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Community College Transfer and Articulation Policies

Looking Beneath the Surface

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Abstract – As the demand for higher education has grown, so has the role of community colleges in providing postsecondary education to students. The development of curriculum articulation and school transfer policies is one policy movement that demonstrates the extent to which state policymakers view community colleges as creating greater and broader access for students. Recent research suggests that the *presence* of a state articulation and transfer policy does not increase the transfer rate of community college students to four-year institutions. However, all such policies are not the same - so we must account for more than just the presence of these policies when assessing their impact, and account for the mechanisms through which they encourage or facilitate student transfers.

We attempt to address this gap in this paper by exploring the relative importance of specific policy components (such as common course numbering or common general education requirements) on postsecondary outcomes, and how such policies differently impact students with different aspirations or economic and ethnic backgrounds. In addition, we explore how the potential impacts of these policies compare with some institution-level policies such as support for tenured faculty, expenditures for student services, or expenditures for instruction. In the end, we find only small effects – concentrated amongst Hispanic students – that state transfer and articulation policies are related to the transfer of students between sectors. In terms of general effects across students, institutional factors regarding faculty tenure at community colleges seem to be more correlated to the propensity of students to transfer between community colleges and four-year institutions.

Introduction

Finding success in the labor market has increasingly required employees to have college

degrees, and the demand for higher education has grown accordingly: the number of students

expecting to attend postsecondary college is higher now than at any other point in history (Kirst

and Venezia 2004). Community colleges have assumed a progressively more prominent role in

meeting the demands of the higher educational system. According to the National Center on

Education Statistics (NCES), as of 2005, community colleges made up almost two-fifths of

degree-granting institutions in the United States, an increase of nearly 10 percent from 1950

(U.S. Department of Education 2007). Similarly, the share of undergraduates attending

community colleges increased from 27 percent in 1970 to 37 percent in 2005. Community

college enrollment has nearly doubled over the past three decades compared to all other

postsecondary institutions, which grew by 76 percent during the same time.

Community colleges are a particularly important point of entry to higher education for

minority and low-income students. For instance, NCES reports that in 2005, minority students

represented 36 percent of community college students compared to 27 percent of students in

four-year institutions. In 1999-00 students from families with incomes of $35,000 or less

represented 30 percent of all community college students but only 23 percent of students in four-

year public institutions and only 19 percent of students in four-year private institutions.

Efforts by states in the 1980s to develop policies that integrate state community colleges

with the traditional four-year college and university system schools continue today. These cross-

institutional agreements align curriculum and degree requirements and monitor the flow of

students across institutions, improving the coordination of higher educational institutions. The

hope is that these policies increase the number of students participating in higher education,

transferring from two to four year institutions and, ultimately, earning bachelor's degrees. (Ignash and Townsend 2001; Knoell 1990).

While higher education researchers have examined the structure of these policies (commonly known as transfer and articulation policies) and stakeholder participation in them, only a handful of studies have examined the impact of these policies on students' higher educational experiences and outcomes, and these have found little evidence on the effect of the policies on students' transfer rates and ability to preserve credits (Anderson, Sun, and Alfonso 2006; Roksa 2007; Roksa and Keith 2008). Each of these studies makes valuable contributions to our understanding of both the theory and effects of these policies. However, they do not account for the wide variation that exists in the design of these policies across states, with some states operating with very limited agreements across only a small share of institutions and other states offering strong comprehensive agreements with broad participation.

In this paper we explore whether this policy variation seems to matter for transfer and graduation of students who begin their postsecondary studies in two-year colleges. We focus special attention on whether the policies have differential impacts on lower income and minority students, given the importance of community colleges to these student subgroups. Specifically, we ask: Does it matter how "strong" the policy is? Are some policy approaches associated with better transfer and attainment outcomes? Do minority, low-income, and first-generation college students potentially benefit more from these policies than other students? Finally, how do the potential impacts of these policies compare with some institution-level policies, such as support for tenured faculty, expenditures for student services, or expenditures for instruction?

In general, we find only small effects – concentrated amongst Hispanic students – that state transfer and articulation policies are related to the transfer of students between sectors, and

no evidence that these policy correspond with an increase in bachelor's degrees earned by transferring students. In terms of general effects across students, institutional factors regarding faculty tenure at community colleges and the student-to-faculty ratio seem to be more correlated to the propensity of students to transfer between community colleges and four-year institutions and ultimately to earn bachelor's degrees.

Improving the pipeline between two- and four-year institutions

State agreements that articulate curriculum across their publicly funded, two-year community colleges and four-year colleges and universities, and facilitate the transfer of students across these institutions, clarify the pathways for students wishing to use community college attendance as a bridge to eventually transfer to a four-year college (Anderson, Sun and Alfonso 2006). Policies governing the transfer of students across institutions and the articulation of higher education curricula, particularly in core subject areas, can include several different components such as incentives to transfer (for example, financial assistance or guaranteed acceptance); common general education requirements; common general education core classes; common requirements for program majors; or common course numbering for courses of similar content.

In theory, these policies were intended to impact postsecondary attendance and attainment by improving the quality of information to students, two-year institutions, and four-year institutions and minimizing uncertainty around transferring for both students and receiving institutions (see **Figure 1**). Policies that define degree and/or program requirements better inform students – who some argue are poorly advised in high school (Rosenbaum, Deil-Amen, and Person 2006) – and their two-year institutions about the classes they need to take or prepare to take when in their two-year institution.

Common course numbering could potentially eliminate students' confusion over which community college courses are not credit earning, which are credit earning but not transferable, and which are credit earning and transferable – a problem that has at times dampened students' enthusiasm for continuing and cost additional time and money (Rosenbaum et al. 2006). In addition, common course numbering could improve four-year colleges' confidence in the quality of curriculum taken by students requesting transfer from two-year colleges and facilitate the transfer of credits across institutions. As a result, institutions would expect students to be better prepared to transfer to a four-year college and provide greater encouragement to do so, and states would expect to see more students transferring from two-year to four-year institutions.

In addition to improving the information and facilitating students' preparation, these policies can potentially improve a transferring student's ultimate success in earning a bachelor's degree. Students have consistently found a penalty to starting a BA degree in community college (Long and Kurlaender 2009), citing difficulty earning credits and lengthy matriculation as two common impediments. Effective transfer and articulation policies between schools should improve this situation for students by limited the number of credits lost through transfer.

Previous research on transfer and articulation policies, however, failed to find any significant positive effects associations between the policies and student transfers or degree earning. One explanation is that these earlier studies, which generally classify states as having an agreement or not, do not capture the relevant variation in state policies. Though motivated by the common goal of improving coordination across institutions, the specific approaches built into these policies varies rather substantially across states.

The Education Commission of the States' (ECS) survey of transfer and articulation policies, conducted in 2001, reveals this variation. ECS found that 30 states had some type of

formal transfer and articulation policy written into legislation. The most common policy elements among these states are data collection systems to monitor transfers, statewide articulation guides providing concrete descriptions of the transfer process, and a common set of core courses. However, these policy elements appeared in only 23, 17, and 16 of the states, respectively. Some less common elements appear in only a handful of state policies. Legislated agreements to provide extra incentives to encourage transfer – such as financial aid, guaranteed transfer of credit, or priority admission – appears in only 13 states, while a common course numbering system has been implemented by only 4 states. These elements are far less likely to be included in states with cooperative agreements that are formulated on a department-to-department or institution-to-institution basis (ECS 2001).[1]

In this paper we explore whether states with different policies see different patterns of attendance and attainment by students who initially enroll in two-year colleges. Before going further, it is worth noting explicitly that our findings do not offer strong causal inferences. The data we examine are cross-sectional, and although we attempt to account for various individual, institutional, labor market, and state influences on transfer behavior, the possibility exists of unaccounted-for factors that relate to the propensity of transfer and the policies on which we are focusing.

Data on students and policies

We use three primary sources of data to examine the relationship between states' established curriculum articulation and transfer agreements and students' use of transfer pathways, as well as between institution-level factors (such as student expenditures and staffing

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[1] While it is more common to discuss the impact of these policies on the transfer from two- to four-year colleges and the subsequent goals, these policies also have the potential to improve the flow from four- to two-year colleges, known as reverse transferring (Yang 2006; Townsend 2001). Indeed, a small but growing number of students are pursuing reverse transfers. While this is an important phenomenon that merits future research, in this paper we focus on the more traditional transfer route from two- to four-year institutions.

patterns) and the use of these pathways: the *National Educational Longitudinal Study* 1988 to 2000 data (NELS88/2000) and the *NELS 2000 Postsecondary Education Transcript Study (PETS: 2000)*; the 1999 *Survey of State Transfer and Articulation Policies* conducted by Ignash and Townsend; and the 1992 *Integrated Postsecondary Education Data System* (IPEDS).

First, student data on postsecondary career paths is drawn from the NELS:88/2000. The NELS survey includes detailed information on high school and postsecondary educational experiences. Beginning with a nationally representative cohort of students in the 8th grade in 1988, the NELS follows these students with subsequent surveys in 1990, 1992, 1994, and 2000 and logs their educational aspirations, academic experiences, and labor market experiences during these years. The *NELS 2000 Follow-up* and *PETS:2000* (with 12,144 respondents) includes information on students' initial college attendance, course taking, and degree attainment, with nearly 25 and 54 percent of the entire sample reporting that they attended a two- or four-year college after high school, respectively. These data follow students through their high school and postsecondary experiences, and allow us to examine how transfer and articulation policies potentially impact their decision to attend a community college or four-year institution.

Our analytic sample includes all students whose first postsecondary enrollment after high school was in an associate's degree granting two-year college and in a state for which we had state policy information. To determine students' postsecondary order of institutional attendance, we trace students' institutional enrollments using the *PETS 2000*, which gathered transcripts for all participants in the NELS88/2000 who claimed postsecondary attendance.[2] A total of 9,475 students or roughly 80 percent of the respondent population reported some form of

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[2] It is important to recognize that the relatively short follow-up period after students leave high school (1992-2000) means that our sample includes only relatively young or "traditionally aged" students in our analysis. Two-year colleges also serve many older students who are returning to education.

postsecondary attendance.[3] We exclude all students whose only institutional enrollments were before high school graduation, leaving an initial sample of 8,886 college students. Limiting respondents to those whose first postsecondary college was an associate's degree granting institution nets us a total of 3,918 students and a final analytic sample of 3,621 students for which we have state policy information.[4]

It is important to note that this sample of students in two-year colleges does not represent all students who enroll in two-year colleges. Specifically, this sample predominantly reflects traditionally aged students – those enrolling in postsecondary immediately or shortly after graduating from high school. While traditionally aged students represent the highest share of students in two-year colleges (Provasnik and Planty 2008), adult returning students are an important age group in community college research but unfortunately not examined in this research.[5]

The typical student in the NELS cohort graduated high school in 1992, making it important for us to capture the transfer and articulation policies present in states in 1992. Unfortunately, there was no systematic survey of these policies at that time. However, in 1999 Ignash and Townsend conducted their *Survey of State Transfer and Articulation Policies* (for more information, see Ignash and Townsend 2001) that asked about *legislation* regarding transfer and articulation; institutional *cooperative agreements* between two- and four-year institutions; *unified reporting* of transfer data; *student incentives* for transfer from a two- to four-year institution; and *statewide curriculum articulation* with common course descriptions, core

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[3] Transcripts were not requested for 127 students who claimed postsecondary attendance because he or she attended a foreign institution, claimed enrollment at an institution that could not be located, or the precise name of the school was indeterminate.
[4] Our sample includes students who attended two or more two-year associate's degree granting institutions if enrollment was consecutive. The last institution attended is identified as the 'transferring institution'.
[5] According to the *2003-04 Postsecondary Student Aid Study* by the National Center for Education Statistics, 47 percent of all two-year students were 24 years old or younger, but 36 percent were over the age of 30.

curriculum, and course numbering systems. Forty-three states responded to the survey, which asked questions about the various aspects of states policies and, importantly, asked respondents to pinpoint when their state's agreement was implemented – we used this information for our analyses.

We inferred the status of each state's policy in 1992 from the 1999 policy status and information regarding the origin of the policy. **Table 1** reports the 1999 policy status as specified by Ignash and Townsend (2001) as well as the inferred 1992 status for all states with available data (a complete list of all states and their policies is provided in Table A-1 of the Appendix). States categorized as having a policy in 1999 but not in 1992 are those that reported having a policy in the 1999 survey but also reported that it went into place after 1999. We borrow four policy classifications from Ignash and Townsend (2001): Presence of policy agreement; Overall strength of policy agreement; Individual transfer components; and Transfer Component Strength.

First, we consider a binary indicator of states with formal transfer and articulation agreements (such as institutional agreements or state legislation). Second, we consider an indicator of the overall policy agreement strength based on: (1) the types of transfer, scope of participating institutions, and percentage of undergraduates covered by the agreement level of authority for policy (e.g., two- to four-year transfer for public institutions only); (2) the level of faculty involvement in developing agreements (e.g., "very involved" to "not at all"); (3) the presence of transfer components specifying curriculum alignment (e.g., common general education requirements or common requirements for majors); and (4) the state's effort to monitor/evaluate transfers (e.g., data collection or anecdotal evidence). Ignash and Townsend rank states on a scale of one to five, however for our analysis we condense these classifications

to three.[6] Third, in addition to these broad policy indicators, we consider (separately) indicators of five specific transfer components, including automatic transfers of associate degree, common general education requirements, common core courses, common requirements for program majors, and common course numbering. Finally, respecting that policy monitoring systems and faculty participation may not impact student transfer behavior, we also consider an aggregate indicator of the overall strength of just the transfer components.

For our final analytic model, in which we explore the relationship between institutional factors and student transfers, we pull in school-level data from the 1992 IPEDS. The IPEDS, collected annually by the National Center for Education Statistics (NCES), provides institutional, state, and national level information for all postsecondary educational institutions in the United States. The database covers a variety of institutional characteristics in areas of enrollment, program completion, graduation rates, faculty and staff counts, finances, and student financial aid. We match six variables (expenditures for instruction, expenditures for student support, percent of tenured faculty, total student enrollment, student-to-faculty ratio, and an indicator for public or private institution) to students in the NELS sample attending these institutions.

To supplement these datasets, we merge in additional contextual information thought to influence students' participation in postsecondary education. First, we gather secondary data from the Bureau of Labor Statistics on the labor market conditions prior to students' high school. Organized by county, 1990 annual unemployment rates and average wages are linked to students' county of high school attendance.[7] Second, in order to capture state differences in the

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[6] See Ignash and Townsend (2001) for a detailed explanation of the strength classifications.
[7] Unemployment rates by county are downloaded from the Bureau of Labor Statistics "Labor force data by county, 1990 annual averages" table (available at ftp://ftp.bls.gov/pub/special.requests/la/laucnty90.txt). Average annual wages are assembled from the Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) program for 1990. Historic data files and description of the QCEW are available at ftp://ftp.bls.gov/pub/special.requests/cew/SIC/history/.

availability and affordability of transferring to a four-year postsecondary institution, we include the percentage of undergraduate fall enrollment in public four-year institutions and the ratio of four-year tuition to two-year tuition for in-state public institutions in 1992 – the time when most of the sample was two years removed from high school. These state-level measures are taken from IPEDS-generated tables published in the *Digest of Education Statistics*, which is an annual compilation of statistical information covering American education from kindergarten to graduate school.[8] See the **Appendix** for more detailed descriptions of the variable measures and corresponding data sources.

Modeling Student Transfers

We examine the relationship between state transfer and articulation policies and student transfers and earned bachelors degrees with a series of logistic regressions, which provide an estimate of the odds that a student transfers, controlling for local conditions and student background. We define transfer students as all students who enrolled in a four-year college subsequent to their enrollment in a two-year college. We define those earning a bachelor's degree after transfer as those students whose initial postsecondary enrollment is in a two-year college but at some point transfers to a four-year college and earn a bachelor's degree by the year 2000 – eight years after the typical student in our sample graduated from high school.

Each specification follows the basic functional form given by equation (1) below:

$$\log\left(\frac{\theta}{1-\theta}\right) = \alpha + \beta_1 P + \beta_2 C + \varepsilon \qquad (1)$$

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[8] The 1992 undergraduate fall enrollments in institutions of higher education by control (public versus private), level of enrollment (two-year versus four-year) and state are lifted from the 1995 Digest of Education Statistics table 193. Information on states' average undergraduate tuition paid by students by level of control and enrollment comes from 1993 Digest of Education Statistics table 307.

Coefficients from these logistic models reflect the marginal change in the log odds of transferring with differences in policy components (β_1) and a series of explanatory control variables (β_2). The change in odds is computed by exponentiation of the regression coefficient, and e^β-1 can be interpreted as the percent change in odds given a one-unit change in the explanatory variable.

Across all specifications, we control for several factors that potentially affect students' desire or ability to transfer from a two-year to four-year college, regardless of the state transfer and articulation agreement in place. First, we control for the local labor market conditions with indicators of the local wage rate and local unemployment rate. Second, we control for the state postsecondary environment indicators of four-year attendance and the relative tuition cost of two- and four-year institutions. Finally, we include several student background factors including gender, minority status, family income, parents' postsecondary enrollment, and a composite score of students' cognitive ability. Summary statistics for the sample of students enrolled in two-year colleges are presented in **Table 2,** while summary statistics for the sample of students who transferred from a two-year to four-year college are presented in **Table 2a.**[9]

Results

Below, we present the results of our multivariate, cross-sectional models exploring the relationship between transfer and articulation policies, the components of these policies, and the strength of these policies and the rates at which students transfer from two-year to four-year colleges. In this analysis, we first explore the average impact of having a transfer and articulation policy at the state level as well as the distinct impact of different components of these policies on

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[9] Mean-substitution was used to replace missing values.

two- to four-year transfer rates. We then investigate whether these policies have had a differential impact on African-American students, Hispanic students, or first-generation college students. Finally, we look at the relative impact of these state-level policies and basic institutional conditions – including expenditures on instruction and student services, and the share of tenured faculty – on transfer rates.

State transfer and articulation policies and a successful two- to four-year pipeline

State transfer and articulation policies aim, in part, to improve the rate at which students transfer from two- to four-year colleges and finally earn a bachelor's degree. Although research by Anderson, Sun and Alfonso (2006) finds that the existence of transfer and articulation agreements had no impact on student transfers from two- to four-year colleges and, similarly, research by Roksa (2007) finds no effects on graduation rates, our analysis offers a more-nuanced story about the relationship between such policies and student transfers. That said, we also conclude that no particular design or component of these policies corresponds with improved transfer rates or bachelor's degrees earned for most community college students.

Looking first at students transferring from two-year to four-year colleges, **Table 3** details the coefficient estimates for a series of logistic regression models of students' transfer from two- to four-year colleges as a function of the state transfer and articulation policy as well as a series of control variables (specified above). In this table, we present a sequence of models beginning with a baseline model that estimates the log odds of transferring given our series of local economic and postsecondary conditions and student background characteristics. Five additional models are included, where the state policy is specified as follows: (a) a single dummy variable indicating the presence of a legislated state policy, (b) a series of variables indicating the overall

strength of the state policy, (c) a series of variables indicating the components of the transfer policy, (d) a series of dummy variables reflecting the strength of the transfer mechanisms, and (e) variables indicating the scope of reach for the policy along with the transfer component strength.

From the baseline model (**Column A** of **Table 3**), we learn that the most powerful predictors of a students' transfer are, unsurprisingly, student background variables. Students coming from middle-income ($35,000-$74,999) and high-income (more than $75,000) families are 42 percent and 47 percent more likely to transfer than students from families with incomes of less than $15,000.[10] In addition, students who scored better on a measure of cognitive ability were also more likely to transfer. None of the factors reflecting the state or local context seem to be associated with student transfer behavior.

As we add indicators for the state transfer and articulation policy, we first ask if these variables seem to predict the likelihood of a student's transfer. We also ask if adding policy indicators seem to lessen the importance of family income, thereby potentially improving equity for access to and attainment in higher education.

Looking across all specifications that reflect state transfer and articulation policies, we find no evidence that these policies, in any form, have boosted the chance a student will transfer from a two- to four-year college. The simple model indicating the presence of a state policy presented in **column B** of **Table 3** shows that the effect of the policy is not statistically significant – a finding that is consistent with prior research (Anderson, Sun, and Alfonso 2006).

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[10] 'Families with incomes less than $15,000' is the model's reference group. While students from families in the next income bracket ($15,000-$34,999) may also show a higher chance of transferring (the logistic coefficient is positive), the coefficient for this income group is not statistically significant, suggesting that students in this income group are not statistically different from the lowest income group.

Policies, however, are not created equal. **Column C** of **Table 3** shows the relative effect of policies based on the "strength index," with the reference group being states with no state transfer policy at all. Overall policy strength indicators run counter to expectations. Instead of finding that students in states with stronger policies are *more likely* to transfer from two- to four-year colleges, the only statistically significant effect appears for states with relatively weak policies and this effect is negative. Based on this model, we can expect students in states with weak policies to be 44 percent less likely to transfer than students in states without policies. The chance that students will transfer in states with moderate or strong policies is not statistically different from those in states without policies.

One possible explanation for these counterintuitive findings is that states may decide to (or *not to*) adopt these policies because of a perceived need. That is, states adopting policies do so because they feel there are relatively too few students transferring between two- and four-years schools in their state, whereas states deciding not to pursue such policies may conclude that they are unnecessary because their transfer rates are already high. Even if states adopting policies see improvements in transfer rates over time, we will not detect these effects unless the transfer rates in policy states improve enough to exceed the rates in non-policy states. As such, our findings may reflect the endogeneity associated with the underlying state factors that are driving transfer and articulation policies, rather than the causal impact of these policies on the decisions made by students.

Having said that, it is worth asking if these gross measures of transfer and articulation policies are masking important distinctions that an examination of more-refined policy variables might reveal – something not done in previous research. To test this notion, we focus on five different individual policy components that would directly impact two-year students' preparation

for and application to four-year institutions, as well as a composite score reflecting the strength of these policies. These components include (1) the automatic acceptance of an associate's degree for transfer to a four-year college, (2) standardized credit requirements but without subject specifications, (3) standardized credit requirements in specific subjects, (4) common requirements for program majors, and (5) common course numbering. As seen in **column D** of **Table 3**, only the automatic transfer of an associate's degree and common course numbering show positive coefficients that would suggest these components increase the likelihood that students transfer. However, only common core numbering is marginally significant (at a 90 percent level of confidence).

Additionally, it does not seem that the combined strength of the transfer components had the desired effect (see **column E** in **Table 3**). The composite indicators reflecting the strength of the transfer components shows a negative (though not significant) association between the transfer components strength and the chance a student would transfer.

The only policy factor that seems to differentiate state policies in terms of their impact on student transfers is the percent of students covered by the state articulation policy. States vary widely in which postsecondary institutions fall under the governance of the agreement. For example, some states include only state institutions; others include all state institutions but exempt their state's flagship institutions; and some include both state and private institutions. **Column F** of **Table 3** reveals that the type of coverage may matter. In particular, the higher share of private school students covered has a statistically significant and positive effect on the likelihood that a student will transfer. However, the policy variables (represented by the strength of the transfer components) remain negative and now significant. As such, students in states with a policy reach that extends to a large number of private school students may be more likely to

transfer than in states with a narrower reach, but they may still be less likely to transfer than students in states without a policy at all.

Turning now to the relationship between transfer and articulation policies and degree attainment by transfer students, we examine a sequence of models that parallel the models of transfer students described above. In these analyses the sample of students includes all students who began their postsecondary education in two-year colleges and at some point transferred to a four-year college. Students earning bachelor's degrees in these models are those who earned the degree by 2000 – the last year the NELS was administered to this cohort of students and eight years after this cohort of students graduated from high school. Again, we find no evidence that transfer students in states with agreements were more likely to earn bachelor's degrees, regardless of the particular policy components or design.

The baseline model given in **column A** of **Table 4** shows that family income, gender, cognitive ability, and race or ethnicity are highly associated with degree attainment. Women and students from higher income families are considerably more likely to earn bachelors degrees, as are students who performed better on a cognitive assessment. Hispanic and African American students are less likely to earn degrees, in fact substantially less so, with Hispanic transfer students 40 percent less likely to earn a bachelor's degree and African American transfer students almost 85 percent less likely to earn a bachelor's degree.

Of the factors reflecting the state and local context, the percent of students attending a four-year institution in the state is statistically significant and the local unemployment rate is marginally significant. The higher the share of the state's students who are in four-year institutions, the less likely a student transferring from a two-year college will earn a bachelor's degree. The higher the local unemployment rate the greater the chance the transfer student will

16

earn a bachelor's degree, suggesting that higher unemployment either motivates students to stay in college or that students are staying to earn degrees because it is difficult to find work.

Looking across the various representations of state transfer and articulation policy presented in **columns B** through **F** of **Table 4**, we immediately see that students in states with transfer and articulation policies are, on average, almost 28 percent less likely to earn bachelor's degrees, confirming previous research by Roska (2007). As we saw in the models of student transfers, the models representing the overall policy strength (**column C**), specific transfer components (**column D**), and strength of the transfer components (**column E**) continue along those same lines. We see no statistically significant and positive effects associated with the strength or design of the policy. While the automatic transfer of an associate's degree, common credit requirements (without subject specification) and common requirements for program majors each show positive coefficients, none of these effects are statistically significant. Unlike the models of transfer students given above, the share of students covered by the agreements does not seem to have a statistically significant association with degree attainment.

From the analyses described above there is little reason to believe that transfer and articulation policies are associated with the student postsecondary outcomes considered here. These models, however, look for an average policy effect across all students. It is certainly possible that these policies may relate to different types of students differently – a possibility we take up in the next section.

Does the policy matter more for some?

Given the goal of improving equity in postsecondary attainment, certain subgroups of students merit additional attention, including lower income students, first generation college

students, and minority students – all of which are under-represented in four-year colleges and over-represented in two-year colleges (U.S. Department of Education 2005).[11] Community colleges serve a large number of students in these subgroups, many of whom come from families or communities with limited exposure to U.S. higher educational institutions. Because these students are less likely to be prepared for postsecondary schooling (Lee and Frank 1990) or to draw on experiences from their families or communities (Tym, McMillion, Barone and Webster 2004), they are poised to benefit greatly from added clarity and fluidity offered by state transfer and articulation policies.

Although we have found thus far that the policy, its strength, or any of its individual components has not had a widespread impact on the likelihood that students transfer from two- to four-year colleges or earn degrees, it is still possible that these policies have mattered more for students who may require extra guidance through the postsecondary system. To test this hypothesis we explore whether the policy interacts with a student's background in predicting the chance that the student will transfer and in separate models we test the same interactions effects on the chance that students will graduate.

The models examining the different effects of the state policies on students' likelihood of transferring and of earning a bachelor's degree are illustrated in **Figure 2 and 3,** respectively**.** These figures reflects the change in the odds of transferring or earning a bachelor's for a given subgroup in states with agreements to the relative odds of transfer or degree attainment in states without agreements. For example, in **Figure 2** the bar representing Hispanic students shows how much the odds of transferring differs for Hispanic students in states with policies compared to Hispanic students in states without policies.

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[11] Drawing from the IPED, the Conditions of Education 2005: Indicator 31 Report indicates that while Hispanic students and black students make up 10 and 11.9 percent of the total postsecondary population of students, they represent 14 and 13 percent of two-year college enrollment, respectively.

Both figures offer two relevant dimensions. First, readers should consider the length and direction of the individual bars. A bar rising above the axis line indicates that the subgroup shows increased likelihood of transferring in states with agreements, while a bar falling below the axis reflects lower likelihood of transferring in agreement states. The length of the bar shows the size of the increase or decrease. The second aspect of this figure of interest is the difference in the bars between the subgroups. Specifically, the difference between a subgroup bar and the baseline group bar indicates how different the policy effect is for these two types of students. In these models, the baseline group is white students whose parents have some postsecondary education.

Figure 2 indicates that first generation college students and African American students in states with transfer policies are less likely to transfer. Their bars dip below the x-axis. Moreover, their bars also fall well below the bar for baseline white students, suggesting that the policy effect or the association between the policy and transfer rates differs between baseline students and these two subgroups. These "extra" effects, however, are not statistically significant, therefore we cannot report with confidence that the policy effects on first generation college students and African American students are statistically different from the baseline students.

The story is a bit different for Hispanic students. It appears that Hispanics students, who have on average a 20 percent lower odds of transferring to a four-year college, have a 78 percent greater odds of transferring when living in a state with a transfer policy than they do in states without transfer policies – a gain that significantly outpaces that of the baseline group where the policy effect is essentially zero. Such a substantial result is surprising enough to warrant further investigation.

First, it should be noted that only about 18 percent of the sample is Hispanic and only 25 percent of the sample's Hispanic students attended two-year institutions in agreement states. Such small numbers can compromise the robustness of any results, but given the strong significance of the result, the small sample size probably cannot disqualify the findings. We also explore two possible explanations for this result: (1) that the sample's Hispanic students in agreement states were concentrated in states with unusually high transfer rates or, conversely, that Hispanic students in non-agreement states were concentrated in states with unusually low transfer rates, and (2) that Hispanic students were disproportionately more likely to aspire to transfer. While we do see Hispanic students concentrated in Florida (an agreement state) and California (a non-agreement state), the result persists even after we control for all students in these states, thus the effects are apparently not driven by a Florida or California state effect. Moreover, the result does not seem to be driven by student aspirations. While the degree (associate or bachelor) a student aspires to certainly predicts whether a student ultimately transfers, the interaction effect of the policy for Hispanic students persists – a potentially positive result for states with transfer policies.

The variation in policy effects for the graduation models was less compelling than in the models of transferring. **Figure 3** shows that all of the subgroups saw decreases in their change in the odds of earning a bachelor's degree after transferring in states with transfer policies. While it appears that first generation college students and Hispanic students saw less of a decrease than other students, these differences and the smaller differences observed for African American students were not statistically significant, a fact that may very well be due to the rather limited size of our sample. As such, we cannot conclude that students in any of these subgroups chance

of earning a bachelor's degree differed from that of the baseline students, which was also negative.

Although our earlier results suggest that transfer and articulation policies offer little improvement in the transfer of students from two- to four-year colleges, these models examining student subgroups offer a somewhat more hopeful result, at least for Hispanic students.

How do state transfer and articulation policies compare with other factors?

Up to this point, we have described the relationship between transfer and articulation policies on two-year student transferring and degree attainment as modest overall, though potentially more valuable for Hispanic students. However, it is hard to know how much or how little these policies relate to student behavior until we look at other policy issues that can impact the same goals. In this section, we compare the measured effect of state transfer and articulation policies to the measured effect of an array of institutional level variables including the expenditures on student support and instruction, the institution's faculty to student ratio, the percent of tenured faculty at the two-year institution,[12] and finally the total enrollment two-year institution. While a great many institutional factors likely relate to a students' transfer propensity and degree earning, we selected these six variables for their availability in a national database and because each of these represents, to some extent, policy choices made by the institution regarding its organization and operation.

It is not difficult to understand why per-pupil expenditures for instruction and faculty-to-student ratios might make a difference in the chance that a student would transfer from a two- to four-year college and ultimately earn a degree. When more resources (financial and personnel)

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[12] We also include a variable giving the percent of tenured faculty at the four-year institutions but little variation exists across institutions in this variable because tenured faculty are customary in four-year institutions.

are devoted to instruction, institutions can hire more and higher-quality faculty, offer smaller classes, support office hours where students can access faculty, and support lab courses as well as any number of other instructional supports. These and other benefits hold the potential to improve the quality of the student's education and preparation for more advanced coursework.

However, students attending and transferring from two-year colleges might need more than just academic preparation. Advising and counseling in two-year colleges is particularly important because students often come to postsecondary institutions with unclear expectations, unfamiliar with large educational institutions, and often as part-time students whose attention is understandably divided between their schooling, work, and families. Support needs only continue as they enroll in four-year colleges, as they must learn to navigate a new and often larger university environment with ever-increasing expectations.

Although the allocation of resources is important, a student's educational experience fundamentally hinges on the quality of instruction in the institution. The quality of instruction has become a particularly active debate in the two-year college community. In a recent study of students who successfully transferred from a two-year to a four-year college (even those who had no prior expectation to do so), students reported that their instructors' attention and expectations were key to giving them the skills and confidence to transfer (Rosenbaum et al. 2006). Since measuring the quality of teaching is not easy, debate surrounding the quality of teaching in community colleges often focuses on the use of part-time faculty.

Provasnik and Planty (2008) report that in 2003, two-thirds of faculty held part-time appointments, raising concerns that part-time faculty are not as present, committed or professionally advanced as full-time faculty. Some researchers argue that many faculty choose part-time status because they remain engaged in their primary profession but are no less

committed to teaching or capable of teaching than their full-time counterparts (Leslie and Gappa 2008). Schuetz (2002), on the other hand, drawing from a survey of community college faculty, found significant differences in the instructional approach of part-time and full-time faculty. Specifically, part-time faculty members were less likely to use interactive instructional approaches than full-time faculty. Moreover, she found that part-time faculty members were less likely to engage with students outside the classroom, something found to be important for community college student success. Jacoby (2006) and Eagen and Jaeger (2009) reinforce these findings, reporting that the more students take classes with part-time faculty the less likely they are to complete their associate's degree. Though this remains a debated issue, it is nonetheless an important policy decision for these institutions and might reasonably have implications for the rate at which students transfer. Since we do not have access to data on the number or share of faculty with full- or part-time status in 1992, we approximate the institution's commitment to full-time faculty with the share of tenured faculty. Though tenure is a level of commitment (for both teachers and the institutions) beyond simply full-time status, the percent of faculty with tenure should indicate the institution's commitment to full-time faculty.

Finally, when considering enrollment size (generally understood to be an important factor in students' postsecondary experience), it is not immediately obvious how the size of a given school would relate to students chance of transferring or earning a degree. On the one hand, small institutions might provide students with a more individually focused and easy to navigate environment. Administration and faculty in smaller institutions might more easily spot and respond to students' needs, and students might more easily access faculty and administration for support. Alternatively, larger institutions might have the resources to provide a wider range of specialized services to students and be in a better position to provide services that target the

particular needs of students transferring in from two-year colleges. In addition, larger institutions, especially larger two-year institutions, may be more experienced with transferring students and have a more formal and efficient process that helps students to prepare for and execute a transfer.

In the end, we learn that factors reflecting the faculty-to-student relationships have the most consistent relationship with transfer and degree earning outcomes for our sample of students. The model that explores the relationship between two-year institutional variables and the likelihood that a student will transfer from a two-year college to a four-year college, presented in **Table 5,** shows that factors ranging from expenditures, to faculty, to enrollments, all relate to the students' odds of transferring. First, students at schools with higher shares of tenured faculty are more likely to transfer. In fact, the model estimates that for every 10 percent increase in the percent of tenured faculty in the two-year college, holding all else equal, the odds that a student will transfer to a four-year college increases by 8 percent. In addition, the model estimates that the odds of transferring decreases as the number of students per faculty member increases. A student's odds of transferring decline by one percent for every additional student per faculty member in the two-year college they attend. Spending on student services is also associated with increased odds of transferring: each $100 in per-student spending is associated with a five percent increase in a student's odds of transferring.

For the most part, the relationship between student transfers and the institutional variables described above correspond with expectations. But, as noted above, the hypothesized relationship between enrollment and postsecondary outcomes is not obvious. In this case, the model estimates that students are more likely to transfer when enrolled in larger institutions. It is important to remember here that these models control for the student-to-faculty ratio. Therefore,

holding student-to-faculty ratios constant, it seems plausible that students benefit from the added services or structure of a larger institution.

Student-to-faculty relationships also appear relevant in the model of bachelor degree earners presented in **Table 6,** though fewer four-year institutional factors show a significant relationship with the odds students earning bachelor's degrees. This model estimates that the student-to-faculty ratio in the four-year colleges is again inversely related to the desired outcome – earning a bachelor's degree. A two-year college transfer student's odds of earning a bachelor's degree is estimated to decline by 1.5 percent with each additional student per faculty member. Though only marginally significant, per-pupil instructional spending by the four-year institution appears to be associated with the greater odds of earning a bachelor's degree.

Of particular interest is the fact that, although the students in the model are now enrolled in four-year institutions, factors related to the two-year college they previously attended remain statistically salient. Both the percent of tenured faculty and student-to-faculty ratios from the student's two-year college are associated with degree earning. Again, the percent of tenured faculty is positively associated with degree earning while student-to-faculty ratios are negatively associated with degree earning – effects that exactly parallel their effects on the odds of transferring.

It is important to remember here that these models can only tell us how these variables *relate to* student postsecondary outcomes and not whether these variables *cause* changes in postsecondary outcomes. It is certainly possible that the most ambitious students seek out two-year institutions with high shares of tenured faculty and low student-to-faculty ratios or that institutions adopt these organizational designs to attract ambitious students. Although we find that the effects from these models hold up after we account for student aspirations, more

sophisticated models that exploit instrumental variables would be necessary to tease out the causal effects. Nonetheless, the associations between institutional factors and the postsecondary outcomes we examine here are notable, not only because they exist but also because, unlike the associations found for state transfer policies, the relationships are consistent across models and largely consistent with expectations.

Why isn't there a clearer relationship between states' policies and transfers?

On the surface, the aim of these policies is to increase the clarity and fluidity between complex institutions and improve the chances of successful transfers for students who often lack the background and guidance needed to navigate postsecondary institutions. Although these data are limited in their explanatory power and, as we noted above, our cross-sectional analysis cannot reflect any transfer improvements within the state over time, it is clear that these policies have not had large impacts on transfer behavior or the success of transfer students to earn a bachelor's degree – so it is reasonable to ask why.

Two simple explanations for the policy failure are weak design or poor implementation. Anderson, Sun, and Alfonso (2006) observe that many agreements were just that – agreements without legislative authority. However, when they examined the transfer effect of policies in states *with* legislative agreements, they also found no effect on student transfers. Our results suggest that the reach of the policy across institutions might matter as well. We find a greater likelihood of transfer in states where the agreement included more students in private institutions but, overall, students in states with agreements saw little or no greater change in the odds of transferring or earning a bachelor's degree than did students in states without agreements.

Others point to weak implementation. Sack (2006) reports that a 2004 study by Holaday and McCauley found that, despite the existence of policies to unify two- and four-year curriculum and institutions, individual institutions still exercised a fair degree of discretion in the extent to which they participated in the policy measures. Despite efforts to unify curriculum across institutions, a researcher from Illinois found that the state's main university, the University of Illinois, remained skeptical about the curriculum quality in the state's two-year institutions and continued to follow its own transfer guidelines instead of those written into the state agreement (Sack 2006). Certainly, poor implementation presents a reasonable explanation for the weak results.

Some levy a more fundamental critique of these policies and the purported role they might play in student transfers, charging that they were not designed to increase the chance of transfer at all. Roksa and Keith (2008) are not convinced that improving information to students and institutions and offering more fluid transfer, as we argue, would improve transfers. Instead they contend that these policies only help students *after* they transfer, by minimizing credit loss and reducing the number of courses they must take to graduate. But if this were the case, we would see effects on graduation rates. In fact, the authors argue that the more appropriate outcomes to consider include the number of credits transferred, number of credits to graduation, and graduation rates. However, their study found no improvements in any of these outcomes. Of course, our analysis confirms their findings on graduation rates.

While it is possible that the policy elements may more directly impact outcomes after transfer, it is still reasonable to imagine that better informed students would be better positioned to transfer. Moreover, our results showing that Hispanic students are more likely to transfer in agreement states suggests that the policies may, in fact, influence student transfers. The better

question to ask might be why these policies do not increase the chance of transfer for more students.

Other authors who critique the underlying motivation of the policies do not rule out the chance that these policies might have some role in improving transfers, but suggest that improving transfers might have been a secondary concern. Anderson, Alfonso and Sun (2006) argue instead that the primary goal of these policies may have been to increase the legitimacy of the two- to four-year pathway as a means to earning a bachelor's degree. They go on to make the case that, because two-year colleges are considerably less costly than four-year colleges, improving the pipeline between the two types of institutions effectively acts as a strategy to lower the cost of a bachelor's degree. They further argue that, by legitimizing the two- to four-year pathway, states risk "crowding out" low-income and minority students from two-year institutions as more middle-class students opt for this pathway. If the policy ends up encouraging more middle-class students to enroll at two-year colleges when they might otherwise have enrolled directly into four-year colleges and might reasonably be the sort of student that would already be highly likely to transfer without the policy, we would see no effect on the likelihood of transfer in our models for these students. If improving the chance that low-income and minority students transfer is only of secondary interest, the inconsistent effect across student types would not be surprising.

The most compelling explanations, however, might be that the benefits of these policies are simply over shadowed by the myriad other concerns students face when deciding to transfer form a two- to four-year institution. At a recent conference of the Association of American Colleges and Universities, conference participants representing both two- and four-year institutions across the country argued that transfer students, who often must first overcome low

expectations and poor academic preparation, are faced with the prospect of relocating away from families and jobs and taking on much higher tuition burdens in order to attend a four-year college. Moreover, students who do apply to a four-year college and are accepted can find themselves accepted to the college, but not to the department of their choice, leaving them in a strange limbo state.

While none of the higher education officials in attendance felt that these policies should be abandoned – the alternative of institution-to-institution agreements is far more challenging to deal with – they all agreed that such policies should be considered only a small part of a more comprehensive effort that involves institution- and student-level efforts to improve transfer opportunities.

At this point it appears that both researchers and university administrators seem content to accept that these policies, while extremely valuable for the administration of postsecondary institutions, likely have little impact on student postsecondary behavior and success. Nonetheless interest in these policies remain high nationwide. Moving forward, a more valuable evaluation of these policies should perhaps turn to administrative outcomes that could reflect the organizational efficiencies that are gained by these policies. Outcomes such as the number of participating institutions, the costs associated with processing a transfer student, the range of institutions transferred from and to are all relevant indicators of the extent to which these policies are providing valuable administrative improvements. Although not directly associated with student outcomes, the more these policies reduce costs and minimize the demand on personnel the more the colleges and universities can devote their attention to instruction.

References

Anderson, G., Alfonso, M., and Sun, J. (2006). "Rethinking Cooling out at Public Community Colleges: An Examination of Fiscal and Demographic Trends in Higher Education and the Rise of Statewide Articulation Agreements." *Teachers College Record* 108 (3): 422-451.

Anderson, G., Sun, J. and Alfonso, M., 2006. "Effectiveness of Statewide Articulation Agreements on the Probably of Transfer: A Preliminary Policy Analysis." *The Review of Higher Education* 29(3): 261-291.

Eagen, M., and Jaeger, A. (2009) "Effects of Exposure to Part-time Faculty on Community College Transfer." *Research on High Education* 50:168–188.

Education Commission of the States (2001). "Transfer and Articulation Policies." *StateNotes.* Education Commission of the States. Denver CO.

Ignash, J.M., and Townsend, B.K. (2001). "Statewide Transfer and Articulation Policies: Current Practices and Emerging Issues." In *Community Colleges: Policy in the Future Context*, edited by B. K. Townsend and S. B. Twombly. Westport, CT: Ablex Publishing.

Jacoby, D (2006). "Effects of Part-Time Faculty Employment on Community College Graduation Rates." *The Journal of Higher Education*77(6): 1081-1103.

Kirst, M.W., and Venezia, A. (2004). *From High School to College: Improving Opportunities for Success in Postsecondary Education*. San Francisco: Jossey-Bass, An Imprint of Wiley.

Knoell, D. (1990). *Transfer, Articulation, and Collaboration Twenty-Five Years Later: The Report of a Research Project Funded by the Ford Foundation*. Washington, D.C: American Association of Community and Junior Colleges and Sacramento, CA: California Postsecondary Education Commission.

Lee, V. and Frank, K. (1990). "Students' Characteristics that Facilitate the Transfer from Two-Year to Four-Year Colleges." *Sociology of Education* 63(3): 178-193.

Leslie, D. and Gappa, J. (2002). "Part-Time Faculty: Competent and Committed." *New Directions for Community Colleges* 118: 59-67.

Long, B. T. and Kurlaender, M. (2009). "Do Community Colleges Provide a Viable Pathway to a Baccalaureate Degree?" Educational Evaluation and Policy Analysis 31(1): 30-53.

Provasnik, S., and Planty, M. (2008). *Community Colleges: Special Supplement to The Condition of Education 2008 Statistical Analysis Report*. Washington, D.C: U.S. Department of Education.

Roksa, J. (2007). *Building Bridges for Student Success: Are Transfer Policies Effective?* Report for the Transitions to College Program, Social Science Research Council.

Roksa, J and Keith, B. (2008). "Credits, Time, and Attainment: Articulation Policies and Success After Transfer." *Educational Evaluation and Policy Analysis*, 30(3): 236-254.

Rosenbaum, J.E., Deil-Amen, R., and Person, A.E. (2006). *After Admission: From College Access to College Success*. New York, NY: Russell Sage Foundation.

Sack, J. (2006). "Is IAI Improving Transfer?" *Update on Research and Leadership*. Office of Community College Research and Leadership. University of Illinois at Urban-Champaign.

Schuetz, P. (2002) "Instructional Practices of Part-Time and Full-Time Faculty." *New Directions for Community Colleges* 118: 39-46.

Townsend, B.K. (2001). "Redefining the Community College Transfer Mission." *Community College Review* 29(2): 29-42.

Tym, C., McMillion, R., Barone, S. and Webster, J. (2004). *First-Generation College Students: A Literature Review*. (Research and Analytic Services). Texas Round Rock, TX: Texas Guaranteed Student Loan Corporation.

U.S. Department of Education, National Center for Education Statistics. (2005). The Condition of Education 2005,NCES 2005-094, Washington, DC: U.S. Government Printing Office.

U.S. Department of Education, National Center for Education Statistics. (2007). "Chapter 3: Postsecondary Education: Degree-Granting." (Table 187; Table 217; Table 255; Table 320). In *Digest of Education Statistics*. Washington, D.C.: U.S. Department of Education.

Yang, P. (2006). "UCLA Community College Review: Reverse Transfer and Multiple Missions of Community Colleges." *Community College Review* 33(304): 55-70.

Tables and Figures

Table 1. Summary of Transfer Agreements between 1992 and 1999 (n=43)

	1992	1999
States with legislated agreements	24	34
Overall agreement strength		
No transfer policy (0)	19	9
Weak (1)	2	1
Moderate (2)	13	16
Strong (3)	9	17
Average overall strength	1.279	1.953
Transfer components		
AA degree that automatically transfers	18	23
Common general education requirements	14	22
Common general education core	14	24
Common requirements for program majors	4	7
Common course numbering	7	13
Transfer component strength		
No transfer policy (0)	19	9
Weak (1)	7	7
Moderate (2)	10	13
Strong (3)	7	14
Average transfer component strength	1.116	1.744
Maintained agreement from 1992 to 1999		23
Enacted agreement in 1992		2
New agreement		11
Never enacted a statewide agreement		8
Retracted agreement		1

Table 2. Summary Statistics

	Total		Agreement (N= 1269)		Non-Agreement (N=2352)	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Dependent Variable						
Transfer from 2-year to 4-year Institution	0.24		0.22		0.26	
Independent Variables						
Student Characteristics (N= 3,621) [A]						
Female	0.52		0.56		0.50	
Hispanic	0.13		0.07		0.17	
Black	0.09		0.09		0.09	
Family Income						
Low ($14,999 or less)	0.11		0.09		0.12	
Low-mid ($15,000-$34,999)	0.24		0.25		0.24	
High-mid ($35,000-$74,999)	0.36		0.37		0.35	
High (more than $75,000)	0.07		0.06		0.07	
Failed to Report	0.22		0.22		0.22	
Expect to Obtain Bachelor's Degree	0.57		0.54		0.59	
Parents with High School Education or Less	0.23		0.21		0.24	
Standardized Test Composite Score	49.88		50.40		49.59	
State Environment (N= 43)						
Articulation Policy	0.56		1.00		0.00	
Policy Strength						
No Policy	0.44		–		1.00	
Weak	0.16		0.08		–	
Moderate	0.23		0.54		–	
Strong	0.16		0.38		–	
Transfer Component Strength						
No Policy	0.44		–		1.00	
Weak	0.05		0.29		–	
Moderate	0.30		0.42		–	
Strong	0.21		0.29		–	
Transfer Components						
AA Degree that Automatically Transfers	0.42		0.75		–	
Credit Requirements without Subjects	0.33		0.58		–	
Credit Requirements in Specific Subjects	0.33		0.58		–	
Requirements for Program Majors	0.09		0.17		–	
Common Core Numbering	0.16		0.29		–	
Undergraduates Covered by Articulation Policy (%)						
Public Institutions	48.13	46.94	86.24	24.38	–	
Private Institutions	2.74	11.76	4.91	15.54	–	
Students Attending Public Four-year Institutions (%)	45.40	14.97	45.90	15.45	44.77	14.72
Ratio of Four-year Tuition to Two-year Tuition	6.45	6.56	5.43	1.72	7.73	9.67
Local Environment (County) (N= 511)						
Unemployment Rate	6.15	2.95	5.73	2.14	6.50	3.45
Annual Salary (per $1000)	20.45	3.97	19.95	3.68	20.87	4.16
Two-Year Postsecondary Institution (N= 836)						
Public Institution	0.79		0.80		0.79	
Total fall enrollment	5707.08	6350.10	4805.55	5815.55	6289.17	6613.22
Percent Tenured Faculty	69.08	15.91	65.97	16.58	71.09	15.14
Student-to-faculty ratio	58.25	35.48	54.30	23.54	60.79	41.23
Per Student Spending (per $1,000)						
Student Services	0.48	0.47	0.45	0.39	0.50	0.51
Instructional	1.80	1.33	1.89	0.85	1.75	1.56

[A] Weighted to be representative of U.S. high school graduates in 1992.

Table 2a. Summary Statistics for Two-to-Four Year Transfer Students

	Total		Agreement(N=285)		Non-Agreement(N=544)	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Dependent Variables						
Earn Bachelor's Degree	0.53		0.54		0.53	
Independent Variables						
Student Characteristics (N=829) [A]						
Female	0.50		0.45		0.52	
Hispanic	0.10		0.08		0.10	
Black	0.05		0.04		0.05	
Family Income						
Low ($14,999 or less)	0.06		0.04		0.07	
Low-mid ($15,000-$34,999)	0.24		0.35		0.19	
High-mid ($35,000-$74,999)	0.42		0.40		0.42	
High (more than $75,000)	0.08		0.08		0.09	
Failed to Report	0.20		0.13		0.23	
Expect to Obtain Bachelor's Degree	0.74		0.71		0.76	
Parents with High School Education or Less	0.15		0.14		0.16	
Standardized Test Composite Score	52.40		53.34		51.94	
Remedial Courses at Two-Year Institution (%)	6.89		5.95		7.35	
Earned Associate's Degree	0.35		0.44		0.31	
State Environment (N=40) [B]						
Articulation Policy	0.58		1.00		0.00	
Policy Strength						
No Policy	0.43		--		1.00	
Weak	0.05		0.09		--	
Moderate	0.30		0.52		--	
Strong	0.23		0.39		--	
Transfer Component Strength						
No Policy	0.43		--		1.00	
Weak	0.18		0.30		--	
Moderate	0.23		0.39		--	
Strong	0.18		0.30		--	
Transfer Components						
AA Degree that Automatically Transfers	0.45		0.78		--	
Credit Requirements without Subjects	0.33		0.57		--	
Credit Requirements in Specific Subjects	0.33		0.57		--	
Requirements for Program Majors	0.10		0.17		--	
Common Core Numbering	0.18		0.30		--	
Undergraduates Covered by Articulation Policy (%)						
Public Institutions	50.81	47.40	88.36	22.69	--	
Private Institutions	2.94	12.18	5.13	15.85	--	
Students Attending Public Four-year Institutions (%)	43.61	13.69	44.74	14.68	42.08	12.51
Ratio of Four-year Tuition to Two-year Tuition	6.63	6.76	5.43	1.76	8.27	10.11
Local Environment (County) (N=299)						
Unemployment Rate	5.95	2.48	5.50	2.10	6.30	2.70
Annual Salary (per $1000)	20.94	4.22	19.91	3.57	21.77	4.52
Two-Year Postsecondary Institution (N=358)						
Public Institution	0.93		0.93		0.93	
Total fall enrollment	8753.60	7673.96	7065.83	7542.84	9763.26	7590.00
Percent Tenured Faculty	71.55	16.99	66.85	18.83	74.35	15.14
Student-to-faculty ratio	58.41	23.17	52.89	23.42	61.72	22.42
Per Student Spending (per $1,000)						
Student Services	0.43	0.42	0.41	0.39	0.44	0.43
Instructional	1.73	0.79	1.93	1.00	1.61	0.60
Four-Year Postsecondary Institution (N=401)						
Public Institution	0.66		0.71		0.63	
Total fall enrollment	10644.58	9601.23	10806.37	9222.25	10556.84	9817.01
Percent Tenured Faculty	86.65	15.14	87.56	11.79	86.16	16.68
Student-to-faculty ratio	30.80	14.34	30.44	14.82	30.99	14.10
Per Student Spending (per $1,000)						
Student Services	0.74	0.86	0.70	1.31	0.76	0.46
Instructional	3.56	2.57	3.68	3.52	3.50	1.88

[A] Weighted to be representative of U.S. high school graduates in 1992.

[B] In this sample, no students transfer from a two- to four-year institution in Montana, Maine, and South Dakota.

Table 3. Transfer from Two-Year to Four-Year College (N =3398)

Parameter	Column A Baseline	SE	Column B Policy Presence	SE	Column C Overall Policy Strength	SE	Column D Individual Transfer Components	SE	Column E Transfer Component Strength	SE	Column F Component Strength and Scope	SE
Intercept	-3.172 ***	0.621	-3.193 ***	0.708	-3.276 ***	0.700	-3.317 ***	0.633	-3.214 ***	0.702	-3.056 ***	
State Environment												
Presence of Transfer and Articulation Agreement			0.015	0.181			-0.218	0.265				
Overall Policy Strength [A]												
Weak					-0.568 **	0.181						
Moderate					0.163	0.185						
Strong					-0.042	0.272						
Undergraduates Covered by Articulation Policy (%)												
Public Institutions											0.006 *	0.003
Private Institutions											0.029 **	0.008
Individual Transfer Components												
AA Degree that Automatically Transfers							0.431	0.318				
Credit Requirements without Subjects							-0.285	0.299				
Credit Requirements in Specific Subjects							-0.079	0.205				
Requirements for Program Majors							-0.330	0.376				
Common Core Numbering							0.629 †	0.312				
Transfer Component Strength [B]												
Weak									-0.109	0.229	-0.546 *	0.262
Moderate									0.168	0.184	-0.296	0.218
Strong									-0.065	0.300	-0.774 *	0.332
Students Attending Public Four-year Institutions (%)	-0.010	0.008	-0.010	0.008	-0.008	0.008	-0.008	0.008	-0.010	0.008	-0.015 †	0.009
Ratio of Four-year Tuition to Two-year Tuition	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.002	0.004
Local Environment (County)												
Unemployment Rate	-0.010	0.020	-0.009	0.021	-0.013	0.021	-0.005	0.020	-0.012	0.021	-0.005	0.020
Annual Salary (per $1000)	0.003	0.016	0.003	0.017	0.004	0.016	0.006	0.016	0.003	0.017	0.007	0.016
Student Characteristics												
Female	0.040	0.087	0.040	0.087	0.041	0.087	0.049	0.088	0.036	0.088	0.026	0.090
Hispanic	-0.181	0.149	-0.180	0.150	-0.169	0.156	-0.212	0.144	-0.170	0.155	-0.170	0.156
Black	-0.298	0.286	-0.298	0.285	-0.296	0.286	-0.317	0.291	-0.285	0.286	-0.269	0.289
Family Income [C]												
Low-mid ($15,000-$34,999)	0.231	0.172	0.231	0.172	0.226	0.173	0.213	0.170	0.228	0.172	0.219	0.171
High-mid ($35,000-$74,999)	0.352 *	0.149	0.352 *	0.149	0.354 *	0.150	0.360 *	0.149	0.349 *	0.149	0.354 *	0.150
High ($75,000-$200,000 plus)	0.383 *	0.156	0.383 *	0.156	0.385 *	0.157	0.378 *	0.159	0.383 *	0.156	0.378 *	0.157
Parents with High School Education or Less	-0.289 **	0.095	-0.289 **	0.094	-0.286 **	0.095	-0.268 **	0.094	-0.289 **	0.095	-0.275 **	0.095
Standardized Test Composite Score	0.042 ***	0.007	0.042 ***	0.007	0.042 ***	0.007	0.042 ***	0.007	0.043 ***	0.007	0.042 ***	0.007
log likelihood	-1878.420		-1878.408		-1874.494		-1870.437		-1876.829		-1867.105	
Wald Chi-Square	235.340 *		252.440 ***		293.360 ***		307.590 ***		251.400 ***		333.200 ***	
Pseudo R-Square	0.036		0.036		0.038		0.040		0.037		0.042	

† p<.10, * p<.05, **p<.01, ***p<.001

[A]Referent group is no statewide policy;   [B]Referent group is no statewide policy;   [C]Referent group is low income ($0-$14,999)

Table 4. Probability of Transfer Students Receiving Bachelor's Degree (N =829)

Parameter	Column A Baseline _	SE	Column B Policy Presence _	SE	Column C Overall Policy Strength _	SE	Column D Individual Transfer Components _	SE	Column E Transfer Component Strength _	SE	Column F Component Strength and Scope _	SE
Intercept	-1.962 †	1.037	-1.470	0.980	-1.605 †	0.974	-1.851 †	0.971	-1.495	1.007	-1.564	1.001
State Environment												
Articulation Policy			-0.303 *	0.139			-0.286	0.336				
Policy Strength [A]												
Weak					-0.639 ***	0.171						
Moderate					-0.099	0.194						
Strong					-0.480 **	0.170						
Transfer Components												
AA Degree that Automatically Transfers							0.044	0.492				
Credit Requirements without Subjects							0.429	0.313				
Credit Requirements in Specific Subjects							-0.427 †	0.225				
Requirements for Program Majors							0.221	0.278				
Common Core Numbering							-0.576 *	0.227				
Undergraduates Covered by Articulation Policy (%)												
Public Institutions											0.006	0.004
Private Institutions											-0.008	0.008
Transfer Component Strength [B]												
Weak									-0.563 *	0.269	-1.139 **	0.387
Moderate									-0.008	0.205	-0.527	0.328
Strong									-0.467 **	0.171	-0.988 *	0.408
Students Attending Public Four-year Institutions (%)	-0.029 ***	0.008	-0.031 ***	0.007	-0.029 ***	0.007	-0.026 ***	0.007	-0.030 ***	0.007	-0.029 ***	0.007
Ratio of Four-year Tuition to Two-year Tuition	-0.003	0.003	-0.005 †	0.003	-0.005	0.003	-0.005	0.003	-0.006 †	0.003	-0.005 †	0.003
Local Environment (County)												
Unemployment Rate	0.081 †	0.048	0.069	0.046	0.071	0.046	0.066	0.046	0.062	0.045	0.058	0.045
Annual Salary (per $1000)	0.009	0.025	-0.002	0.026	0.001	0.026	0.004	0.026	-0.000	0.026	0.000	0.026
Student Characteristics												
Female	0.455 ***	0.131	0.449 ***	0.129	0.461 ***	0.127	0.439 **	0.13	0.450 **	0.131	0.445 **	0.132
Hispanic	-0.489 *	0.211	-0.483 *	0.212	-0.467 *	0.217	-0.470 *	0.211	-0.467 *	0.213	-0.463 *	0.213
Black	-1.913 ***	0.390	-1.917 ***	0.392	-1.940 ***	0.388	1.927 ***	0.385	-1.937 ***	0.387	-1.955 ***	0.386
Family Income [C]												
Low-mid ($15,000-$34,999)	0.587 †	0.353	0.604 †	0.348	0.587 †	0.354	0.605 †	0.348	0.571	0.351	0.566	0.351
High-mid ($35,000-$74,999)	0.615 *	0.277	0.615 *	0.270	0.603 *	0.271	0.609 *	0.272	0.596 *	0.270	0.598 *	0.271
High ($75,000-$200,000 plus)	0.825 *	0.376	0.814 *	0.375	0.813 *	0.377	0.793 *	0.378	0.794 *	0.379	0.780 *	0.382
Parents with High School Education or Less	-0.257	0.201	-0.274	0.201	-0.275	0.201	-0.273	0.204	-0.285	0.204	-0.288	0.204
Standardized Test Composite Score	0.036 *	0.016	0.037 *	0.016	0.037 *	0.016	0.039 *	0.017	0.037 *	0.017	0.038 *	0.017
log likelihood	-542.638		-523.182		-521.902		-521.100		-521.302		-520.558	
Wald Chi-Square	186.250 ***		220.270 ***		444.970 ***		354.570 ***		288.000 ***		323.000 ***	
Pseudo R-Square	0.082		0.084		0.086		0.088		0.087		0.089	

† p<.10, * p<.05, **p<.01, ***p<.001

[A] Referent group is no statewide policy; [B] Referent group is no statewide policy; [C] Referent group is low income ($0-$14,999)

Table 5. Institutional Factors and Likelihood of Transferring from Two-year to Four-year College (N =3621)

Parameter	Column A Policy Strength and Scope		Column B Component Strength and Scope	
	_	SE	_	SE
Intercept	-3.724 ***	0.789	-3.597 ***	0.782
State Environment				
Overall Policy Strength [A]				
Weak	-0.801 **	0.261		
Moderate	-0.124	0.204		
Strong	-0.617 †	0.348		
Transfer Component Strength [B]				
Weak			-0.439	0.346
Moderate			-0.266	0.260
Strong			-0.822 *	0.400
Undergraduates Covered by Articulation Policy (%)				
Public Institutions	0.004	0.003	0.006 †	0.003
Private Institutions	0.030 **	0.009	0.034 **	0.010
Students Attending Public Four-year Institutions (%)	-0.011	0.007	-0.014 †	0.008
Ratio of Four-year Tuition to Two-year Tuition	0.001	0.003	-0.001	0.004
Local Environment (County)				
Unemployment Rate	-0.014	0.021	-0.012	0.021
Annual Salary (per $1,000)	0.001	0.016	0.002	0.016
Postsecondary Institution				
Public Institution	0.797 *	0.345	0.804 *	0.346
Total Fall Enrollment (per 1,000 Students)	0.016 **	0.006	0.016 **	0.006
Student-to-Faculy Ratio	-0.010 ***	0.003	-0.009 ***	0.003
Percent Tenured Faculty	0.008 **	0.003	0.007 **	0.003
Per Student Spending (per $1,000)				
Student Services	0.519 *	0.242	0.531 *	0.241
Instructional	-0.216 †	0.126	-0.236 †	0.137
Student Characteristics				
Female	0.052	0.096	0.045	0.097
Hispanic	-0.217	0.152	-0.215	0.152
Black	-0.300	0.319	-0.289	0.319
Family Income [C]				
Low-mid ($15,000-$34,999)	0.263	0.166	0.257	0.163
High-mid ($35,000-$74,999)	0.389 **	0.146	0.378 *	0.146
High ($75,000-$200,000 plus)	0.433 **	0.148	0.423 **	0.148
Parents with High School Education or Less	-0.244 **	0.094	-0.251 **	0.094
Standardized Test Composite Score	0.040 ***	0.007	0.040 ***	0.007
log likelihood	-1841.894		-1843.395	
Wald Chi-Square	506.650 ***		336.000 ***	
Pseudo R-Square	0.055		0.054	

† p< .10, * p< .05, **p<.01, ***p<.001

[A] Referent group is no statewide policy;　　[B] Referent group is no statewide policy;　　[C] Referent group is low income ($0-$14,999)

Table 6. Institutional Factors and Likelihood of Transfer Students Receiving a Bachelor's Degree (N =829)

Parameter	Component Strength		
	_		SE
Intercept	-2.321	†	1.200
State Environment			
Transfer Component Strength [B]			
Weak	-1.391	***	0.253
Moderate	-0.819	**	0.267
Strong	-1.205	***	0.336
Undergraduates Covered by Articulation Policy (%)			
Public Institutions	0.009	**	0.003
Private Institutions	-0.008		0.010
Students Attending Public Four-year Institutions (%)	-0.027	***	0.007
Ratio of Four-year Tuition to Two-year Tuition	-0.006	†	0.004
Local Environment (County)			
Unemployment Rate	0.045		0.045
Annual Salary (per $1,000)	0.003		0.025
Two-Year Postsecondary Institution			
Public Institution	0.550	†	0.328
Total fall enrollment	0.005		0.008
Percent Tenured Faculty	0.008	*	0.004
Student-to-faculty ratio	-0.009	**	0.003
Per Student Spending (per $1,000)			
Student Services	0.225		0.253
Instructional	-0.012		0.124
Four-Year Postsecondary Institution			
Public Institution	-0.022		0.230
Total fall enrollment	0.007		0.012
Percent Tenured Faculty	0.003		0.005
Student-to-faculty ratio	-0.015	*	0.007
Per Student Spending (per $1,000)			
Student Services	0.032		0.120
Instructional	0.077	†	0.040
Student Characteristics			
Female	0.511	***	0.126
Hispanic	-0.481	*	0.191
Black	-2.026	***	0.401
Family Income [C]			
Low-mid ($15,000-$34,999)	0.515		0.357
High-mid ($35,000-$74,999)	0.580	*	0.269
High ($75,000-$200,000 plus)	0.637	†	0.378
Parents with High School Education or Less	-0.318		0.200
Standardized Test Composite Score	0.035	†	0.018
log likelihood	-506.816		
Wald Chi-Square	1035.630	***	
Pseudo R-Square	0.111		

† p< .10, * p< .05, ** p<.01, *** p<.001

[A] Regression model is run with state level dummy variables (coefficients available upon request). The total number of observations is reduced to 3381 as all respondents in three states predict failure perfectly.

[B] Referent group is no statewide policy;   [C] Referent group is low income ($0-$14,999)

Figure 1. Increasing Student Transfers with Transfer and Articulation Policy: A Theory of Action
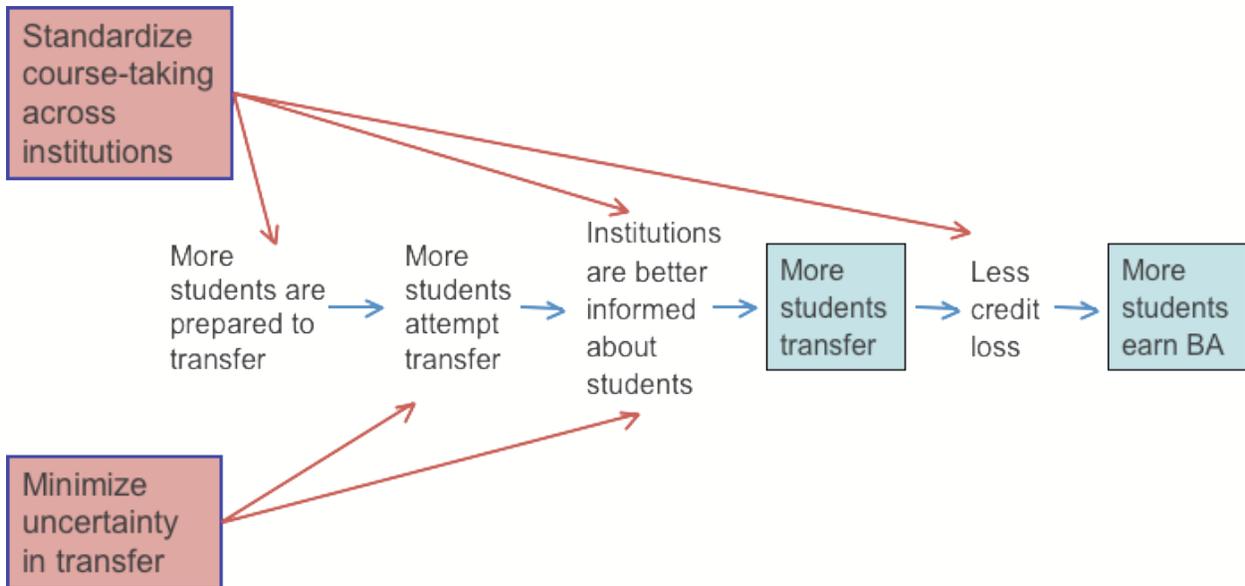
Figure 2. Changes in the Odds of Transferring in Agreement States Relative to Non-Agreement States
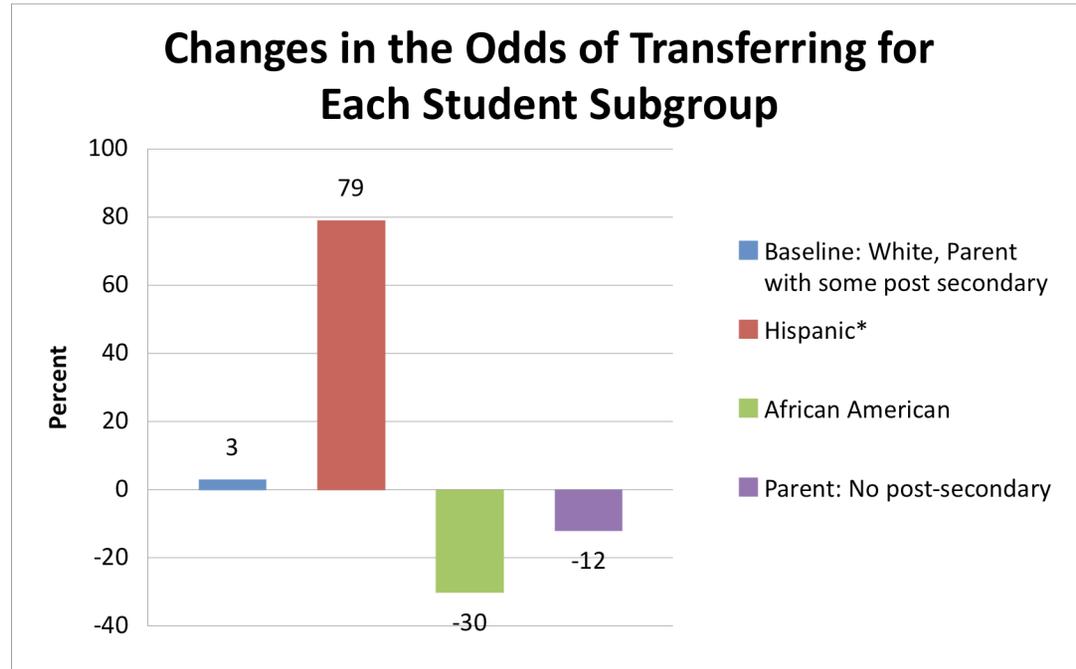
* Indicates statistically significant difference from baseline students.

Figure 3. Changes in the Odds of Graduating in Agreement States Relative to Non-Agreement States

Changes in the Odds of Graduating
for Each Student Subgroup

Percent

-12

-16

-61

-65

■ Baseline: White, Parent
with some post secondary

■ Hispanic

■ African American

■ Parent: No post-secondary
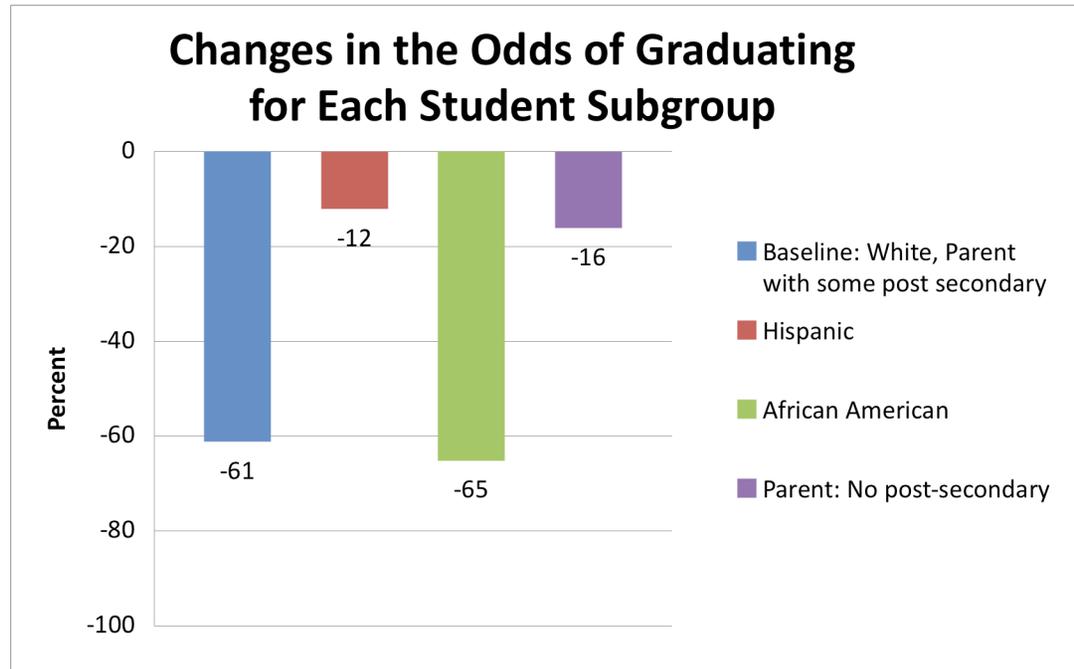
Appendix

Table A-1: Transfer Policies in 50 States

State	Yes	Strength	Transfer Component					
			AA Degrees	General Ed.	Ed. Core	Program Majors	Common Numbering	Transfer Overall
Alabama		0	0	0	0	0	0	0
Alaska	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
Arizona		0	0	0	0	0	0	0
Arkansas	x	2	0	1	1	0	0	2
California		0	0	0	0	0	0	0
Colorado	x	2	1	1	1	0	1	3
Connecticut		0	0	0	0	0	0	0
Delaware		0	0	0	0	0	0	0
Florida	x	3	1	1	0	1	1	3
Georgia	x	3	1	1	1	1	1	3
Hawaii	x	3	1	0	0	0	0	1
Idaho	x	3	1	1	1	0	1	3
Illinois		0	0	0	0	0	0	0
Indiana	x	1	0	0	1	0	0	1
Iowa	x	2	1	0	0	0	0	1
Kansas	x	2	1	1	1	0	0	2
Kentucky		0	0	0	0	0	0	0
Louisiana		0	0	0	0	0	0	0
Maine		0	0	0	0	0	0	0
Maryland		0	0	0	0	0	0	0
Massachusetts	x	2	1	0	1	0	0	2
Michigan		0	0	0	0	0	0	0
Minnesota	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
Mississippi	x	2	1	0	0	1	0	2
Missouri	x	3	1	1	1	0	0	2
Montana	x	2	0	1	1	0	0	2
Nebraska	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
Nevada	x	2	1	1	0	0	0	2
New Hampshire	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
New Jersey	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
New Mexico		0	0	0	0	0	0	0
New York		0	0	0	0	0	0	0
North Carolina	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
North Dakota	x	3	1	1	1	0	1	3
Ohio	x	3	1	1	1	1	0	3
Oklahoma		0	0	0	0	0	0	0
Oregon	x	2	1	1	0	0	0	2
Pennsylvania		0	0	0	0	0	0	0
Rhode Island	x	2	0	0	0	0	0	1
South Carolina		0	0	0	0	0	0	0
South Dakota		0	0	0	0	0	0	0
Tennessee		0	0	0	0	0	0	0
Texas		0	0	0	0	0	0	0
Utah	x	3	1	1	1	0	1	3
Vermont	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
Virginia	x	2	1	0	0	0	0	1
Washington	x	2	1	1	1	0	0	2
West Virginia	x	3	1	0	1	0	0	2
Wisconsin	x	1	0	0	0	0	0	1
Wyoming	x	2	0	0	0	0	1	1
Total	24		18	14	14	4	7	

Dependent Variables

Transfer from two- to four-year institution: We use a dichotomous variable to measure students' postsecondary transfer behavior. Using the PETS 2000 data, a student was identified as transferring from a two- to four-year college from the NELS derived measure of 'combination of institutions attended' (instcomb). Assigned by hand-and-eye reading of records by two judges, students' combination of institutions attended was determined from requested transcripts, student claims, and unrequested transcript evidence found on received transcripts. Institutions attended prior to high school graduation were not considered in the construction of this measure. Students' with a value of '3' (institutional combination of '2-year, then 4-year') are designated as a transferring; all others are identified as non-two- to four- year transfers.

Earned bachelor's degree: Students' bachelor's degree attainment is measured as a dichotomous (earned or not) from the PETS 2000 file.

Independent Variables

Student Characteristics

Gender: Dummy variable indicating whether a student is female. *Source: NELS:88/2000*

Race/ethnicity: Dummy variable indicating whether the student is Hispanic and a dummy variable indicating whether the student is black. *Source: NELS:88/2000*

Student's total family's income: A categorical measure of student's total gross family's income, including all earners in the household in 1991. We collapse response options, presented to parents in fifteen irregular intervals (e.g., 'None'; 'Less than $1,000'; '$10,000-$14,999'; '$25,000-$34,999'; '$100,000-$199,999', etc.) into four dummy variables. Our four-category measure of family income is constructed using the poverty threshold for a family of four in 1992 ($14,335) and the U.S. median family income in 1990 as measured by the U.S. Census Bureau ($35,225) as reference points.[13] *Source: NELS:88/2000*

Parents with high school education or less: Dummy variable indicating whether parents highest level of education is a high school education or less. *Source: NELS:88/2000*

Student's cognitive ability: A continuous test composite measure of student's proficiency in math and reading. Test scores were standardized on a scale of 0 to 100 (with a mean of 50 and a standard deviation of 10). *Source: NELS:88/2000*

Local Environment (County)

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[13] Historical poverty thresholds by year are available at
http://www.census.gov/hhes/www/poverty/histpov/hstpov1.html (accessed on 8/21/08). Income summary measures for the United States and by state are available at http://www.census.gov/hhes/www/income/cphls/cphl122.html (accessed on 8/21/08).

Unemployment rate: A continuous measure of average annual unemployment in 1990. *Source: Bureau of Labor Statistics*

Annual salary: A continuous measure of annual average wages across all industries. *Source: Bureau of Labor Statistics*

Postsecondary Institutional Characteristics

Public institution: Dummy variable indicating whether a postsecondary institution is a public college. *Source: 1992 IPEDS*

Total fall enrollment: A continuous measure of the number of students enrolled in the college at the beginning of the academic year. *Source: 1992 IPEDS*

Percent tenured faculty: A continuous measure of the total tenured faculty divided by total faculty employed at the institution (multiplied by 100). *Source: 1992 IPEDS*

Student-to-faculty ratio: A continuous measure of the total fall student enrollment divided by the total number of faculty at the institution. *Source: 1992 IPEDS*

Student services expenditures per student: A continuous measure of student services spending divided by total fall student enrollment. *Source 1992 IPEDS*

Instructional expenditures per student: A continuous measure of instructional spending divided by total fall student enrollment. *Source 1992 IPEDS*

State Characteristics

Articulation policy: A dummy variable indicating whether a state had a legislated policy for the statewide articulation of students between two-year and four-year colleges in 1992. *Source: 1999 Survey of State Transfer and Articulation Policies*

Articulation policy strength: A categorical measure of the overall strength of state's legislative articulation policy. We collapse the original five-level ranking into three strength dummy variables (weak, moderate, and strong) and a no policy indicator—four measures are mutually exclusive. *Source: 1999 Survey of State Transfer and Articulation Policies*

Transfer Component—automatic transferable associate's degree: Dummy variable indicating whether the state's articulation agreement includes a transfer provision designating one or more associates degrees as degrees that automatically transfer to all four-year public state institutions. *Source: 1999 Survey of State Transfer and Articulation Policies*

Transfer Component—credit requirements without subjects: Dummy variable indicating whether the state's articulation agreement includes a transfer provision minimizing the loss of credits by stipulating requirements for general education whereby the state identifies the number of credits regardless of subject area. *Source: 1999 Survey of State Transfer and Articulation Policies*

Transfer Component—credit requirements in specific subjects: Dummy variable indicating whether the state's articulation agreement includes a transfer provision minimizing the loss of credits by stipulating requirements for a common core of general education for all state schools in which students are required to complete a certain number of credits in specified subject areas. *Source: 1999 Survey of State Transfer and Articulation Policies*

Transfer Component—requirements for program majors: Dummy variable indicating whether the state's articulation agreement includes a transfer provision minimizing the loss of credits by stipulating credit requirements for program majors. *Source: 1999 Survey of State Transfer and Articulation Policies*

Transfer Component—common course numbering: Dummy variable indicating whether the state's articulation agreement includes a transfer provision minimizing the loss of credits by requiring a common numbering system across all state school or a similar system identifying equivalent courses across sectors.

Transfer component strength: A categorical indicator of the overall strength of the transfer component portion of state's articulation policy. We collapse the original five-level strength measure—based on the presence or absence of the five individual transfer components—into three strength dummy variables (weak, moderate, strong) and a no policy indicator. *Source: 1999 Survey of State Transfer and Articulation Policies*

Percentage of undergraduate students covered by transfer components: Two continuous measures of the percentage of undergraduate student population covered by the statewide agreement in public and private institutions, respectively. *Source: 1999 Survey of State Transfer and Articulation Policies*

Percentage of undergraduate students attending public four-year institutions: A continuous measure of the total number of undergraduate students attending public four-year colleges divided by the total number of undergraduate students (multiplied by 100). *Sources: 1992 IPEDS*

Ratio of four-year to two-year tuition: A continuous measure of the average in-state tuition in public four-year colleges divided by the average in-state tuition in public two-year colleges. *Sources: 1992 IPEDS*