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Heterogeneous Paths Through College: Detailed Patterns and Relationships with Graduation and Earnings

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Abstract

A considerable fraction of college students and bachelor's degree recipients attend multiple postsecondary institutions. Despite this fact, there is scant research that examines the nature of the paths – both the number and types of institutions – that students take to obtain a bachelor's degree or through the higher education system more generally. We also know little about how contact with multiple institutions of varying quality affects postgraduate life outcomes. We use a unique panel data set from Texas that allows us to both examine in detail the paths that students take towards a bachelor's degree and estimate how contact with multiple institutions is related to degree completion and subsequent earnings. We show that the paths to a bachelor's degree are diverse and that earnings and BA receipt vary systematically with these paths. Our results call attention to the importance of developing a more complete understanding of why students transfer and what causal role transferring has on the returns to postsecondary educational investment.

The paths students take through the postsecondary sector are heterogeneous and have become more so over time. For example, in the high school class of 1982, only 46.9% of students attended one institution, and this proportion fell to 43.5% (a 7.2% decline) among the high school class of 1992. This trend of increasing multi-institutional contact has continued to grow since the 1990s (McCormick, 2003). Despite the prevalence of transferring, the reasons why students transfer still are poorly understood. Plausible hypotheses include students beginning college at less expensive two-year schools to save money, students transferring to increase the match quality between them and their university, and adverse family events causing students to transfer closer to home. Multiple institutional contact is associated with worse academic backgrounds and with lower socioeconomic status (McCormick, 2003; Adelman, 2006; Goldrick-Rab, 2006; Goldrick-Rab and Pfeffer, 2009). That a large number of students from these backgrounds transfer highlights the need to understand more about how students transfer, who transfers, and how this behavior is associated with long-run student outcomes.

The purpose of this paper is twofold. First, using administrative data from the University of Texas at Dallas's Education Research Center, we provide a detailed description of the educational paths that students take as they attempt to navigate the post-secondary educational system in Texas. Our data contain rich information about all in-state postsecondary institutions attended by all students in Texas, which allows us to trace out the myriad ways in which students move through the state's higher education system. Somewhat akin to Adelman (2004) and Jargowsky, McFarlin, Jr. and Holovchenko (2005), we show that transferring is prevalent and that “traditional” transfer pathways – for example attending a two year school and then attending a four-year college or transferring once between four-year colleges – are inadequate to capture the multitude of ways that students progress through the postsecondary education system. Unlike these previous analyses, however, we have a sufficiently large sample size to examine a complex and comprehensive set of transferring patterns among postsecondary students in Texas. This descriptive analysis highlights the importance of many different forms of multi-institutional contact in

higher education and is strongly suggestive that such issues deserve more consideration among education researchers.

The second goal of this paper is to offer evidence about the relationship between a student's pathway through college and subsequent outcomes. Our analysis focuses on the likelihood of graduating with a bachelor's (BA) degree and on subsequent earnings. There is increasing evidence that school quality impacts the ability of students to obtain a BA (e.g., Bound, Lovenheim and Turner, 2010). There also is a sizable literature that seeks to estimate the labor market returns to college quality (e.g, Brewer, Eide and Ehrenberg, 2010; Dale and Krueger, 2002; Black and Smith, 2006; Hoekstra, 2009; Andrews, Li and Lovenheim, 2011). On the main, this literature finds large returns, as measured by subsequent wages or earnings, to attending a college of higher quality. Identification of the effect of higher education quality on BA receipt and future labor market success typically characterizes quality as a function of the first school attended by a student. However, a focus on the first institution attended ignores the fact that the first institution is not sufficient to encapsulate a student's educational experience because of transferring. We show that a substantial portion of students have contact with multiple institutions, so it is not clear what the simple metric of first college affiliation used in the previous work actually represents.

There are few published papers that examine how the returns to college vary with transfer status. Hilmer (2000) finds that direct attendees (i.e., students who begin and graduate from the same institution), students who transfer to four-year schools from community colleges, and students who transfer from lower quality universities to universities of high quality (defined as a university with an average age SAT score of at least 1200 points) experience large and statistically significant wage gains from college. However, students who transfer from high quality universities to institutions of lower quality experience significant wage penalties relative to these other groups. That students who “transfer down” perform worse in the labor market is notable and suggests that transferring behavior does impact the returns to investing in a college degree. But, because transfer students tend to have lower academic

achievement and tend to be from lower socioeconomic backgrounds, it is difficult to interpret such evidence as causal.

Light and Strayer (2004) analyze data from NLSY79 and show that transferring is prevalent among BA and non-BA recipients as well as among eventual associates degree recipients. They also find evidence that transferring increases earnings relative to observationally-equivalent non-transfer students. The mechanisms hypothesized are that transferring increases match quality and also facilitates graduating. This analysis focuses on returns to different levels of schooling by transfer status, but due to sample size limitations, they cannot examine the role of institutional quality beyond the general two-year, four-year distinction. It also is not possible in the NLSY79 to trace out transfer paths with a high degree of specificity.[1]

Our analysis makes several contributions to the literature. First, with our large data set of almost 895,000 college students in Texas, we are able to examine a richer set of educational paths than in previous work (e.g., Hilmer, (2000) observes only 794 male graduates and Adelman (2006) uses the approximately 6,000 students with a postsecondary transcript file in the NELS:88). Our larger sample size combined with our use of state administrative data allow us to trace out in a detailed manner the heterogeneous ways in which students move through the postsecondary system.[2] Our data include state unemployment insurance earnings records as well, which allows us to link these pathways to differences in returns to education. We are able to examine these relationships for the overall sample and differently by race and ethnicity. Such an analysis is novel in this literature. Our ability to make causal statements about how college paths affect student outcomes is hampered by the lack of an instrument or exogenous

[1] There is a literature as well on the completion effects of transferring from two-year to four-year schools that is relevant for this analysis. Long and Kurlaender (2009) and Reynolds (2009) both find evidence that students who begin at a two-year college are much less likely to complete a BA, even conditional on the desire to transfer. Kalogrides and Grodsky (2011) highlight the role of community colleges as "safety nets," however, which help reduce dropping out of higher education.

[2] The drawback of using these data is that we are unable to observe private school attendance. However, higher education in Texas is dominated by the public institutions, so we do not miss many students due to the absence of private schools from our data.

variation in these paths. However, we argue that the most likely direction of selection bias allows us to provide instructive bounds on the range of such causal effects, and the descriptive evidence we provide is both novel and informative about how multiple institutional contact relates to BA attainment and earnings.

To preview our findings, we uncover a large amount of heterogeneity in the paths students take through college that involve more than two-year to four-year transfers and single institution switches. In line with previous work, we find that, among those who eventually obtain a four-year degree, students who "transfer up" to more selective institutions, such as transferring from a non-flagship four-year school to a state flagship such as University of Texas at Austin, have lower measured academic achievement in high school, and they are more likely to be black or Hispanic. Transfer students also tend to have slightly lower college GPAs and are less likely to major in technical subjects, such as engineering.

With respect to completion, we find that students who transfer to flagship universities from the non-flagship sector are somewhat more likely to graduate than direct attendees, but those who transfer in from community colleges are much less likely to graduate. Among the non-flagship sector, transfers in from all other sectors are more likely to graduate than direct attendees. These estimates refute the notion that transferring reduces BA attainment.

We also find that the relationship between returns to college and transferring takes different forms depending on the institution. Among UT-Austin graduates, transfer students from non-flagship four-year and community colleges who graduate earn between 15% and 17% less than direct attendee graduates, while among Texas A&M graduates this difference is between 4% and 5%. However, among non-flagship university graduates, those who transfer from one of the two flagship schools have the same returns as direct attendees, but those who transfer from another non-flagship or from a community college earn about 3-5% less. Finally, we document a significant amount of heterogeneity in these patterns by race and ethnicity.

The remainder of this paper is organized as follows. Section 1 describes the data. Section 2 presents detailed tabulations of transfer behavior, and Section 3 describes the relationship between the path to a BA and the returns to graduating from different types of schools. The 4th Section concludes.

Section 1. Data

The data used in this study are derived from three sources: Pre-K to 12th grade administrative data from the Texas Education Agency (TEA), college administrative data from the Texas Higher Education Coordinating Board (THECB), and quarterly earnings data from the Texas Workforce Commission (TWC), which are generated from unemployment insurance records for Texas residents who work. The data are housed at the Texas Schools Project, a University of Texas at Dallas Education Research Center (ERC). Using a unique identifier based on an individual's social security number to link the data from these three sources, the data allow us to follow each Texas student from Pre-K all the way through college until entering into the job market as long as this student stays in Texas.[3]

Section 1.1. Sample to Study Transfer Behavior

Using the ERC data, we first generate a sample to investigate the transfer behavior of the college students enrolled in Texas public colleges or universities. Due to data availability, we focus on students who graduate from Texas public high schools between 1992 to 2000 and who start their college education in Texas public colleges or universities within two years after high school graduation. We have a total of 894,886 students in our sample.

To observe the possible different transfer behaviors for students starting from different institutions, we group our sample into four subsamples: UT-Austin (UT), Texas A&M-College Station (TAMU), Other

[3] This data set is the same one used in Andrews, Li and Lovenheim (2011). That paper shows detailed evidence that graduates from each college sector we consider are not missing from the data differentially with respect to their observable characteristics. Individuals can be missing from our postsecondary data because they attend a private university or because they attend school out of state. They can be missing from our earnings sample because they do not work or because they leave the state after college. Table 2 in Andrews, Li and Lovenheim (2011) shows that there are no systematic differences in the characteristics of those excluded from our data across college sectors.

4-year colleges or universities, and community colleges.[4] There are 46,582, 46,941, 267,298, and 534,065 students that started their college education at UT, TAMU, Other 4-year colleges or universities, and community colleges, respectively (See Table 1). These sectors also represent the different quality levels of public institutions in Texas.[5]

To observe the transfer behavior of the students in our sample, we examine their enrollment histories. The THECB collects students' enrollment data for each semester. We stack all enrollment records of a student in order to sequence each student's enrollment history. Because college students take various lengths to finish their college education, we limit our observation of transferring behavior in an eight-year window by dropping off any enrollments beyond eight years after one started college.[6] For the bachelor degree recipients, we drop all the enrollment records after they received their first bachelor's degree or from before high school graduation. Meanwhile, students often choose to take courses at community colleges or universities close to their homes in summer semesters, with the intention of returning to their full-time institution in the fall or spring. These types of enrollment changes are not traditionally viewed as transfer behaviors, and so we drop all the enrollment records in summer semesters and do not count such enrollment as part of our multiple institutional contact measure.

We follow THECB's definition of a transfer. When a student's current enrolled institution is different from the institution she enrolled in the previous semester, excluding summer semesters, we view that as a transfer. Sometimes, students enroll in multiple institutions simultaneously. In such cases, we do

[4] Hereafter, we will use "UT" to stand for UT-Austin and "TAMU" to stand for Texas A&M-College Station. These two flagship universities are distinguished from other UT campuses and other Texas A&M campuses, which are part of the other four-year, or "non-flagship" sector.

[5] College quality is very difficult to measure with a single variable or set of variables (Black and Smith, 2006). Our use of broad sectors to differentiate schools of different quality follows much of the previous literature (e.g., Brewer, Eide and Ehrenberg, 1999; Bound, Lovenheim and Turner, 2010; Lovenheim and Reynolds, 2011).

[6] Bound, Lovenheim and Turner (2010) show that most "traditional" students who graduate do so within eight years of high school graduation.

not count this student as having transferred. Combined with our exclusion of summer enrollment, this restriction on our definition of transferring leads to a conservative measure of number of transfers.

Our definition of a transfer, while conservative, is similar to what has been done previously. Like Goldrick-Rab (2006), we exclude summer enrollment; however, the focus of that paper is on contact with multiple institutions, and a count of the number of institutions on the transcript is used to measure multi-institution contact. This measure likely conflates dual enrollment with transferring. Goldrick-Rab and Pfeffer (2009) first define one's "primary institution" as the institution where a student took the most credits for a given year. A transfer is defined as switching one's primary institution in the subsequent year. Overall, this definition is similar to our own; however, this definition could over-count transfers to the extent that the identity of the primary institution may switch without an actual transfer if there is dual enrollment and the proportion of credits is shifted across schools. Light and Strayer (2004) define transferring in the NLSY79 as a student attending multiple colleges within 12 months of each other. Our definition of transfer does not impose the time limit. Therefore, our measure classifies changes in institution that occur more than a year apart as a transfer while the definition used in Light and Strayer (2004) would not. Otherwise, the definitions are quite similar.

Section 1.2. Sample to Study Differences in BA Receipt and Earnings

In order to examine how transferring relates to completion likelihoods and post-collegiate earnings, we first define a "direct attendee" as any student who begins and finishes at a given institution and who does not transfer. In categorizing multiple institution contact while examining outcomes, we only consider one's first postsecondary institution and one's graduating institution, which means we ignore the transfer paths in between starting and graduating from colleges. We simplify college paths in this manner in order to give us a tractable way to examine the heterogeneity in returns based on students college paths. Examining returns separately for each of the different paths we consider in the first part of the analysis would generate a large volume of estimates, many of which would be based on small sample sizes, and

thus they would be very hard to interpret. Our simplification dramatically reduces the number of potential estimates while still allowing us to examine differences in earnings and BA receipt among students taking different core pathways to obtain a degree at a given institution type.

We focus on students who graduate from Texas public high schools during the years 1996 – 2002, and for much of our earnings analysis we restrict our sample to those who have earned bachelor degrees from Texas' public colleges and universities. The sample includes all students in public universities in Texas over this time period who meet the following restrictions: 1) No missing data for any of the covariates, 2) The student must start college education within two years after high school graduation and must graduate no later than eight years after first enrollment in college, 3) The graduate's earnings for a given year are included only if he or she worked for four consecutive quarters in the year, with the exception of 2009 where the requirement for inclusion is three consecutive quarters as we only have three quarters of available earnings data for 2009, and 4) The student must not be currently enrolled in graduate school when the earnings are measured.[7] These restrictions are meant to isolate the earnings of full-time workers, and they are similar to the sample restrictions imposed by Hoekstra (2009) and Andrews, Li and Lovenheim (2011).

The sample includes 155,345 graduates. Among the 20,886 UT-Austin graduates, there are 17,583 direct attendees, 1,286 transfers from Texas's other four-year public colleges and universities, and 2,017 transfers from Texas's community colleges. At Texas A&M, there are 27,036 graduates, with 20,153 direct attendees, 1,733 transfers from Texas's other four-year public colleges and universities, and 5,150 transfers from Texas' community colleges. Among the non-flagship public universities in Texas, we observe 107,423 graduates, 61,274 of whom are direct attendees, 9,524 are transfers from other non-flagship four-year public colleges and universities in Texas, 2,023 are transfers from UT or TAMU, and 34,602 are transfers from Texas' community colleges. There are 941 students who do not fall into any of the above

[7] Students who earn a graduate degree are included. The fourth restriction ignores earnings while students are enrolled in graduate school because they are likely not reflective of the student's permanent earnings.

groups. Because there are very few UT graduates who transferred from TAMU as well as TAMU graduates who transferred from UT, we do not include them in our earnings analysis.

We obtain records of each individual's quarterly earnings from the TWC and examine earnings data for the years 2007 – 2009. We observe more than one quarter of earnings for all sample members. In order to generate one earnings estimate for each respondent, we stack an individual's log quarterly earnings data (subject to the inclusion criteria above) and regress them on year dummies, quarter-of-year dummies, and a series of cohort dummies that indicate when an individual graduated from high school. We use the within-graduate average of the residuals from this regression as the earnings measure in our empirical models. This method isolates the constant component of earnings for each individual over the period for which we observe his earnings and allows us to control for time- and cohort-specific shocks as well as for seasonality.

A major strength of our data from TEA is that they include a rich set of individual academic, demographic and high school information that allows us to control in a detailed manner for selection of students into universities of different quality. Individual information consists of quartics in math, reading and writing TAAS scores,[8] within-high school relative rank on each exam, student race/ethnicity, Title I status, English proficiency, free and reduced price lunch status, enrollment in gifted/talented program, special education, and technology courses, whether the student has a college plan, and whether he was at risk of dropping out. High school campus variables include, for each year of graduation, the ethnic composition of the high school, the percentage of students in each economic status group, the percentage of gifted students and students at risk, the percentage of title I eligible students, and total school enrollment. These individual covariates represent a more powerful set of controls for student academic backgrounds that are correlated with college paths and with collegiate and post-collegiate

[8] The Texas Assessment of Academic Skills (TAAS) are state standardized exams that are given to all students in Texas and are used, in part, to determine graduation eligibility. Thus, students have an incentive to perform well on these exams, and they provide important measures of student academic capabilities as of 11th grade.

outcomes than are available in the data sets used in previous analyses on transfer behavior. In addition, we obtain graduation status and timing from the THECB for each student.

Section 2. Description of Transfer Behavior

Table 1 presents the distribution of transfers for both college attendees and for those who receive a BA degree within eight years of high school graduation. In the first two columns, we show this distribution for all Texas public postsecondary students. Among all attendees (including community college students), 32% of students transfer at least once. For BA recipients, over half of the students transfer at least once, many from a community college. Thus, transferring is relatively common, particularly among eventual BA recipients, and many students transfer more than once. Among BA recipients, 17% transfer more than once, with 11% among attendees doing so. Thus, almost 1/5 of all college completers who begin college soon after high school transfer at least twice. In fact, 6.4% transfer three or more times. Overall, a large proportion of students have paths through the higher education system that are characterized by contact with many institutions. This pattern is evident both among the attendee sample as well as among the graduating sample.

In the remaining columns of Table 1, we examine transferring behavior by the first institution attended. At the flagship state universities, transferring is much less prevalent: between 80% and 82% of attendees do not transfer and between 86% and 88% of BA recipients do not transfer. However, over 10% of BA recipients at each school transfer once or twice, which highlights the fact that even at elite institutions transferring is not uncommon. Among those who first attend a non-flagship four-year school, it is much more commonplace to switch institutions. Almost 30% of attendees at such schools transfer, and 18% transfer more than once. Among eventual BA recipients, over 21% transfer more than once and over 5% transfer more than twice.

For those who enter the postsecondary system at community colleges, transferring among the attendee sample is prevalent, and the transfer distribution is similar to the non-flagship transfer distribution.[9] Among eventual BA recipients, all community college students must transfer, but almost 18% do so more than once and almost 12% do so more than twice. These paths through the higher education system point to considerable heterogeneity that makes it difficult to classify simply the types of schools students attend.

Table 1 suggests that it is not easy to characterize how students move through the post-secondary system as well as the quality of the institution to which they are exposed during college. However, Table 1 masks a considerable portion of students' heterogeneous experiences because it is not clear what types of schools students are transferring into and out of. We now show the full distribution of transfers by institution type for students who transfer once (Table 2) and twice (Table 3). We do not examine these distributions for those who go to more than 3 schools because of the complexity of the possible paths students can take does not allow for a parsimonious description. Furthermore, with 4% of the attendee sample and 6% of the BA sample transferring more than twice, our analysis captures the majority of students in Texas. We also do not have sufficient sample size to fully describe the post-secondary paths students who transfer three or more times take.

Table 2 shows the distribution of school types among those who transfer once. In the table, each column sums to one and shows, conditional on first institution attended, the distribution of attendance at other institution types. For example, among those who first attend UT and transfer, 50.58% transfer to a non-flagship four-year school and 45.55% transfer to a community college. A similar pattern holds for TAMU students, although community college transferring is slightly larger. While there is some movement between flagship universities, the predominant pattern is movement downward in quality, with a relatively large amount of transferring into the two-year sector. Among eventual BA recipients,

[9] We do not count transferring across community colleges as a transfer.

the transferring to non-flagship schools is more dramatic, although there are much fewer of such students. As Table 1 shows, there are not a lot of BA recipients who transfer once and who start at UT-Austin or Texas A&M. The proportion of attendees at these schools who transfer once is larger, although it still is below 10%. Thus, even at the flagship universities, there is a sizable group of students who transfer to a non-flagship school or a community college, and a majority of these students do not obtain a BA.

Among students who begin college at non-flagship schools, the 20.7% of attendees who transfer once do so predominantly to community colleges as well as to other non-flagship four-year universities in Texas. Among the 11% of eventual graduates who transfer once, however, over 25% transfer to a flagship university. Thus, for over a quarter of these students, transferring is associated with an increase in college quality, while the rest of these students transfer laterally.[10] As in Table 1, this pattern suggests that some transferring may be positively correlated with the likelihood of graduating and with subsequent earnings, while other transfers may be negatively correlated with such outcomes. We examine these relationships more formally below.

Most community college students who transfer switch to a non-flagship university. However, 12% of attendees and almost 15% of BA recipients transfer to a flagship university. For many students, the community college is a viable gateway to a BA degree, but the quality of schools to which students transfer varies considerably.

In Table 3, we examine the distribution of transfers among students who transfer twice. The percents in each block refer to the first institution attended, and they sum to one.[11] The first line of schools shows the first institution attended, the second line of schools shows the second institution attended, and the schools listed in the second column show the third institution attended. For example,

[10] Of course, students may view their transfer as a change in quality, especially if they are switching institutions for match-specific reasons.

[11] The ** marks in the table indicate means drawn from fewer than 5 observations. Our data use agreement with the Texas Higher Education Coordinating Board specifies that we cannot show any means with cell sizes less than 5.

8.12% of UT attendees transfer to a non-flagship four-year school and then back to UT. Focusing on UT, the most common paths are to transfer to a community college and then either back to UT or to a non-flagship four-year school. A similar pattern holds for TAMU students, with many students transferring to a community college and then back to Texas A&M. In general, it is quite common among those who transfer twice and who start at a flagship university to transfer back to the original flagship school. This pattern is even more prevalent among BA recipients (Panel B). Thus, to the extent that transferring has an effect on postsecondary outcomes as well as on future earnings, it is important to pay attention to the fact that even those who enter or graduate from a flagship university may have significant contact with another institution.[12]

The pattern of transferring back to one's original institution is prevalent among those who first attend a non-flagship university as well. Over 56% of these students in Panel A and over 37% in Panel B transfer away from their original university only to return later in their postsecondary career. Much of the remainder of the students transfer to a community college and then to a different non-flagship school or to two different non-flagship, four-year universities. A very small proportion of students transfer to a flagship university and then transfer away.

Among community college students, the most common path is to transfer to two non-flagship universities for eventual graduates. For all attendees, students typically either transfer to a non-flagship and then transfer back to a community college or transfer to another non-flagship university. Interestingly, among both attendees and BA recipients, it is not uncommon to transfer to a flagship university and then transfer to a non-flagship university. For BA recipients, 11.7% of those who transfer twice (5.9% of the community college sample) follow this path. Such transfers could be due to a lack of

[12] As discussed above, we have taken care not to count dual enrollment or summer enrollment as transferring. Thus, student transferring back to a flagship does not simply reflect taking courses over the summer at a local college or enrolling in a course at a community college while enrolled in one of the flagship universities.

academic training for the higher rigor at flagship universities; this finding is suggestive that flagship universities do not provide a good match for many students who transfer in from community colleges. Tables 1-3 show multi-institution contact is highly prevalent in Texas. Given this heterogeneity in college paths, it is of interest to know how these paths relate to subsequent student outcomes. Next, we examine how multi-institution contact correlates with four-year college completion and with post-collegiate earnings in order to shed some light on these relationships.

Section 3. The Relationship Between College Path, College Graduation and Future Earnings

Section 3.1. Methods

The goal of the analysis in this section is to estimate the differences in postsecondary completion rates and in subsequent earnings for students who take different paths through college. Most previous studies that examine the effect of institutional quality on educational attainment and earnings measure the quality either of the first college or university one attended or of the college or university from which one graduated.[13] Both of these measures impose the assumption that students accomplish their college education at one institution. However, as shown in Section 2, a large proportion of students have contact with multiple institutions throughout their postsecondary careers. Thus, it is necessary to explore how transfer behavior correlates with the returns to education as well as with the likelihood of obtaining a four-year degree.

As Tables 1-3 demonstrate, transfer behavior is not simple to characterize succinctly — students take many different paths through the postsecondary sectors that vary significantly from person to person. In order to make our analysis tractable, we only examine where one starts and where one ends his college education. Therefore, in our earnings equations, we allow the returns to college quality to

[13] For example, see Black and Smith (2004), Black and Smith (2006), Dale and Krueger (2002), Hoekstra (2009), Bound, Lovenheim and Turner (2010), Brewer, Eide and Ehrenberg (1999), Kane and Rouse (1999), Andrews, Li and Lovenheim (2010), and Kinsler and Pavan (Forthcoming).

differ by the quality of the higher education institution in which a student first enrolls and the quality of institution from which the same student graduates. When examining completion, we allow the likelihood of BA attainment to vary by where students first entered the postsecondary system and where they left, where leaving includes BA receipt or dropping out. Though a simplification, Tables 1-3 show that this characterization of transferring captures a large amount of the variation in transferring behavior across students. One notable shortcoming of this method is that we are not able to examine separately the returns of students who begin and end at the same place but who transfer in between. We ignore the relationship between this set of paths and subsequent earnings because of the small proportion of our sample who take such paths, even though they represent a sizable fraction of those who transfer three times. Despite this simplification, our estimates provide new insight into the relationship between multiple institutional contact, collegiate outcomes and the returns to higher education quality.

We first examine the relationship between transferring and the likelihood of obtaining a four-year degree. To assess whether the likelihood of degree attainment varies by transfer path, we estimate linear regressions of the following form:

$$C_i = \gamma + \phi T_i + \beta X_i + \varepsilon_i, \qquad (1)$$

where C_i is an indicator variable equal to 1 if the student graduates by the age of 25, T_i is an indicator variable equal to 1 if the student transfers, and X is a vector of socioeconomic and academic background characteristics discussed in Section 1. We estimate equation (1) separately using pairings of final and original institution attended. For example, to test whether UT-Austin students who transferred from a non-flagship university were less likely to finish than direct attendees, we estimate equation (1) using the sample of students who transfer in this manner and the direct UT-Austin attendees. The coefficient ϕ then yields the effect of interest. We estimate such regressions for all pairings of direct attendees and transfers who leave higher education at that same institution but who begin in another

institution type. Note that this method nests a specification in which we use all students who end in a given sector and include a set of indicators for transfer paths for non-direct attendees. Equation (1) is a more general specification than such a model because it allows the coefficients on the *X* variables to vary across transfer paths.

To study the relationship between transferring and earnings, we begin by specifying an earnings function that is very similar to the one used in Andrews, Li and Lovenheim (2011) and allows us to identify the returns to graduating from a specific college sector in Texas. The earnings function is as follows:

$$Y_i = \alpha_1 Q_i^{FE} + \alpha_2 Q_i^{G} + \beta X_i + \varepsilon_i, \qquad (2)$$

where Y_i is the log quarterly earnings residual of student *i* that was discussed in Section 1, Q_i^{FE} is the sector of the higher education institution in which student *i* first enrolls, Q_i^{G} is the sector of institution from which the student graduates, and all other variables are as previously defined.

In terms of equation (2), Q_i^{FE} is a set of fixed effects for an individual's sector of first attendance, with the non-flagship public sector as the omitted category. The variable Q_i^{G} is similarly defined for the sector of graduation. The critical identifying assumption of the model is that our extensive controls for student background characteristics are sufficient to control for the selection of students with different underlying earnings potentials into school sectors of different quality. For example, we observe that students graduating from UT-Austin earn more than those who graduate from a non-flagship university. Is this differential because of the higher quality of a UT-Austin education or is it because the UT-Austin students are more academically capable and are from higher socioeconomic backgrounds on average, both of which are associated with higher earnings? Our administrative data contain rich controls for such selection, including quartics in math, reading and English state exams, relative rank within each high school on these exams, and detailed information regarding one's track through high school. These

controls are more extensive than have been used in most previous "selection on observables" studies of the returns to college quality (e.g., Black and Smith, 2004, 2006; Brewer, Eide and Ehrenberg, 1999), and we argue they account for many of the sources of bias stemming from the endogeneity of transferring.[14] However, absent an exogenous source of variation in college paths, we are cautious in offering a causal interpretation of these estimates.

The model given in equation (2) differs from previous work on the returns to education quality in allowing for earnings to differ by the quality of the first and graduating institution. When all students are exposed to only one higher education institution (i.e., direct attendees), ($Q_i^{FE} = Q_i^G$). Equation (2) can be rewritten as either:

$$Y_i = \alpha Q_i^{FE} + \beta X_i + \varepsilon_i \quad (3)$$

or

$$Y_i = \alpha Q_i^{G} + \beta X_i + \varepsilon_i \quad (4)$$

When there are both direct attendees and transfer students, we want to estimate the differences in earnings between groups of students taking different paths. We first investigate whether, conditional on graduating from a given sector, there are earnings difference between direct attendees and students who transferred in from another type of universities or colleges. The differences in earnings among graduates between direct attendees and transfer students is important from a policy perspective because many students who are academically capable of attending a four-year or flagship university choose not to do so, perhaps due to cost considerations. If the returns are the same for those who transfer in and graduate as compared to direct attendees, then beginning college at a two-year or less selective four-year school may be sensible for many students. However, if there are earnings penalties

[14] Andrews, Li and Lovenheim (2011) focuses extensively on the credibility of this model to identify the causal effect of college quality on earnings. We point interested readers to the discussion in that paper about identification concerns related to this model.

associated with such paths, it could point to a value for policies that induce academically capable students to enroll directly in four-year schools.

To identify the differences between earnings among transfer students as compared to direct attendees *who graduate from the same sector*, we first condition on graduating from a given sector. Then, we estimate the following regression for these graduates:

$$Y_i = \gamma + \sigma T_i + \beta X_i + \varepsilon_i, \quad (5)$$

where T_i is an indicator variable that is equal to 1 if the graduate transferred in and is equal to zero otherwise. The coefficient of interest in equation (5) is σ, which shows the average difference in earnings between transfer and direct attendees in each sector. We estimate this model separately for each of the three four-year sectors in our data, which allows us to compare how the relationship between earnings and transferring differ by the quality of the postsecondary sector from which one earns a degree. Similar to the completion estimates, we differentiate between transfers who come in from community college and from non-flagship schools in the two flagship sectors and allow for transferring to have a differential impact among those who transfer in from community colleges, other non-flagship schools and from flagship schools for non-flagship graduates. Thus, our estimates show not only how transferring *per se* is related to earnings but how this relationship differs by the specific path the transfer takes.

A question of fundamental importance is whether we can interpret the estimates of σ as causal. Transferring behavior is endogenous to underlying student characteristics as well as to college outcomes that likely are independently correlated with earnings. We do not seek to make strong causal claims about the effect of transferring on returns in this analysis. Rather, we describe how the returns to college are correlated with the path one takes, after accounting for a detailed series of covariates designed to measure students' academic achievement prior to college and their socioeconomic status. Because little previous work has been done in this area, and because our observable background

characteristics and the transfer patterns we consider are more detailed than those used previously,[15] such correlational evidence is informative. Furthermore, as we show below, transfer students tend to be less academically prepared for college as measured by high school achievement and tend to come from lower socioeconomic backgrounds. We thus believe it is likely that the bias in equation (5) is negative: that is, the types of students who transfer typically would have lower earnings than direct attendees regardless of which college they attend. If this bias is indeed negative, our estimates provide upper bounds (in absolute value) of the effect of transferring on earnings. It also could be the case that transfer students have higher non-cognitive skills, such as motivation, than direct attendees. To the extent such skills are valued in the labor market, this will cause our estimates of the relationship between transferring and earnings to be biased upward.[16]

In addition to estimating how earnings relate to transferring behavior among graduates of schools in the same sector, we also wish to know how earnings differ among those who begin college at the same type of institution and who take different paths through the higher education system. This part of the analysis will show whether, for example, two observationally equivalent students who begin at a community college but who transfer to different school types have earnings that are different after graduation. To explore this question, we estimate a model akin to equation (5) but condition on first sector attended rather than the last sector attended. The coefficients on the transfer indicators represent the differences in earnings between any two groups of students who start their college education at the same institution but who graduate at different institutions.

[15] The only previous work of which we are aware that examines earnings by transfer status is Light and Strayer (2004). They use NLSY79 data, which while rich in covariates, only contains one measure of precollegiate academic ability – AFQT scores – and contains samples that are too small to examine the types of transfers we analyze.

[16] We believe the former source of bias is likely to be more prevalent than the latter, particularly when comparing students who transfer to more selective schools, because those with higher non-cognitive skills are likely to select into more selective universities directly out of high school. While this assumption is not testable in our data, economic theory predicts sorting of students into colleges of different quality based on cognitive and non-cognitive skills. We observe detailed and extensive information about student academic backgrounds that proxy for these skills, but to the extent that there is a component of student ability that is residual to our controls, it most likely biases our transfer estimates downward.

As discussed above, the educational "paths" that we consider are a coarse presentation of some of the paths described in the previous section. Still, we offer a more diverse set of paths than is contained in Hilmer (2000) and Light and Strayer (2004), which are the two existing papers most similar to this one. Because we are not forced to treat all transfers similarly, we can examine whether certain types of transfer paths correlate with higher or lower earnings, which previous research has not been able to study.

Section 3.2. Descriptive Characteristics of Transfers and Direct Attendees

Table 4 presents summary statistics of observable individual characteristics for our analysis sample, separately by college paths to bachelor degrees. For both UT graduates and Texas A&M graduates, the direct attendees have higher high school test scores in every subject than transfer students. The direct attendees are much more likely to be in the top 10^{th} percentile of their school in each of these tests. They also are more likely to be gifted and less likely to be at risk of drop-out in high school than transfer students. These estimates are in-line with previous work showing that transfer students have lower academic achievement than their peers at the institutions to which they transfer (McCormick, 2003; Adelman, 2006; Goldrick-Rab, 2006; Goldrick-Rab and Pfeffer, 2009). Interestingly, the background characteristics of transfers into UT look very similar with respect to high school exam scores and economic disadvantage across those who begin at a non-flagship university and those who begin at a community college. However, the transfers in from community colleges are more likely to be white. Similar patterns are evident for those transferring into Texas A&M. Finally, among non-flagship graduates, the direct attendees and those who transfer across non-flagship institutions look very similar with respect to high school test scores, but those who transfer in from a community college appear less academically qualified than those who start at a four-year school. The students who "transfer down" from a flagship have higher high school achievement scores, and they also are more likely to be white and are less likely to be economically disadvantaged than direct attendees at non-flagship, four-year institutions.

Unsurprisingly, direct attendees at UT and Texas A&M earn more than transfer students. Among the non-flagship graduates, it is those who transfer in from a flagship who earn the most, followed by direct attendees and then by transfers from other four-year and community colleges. These raw differences in log earnings residuals are driven, at least in part, by the fact that these groups all differ on observable characteristics that are correlated with future earnings. Our empirical analysis below seeks to understand what part of this difference remains once we control for our extensive set of background characteristics.

That transfers and direct attendees differ with respect to academic and socioeconomic backgrounds suggest these groups also may have systematically different preferences over courses of study and may perform differently in college. To the extent that different majors and/or college performance are valued more or less by the labor market, any differences along these margins may translate into differences in the returns to graduating from a given university sector. Table 5 shows the distribution of majors and mean college grade point averages (GPAs) by sector of graduation and by broad transfer path. Several patterns are evident in the table. First, at UT and Texas A&M, the GPAs of transfers are lower than those of direct attendees, although the differences are not large and are smaller among UT-Austin graduates than among Texas A&M graduates.[17] Among non-flagship graduates, GPAs among all groups are ostensibly the same, with the exception of those who transfer in from flagships. These students have higher GPAs, which are higher on average than GPAs among direct attendees at flagship schools. This tabulation suggests those who transfer out of the flagship sectors may not be doing so because of academic struggles. Transfers and direct attendees also tend to major in different areas. At UT-Austin and Texas A&M, transfers are less likely to major in engineering and business and more likely to be in liberal arts, communications, agriculture and social sciences. At non-flagship schools, the distribution of majors differs little between direct attendees and transfers.

[17] These grade point averages are calculated for all schools attended in Texas, not just one's graduating institution.

The choice of college major, and the GPA one attains while in college, may be endogenous to the transfer decision. If a student transferring has a causal effect on her GPA, perhaps due to the disruption of switching institutions or if students transfer because of preferences for a degree program that is stronger at another school, majors and GPAs may themselves be an outcome of transferring behavior. As such, it would be improper to include them as controls in our estimation of equation (5). Nonetheless, we control for major choice and GPA in some specifications below in order to give a descriptive accounting of how these variables impact the estimated earnings differences across groups. Although we view them as informative about the role of college major and college performance in driving differences in returns by transfer type, we urge some caution in interpreting these estimates due to the potential endogeneity of college majors and GPAs to transferring decisions.

Section 3.3. Transferring and the Likelihood of BA Attainment

Table 6 shows estimates of equation (1) by last institution attended. Each cell is from a separate regression that compares completion rates among direct attendees and transfers in from another sector. For UT-Austin and Texas A&M, transferring in from a non-flagship university is positively associated with BA attainment once the demographic variables are controlled for. For example, at UT-Austin, non-flagship transfers are 16.3 percentage points more likely to obtain a BA than direct UT attendees. The estimate is 8.1 percentage points for Texas A&M, although it is not statistically different from zero at conventional levels. However, at both flagship universities, transfers in from community colleges are 24.8 and 8.1 percentage points less likely to graduate than direct attendees. Particularly at UT-Austin, the likelihood of transfer students graduating varies dramatically by the first institution attended.

Among those whose last recorded institution is a non-flagship university, all transfer students are more likely to graduate than direct attendees. Community college students are 26.7% more likely to graduate with a BA, and flagship students are 13.3% more likely. Note that those who start at a flagship and transfer to a non-flagship are more likely to graduate than non-flagship direct attendees and those

who start at a non-flagship and transfer into a flagship are more likely to graduate than flagship direct attendees. This is evidence consistent with students transferring to institutions that better meet their educational needs. Furthermore, that community college transfers into non-flagship schools graduate at relatively high rates but transfers from community colleges into flagships do not is suggestive that the more rigorous academic work at flagship universities may dissuade some of these students from graduating. We cannot test such a hypothesis, however, but our results indicate this may be a fruitful area for future research.

Section 3.4. Earnings Estimates

Table 7 contains the estimates of equation (5), which shows the differences in earnings between bachelor degree recipients who are direct attendees and bachelor degree recipients who graduate from the same college type but who started college in a different sector. Estimates are shown separately by graduating sector, and each set of two estimates in a row are from the same regression. For all estimates in Table 7, the reference group is the direct attendees from the given college sector. Thus, for example, in the first row of Table 7, those who transfer into UT-Austin from a non-flagship university earn 15.6% less than direct UT graduates. Community college transfers earn 20% less. In the second row of the table, we add in controls for selection of students with different underlying abilities into college sectors of differing quality. These controls consist of the detailed test score and demographic characteristics discussed in Section 2. In the third row, we add in controls for college major and GPA.

The estimates in the table follow a similar pattern across rows but not across school types. For all school types, controlling for student background characteristics significantly reduces the differences in earnings between transfers and direct attendees. At UT-Austin, the other 4-year coefficient drops from 15.6% to 11.4%, a 27% decline. An even larger drop is evident among community college transfers to UT. At TAMU, there also is a decline in the estimated relationship between transferring and earnings, but the absolute value of the magnitudes is much smaller than for the UT graduate sample.

Among TAMU graduates, once one controls for background characteristics, transfers from other four-year schools earn 6.9% less than direct attendees, and community college transfers earn 6.0% less. Both of these estimates are statistically significantly different from zero at the 5% level. The differences across these schools in the effect of transferring is striking: transfers at UT do much worse in terms of earnings relative to direct attendees than do TAMU transfers relative to their direct attendees. One potential explanation for these differences is differences in college majors across schools. Texas A&M is more focused on engineering and technical areas, which could have higher average returns (See Andrews, Li and Lovenheim (2011) for evidence on earnings in Texas by college major). To give some evidence on the empirical relevance of this explanation, in the final row of results in the table, we control for college major and college GPA. At UT, the earnings differences drop considerably in absolute value, but they remain both sizable and statistically significant, at 6.5% and 8.4%. At Texas A&M, all earnings differences between direct attendees and transfers disappear. Thus, GPA and major differences, from an accounting standpoint, explain much of the residual differences in earnings between direct and transfer students within UT and Texas A&M. These estimates are suggestive of a sizable role for major choice and college performance in driving the lower postsecondary earnings of transfer students relative to non-transfer graduates. But, we again stress that because of the potential endogeneity of major and GPA with respect to transferring, these estimates are merely suggestive.

The final set of estimates in Table 7 show differences in earnings by transfer status among non-flagship graduates. Here, the raw differences are even smaller than in Texas A&M, and controlling for background characteristics further reduces the magnitude of the estimates in absolute value. The exception to this pattern is for those who transfer into a non-flagship from a flagship. For these students, once one controls for student background, there is no difference between transfer student earnings and direct attendee earnings. This estimate in particular is of interest because these students have pre-college characteristics that suggest they would have higher earnings, and indeed this is true in the raw data.

However, our controls are sufficient to fully account for these pre-collegiate differences. The addition of the college outcome variables indicate that a transfer from a flagship earns 1.4% more than a comparable direct attendee, but this difference is not statistically significant at conventional levels.

The sum total of the evidence in Table 7 points to transfer students earning less than students who are direct attendees and who graduate from the same college sector. However, the amount of the earnings penalty varies both by graduating and entering school type. As argued above, these estimates most likely represent upper bounds of the effect of transferring on earnings, due to the fact that transfers tend to have lower academic achievement prior to college and to be from less affluent backgrounds. As upper bounds, our results are informative because, particularly for Texas A&M and non-flagship graduates, they show that the effect of transferring on earnings may be small.

It also is instructive to compare earnings among graduates based on their initial institution rather than on their graduating institution. Such comparisons are important because to the extent that students who start at the same type of school but who graduate at different places earn different amounts, it points to the value of assessing not only whether students transfer, but to where they transfer. Table 8 contains these estimates. In columns (i) and (ii), we compare earnings of direct attendees among our three postsecondary four-year sectors. Once one controls for background characteristics, UT graduates earn 9% more than non-flagship graduates, and Texas A&M graduates earn 15% more. When we control for college major and GPA, these estimates change to 10% and 12%, respectively. Despite the potential endogeneity of major and GPA, these results again point to the importance of courses of study and college performance in driving subsequent earnings of graduates, particularly for Texas A&M graduates.

In the next set of columns ((iii) and (iv)), we compare students who begin at a non-flagship school and transfer to one of the flagships to direct non-flagship graduates. Here, there are large differences by whether one transfers to UT or to TAMU, with TAMU graduates earning 9% more than direct attendees and UT transfers earning 3.2% less than non-flagship direct attendees. Both of these estimates are

statistically different from zero at the 5% level, and they suggest those who transfer into UT-Austin earn less than their counterparts who do not transfer, even though the transfer students are similar to each other on observables. When we compare those who begin at non-flagship schools and transfer to a flagship to those who begin at a non-flagship and transfer to another non-flagship in columns (v) and (vi), our estimates change little relative to the non-flagship direct attendee comparison. The UT graduates among this group earn the same amount as the other four-year graduates, while the TAMU graduates earn about 11% more. Once one controls for college outcome variables, however, the UT graduates earn 3% more than other four-year transfers, which suggests our estimates without these controls are driven in part by UT transfers selecting less lucrative majors and performing worse in college (as Table 5 indicates).

The final set of comparisons in Table 8 shows estimates for community college transfers. The results are remarkably similar to those for the non-flagship four-year transfers. In particular, when we only control for background characteristics, community college students who transfer into Texas A&M and earn a degree make 13% more than degree recipients who transfer to non-flagship universities and who receive a degree. There is no difference between the UT and other four-year transfers. Controlling for college major and GPA again shows that UT transfers earn more than non-flagship transfers. The estimates suggest that these students earn about 2% more than community college students who receive a degree at a non-flagship university. These estimates point to the importance of the types of schools students transfer into in driving future earnings, and they strongly suggest that transfer students who focus more on technical areas of study, such as engineering, have higher returns to degree receipt at more selective universities.

Taken together, Table 7 and Table 8 demonstrate that there is significant heterogeneity in relationship between earnings and transferring behavior that is not simple to characterize with the quality of the starting or finishing institution. In effect, movement towards institutions of higher quality are not universally positive. These estimates show that any decision rule that attempts to ascertain whether a

particular inter-college move is optimal depends greatly on the point of reference, the course of study a student selects and his performance in that course of study. Understanding more fully how initial institutional quality and graduating college major and institutional quality map to earnings is a ripe area for future research given these findings.

Finally, we show estimates akin to those in Table 7 but stratified by race/ethnicity in Table 9. Given that white students constitute the majority of the sample, it is unsurprising that the estimates we observe closely mirror the estimates we see in Table 7. The estimates for Hispanic students are largely similar to those for white students as well. Hispanic students who begin at a four-year public non-flagship universities in Texas and finish at UT suffer a wage penalty on the order of 12%, when compared to Hispanic UT direct attendees. Hispanic students who transfer to UT from community college, however, have earnings that are only 6.7% lower than direct attendees, which is not statistically different from zero at conventional levels. None of the non-flagship student transfer patterns exhibit a statistically significant relationship with earnings, and the estimates are similar to those for the whites, although they are less precise due to smaller sample sizes.

Though most of the estimates are statistically insignificant for black students, it does appear that black students who begin at a community college in Texas and finish at UT do slightly better in terms of earnings relative to black direct attendees. Interestingly, the estimates for black transfers into TAMU from non-flagships and community colleges are negative and sizable in magnitude, ranging from -11% to -17%. The estimates for Asian students typically indicate a negative relationship between transferring and earnings compared to direct attendees, with the estimates for those who transfer into a non-flagship school from another non-flagship school or a community college being the only estimates that are statistically significantly different from zero at even the 10% level.

Overall, the estimates by race/ethnicity demonstrate that the relationship between college path on subsequent earnings varies substantially across ethnic and racial categories as well as by the particular

educational path. The estimates point to potentially large positive effects for historically under-represented minority students who transfer to schools of higher quality, but given the imprecision of our estimates, these conclusions are only suggestive.

Section 4. Conclusion

With student transferring becoming more prevalent and multiple institutional contact becoming more the norm in higher education, it is critically important to understand the different paths students take through the postsecondary system and how these paths relate to college outcomes and earnings. We use detailed administrative data in Texas to examine these questions. Our data contain sample sizes that are sufficient to detect very complex paths that students take, and our ability to link these paths to subsequent earnings is unique in the literature.

We first show that transferring is prevalent in Texas and that looking only at where students begin or exit college is not sufficient to characterize their college experiences. There are many students who transfer more than once and have complex transfer patterns.

We next show that transferring is highly correlated with both BA completion rates and future earnings. In particular, transfers from non-flagship four-year schools into flagships are more likely to graduate than direct flagship attendees, but for community college transfers into these same institutions it is the opposite. At non-flagship institutions, all transfers obtain BAs at higher rates than direct attendees. These estimates highlight the role of match-specific quality in driving completion rates, which includes the student's academic preparation for the level of rigor expected at each institution type.

When we examine earnings, the broad finding is that direct attendee graduates earn more than transfers into their institutions, but for Texas A&M and for the non-flagship sectors, these differences

typically are small. We provide suggestive evidence that some of the differences across institutions are due to the major choices of transfers relative to the major choices of direct attendees.

Overall, this paper describes the heterogeneous paths students take through college and demonstrates that these paths relate in interesting ways to both college completion and to subsequent earnings. The goal of this paper was to describe these patterns and how they relate to student outcomes, but an important limitation of this work is that we are unable to examine why these patterns look the way they do; that is, we are unable to tightly identify a causal relationship between transferring and college completion or earnings. Given the increasing prevalence of multiple institutional contact and the importance of understanding the economic returns to college quality and the process by which students decide to complete college or drop out, we view these areas as important topics for future work.

References

Adelman, Clifford. 2005. "Moving into Town and Moving On: The Community College in the Lives of Traditional Age Students." Technical Report, Washington, DC: U.S. Department of Education.

Adelman, Clifford. 2006. "The Toolbox Revisited: Paths to Degree Completion from High School Through College." Technical Report, Washington, DC: U.S. Department of Education.

Andrews, Rodney J., Jing Li and Michael Lovenheim. 2011. "Quantile Treatment Effects of College Quality on Earnings: Evidence from Administrative Data in Texas." Mimeo.

Black, Dan A. and Jeffrey A. Smith. 2004. How Robust is the Evidence on the Effects of College Quality? Evidence from Matching." *Journal of Econometrics* 121(1-2): 99-124.

Black, Dan A. and Jeffrey A. Smith. 2006. Estimating the Returns to College Quality With Multiple Proxies for Quality." *Journal of Labor Economics* 24(3): 701-728.

Bound, John, Michael Lovenheim and Sarah Turner. 2010. "Why Have College Completion Rates Declined? An Analysis of Changing Student Preparation and Collegiate Resources." *American Economic Journal: Applied Economics* 2(3): 129-157.

Brewer, Dominic J., Eric R. Eide and Ronald G. Ehrenberg. 1999. "Does it Pay to Attend an Elite Private College? Cross-cohort Evidence on the Effects of College Type on Earnings." *Journal of Human Resources* 34(1): 104-123.

Dale, Stacy and Alan B. Krueger. 2002. "Estimating the Payoff to Attending a More Selective College: An Application of Selection on Observables and Unobservables." *The Quarterly Journal of Economics* 117(4): 1491-1527.

Goldrick-Rab, Sara. 2006. "Following their Every Move: An Investigation of Social-Class Differences in College Pathways." *Sociology of Education* 79: 61-79.

Goldrick-Rab, Sara and Fabian T. Pfeffer. 2009. "Beyond Access: Explaining Socioeconomic Differences in College Transfer." *Sociology of Education* 82(2): 101-125.

Hilmer, Michael J. 2000. "Does the Return to University Quality Differ for Transfer Students and Direct Attendees?" *Economics of Education Review* 19(1): 47-61.

Hoekstra, Mark. 2009. "The Effect of Attending the Flagship University on Earnings: A Discontinuity-based Approach." *Review of Economics and Statistics* 91(4): 717-724.

Jargowsky, Paul A., Isaac McFarlin, Jr. and Vera Holovchenko. 2005. "Community College: Help or Hindrance to Senior College Graduation." Mimeo.

Kalogrides, Demetra and Eric Grodsky. 2011. "Something to Fall Back On: Community Colleges as a Safety Net." *Social Forces* 89(3): 853-877.

Kane, Thomas J. and Cecilia E. Rouse. 1995. "Labor Market Returns to Two- and Four-Year Colleges." *American Economic Review* 85(3): 600-614.

Kinsler, Joshua and Ronni Pavan. Forthcoming. "Family Income and Higher Education Choices: The Importance of Accounting for College Quality." *Journal of Human Capital*.

Light, Audrey and Wayne Strayer. 2004. "Who Receives the College Wage Premium? Assessing the Labor Market Return to Degrees and to College Transferring Patterns." *Journal of Human Resources* 39(3): 746-773.

Long. Bridget Terry and Michal Kurlaender. 2009. "Do Community Colleges Provide a Viable Pathway to a Baccalaureate Degree?" *Educational Evaluation and Policy Analysis* 31(1): 30-53.

Lovenheim, Michael F. and C. Lockwood Reynolds. 2011. "Changes in Postsecondary Choices by Ability and Income: Evidence from the National Longitudinal Surveys of Youth." *Journal of Human Capital* 5(1): 70-109.

McCormick, Alexander. 2003. "Swirling and Double-Dipping: New Patterns of Student Attendance and their Implications for Higher Education." *New Directions in Higher Education* 121: 13-24.

Reynolds, C. Lockwood. 2009. "Where to Attend? Estimating the Effects of Beginning College at a Two-year School." Mimeo.

Tables

Table 1. Distribution of the Number of Transfers Among All Attendees and for BA Recipients

Number of Transfers	Full Sample		First Institution Attended: UT		TAMU		Other Four-Year		Community College	
	Attendee	BA	Attendee	BA	Attendee	BA	Attendee	BA	Attendee	BA
0	67.99	49.73	82.48	87.59	79.87	85.79	61.3	68.34	69.03	—
1	21.33	33.18	7.55	3.83	8.63	3.78	20.7	11.05	23.96	82.3
2	6.84	10.63	7.51	6.82	9.02	8.54	13.2	15.78	3.40	5.93
3	2.63	4.34	1.32	0.80	1.34	0.89	2.54	2.10	2.90	9.68
4	0.84	1.42	0.96	0.81	0.95	0.83	1.74	2.12	0.38	0.93
5	0.27	0.49	0.13	0.10	0.11	0.09	0.3	0.33	0.28	0.98
6	0.08	0.15	0.05	0.05	0.06	0.05	0.18	0.23	0.03	0.10
7	0.02	0.04	0.01	0.01	0.01	0.01	0.02	0.03	0.02	0.06
8	0.01	0.01	—	—	0.01	0.01	0.01	0.02	0.00	0.01
9	0.00	0.00	—	—	—	—	0.00	0.00	0.00	0.01
Observations	894,886	344,946	46,582	38,741	46,941	40,567	267,298	150,427	534,065	115,211

[1] The "Attendee" sample consists of all students who attend college within two years of high school graduation. The "BA" sample consists of all BA recipients who obtain a degree by age 25 and who begin college within two years of high school graduation. First institution attended is the first post-secondary institution at which a student enrolls after high school graduation. Transfers are the number of times a student changes the post-secondary school at which he enrolls in non-summer semesters.

[2] The value 0.00 stands for a value that is too small to be shown and "—" stands for no observations.

Table 2. Distribution of Transfers Among Students Who Transfer Once

Second Institution Attended	First Institution Attended: UT		TAMU		Other Four-Year		Community College	
	Attendee	BA	Attendee	BA	Attendee	BA	Attendee	BA
UT	—	—	6.46	15.65	4.26	12.65	4.84	5.54
TAMU	3.87	9.04	—	—	4.35	13.55	7.18	9.01
Other Four	50.58	90.96	42.34	84.35	31.1	73.8	87.98	85.45
CC	45.55	—	51.2	—	60.3	—	—	—
Observations	3,515	1,483	4,053	1,534	55,326	16,626	127,943	94,820

The "Attendee" sample consists of all students who attend college within two years of high school graduation. The "BA" sample consists of all BA recipients who obtain a degree by age 25 and who begin college within two years of high school graduation. First institution attended is the first post-secondary institution at which a student enrolls after high school graduation. The second institution attended is the subsequent institution in which the student enrolls in a non-summer semester. "—" stands for no observations.

Table 3. Distribution of Transfers Among Students Who Transfer Twice

Panel A: Full Sample:

	Second Institution Attended:	First Institution Attended: UT			TAMU			Other Four-Year				Community College		
		TAMU	4-Year	CC	UT	4-Year	CC	UT	TAMU	4-Year	CC	UT	TAMU	4-Year
Third Institution Attended:	UT	0.29	8.12	50.8	—	0.31	1.96	—	0.02	0.32	1.86	—	0.12	1.78
	TAMU	—	0.31	1.94	0.28	6.19	44.54	**	—	0.34	3.19	0.12	—	2.12
	Different 4-Yr.	**	3.26	33.54	**	3.00	41.87	0.19	0.14	3.07	31.22	2.31	3.08	40.71
	Original 4-Yr.	—	—	—	—	—	—	0.68	0.52	6.51	48.49	—	—	—
	CC	**	1.51	—	**	1.7	—	**	0.14	3.22	—	1.59	1.61	46.57
Observations			3,498			4,232			35,276				18,169	

Panel B: BA Recipients Sample

	Second Institution Attended:	First Institution Attended: UT			TAMU			Other Four-Year						
		TAMU	4-Year	CC	UT	4-Year	CC	UT	TAMU	4-Year	CC	UT	TAMU	4-Year
Third Institution Attended:	UT	**	9.46	49.62	—	0.37	2.17	—	0.03	0.42	2.42	—	0.23	4.04
	TAMU	—	0.34	2.31	**	7.18	48.07	**	—	0.48	4.42	0.28	—	5.16
	Different 4-Yr.	**	3.44	34.45	**	2.86	38.92	**	0.16	3.27	33.93	5.06	6.60	78.64
	Original 4-Yr.	—	—	—	—	—	—	0.9	0.66	7.45	45.65	—	—	—
	CC	**	9.46	49.62	—	0.37	2.17	—	0.03	0.42	2.42	—	0.23	4.04
Observations			2,642			3,466			23,734				6,833	

[1] Source: Authors' calculations from the University of Texas at Dallas Education Research Center data as described in the text. The "Attendee" sample consists of all students who attend college within two years of high school graduation. The "BA" sample consists of all BA recipients who obtain a degree by age 25 and who begin college within two years of high school graduation. First institution attended is the first post-secondary institution at which a student enrolls after high school graduation. The second institution attended is the subsequent institution in which the student enrolls in a non-summer semester. The third institution attended is similarly defined. Dual enrollment does not count as transferring nor does switching across community colleges.

[2] ** refers to the cell being too small to report without violating confidentiality: we are unable to report any tabulations that include less than 5 people. Each 3x5 block in Panel A and 3x4 block in Panel B would sum to 1 if the ** percentages were included in the table. "—" stands for no observations.

Table 4. Means of Selected Earnings and Background Characteristics for Earnings Sample

	UT Graduates			TAMU Graduates			Other Four-Year Graduates			
Variable	Direct Attendee	Other 4 → UT	CC → UT	Direct Attendee	Other 4 → UT	CC → UT	Direct Attendee	Other 4 → Other 4	Flagship → Other 4	CC → Other 4
Log Quarterly Earnings	0.132	-0.025	-0.068	0.175	0.092	0.086	-0.04	-0.066	0.004	-0.091
TAAS Math Score	56.339	54.218	53.251	56.045	54.034	53.313	53.079	52.519	55.559	51.597
TAAS Reading Score	45.479	44.726	44.181	45.35	44.274	43.811	43.696	43.462	45.008	42.71
TAAS Writing Score	37.727	36.841	36.315	37.453	36.16	35.835	36.043	35.844	37.266	35.178
Math Rank										
Top 10%	0.495	0.302	0.268	0.474	0.293	0.254	0.271	0.224	0.417	0.182
70^{th}-90^{th} %	0.33	0.32	0.313	0.343	0.344	0.319	0.325	0.319	0.377	0.301
Below 70^{th} %	0.176	0.378	0.419	0.183	0.363	0.427	0.403	0.457	0.206	0.517
Reading Rank										
Top 10%	0.466	0.324	0.315	0.455	0.297	0.26	0.291	0.25	0.427	0.206
70^{th}-90^{th} %	0.319	0.348	0.31	0.335	0.353	0.316	0.323	0.325	0.342	0.302
Below 70^{th} %	0.215	0.328	0.375	0.21	0.35	0.425	0.386	0.425	0.232	0.492
Writing Rank										
Top 10%	0.483	0.321	0.304	0.456	0.259	0.25	0.302	0.265	0.446	0.222
70^{th}-90^{th} %	0.321	0.353	0.316	0.33	0.346	0.316	0.32	0.321	0.329	0.298
Below 70^{th} %	0.197	0.326	0.379	0.214	0.395	0.434	0.378	0.415	0.225	0.48
Race/Ethnicity										
White	0.684	0.696	0.763	0.875	0.887	0.932	0.624	0.688	0.748	0.694
Hispanic	0.12	0.173	0.148	0.074	0.082	0.047	0.203	0.172	0.136	0.209
Black	0.036	0.024	0.022	0.023	0.009	0.007	0.126	0.104	0.029	0.057
Asian	0.158	0.107	0.065	0.027	0.019	0.012	0.045	0.035	0.086	0.038
Male	0.44	0.439	0.252	0.449	0.504	0.493	0.377	0.347	0.415	0.364
Gifted	0.439	0.259	0.252	0.393	0.208	0.168	0.228	0.191	0.394	0.135
At Risk	0.04	0.064	0.089	0.033	0.079	0.087	0.131	0.122	0.049	0.183
Male	0.936	0.935	0.941	0.965	0.968	0.975	0.85	0.893	0.931	0.86
Gifted	0.132	-0.025	-0.068	0.175	0.092	0.086	-0.04	-0.066	0.004	-0.091
Not Econ. Disadvantaged	56.339	54.218	53.251	56.045	54.034	53.313	53.079	52.519	55.559	51.597
Observations	17,583	1,286	2,017	20,153	1,733	5,150	61,274	9,524	2,023	34,602

The Earnings sample consists of graduates from a public Texas college or university who attend college within two years of high school graduation and who graduate within eight years. All earnings are measured from 2007-2009 and are restricted to those not concurrently enrolled in graduate school and for whom we observe at least three consecutive quarters of earnings. The Log Quarterly Earnings measure is the residual from a regression of quarterly earnings that fit our sample criteria on year, quarter, and birth cohort indicators.

Table 5. GPA and College Major Distribution for Earnings Sample

	UT Graduate			TAMU Graduates			Other Four-Year Graduates			
Variable	Direct Attendee	Other 4 → UT	CC → UT	Direct Attendee	Other 4 → UT	CC → UT	Direct Attendee	Other 4 → Other 4	Flagship → Other 4	CC → Other 4
GPA	3.12	3.07	3.03	3.07	2.95	2.94	2.99	3.01	3.18	3.02
Majors	0.00	0.00	0.00	11.65	20.08	24.97	2.81	2.24	1.94	3.09
Agriculture	13.13	14.21	16.16	6.54	7.97	7.93	11.74	11.65	11.40	11.39
Liberal Arts	5.12	4.74	7.19	8.96	11.66	13.46	9.97	11.05	8.26	15.55
Interdisciplinary Studies	13.26	14.35	15.07	2.16	2.25	1.94	6.31	5.66	5.57	4.60
Communications	2.93	1.32	1.24	1.30	0.92	0.49	1.82	0.99	3.11	1.13
Computer Science	12.31	6.61	6.35	18.10	14.65	11.17	6.32	4.02	7.17	3.31
Engineering	5.15	6.74	3.62	4.57	5.71	4.17	4.88	3.73	4.60	2.92
Biology	1.62	1.40	1.49	2.95	1.90	1.42	0.99	0.68	1.24	0.88
Math and Statistics	1.30	1.56	1.14	1.15	1.10	0.74	0.77	0.58	1.04	0.37
Physical Sciences	21.65	32.50	30.90	12.30	16.39	15.38	13.20	14.61	11.92	13.57
Social Sciences	23.17	17.18	16.86	28.53	17.37	18.35	41.18	44.78	43.77	43.18
Business & Support Serv.	3.12	3.07	3.03	3.07	2.95	2.94	2.99	3.01	3.18	3.02

Source: Authors' calculations from the University of Texas at Dallas Education Research Center data as described in the text.

Table 6. Differences in BA Attainment Rates by First and Last Institution Attended

	Last Institution Attended:						
	UT		TAMU		Other Four-year		
Controls	Other Four	CC	Other Four	CC	Other Four	Flagship	CC
No Controls	-0.041**	-0.443**	0.010	-0.159**	0.205**	0.474**	0.190**
	(0.069)	(0.045)	(0.083)	(0.049)	(0.014)	(0.031)	(0.008)
Demographic & HS	0.163**	-0.248**	0.081	-0.080*	0.172**	0.133**	0.267**
	(0.071)	(0.049)	(0.086)	(0.055)	(0.015)	(0.032)	(0.009)
Observations	35,842	37,671	34,520	39,563	178,749	157,510	261,275

[1] Demographic and High School (HS) variables are as described in section 1. Each cell is a separate regression, and in each column the sample is the set of direct attendees in the given sector and the set of students who begin at the given sector and whose last sector or sector of BA completion is the same as the direct attendees. Completers are those who complete college by the age of 25.

[2] Robust standard errors are in parentheses: ** indicates statistical significance at the 5% level and * indicates statistical significance at the 10% level.

Table 7. Differences in Earnings Between Direct Attendees and Transfers, Conditional on Graduation

	UT Graduates		TAMU Graduates		Other Four-year Graduates		
Controls	Other Four	CC	Other Four	CC	Other Four	Flagship	CC
No Controls	-0.156**	-0.200**	-0.083**	-0.089**	-0.026**	0.044**	-0.051**
	(0.018)	(0.015)	(0.014)	(0.009)	(0.006)	(0.012)	(0.004)
Demographic & HS	-0.114**	-0.137**	-0.069**	-0.060*	-0.019**	-0.003	-0.033**
	(0.018)	(0.015)	(0.014)	(0.009)	(0.006)	(0.012)	(0.004)
Demographic, HS & College	-0.065**	-0.084**	-0.010	0.009	0.005	0.014	-0.013**
	(0.017)	(0.015)	(0.013)	(0.009)	(0.006)	(0.012)	(0.004)
Observations	18,869	19,600	21,886	25,303	70,793	63,292	95,873

[1] Demographic controls and High School (HS) variables are as described Section 1. The college controls are college GPA at graduation and college major indicators. Definitions of "Direct Attendee" and "Transfer Students" follow the description in Section 1.
[2] Robust standard errors are in parentheses: ** indicates statistical significance at the 5% level and * indicates statistical significance at the 10% level.

Table 8. Differences in Earnings between Direct Attendees and Transfer Students Using Varying Reference Groups

	Reference Group:							
	Other 4 Direct Attendees		Other 4 Direct Attendees		Other 4 → Other 4		CC → Other 4	
Controls	UT Direct Attendee	TAMU Direct Attendee	Other 4 → UT	Other 4 → TAMU	Other 4 → UT	Other 4 → TAMU	CC → UT	CC → TAMU
No Controls	0.172**	0.215**	0.015	0.132**	0.041**	0.158**	0.023**	0.177**
	(0.005)	(0.005)	(0.016)	(0.013)	(0.016)	(0.014)	(0.012)	(0.008)
Demographic & HS	0.089**	0.151**	-0.032**	0.089**	-0.001	0.109**	-0.011	0.134**
	(0.005)	(0.005)	(0.015)	(0.009)	(0.017)	(0.014)	(0.012)	(0.008)
Demographic, HS & College	0.102**	0.124**	0.029	0.111**	0.031*	0.097**	0.020*	0.122**
	(0.005)	(0.005)	(0.015)	(0.013)	(0.017)	(0.015)	(0.012)	(0.008)
Observations	78,885	81,425	62,558	63,005	10,807	11,254	36,618	39,751

[1] Demographic controls and High School (HS) variables are as described Section 1. The college controls are college GPA at graduation and college major indicators. Definitions of "Direct Attendee" and "Transfer Students" follow the description in Section 1.
[2] Robust standard errors are in parentheses: ** indicates statistical significance at the 5% level and * indicates statistical significance at the 10% level.

Table 9: Differences in Earnings between Direct Attendees and Transfer Students Conditional on Graduation, By Race/Ethnicity

	UT Graduates		TAMU Graduates		Other Four-year Graduates		
Controls	Other Four	CC	Other Four	CC	Other Four	Flagship	CC
White							
No Controls	-0.164**	-0.215**	-0.084**	-0.094**	-0.028**	0.018	-0.060**
	(0.022)	(0.017)	(0.015)	(0.009)	(0.007)	(0.015)	(0.005)
Demographic & HS	-0.124**	-0.157**	-0.069**	-0.061**	-0.014*	-0.010	-0.042**
	(0.022)	(0.018)	(0.015)	(0.010)	(0.007)	(0.014)	(0.005)
Demographic, HS &	-0.079**	-0.097**	-0.008	0.009	0.009	0.006	-0.017**
College	(0.021)	(0.017)	(0.014)	(0.009)	(0.007)	(0.014)	(0.005)
Observations	12,920	13,564	19,164	22,428	44,794	39,755	62,273
Hispanic							
No Controls	-0.151**	-0.116**	-0.085	-0.073**	-0.023*	0.057*	-0.033**
	(0.042)	(0.036)	(0.049)	(0.039)	(0.014)	(0.032)	(0.008)
Demographic & HS	-0.123**	-0.067	-0.067	-0.029	-0.020	0.029	-0.006
	(0.043)	(0.038)	(0.051)	(0.043)	(0.014)	(0.031)	(0.008)
Demographic, HS &	-0.066	-0.039	-0.023	0.039	0.004	0.049	0.006
College	(0.041)	(0.036)	(0.048)	(0.041)	(0.013)	(0.031)	(0.008)
Observations	2,326	2,402	1,629	1,727	14,053	12,695	19,638
Black							
No Controls	-0.082	-0.027	-0.204	-0.155	-0.026	0.085	-0.058**
	(0.113)	(0.094)	(0.140)	(0.093)	(0.018)	(0.069)	(0.013)
Demographic & HS	-0.031	0.053	-0.170	-0.111	-0.022	0.024	-0.025*
	(0.121)	(0.102)	(0.151)	(0.104)	(0.018)	(0.069)	(0.013)
Demographic, HS &	-0.076	0.028	-0.129	-0.035	0.008	0.044	-0.001
College	(0.114)	(0.097)	(0.140)	(0.098)	(0.018)	(0.066)	(0.013)
Observations	664	678	480	501	8,721	7,788	9,707
Asian							
No Controls	-0.062	-0.168**	-0.019	-0.095	-0.078**	0.056	-0.123**
	(0.055)	(0.057)	(0.104)	(0.078)	(0.034)	(0.046)	(0.020)
Demographic & HS	-0.035	-0.077	-0.105	-0.149	-0.062*	0.017	-0.080**
	(0.056)	(0.060)	(0.111)	(0.090)	(0.034)	(0.047)	(0.021)
Demographic, HS &	-0.032	-0.048	-0.115	-0.126	-0.018	0.040	-0.052**
College	(0.051)	(0.055)	(0.104)	(0.086)	(0.033)	(0.044)	(0.020)
Observations	2,916	2,910	577	606	3,103	2,947	4,083

[1] Demographic controls and High School (HS) variables are as described Section 1. The college controls are college GPA at graduation and college major indicators. Definitions of "Direct Attendee" and "Transfer Students" follow the description in Section 1.

[2] Robust standard errors are in parentheses: ** indicates statistical significance at the 5% level and * indicates statistical significance at the 10% level.