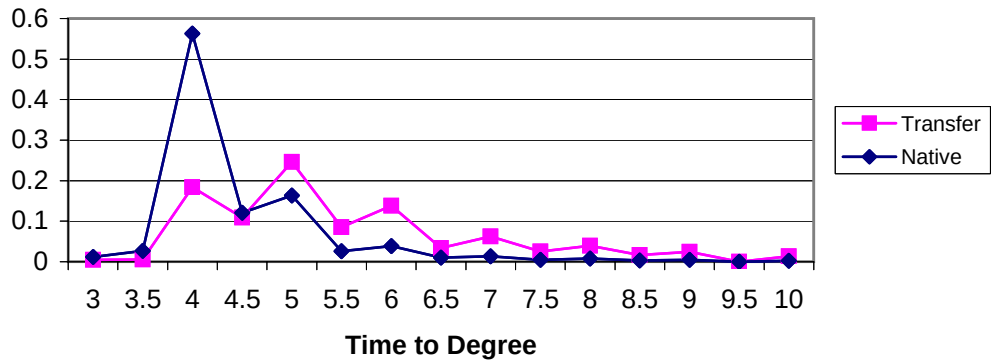


**Figure 2a: Percent of Students who Have Taken at Least One Semester Off, Transfers v Natives**

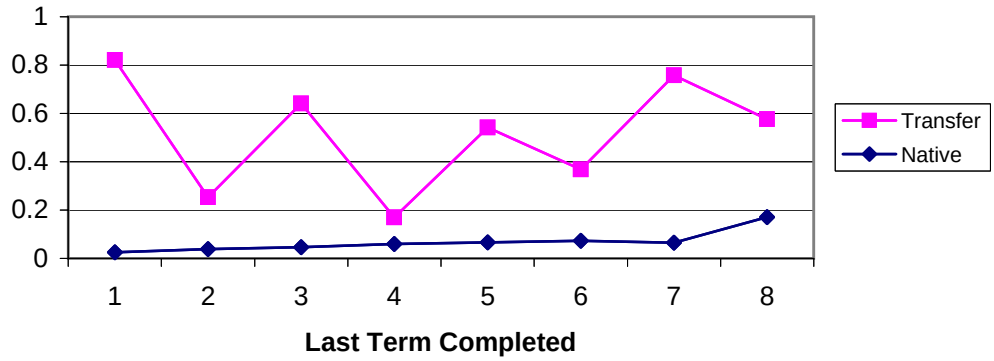


**Figure 2b: Percent of Students Not Enrolled in Previous Semester, Transfers v Natives**

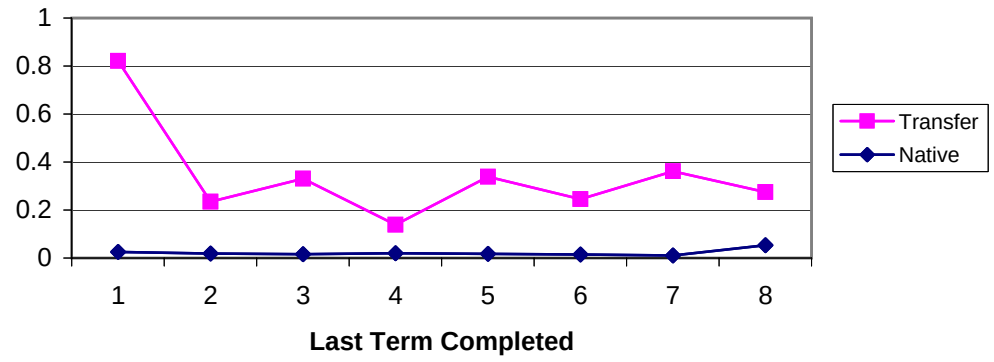

**Figure 3a: Difference in Log Credits Accumulated at Beginning of Term, Natives minus Transfers**

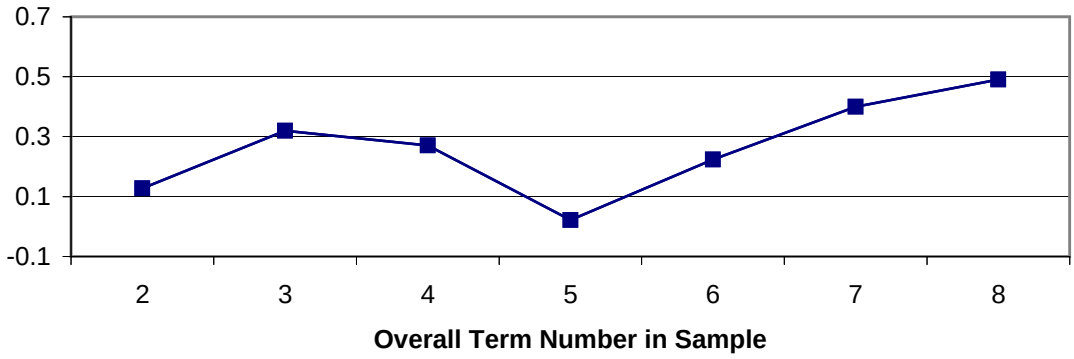


**Figure 3b: Difference in Log Credits Accumulated at Beginning of Quasi-Term (Natives minus Transfers)**

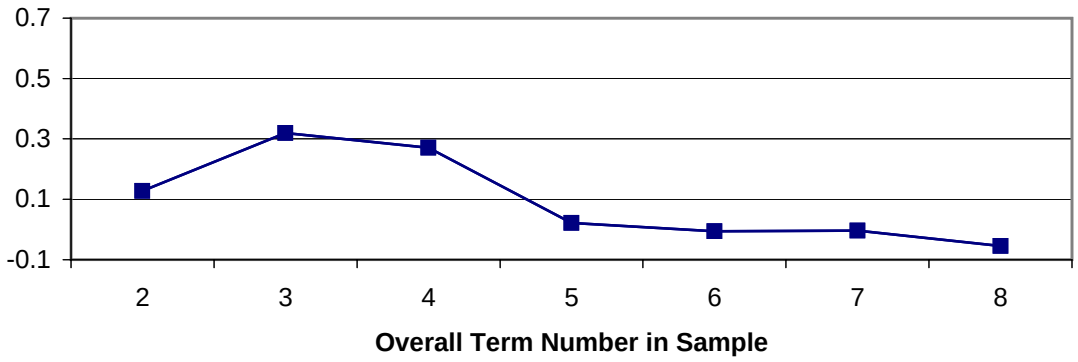

**Figure 4: Marginal Effect of Time-of-Transfer on Probability of Baccalaureate Receipt Derived from Multinomial Logit Estimations**

**Figure 4a: 6 Year Baccalaureate Probability**

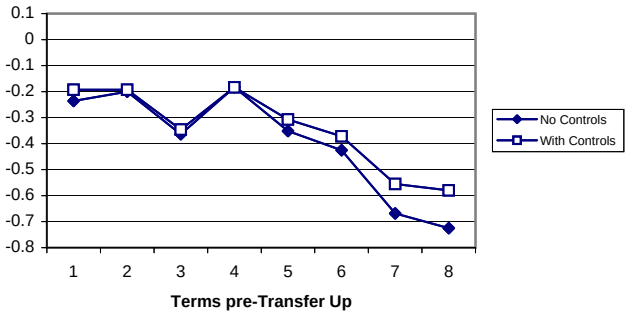


**Figure 4b: 8 Year Baccalaureate Probability**

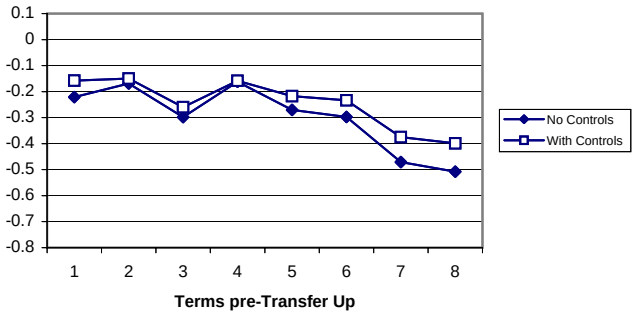


**Figure 4c: 6 Year Baccalaureate Probability, Including Attendance Controls**

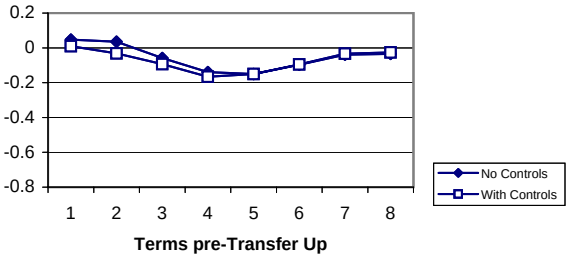


**Figure 4d: 8 Year Baccalaureate Probability, Including Attendance Controls**

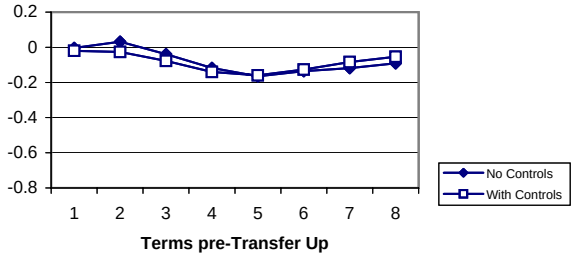


**Figure 4e: 6 Year Baccalaureate Probability, Including Attendance Controls**

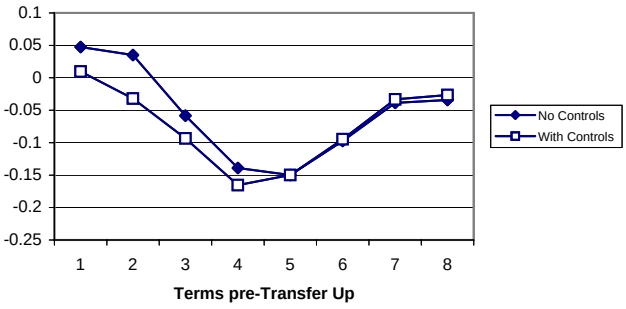


**Figure 4f: 8 Year Baccalaureate Probability, Including Attendance Controls**

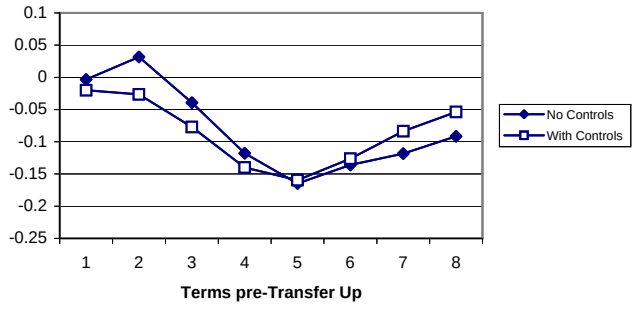

**Figure 5a: Lagged Marginal Effect of Time-of-Transfer on 8-year Baccalaureate Rate, Transfer within 4 semesters**

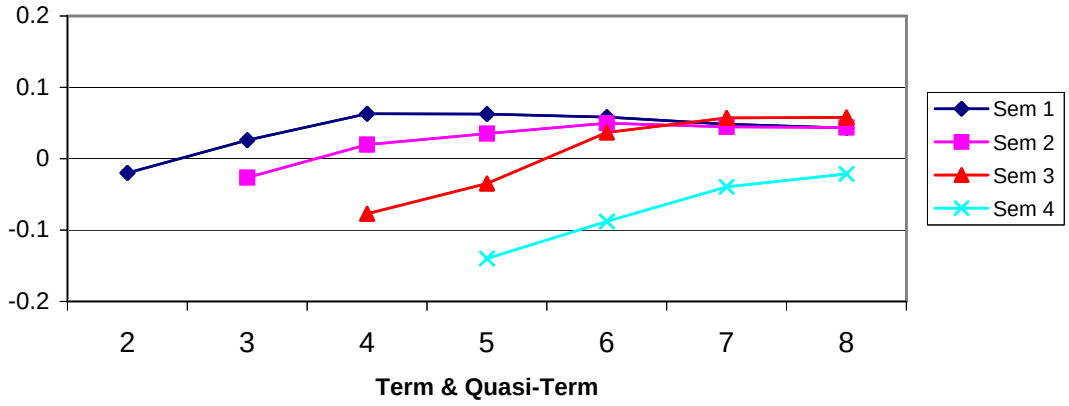


**Figure 5b: Lagged Marginal Effect of Time-of-Transfer on 8-Yr Baccalaureate Rate, Quasi-Term=5**

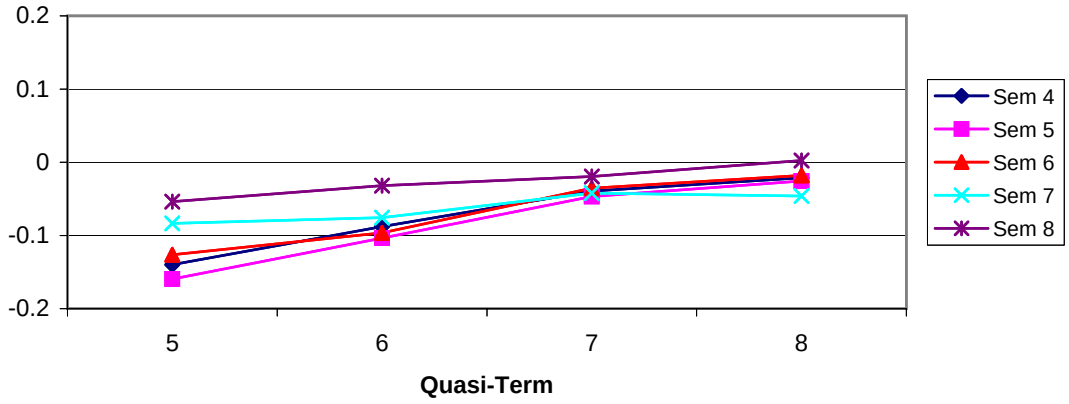


**Figure 5c: Lagged Marginal Effect of Time-of-Transfer on 8-Year Baccalaureate Rate**

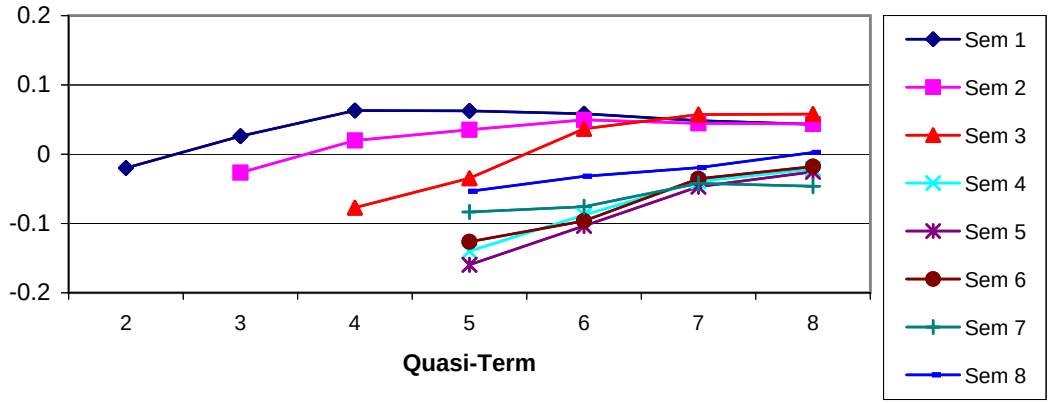

**Figure 6**: Lagged Marginal Effect of Time-of-Transfer, with and without Updated Attendance Controls

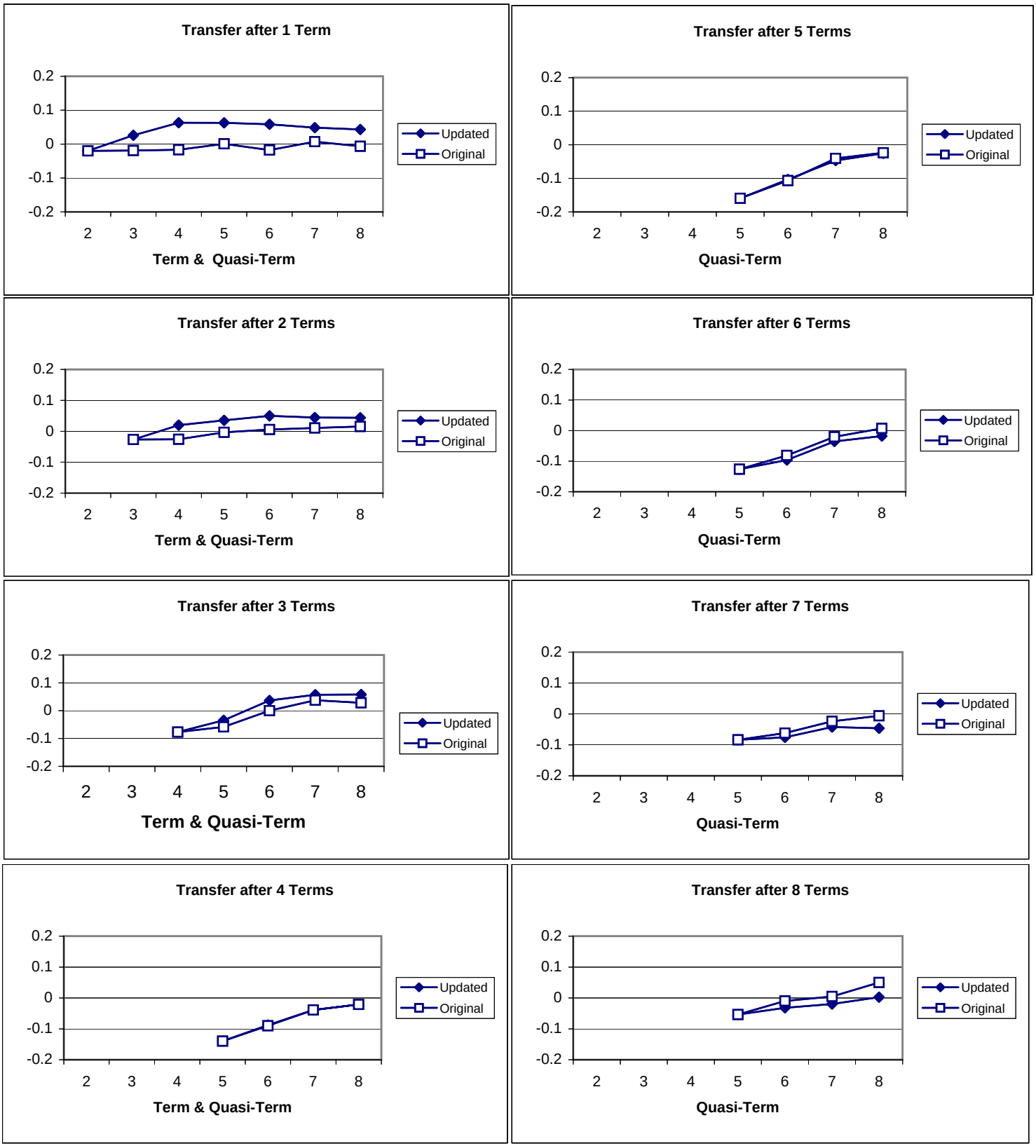

**Figure 7a: Lagged Marginal Effect of Time-of-Transfer on 8-year baccalaureate rate, allowing differences in credits and itinerance, Transfer within 4 semesters**

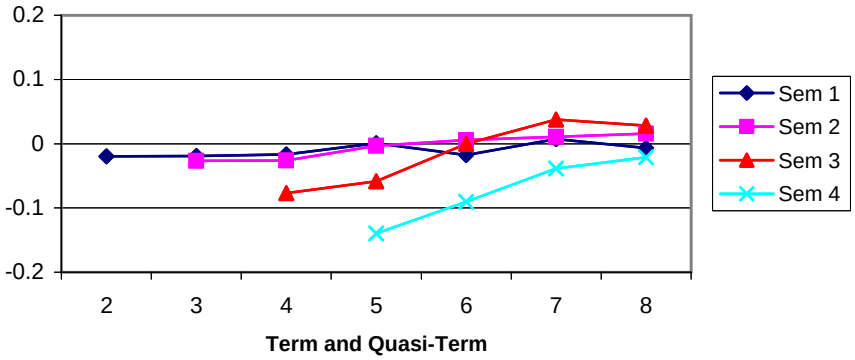


**Figure 7b: Lagged Marginal Effect of Time-of-Transfer on 8-year Baccalaureate Rate, allowing differences in credits and itinerance, Quasi-Term=5**

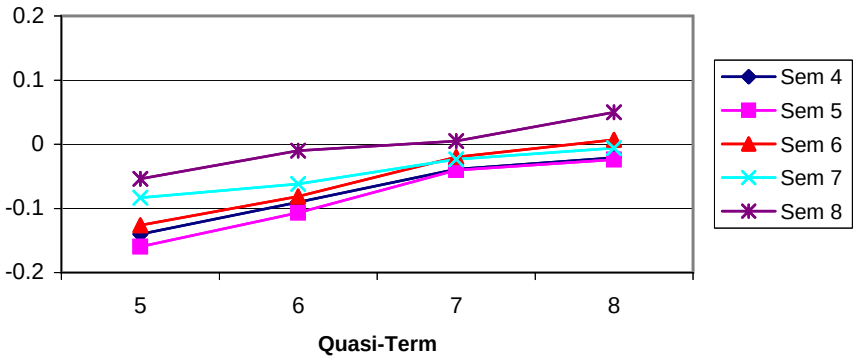


**Figure 7c: Lagged Marginal Effect of Time-of-Transfer on 8-year Bacc Rate, no updated controls for attendance**

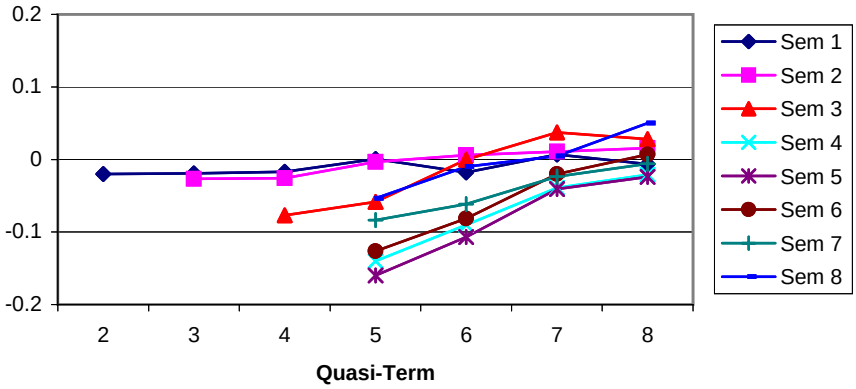

**Figure 8: PTTBE Relative to Natives, All 10-year Baccalaureates, by Time-of-Transfer With and Without Controls for Credits at Transfer**

**Figure 8a: All 10-year Baccalaureate Recipients**

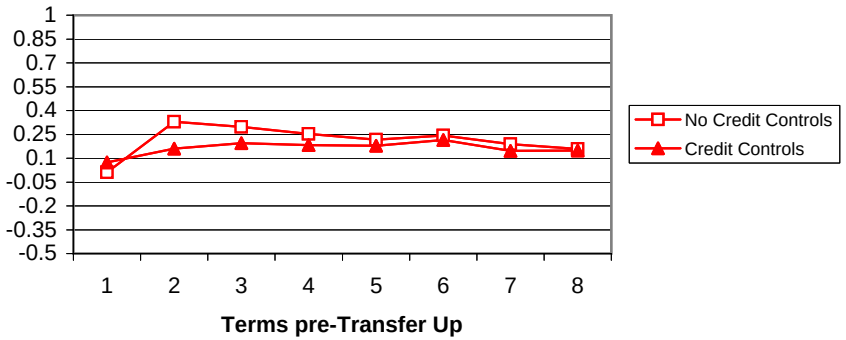


**Figure 8b: Math/Science 10-year Baccalaureate Recipients**

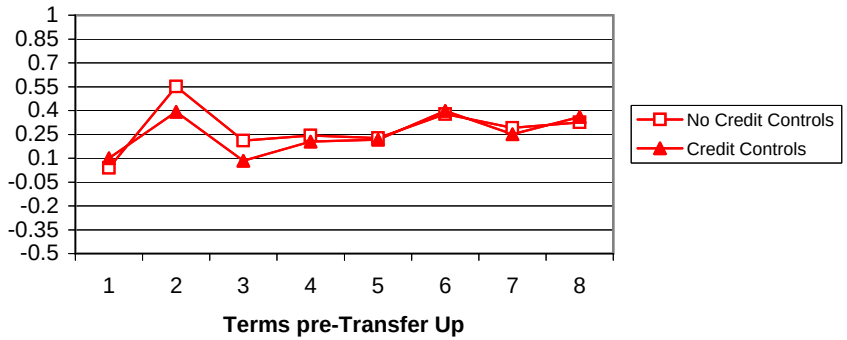


**Figure 8c: Arts/Letters 10-year Baccalaureate Recipients**

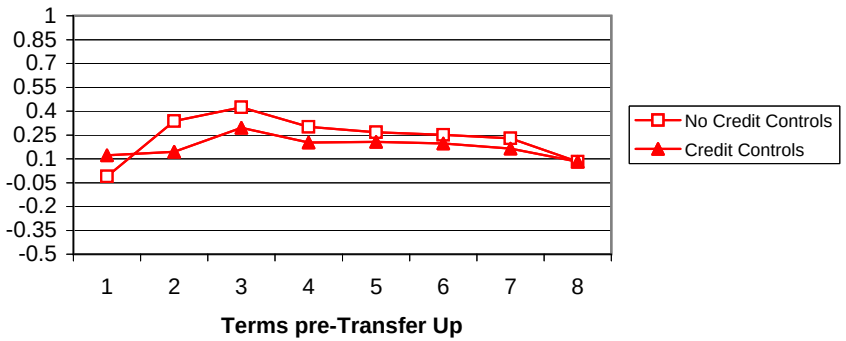


**Figure 8d: Occupational 10-year Baccalaureate Recipients**

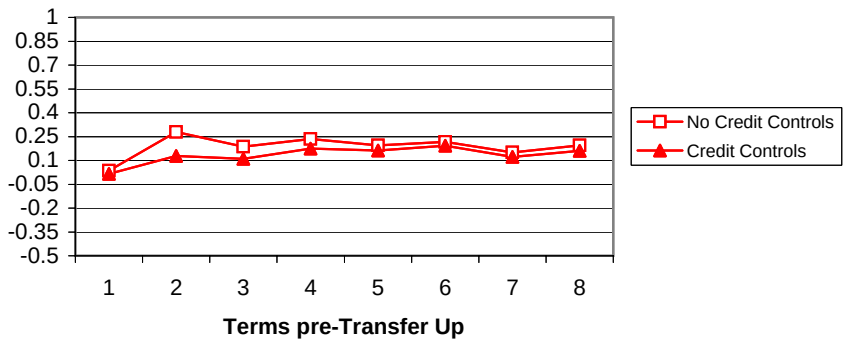

**Figure 9: Credits at Baccalaureate Relative to Natives, All 10-year Baccalaureates, by Time-of-Transfer**