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The Success of Transfer Students and Four-Year Starters in Completing Bachelor's Degrees

A Report Prepared by

Dr. Donna K. Ginther, Director, CSTEP

Patricia Oslund, Research Economist

Center for Science, Technology, & Economic Policy (CSTEP)

Institute for Policy & Social Research, The University of Kansas

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Executive Summary

At the request of the Kansas Board of Regents, the Center for Science, Technology, & Economic Policy (CSTEP) at the University of Kansas evaluated the success of community college transfer students compared to four-year natives. We limited our analysis to transfer students and four-year natives who had achieved junior status (54 or more credits). We did so to limit survivor bias in our analysis and because previous studies found no significant differences in the probability of completion in the two groups. We examined the effect of transfer students on completing a bachelor's degree within six years, employment in Kansas and earnings. Our study found the following:

- Only about 13% of community college starters transfer directly to a Kansas public four-year school with any number of credits.

- Community college transfer students are 21.6 percentage points less likely to complete their bachelor's degree within six years than those who start at a four-year university.

- Transfer students are 6.9 percentage points more likely to complete at Kansas State University and the University of Kansas than students who transferred to regional universities. However, the transfer penalty compared to native four-year starters remains large.

- In an analysis that includes all students, students of color and nontraditional students are less likely to complete a bachelor's degree. Female students are more likely to complete a degree than males. However, we found no significant differences for students of color, nontraditional, and female students when the analysis was limited to transfer students only.

- Among all transfer students, those receiving Pell grants were nine percentage points less likely to complete a bachelor's degree than those with more economic resources.

- Among all transfer students, those who have 63 credits or more were 25.9 percentage points more likely to graduate.

- Students who worked during all semesters enrolled were 8.5 percentage points less likely to graduate.

- Transfer students earn fewer credits per term than native students. Transfer students enroll in more lower-division credits upon transfer to a four-year institution. Thus, transfer students on average are "behind" natives in terms of credit towards degree at the time of transfer.

- Observable characteristics explain only one-third of the transfer student graduation penalty. Credit loss by transfer students also explains part of the graduation penalty.

- Graduation rates for transfer students at research universities increase by about 11 percentage points and rates at regional universities increase by about 15 percentage points when we consider graduation rates seven and eight years after enrollment. However, the transfer penalty persists.

- Transfer students and four-year starters pick different majors. Transfer students are more likely to major in education, protective services, agriculture, and business, and they are less likely to major in engineering, liberal arts, art, and biological sciences.

- Transfer students are more likely to be employed in Kansas and Missouri than students who started in four-year institutions.

- Transfer students earn significantly less ($1400) than students who start in four-year institutions.

The Success of Transfer Students and Four-Year Starters in Completing Bachelor's Degrees

Introduction

Community colleges serve several important functions in the educational pipeline. First, community colleges offer technical degrees and certificates that prepare students for entry into labor market. Second, community colleges retrain nontraditional, older students for in-demand job opportunities, often preparing them for labor market re-entry. Third, community colleges offer high school students opportunities to complete college-level work and a head start on post-secondary education. Fourth, community colleges serve as a point to entry on the path to a bachelor's degree. This report focuses on the fourth role—preparing students for a bachelor's degree and beyond.

Review: Community college enrollment and bachelor's degree attainment

Aspirations and achievement

Nationally, the achievements of community college students fall far short of the students' initial aspirations. Data from the Beginning Postsecondary Students (BPS) Longitudinal Study (US Department of Education, 2009, 2014) illuminate this issue.[1] As shown in Table 1, almost 80% of students who start at 2-year community colleges plan to earn at least a bachelor's degree.

Yet very few of those community college starters who aspire to a bachelor's degree actually end up with a degree in hand after 6 years, only about 13% (Table 2). Another 22% have earned an associate's degree or a certificate. But almost 45% of community college starters have no academic credential and are no longer enrolled after 6 years. In contrast, about 60% of the four-year starters who aspire to a bachelor's degree achieve their goal after 6 years, and less than one-fourth have left school with no credential.

Statistics such as these have led researchers to think carefully about the role of community colleges. Are differences in college outcomes between two-year and four-year starters due to students self-selecting into the alternative modes of education, or does the community college experience create barriers to earning a bachelor's degree?

[1] The BPS follows students for several years after their initial college enrollment. Data from the 2009 BPS show outcomes for students who started 6 years earlier in academic year 2003-2004. Data from the 2014 BPS include 3-year outcomes for students who started in 2011-2012. Students who started in 2011-2012 will be surveyed again during 2017.

Table 1
Highest degree expected when starting post-secondary education for students starting college in 2003-2004, by level of starting institution

	Highest degree expected		
Starting institution	Less than associate's	Associate's	Bachelor's or higher
2-year	5.0%	15.3%	79.7%
4-year	0.3%	1.8%	97.9%

Table 2
Highest degree actually attained 6 years after matriculation for students starting college in 2003-2004 who *expected* a bachelor's degree or higher

	Highest degree attained			
Starting institution	Associate's or certificate	Bachelor's or higher	No degree, still enrolled	No degree, not enrolled
2-year	22.1%	13.0%	20.4%	44.4%
4-year	5.6%	59.1%	12.2%	23.1%

Note: Includes students who started post-secondary education in 2003 and were followed through 2009.
Source (Tables 1 and 2): US Department of Education, National Center for Education Statistics, 2009 Beginning Postsecondary Students Longitudinal Study. Computation by NCES QuickStats on 8/22/2017. https://nces.ed.gov/datalab/quickstats

Types of community college studies

Numerous studies compare the outcomes of students who begin their schooling at community colleges with those who start at four-year institutions. Some studies compare students from the time that they first enter college or when they graduate from high school. Other studies compare students starting at approximately the beginning of their junior years. In theory, the first type of study has the potential for tracking multiple types of community college outcomes such as technical training. In practice, both types of studies generally focus on whether students receive bachelor's degrees.

Studies comparing two-year and four-year starters

Rouse (1995) characterizes questions about community college outcomes along the themes of "democratization versus diversion." She analyzes data from the national High School and Beyond survey; her sample includes all high school graduates regardless of whether they attend college. Proximity to two- and four-year institutions serve as instrumental variables[2] for college attendance. Rouse finds that overall, community colleges have little effect on the completion of a bachelor's degree. Some students who might have attended four-year schools end up completing fewer years of education when they are diverted to community colleges. These students are balanced out by those who would not have

[2] Students select what kind of institution they attend—they are not randomly assigned to two- or four-year schools. Instrumental variables are variables highly correlated to the actual variables of interest (school attendance) but which help avoid econometric inconsistencies due to the self-selection problem.

attended college at all without the community college option—the democratization effect of community colleges.

Whereas Rouse includes all high school graduates in her study, more recent studies start at a different point in the educational pathway, limiting the analysis to those who actually start college. Doyle (2009) uses a sample from the BPS matched on demographic and other observable characteristics. The sample is restricted to those who report intentions of completing a bachelor's degree. Doyle finds that in the matched sample, community college starters are only about 68% as likely as four-year starters to complete a bachelor's degree. Long and Kurlaender (2009) use administrative data from Ohio and find that, among students who intend to complete a bachelor's degree, students starting in community colleges are 14.5% less likely to complete their goal. Alfonso (2006) finds similar results using data from the National Education Longitudinal Study (NELS). Students who are similar based on measurable characteristics have a lower probability of achieving a bachelor's degree (20%-30%) if they start at a community college. Using the similar data, Sandy, Gonzalez, and Hilmer (2006) attribute most of the reduced success of community college students to lower student preparation/quality. Using a sample of Chicago Public Schools graduates, Brand, Pfeffer, and Goldrick-Rab (2014) find that attending a community college has a small positive effect on disadvantaged students who would not otherwise have attended college. They attribute most of the negative impact of community college matriculation on bachelor's degrees on the heterogeneity of students.

Studies focusing on transfer students

An emerging set of studies compares the outcomes of *transfer* students from community colleges with outcomes of four-year college juniors, following the two groups for four to six years. Melguizo and Dowd (2009) analyze data from NELS. After controlling for socioeconomic and state-specific factors, they find no statistically significant differences in bachelor's degree completion between the groups. Melguizo, Keinzl, and Alfonzo (2011) apply propensity score matching to select a sample from NELS matched on socioeconomic characteristics. They find similar results—no significant differences in educational outcomes when transfers are compared with college juniors. Umbach, Tuchmayer, and Clayton (forthcoming) use administrative data from North Carolina and find that transfers and college juniors do equally well after controlling for observable characteristics. Dietrich and Lichtenberger (2015) find similar results using administrative data from Illinois. Andrews, Li, and Lovenheim (2014) use administrative data from Texas to examine the complex paths of post-secondary education. They find that transfer students graduate at the same or higher rates than those who start at four-year institutions. They examine post-graduation earnings of transfers versus four-year starters and find that transfer students earn less. However, the differences between the two groups is small except for graduates of Texas flagship institutions. Xu, Jaggers, and Fletcher (2016) use administrative data from Virginia to confirm that transfer students are equally likely to graduate as similar four-year starters. The authors also examine employment outcomes—they find no significant differences in earnings eight years after starting college between transfer students and four-year starters.

We summarize the literature with four stylized facts:

1. Community college starters are less likely to complete a bachelor's degree than four-year starters, even after controlling for socioeconomic variables and for intentions to complete a bachelor's degree.

2. Socioeconomic variables explain some but not all of the differences in completion between the two groups.
3. Comparisons of transfer students (with approximately 2 years of previous college work) with four-year starters at the junior level show no significant differences in completion rates. That is, students who make it to the junior level are equally likely to complete a bachelor's degree regardless of where they started their education.
4. Post-graduation earnings of transfers are similar to those of four-year starters, except possibly for graduates of flagship institutions.

Approach to the Kansas study

This study focuses on the role of community colleges on the path to a bachelor's degree with the state of Kansas. The study compares the success of two groups of students:

- Students who start their college education at community colleges and then transfer to four-year schools when they are close to beginning their junior year (54 or more credits at time of transfer)
- Students who attend four-year institutions from the beginning of their college careers and survive in college long enough to earn at least 54 credits.

The study uses administrative data from the Kansas Board of Regents (KBOR) and hence is limited to those students who attend Kansas public postsecondary institutions. Measures of success include completion of a bachelor's degree (within six years of college matriculation), employment, and wages. The study examines the extent to which the outcomes of Kansas students are similar to those found nationally, and looks at how unique characteristics of the Kansas system may affect results.

Our study compares two samples of *survivors*. On the transfer side, students have stayed in community colleges long enough to earn at least 54 credits. Many students have 65 or more credits at the time of transfer. On the four-year side, students have persisted in college long enough to earn at least 54 credits. We compare the outcomes of the two groups starting from approximately the same point in their college careers.

A major reason that our study (and many others) tracks students from the point that they are juniors or near juniors is to minimize survivor bias. Suppose, for example, we looked at students who transfer with 9 or more credits (instead of 54 or more credits) and compare them with four-year starters with 9 or more credits. On the transfer side, we only observe students who survive long enough to transfer. There are community college starters who intend to transfer, say after earning 30 credits, who drop out before they reach their intended transfer point. We do not observe these students because they never make it to being a transfer. On the other hand, we observe all of the four-year dropouts—those who drop out with 10 credits, 20 credits, 30 credits, etc. When we use 54 plus credits as a starting point, we catch community college students who have or who nearly have completed a community college curriculum, so that community college dropouts have already been weeded out. In Appendix A we present results from a sample that includes all students with 9 or more credits. We caution, however, that the results are subject to survivor bias.

Our current study focuses on the effect of completing the first years of college at a two-year institution on bachelor's degree completion. We plan additional research that compares four-year and two-year starters (regardless of whether they transfer) from the point that they enter college.

Defining the sample and variables

The research requires that we operationalize the definitions of four-year starters and transfers so that students in the Kansas Board of Regents database can be classified unambiguously. Complexity defines the pattern of student enrollments in Kansas. Students often enroll in more than one school in order to complete their schooling. Students may enroll at community colleges during the summer and at four-year institutions during the traditional school term. They may enroll in community colleges and four-year institutions simultaneously. They may transfer between two- and four-year institutions outside of the Kansas Board of Regents system. They may enter the Kansas system with Advanced Placement (AP) or other college credits earned in high school credits so that they never actually are classified as freshmen. The complexity of enrollments can make it difficult to determine exactly when a student begins her or his college education and exactly when a student should be counted as a transfer student. We used the following definitions and criteria for defining freshmen, transfer students, and four-year students:

1. The study is limited to students who are Kansas residents when they start college. Students from out-of-state may have different socioeconomic characteristics than residents.
2. For this study, students are classified as first-time freshmen when they have a KBOR enrollment record that is flagged as a first-time freshman. Some students have multiple first-time flags, in which case we use the earliest record.
3. Students are also first-time freshmen (even with no "first-time freshmen flag") if their enrollment status is freshman, they have finished high school, and they have no previous record of post-secondary degree-seeking enrollment from inside or outside the KBOR system. We used data from the National Student Clearinghouse to verify out of system enrollments.
4. If a student enrolls for the first time in the summer and then enrolls in a different school in the fall, the fall enrollment is counted as her first-time freshman enrollment. Students are classified as transfers for this study if they start at a KBOR two-year institution and transfer to a KBOR four-year institution. Data for schools outside the KBOR system are not sufficient for us to include transfers from non-KBOR schools in the research.
5. Sometimes students attend several community colleges before transferring to a four-year institution. For this study, we include only those students who transferred from the two-year school at which they started college.
6. We focus on KBOR transfer students with approximately 1.5 to 2 years of college work. In an appendix, we extend the study to a broader group of students and discuss the conceptual limitations of the broader approach. Our comparison group includes students who start college at a Kansas four-year institution and earn at least 54 credits.
7. We include only students who start their educations between 2008 and 2011. Students who start later than that may not have time to complete their degrees by 2016, the last year in our data.

Our study depends on several interconnected files from KBOR's database system (Kansas Board of Regents, 2015). Some of KBOR's files contain additional data from the National Student Clearinghouse

and from the Kansas Department of Labor that have been linked to student records. We supplement the KBOR database by linking US Census Bureau measures of poverty based on the zip code of a student's residence at the time she or he first applied to college. Our outcome variables include: a) completion of a bachelor's degree within six years; b) employment after graduation; and c) wages after graduation.

Four-year starters and transfer students differ in socio-demographic characteristics and in college readiness (Table 3). Compared with transfers, four-year students are much *less* likely to be underrepresented minorities or nontraditional students, and they are less likely to have to work while attending school. They are much *more* likely to come from low poverty neighborhoods where less than 20% of households have incomes below 185% of the poverty line. They also are more likely to be female. Four-year starters are more prepared for college than transfer students, as indicated by higher ACT scores, higher high school GPAs, and lower placement into developmental courses at the start of their college careers. Overall, four-year starters are much more likely to complete a bachelor's degree within 6 years than are transfer students. One of the main questions of this research is the extent to which demographic factors and college preparedness explain this difference in graduation rates.

Graduation outcomes for four-year starters and transfers with 54 or more credits

Graduation patterns

Graduation rates for both four-year starters and transfers vary substantially by school (Table 4 and Figure 1). Graduation rates for four-year starters at the state's research universities far exceed those at regional universities. Graduation rates for four-year starters exceed those of transfers at all schools. Differences in graduation rates do not necessarily reflect the underlying quality of the institution. Different institutions attract students with different college preparation and socio-economic backgrounds.

Table 3
Characteristics of the Sample

Variable	Four-year starters	Transfers	All students
Transfer student (count)	22,643	4,546	27,189
Earns BA in 6 or fewer years	83.7%	53.0%	78.6%
Starting academic year 2009	25.2%	24.2%	25.1%
Starting academic year 2010	25.1%	26.2%	25.3%
Starting academic year 2011	25.0%	26.2%	25.2%
Enrolled at regional 4-year	34.0%	64.7%	39.1%
Female gender	54.0%	51.3%	53.6%
Underrepresented minority student	10.3%	19.9%	11.9%
Nontraditional student (starting age 23 or older)	1.6%	8.2%	2.7%
Poverty measure missing	2.9%	5.9%	3.4%
>40% of households in home zip code below 185% poverty	12.4%	14.3%	12.7%
20-40% of households in home zip code below 185% poverty	41.2%	52.4%	43.0%
<20% of households in home zip code below 185% poverty	43.5%	27.5%	40.9%
Number terms working/number terms enrolled (ratio)	40.4%	57.4%	43.2%
ACT score missing	6.1%	25.3%	9.3%
ACT score low (<= 18)	6.4%	20.3%	8.7%
ACT score midrange (19-25)	50.7%	45.2%	49.7%
ACT score high (>= 26)	36.9%	9.1%	32.2%
Took any developmental class	14.2%	41.9%	18.8%
HS GPA missing	24.8%	51.3%	29.2%
HS GPA low (< 2.7)	3.7%	9.6%	4.7%
HS GPA lower midrange (2.7-3.2)	11.9%	12.4%	12.0%
HS GPA upper midrange (3.2-3.7)	26.6%	16.5%	24.9%
HS GPA high (> 3.7)	33.1%	10.1%	29.3%

Source: Compiled from Kansas Higher Education Data System for students earning at least 54 credits. Transfer students have 54 or more credits at time of transfer.

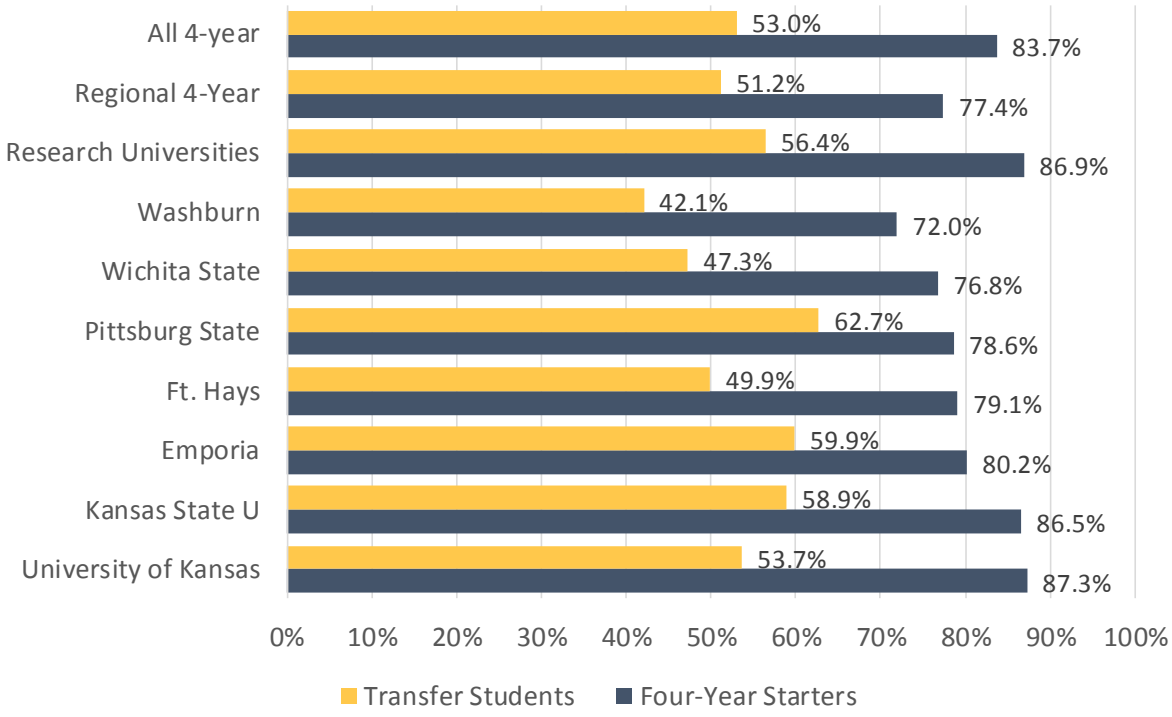
Table 4

Percent of students earning bachelor's degree within six years, by four-year institution and type of student, for students starting in 2008-2011

Four-year attended	Four-year starter	Transfer student	Transfer penalty (transfer - 4-yr starter)
University of Kansas	87.3%	53.7%	-33.6%
Kansas State Univ.	86.5%	58.9%	-27.6%
Emporia	80.2%	59.9%	-20.3%
Ft. Hays	79.1%	49.9%	-29.2%
Pittsburg State	78.6%	62.7%	-15.9%
Wichita State	76.8%	47.3%	-29.5%
Washburn	72.0%	42.1%	-29.9%
Research Universities	86.9%	56.4%	-30.5%
Regional 4-year	77.4%	51.2%	-26.2%
All 4-year	83.7%	53.0%	-30.7%

Source: Compiled from KBOR Administrative Datatbase for students earning at least 54 credits. Research Universities are University of Kansas (KU) and Kansas State University (K-State).

Figure 1
Six-year graduation rates for students starting in 2008-2011 and earning 54 or more credits



Regression models for students with 54 or more credits

In order to explain differences in graduation rates between four-year starters and transfers, we construct linear probability models using the variables in Table 3 as controls. Our control variables are similar to those used in other studies. We construct interaction terms for key variables to test whether the impact of a factor (for example, gender) is different for four-year starters versus transfers. We examine three increasingly detailed models:

- Model 1 includes only variables for whether the student is a transfer and for what type of institution the student attends.
- Model 2 adds socio-economic and demographic variables.
- Model 3 adds college preparedness variables to the previous specification.

The dependent variable in all models is whether the student receives a bachelor's degree within 6 years of starting college, coded as 1 for "yes" and 0 for "no." Table 5 shows the model results.

Model 1 (see Table 5) derives the same information shown in the last rows of Table 4. The coefficient of the transfer variable (-.305) indicates that transfer students are 30.5 percentage points less likely to complete their bachelor's degrees than four-year starters. However, for students at a regional institution, the transfer interaction coefficient is positive (.043). Thus, the gap between transfers and non-transfers is smaller by 4.3 percentage points at regional institutions versus research universities. Finally, the negative coefficient on the "regional institution" variable indicates that graduation rates at regional institutions are 6.9 percentage points lower than rates at research institutions.

Model 2 (Table 5) controls for demographic and economic factors. Once these controls have been added to the model, the baseline transfer coefficient becomes slightly smaller in absolute value (-.278 vs. -.305). The regional institution interaction term is small and statistically insignificant, so the shrinking gap applies to both research and regional institutions. Female students graduate at higher rates than males. Interaction terms are positive and significant, indicating that the positive gap between female and male students is even larger in the transfer student population. Underrepresented minorities and nontraditional students graduate at lower rates than other groups. Interaction terms are small and insignificant for underrepresented minority students, indicating that the gap applies equally to four-year starters as well as transfers. For nontraditional students, the interaction term is positive, indicating that these students face a smaller disadvantage if they start at a community college. Coming from a high poverty neighborhood and working while in school both have negative and statistically significant effects on the probability of graduation.

Model 3 (Table 5) adds controls for college readiness to the previous specification. We include variables for:

- High school GPA. Having a low high school GPA lowers the probability of graduating by about 17 percentage points in comparison with an "upper midrange" GPA of 3.2-3.7[3]ACT score. Students with low ACT scores are about 3 percentage points less likely to graduate than students with high scores.

[3] Both GPA and ACT scores are included as dummy variables. For GPA, the comparison category is 3.3-3.7. For ACT scores, the comparison category is 26 and above.

- Developmental coursework. Students who enroll in developmental classes are 6.5 percentage points less likely to graduate than students who do not need to take these courses.

Once the college readiness variables are included, the baseline transfer coefficient shrinks in absolute value to -.216 compared with the initial -.305. The college readiness variables along with demographic and economic factors explain some but certainly not all of the differences in graduation success between four-year starters and transfer students. A substantial gap remains. In a later section of this report we use an additional technique (Oaxaca decomposition) to examine the extent to which any gap between four-year starters and transfers can be explained by observable variables.

Additional factors affecting transfer student success

Some additional information effecting student success is available only for transfer students, not four-year starters. Information includes the two-year institution attended, whether the student receives a Pell grant (not available for four-year starters in the KBOR database), the number of credits earned before transfer, and the percentage of credits accepted at a four-year institution. In this section of the report we examine these additional factors.

Both the share of students who transfer to a Kansas public four-year institution and the success of transfers vary substantially across the two-year institutions attended (Table 6 and Figure 2). For this analysis, we limit first time freshmen to those earning at least 9 credits to eliminate students who only intend to take a course or two. We limit transfers to the first transfer that students make from the school at which they matriculate.

On average, less than 9% of community college starters complete a substantial amount of work (54 or more credits) at a community college before transferring to a Kansas public four-year school. Only about 13% of community college starters transfer directly to a Kansas public four-year school with any number of credits. Our analysis excludes students who transfer to private and out-of-state four-year institutions; it also excludes students who transfer to another community college before finally ending up at a four-year school. Nevertheless, we expect the number of transfers to be small. It appears that preparing students with their first two years of undergraduate education comprises only a small part of the mission of Kansas community colleges.

Success rates for achieving a bachelor's degree vary from 14% for transfers from technical colleges to about 62% for students from Labette and Dodge City community colleges. We point out again that differences across institutions do not necessarily reflect quality of instruction—differences may reflect the characteristics of the students who attend the schools and the programs that the schools offer.

Table 5

Models explaining graduation rates for students with 54 or more credits

Dependent variable = Bachelor's degree within 6 years

Variable	Model 1	Model 2	Model 3
Intercept	0.869 (0.003) ***	0.887 (0.007) ***	0.890 (0.008) ***
Starting academic year 2009		-0.010 (0.007)	-0.006 (0.007)
Starting academic year 2010		-0.011 (0.007) *	-0.015 (0.007) **
Starting academic year 2011		0.003 (0.007)	-0.004 (0.007)
Transfer student	-0.305 (0.010) ***	-0.278 (0.012) ***	-0.216 (0.012) ***
Enrolled at regional 4-year	-0.095 (0.006) ***	-0.067 (0.006) ***	-0.055 (0.006) ***
Interaction: transfer with regional 4-year	0.042 (0.013) ***	0.015 (0.013)	0.008 (0.013)
Female gender		0.059 (0.005) ***	0.046 (0.005) ***
Interaction: transfer with female		0.030 (0.013) **	0.020 (0.012)
Underrepresented minority student		-0.075 (0.008) ***	-0.046 (0.008) ***
Interaction: transfer with underrepresented		0.007 (0.017)	0.012 (0.016)
Nontraditional student (starting at age 23 or older)		-0.318 (0.021) ***	-0.191 (0.021) ***
Interaction: transfer with nontraditional		0.152 (0.029) ***	0.081 (0.029) ***
Poverty measure missing		-0.033 (0.014) **	0.023 (0.015)
>40% of households in home zip code below 185% poverty		-0.042 (0.008) ***	-0.041 (0.008) ***
20-40% of households in home zip code below 185% poverty		0.002 (0.005)	-0.008 (0.005)
Number terms working/number terms enrolled		-0.090 (0.007) ***	-0.085 (0.007) ***
ACT score missing			-0.071 (0.011) ***
ACT score low (<= 18)			-0.031 (0.010) ***
ACT score midrange (19-25)			0.004 (0.006)
Took any developmental class			-0.065 (0.008) ***
HS GPA missing			-0.001 (0.007)
HS GPA low (< 2.7)			-0.169 (0.012) ***
HS GPA lower midrange (2.7-3.2)			-0.072 (0.008) ***
HS GPA high (> 3.7)			0.076 (0.007) ***

Source: Compiled from Kansas Higher Education Data System.

Notes: *** = significant at 1% level; ** = 5% level; * = 10% level. Sample includes only students who were Kansas residents when starting college.

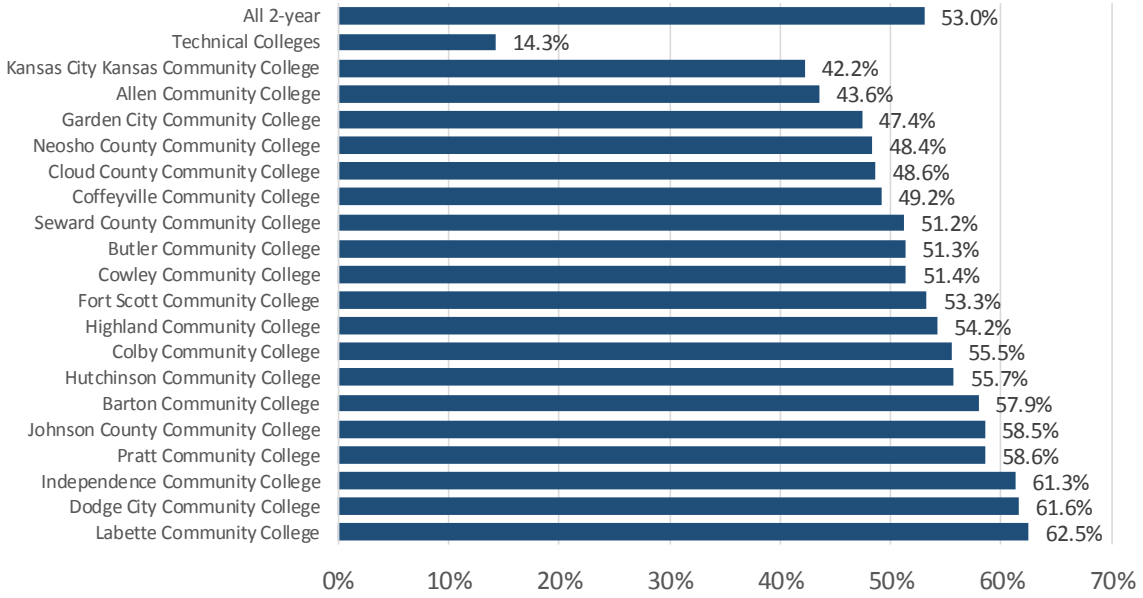
Table 6
Transfer students with 54 or more credits earning bachelor's degree within 6 years, by transferring 2-year school

Transferring Institution	Number of first-time freshmen	Transfers to four-year institutions	Transfers to four-year, 54 or more credits	% of freshmen transferring, 54 or more credits	% transfers graduating within 6 years
Labette Community College	1,050	145	88	8.4%	62.5%
Dodge City Community College	1,337	219	138	10.3%	61.6%
Independence Community College	912	88	62	6.8%	61.3%
Pratt Community College	987	196	152	15.4%	58.6%
Johnson County Community College	8,678	1,076	586	6.8%	58.5%
Barton Community College	2,714	317	214	7.9%	57.9%
Hutchinson Community College	4,076	718	522	12.8%	55.7%
Colby Community College	925	191	146	15.8%	55.5%
Highland Community College	1,981	294	177	8.9%	54.2%
Fort Scott Community College	2,113	235	137	6.5%	53.3%
Cowley Community College	3,928	583	424	10.8%	51.4%
Butler Community College	7,467	1,397	943	12.6%	51.3%
Seward County Community College	1,101	107	82	7.4%	51.2%
Coffeyville Community College	1,488	226	177	11.9%	49.2%
Cloud County Community College	1,198	143	74	6.2%	48.6%
Neosho County Community College	1,125	134	91	8.1%	48.4%
Garden City Community College	1,439	254	173	12.0%	47.4%
Allen Community College	1,965	324	202	10.3%	43.6%
Kansas City Kansas Community College	4,089	218	116	2.8%	42.2%
Technical Colleges	5,209	98	42	0.8%	14.3%
All 2-year	53,782	6,963	4,546	8.5%	53.0%

Source: Compiled from Kansas Higher Education Data System.

Note: First-time freshmen are limited to those earning at least 9 credits in their first year. Includes students who are first-time freshmen in 2008-2011. Transfer students are those transferring with 54 or more credits.

Figure 2. Percent of transfer students with 54 or more credits who graduate within 6 years



We estimate two regression models to further explore the determinants of transfer student success. The models include variables that only are available only for transfer students as well as the variables demographic, socio-economic, and college readiness variables discussed earlier (see Table 7). Model 4 includes only the Pell grant and credits variables, while Model 5 includes individual 4-year and 2-year transfer institution variables. In both models, we find that a positive impact on graduation for having more than 85% of credits accepted and for completing more credits before transfer. We find a negative impact for receiving a Pell grant; the Pell grant variable probably stands as a proxy for coming from a low-income family. The size of the coefficients is similar across the two models. Receiving an associate's degree does not have a significant impact on bachelor's degree success once we control for the number of transfer credits accepted.

In Model 5, we see the effect of the transferring institutions after controlling for other observable characteristics of the students. We calculate all coefficients relative to a baseline, which for this model is "transferred from technical college." Transfer students from Johnson County, Dodge City, Barton, Independence, and Labette community colleges appear to have the highest probability of success after controlling for demographics, economics, credits presented and accepted, and college preparedness.

Table 7

Models explaining graduation rates for students with 54 or more credits: Transfers only

Dependent variable = Bachelor's degree within 6 years

Variable	Model 4	Model 5
Intercept	0.460 (0.048) ***	0.141 (0.090)
Starting academic year 2009	-0.018 (0.020)	-0.016 (0.020)
Starting academic year 2010	-0.016 (0.020)	-0.010 (0.020)
Starting academic year 2011	0.001 (0.020)	0.002 (0.020)
Female gender	0.068 (0.014) ***	0.069 (0.014) ***
Underrepresented minority student	-0.013 (0.018)	-0.009 (0.018)
Nontraditional student (starting at age 23 or older)	-0.047 (0.029)	-0.031 (0.030)
>40% of households in home zip below 185% poverty	-0.039 (0.023) *	-0.021 (0.025)
20-40% of households in home zip code below 185% poverty	0.008 (0.017)	0.021 (0.018)
Number terms working/number terms enrolled	-0.093 (0.020) ***	-0.089 (0.020) ***
ACT score low (<= 18)	-0.060 (0.031) *	-0.043 (0.031)
ACT score midrange (19-25)	-0.041 (0.026)	-0.035 (0.026)
Took any developmental class	-0.037 (0.017) **	-0.064 (0.017) ***
HS GPA missing	-0.032 (0.020)	-0.050 (0.025) **
HS GPA low (< 2.7)	-0.180 (0.029) ***	-0.180 (0.030) ***
HS GPA lower midrange (2.7-3.2)	-0.088 (0.026) ***	-0.093 (0.026) ***
HS GPA high (> 3.7)	0.135 (0.028) ***	0.138 (0.028) ***
More than 85% of credits accepted for transfer	0.121 (0.018) ***	0.113 (0.018) ***
Student received Pell grant	-0.099 (0.015) ***	-0.091 (0.015) ***
Transferred 33-62 credit hours	0.206 (0.035) ***	0.209 (0.035) ***
Transferred 63 or more credit hours	0.254 (0.037) ***	0.259 (0.037) ***
Has AA when transferred	0.078 (0.056)	0.088 (0.056)
Enrolled at regional 4-year	-0.069 (0.015) ***	

Table 7 continued

Variable	Model 4	Model 5
Enrolled at Ft Hays		0.058 (0.036)
Enrolled at Pittsburg		0.181 (0.039) ***
Enrolled at Emporia		0.154 (0.040) ***
Enrolled at KSU		0.121 (0.034) ***
Enrolled at KU		0.103 (0.036) ***
Enrolled at WSU		0.039 (0.035)
Transferred from Allen		0.136 (0.080) *
Transferred from Cowley		0.150 (0.077) *
Transferred from Butler		0.189 (0.077) **
Transferred from Cloud		0.158 (0.091) *
Transferred from Coffeyville		0.099 (0.082)
Transferred from Colby		0.121 (0.084)
Transferred from Dodge City		0.280 (0.085) ***
Transferred from Ft Scott		0.128 (0.086)
Transferred from Garden City		0.166 (0.082) **
Transferred from Highland		0.151 (0.081) *
Transferred from Hutchinson		0.164 (0.077) **
Transferred from Independence		0.218 (0.095) **
Transferred from Kansas City Kansas		0.137 (0.087)
Transferred from Labette		0.177 (0.090) **
Transferred from Neosho		0.048 (0.088)
Transferred from Pratt		0.149 (0.083) *
Transferred from Barton		0.202 (0.081) **
Transferred from Seward		0.132 (0.091)
Transferred from Johnson County		0.285 (0.077) ***

Source: Compiled from Kansas Higher Education Data System.

*** = significant at 1% level; ** = 5% level; * = 10% level.

To what extent are graduation differences between four-year starters and transfers due to the observable characteristics of the students?

In previous sections of this report, we have presented results from regressions with various specifications. But we have not fully quantified the extent to which differences in average graduation rates between four-year starters and transfers (see Table 4) can be explained by the *observable* characteristics of the students in the two groups. By observable, we mean characteristics for which data exist in the KBOR database or which can be constructed from such data. KBOR does not track characteristics such as motivation and work ethic, although they potentially are observable through psychological assessments.

An econometric technique known as an Oaxaca decomposition (Oaxaca, 1973) provides a method for attribution differences in outcomes between groups into explained and unexplained parts. The steps in the decomposition include:

1. Divide the sample into two groups, four-year starters and transfers.
2. Estimate models explaining graduation rates separately for the two groups. Use the same explanatory variables for each group. The result is two vectors of estimated parameters, $\mathbf{B}_{\text{fouryr}}$ and $\mathbf{B}_{\text{transfer}}$.
3. Calculate the means for the explanatory variables $\bar{\mathbf{x}}_{\text{fouryr}}$ and $\bar{\mathbf{x}}_{\text{transfer}}$.
4. Calculate the means for the outcomes (graduation rates) for the two groups, $\bar{\mathbf{y}}_{\text{fouryr}}$ and $\bar{\mathbf{y}}_{\text{transfer}}$.
5. Mathematically, $(\bar{\mathbf{y}}_{\text{fouryr}} - \bar{\mathbf{y}}_{\text{transfer}}) = (\bar{\mathbf{x}}_{\text{fouryr}} - \bar{\mathbf{x}}_{\text{transfer}})(\mathbf{B}_{\text{fouryr}}) + (\bar{\mathbf{x}}_{\text{transfer}})(\mathbf{B}_{\text{fouryr}} - \mathbf{B}_{\text{transfer}})$.
6. The first term on the right-hand side of the above equation is the part of the outcome difference due to the observable variables. The second term is the amount of the difference due to unexplained differences in structure—the estimated parameters are different for four-year starters and transfers.

As presented in Table 8 there is a 30.7 percentage point gap between transfer students and four-year starters. For KBOR institutions, 78.6% of students complete a bachelor's degree within six years. Only about 10.4 percentage points (one-third) of the difference in graduation rates can be explained by the observable characteristics of the students. Of this 10.4 percentage points, about half is due to demographic and economic variables, while the other half is due to college readiness. A substantial unexplained gap in graduation rates of more than 20 percentage points (two-thirds) remains.

Table 8
Oaxaca decompostiion effects for four-year starters versus transfers
Students with 54 or more credits starting in 2008-2011

Estimate	Amount
Mean graduation rate: four-year starters	83.7%
Mean graduation rate: transfers	53.0%
Difference	30.7%
Amount due to differences in observables	10.4%
Demographic and economic variables	5.3%
College readiness variables	5.1%
Amount due to unexplained structural differences	20.3%

Why do Kansas transfers graduate at a lower rate than four-year starters?

Disparities with existing literature

Our findings differ substantially from those reported in the recent literature based on other states, which concludes that students who make it to the junior level are equally likely to complete a bachelor's degree regardless of where they started their education. Both the size of the "transfer penalty" and the conflict with previous findings prompted us to probe more deeply into the reasons Kansas transfers fail to complete bachelor's degrees at the same rate as four-year starters.

Do transfers need more time to graduate?

Our discussion so far has focused on whether students graduate within six years of their initial enrollment. Some of the existing literature looks at longer time frameworks. For example, Long and Kurlaender (2009) consider both six- and nine-year graduation rates. Our data limits us to freshmen who started in 2008 or later. We can follow a subsample of our data, those who started in 2008, 2009, and 2010 for seven years, and those who started in 2008 and 2009 for eight years. Our question is whether transfer students "catch up" to four-year starters. We know that transfer students work more than four-year starters—as a consequence they may take lighter credit loads. We compare seven- and eight-year graduation rates between transfers and four-year starters (Table 9).

The transfer penalty narrows for both research and regional universities when we extend the analysis by two more years. Graduation rates for transfer students at research universities increase by about 11 percentage points and rates at regional universities increase by about 15 percentage points when we look at a longer time horizon. However, transfer students still are much less likely to graduate in eight years than four-year starters in the same time span. Extra time helps, but a transfer penalty persists.

Table 9
Percent of students earning bachelor's degree by years since initial enrollment, institution type, and transfer status

Four-Year Type	Years since initial enrollment	Four-Year Starter	Transfer Student	Transfer penalty (transfer - 4-yr starter)
Research Universities	6	86.9%	56.4%	-30.5%
	7	88.8%	65.1%	-23.7%
	8	90.1%	67.8%	-22.3%
Regional 4-Year	6	77.4%	51.2%	-26.3%
	7	81.9%	61.4%	-20.6%
	8	84.4%	66.3%	-18.1%
All 4-year	6	83.7%	53.0%	-30.7%
	7	86.5%	62.7%	-23.8%
	8	88.2%	66.9%	-21.3%

Source: Compiled from Kansas Higher Education Data System for students earning at least 54 credits.

Credit loss

We examine the enrollment behavior of transfer students to gain insight into what might hold these students back from graduation. For this analysis, we break the transfer students into four different groups based on the number of credits earned before transfer, as shown in Table 10. Note that students typically lose credits upon transfer—generally only about 80-90% of community college credits are accepted by the student's four-year university. Regional universities appear to accept a larger proportion of credits than do the Kansas research universities. As shown in Table 7, transfer students with a high percentage of their credits accepted are more likely to graduate than transfer students with fewer credits accepted.

Students who transfer with a large number of credits face a stiffer loss—there is a limit to the number of lower division credits that can be transferred from community colleges. For example, at KU the limit is 64 credits; at K-State the limit is one-half of the number of credits required for a degree. Furthermore, developmental courses and technical-vocational courses are not transfer-eligible. Although transfer credits may be accepted, they may not count towards degree completion, making it more difficult for transfer students to complete the bachelor's degree.

Table 10
Transfer credit groups

Number of community college credits earned at time of transfer	Group #	Research universities			Regional 4-year universities		
		Number of transfer students	Mean credits before transfer	Mean credits accepted by 4-year	Number of transfer students	Mean credits before transfer	Mean credits accepted by 4-year
54-64 credits	1	492	59.9	89.8%	893	60.0	90.5%
65-74 credits	2	640	69.0	84.2%	1171	69.1	90.4%
75-84 credits	3	282	78.7	81.0%	525	78.9	87.1%
85 or more credits	4	193	94.0	73.8%	346	93.8	80.2%

Source: Compiled from Kansas Higher Education Data System.

Transfer student enrollment behavior

Credit loss provides part of the reason that Kansas transfer students fail to graduate in a timely fashion. But for most students, credit loss is substantially less than a semester's work. We explore additional factors that might help to explain low observed graduation rates. To continue the analysis, we match transfer students with four-year students who have earned a similar number of credits by the end of the previous semester. We track students for a full year after: a) the student transfers; or b) the four-year student earns an equivalent number of credits for the group with which the student is matched. For example, transfer students who earned 54-65 credits before transfer are compared with all four-year students who earn 54-65 credits, with the one-year clock starting the semester after the students earn 54-65 credits.

Table 11 shows the results from the one-year comparisons. We discuss each result below.

- Transfer students generally enroll for fewer semesters than four-year starters with a similar number of credits. We counted summer semesters as 1/3 of a regular term. On average, transfer students enroll in fewer terms that four-year starters during the year used for matching. The transfer students may drop out, stop out, or enroll in fewer summer terms.
- Transfer students enroll in and pass fewer credits than similarly positioned four-year starters. The percentage differences between transfers and four-year starters generally are larger in absolute value for credits than for terms enrolled, indicating that the smaller number of credits is not due to the number of terms enrolled alone. As an example, consider the 54-63 credit group at research universities. Credits passed per term average 13.2 for four-year starters and 11.3 for transfers.
- The number of upper division (and graduate) credits passed differs dramatically between the two groups. Consider again the group with 54-63 credits passed. At research universities, four-year starters pass about 19 upper division credits in the matched year, while transfer students pass only about 8 upper division credits. Similar comparisons apply to the regional universities. Most courses fulfilling requirements for a major consist of upper division work. In addition, general degree requirements typically require 45 upper division credits. The transfer students in our analysis are at or near what should be junior status. Yet they earn relatively few upper division credits compared with their four-year starter counterparts. Although the students usually transfer with 50 or more accepted lower division credits, they continue to enroll in

additional lower division courses. The transfer students may be filling in deficits in pre-requisite courses for their majors. Their courses at the community colleges may fail to count towards their majors, even if the credits are accepted. Furthermore, it appears that transfers are slow to earn the upper division credits that count towards a major.

- A final consideration is whether transfer students spend substantially longer earning their community college credits that four-year students spend earning an equivalent number of credits. This appears to be true for students who transfer with 54-74 credits (groups 1 and 2) but not for other groups. Groups 1 and 2 contain the majority of transfer students, so time spent before transfer rates as an additional impediment to timely graduation.

Our analysis of graduation rates considers only factors on which we have data available. Transfer students may be more likely than four-year students to have family and other responsibilities that affect the pace at which they can complete their education. Without more detailed data we can only speculate.

Labor market outcomes for four-year starters and transfers

Our final research question is whether four-year starters and transfers experience similar labor market success. We look at labor market outcomes in the year after students graduate with a bachelor's degree. KBOR linked labor market data from the Kansas and Missouri departments of labor with individual student records, allowing us to measure outcomes in a bi-state area. Unfortunately, we do not have access to labor market data for other states.

Four-year starters and transfers who complete their degrees exhibit different choices of majors (Table 12). Transfers are more likely to major in education, protective services, agriculture, and business; they are less likely to major in engineering, liberal arts, art, and biological sciences. Different majors may have different labor market outcomes, so it is important to control for major in the analysis.

Table 11
Progress towards degree of four-year starters and transfer students
Grouped by number of credits earned

Measure	Credit group	Research universities			Regional 4-year universities		
		4-year starters	Transfers	Difference	4-year starters	Transfers	Difference
Number of terms enrolled in year after transfer or after earning equivalent number of credits	1	2.06	1.98	-4.1%	2.04	1.95	-4.6%
	2	2.08	1.96	-5.5%	2.07	1.99	-4.0%
	3	2.06	1.93	-6.8%	2.05	1.98	-3.7%
	4	1.92	1.97	2.8%	1.97	1.83	-7.7%
Credits enrolled	1	29.49	26.74	-9.8%	29.12	25.66	-12.7%
	2	29.50	26.37	-11.2%	29.74	26.29	-12.3%
	3	29.08	25.61	-12.7%	29.46	25.80	-13.2%
	4	26.60	25.94	-2.5%	28.16	23.64	-17.5%
Credits passed	1	27.21	22.39	-19.4%	26.77	21.87	-20.1%
	2	27.28	22.94	-17.3%	27.49	22.76	-18.9%
	3	27.11	22.48	-18.7%	27.43	22.95	-17.8%
	4	25.12	21.99	-13.3%	26.55	19.73	-29.5%
Upper division credits passed	1	19.21	8.35	-78.8%	17.05	9.75	-54.5%
	2	20.98	10.44	-67.1%	19.64	11.40	-53.1%
	3	21.89	11.53	-62.0%	20.78	12.72	-48.1%
	4	20.97	11.05	-62.0%	21.20	11.18	-61.9%
Years until transfer or equivalent number of credits	1	2.04	1.59	-24.8%	2.12	1.61	-27.3%
	2	2.16	2.05	-5.2%	2.25	2.06	-8.8%
	3	2.38	2.36	-0.8%	2.42	2.40	-0.8%
	4	2.48	2.74	10.0%	2.57	2.74	6.4%
6-year graduation rate	1	87.5%	56.3%	-43.4%	77.3%	49.1%	-28.3%
	2	88.3%	59.2%	-39.5%	79.8%	54.3%	-25.5%
	3	89.9%	59.2%	-41.2%	82.2%	55.4%	-26.8%
	4	92.2%	43.5%	-71.8%	87.3%	40.2%	-47.2%

Source: Compiled from Kansas Higher Education Data System.

Note: Percentage differences calculated using midpoint method.

Table 12
Bachelor's degree majors for four-year starters and transfer students for students starting in 2008-2011

Major	Four-year starters		Transfers		Difference
	Number	% of total	Number	% of total	(transfer - 4-yr)
Agriculture and natural resources	850	4.5%	151	6.3%	1.8%
Architecture or engineering	1,947	10.3%	128	5.3%	-5.0%
Arts	1,030	5.5%	88	3.7%	-1.8%
Biological science	930	4.9%	73	3.0%	-1.9%
Business	3,151	16.7%	441	18.4%	1.7%
Education	1,840	9.7%	333	13.9%	4.1%
Health sciences	1,631	8.6%	228	9.5%	0.8%
Liberal arts	3,097	16.4%	314	13.1%	-3.3%
Math and computer science	464	2.5%	52	2.2%	-0.3%
Physical science	307	1.6%	30	1.2%	-0.4%
Protective services	224	1.2%	90	3.7%	2.6%
Psychology and social science	2,692	14.3%	362	15.1%	0.8%
Recreation, sports, leisure	658	3.5%	110	4.6%	1.1%
Technicians	58	0.3%	3	0.1%	-0.2%
Total	18,879	100.0%	2,403	100.0%	

Source: Compiled from Kansas Higher Education Data System.

Note: Results based on sample of four-year starters and transfers with 54 or more credits.

The regression results shown in Table 13 estimate the impacts of various factors on a student's probability of employment in the bi-state region. Transfer status does not affect a graduate's probability of employment after controlling for major and other factors. Graduates of regional universities are about 5 percentage points more likely than research university graduates to be employed in the bi-state region. It is likely that research university graduates seek opportunities in the national as well as regional labor markets. Underrepresented minority students are almost 3 percentage points less likely to be employed in the region in the year after graduation. Working while in school substantially increases the probability of employment in Kansas and Missouri—a student who works every term while in college has a 19 percentage point greater probability of regional employment than does a student with no work experience. It is likely that some work experience takes the form of internships, which may lead to permanent employment opportunities. Employers may also seek out students with substantial experience in a work environment. Finally, some students who work while in college may continue in their same jobs after graduation while searching for career opportunities. The effects of college major on employment all are measured against a residual category—liberal arts majors. Compared with liberal arts majors, agriculture and natural resources, engineering, biological science, and physical science majors are significantly less likely to be employed in the bi-state region. It is likely that these graduates look for employment out-of-state. Education, protective services, health, business, and technician majors are more likely to be employed regionally.

Table 13
Models of employment and wages in Kansas and Missouri
For Kansas graduates in year after receiving bachelor's degree

Explanatory variable	Dependent Variable: Employment (effect on share employed)	Dependent Variable: Wages (effect on $wages)
Intercept	0.573 (0.010) ***	22,365 (438) ***
Transfer student	0.000 (0.010)	-1,412 (438) ***
Enrolled at Regional4Yr	0.048 (0.007) ***	-909 (311) ***
Female gender	0.013 (0.007) *	-1,362 (304) ***
Underrepresented minority student	-0.027 (0.010) ***	-1,877 (460) ***
Nontraditional student (starting age 23 or older)	-0.020 (0.026)	-1,041 (1,135)
Job outside metro area		-1,372 (345) ***
Number terms enrolled/number terms working	0.195 (0.009) ***	3,065 (395) ***
Major: Agriculture and natural resources	-0.060 (0.016) ***	6,399 (785) ***
Major: Architecture or engineering	-0.050 (0.013) ***	23,393 (611) ***
Major: Arts	0.007 (0.016)	-1,463 (697) **
Major: Biological science	-0.074 (0.016) ***	-4,142 (773) ***
Major: Business	0.062 (0.011) ***	10,714 (481) ***
Major: Education	0.148 (0.013) ***	7,725 (534) ***
Major: Health sciences	0.051 (0.013) ***	11,543 (574) ***
Major: Math and computer science	0.040 (0.021) *	16,552 (955) ***
Major: Recreation, sports, leisure	-0.032 (0.018) *	-3,391 (827) ***
Major: Physical science	-0.122 (0.026) ***	-1,873 (1,276)
Major: Protective services	0.057 (0.027) **	5,281 (1,131) ***
Major: Psychology and social science	-0.005 (0.011)	-1,315 (506) ***
Major: Technicians	0.125 (0.058) **	4,194 (2,426) *

Source: Kansas Higher Education Data System, merged with Kansas and Missouri labor market data.

Note: *** = significant at 1% level; ** = 5% level; * = 10% level.

The wage regressions shown in Table 13 indicate that transfer students suffer a wage penalty of about $1400 per year. We have not controlled for grades in these regressions because letter grades were not available for all of the years of our analysis. However, given that transfers on average have lower high school GPAs and lower test scores, it is likely that they also have lower GPAs than four-year starters. This may make them less competitive for the highest paying jobs in their fields. Females and underrepresented minorities also experience negative wage differentials of $1400 and $1900 respectively. Students who select jobs outside of the metro areas of Kansas and Missouri receive about $1400 less in pay than their metro counterparts. When we look at pay by major (again using liberal arts as the baseline comparison) we find substantial and statistically significant positive wage differentials for engineering, health sciences, computer science, business, and education majors. We find negative differentials for biological sciences, art, and psychology and social sciences. Some biological and psychology-social science majors may be enrolled in graduate school after their bachelor's degrees and be working as low-paid teaching and research assistants.

Conclusion

Despite previous research findings to the contrary, our research has shown that transfer students are significantly less likely to complete four-year degrees after transferring compared with native four-year students. We limited our analysis of Kansas resident transfer students to those that had achieved junior status (54 or more credits). We found that transfer students were 21.6 percentage points less likely to complete their bachelor's degrees within 6 years compared to four-year starters. We decomposed the transfer gap into factors explained by observable characteristics and those explained by differences in covariates. Only one-third of the gap is explained by observable factors including demographics, high school GPA, ACT score, and poverty. Two-thirds of the gap is due to unobserved characteristics.

We probed the analysis further to determine whether community college characteristics and course-taking behavior explained the transfer gap. We found that transfer students from some institutions had a higher probability of graduating than students from others. We also found that transfer students complete fewer credits per semester, and once they arrive at four-year institutions, must take more lower division credits.

Those transfer students that do graduate earn less than four-year natives. However, those students are more likely to be employed in Kansas and Missouri than four-year natives.

None of these additional analyses fully explain the transfer student disadvantage in Kansas. We offer several suggestions for future research. First, we could use matching methods to compare similar students in order to determine whether selection on observables explains more of the transfer student disadvantage. Second, we could expand our regression analysis to consider whether the disadvantage narrows within seven or eight years of starting as a freshman. Third, we could examine whether transfer articulation agreements between community colleges and some four-year universities improve prospects for transfer students completing their bachelor's degrees.

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Appendix A
Analysis of student outcomes for transfer students with 9 or more credits

In a previous version of this research, our sample consisted of transfer students and four-year starters who earned at least 9 credits in their first year of college. Further investigation leads us to believe that our previous sample suffered from serious survivor bias. For example, imagine two students who start at a community college and earn 15 credits in their first semester of school. One of the students decides to transfer, in which case the student is included in our sample of students with 9 or more credits. The other student plans to transfer but instead drops out before transfer, in which case the she or he never makes it into our analysis. Although the student fails to earn a bachelor's degree, this never is counted in our statistics because our sample includes only those students who actually transfer. On the other hand, we record *all* of the dropouts of four-year starters who make it to the 9 credit cutoff point. Note that using a higher cutoff (54 or more) credits may not eliminate survivor bias, but the bias is minimized because most dropouts occur in the first two years of school.

We include regression results using the 9 or more credits sample for three increasingly detailed models in Table A-1. The reported effects of transfer student status are much smaller in absolute value than those reported in Table 5 (for the 54 or more credit sample). Survivor bias makes transfer student graduation rates look better because we do not observe the dropouts that occur before students transfer. Other variables generally have the same signs as in the 54 or more credit analysis. For example, female students are more likely to graduate while nontraditional students and underrepresented minorities are less likely to graduate. Coming from a high poverty neighborhood and having a low high school GPA also have a negative effect on graduation.

Table A-1

Models explaining graduation rates for students with 9 or more credits

Dependent variable = Bachelor's degree within 6 years

Variable	Model 1	Model 2	Model 3
Intercept	0.715	0.779	0.812
	(0.003) ***	(0.007) ***	(0.008) ***
Starting academic year 2009		-0.018	-0.010
		(0.007) ***	(0.006)
Starting academic year 2010		-0.017	-0.026
		(0.007) **	(0.006) ***
Starting academic year 2011		0.005	-0.012
		(0.007)	(0.006) *
Transfer student	-0.198	-0.162	-0.064
	(0.010) ***	(0.011) ***	(0.011) ***
Enrolled at regional 4-year	-0.188	-0.131	-0.099
	(0.005) ***	(0.006) ***	(0.005) ***
Interaction: transfer with regional 4-year	0.124	0.081	0.057
	(0.013) ***	(0.013) ***	(0.012) ***
Female gender		0.089	0.061
		(0.005) ***	(0.005) ***
Interaction: transfer with female		0.016	0.006
		(0.012)	(0.012)
Underrepresented minority student		-0.130	-0.066
		(0.008) ***	(0.008) ***
Interaction: Transfer with underrepresented		0.063	0.046
		(0.016) ***	(0.015) ***
Nontraditional student (starting age 23 and over)		-0.347	-0.183
		(0.016) ***	(0.016) ***
Interaction: Transfer with nontraditional		0.201	0.093
		(0.025) ***	(0.024) ***
poverty measure missing		-0.048	0.007
		(0.014) ***	(0.014)
>40% of households in home zip code below 185% poverty		-0.074	-0.065
		(0.008) ***	(0.007) ***
20-40% of households in home zip code below 185% poverty		-0.024	-0.036
		(0.005) ***	(0.005) ***
Number terms enrolled/number terms working		-0.175	-0.154
		(0.007) ***	(0.006) ***
ACT score missing			-0.095
			(0.011) ***
ACT score low (<= 18)			-0.063
			(0.010) ***
ACT score midrange (19-25)			-0.015
			(0.006) **
Took any developmental class			-0.104
			(0.008) ***
HS GPA missing			-0.029
			(0.007) ***
HS GPA low (< 2.7)			-0.255
			(0.010) ***
HS GPA lower midrange (2.7-3.2)			-0.133
			(0.008) ***
HS GPA high (> 3.7)			0.147
			(0.007) ***

Source: Compiled from Kansas Higher Education Data System.

Notes: *** = significant at 1% level; ** = 5% level; * = 10% level.