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Guaranteed Transfer Policies and Post-Secondary Outcomes

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September 30, 2011

Abstract

Community colleges are a large part of the nation's higher education system and provide an important access point to post-secondary education for many students. Transfer to a four-year institution is one of the many functions served by community colleges. Despite the importance placed on the transfer function, the transfer process between higher education institutions can be confusing. A variety of policies have been instituted to address the uncertainty present in the transfer process. States have formalized and expanded pre-existing institutional transfer agreements to provide clearer linkages between two-year and four-year institutions of higher education, although many schools maintain institution-to-institution agreements. This paper explores the effects of the transfer admission guarantees (TAG) between California Community Colleges and some University of California (UC) campuses. Specifically, we investigate the impact of TAG policies on enrollment at community colleges, transfer rates, and graduation rates. Our analyses show a positive relationship between TAG and community college enrollment with mixed results on transfer and graduation rates. There is no association between TAG and grade point average (GPA) attained by transfer students.

*The author acknowledges support from the Institute of Education Sciences Grant R305B090011-10 to Michigan State University. The opinions expressed within are those of the author and do not represent the views of U.S. Department of Education.

I. Introduction

Community colleges educate a growing number of students, with enrollment growing from roughly 27 percent of undergraduate post-secondary students in 1970 to over 36 percent by 2008 (U.S. Department of Education 2010). Over the past several decades, policymakers have paid increasing attention to student transfer between two-year and four-year institutions. In response to perceived low levels of transfer, postsecondary institutions and state governments have instituted policies aimed at easing transfer. The effectiveness of these policies has implications for both individuals and state governments, because a year of education at a community college is less expensive for both students and states than a year of education at a four-year public university.

The specific policy we will study is a transfer admission guarantee for students transferring from California community colleges to particular University of California (UC) campuses. A February 1996 Research Synopsis from UC Davis discusses the admission guarantee policy as it relates to both students and UC Davis. In particular, they say

“Transfer Admission Agreements [later TAG] benefit both students and the campus. By concentrating on a specific set of courses, students can reduce the time spent preparing for transfer. The campus gains by enrolling students with more focused preparation for upper division major coursework; such preparation could lead to improved student performance and reduce the time needed to complete a degree.” (p. 1)

It is clear from this statement that the administrators and campuses who put this policy in place believed that it would have positive effects on transfer students. These benefits are twofold. First, they believe that the TAG program would reduce the time-to-transfer by focusing students on specific courses and a required grade point average (GPA). Second, transfer students would perform better at the four-year campus and graduate more quickly, due to better pre-

transfer preparation. The goal of this paper is to investigate whether these expectations are met or if there are unintended negative consequences to the policy.

This paper examines transfer policies in the state of California. Previous studies in this area have concentrated on state-level policies and generally found little association between transfer policies and postsecondary student outcomes. Focusing instead on detailed data from one state allows for an analysis of institution-to-institution policies, which may be particularly relevant to students. California is a particularly rich source of data on transfer policies, as its 112 community colleges form the largest higher education system in the nation, serving almost 750,000 full-time equivalent (FTE) students in 2008. California is unique in having a long history of transfer agreements that guarantee the option to transfer to selected University of California (UC) campuses for community college students who have completed a required number of credits and maintained a minimum GPA. We study the effects of these transfer admission guarantees (TAG) on community college outcomes, transfer between two-year and four-year institutions, and bachelor's degree outcomes and graduation rates of transfer students.

We find evidence that TAG policies increase freshman enrollment at community college campuses. TAG shows little relationship to transfer rates for students beginning at community colleges and transferring to the UC system. In addition, graduation rates for students who transferred from community colleges to the UC system are not related to TAG, implying that the average quality of transferring students does not decline in the presence of TAG policies even though the number of transfers increases. Additionally, we find no change in transfer student grade point average (GPA) at UC campuses, further suggesting no change in the average quality of transfer students.

Section II describes the environment of higher education in California, discusses the particular guaranteed transfer policy of interest, and reviews the relevant literature. Section III describes the data used in the analysis. Section IV discusses the methods used to evaluate this particular policy. Section V presents the estimation results, and Section VI provides a discussion and conclusion.

II. Background

Transfer in California

California public higher education consists of three systems: the University of California (UC), California State University (CSU), and the California Community Colleges (CCC). There are currently 9 UC, 23 CSU, and 112 CCC campuses serving undergraduates in California.

Figures 1 and 2 show maps of the UC and CCC systems, respectively.

Figure 3 shows transfers to the UC system over time. Transfers rose dramatically between 1985 and 2010, and this upward trend is similar regardless of whether the measure of transfers includes only transfers into UC campuses or, more inclusively, transfers into all public four-year universities in California. The downward trend in transfers to the UC system beginning in 1993 prompted the UC campuses to agree to try and increase transfer students, which resulted in a 1997 policy change.

The Memorandum of Understanding (MOU) in 1997 began a renewed focus on transfer students into the University of California system. In response to concern over the declining rates of transfer between the California Community Colleges and the UC system beginning in 1993, the MOU re-asserted the transfer role and set transfer targets. The signing of this agreement set off a new wave of expansion of the transfer guarantee programs in California. UC campuses that

already had transfer agreements in place, such as UC Davis, UC San Diego and UC Santa Cruz extended those agreements to more community colleges. Other campuses initiate transfer guarantee: for example, UC Irvine and UC Santa Barbara began their programs after 1997.

There were several other transfer-related policies in place in California during this time. One is the Intersegmental General Education Transfer Curriculum (IGETC), which fulfills lower-division general education requirements at both UC and CSU campuses. The “Access to Transfer Information for Community College Students Act”, passed by the California State Legislature in 2000, required community colleges to publicize IGETC so that students would know what courses and credits were transferable. The passage of this act suggests that the IGETC may not have been effective prior to 2000 because students may not have known about its existence.

The Articulation System Stimulating Interinstitutional Student Transfers (ASSIST) website (www.assist.org) lists all of the course articulation agreements between each community college and four-year campus in California. While the ASSIST website guides students about particular courses that transfer, the admission guarantee policy is much broader in that it is a guarantee of admission for meeting certain requirements.

Transfer Admission Guarantee (TAG)

The policies known as Transfer Admission Guarantees (TAG) in California have also been called Transfer Admission Agreements (TAA), Guaranteed Admission for Transfer Entry (GATE – at UC Santa Cruz), and Preliminary Admission in the Field (PAIF – at UC Irvine). The TAG policy, begun at UC Davis in the mid-1980’s, expanded to other UC campuses during the 1990’s and early 2000’s. Students typically sign these agreements at the beginning of their

second year of community college to apply for admission to a UC campus in the following fall. Students using TAG are considered junior-level transfers. In order to sign the agreement, students generally must have completed 30 transferable semester (45 quarter) units. In addition, many TAG agreements require a minimum grade point average (GPA), which may vary by campus and by major within campus. The GPA requirements ranged from 2.8 to 3.2 during the years we consider below. Students must maintain the minimum GPA and complete a specified number of credits by the spring before they transfer.

Students do not need to sign a TAG agreement in order to be admitted to a UC campus. However, signing a TAG allows for early review of student records and a guarantee of admission to the campus. Community college students who do not sign a TAG are given priority but not guaranteed admission to a UC campus. In general, the requirements for signing a TAG are more stringent than those needed for regular transfer admission. For example, the GPA minimum for TAG agreements is higher than regular transfer admission GPA. Nonetheless, the benefits of guaranteed admission are sufficient to encourage a non-trivial portion of transfer students to sign a TAG.

The number of students signing TAGs varies from campus to campus. According to the UC Davis Research Synopsis reports from 1996 and 2000, the number of TAGs (then called TAAs) signed at UC Davis was 202 in 1987-88, 792 in 1994-95, and 716 in 1998-99. These agreements accounted for 23%, 44%, and 40%, respectively, of entering community college transfer students in those academic years. In 1994-95, 35% of all entering transfer students signed an agreement. The number of TAGs submitted to UC Davis for review in 2009-10 exceeded 3,000. However, the number of TAGs signed was much lower at UC Merced, with only around 200 students signing a TAG in 2009-10. Students who sign TAGs are more likely to

enroll in UC Davis than transfer students admitted without signing a TAG. For example, in 1998-99, 62% of TAG signers enrolled at UC Davis, compared to 50% of other advanced standing applicants.

In 2007, the seven UC schools that use admission guarantees agreed to a common name – Transfer Admission Guarantee (TAG). In addition, the UC campuses decided to use a common TAG application form for all campuses. The TAG application became available on-line in the summer of 2010, for students seeking fall 2011 admission. While UC Berkeley and UCLA do not participate in the TAG program, they do offer priority admission to CCC transfer students.

In many ways the California experience with Transfer Admission Guarantees (TAG) provides ideal variation to study the effect of policies on transfer students' experiences. Since 1997, the TAG agreements have grown in two ways. First, they rolled-out across the UC campuses over time, with the exception of Berkeley and UCLA. Second, for some UC campuses the agreements generally began regionally and then expanded to include community colleges across the state of California. For example, UC Davis expanded its program from 56 community colleges in 2000, to 94 partner colleges by fall 2008. UC Santa Cruz expanded its TAG program from 20 community colleges in 2000, to 90 in 2001, and then to 102 by 2008. This analysis examines the expansion of the TAG policy after 1997. The empirical analyses described below will use both of these sources of variation in exposure to the TAG policy to identify the effects of TAG on post-secondary outcomes.

Relevant Literature

Several papers look at whether there is an association between state transfer policies and student outcomes. The datasets used are the National Education Longitudinal Study (NELS)

88/2000, and the Beginning Postsecondary Students (BPS) 89/94 longitudinal study. The most common outcomes studied are the probability of transfer, and, conditional on transfer, the probability of receiving a bachelor's degree as well as time-to-degree. So far, the bulk of research concludes that the presence of a state policy does not increase the transfer rate between 2-year and 4-year institutions.

The studies that use the NELS:88/2000 are Goldhaber and Gross (2009), Roksa and Keith (2008) and Reynolds (2007). In most of the studies, there is a dummy variable indicating whether or not a state had a transfer or articulation policy in a given year. Goldhaber and Gross (2009) attempt to classify 'strong' and 'weak' policies. However, even after trying to account for the differences in state policies, the authors find only small effects on transfer. Gross and Goldhaber next investigate if state policies have differential effects for minority students or for first-generation college attendees. They find that state policies are associated with higher odds of transfer for Hispanic students. Roksa and Keith (2008) investigate the outcomes of transfer, bachelor's degree attainment, and time-to-degree. They find no effect of a state transfer policy on these outcomes. The policy variable they use, an indicator for whether a state has a policy, does not exactly match the policy indicator used by Gross and Goldhaber. Reynolds, in a 2007 dissertation, tries to look at the effect of state policies on students by using propensity score matching. He matches students who have similar characteristics on the outcome of living in a state with a transfer policy. He also runs his analysis separately for men and women. Reynolds' paper is the only one that finds an effect of state articulation policies on student outcomes.

Anderson, Sun, and Alfonso (2006) use the BPS 89/94 to look at transfer rates between two-year and four-year institutions. They define their policy as presence of a legislated transfer

policy in a state by 1991. They find no effect of presence of a transfer policy on transfer in a state.

Two studies examine the relationship between California's transfer agreements and early post-secondary outcomes of transfer and junior-year GPA at the transfer UC campus. The first study finds a relationship between a community colleges transfer rate and the use of Transfer Admission Agreements (TAAs) and Transfer Admission Guarantees (TAGs) (Transfer Velocity Project, RP Group, 2010). In particular, the Transfer Velocity Project showed a positive association between a community colleges transfer rate and the number of students signing TAAs or TAGs with a UC or CSU institution. We use the same outcome in our analysis to supplement our main findings.

The second study by Dupraw and Michael (1995) studies the early outcomes of TAG transfer students and UC San Diego (UCSD). They compare junior GPA at UCSD for students who transferred with a TAG to community college students who transferred without a TAG, and to students who began their studies as freshman at UCSD (known as native students). Their data covers three cohorts of transferring students, from fall 1988 to spring 1991. This period was in the very early stages UCSD's TAG program with only a few local community colleges participating. The authors find that both types of transfer students obtain roughly the same GPA, and that this GPA is only slightly lower than that received by students who entered the university as freshman. Transfer students who earned a higher community college GPA were less likely to face academic probation at UCSD due to poor academic performance. The authors relate this higher level of academic success to the increase in the GPA requirement for TAG students from 2.4 in fall 1988 to 2.8 in fall 1990. We expand on these two studies by analyzing graduation rates of transfer students in addition to transfer rates and GPA.

Ehrenberg and Smith, 2004 assess two-year and four-year institutions in New York based on transfer and graduation rates. The authors have access to persistence, graduation, and dropout data for transfer students from two-year to four-year schools in the SUNY system. The data is observed at the pair level; that is they know the two-year sending institution and the four-year receiving institution. Their methodology models transfer students outcomes after three years as a function of the two-year college and four-year college a student attended, the year a student transferred, the distance between the two-year and four-year college, any degrees earned prior to transfer, and local labor market conditions. Overall, the authors find that some schools are more successful than others at promoting transfer and degree completion. We have a similar data structure and will employ similar estimation methods discussed in greater detail in the methodology section.

None of the studies listed above is able to take advantage of policy changes over time, which may be one reason why they find little relationship between state transfer policies and post-secondary outcomes. In addition, several of these studies look at state-level policies. One reason nationally representative studies may not show a relationship is that there might be many other differences between states that are hard to control for. State level studies show more promising results.

Data

The data used in the analysis comes primarily from publicly available data at the California Postsecondary Education Commission (CPEC) website¹. The data includes regular freshman

¹ According to the CPEC website, the agency and website will close sometime in fall 2011. This message is posted on their website: “Funding for CPEC has been eliminated from the 2011-12 state budget; as a result, the agency will close in fall 2011. CPEC’s closure will affect this website and other agency resources. This website will likely cease to exist sometime in September 2011.” (<http://www.cpec.ca.gov/>, last accessed August 22, 2011)

enrollment at each community college, transfers between each two-year and four-year public institution in California, and bachelor's degree outcomes for transfer students at the four-year campuses. Regular freshman enrollment includes full-time and part-time freshman students enrolled for credit at each community college. The transfer data covers both fall-term and full-year transfers from each community college to each UC campus.² Enrollment and transfer data is coded as occurring in the fall of the academic year.

Bachelor's degree data consists of the number of bachelor's degrees received each year at each public four-year institution by transfer students from each sending community college. Unlike the transfer data, the bachelor's degree data is coded as occurring in the spring of the academic year. That is, students who receive a bachelor's degree in the 1998-1999 academic year are coded as receiving that degree in 1999.

The data publicly available from CPEC provides snapshots of enrollment, transfer, and graduation, but does not follow cohorts of students over time.³ As a result, we cannot generate cohort-level transfer or graduation rates. However, we do use these snapshots to approximate transfer and graduation rates at both the pair-level and the community college level. We supplement these calculated rates with community college level cohort transfer and graduation rates publicly available from other data sources.

² Data on transfers between community colleges, and from community colleges to in-state private or out-of-state institutions is not available for all years and missing for some institutions. As a result, this transfer data will not be used in the analysis.

³ For example, the pair-level transfer data gives the number of students transferring between community college *j* and UC campus *h* in a particular year, but provides no information on when those students entered the community college. As a result, some of the students may transfer after one year, while others transfer after two, three, or more years. Similarly, pair-level bachelor's degree data reports the number of transfer students from community college *j* that received a bachelor's degree at UC campus *h* in year *t*, but does not note when students transferred. Data linking students over time was not available.

Community college level transfer rates are available from the California Community College Chancellor's Office. This data include one- to four-year transfer rates for cohorts from 1997-98 to 2004-05. The Transfer Velocity Cohort Report, which provides the data tracks cohorts of student over time and calculates transfer rates into four-year institutions across the country.⁴

Cohort persistence rates, graduation rates, and GPA data come from University of California StatFinder.⁵ Specifically, the data measure one-year persistence rates, two- to four-year graduation rates, and one-year and graduation GPA for students from each community college into the UC campus system. One-year persistence rate and one-year GPA are measured from 2000 to 2007, two-year graduation rates from 2000-2006, three-year graduation rates from 2000-2005, and four-year graduation rates and graduation GPA from 2000-2004. The community college level transfer and degree outcome data, as well as community college level transfer and graduation rates constructed from the CPEC data, are used to supplement the pair-level analysis.

The policy variable was compiled mainly from information in the Answers for Transfers publication from the University of California. Other sources, including campus reports, email correspondence with Admissions and TAG representatives at the UC campuses, and on-line searches supplemented the Answers for Transfers information. The policy variable is given at the community college – UC campus pair level. That is, each community college is linked to each UC campus. The TAG policy is coded as zero in years when the policy did not exist between the campus pair, and switches to one the fall of the first academic year that transfer students were accepted. As a result, each pair of campuses has one TAG policy variable that can switch from zero to one. Three policy variables are constructed to measure exposure to TAG at

⁴ A report on the methodology used to calculate the transfer rates can be found at <http://webprod.cccco.edu/datamartrans/dmtrnsstucsel.aspx>.

⁵ Data can be found at: http://statfinder.ucop.edu/reports/schoolreports/summary_reports.aspx

each community college. These variables are described in the Methods section below. This paper analyzes the implementation of the TAG policy after 1997. The Policy Appendix contains information on the policy date for each pair.

Other covariates include county-level employment rates, median household income, county population, county population growth rate, percent male, percent white, and percent in age categories zero to 14, 15 to 29, and 30 to 49. Specifically, these variables are associated with the county where the community college is located. These variables are included as controls to account for possible outside labor market opportunities.

Currently, there are 112 community colleges in California, although two were added after the period of this study. There are 107 community colleges that are open for the entire period of the study. For right now, we restrict our analysis to these colleges as we gather particular information on when new colleges were added. See Figure 2 for a map of the California community colleges.

There were eight UC campuses open during the entire study period. UC Merced opened in 2005-06. Figure 1 shows a map of the UC system. UC Berkeley and UCLA never had the TAG policy while UC Riverside had a TAG with all California community colleges by 1997. Complete TAG policy data was not available for UC Irvine. Therefore, the policy variation comes from schools added to the TAG program at UC Davis, San Diego, Santa Barbara, and Santa Cruz. Table 1 shows the number of community colleges that had a TAG with each UC campus over time. Of the UC campuses with a policy change, UC Davis had the most agreements, with 56 community colleges, as of 1997. On the other hand, UC Irvine and UC Santa Barbara did not have a guaranteed transfer program in place in 1997. By 2009, the UC

campuses with a TAG program had added all community colleges, with the exception of UC Santa Cruz.

III. Methods

This project explores the relationship between the TAG policy and post-secondary outcomes of students who begin their studies at community colleges. Outcomes of interest include transfer rates, persistence, and graduation rates. Analysis of post-secondary outcomes takes advantage of both community college level and dyad data connecting each community college to each UC campus. Before we turn to the empirical specification, we define the outcomes of interest and main independent variable.

Dependent variables

The research question of interest is the effect of TAG on transfer and graduation rates. The transfer rate is a measure of the number of students who begin at a community college and transfer to a four-year institution. We generate a pair-level transfer rate taking transfers from each community college to each UC campus in a given year and dividing by the average regular freshman enrollment for the prior three years.⁶ This rate is then multiplied by 10000. The averaging in the denominator is intended to account for varying time-to-transfer. This transfer rate is created as

$$\text{TransferRate}_{jht} = 10000 * (\text{Transfers}_{jht}) / (\text{average regular freshman enrollment at CC } j \text{ years } t-1 \text{ to } t-3)$$

⁶ The transfer and graduation rates generated here are similar to the Averaged Freshman Graduation Rates (AFGR) calculated for public high school students by the Department of Education (Chapman, Laird, KewalRamani, 2010, p. 12, <http://nces.ed.gov/pubs2011/2011012.pdf>)

A community college level transfer rate can be constructed in a similar manner. The denominator remains the same as above, but now the numerator measures transfers from each community college to all UC campuses.⁷ Alternatively, the numerator can measure transfers into the four UC campuses for which we have full policy information.⁸

Pair-level and community college level graduation rates are also calculated. The graduation rate is a measure of the fraction of community college transfer students who obtain a bachelor's degree. For a pair-level graduation rate the numerator is the number of bachelor's degrees awarded to transfer students from community college j to UC campus h in a given year. The denominator is the average of lagged transfers into the UC campus. We use the average of two- to four-year lags of transfers as the denominator because the UC system reports two-, three-, and four-year graduation rates. Specifically,

$$\text{GraduationRate}_{jht} = 100 * (\text{bachelor's degrees}_{jht}) / (\text{average transfers from CC } j \text{ to UC } h \text{ years } t-2 \text{ to } t-4)$$

For the community college level graduation rate at the UC campuses the numerator becomes bachelor's degrees given at all UC campuses to transfer students from community college j in year t . The denominator is now the average of lagged transfers from each community college into the UC system as a whole.⁹ We can also define the graduation rate using only the four UC campuses for which we have complete TAG policy information.¹⁰

⁷ $\text{TransferRate}_{jt} = 100 * (\text{Transfers to UC}_{jt}) / (\text{average regular freshman enrollment at CC } j \text{ years } t-1 \text{ to } t-3)$

⁸ That is, total transfers from community college j to UC Davis, San Diego, Santa Barbara, and Santa Cruz.

⁹ $\text{GraduationRate}_{jt} = 100 * (\text{UC bachelor's degrees}_{jt}) / (\text{average transfers from CC } j \text{ to UC system years } t-2 \text{ to } t-4)$

¹⁰ The numerator is bachelor's degrees conferred on transfer students from community college j to the four UC changer campuses. The denominator is the two- to four-year lagged transfers from community college j into those same four UC campuses.

At the community college level cohort transfer and graduation rates are available for each community college. These variables were discussed in the Data section. Freshman enrollment is also used as a dependent variable in the community college level analysis.

Defining TAG policy variables

All of the variation in TAG policy comes from the four UC campuses that expanded TAG after 1997 and for which we have complete policy data (Davis, San Diego, Santa Barbara, and Santa Cruz).

When using pair-level data, the TAG policy is quite straightforward. The TAG policy variable, TAG_{jht} , is an indicator variable that equals one if the community college and UC campus pair has an admission guarantee in year t . It equals zero otherwise. When looking at pair-level transfer rates, the TAG policy is defined in the same year as the outcome. However, the TAG policy is lagged three years in graduation rate specifications to approximate the policy in place at the time of transfer.

There are several ways to think about defining the TAG policy faced by students when conducting analysis at the community college level. First, we consider an indicator variable for whether the community college has a TAG agreement with any of the four UC campuses listed above. This variable, called $AnyTAG_{jt}$, is equal to one if there is a TAG agreement with any UC campus and equal to zero otherwise. A second option for defining TAG at the community college is to look at the number of TAG agreements with the four UC campuses listed above, $\#TAG_{jt}$. This variable ranges from zero to four over the study period. Finally, we can define

TAG policy as the number of TAG agreements each community college had with UC campuses for which there was an average of five or more transfers between the pair pre-TAG, #TAG5jt.¹¹

We now turn to the empirical model using the expansion of the TAG policy to estimate a differences-in-differences model.

Empirical Specification

Pair-level estimation

First, we conduct a pair level analysis to exploit the expansion of the TAG policy to each community college-UC campus pair. The estimating equation relates transfer and graduation rates to the admission guarantee policy, and other characteristics in the community college county. These outcomes are measured in year t for individuals who transferred from community college j to four-year UC campus h . In the case of transfer rates, the year t is the fall of the academic year in which the student transferred. When using graduation rates as the outcome, the year is the spring of the academic year in which the student graduated with a bachelor's degree.

Specifically, we will estimate

$$\text{TransferRate}_{jht} = \alpha + \beta \text{TAG}_{jht} + \eta X_{jt} + \lambda_t + \theta_{jh} + \varepsilon_{jht} \quad (1)$$

where X_{jt} is a set of county labor market and demographic characteristics. This includes the county employment rate, median household income, total county population, county population growth, percent male, percent white, and percent in age categories zero to 14, 15 to 29, and 30 to 49. Equation (1) also includes a set of year dummies, λ_t , and a random error term ε_{jht} . The θ_{jh} are pair fixed effects. The data used in this project is not student-level data, so there are no student demographic characteristics. $\text{TransferRate}_{jht}$ in equation (1) is constructed as defined above. The

¹¹ Average transfers between each community college and UC campus are calculated for the three years prior to implementation of the TAG policy for those pairs that added TAG after 1997. For pairs that had a TAG policy as of 1997, average transfers are calculated for the years 1994 to 1996.

TAG policy variable, TAG_{jht} defined above, equals one if the community college and UC campus pair has an admission guarantee in year t and zero otherwise. When looking at pair-level transfer rates, the TAG policy is defined in the same year as the outcome.

Transfer is an intermediate outcome but the goal of transfer policies is to help students attain bachelor's degrees. Therefore, graduation rates are perhaps a better way to evaluate transfer policies. To analyze the effect of the TAG policy on graduation rates we estimate

$$\text{GraduationRate}_{jht} = \alpha + \delta \text{TAG}_{jh,t-3} + X_{jt} + \lambda_t + \theta_{jh} + \varepsilon_{jht} \quad (2)$$

where $\text{GraduationRate}_{jht}$ is defined above. The TAG variable represents a three-year lag of the TAG policy in (1). For example, the three-year lag means that students obtaining a bachelor's degree in the 1999-2000 school year (coded as 2000), are given the value of the TAG policy in 1997. All other variables are defined above in equation (1).

Equations (1) and (2) are estimated for each UC campus separately, as well as pooled across UC campuses. UC Irvine and UC Merced are not included in any specification due to incomplete policy information and low number of bachelor's degree outcome observations, respectively. Pooled regressions include the remaining seven UC campuses. Additionally, some specifications analyze just the four campuses that expanded TAG during the study period. All pooled regressions contain UC campus-by-year fixed effects.¹²

Community-college level estimation

In addition to pair-level analysis, we conduct an analysis using community college level outcomes. Outcomes of interest include freshman enrollment, transfer rates, and graduation rates. We construct community college level transfer and graduation rates as

¹² These dummy variables account for different time paths at each UC campus. Figure 5 plots the coefficients on these dummy variables for the regression results found in column (5) of Table 3.

described above. In addition, we take advantage of publicly available cohort-level transfer and graduation rates for each community college. The outcomes are measured in year t for community college j . Specifically, we estimate

$$Y_{jt} = \alpha + \beta \text{TAG}_{jt} + \eta X_{jt} + \lambda_t + \theta_j + \varepsilon_{jt} \quad (3)$$

where X_{jt} and λ_t are as described in equation (1) above. Equation (3) also includes a random error term ε_{jt} . The θ_j are community college fixed effects. The TAG policy variables are lagged three years when using our calculated graduation rates as the outcome.

Of interest is the coefficient β on the variable TAG_{jt} . Three measures of the TAG policy, AnyTAG_{jt} , $\#\text{TAG}_{jt}$ and $\#\text{TAG5}_{jt}$ described above are used in equation (3). Y_{jt} in equation (3) represents freshman enrollment, transfer rates into the UC system, and graduation rates for transfer students from the UC system. One-year persistence rates and UC grade point averages (GPA) for transfer students are also considered as dependent variables.

IV. Results

Descriptive statistics are given in Table 2. The always TAG group is defined as those pairs having an agreement by 1997. The never TAG designation consists of Berkeley, UCLA, and several UC Santa Cruz pairs. Note that fall transfers and bachelor's degrees awarded are much higher for the pairs that always had a TAG or never had a TAG. Figure 3 shows trends in transfer to the UC system over time. In general, transfers are rising. After 1997, transfers rise steadily until 2005 when they dip and then begin rising again. Figure 4 shows trends in fall transfers to each UC campus. Transfers are generally rising over time. The jump in fall transfers at UCLA in the early 2000s appears to result from a change in policy of admitting transfer students year-round, to only admitting transfer students in the fall.

Pair-level results

Table 3 gives the main results for the baseline specification in equation (1). Columns (1)-(4) show campus-specific results, while column (5) pools across campuses that changed TAG during the period. All specifications include year and pair fixed effects. The only significant coefficient on the TAG policy variable is 3.11 in the regression for UC Santa Cruz. The TAG policy at UC Santa Cruz is associated with an increase in transfer rate from community colleges to Santa Cruz. All other coefficients on the policy variable are statistically insignificant, with mostly positive coefficients. Overall, there appear to be slightly positive effects of TAG on transfer rates, but the relationship is only significant at one UC campus.

Table 4 shows results for pair-level graduation rates. Note that some community colleges and some years are dropped due to zero transfers between pairs. Some observations are also dropped due to using the third lag of the TAG policy variable. Again, columns (1)-(4) give results for each campus, and column (5) pools campuses that expanded TAG. None of the coefficients on the lagged TAG policy variable is significantly different from zero. The results are mixed with some positive and some negative coefficients. Overall, TAG is not associated with significant increases or decreases in the pair-level graduation rate.

To provide a more complete picture of the timing of the effect of the TAG policy, the analysis also employs an event history methodology.

$$Y_{jht} = \alpha + \sum \pi_k D_{jh} 1(t - T_{jh} = k) + \eta X_{jt} + \lambda_t + \theta_{jh} + \varepsilon_{jht} \quad (4)$$

where Y_{jht} measures either transfer rates or graduation rates for students transferring from community college j at UC campus h in year t . D_{jh} is a dummy variable equal to one if the pair ever got a TAG agreement, and equal to zero otherwise. The indicator function $1()$, is equal to

one if the pair is k years from the enactment of the TAG agreement. The omitted category is the year in which TAG is enacted between the pair. All specifications include year and pair fixed effects. Estimation of equation (4) is done using a balanced panel where each pair is observed for two years pre-policy and two year post-policy. Note that the number of observations is very small for some specifications.

Table 5 shows results for the event history analysis using pair-level transfer and graduation rates as the outcome. For the full-year transfer rate regressions, the only significant coefficient is an increase in the transfer rate to UC Davis in the first year of the TAG policy. No other coefficients are significantly different from zero. The pair-level graduation rate analysis also produces mostly insignificant coefficients. The exceptions are the coefficients for UC Davis, which are positive pre-policy and negative in the two years following implementation of TAG. Overall, UC Davis is the only campus to show statistically significant coefficients on the TAG policy variables in the event history specification. We now turn to a community college level analysis of enrollment, and transfer and graduation rates.

Community college level results

In addition to a pair-level analysis we conduct analysis at the community college level. This allows us to look at enrollment responses to TAG as well as add publicly available cohort transfer and graduation rates. In general, the community college level results match the pair-level results in finding little association between TAG and transfer or graduation rates.

Table 6 shows results relating TAG to freshman enrollment at community colleges. Columns (1)-(3) relate to regular freshman enrollment, while columns (4)-(6) and (7)-(9) cover full-time and total freshman enrollment respectively. TAG is positively and significantly related

to freshman enrollment in all but one specification. The estimates range from just over six percent to just over nine percent of average enrollment in each category depending on the specification used. Regular freshman enrollment is the measure of enrollment used in the denominator when calculating transfer rates.

Table 7 shows regression results using community college level transfer rates as the outcome. Columns (1)-(6) use transfer rates calculated from the CPEC data as the outcome, while columns (7)-(9) use cohort three-year transfer rates. TAG appears to have little association to the transfer rates we calculate using the CPEC data. Column (5) shows the only significant coefficient, a -0.10. All other coefficients in columns (1)-(6) are not statistically significant and include both positive and negative coefficients. However, TAG is positively and significantly related to cohort three-year transfer rates regardless of the TAG definition used. The cohort transfer rates only look at transfer-ready students who have taken preparatory transfer coursework. In addition, they include transfers to all four-year institutions, not just into the UC campuses. Therefore, it is not clear from the three-year cohort transfer rate whether there is an increasing transfer rate into the UC campuses. These results do not provide conclusive evidence of increasing transfer rates into UC campuses related to TAG implementation, although transfer rates do not significantly decrease.

Regression results using community college level graduation rates are provided in Table 8. Panel A shows the results for community college level graduation rates that we calculated using the CPEC data. Positive and statistically significant coefficients appear in columns (2), (4), and (5). The presence of any TAG agreement is associated with an increase in graduation rate of between eight and ten percent in columns (2) and (5). However, these effects are not consistent across columns and statistical significance depends on which TAG policy variable is

used. Panel B gives results from regressions using cohort persistence and graduation rates, and graduation GPA as the outcomes. The policy variable is not lagged for the cohort regressions because we know the year of transfer and assign TAG as the policy in place when the cohort transferred. The two-year graduation rate is positively and significantly related to TAG when the policy is measured as the number of TAGs with UC campuses where pre-TAG transfers were five or greater. There appears to be no relationship between TAG and persistence and three- or four-year cohort graduation rates. Columns (16)-(18) in Panel B show little relationship between TAG and graduation GPA of transfer students at UC campuses. The coefficient on TAG in column (18) is negative; however, it represents a practically small change in GPA. Overall, Panels A and B of Table 8 show that graduation rates either remain the same or increase slightly depending on the specification. Graduation GPA does not change much as a result of TAG. Taken together, the results from Table 8 suggest little change in the quality of transfer students into UC campuses associated with TAG.

Sensitivity Checks

The results presented above show little relationship between the TAG policy and transfer and graduation rates. However, additional specifications should be considered to assess the robustness of the results to the estimation methods used. Supplementary techniques are discussed below. The robustness checks are included in the Appendix.

First, we estimate equation (1) using only those pairs that had an average of five or more transfers between them in the three years prior to adoption of TAG. Table A1 shows the results of this estimation. Columns (1)-(4) contain campus-specific regressions, while column (5) shows the results pooled across the four campuses for which we have complete policy

information. Many of the regressions show a negative relationship between TAG and transfer rates. However, the coefficient on TAG is not statistically significant in any specification. The results using this restricted sample match the general transfer rate analysis above.

We estimate equations (1) and (2) using level of transfers and bachelor's degrees conferred on transfer students as the outcomes. That is, we change the dependent variables from rates to levels, using the numerator as the new outcome. Table A2 contains results for these regressions. Columns (1)-(4) and (6)-(9) contain campus-specific results, while columns (5) and (10) pool across the four UC campuses. There is a positive association between TAG and level transfers at all campuses except UC Davis. The effect is statistically significant at UC Santa Barbara and Santa Cruz. The results for bachelor's degrees are similar, with positive coefficients on the third lag of the policy variable except for at UC Davis. Overall, the slight increases in transfers and bachelor's degrees between pairs match the previous results showing increases in freshman enrollment but little change in transfer or graduation rates.

V. Discussion and Conclusion

This paper provides an initial look at the relationship between inter-institution guaranteed transfer policies and post-secondary outcomes for students who begin their postsecondary education at a community college. Estimates suggest that freshman enrollment at community colleges responds to expansion of TAG. However, transfer and graduation rates show either little relationship to the policy or a slightly positive relationship depending on the specification used. In addition, TAG has little effect on one-year or graduation GPAs of transfer students into the UC system. Overall, these results suggest that TAG is associated with increases the number of students transferring and attaining bachelor's degrees with little change in the quality of these transfer students.

This paper uses multiple sources of data at both the pair-level and community college level to address the relationship between TAG and post-secondary outcomes. Despite this, additional research may benefit from longitudinal student-level data. First, data of this type would allow for construction of cohort transfer and graduation rates for each pair of campuses, which is not possible with the current publicly available data. Second, student data would allow for a more in-depth analysis of how particular students respond to the policy. For example, do students in different racial, ethnic, or socioeconomic groups respond differently? Future research should explore these possible differences as well as how guaranteed transfer policies operate at institutions outside of California.

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Tables and Figures

Table 1. Number of community college campuses with a TAG agreement with each UC campus in selected years.

	UCB	UCD	UCI	UCLA	UCM	UCR	UCSD	UCSB	UCSC
1986	None	3	None	None	.	None	None	None	None
1988	None	25	None	None	.	None	3	None	None
1995	None	56	None	None	.	?	?	None	?
1997	None	56	None	None	.	All	14	None	17
1998	None	56	?	None	.	All	14	None	17
1999	None	56	?	None	.	All	14	None	17
2000	None	56	16	None	.	All	15	None	20
2001	None	60	16	None	.	All	16	None	92
2002	None	70	All	None	.	All	17	3	92
2003	None	81	All	None	.	All	17	9	94
2004	None	81	All	None	.	All	24	10	97
2005	None	82	All	None	All	All	26	All	99
2006	None	90	All	None	All	All	27	All	99
2007	None	90	All	None	All	All	33	All	101
2008	None	94	All	None	All	All	33	All	101
2009	None	All	All	None	All	All	All	All	103
2010	None	All	All	None	All	All	All	All	103

Table 2. Descriptive statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Always TAG			Change TAG			Never TAG	
Pair-level: 1997-2009	N	mean	sd	N	mean	sd	N	mean	sd
Year	2,509	2003	3.742	4,394	2003	3.742	2,821	2003	3.742
Fall transfers	2,508	16.25	28.32	4,390	6.912	19.81	2,819	18.68	40.62
Junior fall transfers	2,508	14.43	25.84	4,390	6.352	18.63	2,819	17.98	38.87
Full-year transfers	2,509	20.02	37.35	4,394	8.063	24.98	2,821	21.10	45.39
Bachelor's degree	2,507	17.23	33.00	4,386	6.789	23.07	2,817	18.89	41.38
Regular freshman enrollment	2,509	6,731	4,056	4,394	6,775	4,199	2,821	6,797	4,140
Freshman FT enrollment	2,509	2,073	1,359	4,394	2,019	1,361	2,821	2,035	1,358
All freshman enrollment	2,509	7,524	4,392	4,394	7,597	4,597	2,821	7,623	4,524
Employment rate (%)	2,509	93.44	3.136	4,394	93.43	2.953	2,821	93.45	3.005
CC county population	2,509	2.298e+06	2.911e+06	4,394	3.252e+06	3.634e+06	2,821	2.992e+06	3.468e+06
% male (CC county)	2,509	50.19	1.543	4,394	50.04	1.429	2,821	50.09	1.459
% White (CC county)	2,509	78.59	10.21	4,394	79.75	9.054	2,821	79.29	9.421
% 0-14 (CC county)	2,509	21.85	2.987	4,394	22.37	2.862	2,821	22.19	2.893
% 15-29 (CC county)	2,509	21.53	2.166	4,394	21.61	2.100	2,821	21.59	2.105
% 30-49 (CC county)	2,509	30.23	2.604	4,394	29.97	2.328	2,821	30.08	2.415
% CC county pop. change	2,509	1.021	0.996	4,394	1.086	1.039	2,821	1.056	1.019
Median hhold income	2,509	52,935	14,025	4,394	50,420	12,359	2,821	51,332	12,999
TAG	2,509	1	0	4,394	0.384	0.486	2,821	0	0

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Always TAG			Change TAG			Never TAG	
Pair-level: 2000-2009	N	mean	sd	N	mean	sd	N	mean	sd
Bachelor's degree	1,930	17.56	33.53	3,380	6.895	23.34	2,170	19.62	43.11
TAG	1,930	1	0	3,380	0.499	0.500	2,170	0	0

	(1)	(2)	(3)
Community college level	N	mean	sd
Year	1,391	2003	3.743
#TAG	1,391	2.022	1.297
Any TAG	1,391	0.841	0.366
#TAG with at least 5 pre-TAG transfers	1,105	1.560	1.180
UC fall transfers	1,371	101.3	124.2
UC full-year transfers	1,390	117.6	143.0
Full-year transfers to UC TAG changers	1,390	53.22	73.27
UC bachelor's degrees	1,388	101.0	124.4
Bachelor's degrees at UC TAG changers	1,388	46.28	66.15
Regular freshman enrollment	1,391	6,772	4,144
Full-time freshman enrollment	1,391	2,038	1,359
Total freshman enrollment	1,391	7,586	4,522
1-yr persistence rate	849	90.06	9.345
2-yr graduation rate	742	44.05	12.98
3-yr graduation rate	636	74.22	14.28
4-yr graduation rate	530	80.44	13.23
1-yr GPA	848	2.884	0.233
Graduation GPA	525	3.099	0.149
3-yr transfer rate	856	13.69	4.120

Table 3. Pair-level transfer rate regressions.

	(1)	(2)	(3)	(4)	(5)
Full-year transfer rate					
TAG	0.25 (1.30)	3.56 (3.27)	-2.26 (5.75)	3.11** (1.38)	1.13 (1.10)
Obs	1,390	1,390	1,390	1,390	5,560
R-sq	0.02	0.16	0.09	0.11	0.03
#Pairs	107	107	107	107	428
Year FE	X	X	X	X	X
Pair FE	X	X	X	X	X
Campus interactions	.	.	.	.	X
Campus	Davis	San Diego	Santa Barbara	Santa Cruz	Pooled
Mean	24.80	19.31	17.71	13.64	18.87
SD	46.10	36.64	46.80	30.60	40.79
Covariates	X	X	X	X	X

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Pair-level transfer rates are calculated by the author from publicly available enrollment and transfer data from CPEC.

Table 4. Pair-level graduation rate regressions.

	(1)	(2)	(3)	(4)	(5)
	Graduation rate				
TAG (-3)	9.71 (6.23)	-2.55 (4.51)	5.83 (6.24)	-6.40 (6.70)	1.61 (3.41)
Observations	1,003	992	1,019	997	4,011
R-squared	0.02	0.03	0.03	0.02	0.02
# Pairs	105	107	106	105	423
Year FE	X	X	X	X	X
Pair FE	X	X	X	X	X
Campus-by-year	.	.	.	.	X
Campus	Davis	San Diego	Santa Barbara	Santa Cruz	Pooled
Mean	90.34	82.27	90.86	84.05	86.91
SD	60.83	56.24	61.93	59.42	59.76
Covariates	X	X	X	X	X

Note: Pair-level graduation rates are calculated by the author from publicly available data from CPEC on transfers and bachelor's degrees awarded to transfer students.

Table 5. Pair-level event history specifications.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full-year transfer rate					Graduation rate				
-2	-0.57 (1.68)	2.35 (9.93)	3.63 (6.58)	-2.37 (3.83)	1.81 (1.80)	89.71** (39.98)	-63.36 (54.73)	24.64 (25.74)	-24.20 (39.71)	0.93 (23.02)
-1	0.56 (1.46)	3.61 (4.61)	7.13 (9.17)	-1.88 (2.63)	2.57 (2.15)	61.04* (31.02)	-32.00 (30.53)	2.16 (13.76)	24.22 (25.88)	10.36 (15.98)
1	4.45** (1.85)	2.79 (5.56)	1.66 (5.78)	1.61 (2.16)	1.81 (1.35)	-45.13* (25.41)	14.24 (26.10)	-6.22 (14.19)	9.48 (33.34)	2.43 (17.40)
2	2.84 (1.90)	2.04 (11.02)	-3.99 (8.24)	4.01 (3.70)	-0.29 (2.33)	-97.86** (39.71)	64.63 (51.93)	-30.47 (22.46)	-16.25 (31.08)	-8.12 (23.20)
Obs	185	90	535	410	1,220	179	90	509	393	1,171
R-sq	0.16	0.68	0.10	0.10	0.13	0.13	0.42	0.04	0.07	0.05
#Pair	37	18	107	82	244	37	18	105	80	240
Year FE	X	X	X	X	X	X	X	X	X	X
Campus interactions	.	.	.	.	X	.	.	.	.	X
Pair FE	X	X	X	X	X	X	X	X	X	X
Mean	5.63	22.62	18.65	8.68	13.62	85.65	87.51	90.16	83.82	87.14
SD	6.37	13.58	51.40	9.30	35.23	68.74	27.59	59.04	65.99	61.30
Campus	Davis	San Diego	Santa Barbara	Santa Cruz	Pooled	Davis	San Diego	Santa Barbara	Santa Cruz	Pooled

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Note: Full-year transfer rates and graduation rates were calculated by the author using publicly available enrollment, transfer, and bachelor's degree data from CPEC.

Table 6. Community college enrollment regressions.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Regular freshman enrollment			Full-time freshman enrollment			Total freshman enrollment		
#TAG	474.46*** (139.59)			164.12*** (50.61)			479.74*** (149.71)		
Any TAG		642.32* *			135.11 (88.12)			569.76* (310.49)	
#TAG with 5 transfers pre-TAG			519.94*** (160.86)			163.11*** (49.07)			604.71*** (164.01)
Obs	1,391	1,391	1,105	1,391	1,391	1,105	1,391	1,391	1,105
R-sq	0.21	0.20	0.23	0.16	0.15	0.19	0.23	0.22	0.27
Mean	6772	6772	7621	2038	2038	2351	7586	7586	8535
SD	4144	4144	4065	1359	1359	1317	4522	4522	4413
#CC	107	107	85	107	107	85	107	107	85

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Regular enrollment students are those taking classes for credit. Total enrollment includes regular/non-credit, and full-time/part-time students. Freshman students are those classified as freshman at the community college – this is an approximation to entering students.

Table 7. Community college level transfer rate regressions.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(UC transfers)/(avg. 1-3 yr lag regular fresh enroll)			(UC transfers to 4 UC TAG changers)/(avg. 1-3yr lag regular fresh enroll)			3-yr transfer rate		
#TAG	0.08 (0.05)			0.01 (0.02)			0.50*** (0.18)		
Any TAG		-0.14 (0.15)			-0.10** (0.05)			1.23** (0.50)	
#TAG with 5 transfers pre-TAG			-0.05 (0.10)			-0.02 (0.04)			0.36* (0.20)
Obs	1,389	1,389	1,104	1,389	1,389	1,104	856	856	680
R-sq	0.03	0.03	0.04	0.04	0.05	0.05	0.13	0.13	0.15
Mean	1.58	1.58	1.82	0.76	0.76	0.89	13.69	13.69	14.08
SD	1.80	1.80	1.92	0.90	0.90	0.96	4.12	4.12	3.96
#CC	107	107	85	107	107	85	107	107	85

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Columns (1)-(6) contain transfer rates constructed by the author from CPEC data. Columns (1)-(6) list the numerator where the denominator is always the average of lagged 1-3 year community college freshman enrollment. Columns (6)-(9) contain 3-year transfer rates from the Transfer Velocity Project calculated by following a cohort of students. The numerator in columns (6)-(9) includes students who transfer to non-public colleges in California, as well as those who transfer out of state. Students enter the Transfer Cohort, the denominator, by taking twelve credit units and attempting a transfer-level math or English course in six years.

Table 8. Community college level graduation rate regressions.

Panel A	(1) FE (UC bachelor's degree)/(avg. 2-4yr UC transfers)	(2) FE (avg. 2-4yr UC transfers)	(3) FE (avg. 2-4yr UC transfers)	(4) FE (4 changer UC bachelor's degrees)/(avg. 2-4yr transfers to 4 UC schools)	(5) FE (avg. 2-4yr transfers to 4 UC schools)	(6) FE (avg. 2-4yr transfers to 4 UC schools)
#TAG (3 rd lag)	1.41 (1.09)			7.02*** (2.62)		
Any TAG (3 rd lag)		8.62** (3.74)			10.86* (5.57)	
#TAG with 5 transfers pre-TAG (3 rd lag)			0.19 (0.63)			-0.25 (0.86)
Obs	1,065	1,065	846	1,053	1,053	846
R-sq	0.03	0.04	0.04	0.04	0.04	0.03
Mean	88.47	88.47	90.35	87.36	87.36	88.59
SD	20.16	20.16	14.43	33.10	33.10	18.44
#CC	107	107	85	107	107	85

Note: Columns (1)-(6) contain community college level graduation rates constructed by the author from CPEC data.

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(16)	(17)	(18)
	1-yr persist			2-yr grad			3-yr grad			4-yr grad			Grad GPA		
#TAG	0.27 (0.75)			1.55 (0.98)			1.37 (1.14)			1.47 (1.23)			-0.01 (0.01)		
Any TAG		0.65 (1.69)			0.96 (2.50)			0.66 (4.04)			-0.71 (2.96)			-0.01 (0.03)	
#TAG with 5 transfers pre-TAG			0.13 (0.29)			0.92* (0.53)			-0.27 (0.57)			-0.05 (0.51)			-0.02** (0.01)
Obs	849	849	678	742	742	593	636	636	508	530	530	423	525	525	423
R-sq	0.03	0.03	0.06	0.08	0.08	0.20	0.05	0.05	0.16	0.04	0.03	0.16	0.07	0.07	0.14
Mean	90.06	90.06	91.18	44.05	44.05	45.70	74.22	74.22	76.59	80.44	80.44	82.80	3.10	3.10	3.10
SD	9.35	9.35	4.56	12.98	12.98	9.81	14.28	14.28	8.02	13.23	13.23	6.74	0.15	0.15	0.12
#CC	107	107	85	107	107	85	107	107	85	107	107	85	106	106	85

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Columns (1)-(18) are GPA and persistence and graduation rates for cohorts of students who transferred from each community college into the UC campus system. There were no significant effects on 1-year GPA, so those results were excluded from this table.



Figure 1. UC campus map. Note: UC San Francisco does not serve undergraduates.

Source: <http://www.universityofcalifornia.edu/campuses/welcome.html>



Figure 2. California Community Colleges map. Source: Chancellor's Office, California Community Colleges (<http://www.cccco.edu/LinkClick.aspx?fileticket=1MLZTbFko6s%3d&tabid=917>)

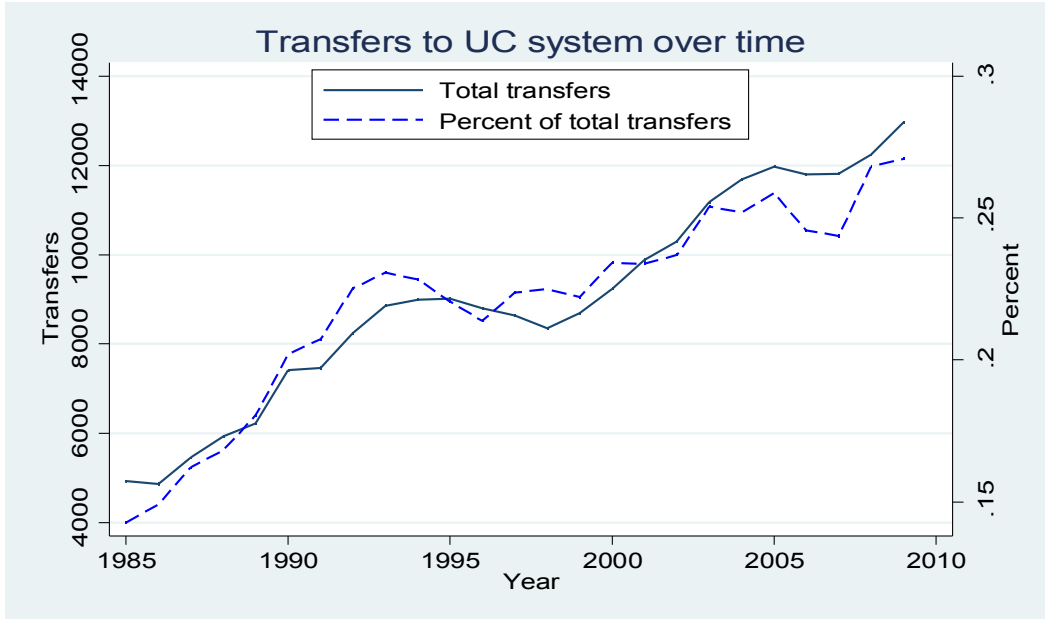


Figure 3. Transfers from the California Community Colleges to the UC campuses over time.

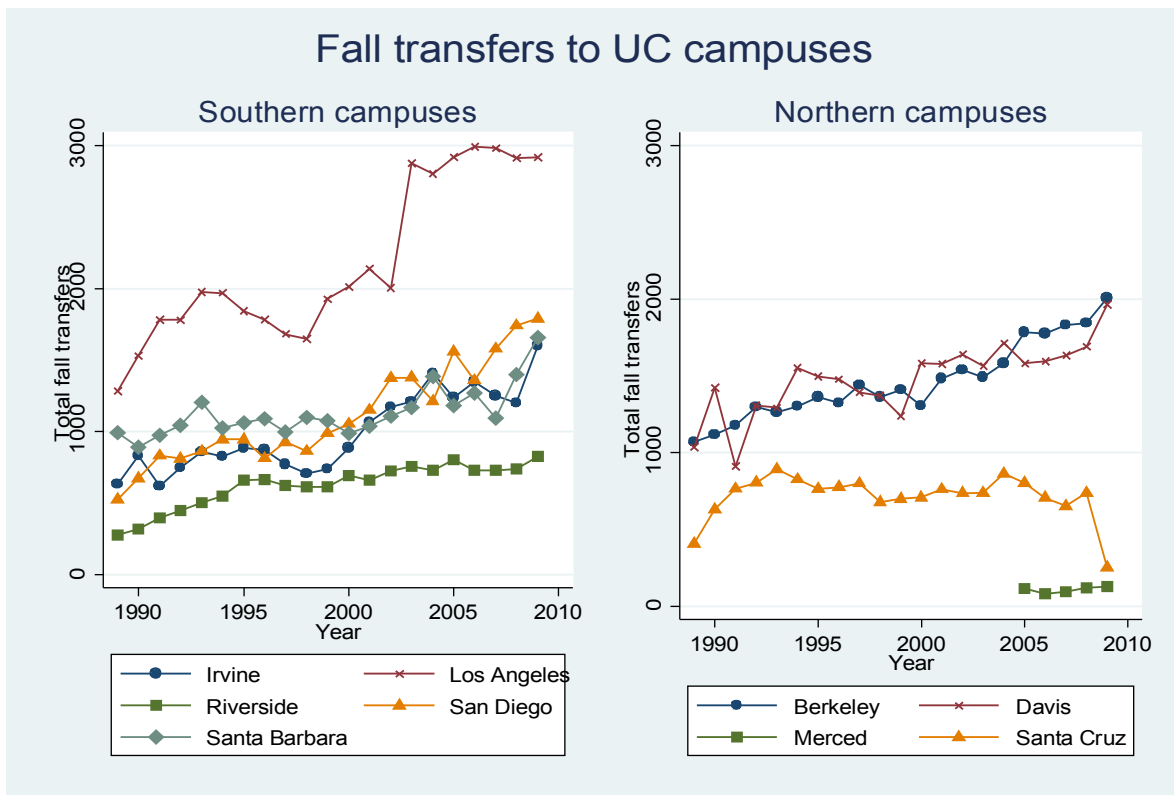


Figure 4. Fall transfers to UC campuses. Source: California Postsecondary Education Commission

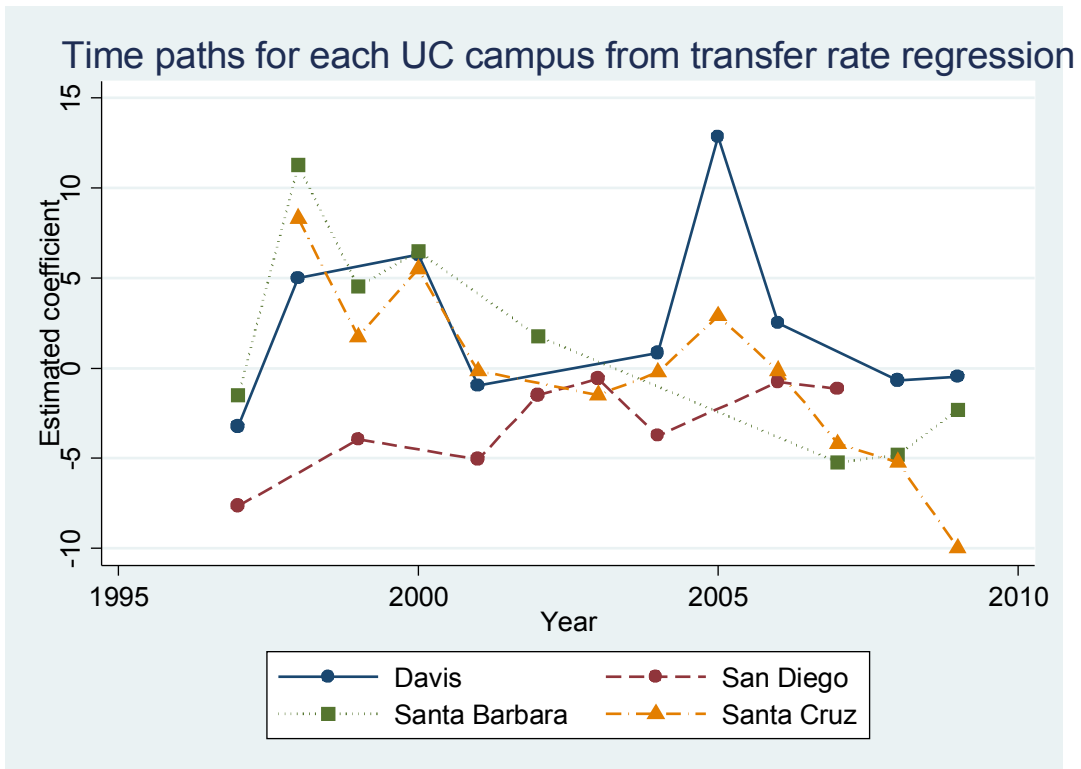


Figure 5. Coefficients on the UC campus-by-year dummies in pair-level transfer rate regression shown in column (5) of Table 3.

Appendix Tables.

Table A1. Pair-level transfer rate regressions on the sample that had at least five average pre-TAG transfers (defined 1-3 years pre-TAG) between the pair.

	(1)	(2)	(3)	(4)	(5)
Full-year transfer rate					
TAG	-4.48 (4.49)	5.54 (4.96)	-7.63 (8.21)	-1.39 (2.09)	-1.46 (3.04)
Obs	550	539	529	450	2,068
R-sq	0.06	0.26	0.11	0.06	0.04
#Pair	55	54	53	45	207
Year FE	X	X	X	X	X
Pair FE	X	X	X	X	X
Campus interactions	.	.	.	.	X
Campus	Davis	San Diego	Santa Barbara	Santa Cruz	Pooled
Covariates	X	X	X	X	X

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Table A2. Pair-level regressions using levels of transfers and bachelor's degrees as the outcomes.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Full-year transfers						Bachelor's degrees awarded to transfers				
TAG	-1.68** (0.83)	1.96 (3.15)	3.66** (1.78)	2.95** (1.22)	0.67 (0.84)					
TAG (3 rd lag)						-0.41 (0.68)	5.50* (2.79)	1.16 (1.51)	1.06* (0.59)	1.49** (0.59)
Obs	1,391	1,391	1,391	1,391	5,564	1,070	1,070	1,070	1,070	4,280
R-sq	0.11	0.21	0.06	0.12	0.11	0.06	0.19	0.02	0.03	0.08
# Pair	107	107	107	107	428	107	107	107	107	428
Year FE	X	X	X	X	X	X	X	X	X	X
Pair FE	X	X	X	X	X	X	X	X	X	X
Campus interactions	.	.	.	.	X	.	.	.	.	X
Campus	Davis	San Diego	Santa Barbara	Santa Cruz	Pooled	Davis	San Diego	Santa Barbara	Santa Cruz	Pooled
Covariates	X	X	X	X	X	X	X	X	X	X

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1