Strengthening Transfer Paths to a Bachelor's Degree: Identifying Effective Two-Year to Four-Year College Partnerships

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Abstract

While preparing students academically for vertical transfer to four-year colleges has traditionally been viewed as the major responsibility of the home institutions, there is a growing consensus that the receiving institutions play a critical role in facilitating the transfer process and in supporting students' academic success after transfer. The goal of improving transfer outcomes cannot be fully achieved until colleges nationwide are provided with commonly accepted metrics and methods for measuring the effectiveness of transfer partnerships. Using the individual term-by-term college enrollment records from the National Student Clearinghouse for the entire 2007 fall cohort of first-time-in-college community college students nationwide, this paper introduces a two-stage, input-adjusted, value-added analytic framework for identifying partnerships of two- and four-year institutions that are more effective than expected in enabling community college students to transfer to a four-year institution and earn a bachelor's degree in a timely fashion. In doing so, the paper provides a description of transfer patterns nationwide, broken out by key institutional characteristics. Recommendations and cautions for using this framework to evaluate and benchmark institutional performance in terms of supporting the academic success of vertical transfer students for baccalaureate attainment are also discussed.

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1. Introduction

Community colleges enroll nearly half of the nation's undergraduates. One of the key functions of community colleges is to provide lower division education to prepare students to transfer to bachelor's degree programs at four-year institutions. But while a large number of studies have documented the benefits of attaining a bachelor's degree among both native four-year entrants (see a review in Oreopoulos & Petronijevic, 2013) and those who transferred from two-year colleges (Belfield & Bailey, 2011), relatively few community college students attain a bachelor's degree. Of the nearly two million students who enter higher education through community colleges each year, 80 percent indicate that they intend to transfer and earn a bachelor's degree (Horn & Skomsvold, 2011), but only about a quarter transfer to a four-year institution, with about one in six completing a bachelor's degree within six years of starting at a community college (Jenkins & Fink, 2016; Shapiro et al., 2013).

Yet this is where challenge and opportunity meet. Given the large number of community college enrollees who are seeking a bachelor's degree, the community college to four-year institution transfer pathway has large potential for increasing baccalaureate attainment nationally. For example, a simple extrapolation suggests that a 5 percentage point increase in the rate at which students transfer from community colleges to four-year institutions would yield an estimated 42,000 additional bachelor's degrees each year given the current bachelor's degree completion rate among transfer students; the number would be even larger if the baccalaureate completion rate for transfer students were improved as well.[1]

Moreover, compared with four-year institutions, community colleges enroll proportionately more students from underrepresented demographic groups, including racial/ethnic minority, low-income, first-generation, and nontraditional-age college students (Cohen, Brawer, & Kisker, 2014). Strengthening community college transfer pathways to bachelor's degrees is therefore a potentially important strategy for addressing equity issues in higher education nationally (Olson & Labov, 2012).

[1] The calculation is based on an unpublished simulation of National Student Clearinghouse data conducted by CCRC using measures and definitions from Jenkins and Fink (2016).

While the academic preparation of students to transfer successfully to four-year colleges has been traditionally viewed as the major responsibility of the home institutions (community colleges), there is a growing consensus on the equally critical role of the receiving institutions (four-year colleges) in facilitating the transfer process and in supporting students' academic success after transfer. To smooth the transition from one institution to the other and provide the necessary support throughout the whole process, two-year and four-year institutions must work together more effectively as partners. As Bahr, Toth, Thirolf, and Masse (2013) point out in their extensive review of the literature on the experience and outcomes of community college students who transfer to four-year institutions,

> To quote an old adage, "it takes two to tango." Both the community college and the four-year institution share responsibility for the outcomes of community college transfer students. (p. 461)

Yet, the goal of improving the transfer partnerships cannot be fully achieved, at least not at scale, until colleges nationwide are provided with commonly accepted metrics and methods for measuring the effectiveness of two- and four-year institutions in serving transfer students, as well as with help identifying scalable and sustainable practices that improve students' transfer outcomes. Although interest in this issue has been growing, evaluating college performance is a complex task. Above all, practical outcome indicators such as raw transfer or graduation rates among transfer students seldom tell policymakers and states directly what they want to know. This is largely because educational outcomes are the joint product of entering student characteristics, resource inputs, and institutional practices. Using raw graduation rates, for example, policymakers can determine which community colleges are transferring more of their students. What they will not know, however, is whether such outcomes are due to a better-prepared entering student population and greater institutional resources, or instead due to college practices and policies that are effectively improving transfer rates. Such difficulty is further complicated by the nature of the transfer process, which involves both the home institution and the destination institution. The inherent complexity of the transfer process and the institutional relationships, the variation in program requirements, and the lack of

data that would actually capture all the movement among the institutions involved have made it difficult to measure the effects of transfer on student outcomes.

In this paper, we take an initial step toward addressing this issue by presenting a novel approach to measuring the effectiveness of community college and four-year institution transfer partnerships. To accomplish this, we use individual term-by-term college enrollment records from the National Student Clearinghouse (NSC) for the entire 2007 fall cohort of first-time-in-college community college students nationwide and develop a two-stage analytic framework for identifying partnerships between two- and four-year institutions that are more effective than expected in enabling community college entrants to transfer to a four-year institution and earn a bachelor's degree in a timely fashion. While raw transfer rates and baccalaureate completion rates are important measures of institutional performance, they also reflect entering student characteristics, fixed institutional characteristics, and funding sources, many of which are beyond the control of the institution. Therefore, to enable fair comparisons across institutions, we used a "value-added" approach, comparing residuals for each institution in a transfer partnership from regression equations that control for observable student and college characteristics.

Through this analysis, this paper makes two unique contributions to the existing literature on vertical transfer. First, using information on all students who entered any community college in the fall semester of 2007, this study provides valuable descriptive detail on the general transfer patterns and performance of two-and-four-year transfer partnerships nationwide, broken out by key institutional characteristics. In addition, the analytic framework used in this study provides a novel strategy for identifying effective partnerships, as well as for benchmarking the performance of two- and four-year institutions in serving transfer students.

2. Background on Transfer Benchmarks and College Partnerships

Despite the critical role of the community college to four-year college pathway as a route to baccalaureate attainment, neither the federal government nor most states have collected data on the performance of two- and four-year colleges in enabling community

college students to transfer and earn bachelor's degrees. According to a College Board report on student transfer, "community colleges and four-year institutions are rarely acknowledged for the work they do on behalf of transfer, and where transfer-related metrics exist, they are often imprecise, inadequate, or misapplied" (Handel & Williams, 2012, p. 59). Under the federal Integrated Postsecondary Education Data System (IPEDS) "student right-to-know" statistics to which all institutions whose students receive federal financial aid are required to contribute, community colleges report the rate at which students transfer to four-year institutions. However, these statistics have been criticized because of the variation in the methods by which institutions track transfer students (Albright, 2010).

Moreover, merely tracking transfer rates does not give an indication of how many transfer students succeed in earning bachelor's degrees. Transfer students are not included in the statistics that four-year institutions report to IPEDS (Cook & Pullaro, 2010), but some four-year institutions voluntarily report on the baccalaureate success of their transfer students through the Student Achievement Measure (SAM).[2] Yet SAM is neither comprehensive of all undergraduates at four-year institutions nor inclusive of community college outcomes on transfer student bachelor's degree completion.

As a part of the its College Scorecard data,[3] released in September of 2015, the federal government published institutional performance metrics for student transfer and completion among federal financial aid recipients at community colleges and four-year institutions. However, as discussed in the accompanying technical report (Office of the President, 2015), the College Scorecard transfer and completion metrics are admittedly weak measures of institutional performance given problems with data quality prior to 2012 (namely, institutional misreporting on Pell-only aid recipients), an estimated 70 percent accuracy in placing students into starting cohorts, and the bias of a student sample limited to solely financial aid recipients.

Some state higher education agencies periodically look at transfer outcomes, but generally, like the federal government, their accountability measures do not include transfer students. For example, a 2013 review of performance funding in eight states that

[2] http://www.studentachievementmeasure.org/about
[3] https://collegescorecard.ed.gov/data/documentation/

are considered to be national leaders in such policies found that only two—Missouri and Tennessee—include measures related to successful transfer from two- to four-year institutions, and in both cases the measures apply to community colleges, not four-year institutions (Dougherty & Reddy, 2013).

Much research on transfer has focused on the student experience of transfer; less has focused on the institutional structures, policies, and practices that promote degree attainment by community college transfer students (Bahr et al., 2013). Extensive research has been done on the difference in probability of completing a bachelor's degree starting at a community college and transferring versus starting at a four-year institution (Alfonso, 2006; Doyle, 2009; Gross & Goldhaber, 2009; Leigh & Gill, 2003; Long & Kurlaender, 2009; Melguizo & Dowd, 2009; Roksa & Keith, 2008; Rouse, 1995; Sandy, Gonzalez & Hilmer, 2006; Xu, Jaggars, & Fletcher, 2016). However, very few studies have sought to estimate the effects of individual two- and four-year institutions on transfer student bachelor's degree completion rates.

One such study was conducted by Ehrenberg and Smith (2002), who developed a model that includes fixed effects for the sending and receiving institutions to estimate how each institution differentially affected transfer student outcomes. Using data on a sample of students who transferred from the State University of New York's (SUNY) two-year schools to its four-year institutions, these researchers ranked two-year SUNY institutions based on how well each was doing to prepare its students to transfer to public four-year institutions in the state. They similarly ranked four-year institutions based on how successful each was doing in graduating students from two-year colleges who transferred to it. They found that transfer students from different two-year SUNY institutions appeared to have different probabilities of completing their four-year degrees and of dropping out within three years after transfer. Similarly, students who transferred to different four-year SUNY institutions had different probabilities of completing a bachelor's degree. Ehrenberg and Smith argued that their methodology "… could be used either in summative evaluations that relate to resource allocation decisions, or more preferably, in formative evaluations in which knowledge of the best practices of the most successful institutions are transmitted to their sister institutions in the state" (p. 3).

In a more recent study of community college transfer performance, Carrell and Kurlaender (2016) tracked multiple cohorts of former high school students who subsequently enrolled at California's community colleges and transferred to one of the California State Universities (CSUs). The authors measured community college performance with transfer in two ways: how productive the college was at transferring its students to one of the CSUs, and how successful the college's transfer students were in completing bachelor's degrees at the CSUs. Adjusting for student and institutional inputs, the authors found that some of the community colleges were more effective than others at both transferring students to CSUs and preparing their transfer students for success at the CSUs. The authors also found small positive associations between these measures of success and community colleges that had larger student populations and that were located closer to a CSU. That study did not, however, account for the effects of practices by CSU institutions in enabling transfer students to earn a bachelor's degree.

In 2016, the Community College Research Center, the National Student Clearinghouse (NSC) Research Center, and the Aspen Institute published a report that addressed the lack of comparable measures of institutional performance with respect to transfer students by introducing such measures for community colleges and four-year institutions (Jenkins & Fink, 2016). Using student-level data from the NSC on a cohort of degree-seeking students who started higher education in a community college, the authors calculated rates of transfer out, transfer with a community college award, and bachelor's completion rates for transfer students as measures of community college and four-year institutional performance. Jenkins and Fink found that 33 percent of entering, degree-seeking community college students transferred to a four-year college, and only 14 percent completed a bachelor's degree within six years. Average performance did not vary much by the type of community college students first attended; instead, there were larger differences in average completion rates based on the type of four-year transfer destination in favor of more selective colleges, public colleges, and colleges serving higher SES students. The study also showed wide variation in individual institutional performance as well as wide variation in average performance by state.

While the Ehrenberg and Smith (2002), Carrell and Kurlaender (2016), and Jenkins and Fink (2016) studies have taken important initial steps toward measuring how

different institutions influence students' transfer outcomes, these studies focused separately on the performance of two- and four-year institutions, leaving unstudied the effectiveness of partnerships between pairs of two- and four-year institutions. Yet, students who transfer have to navigate through both types of institutions.

To help understand the interplay between partners, this paper describes the variation in the outcomes of two- and four-year institutional transfer partnerships, and it presents a methodology for identifying partnerships that are more effective than expected in enabling students who start at a community college and transfer to a four-year institution to earn bachelor's degrees.

3. Data and Descriptive Information

To measure the performance of two-year–four-year institutional partnerships in enabling community college students to transfer and earn degrees, we use data on institutional enrollment and degree completion by individual students from the National Student Clearinghouse (NSC). We follow the progress and outcomes of students who entered higher education for the first time at a community college in the fall semester of 2007. We exclude students who were enrolled in college courses through "dual high school–college enrollment" arrangements by limiting the cohort to students of ages 18 or older at their first enrollment. We also exclude students who were enrolled in either for-profit or private non-profit two-year colleges. The final dataset includes 1,275,697 students in the fall 2007 cohort.

3.1 Definitions of Key Measures

While we rely primarily on IPEDS data to categorize institutions as community colleges and four-year institutions, we revise the IPEDS categorization for some institutions that offer relatively few bachelor's degree programs. These are listed as a public four-year institution in IPEDS, but are more accurately categorized as community colleges based on their history, mission, and degree mix. We use IPEDS data on Carnegie Classifications, program offerings, mix of associate versus bachelor's degrees awarded, mission statements, and membership in national associations to categorize institutions as

community colleges or four-year institutions. We exclude institutions in the U.S. Virgin Islands and Puerto Rico. Below we explain how we define each key measure in our analysis.

Transfer students: Students who entered higher education for the first time in a two-year college and transferred directly to only a four-year college; i.e., these students enrolled in only two institutions. A substantial proportion of students attend multiple institutions. Among students in the NSC fall 2007 FTEIC (first time ever in college) community college cohort who transferred, 42 percent transferred to more than one two- or four-year institution. We exclude these students because we want to focus on the effectiveness of dyads of two- and four-year institutions; therefore, including students who "swirled" among more than two institutions during the study period would have made it harder to attribute credit for student outcomes to any specific institution.

Transfer Partnership: A pairing of a community college and a four-year institution where at least one student transferred from the community college to the four-year institution. The transfer partnership definition we use in our final analytic sample restricts the pairing to a community college and a four-year institution with at least 30 transferring students.[4]

Completion rate among transfers (two-year institutions only): The number of transfer students from the 2007 fall FTEIC community college cohort who earned a bachelor's degree in the study period divided by the total number of transfer students in the 2007 fall cohort (students who transferred but attended more than two institutions are excluded from the denominator as well).

Completion rate among transfers (four-year institutions only): The number of community college students who transferred to a given four-year institution and earned a bachelor's degree from that four-year institution divided by the total number of community college students who transferred into that four-year institution.

Completion rate (measured for each partnership): The number of students from the 2007 fall FTEIC community college cohort who transferred from a given two-year college (college A) to a particular four-year college (college B) and who completed a

[4] Only a community college–four-year institution pairing with at least 30 transferring students are included in the regression models described in Section 4.

bachelor's degree within seven years divided by the total number of students who transferred from college A to college B.

3.2 Institutional Characteristics

We derive characteristics of the community colleges and four-year institutions participating in each transfer partnership prior to data analysis. Among the institutional characteristics, four-year institutional sector, selectivity, and urbanicity are merged from IPEDS, and the distance between each pair of partner institutions is derived using the Google Maps Distance Matrix API. The derivations of average student socioeconomic status (SES) and community college program mix are described further below.

Average student SES. We create a student-level SES variable by using U.S. Census data to derive a standardized composite of the median household income, educational attainment, and occupational profile of each student's home census tract. We then create institution-level SES variables by taking the median student SES score for either all enrolled students (community colleges) or all transfer students (four-year institutions) from the fall 2007 cohort. Each institution is then placed into quintiles based on the median SES score of its student population, which, for interpretability, we label as higher-SES serving (top two quintiles), middle-SES serving (middle quintile), and lower-SES serving (bottom two quintiles).

Program mix. We categorize community colleges based on each institution's mix of academic and occupational associate degrees awarded. We use data from IPEDS to group institutions into "primarily academic associate degrees" and "primarily occupational associate degrees" categories based on the ratio of academic to occupational associate degrees awarded by the institution. Based on the distribution of colleges by program mix, we classify colleges that awarded 40 percent or more of their associate degrees in occupational fields (as opposed to associate of arts, associate of science, or associate of general education fields) as "primarily occupational," while we classify those that awarded less than 40 percent of their awards in occupational fields as "primarily academic."

3.3 National Transfer Patterns

Overall, there are 938 community colleges and 1,908 four-year institutions in the NSC datasets. Nationally, a greater share of community college transfer students started at primarily academic institutions (61 percent) compared with primarily occupational institutions (39 percent), as shown in Table 1. Transfer students more commonly started at community colleges located in urban (44 percent) or suburban locations (44 percent) compared with rural locations (12 percent), and they also more frequently started at community colleges that serve a higher-SES student population (61 percent) than community colleges serving middle-SES (17 percent) or lower-SES (22 percent) student populations. Averaging all of the community colleges' transfer-out rates weighted by the number of transfer students, community colleges had a national transfer-out rate of 20 percent (*SD* = 6 percent). This rate is lower than the number (33 percent) reported in Jenkins and Fink (2016) mainly because those authors focused only on degree-seeking students while we do not apply that restriction here. The transfer-out rate differs less than one half of a standard deviation comparing across institutional characteristic categories, with the exception of the community colleges' program mix. On average, primarily academic community colleges transferred out 21 percent of the starting cohort, compared with the 17 percent average transfer-out rate for primarily occupational community colleges (*SD* = 6 percent).

On average, 50 percent (*SD* = 11 percent) of community college transfer students completed bachelor's degrees at four-year institutions. The completion rate reported here is higher than the 42 percent completion rate for transfer students reported in Jenkins and Fink (2016) due to the present study's more restrictive definition of transfer (transferred only once, to a four-year institution). Differences among institutional characteristics on the transfer student bachelor's completion rates are less than one half of a standard deviation with the exception of average student SES. Fifty-three percent (*SD* = 10 percent) of students transferring from community colleges that serve higher-SES students completed a bachelor's degree, whereas 45 percent *(SD* = 12 percent) of students from lower-SES serving and 47 percent (*SD* = 11 percent) of students from middle-SES serving community colleges completed bachelor's degrees.

Table 1
Average Community College Transfer Outcomes by Institutional Characteristics

Community College Characteristics		Percent of All Transfer Students Who Started at This Type of Community College (*n* = 247,366)	Average Transfer-Out Rate in Percent (*Std. Dev. In Percent)*	Average Transfer Student Bachelor's Degree Completion Rate at Any Four-Year Institution in Percent *(Std. Dev. In Percent)*
Program Mix	Primarily academic	61	21 *(6)*	49 *(10)*
	Primarily occupational	39	17 *(6)*	52 *(12)*
Urbanicity	Rural	12	20 *(6)*	51 *(11)*
	Suburban/town	44	20 *(6)*	51 *(11)*
	Urban	44	19 *(7)*	49 *(11)*
Average Student SES	Lower-SES serving	22	20 *(7)*	45 *(12)*
	Middle-SES serving	17	19 *(6)*	47 *(11)*
	Higher-SES serving	61	20 *(6)*	53 *(10)*

Table 4 provides descriptive information on the institutional characteristics of four-year destinations for community college transfer students. On average, more students transferred to urban (59 percent) four-year institutions compared with suburban (39 percent) and rural (2 percent) institutions, and more students transferred to higher-SES serving institutions (47 percent) compared with middle- (20 percent) or lower-SES serving institutions (33 percent). Seventy-two percent of community college transfer students matriculated at public four-year institutions compared with 21 percent at private non-profit and only 7 percent at private for-profit four-year institutions. Additionally, most community college transfer students matriculated at moderately selective four-year institutions (52 percent), with fewer transferring to non-selective (24 percent) or very selective institutions (21 percent).

Public four-year institutions (56 percent, *SD* = 17 percent) and private non-profit institutions (46 percent, *SD* = 29 percent) tended to have higher completion rates compared with private for-profit institutions (10 percent, *SD* = 11 percent), and on average more selective institutions had higher bachelor's degree completion rates, averaging 70 percent (*SD* = 18 percent), 53 percent, (*SD* = 18 percent), and 31 percent (*SD* = 18 percent) for very, moderately, and non-selective institutions, respectively. Urban (51 percent, *SD* = 23 percent) and suburban (50 percent, *SD* = 23 percent) four-year institutions tended to have higher bachelor's degree completion rates compared with

rural institutions (39 percent, *SD* = 26 percent), and four-year institutions serving higher-SES transfer students (58 percent, *SD* = 21 percent) tended to have higher bachelor's degree completion rates than those serving lower-SES students (39 percent, *SD* = 26 percent). Overall readers should be cautious about the magnitude of average differences among institutional characteristics given the large variation in individual institutional performance.

Table 2
Average Four-year Institution Transfer Outcomes by Institutional Characteristics

Four-Year College Characteristics		Percent of All Transfer Students Who Transferred to This Type of Four-Year Institution	Average Transfer Student Bachelor's Degree Completion Rate at the Four-Year Institution in Percent *(Std. Dev. In Percent)*
Urbanicity	Rural	2	39 *(26)*
	Suburban/town	39	50 *(23)*
	Urban	59	51 *(23)*
Average Student SES	Lower-SES serving	33	39 *(23)*
	Middle-SES serving	20	50 *(21)*
	Higher-SES serving	47	58 *(21)*
Sector	Public	72	56 *(17)*
	Private non-profit	21	46 *(29)*
	Private for-profit	7	10 *(11)*
Selectivity	Missing	3	26 *(30)*
	Not selective	24	31 *(21)*
	Moderately selective	52	53 *(17)*
	Very selective	21	70 *(18)*

3.4 Sample Description for Identifying Effective Partnerships

To identify effective partnerships, we apply several restrictions to the sample. Specifically, among all the institutions included in the NSC dataset, 133 community colleges and 105 four-year institutions did not enroll any transfer students. The remaining 803 community colleges and 1,803 four-year institutions resulted in 44,135 combinations of institutional partnerships wherein at least one student transferred from the community college to the four-year institution. To focus on partnerships with a significant number of transfer students, we further restrict the data to partnerships with 30 or more transfer students, which results in a final analytical sample that consists of 1,458 combinations of

institutional partnerships with at least 30 transfer students, involving 564 unique community colleges and 527 unique four-year institutions. [5]

Tables 3 and 4 show the percentage of community colleges and four-year institutions remaining after we restrict the sample to partnerships with 30 or more students transferring between the two- and four-year institution. As shown in Table 3, some types of community colleges become overrepresented in the sample when the sample is restricted to community colleges that transferred out a minimum of 30 students to a particular four-year partner. For example, 69 percent of urban community colleges are retained in the restricted sample, whereas only 44 percent of rural institutions are retained. Similarly, 71 percent of higher-SES serving community colleges are retained in the final analytic sample, but only 48 percent of lower-SES serving community colleges are retained.

As shown in Table 4, public, urban, and suburban four-year institutions are overrepresented when the sample is restricted to four-year institutions that received at least 30 transfer students from a particular community college. In contrast, rural, private, non-selective, and very selective institutions are less represented in the restricted sample used for analyses because these types of institutions enrolled fewer community college transfer students.

Table 3
Description of Community Colleges in the Transfer Partnership Sample

Community College Characteristics		All Community Colleges (*n* = 938)	Percent of Community Colleges Sending at Least 30 Transfer Students to a Particular Four-Year College
Program Mix	Primarily academic	505	64
	Primarily occupational	433	56
Urbanicity	Rural	211	44
	Suburban/town	415	62
	Urban	312	69
Average Student SES	Lower-SES serving	376	48
	Middle-SES serving	188	64
	Higher-SES serving	374	71

[5] Thirty is the median number of transfer students among all the transfer partnership colleges, so we used this number as the threshold to identify partnerships with a reasonably high volume of transfer students.

Table 4
Description of Four-Year Institutions in the Transfer Partnership Sample

Four-Year College Characteristics		All Four-Year Institutions (*n* = 1,908)	Percent of Four-Year Institutions Receiving at Least 30 Transfer Students From a Particular Community College
Urbanicity	Rural	110	14
	Suburban/town	818	28
	Urban	980	29
Student SES	Lower quintiles	762	27
	Middle quintile	384	30
	Top quintiles	762	27
Sector	Public	562	67
	Private non-profit	1,113	12
	Private for-profit	233	6
Selectivity	Missing	364	4
	Not selective	551	25
	Moderately selective	672	44
	Very selective	321	26

4. Analytic Framework

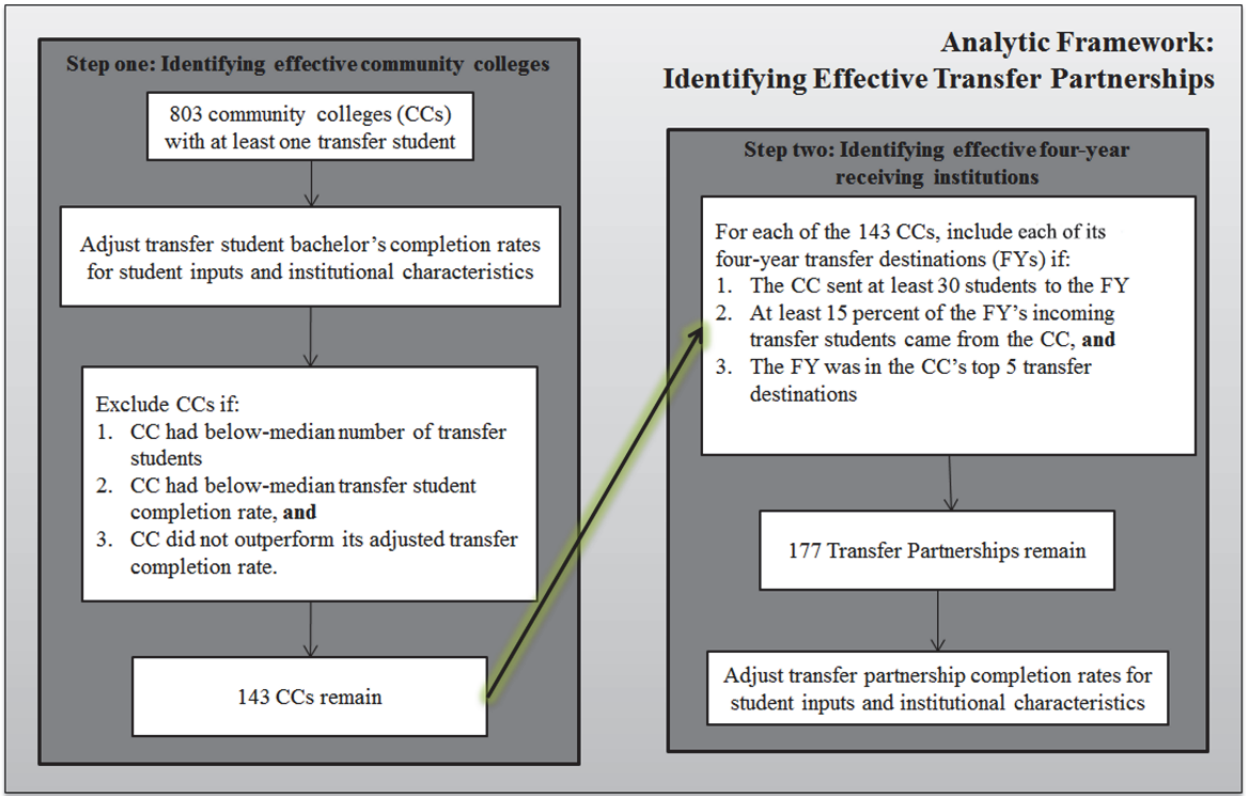
While raw outcome measures such as baccalaureate attainment rates are important measures of institutional performance, evaluating an institution solely based on unadjusted raw outcome measures is not ideal. This is because measures of institutional performance result not only from institutional policies and practices but also from inputs concerning student characteristics, college resources, and external factors, many of which are beyond the control of the institution. For example, four-year receiving institutions with more selective admissions have higher transfer student graduation rates on average than less-selective four-year institutions (Jenkins & Fink, 2016, Table 6). Such differences in institutional performance may be attributed to student inputs rather than how much value-added the institution provides in the ways it serves students.

Based on this reasoning, we used an input-adjustment approach that carries out analysis of outcomes conditional on student demographic and fixed institutional

characteristics so that reasonable comparisons can be made among the outcomes of different institutional partnerships. We draw on the large volume of literature on college ranking (see a comprehensive review in Bailey & Xu, 2012) to do this. We use a value-added model that evaluates institutional performance based on residuals from a regression equation that controls for student demographic characteristics such as SES status and SAT scores, as well as fixed institutional characteristics such as resources, location, and admission selectivity. In this approach, an institution with a positive residual—in other words, better-than-expected outcomes given its student population and resources—adds "value" to student outcomes.

Given that a transfer partnership involves two parties, we conduct a two-stage evaluation process that takes into account the performance of both the community college and the receiving four-year institution. A summary of the analytic framework for identifying high-performing partnerships is presented in Figure 1. Specifically, the first stage of the analysis identifies effective community colleges that produce a high volume of transfer students and a better-than-expected (i.e., with a positive residual) bachelor's degree completion rate for its students who transfer to *any* four-year institution, after accounting for student demographics and institutional resources. Focusing on these community colleges, in the second step we identify effective transfer partnerships as those in which a four-year institution is not only a major transfer destination for students from a particular two-year college but also has higher-than-expected bachelor's degree completion rates among those transfer students after controlling for available institutional and individual characteristics.

Figure 1
Two-Step Analytic Framework for Identifying Effective Transfer Partnerships



4.1 Identifying Effective Community Colleges

The purpose of the first-step regression is to identify community colleges with relatively high transfer volumes as well as better-than-expected bachelor's degree completion rates among transfer students. The reason why we included bachelor's degree completion rates among transfer students from community colleges is to identify community colleges that were effective not only in helping students transfer to four-year colleges, but also in adequately preparing these transfer students to succeed in bachelor's degree programs at four-year institutions.

In the first-step regression, we compute a model-adjusted prediction of the bachelor's degree completion rate among transfer students for each community college, and then subtract it from the actual bachelor's degree completion rate for each two-year institution, yielding a residual of the bachelor's degree completion rate for each community college. The expected completion rate among transfer students for each institution is predicted based on a regression controlling for the following college-level

characteristics: average student census tract SES (occupation, education level, and median income of census tract); location (indicators for city, suburban); state; selectivity (categorical variable retrieved from IPEDS); percentage of each racial/ethnic group; percentage of female students; percentage of Pell grant recipients; total number of full-time students enrolled; percentage of degree-seeking students; program mix (academic versus occupational—or a dummy indicator for missing this measure); spending per FTE student; and distance from each two-year college to the nearest four-year institution.[6]

Based on the results from the regression, we restrict community colleges to a smaller pool. Each college meets the following thresholds. First, the community college has a total number of transfer students that is above the median among all community colleges. This criterion is to guarantee that we focus on colleges with a substantial number of transfer students. Second, the bachelor's completion rate among transfer students is above the median for all community colleges in our sample. And third, the community college has a positive residual from the regression; that is, the institution performs better in terms of baccalaureate completion rate among transfer students given its student demographic characteristics and fixed institutional characteristics. Applying these thresholds identifies 143 community colleges for the second-stage analysis.

4.2 Identifying Effective Four-Year Receiving Institutions

The purpose of the second step regression is to identify receiving four-year colleges with better-than-expected baccalaureate completion rates for students from the effective sending community colleges we identified in the first step. To focus the analysis on transfer partnerships, we calculate the baccalaureate completion rate among transfer students for each pair of partner two-year and four-year institutions.

Because there are substantial variations in the number of transfers between pairs of institutions, we restrict the analytical sample based on three criteria before running the second-stage regression on baccalaureate completion: (1) at least 30 students in the fall 2007 FTEIC cohort transferred from the community college to the four-year institution;

[6] We matched students' census track indicators received from NSC with the U.S. Census to retrieve the following information of the census block for each student: median household income, proportion of residents older than 25 years old with a bachelor's degree, and proportion of residents in a professional occupation. We calculated a proxy SES indicator for each student based on the z-score of the three census block indicators mentioned above, with 1 representing the lowest SES status and 5 representing the highest SES status. For a more detailed description of this procedure, see Crosta, Leinbach, and Jenkins (2006).

(2) the four-year institution received at least 15 percent of all transfer students from the given community college; and (3) the four-year institution was among the top five transfer destinations for the given community college. These three criteria are applied to ascertain that a given receiving institution is among the important partners in taking in transfer students from a particular community college.

For partnerships that remain in the pool, we run a regression to predict the baccalaureate completion rate for students who transferred from a specific community college to a particular four-year institutional partner. That is, the outcome measure is calculated only among transfer students within a particular pair of transfer partners, and a community college may have multiple partner four-year colleges that satisfy the three thresholds mentioned above. We then subtracted the expected baccalaureate completion rate from the actual baccalaureate completion rate, yielding a residual of the baccalaureate completion rate for each pair of transfer partner institutions.

The expected partnership bachelor's degree completion rate predictions are based on a regression model controlling for the following characteristics of the receiving institution: average student census tract SES (occupation, educational level, and median income of census tract); institutional sector (indicator for public schools); location (indicators for city, suburban); state; selectivity of four-year partner (categorical variable retrieved from IPEDS); percentage of each racial ethnic group; percentage of Pell grant recipients; total number of full-time students enrolled; percentage of degree-seeking students; spending per FTE student; and distance between each partnership two-year and four-year colleges. Finally, we rank partnerships based on the size of the residual on the baccalaureate completion rate.

5. Results

5.1 Overall Patterns of Transfer Partnerships

Before reporting the results from the two-stage regression analysis that we conducted, we first describe the descriptive patterns of direct transfer partnerships in our analytic sample, including 1,458 transfer partnerships with at least 30 students in each

partnership, totaling 128,053 transfer students. As shown in Table 5, a majority of the partnerships and transfer students in the final sample started at primarily academic, urban or suburban, and higher-SES community colleges. Public four-year institutions comprised 84 percent of the transfer destinations and 90 percent of the transfer students in the final sample, and moderately selective and urban four-year institutions comprised a majority of both institutional destinations and students in the final sample. Additionally, most of the transfer partnership pairs in the final sample were within a one hour's drive of one another.

Overall, the bachelor's degree completion rate of transfer students within the partnerships in the final analytic sample was 54 percent *(SD* = 20 percent). The bachelor's degree completion rates are consistent across types of starting community colleges, with no differences in rates greater than one half of a standard deviation. We observed more differences in the average partnership bachelor's degree completion rates across different types of destination four-year institutions than across different types of starting community colleges. For example, partnerships with a public four-year institution destination averaged a 56 percent (*SD* = 17 percent) completion rate compared with the 9 percent (*SD* = 9 percent) completion rate among partnerships with a private for-profit four-year destination. Partnerships with a very selective four-year institution destination averaged a 70 percent (*SD* = 18 percent) bachelor's degree completion rate, whereas the completion rate of partnerships with a non-selective four-year destination institution was 39 percent (*SD* = 21 percent).

Additionally, transfer students performed relatively well in partnerships with suburban or rural four-year destinations (compared with urban institutions) as well as in those with higher-SES serving four-year destinations. With regard to distance between transfer partner institutions, transfer student bachelor's degree completion rates tended to increase with the driving distance between institutions, to a point. Transfer student bachelor's degree completion rates were lower, on average, among the few partnerships with six hours or more driving distance between institutions. One possible explanation is that students who are willing to travel further or relocate to attend a four-year institution may be willing to do so because the four-year institution is more selective. In other words, institutional selectivity may explain why students who transfer to four-year

institutions farther away have higher graduation rates than students who attend their local four-year institution.

Table 5
Descriptive Results for Transfer Partnerships With at Least 30 Students Transferring Between a Community College and a Four-Year Institution

Characteristics		Percent of Partnerships (*n* = 1,458)	Percent of Transfer Students (*n* = 128,053)	Bachelor's Degree Completion Rate for Partnerships *(Std. Dev. In Percent)*
Program Mix	Primarily academic	62	62	52 *(20)*
	Primarily occupational	38	38	59 *(18)*
Urbanicity	Rural	12	9	57 *(18)*
	Suburban/town	46	43	56 *(19)*
	Urban	42	48	52 *(20)*
Average Student SES	Lower-SES serving	23	18	47 *(20)*
	Middle-SES serving	18	15	51 *(19)*
	Higher-SES serving	60	67	57 *(19)*
Sector	Public	84	90	56 *(17)*
	Private non-profit	13	8	42 *(29)*
	Private for-profit	4	2	9 *(9)*
Selectivity	Missing	1	1	22 *(32)*
	Not selective	22	20	39 *(21)*
	Moderately selective	54	60	55 *(14)*
	Very selective	23	20	70 *(18)*
Urbanicity	Rural	2	1	36 *(25)*
	Suburban/town	39	39	54 *(19)*
	Urban	59	60	55 *(20)*
Average Student SES	Lower-SES serving	33	28	44 *(21)*
	Middle-SES serving	20	19	53 *(16)*
	Higher-SES serving	47	53	60 *(17)*
Driving Time Between Partner Institutions	Less than 30 minutes	33	47	52 *(18)*
	30 minutes to 1 hour	26	25	55 *(19)*
	1 to 1.5 hours	14	10	56 *(20)*
	1.5 to 2 hours	9	6	61 *(17)*
	2 to 3 hours	8	5	63 *(21)*
	3 to 4 hours	4	2	65 *(19)*
	4 to 6 hours	2	2	59 *(29)*
	6 or more hours	3	2	28 *(30)*

5.2 Factors Predicting Effective Community Colleges

Table 6 presents the results from the first-stage analysis that regresses the baccalaureate completion rate among vertical transfer students in community colleges on a set of institutional characteristics. As expected, colleges with students who are coming from a more advantaged socioeconomic background (as measured by average median household income, average percentage of residents with bachelor's degree or above, and average percentage of residents who work in professional occupations) are more likely to have higher baccalaureate completion rates among transfer students. Colleges with fewer Pell grant recipients and higher percentages of White and Asian students are also associated with higher baccalaureate completion rates among transfer students. It is important to recognize that the top effective community colleges we select based on the residual from the first-stage regression model are the ones that did a great job preparing transfer students to complete a bachelor's degree after controlling for these observed institutional characteristics. This means that there are some unobserved institutional efforts that made them particularly effective in preparing transfer students for baccalaureate completion.

Table 6
Regression Results for First-Stage Model: Factors Predicting Effective Community Colleges

	Bachelor's Degree Completion Rate Among Transfer Students	
	Standard Beta	***t-statistic***
SES proxy: average median income z score	0.0449	[2.41]*
SES proxy: avg. percentage of residents over 25 years with bachelor's degree	0.0653	[3.14]**
SES proxy: avg. percentage of residents working in professional occupation	-0.0561	[3.00]**
Located in city area	-0.0138	[1.38]
Located in suburban area	-0.0109	[1.00]
IPEDS: percentage of students receiving Pell grant	-0.0009	[2.36]*
IPEDS: number of first time in college enrollment	<0.01	[1.64]
Percentage of female students	0.1928	[3.28]**
IPEDS: percentage of Asian students	0.2667	[2.36]*
IPEDS: percentage of African American students	-0.1758	[2.51]*
IPEDS: percentage of Hispanic students	-0.0468	[0.70]
IPEDS: percentage of White students	0.0612	[0.96]
Program mix: percentage of occupational awards	0.0183	[0.83]
Expenses per FTE	<0.01	[0.71]
Indicator for missing program mix	-0.1356	[6.15]**
Indicator for missing expense	-0.0239	[0.55]
Distance to nearest four-year institution	<0.01	[1.42]
Selectivity: high	-0.0373	[4.19]**
Constant	0.3869	[5.11]**
Observations	800	
R-squared	0.57	

Note. This model controls for state fixed effects; absolute values of *t*-statistics in brackets.

*$p < .05$, **$p < .01$.

5.4 Factors Predicting Effective Transfer Partnerships

Table 7 presents results from the second-stage regression model for identifying effective partnerships for bachelor's degree completion among transfer students. The sample for this second stage in our selection method includes 177 transfer partnerships between the effective community colleges identified in the first-stage regression and their respective four-year partners that met the thresholds detailed in section 4.2. Thus, the outcome measure (i.e., the bachelor's degree completion rate) is calculated only among transfer students within a particular pair of transfer partner institutions. The regression model results suggest that selectivity of the four-year institution and percentage of Pell grant recipients are the most important predictors. Again, the effective partnerships we identify from the second-stage regression model are the ones that did a great job moving transfer students from a particular two-year college toward degree completion after controlling for the institution-level resources and characteristics of the receiving institution.

Table 7
Regression Results for Second-Stage Model:
Factors Predicting Effective Transfer Partnerships

	Bachelor's Degree Completion Rate	
	Standard Beta	***t-statistic***
SES proxy: average median income z score	-0.0285	[0.56]
SES proxy: avg. %age of residents over 25 years with bachelor's degree	0.0787	[1.70]
SES proxy: average percentage of residents work in professional occupation	0.036	[0.72]
Selectivity: more selective with high amount of transfer	0.0363	[0.64]
Selectivity: more selective with low amount of transfer	0.0555	[0.81]
Selectivity: selective with high amount of transfer	0.0393	[1.14]
Selectivity: selective with low amount of transfer	0.1434	[2.87]**
IPEDS: percentage of students receiving Pell grant	-0.0074	[2.99]**
IPEDS: number of first time in college enrollment	<0.01	[0.76]
IPEDS: percentage of Asian students	-0.6847	[1.56]
IPEDS: percentage of African American students	-0.3134	[0.78]
IPEDS: percentage of Hispanic students	-0.0806	[0.26]
IPEDS: percentage of White students	0.0178	[0.07]
Public college	-0.075	[1.44]
Locate in city area	0.045	[1.43]
Locate in suburban area	-0.0324	[0.89]
Total Expenses per FTE student	<0.01	[1.95]
Indicator for missing expense	0.1187	[0.96]
Distance between the partnership colleges	0.0002	[1.23]
Constant	0.9072	[3.18]**
Observations	177	
R-squared	0.64	

*$p < .05$, **$p < .01$.

6. Discussion and Conclusion

Given both the growing desire of state governments to hold higher education institutions to new standards of accountability and the widespread awareness of inefficiency in the transfer process, the focus on transfer effectiveness and outcomes is likely to increase. Yet, whether conducted for the purpose of general accountability, outcome-based funding, or informing efforts to improve postsecondary student success, assessing institutional transfer performance without accounting for the characteristics of the students served and the resources available to the colleges involved cannot convey to policymakers, researchers, and the public what they really want to know with regard to the college practices that influence students' outcomes. It may even result in misleading conclusions.

In this paper, we introduce a method to evaluate and benchmark institutional performance in terms of supporting the academic success of vertical transfer students as they strive toward their goal of baccalaureate attainment. To take into account the responsibility of both the home institution and the receiving institution in this process, we use a two-stage assessment, evaluating the performance of community colleges and receiving four-year institutions respectively, through a value-added approach to adjust for the characteristics of students entering each institution and the resources available to each. For each stage of the analysis, we evaluate the performance of either a two-year or a four-year institution after taking into account demographic and institutional characteristics that are often beyond a college's control.

It is worth noting that while the focus of this paper is on the development a method for identifying effective transfer partnerships, we also provide a description of the general transfer patterns nationwide for a better understanding of the potential variation in transfer behaviors and outcomes by key institutional characteristics. In the course of developing the method we identify a number of interesting national transfer patterns. For example, we found more than 40,000 unique community college to four-year college direct transfer partnerships through which at least one entering student transferred, and we found 1,800 partnerships through which 30 or more students transferred. Our findings show that, among the larger partnerships with more than 30 transfer students, more than one third of transfer students who started at community

colleges with a primarily occupational program focus or at rural community colleges were at a disadvantage compared with students who started at community colleges with more of an academic focus or those in urban or suburban areas.

While the analytic framework introduced in this paper provides an important first step for identifying effective transfer partnerships and benchmarking institutional performance, there are several important caveats and limitations that policymakers and researchers should bear in mind when using this approach. First, community colleges were chartered to serve multiple student needs including non-degree objectives (Cohen & Brawer, 1996). Yet, neither the NSC data nor most of the available national data on institutional characteristics records information on students' educational intent or objectives. The absence of precise information to identify baccalaureate-seeking students has thus made college performance assessment in vertical transfer less accurate.

In addition, there can be substantial "swirling" between a community college and a nearby four-year college, whereby, for example, four-year entrants may attempt a few courses at a community college. Counting these students as transfer students would falsely inflate the graduation rates. Even students who start in a community college may swirl among more than two community colleges or multiple destination institutions, making it harder to attribute credit for student outcomes to any specific partnership. In the analysis reported here, we exclude community college students who attended more than two institutions from our analysis. Future studies may wish to expand our analytic framework to capture such enrollment behavior.

Finally, a major thrust of our analytic framework is to help states and researchers to delve into effective partnerships and identify scalable and sustainable practices that could improve students' transfer outcomes. As a follow-up to this research, the Community College Research Center and The Aspen Institute's College Excellence Program conducted field research at the top-performing transfer partnerships identified using the methodology in this paper. Through interviews and observations at highly effective partnerships in six different states during fall 2015, the researchers distilled a set of essential transfer practices for two- and four-year colleges that align within one of three broad strategies among these institutions: (1) prioritizing transfer, (2) creating clear programmatic pathways with aligned high quality instruction, and (3) providing tailored

transfer student advising. The resulting *Transfer Playbook* (Wyner, Deane, Jenkins, & Fink, 2016) provides evidence-based recommendations to college leaders on how to help more community college students transfer and earn bachelor's degrees. Future studies may wish to conduct similar research in different state contexts to increase the generalizability of these findings, as well as to identify distinct policies that speak only to a particular state's context.

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