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Differences between public and private institutions of higher education in the enrollment of transfer students

John J. Cheslock*

Center for the Study of Higher Education, The University of Arizona, 327A Education Building, Tucson, AZ 85721, USA

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Abstract

This paper examines the determinants of an institution's transfer enrollment for four-year institutions with a focus on differences between public and private institutions. The analysis finds that private institutions enroll a smaller share of their student body as transfers and that the gap between privates and publics grew between 1984 and 1997. In addition, private institutions decrease their share of transfer students more than publics in response to greater selectivity and decreasing attrition rates. The paper concludes with a discussion of the implications of these findings for potential changes in enrollment policies at flagship public institutions.

JEL classification: I21

Keywords: Transfer student enrollment; Enrollment management; Enrollment demand

1. Introduction

Students transferring between institutions of higher learning are an important part of the higher education system. Recent work, using a sample of students who began postsecondary education in the fall of 1989, estimates that approximately one in three students transfer to another institution within 5 years (McCormick & Carroll, 1997). Despite the importance of the transfer route in higher education, very little is known about why four-year institutions enroll transfer students and which institutional characteristics are associated with a large transfer student share.

This lack of knowledge is troubling for three reasons. First, this information is required to predict transfer students' access to certain institutions, which in turn helps determine the potential benefit of the transfer route for a student. This is especially important for transfers who start at a community college or a less-expensive four-year institution with the intention to transfer. Hilmer (1997) finds that students who start at a community college and eventually transfer are able to attend, on average, a more selective four-year institution than similar students who are direct attendees.[1] In

[1] It is important to note that Hilmer's results are for those who are able to persist to the point of transferring to a four-year institution. If a large share of community college students is not able to persist to this point, then the lower average levels of educational attainment from starting at a community college may outweigh the increased quality of four-year institution attended for those who do transfer. This concern is important because Rouse (1995) finds that students who initially attend a community college obtain about three-quarters of a year less of education on average than those who initially attend a four-year institution.

*Tel.: +1-5206213083; fax: +1-5206211875.
E-mail address: cheslock@u.arizona.edu (J.J. Cheslock).

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addition, Hilmer (1997) finds that the increase in selectivity from using the transfer route is highest for students from low-income families and for students who obtained worse grades or test scores in high school. These results are consistent with strategic enrollment by students who are looking to attend community colleges to lower their overall educational costs or to improve their academic credentials. Certainly, the potential benefit of such a strategy depends upon the ability of transfer students to gain access to certain four-year institutions.

Second, a better understanding of the determinants of transfer enrollment shares provides insights into differences in enrollment policies across institutions and over time. One would expect differences in enrollment management between public and private institutions, between research universities and liberal arts colleges, and between selective and non-selective institutions. In addition, one might expect the differences across institutional types to vary over time. For example, Cook and Frank (1993) and Hoxby (2000) provide evidence demonstrating a steady increase in inequality across institutions of higher education in observable student body quality. As more selective institutions increasingly capture a larger share of students with the highest academic credentials, one might expect them to also alter their enrollment of transfer students.

Another change in the higher education landscape is the difference between public and private institutions. Historically, public institutions have had limitations placed upon their admissions and tuition policies while private institutions have enjoyed greater autonomy. This difference, however, may change in the near future. In response to the reductions in state appropriations experienced by publics, many institutions, especially the state flagship schools, are trying to negotiate greater flexibility in setting their enrollments and tuition in exchange for lower levels of state support.[2] As publics enjoy reduced restrictions on their enrollment management, they may move closer to private institutions in terms of enrollment behavior. To understand how public institutions may change in the future, one must understand how public and private institutions have behaved differently in the past.

The final reason why it is important to understand the determinants of an institution's transfer enrollment share is that such knowledge provides insights into the degree to which institutions of higher learning profit from the characteristics of transfers. As discussed in the next section of this paper, transfer students can potentially benefit institutions in numerous ways such as reducing the inefficiencies created by high attrition rates or departmental enrollment imbalances. These productivity gains are important to both individual institutions and state systems of higher education with the latter entities especially able to realize these benefits because they can partially control the supply of transfer students.

Many state systems will find potential increases in efficiency especially appealing in the near future as the children of the "baby boom" reach the traditional college age. Because it is unlikely these systems will be provided with a corresponding increase in resources to educate these additional students, they will need to find ways to make the same funds stretch farther.[3] One possible response to this problem is to increase the number of students starting at two-year institutions, which will result in more transfers within the system. The state will enjoy cost savings from this policy to the extent that four-year institutions can realize the benefits of transfers and to the extent the state spends less on a student attending a community college than on a student attending a four-year institution.

This paper contributes to the literature by investigating the determinants of an institution's transfer enrollment for four-year institutions with a focus on differences between public and private institutions. Using a national sample of institutions from 1984 to 1997, I first examine differences across institutional type and find that the transfer enrollment rate—the percentage of an institution's incoming students who are transfers—is lesser at private institutions, more selective schools, and liberal arts colleges. Analysis of the rates over time finds that differences across institutional types increased over the period. The regression results indicate that for both public and private institutions, transfer enrollment rates are higher at institutions with more student attrition, less financial resources, less freshmen in campus housing, lower tuition and fees, and more students attending two-year institutions in the school's state. In addition, some results are found to differ between publics and privates; for example, private institutions decrease their share of transfer students more than publics in response to greater selectivity and decreasing attrition rates.

2. Conceptual framework

An institution's transfer enrollment rate is determined by two factors: the institution's need for the characteristics of transfer students and direct attendees (often referred to in the literature as enrollment supply), and the number of students of each type desiring enrollment

[2]See Hebel (2003) and Selingo (2003) for a discussion of efforts by public institutions to negotiate greater flexibility in enrollment and tuition.

[3]See Hovey (1998, 1999) for a thorough discussion of why state appropriations to higher education are unlikely to increase.

(enrollment demand). The former influences recruitment efforts and the criteria by which applicants are accepted, while the latter determines the number of transfers and direct attendees produced by a particular enrollment policy. I discuss both factors in greater detail in this section, providing motivation for the subsequent empirical analysis.

Financial considerations are likely to be an important part of the institution's decision between admitting transfers and freshman. Holding other differences constant, an institution will prefer students whose enrollment is most helpful to the net revenue of an institution. Specifically, an institution will be more likely to allocate an enrollment spot to a transfer over a direct attendee if

$$MR_T - MC_T > MR_F - MC_F. \quad (1)$$

Here, MR_T (MR_F) represents the marginal revenue per year generated from enrolling a transfer student (direct attendee) and MC_T (MC_F) represents the marginal cost per year incurred from enrolling a transfer student (direct attendee). Eq. (1) can also be rewritten as

$$MR_T - MR_F > MC_T - MC_F. \quad (2)$$

Eq. (2) indicates that institutions will increase their transfer enrollment share when the marginal revenue of transfer students increases relative to the marginal revenue of a direct attendee or when the marginal cost of transfer students decreases relative to the marginal cost of direct attendees.

Because direct attendees and transfers pay similar levels of tuition, the difference between the yearly marginal revenue generated from each type of student will depend on differences in the amount of aid provided by the institution. It is not obvious which type of student will need more institutional aid. The school might determine that a transfer requires less institutional aid than a direct attendee possessing similar financial resources because transfer students are likely to attend a less expensive institution for part of college, which lowers their total educational costs. Transfers and direct attendees, however, may not possess the same level of financial resources. Whether transfers have more or less wealth than direct attendees may depend upon the reason a student transfers. Students who transfer because they are not a good match with the institution initially attended are likely to possess greater financial resources because transferring between institutions can be costly if it requires a student to increase the time spent in school. Students with more wealth are better able to pay the cost required for an improved institution-student match. On the other hand, students with access to less financial resources will be disproportionately attracted to the strategy of lowering their overall educational costs by initially attending a less expensive institution and then transferring to a more prestigious and costly institution.

Institutions are likely to differ in how much they draw upon these two types of transfer students, and subsequently, are likely to differ in how the financial aid needs of their transfer students vary from the needs of their direct attendees. One way to roughly measure the level of student enrollment from each type is to look at the source institution. Students transferring to improve their institution-student match are more likely to be coming from a four-year institution while students transferring to lower their total educational costs are more likely to initially attend a two-year institution.

To understand how the marginal cost per year differs between transfers and direct attendees, it is vital to remember that transfers, relative to direct attendees, enter four-year institutions further along in their programs and subsequently spend a larger percentage of their time on campus as upperclassmen. As a result, if large amounts of excess capacity exist in upper-division courses and programs, the enrollment of additional transfer students would not lead to higher costs because they would simply use resources that would go otherwise unused. Two types of institutions are likely to have this excess capacity: institutions with high attrition rates and institutions with numerous majors or departments.

Institutions with high attrition rates, relative to institutions with low attrition rates, have more unused capacity in upper-class courses and programs because they have a smaller percentage of upperclassmen in their student body, all else equal. Assuming that an institution does not commensurately restrict the breadth of their curriculum for upperclassmen, their upper-class courses will be relatively empty because too few students progress to junior and senior status.

Institutions that offer a wide variety of majors and upper-level courses have more excess capacity than other institutions because the expanded curriculum and the greater number of departments in these schools increases the possibility of departmental enrollment imbalances and unused upper-level class space for a given attrition rate.[4] Transfer students will be attractive to these institutions for two reasons. First, as discussed above, they will spend a greater percentage of their time on campus in upper-class courses, which will reduce the amount of unused upper-level course space. Second, they may be more easily assigned to departments that have enrollment shortages because their prior experience

[4]The number of majors could indirectly influence the attractiveness of transfer students by affecting the attrition rate. All else equal, students may be more likely to persist if they have a greater variety of majors from which to choose. The author thanks an anonymous referee for suggesting this possibility.

may increase the probability they know their major upon application.

Financial considerations will not be the only factor affecting the institution's decision about which type of students to recruit and accept. Some institutions may have particular "tastes" for transfer and direct attendee students and may not enroll many transfer students for philosophical reasons even if they have financial incentives to do so (Ehrenberg, 2000). Institutions who are more selective or who have more wealth will possess greater ability to ignore financial incentives and cater instead to their "tastes". An institution will have a preference for direct attendees if some faculty and administrators feel it is essential that a student complete all of his or her post-secondary education within the same program. These beliefs are likely to vary by institutional type and could lead some institutions to limit transfer enrollment through a variety of mechanisms such as strict acceptance criteria, limited recruiting and marketing efforts, and numerous course requirements.

Although the institution's desire for transfer students and direct attendees is an important determinant of the composition of its enrollment, the number of students from each group demanding enrollment could be even more crucial. For example, in a study of 16 liberal arts colleges in Ohio and Massachusetts, Duffy and Goldberg (1998) find that several institutions during the 1970s wished to increase their transfer student enrollment in order to replace students lost through attrition, but were unable to attract a sufficient number of qualified transfer applicants. Certainly, the range of enrollment levels available to other institutions is also constrained by the degree to which they possess characteristics that appeal to transfers and direct attendees.

Transfers are likely to differ from direct attendees in several attributes suggesting these two groups of students may be attracted to different institutional characteristics. But as discussed earlier, transfer students are not a homogenous group, and the institutional characteristics that are attractive to transfer students may differ between those who transfer to improve the institution-student match and those who transfer to lower their overall educational costs. The latter group of transfer students are likely to be more price sensitive, so students transferring from community colleges may disproportionately seek four-year institutions that require fewer outlays for tuition, housing, or travel from home.

The state where an individual institution is located will partially determine the number of transfer applicants desiring enrollment. States with a strong community college sector should have a large pool of transfer students upon which four-year institutions can draw. Also, states where the size of the high school graduating class has been shrinking are likely to enjoy a temporary increase in the number of potential transfer students relative to the number of direct attendees if most students attend college directly after high school graduation.

The discussion in this section theorizes that the percentage of an institution's incoming class that is transfer students depends on the institution's selectivity level, institutional type (Carnegie classification, public/private), attrition rate, number of majors, financial resources, tuition level, proximity to potential transfer students and direct attendees, and convenience for commuting students. The next sections will analyze institutional enrollment data to investigate whether these determinants do indeed influence an institution's transfer enrollment rate in the expected manner.

3. Data

The primary data set utilized in this paper is the College Board's *Annual Survey of Colleges* that contains data on the number of transfers and first-time freshmen at each school. From this data set, I drop all proprietary institutions, branch campuses, schools missing necessary data, and all institutions who report total undergraduate enrollment under 1000 students for any year in the period. In addition, I only keep institutions meeting these restrictions that are labeled as Research, Doctoral, Comprehensive or Liberal Arts in the 1994 Carnegie classification scheme. The data for these institutions span the years 1984 to 1997 which is a period of rapidly increasing tuition levels, increasing between-college variation in observable student quality, and varying levels of economic growth and governmental fiscal austerity. I supplement the College Board data with data from CASPAR, which contains information gathered by the US Department of Education in its Higher Education General Information System (HEGIS) and Integrated Postsecondary Education Data System (IPEDS) surveys.

To measure the degree to which institutions enroll transfer students, the final data set contains the transfer enrollment rate for each institution, which equals the number of incoming transfer students divided by the number of incoming direct attendees and transfer students. The data set also contains a number of variables that are good proxies for the concepts discussed in Section 2. The percentage of freshmen that do not return for their sophomore year represents the attrition rate because other data on attrition levels are not available and most students who leave an institution do so after their first year. To measure the financial resources of an institution, I use the level of non-tuition current fund revenue per student, and to gauge the number of majors, I use the number of four-digit

Table 1
Weighted summary statistics[a]

Variables	Private institutions		Public institutions	
	Mean	Std dev	Mean	Std dev
Transfer enrollment rate	0.227	0.169	0.350	0.146
Attrition rate	0.181	0.100	0.282	0.110
# of majors	18.093	7.934	30.952	15.854
Percentage of applicants accepted	0.712	0.171	0.751	0.147
Non-tuition current fund rev. per student, logged	2.019	0.759	2.311	0.496
Percentage of state undergrads enrolled in 2-year institutions	0.377	0.139	0.386	0.146
Average previous cohort/current cohort	1.031	0.054	1.023	0.054
Percentage of freshman living on campus	0.777	0.255	0.576	0.303
Tuition and fees (in thousands)	11.308	4.240	2.313	0.923
Average undergraduate enrollment, logged	7.788	0.575	8.910	0.756
Rural	0.175	0.380	0.351	0.477
Comprehensive	0.374	0.484	0.539	0.499
Liberal arts I & II	0.448	0.497	0.116	0.320
# of observations	4009		3101	

[a]*Notes*: The sample pools information from individual years between 1985 and 1996. Weights equal to the inverse of the percentage of the twelve years the institution reports valid data and is represented in the sample are used.

Classification of Instruction Programs (CIP) with at least five graduates.[5] I also include a variable measuring the average undergraduate enrollment of the school for 1984–97 to control for the size of the institution.[6] To examine whether differences in institutional type and selectivity persist when controls for additional determinants are included, the data set contains Carnegie classification dummy variables and the percentage of an institution's total applicants who are accepted to measure selectivity.

The data set also contains information representing the attractiveness of the institution to transfer students and direct attendees. The level of tuition and fees is added because transfers may be more price sensitive than direct attendees. A rural dummy variable and the percentage of freshmen that live on campus are included to investigate whether transfers and direct attendees differ in their demand for institutions that are accessible for commuters. Two variables are used to measure the size of the transfer and direct attendee pools in an institution's state in a given year: the percentage of students attending two-year institutions in the state during the previous year and the average size of the three previous cohorts of high school graduates in the state divided by the size of the current cohort of high school graduates.

Table 1 contains summary statistics for the pooled sample from 1985 to 1996 for private and public institutions. The results demonstrate that private institutions have lower attrition rates, fewer majors, less non-tuition current fund revenue, smaller enrollments, more freshman living on campus, high tuition and fees, a lower probability of being located in a rural area, and a smaller percentage of applicants accepted. In addition, more private institutions are liberal arts colleges while public institutions are more likely to be comprehensive or research/doctoral universities.

4. Enrollment levels by institutional type

The discussion in Section 2 suggests that the enrollment of transfer students might vary considerably between public and private institutions and between

[5]I use alternative measures of an institution's financial resources and number of majors to ensure that results are robust to the particular measurement of each determinant. For financial resources, I use endowment assets per student and non-tuition education and general revenues per student. For number of majors, I use the number of 4-digit CIP codes with more than one graduate, the number of 6-digit CIP codes with more than five graduates, and the number of majors that an institution reports offering. For all measures of the number of majors, I use the average number of majors from 1989 to 1994 because of missing data for some years and the small variation in program offerings over time. For all results reported in this paper, the findings for these alternative measures are similar to the findings for the measures reported.

[6]Total enrollment and the transfer enrollment rate for any given year are computed using similar information, so a built-in correlation between these two variables could exist and make interpretation of the results difficult. Because institutional size often varies little over time, much of the year-to-year variation in enrollment will add little important information but contribute substantially to the just mentioned problem. For this reason, average enrollment is used instead of yearly enrollment. A superior approach would instrument for the size of the institution but an instrument that influences institutional size but not the transfer enrollment rate was not located.

Table 2
Average transfer enrollment rates for 1984–97 by selectivity level and carnegie classification[a]

	Private institutions			Public institutions		
	n	Mean	Std dev	*N*	Mean	Std dev
A. By Barron's selectivity ranking						
Non & less competitive	64	0.295	0.162	173	0.321	0.113
Competitive	187	0.299	0.150	193	0.380	0.138
Very competitive	100	0.180	0.120	59	0.364	0.163
Highly & most competitive	82	0.082	0.063	14	0.205	0.076
B. By Carnegie classification						
Research universities	38	0.134	0.103	82	0.323	0.113
Doctoral universities	38	0.258	0.121	60	0.400	0.172
Compehensive universities	162	0.315	0.163	244	0.350	0.130
Liberal arts I colleges	98	0.096	0.065	6	0.266	0.147
Liberal arts II colleges	97	0.248	0.137	47	0.334	0.137

[a]*Notes*: Author's estimates using data from the College Board's Annual Survey of Colleges. For both Panels A and B, an ANOVA test rejects the null hypothesis of equal transfer enrollment rates across groups at a 1 percent level of significance for both public and private institutions.

institutions of different selectivity levels or Carnegie classifications. Not only may many of the determinants outlined vary across type, but each type may have different "tastes" for transfer students.

Table 2 reports the average transfer enrollment rate for 1984–97 for all institutions that report at least one year of enrollment data for that period. The transfer enrollment rate equals the percentage of an institution's incoming class that is transfers and is reported separately for private and public institutions.[7] The results demonstrate that transfers are a smaller percentage of the student body at private institutions than at publics; on average, around 23 percent of a private institution's new student class consists of transfers while the corresponding figure for publics is 35 percent. The separation of institutions by their selectivity rankings from *Barron's Profiles of American Colleges* brings to light additional differences between publics and privates.[8] For private institutions, there is almost a monotonic relationship between selectivity and transfer enrollment with more selective institutions enrolling proportionately fewer transfer students. The relationship differs at publics where moderately selective institutions enroll the highest proportion of transfer students. The dissimilarities between publics and privates could be due to several factors such as different "tastes" for transfer students, higher tuition levels at privates, or pressure from state governments to provide access for transfer students.

Table 2 also reports the average rates for different Carnegie classifications for both public and private institutions. The results are somewhat similar for publics and privates with liberal arts I colleges and research universities having the two smallest transfer enrollment rates. Where publics and privates differ is in the degree of difference between the average rates of different Carnegie classifications with greater gaps across classifications for privates.

To examine changes in the transfer enrollment rate between 1984 and 1997, Fig. 1 presents the average rate for each year in the period for both public and private institutions for all institutions. The results indicate that both types of institutions experience some similar trends over the period: their rates mostly fell during the first five and last three years of the period and increased or stagnated during the time in-between.[9] The magnitude

[7]The enrollments used to determine the transfer enrollment rate is based on the total number of freshman and transfer students as opposed to the number of full-time equivalent students (commonly measured as the number of full-time students plus one-third the number of part-time students). The "headcount" figures are used because data on the number of part-time and full-time transfer students are available for a much smaller number of institutions and only for the years 1984 to 1990. For those institutions that did report the necessary data, Table 1 was recalculated using full-time equivalent enrollments, and the results, in terms of differences across selectivity and Carnegie groups, were very similar to those reported in Table 1. The primary difference is that the transfer enrollment rate falls by approximately 8 percent when full-time equivalent enrollment is used because more transfers than direct attendees were enrolled part-time.

[8]The rankings are based on the average rankings from the 1983, 1991, and 1997 editions of *Barron's Profiles of American Colleges*.

[9]These changes closely mirror national trends in the size of the high school graduating class, but in an inverse manner (NCES, 2001). One would expect this relationship because the pool of possible direct attendees is primarily drawn from those

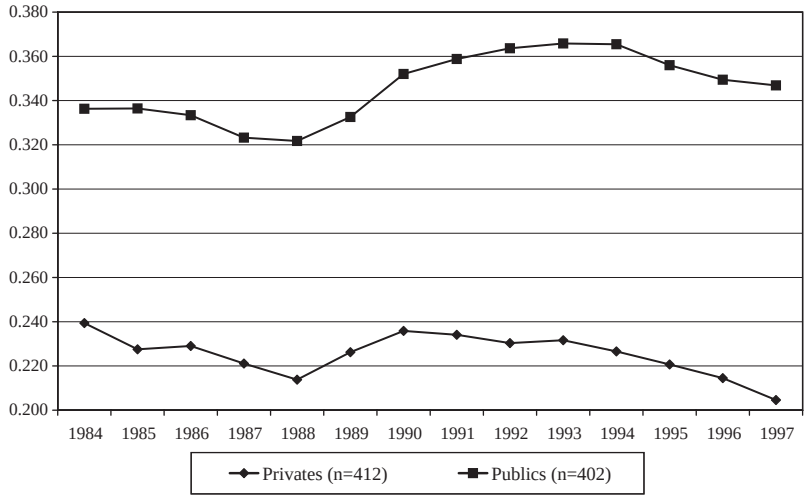

Fig. 1. Transfer enrollment rates over time (*Notes*: Author's estimates using data from the College Board's Annual Survey of Colleges. The sample excludes all institutions who are missing data for two years in a row. If data is missing for a single year, the average of the adjoining years is used).

of the trends differed, however, resulting in the transfer enrollment rate in 1997 being 14.5 percent lower (relative to 1984) for privates, but 3 percent higher for public institutions. Within both the public and private groups, the rates for the more selective institutions fell relative to their less selective counterparts. Moving from the less to more selective categories in Table 1, the changes between 1984 and 1997 are −10, −9, −24, and −37 percent for the privates and +14, 0, −7, and −10 percent for the publics. In summary, these results indicate that transfers are becoming increasingly concentrated at public and less selective institutions of higher education.

5. Regression results

I now turn to regression analysis to examine the possible determinants of enrollment supply and demand as discussed in Section 2. Using the framework specified, one could attempt to estimate a simultaneous equation system with enrollment supply and demand equations for both direct attendees and transfer students. The standard simultaneous equation model, however, does not apply well to this context because tuition is not set to equalize enrollment supply and demand resulting in one of these measures being unobserved. For this reason, I estimate reduced form equations to identify the observed relationship between the transfer enrollment rate and a combination of supply and demand factors. The transfer enrollment rate is specified as the dependent variable, as opposed to enrollment levels, to more easily allow comparisons across institutions of different sizes.

All regressions use a functional form based upon a logistic curve because the transfer enrollment rate is an aggregate measure that only takes values between 0 and 1.[10] All models estimated in this paper can be represented by one of the below two regression equations:

$$\ln\left[\frac{p_{it}}{1-p_{it}}\right] = \alpha + \beta_1 X_{it} + \beta_2 Z_i + \delta Y_t + \varepsilon_{it}, \quad (3)$$

$$\ln\left[\frac{p_{it}}{1-p_{it}}\right] = \alpha + \beta_1 X_{it} + \gamma D_i + \delta Y_t + \varepsilon_{it}, \quad (4)$$

where p_{it} is the percentage of new students who are transfers for institution i in year t, X_{it} is a vector of determinants for institution i in year t, Z_i is a vector of determinants for institution i that do not vary over time, D_i is a dummy variable for institution i, Y_t is a dummy variable for year t, and ε_{it} is the error term for institution i in year t.

Columns 1 (for publics) and 3 (for privates) in Table 3 contain the results for Eq. (3) where all the independent variables discussed in Section 3 are included.[11] The

(*footnote continued*)
graduating high school in that year while the transfer student pool is drawn from earlier high school classes.

[10] The data set used in the regressions only covers the years 1985 to 1996 due to unavailability of certain variables for 1984 and 1997.

[11] For these regressions, I pool the 12 years of data to report unbiased coefficients that reflect the relationship between the explanatory variables and the transfer enrollment rate for the entire period in a reasonable manner. I use robust standard errors with clustering to minimize problems of correlated error terms. Results from individual year regressions are very similar to the results reported for the pooled sample.

Table 3
Determinants of the transfer enrollment rate[a]

Explanatory variables	Private institutions		Public institutions	
	(1)	(2)	(3)	(4)
Attrition rate	1.630**	0.522**	0.271	0.009
	(0.393)	(0.151)	(0.297)	(0.094)
# of majors	0.015*		−0.005	
	(0.008)		(0.004)	
Percentage of applicants accepted	1.164**	0.137	−0.049	−0.065
	(0.205)	(0.091)	(0.207)	(0.065)
Non-tuition current fund rev. per student, logged	−0.236**	−0.010	−0.128	0.060
	(0.064)	(0.040)	(0.068)	(0.045)
Percentage of state undergrads enrolled in 2-yr institutions	1.083**	−0.002	1.776**	0.189
	(0.234)	(0.412)	(0.188)	(0.294)
Previous cohort size/current cohort size	0.438	−0.107	0.721	0.134
	(0.492)	(0.217)	(0.465)	(0.156)
Percentage of freshman living on campus	−1.422**	−0.316**	−0.844**	−0.079
	(0.168)	(0.078)	(0.099)	(0.053)
Tuition & fees (in thousands)	−0.044**	−0.023**	−0.088*	−0.002
	(0.010)	(0.008)	(0.035)	(0.016)
Average undergraduate enrollment, logged	−0.233		0.127	
	(0.124)		(0.078)	
Rural	−0.253**		0.024	
	(0.077)		(0.062)	
Comprehensive	−0.136		−0.131	
	(0.121)		(0.086)	
Liberal arts I & II	−0.567**		−0.200	
	(0.128)		(0.144)	
Time effects	Yes	Yes	Yes	Yes
Institution effects	No	Yes	No	Yes
Number of observations	4009	4009	3101	3101
R-squared	0.628	0.043	0.390	0.130

[a]*Notes*: The dependent variable equals the log (transfer enrollment rate/(1−transfer enrollment rate)). The sample pools information from individual years between 1985 and 1996. Models (1) and (3) use robust standard errors with clustering and weight each observation by the inverse of the percentage of the twelve years the institution reports valid data and is represented in the sample. Coefficients and standard errors (in parenthesis) are reported and an intercept term is included in each model. * and ** indicates statistically significant at the 5 and 1 percent levels, respectively.

results for this model demonstrate that the attrition rate is positively related to the transfer enrollment rate for both public and private institutions, but the results are only substantial in size and statistically significant for privates. At the mean transfer enrollment rate, a one point increase in the attrition rate is associated with a 0.29 percentage point increase in the transfer enrollment rate for privates and a 0.06 percentage point increase for publics. Results for the number of majors demonstrate a positive and statistically significant relationship with the transfer enrollment rate for privates; the results for public institutions reveal no statistically significant relationship and the point estimates suggest a negative relationship.[12] At the mean transfer enrollment rate, an increase of one major for privates is associated with a 0.27 percentage point increase in the transfer share.

Turning to those variables that partially represent the supply of transfer students to an institution, almost all have the anticipated sign for both public and private institutions in columns 1 and 3. The percentage of freshman living on campus is a strong and negative determinant of the transfer enrollment rate for both public and private institutions. While this finding may be

[12]Regressions that include an interaction term between the attrition rate and the number of majors suggest that a substantial indirect relationship between the number of majors and the transfer enrollment rate exists. For both public and private institutions, the interaction term is positive, statistically significant, and non-trivial in size indicating that the effect of the attrition rate is stronger at institutions with a larger number of majors.

due to transfer students preferring institutions that are accessible to commuters, it may also reflect that the educational philosophy that causes institutions to house many of their freshmen on campus may also cause them to find transfers less attractive than direct attendees. Another possible measure of poor accessibility for commuters, a rural dummy variable, is a strong negative determinant of the transfer share for privates, but has no effect for public institutions. The results for tuition and fees suggest that transfer students are more price sensitive than direct attendees because higher tuition levels are associated with lower transfer enrollment rates.

The results for the two measures of the size of the pool of transfer students in the institution's state relative to the size of the direct attendees pool demonstrate that the supply of students matters. The results are stronger for public institutions for both measures probably because public institutions are more likely to enroll in-state students and face pressure from the state government to be responsive to the needs of the state.

The differences by Carnegie classification and selectivity continue to be larger for private institutions than for publics after controls for other determinants are included. For private institutions, the results show that liberal arts colleges enroll a statistically significant smaller transfer student share than other privates while much smaller differences exist for publics. For selectivity, a one percentage point increase in the percentage of applicants who are accepted is associated with a 0.2 percentage point increase in the transfer enrollment rate for privates at the mean transfer enrollment rate, but is not associated with any change in the transfer share for publics. These results provide more evidence that transfers are enrolling at the more selective public institutions, but not the selective privates.

The results for the level of non-tuition current fund revenues suggest that institutions with less financial resources enroll a higher share of transfer students. This relationship is found for both public and private institutions and may be due to richer institutions facing less pressure to abandon a preference for direct attendees in order to obtain the tuition dollars of transfer students. The size of the institution student body does not have the same effect on the transfer share for both types of institutions. Being a larger institution is associated with a lower transfer enrollment rate for privates and a higher rate for publics, but these relationships are relatively weak.

Columns 2 and 4 present results from specifications that include institution fixed-effects that control for all unobserved time-invariant institutional characteristics. Almost all of the coefficients from this model are substantially smaller in magnitude than those just discussed for the pooled cross-section. For the attrition rate, the marginal effect for private institutions at the mean transfer enrollment rate falls from 0.28 to 0.09 while the marginal effect for public institutions falls to zero. The results for the other explanatory variables also become weaker when institution fixed-effects are added. The only statistically significant results are for private institutions where a lower percentage of freshmen living on campus and lower tuition and fees are associated with a higher transfer enrollment rate. The other results are not significant, but some similarities in the difference between public and private institutions remain. The percentage of applicants who are admitted continues to have a more positive relationship with the transfer share for private institutions than publics, while the two measures of the state pool of transfers continue to exhibit a more positive relationship with the transfer share for public institutions.

The substantial variation between the fixed-effects regression results and the pooled cross-section results demand further examination. One potential explanation would produce some interesting implications. The fixed-effects model examines yearly adjustments to enrollment strategies while the cross-section model relies more heavily on the long-term adjustments that are reflected in differences across institutions. With this fact in mind, major differences should be expected because many of the adjustments required to attract more qualified transfer students are long-term efforts such as the development of links with nearby community colleges, the adjustment of policies to make the institution more attractive to transfer students, and the increased marketing efforts towards transfers. Schools are unlikely to invest in such activities if they believe a change in a key determinant is simply a temporary phenomenon, and even when efforts are undertaken, improvements may not attract additional transfers immediately.

Therefore, one interpretation of these results is that long term levels of some determinants substantially impacts the transfer enrollment rate, but short-run fluctuations have a much smaller effect. Of course, other explanations exist; most notably, the possibility that pooled cross-section regressions simply suffer from greater omitted variable bias because no controls for unobserved time-invariant institutional characteristics are included.[13] For variables whose fixed effects results are no longer close to statistical significance, this possibility is likely the primary explanation because

[13]The exacerbation of measurement error bias that pushes the coefficients towards zero provides another potential explanation because this bias is usually stronger in fixed-effects models. Some evidence suggests that measurement error bias may be nontrivial in some cases. An example is the attrition rate where 57 percent of institutions do not report a change in their attrition rate from year-to-year suggesting that many institutions do not always report updated data.

Table 4
How the effect of the attrition rate on the transfer enrollment rate varies by institutional selectivity[a]

Explanatory variables	Private institutions		Public institutions	
	(1)	(2)	(3)	(4)
Attrition rate	5.944**	1.598**	3.016**	−0.293
	(1.320)	(0.591)	(1.006)	(0.350)
Percentage of applicants accepted	1.930**	0.386*	0.920*	−0.171
	(0.320)	(0.161)	(0.377)	(0.135)
Attrition rate × percentage of applicants accepted	−5.770**	−1.423	−3.623**	0.399
	(1.657)	(0.755)	(1.196)	(0.445)
Time effects	Yes	Yes	Yes	Yes
Institution effects	No	Yes	No	Yes
Number of observations	4009	4009	3101	3101
R-squared	0.635	0.044	0.399	0.130

[a] *Notes*: All models also include all independent variables included in Table 3 for the corresponding model. The dependent variable equals the log (transfer enrollment rate/(1−transfer enrollment rate)). The sample pools information from individual years between 1985 and 1996. Models (1) and (2) use robust standard errors with clustering and weight each observation by the inverse of the percentage of the twelve years the institution reports valid data and is represented in the sample. Coefficients and standard errors (in parenthesis) are reported. * and ** indicates statistically significant at the 5 and 1 percent levels, respectively.

some similarity among short term and long term responses should exist.

Table 4 contains regressions that relax the assumption that the effect of the attrition rate is the same for institutions of different selectivity levels.[14] That assumption may be overly simplistic because more selective institutions have a queue of students from which to choose. Therefore, they can adjust their transfer enrollment rate through changes to the acceptance rate or through increased recruitment of direct attendees or transfers while less selective institutions can only use the latter route to adjust their enrollment. Subsequently, one would expect more selective institutions to be able to adjust their enrollments more easily and be more responsive to determinants such as their attrition rate.

Columns 1 and 3 in Table 4 present the results for a regression without institution fixed-effects that includes an interaction between the attrition rate and the percentage of applicants accepted. The results do suggest that more selective institutions are better able to be strategic in their enrollments as both public and private institutions with higher acceptance rates (i.e. less selective institutions) have a much weaker relationship between the attrition rate and the transfer enrollment rate. The size of the interaction is extremely large for both groups, but slightly bigger for private institutions.

The addition of institution fixed-effects (columns 2 and 4 in Table 4) changes the findings. The interaction terms for public institutions not only becomes statistically insignificant, but the point estimates now suggest a positive relationship. While the results for private institutions become weaker, the negative relationship is still significant at a 10 percent level of confidence. Overall, the results in Table 4 provide additional evidence that, relative to publics, private institutions take greater advantage of opportunities to be strategic in their enrollment policy.

6. Conclusion

The introduction of this paper outlined three reasons why it is important to understand the determinants of an institution's transfer enrollment share, and this section discusses the implications of the paper's primary findings for these three areas. Much of the discussion relies on three general findings that highlight differences between private and public institutions. First, relative to publics, a smaller share of incoming students are transfers at private institutions, and this difference grew between 1984 and 1997. Second, the transfer enrollment rate falls as one moves from less selective to more selective private institutions while selectivity and the transfer enrollment rate are not as closely related for public institutions. Third, the relationship between a school's transfer student share and the attrition rate is stronger for private institutions than for publics. All three sets of results suggest greater access for transfer students at public institutions.

[14] Models that allow the effect of the number of majors on the transfer enrollment rate to vary over different selectivity levels were also estimated. No statistically significant results were found for the interaction term between the number of majors and the percentage of applicants that were accepted.

While the first result could be mostly due to transfers preferring public institutions over privates, the second and third at least partially reflect a greater commitment by public institutions to provide opportunities for transfer students to enroll. Publics do not appear to respond to increased selectivity by limiting access to transfers in favor of direct attendees and do not appear to reduce transfer enrollments as much when one of the primary contributions of transfers, using unused upper-level class space created by student attrition, is less beneficial.

Public institutions' commitment to transfers may be due to pressure from the states to ensure that transfers from community colleges can enroll at selective public institutions with low attrition rates. This pressure often results in formal articulation agreements between four-year institutions and community colleges within the state. If the movement, discussed in the introduction, towards increased flexibility and autonomy in enrollment management and tuition setting at flagship public institutions continues, one wonders whether more selective and prestigious public institutions will continue their commitment to providing access for transfer students or whether they will become more like private institutions.

There are several implications if this commitment is lessened in the future. On one hand, it could result in some efficiency improvements as transfer students will increasingly attend less selective public institutions whose higher student attrition rates are likely to result in greater levels of unused upper level course space. Such improvements may help states that need to move more students through their higher education system due to a substantial increase in their college-aged population. These improvements, however, would come at the expense of transfer students who face reduced access to the more prestigious public institutions.

The consequences of reduced access for transfers differ depending upon whether students are using the transfer route to improve their institution-student match, lower their total educational costs, or improve their academic credentials to gain admission to a better institution than allowed by their high-school performance. Students from the first category may be hurt the least by reduced access. As discussed earlier in the paper, these students are likely to come from families with greater financial resources so one would expect them to need lower levels of institutional aid and have stronger academic credentials from high-school. These attributes are attractive to four-year institutions whether or not the student is a direct attendee or a transfer student.

Students who use the transfer route to lower their total educational costs may not be as attractive to four-year institutions because of their higher levels of financial need. Because many of the students in this category are likely to initially attend a two-year institution, they would be hurt most by any movement to weaken existing articulation agreements. Especially troubling is that several other trends in higher education, rising tuition and a lessening of commitment to financial aid based on need, will likely increase the number of poorer students initially attending less-expensive two-year institutions. One would expect these trends in combination to increase stratification in terms of the effect of one's financial resources on the college attended.

Finally, some students use the transfer route because their poor academic credentials from high school do not allow them to attend the four-year institution they prefer. Restricting access to the top institutions for these students will increase the penalty to individuals who are "late bloomers" due to delayed emergence of their talents or due to enrollment in a poorly performing elementary and secondary schools. This could result in society becoming less able to utilize the skills of these students.

This discussion draws attention to important questions that future research needs to address. Due to data limitations, this paper did not analyze how enrollment patterns differ across the different types of transfer students mentioned above. Future work that investigates how the original institution type attended and the demographic characteristics of transfer students differ across institutions of different type and selectivity would improve our understanding of the implications of potential changes in enrollment policies at public institutions.

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