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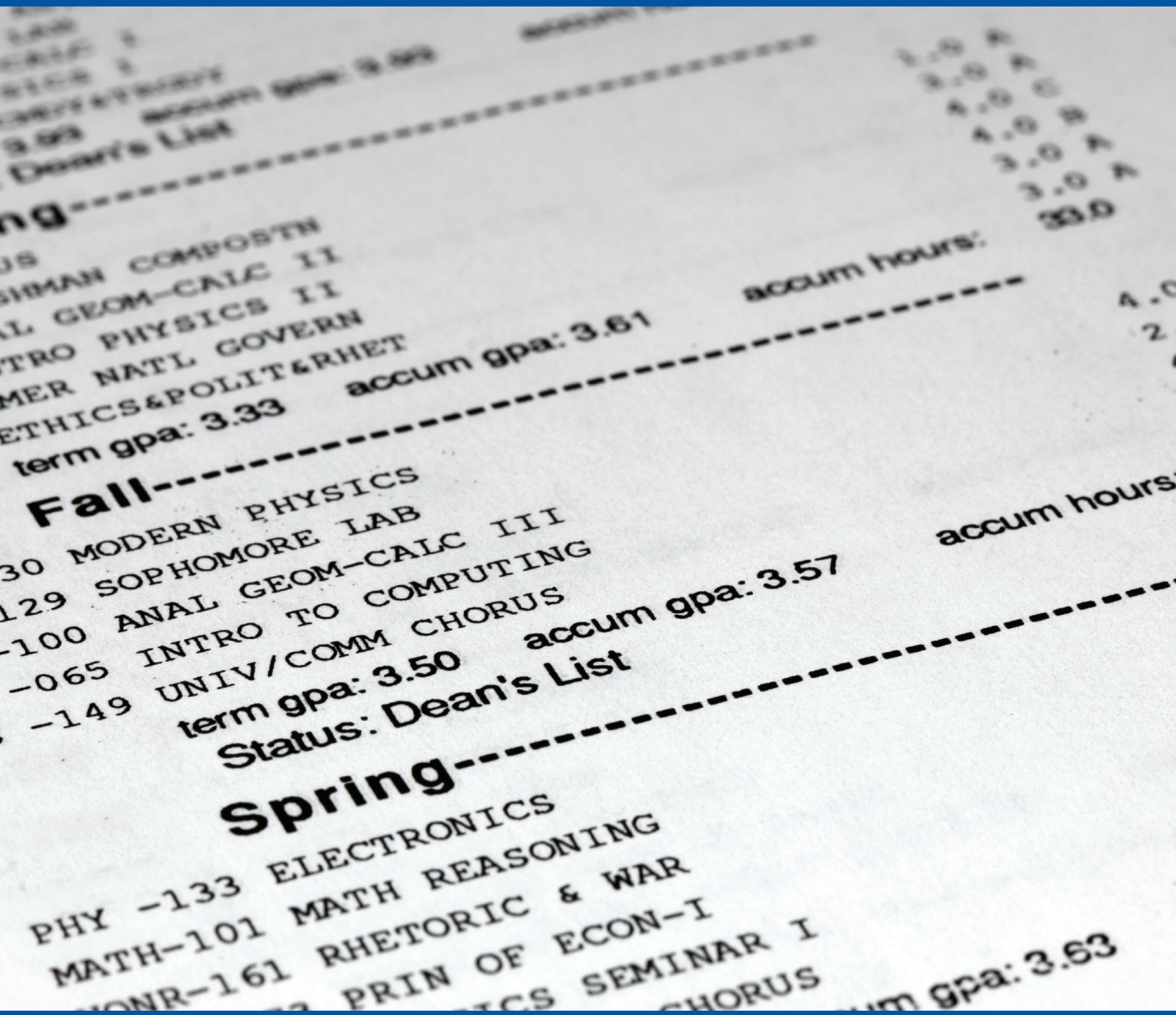
Transferability of Postsecondary Credit Following Student Transfer or Coenrollment

Statistical Analysis Report



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AUGUST 2014

Sean Anthony Simone
National Center for Education Statistics

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Executive Summary

The purpose of this report is to examine how often, and under what conditions, postsecondary institutions accept the transfer of credits earned by students at other institutions. It addresses the following questions:

- How often do members of a cohort of beginning college students transfer or coenroll[1] between postsecondary education institutions during their undergraduate years?
- How often, and in what amounts, do credits transfer when students move from one institution to another?
- What characteristics of institutions (i.e., control, level, accreditation, and selectivity) and students (i.e., grade point average [GPA] and degree/award level of program) are related to credit transfer?

Data Source and Sample

This report uses transcript data from the Postsecondary Education Transcript Study of 2009 (PETS:09), a component of the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), to address these research questions. The BPS followed a nationally representative sample of approximately 17,000 students who entered postsecondary education for the first time in the 2003–04 academic year for a period of 6 years. During those years, students in the BPS:04/09 cohort attended more than 3,000 postsecondary institutions.

The National Center for Education Statistics (NCES) requested transcripts from every institution BPS:04/09 students attended between July 2003 and June 2009. Around 2,620 institutions (86 percent) provided transcripts. Across the institution types represented, participation in the transcript collection ranged from 93 percent among public 4-year doctorate-granting institutions to 71 percent among private for-profit less-than-4-year institutions.

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[1] Coenrollment refers to overlapping periods of postsecondary enrollment at two or more institutions. It should not be confused with dual enrollment or overlapping dates of enrollment between a secondary school and postsecondary institution. See Wang and Wickersham (2014) for more information.

The study collected complete transcript histories for 16,110 students (87 percent) and at least one transcript from 16,960 students (92 percent). The resulting data provide a detailed portrait of students' enrollment, course-taking, credit accumulation, academic performance, and degree histories.

Selected Findings

Selected findings from this report include the following:

- About one-third (35 percent) of first-time beginning undergraduate students transferred or coenrolled at least once during the 6-year period of the BPS study. Approximately 21 percent transferred/coenrolled once, and another 11 percent transferred/coenrolled more than once.[2] The remaining two-thirds (65 percent) did not transfer or coenroll.
- Most transfers or coenrollments (56 percent) originated from public 2-year institutions. Because a transfer can be defined by either the movement of students or the movement of credits from one institution to another institution, this report used two measures to better characterize transfers: (1) opportunity for credit transfer,[3] a student-focused measure, and (2) actual credit transfers,[4] a credit-focused measure. Public 2-year institutions yielded approximately 1.4 million of the 2.6 million opportunities for credit transfer and 19.1 million of the 30.0 million credits transferred.
- Nearly 90 percent of all student credit transfer opportunities occurred between institutions that were regionally, rather than nationally, accredited.

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[2] For students with multi-institutional attendance, "student transfer" refers to the movement from one institution to another. If a student returns to the original institution of attendance and the enrollment spell at the second institution is less than 4 months, the student is not considered to have transferred. Credits need not transfer. The number of institutions attended could not be determined for 3 percent of the students, but it could be determined that these students transferred or coenrolled at least once.

[3] A potential transfer credit opportunity is a potential opportunity for postsecondary credits to move from one institution to another as a result of multi-institutional attendance. Potential transfer opportunities are identified using the beginning and end dates of attendance at each institution to determine the sequential order of attendance. The more institutions a student attends, the greater the number of institution-institution relationships that can be established, resulting in a higher number of potential transfer credit opportunities.

[4] For students with multi-institutional attendance, "credit transfer" refers to the recognition of credits earned at a prior institution by a second (or subsequent) institution of attendance. Unless explicitly stated, noncourse credits (e.g., Advanced Placement exams, credits awarded for experience in the workforce, credits awarded for examination) are not included in credit transfers.

- A multivariate analysis of actual credit transfer indicated that, after taking into account other student and institutional factors:[5]
    - a student's GPA prior to a transfer was related positively to the number of credits accepted at the destination institution;
    - student transfer/coenrollment[6] pathways were related to credit transfer, specifically when compared to students transferring from 2-year to 4-year[7] institutions (i.e., vertical transfer):
        - transferring from 4-year to 2-year institutions (i.e., reverse transfer) was related negatively to the number of credits accepted following transfer; and
        - transferring from 2-year to 2-year institutions or 4-year to 4-year institutions (i.e., horizontal transfer) was related negatively to the number of credits accepted following transfer.
    - Institutional control was related to the number of credits transferred, with students moving to private for-profit and private nonprofit institutions transferring fewer credits than students moving to public institutions.
    - Accreditation status was unrelated to the number of credits transferred between institutions.

These findings indicate that students who follow traditionally articulated pathways in postsecondary education—most notably from 2-year to 4-year institutions—are typically able to transfer credits successfully.

Caveats for Readers

This report focuses on students' first transfer experience because institutional transcripts make it difficult to identify the origin of a given credit after subsequent student transfers/coenrollments (i.e., not all institutions itemize transfer credits, making it difficult to identify the source institution). Because students who transfer

[5] These factors include control of the origin institution and destination institutions; transfer direction (i.e., vertical [2-year to 4-year], horizontal [4-year to 4-year or 2-year to 2-year], or reverse [4-year to 2-year]); accreditation status of origin and destination institutions; academic performance (i.e., GPA); selectivity of the origin and destination institutions; and the months enrolled prior to transfer.

[6] Because the focus of this report is credit transfer, student transfer and coenrollment were not disaggregated. For coenrolled students, potential transfer opportunities and the direction of credit transfer are identified using the beginning and end dates of attendance at each institution to determine the order of attendance.

[7] Institutions that offer 4-year degrees but are predominantly associate's-degree-granting institutions were reclassified as 2-year. Both institutional level and institutional sector were adjusted accordingly.

only once may differ from those who transfer more than once, appendix D compares these populations on a small set of student and institutional characteristics. While the results in appendix D show some differences between the two groups, multiple-transfer students are not likely to contribute much bias to the analysis because they are not being excluded (only data related to their subsequent transfers/coenrollments are excluded) and represent only 9 percent of the weighted cases.

It is important to note three limitations associated with this analysis:

- First, the analysis cannot determine if a student who intended to transfer was discouraged from doing so based on misinformation or other reasons and, therefore, made no attempt to do so.
- Second, although this analysis can observe the movement of a student between institutions, it cannot discern the reasons credit may not transfer. The transfer of credit is driven by both student and institutional decisions. Students may elect to transfer only part of their prior coursework to a destination institution, or may choose not to navigate the destination institution's transfer process at all. Similarly, institutions have the freedom to establish their own policies for the acceptance of credits earned at other institutions. According to the American Association of Collegiate Registrars and Admissions Officers (AACRAO), institutions should consider a variety of factors when awarding credit for prior learning, including quality and curricular applicability.[8]
- Third, sample sizes are low for some subgroups. Specifically, there was a lower volume of students transferring to and from less-than-2-year institutions, which resulted in a low sample size for analysis. As a result, there are fewer opportunities to observe whether credits earned at one institution might be accepted by another for this group.

[8] AACRAO. (2001). *Joint Statement on the Transfer and Award of Credit*. Retrieved from http://tcp.aacrao.org/misc/joint_statement.php.

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Introduction

The federal government invests billions of dollars in grants and loans to help students access and complete postsecondary education. Federal policymakers, therefore, have had a continuing interest in understanding the ability of students to transfer credits between postsecondary institutions. In 2005, the Senate Health, Education, Labor, and Pensions Committee and the House Education and Workforce Committee requested that the Government Accountability Office (GAO) examine factors that influence the transferability of postsecondary credit. The GAO considered

- how postsecondary education institutions decide which credits to accept for transfer;
- how states and accrediting agencies facilitate the credit transfer process; and
- the implications for students and the federal government of students' inability to transfer credits (GAO 2005).

More recently, the Higher Education Opportunity Act of 2008 required institutions participating in Title IV student aid programs to disclose additional information about their policies surrounding the transfer of credit. The Act states

> Each institution of higher education participating in any program under [Title IV] shall publicly disclose, in a readable and comprehensible manner, the transfer of credit policies established by the institution which shall include a statement of the institution's current transfer of credit policies that includes, at a minimum—(A) any established criteria the institution uses regarding the transfer of credit earned at another institution of higher education; and (B) a list of institutions of higher education with which the institution has established an articulation agreement.

Given that policymakers have identified the transfer of credit as an issue of interest, this report examines how often, and under what conditions, postsecondary institutions accept the transfer of credits earned by students at other institutions. Using transcript data from the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), this report addresses the following questions:

- How often do members of a cohort of beginning college students transfer or coenroll between postsecondary education institutions during their undergraduate years?

- How often, and in what amounts, do credits transfer when students move from one institution to another?
- What characteristics of institutions (i.e., control, level, accreditation, and selectivity) and students (i.e., grade point average [GPA] and degree/award level of program) are related to credit transfer?

This report addresses these questions in three chapters. Chapter 1 addresses the first two research questions, providing nationally representative estimates of the number of undergraduate students who transferred from their first institution and whether the credits they earned were transferred to destination institutions. Chapter 2 documents the relationship between selected student or institutional characteristics and credit transfer. Specifically, it provides tables on credit transfer by the following factors:

- academic performance, as measured by GPA;
- type of undergraduate credential sought (i.e., certificate, associate's degree, bachelor's degree);
- the institutional control (i.e., public/private) of origin and destination institutions;
- the predominant degree level awarded by origin and destination institutions;
- the accreditation status of origin and destination institutions; and
- the selectivity of origin and destination institutions.

Definitions for each variable can be found in appendix A.

Finally, because credit transfer may be associated with these student and institutional characteristics in combination, chapter 3 reports the results of a multivariate analysis designed to control for these variables' joint associations with credit transfer.

Background

Approximately 32 percent of first-time students in the 2003–04 academic year transferred at some point within 6 years of their first enrollment (Staklis, Bersudskaya, and Horn 2011). Within this same cohort, approximately 9 percent of bachelor's degree-seeking students starting at a public or private nonprofit 4-year institution, and 8 percent of students starting at a public 2-year institution were coenrolled (Wang and McCready 2013). While a sizeable minority of students transfer or coenroll between institutions, credits earned at one institution may not move with them to the other. To address this loss of credits, institutions, as well as state and federal governments, have created policies designed to facilitate the transfer of credit. Institutions, for example, have developed articulation agreements with other institutions to ensure the joint recognition of credits. The federal government has attempted to facilitate the transfer process by requiring institutions to post the criteria that are used for determining whether credits are transferred (GAO 2005).

Finally, states have enacted a variety of laws and regulations to increase the ease and efficiency with which students can transfer credits from one institution to another. Examples include

- statewide common course numbering systems;
- statewide articulation agreements between public institutions;
- standardized general education requirements;
- mandated acceptance of transfer credit for specific courses; and
- policies or guidelines to improve the transfer of credit (GAO 2005, pp. 28–34).

Even with these interventions, when students transfer from one institution to another, credits earned at the first institution may not move with them.

Limited information is available about why these initiatives are not successful. While the academic literature on student transfer has examined factors that may be related to moving from one institution to another or the persistence/attainment of transfer students, few studies are available that examine the transfer of credits (Roksa and Keith 2008). While not directly focused on credit transfer, research studies that focus on student transfer/coenrollment[1] (rather than credit transfer) do provide enough information to develop hypotheses on factors that may be related to credit transfer.

Direction of transfer or coenrollment. Many scholars (Bahr 2012; McCormick 1997, 2003; Peter and Forrest-Cataldi 2005; Goldrick-Rab 2006; Goldrick-Rab and Pfeffer 2009; Wang 2012) provide evidence that the direction of transfer is related to student success. On average, students who follow traditional transfer pathways from 2-year to 4-year institutions have better outcomes than other transfer students. Some researchers (Goldrick-Rab 2006; Goldrick-Rab and Pfeffer 2009; Wang 2012) observed that less advantaged students are more likely to use nontraditional pathways (e.g., from a 4-year institution to a 2-year institution), to their disadvantage. The results are similar for students who coenroll (Wang and Wickersham 2014). Credit transfer may be a contributing factor to these unfavorable outcomes because advanced courses from a 4-year institution may not be offered at the student's new 2-year institution. Transfer/coenrollment direction is examined in this report to understand if taking a nontraditional pathway is related to a higher loss of credits.

Institutional characteristics. Other studies have examined the relationship between institutional characteristics and student or credit transfer, such as selectivity (Dowd and Melguizo 2008; Dowd, Cheslock, and Melguizo 2008), the control/governance of

[1] Coenrollment refers overlapping periods of postsecondary enrollment at two or more institutions. It should not be confused with dual enrollment or overlapping dates of enrollment between a secondary school and postsecondary institution. See Wang and Wickersham (2014) for more information.

the institution, or its accreditation (GAO 2005). Dowd and Melguizo (2008) and Dowd, Cheslock, and Melguizo (2008) examined the relationship between selectivity and student transfer. They found that selective institutions typically have a lower proportion of low-socioeconomic-status (SES) students compared to other institutions. The analysis in chapter 3 includes selectivity to understand if a similar relationship exists between selectivity and the transfer of postsecondary credit.

Additionally, in a report issued in 2005, the GAO postulated that institutions were using accreditation status as a factor in determining what credits may transfer. The GAO concluded that institutions are not accepting credit from national (rather than regional) accreditors and that it may disproportionately impact credits originating from for-profit institutions. The GAO findings, however, have not been examined in the academic literature. The analysis in this report includes institutional accreditation and institutional control to address questions raised by the GAO.

Academic preparation. Academic preparation in high school (Melguizo 2009; Melguizo and Dowd 2009), academic performance in college (Graham and Dallam 1986; Diaz 1992; Hills 1965; Hughes and Graham 1992), academic intensity (Doyle 2009), and momentum (Doyle 2011) are also explored in the transfer literature. Across most studies, earlier academic success predicts student persistence and attainment among transfer students. The analysis in this report includes postsecondary academic variables immediately prior to transfer.

Risk factors for stopping or dropping out. Certain risk factors identified from previous BPS studies are indicators of leaving postsecondary education without attaining a degree or credential (Horn 1996; Berkner, He, and Cataldi 2002). Such factors include dependency status (dependent and independent), single parent status, responsibility for dependents, employment status, type of high school credential, and postsecondary attendance intensity in the first year. Such factors may predict transfer as well.

Type of academic program. The vocational focus of a community college program has also been investigated in the transfer literature (Brint and Karabel 1989, 1991; Deng 2006; Dougherty 1987, 1994; Roksa 2006) with mixed results. An examination of the type of academic program is limited in this report due to the limited information reported on transcripts.

The lack of availability of data on the transfer of academic credit has been a limitation of previous analyses (Roksa and Keith 2008). This statistical analysis report attempts to address this limitation in the literature by using nationally representative transcript data for first-time beginning students and examines the relationship between institutional and student characteristics and credit transfer to inform future policy discussions on this issue.

Data Sources

The analyses in this report use transcript data from the Postsecondary Education Transcript Study of 2009 (PETS:09), which is a component of the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09). BPS:04/09 followed a nationally representative sample of approximately 17,000 students who entered postsecondary education for the first time in the 2003–04 academic year for 6 years. During that time, students in the BPS:04/09 cohort attended more than 3,000 postsecondary institutions. The National Center for Education Statistics (NCES) collected transcripts through the 2008–09 academic year, creating a 6-year record of academic enrollment, including course-taking, credit accumulation, academic performance, and degree attainment.

The estimates presented in this report were generated using Stata/IC (version 13.1) with a restricted-use data file (publication numbers NCES 2012-243 [BPS:04/09 transcripts] and NCES 2011-244 [BPS:04/09 interview, derived variables, and administrative data]; see http://nces.ed.gov/pubsearch/licenses.asp for licensing information).[2]

BPS:04/09 sampling. The BPS:04/09 sample includes about 18,640 students representing the approximately 3.7 million students who began their postsecondary education in the 2003–04 academic year. BPS sample members were first identified in the 2004 National Postsecondary Student Aid Study (NPSAS), which employed a two-stage sampling design. In the first stage, NPSAS sampled institutions from the universe of all Title IV postsecondary education institutions. In the second stage, BPS sampled students from enrollment lists provided by sampled institutions. A total of 109,210 students were sampled from 1,630 postsecondary institutions. Of those, the study confirmed that 18,640 students were first-time beginners eligible for the BPS:04/09 sample.

Institution-Level Transcript Collection

NCES requested transcripts from all eligible postsecondary institutions attended by the BPS:04/09 sample members, including each sample member's NPSAS institution and any additional institutions attended as reported in the BPS:04/06 and BPS:04/09 interviews or noted on other transcripts collected during the study. The initial institution sample for the transcript collection included 3,100 separate institutions. Of those, 2 percent were ineligible because the institution had closed or because a

[2] The syntax used to generate the tables and statistics in this report can be found at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2014163.

sample member had enrolled in but never actually attended the institution. Of the remaining 3,030 institutions, approximately 2,620 (87 percent) provided transcripts for the cohort. Across the institution types represented, participation in the transcript collection ranged from 71 percent among private for-profit less-than-2-year institutions to 93 percent among public 4-year doctorate-granting institutions (see table 1).[3]

Table 1. Eligible institution participation in the BPS:04/09 Postsecondary Education Transcript Study (PETS) collection, by institution sector and degree level: 2009

Institution sector and degree level	Total eligible institutions	Institution-level participation[1]	
		Number	Percent
Total	**3,030**	**2,620**	**86.6**
Public			
Less-than-2-year	70	50	77.9
2-year	920	810	88.9
4-year non-doctorate-granting	300	270	90.4
4-year doctorate-granting	260	240	93.4
Private nonprofit			
2-year-or-less	90	80	85.9
4-year non-doctorate-granting	510	460	91.3
4-year doctorate granting	240	210	89.0
Private for-profit			
Less-than-2-year	260	180	70.5
2 years or more	390	310	78.4

[1] An institution was considered a participant if it provided a transcript for at least one student.
NOTE: Detail may not sum to totals because of rounding. Sixteen of the participating institutions are not represented in the institution type rows due to unknown institution type.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Postsecondary Student Aid Study (NPSAS:04) and 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Student-Level Transcript Collection

This study includes a complete set of transcripts for 87 percent of the BPS:04/09 sample, and at least one transcript for all but 8 percent of respondents (see table 2). Approximately 86 percent of the institutions that were originally sampled in the NPSAS study (from which the BPS cohort is derived) submitted transcripts. Data from nonresponding institutions were recovered using transcripts from responding institutions when a responding institution included information about a student's prior academic experiences. Therefore, item-level response rates are sometimes

[3] In other chapters of this report, institutional levels (i.e., less-than-2-year, 2-year, 4-year) were changed to reflect the predominant degree offered rather than the highest degree offered. The sampling stratum sectors used for the BPS:04/09 study do not adjust for the level variable to reflect the predominant degree offered at the institution.

higher than student-level response rates. A list of item-level response rates can be found in appendix B.

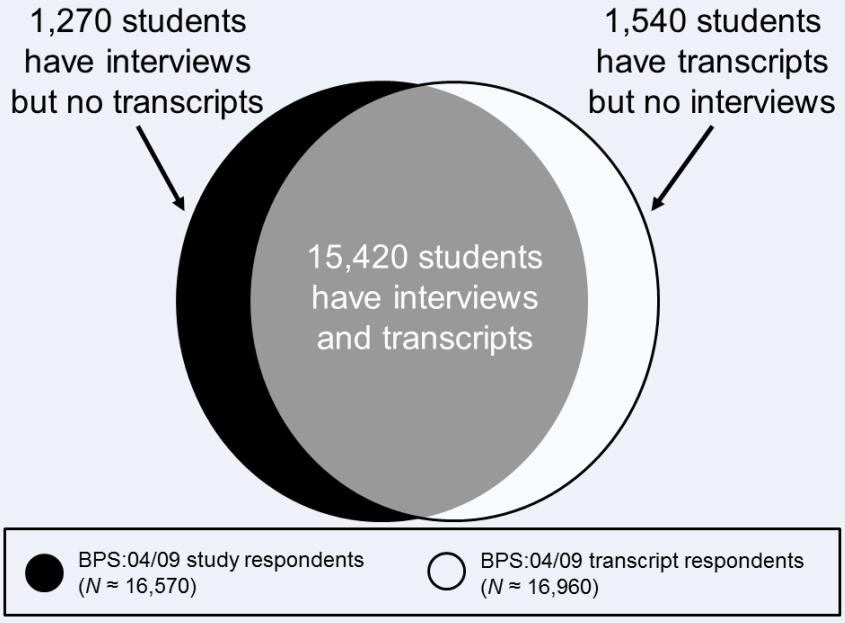
Table 2. Student-level transcript collection results: 2009

Student sample	Number	Percent
Total	18,640	100.0
Transcript respondents[1]	16,960	91.5
NPSAS transcript received	16,540	89.2
All student's transcripts received	16,110	86.9
Transcript nonrespondents	1,580	8.5

[1] A student was considered a transcript respondent if a transcript was received from one or more institutions.
NOTE: Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Postsecondary Student Aid Study (NPSAS:04) and 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

As shown in figure 1, not all BPS:04/09 sample members responded to the BPS student interview—and transcripts for BPS:04/09 sample members were not available from all sample members' institutions. Therefore, the subset of sample members who are considered BPS:04/09 study respondents does not overlap completely with the subset of sample members considered BPS:04/09 transcript respondents. This study uses all 16,960 students considered transcript respondents.

Figure 1. Overlap in BPS:04/09 respondent groups from the main study and the transcript collection



SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Postsecondary Student Aid Study (NPSAS:04) and 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Multi-Institutional Enrollment Patterns, Student Transfer, and Coenrollment

McCormick (2003) notes that student enrollment patterns can be very complicated. Many students do not attend postsecondary institutions sequentially and will enroll in multiple institutions at once. Students attend multiple institutions to test the feasibility of a future transfer, take courses not offered at their home institution, accelerate the time to degree completion, or enroll in two different degree programs at two institutions simultaneously. Enrollment can alternate between two institutions, overlap, or be sequential (McCormick 2003). These patterns are also embedded in the BPS transcript data (Wang and Wickersham 2014; Wang and McCready 2013). Wang and Wickersham (2014) observed overlapping dates of enrollment in the BPS transcript data for 8.7 percent of students starting at 4-year institutions (2.2 percent at another 4-year institution and 6.2 percent at a 2-year institution). Among baccalaureate-aspiring students starting at 2-year institutions, 7.7 percent were coenrolled (1.5 percent at other 2-year institutions and 6.2 percent at 4-year institutions) (p. 9). While coenrollment does occur in the BPS transcript dataset, these enrollments were not entirely simultaneous (e.g., the enrollment start and end dates across coenrolled institutions were not identical). For the purposes of this report, coenrollment refers to overlapping periods of enrollment.

While the type of multi-institutional enrollment pattern is important, credit transfer occurs regardless of the enrollment pattern. Because the focus of this report is credit transfer, the type of multi-institutional attendance was not disaggregated. Any reference to "student transfer" mentioned in this report includes students coenrolled at two or more institutions. For these coenrolled students, potential transfer opportunities and the direction of credit transfer are identified using the beginning and end dates of attendance at each institution to determine the order of attendance.

Definition of Key Terms

This report uses the following terms:

Transfer and/or Coenrollment Definitions

Student transfer/coenrollment. For students who attended more than one institution, "student transfer" or "student transfer/coenrollment" refers to the movement from one institution to another (with or without overlapping dates of enrollment). If a student returns to the original institution of attendance, the student is not considered to have transferred if the enrollment spell at the second institution

is less than 4 months (see incidental transfer). Credits need not transfer. This analysis does not disaggregate student transfer from coenrollment.

Credit hour. Typically, a credit hour refers to the unit of measure representing the equivalent of an hour (50 minutes) of instruction per week over the entire term of a semester system. It is applied toward the total number of credit hours needed for completing the requirements of a degree, diploma, certificate, or other formal award. For this study, the credit hour is dependent on how institutions implemented the measure. All course units on transcripts were normalized to reflect semester credits. Values for clock-hour institutions were divided by 37.5, and quarter-hour institutions were multiplied by two-thirds, so that all respondents had credit values on the same scale. Institutions that had unusual course unit systems were evaluated on a case-by-case basis.

Credit transfer. For students who attended more than one institution, "credit transfer" refers to the recognition of credits earned at a prior institution by a second (or subsequent) institution of attendance. Unless explicitly stated, noncourse credits, credits awarded for experience in the workforce, or credits awarded for examination are not included in credit transfers. Remedial courses are included in the calculation of credits transferred if credit was awarded by the origin institution.[4]

Incidental transfer/coenrollment. For students who attended more than one institution, "incidental transfer" refers to an enrollment spell of less than 4 months at a second (or subsequent) institution of attendance with a return to the origin institution. Unless noted in the table notes, incidental transfers are not included as transfer events.

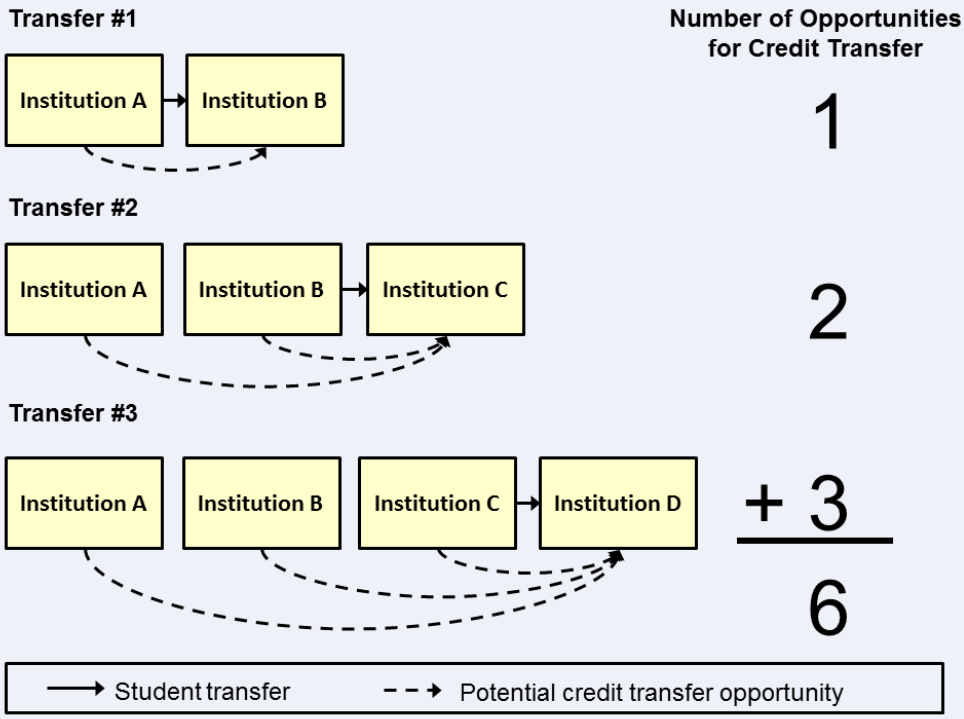
First student transfer/coenrollment or "first transfer." Unless noted in the table notes, this refers to the first known time a student moves from one institution to another based on the first date of attendance. Most analyses in this report are based exclusively on students' first transfer/coenrollment.

Credit transfer opportunities. A potential transfer credit opportunity is a potential opportunity for credits to move between institutions as a result of a student attending multiple institutions. Potential transfer opportunities are identified using the beginning and end dates of attendance at each institution. The more institutions a student attends, the more institution-institution relationships can be established,

[4] There are differences across institutions in classifying remedial courses. It is possible for a remedial course to have credit associated with it if it is defined and coded as remedial in the College Course Map used in the transcript collection but not by the origin institution.

thus leading to more potential transfer opportunities. For example, a student who transfers three times with no overlapping dates of attendance, as shown in figure 2, has six potential transfer opportunities.[5]

Figure 2. Illustration of relationship between student transfer and credit transfer opportunities for a single student



The first opportunity for credit transfer is from institution A to institution B; the second and third are A to C and B to C respectively. The three additional opportunities to transfer credit are from A to D, B to D, and C to D. With each additional student transfer, the number of credit transfer opportunities increases.

For students who are coenrolled, potential transfer opportunities and the direction of credit transfer are identified using the beginning and end dates of attendance at each institution to determine the order of attendance.

[5] Credit transfer opportunities for students who are coenrolled are identified using the last date of attendance at each respective institution. For example, if a student was coenrolled at Institution A and Institution B from September through December of 2004, then continues enrollment at Institution B through May of 2005, this study would identify a credit transfer opportunity from Institution A to Institution B.

Institution Definitions

Origin or sending institution. For each student/credit transfer, the origin or sending institution is the institution from which student and credits transfer.

Destination or receiving institution. For each student/credit transfer, the destination or receiving institution is the institution to which the student and credits transfer.

Transfer Direction Definitions

Vertical transfer. This is a student transfer or coenrollment from a lower institutional level to a higher institutional level, such as from a 2-year institution to a 4-year institution (Bradburn and Hurst 2001). Townsend and Dever (1999) also refer to vertical transfer as a *traditional transfer pattern*.

Horizontal or lateral transfer. This means a student transfer or coenrollment to the same institutional level as the origin institution, such as from a 2-year institution to another 2-year institution or from a 4-year to another 4-year institution.

Reverse transfer. This means a student transfer or coenrollment from a higher institutional level to a lower institutional level, such as from a 4-year institution to a 2-year institution (Townsend and Dever 1999).

Statistical Comparisons

The BPS:04/09 data used for the analyses in this report are from a sample survey with a complex sample design. In the case of the BPS study, a sample of 18,640 students was selected to represent the 3.7 million first-time beginning undergraduate students in Title IV postsecondary institutions in academic year 2003–04. The practice of selecting a sample versus selecting all students introduces statistical uncertainty about how accurately the sample represents the population at large. Data from samples can provide only an approximation of the true or actual value. The uncertainty associated with the approximation must be considered when reporting estimates or making comparisons. This uncertainty surrounding the estimate, or range of potential true or actual values, depends on several factors:

- the amount of variation in the responses;
- the size of the sample;
- the representativeness of the sample; and
- the size of the subgroup for which the estimate is computed.

The magnitude of this uncertainty is measured by the "standard error" of an estimate. When statistics from surveys with complex sample designs are reported, the standard error may be calculated for each estimate using balanced repeated replication (BRR) weights.[6] The standard error of the estimate is used in statistical tests to determine the probability that differences between estimates (such as means and percentages) exist. Due to the large sample size in BPS and the large number of planned comparisons, a conservative threshold ($p < .01$) was established to determine statistical significance. This means the probability that the difference occurred by chance is less than 1 percent.[7]

Statistical significance testing supports all statements about differences in this report. When estimates are from a sample, it is important to exercise caution in drawing conclusions about the differences between estimates. Although one estimate may appear to be larger than another, a statistical test may find that the apparent difference between them is not reliably measurable due to the uncertainty around the estimates. In this case, the estimates will be described as having *no measurable difference,* meaning that the difference between them is not statistically significant. To determine whether differences are statistically significant, this report uses the Wald test at the .01 level when comparing means, and the chi-squared test at the .01 level when comparing proportions.[8]

The appearance of a "!" symbol (meaning "interpret data with caution") in a table or figure indicates that a data cell has a high ratio between the standard error and the point estimate (i.e., the coefficient of variation is greater than or equal to .30 but less than .50); the reader should use caution when interpreting such data. These estimates are still discussed, however, when statistically significant differences are found despite large standard errors. The appearance of a "‡" symbol (meaning "reporting standards not met") indicates a data cell that is suppressed either due to a coefficient of variation that is greater than or equal to .50 or because there are too few respondents to meet reporting standards. The appearance of an asterisk (*) in a table indicates that a group is statistically different from the reference group in italics.

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[6] The standard errors for all estimated totals, means, and percentages in this report can be found in appendix C.

[7] Because all subgroup comparisons were planned *a priori*, statistical tests reported here are not adjusted for multiple comparisons. Instead, a more conservative probability threshold ($p < .01$) was used for all tests.

[8] See the technical notes in appendix B.

Disproportionate Transfer/Coenrollment Rates and the Impact on Data Analysis

The purpose of this section is to describe how the rate of credit and student movement between institutions can limit data analysis. Table 3 displays the descriptive statistics of all potential opportunities for credit transfer in the sample, including those beyond a student's first transfer. The majority of credit transfer opportunities are from public institutions to other public institutions (64 percent). By adjusted level,[9] the largest transfer pattern is vertical, from 2-year to 4-year (37 percent). This is followed by two lateral patterns: (1) 4-year to 4-year (22 percent) and (2) 2-year to 2-year (21 percent). By adjusted sector, most (55.6 percent) credit transfer opportunities come from public 2-year colleges, with 26 percent of all credit transfer opportunities going to public 4-year institutions, 17 percent going to other public 2-year institutions, 8 percent to 4-year private nonprofit institutions, and 4 percent to other institutions (4 percent is not shown in table 3).

Table 3. Among first-time beginning undergraduate students in 2003–04 who transferred/coenrolled, the percentage distribution and number of all potential transfer opportunities, by control, level, sector, and accreditation relationship: 2003–04 to 2008–09

Institution relationship	Percent of transfer opportunities	Number of transfer/coenrollment events (thousands)
Total	**100.0**	**2,604**
Control		
Public to public	64.4	1,680
Public to private nonprofit	13.3	347
Public to private for-profit	4.3	113
Private nonprofit to public	9.4	245
Private nonprofit to private nonprofit	3.1	81
Private nonprofit to private for-profit	0.5	13
Private for-profit to public	3.0	78
Private for-profit to private nonprofit	0.4	11
Private for-profit to private for-profit	1.6	41

See notes at end of table.

[9] Institutions that were classified as 4-year institutions in the Integrated Postsecondary Education Data System (IPEDS) but with a majority of degrees at the associate's level were reclassified in the 2-year sector equivalent using the institutional category (INSTCAT) variable in the IPEDS data center. Approximately 6 percent of institutions were reclassified. This report uses the terms "adjusted level" and "adjusted sector" so that users can distinguish the INSTCAT adjusted level or sector from the LEVEL and SECTOR variables in IPEDS.

Table 3. Among first-time beginning undergraduate students in 2003–04 who transferred/coenrolled, the percentage distribution and number of all potential transfer opportunities, by control, level, sector, and accreditation relationship: 2003–04 to 2008–09—Continued

Institution relationship	Percent of transfer opportunities	Number of transfer/coenrollment events (thousands)
Adjusted level		
4-year to 4-year	22.4	584
4-year to 2-year	16.7	436
2-year to 4-year	37.2	969
2-year to 2-year	21.1	550
All others to/from less-than-2-year	2.7	70
Adjusted sector		
4-year public to 4-year public	10.1	263
4-year public to 2-year public	11.0	287
4-year public to 4-year private nonprofit	4.0	105
4-year private nonprofit to 4-year public	4.3	112
4-year private nonprofit to 2-year public	4.2	110
4-year private nonprofit to 4-year private nonprofit	2.8	74
4-year private for-profit to other institution	1.3	34
2-year public to 4-year public	25.8	674
2-year public to 2-year public	17.1	446
2-year public to 4-year private nonprofit	8.4	220
2-year private for-profit to other institution	2.4	63
Other institution combination	8.4	220
Adjusted sector (origin institutions)		
4-year public to all others	26.2	683
4-year private nonprofit to all others	11.9	310
4-year private for-profit to all others	1.3	34
2-year public to all others	55.6	1,450
Less-than-4-year private nonprofit all others	1.1	29
2-year private for-profit all others	2.4	63
Less-than-2-year public to all others	0.3	8
Less-than-2-year private for-profit to all others	1.3	33
Accreditation		
Regional to regional	92.5	2,333
Regional to national	3.1	79
National to regional	3.3	82
National to national	1.0	25
Other accreditation relationship	‡	‡

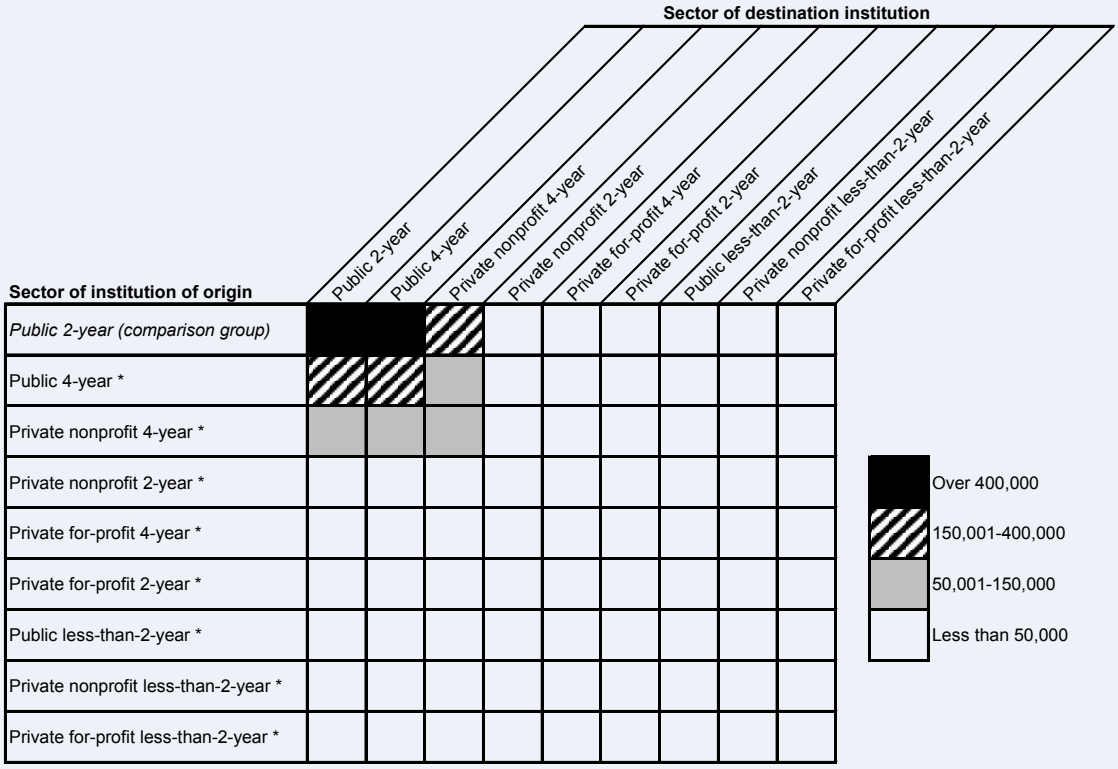
‡ Reporting standards not met. Either there are too few cases or the relative standard error for the estimate is 50 percent or greater.
NOTE: Detail may not sum to totals because of rounding. This table includes all transfer events and may include multiple transfer opportunities per student. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Institutions that offer 4-year degrees but are predominantly associate's degree-granting institutions were classified as 2-year. The term "adjusted level" is used so that users can distinguish the INSTCAT adjusted level from the LEVEL variable in the Integrated Postsecondary Education Data System (IPEDS). The term "adjusted sector" is used to note differences by the sector variable as well.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

By accreditation status,[10] 93 percent of the potential transfer opportunities occurred from regionally accredited institutions to other regionally accredited institutions, while the remaining 6 percent occurred from regionally to nationally accredited institutions or in reverse. Incidental transfers (that is, transfers of less than 4 months) are not included in this analysis.

Figure 3 displays a heat map of the potential opportunities for credit transfer by sector. A heat map is a visual representation of the frequencies in the data. As shown in figure 3 and table 3, public 2-year institutions produce the most opportunities for credit transfer to other institutions, with the highest volume of transfers to public 4-year institutions (674,000 potential opportunities for credit transfer) and other public 2-year institutions (446,000 potential transfer opportunities). Altogether, public 2-year institutions make up more than 1.4 million of the 2.6 million potential transfer opportunities to other institutions. Private for-profit institutions constitute a small share of transfer opportunities, with less than 150,000 transfer events. Public 4-year and private nonprofit 4-year institutions make up a large share of credit transfer opportunities to other institutions (683,000 and 310,000, respectively) than the other sector relationships, but they do not approach the volume of public 2-year institutions.

[10] "Accredited" postsecondary institutions are approved by an organization that establishes operating standards for educational or professional institutions and programs. The accreditation relationship distinguishes between whether institutions have recognition from a regional accrediting body or national accrediting body. Regional accrediting organizations include: Middle States Association of Colleges and Schools (Middle States Commission on Higher Education); New England Association of Schools and Colleges (Commission on Institutions of Higher Education); North Central Association of Colleges and Schools (The Higher Learning Commission); Southern Association of Colleges and Schools (Commission on Colleges); and Western Association of Schools and Colleges (Accrediting Commission for Community and Junior Colleges and Accrediting Commission for Senior Colleges and Universities). Postsecondary education institutions that are both regionally and nationally accredited are classified as regionally accredited.

Figure 3. First-time beginning undergraduate students in 2003–04 who transferred to/coenrolled in another institution: Number of credit transfer opportunities, by sector: 2003–04 to 2008–09

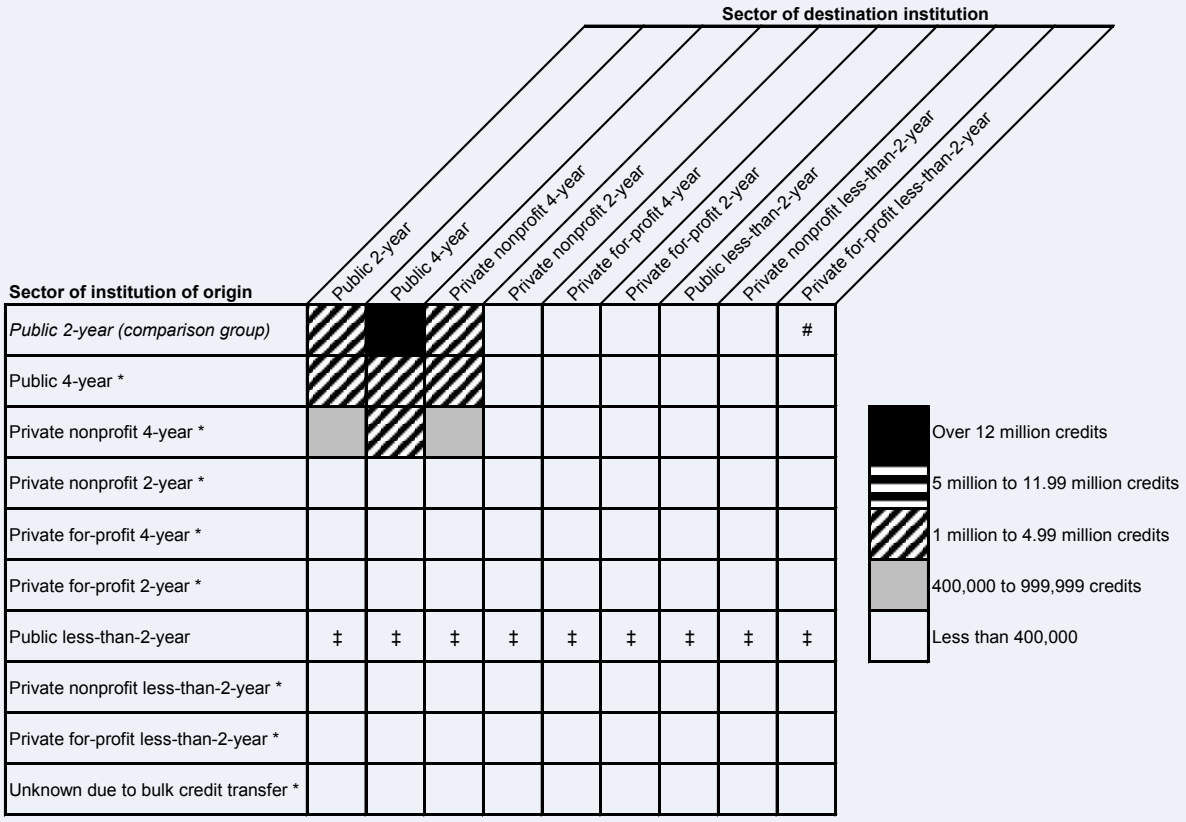


* Estimate is significantly different from the comparison group shown in italics ($p < .01$).
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09) Postsecondary Education Transcript Study (PETS).

The count of actual credits transferred shows a pattern similar to credit transfer opportunities. Figure 4 shows that the volume of credits transferred from public 2-year institutions (19.1 million)[11] exceeds that of all other sectors combined. Even when all other sector relationships are combined (10.9 million credits transferring), the combined transfer credit volume is less than that from public 2-year institutions. The greatest movement of credits, 13.6 million from public 2-year to public 4-year, is statistically different from the other sector combinations. For-profit institutions account for fewer credit transfers than public 2-year institutions, with 126,000 credits transferring out of for-profit 4-year institutions and 175,000 transferring out of profit 2-year institutions. Regardless of control, less-than-2-year institutions had the lowest transfer credit volume.

[11] See table C-4 in appendix C for the values that were used to populate the heat map in figure 3.

Figure 4. First-time beginning undergraduate students in 2003–04 who transferred to/coenrolled in another institution: Volume of credit transfers, by sector: 2003–04 to 2008–09



Estimate averages to zero.
‡ Does not meet reporting standards.
* Estimate is significantly different from the comparison group shown in italics ($p < .01$).
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09) Postsecondary Education Transcript Study (PETS).

The uneven distribution across sectors of transfer events and of credits transferred presents some challenges when attempting to better understand the relationship between credit transfer and institutional characteristics. This limitation, and others of note, is described in detail below.

Limitations

Readers should keep in mind the following limitations when considering the results of this analysis:

- **Low sample sizes for some subgroups lead to loss of precision in estimation:** Because of the relatively small number of student transfers/coenrollments from certain types of institutions (e.g., for-profit institutions), this analysis cannot examine credit transfer from these types of institutions in as much detail as it does for types of institutions where student transfers are more numerous (e.g., public 2-year institutions).
- **Inability to determine why credits do not transfer:** Data from this study cannot identify why credits do not transfer. Specifically, transcript data do not show whether credits did not transfer because an institution determined the credits to be irrelevant to the program of study or of unsatisfactory quality, or because a student never informed the institution of previous attendance. The statistical model used in this paper is specifically designed to address this limitation.
- **Inability to comprehensively determine which credits come from which institutions:** A number of institutions do not itemize credits transferred into the institution, and it is therefore not always possible to identify which credits come from which institutions. This limitation is mitigated because the majority of student who transfer or coenroll do so only once. For students who transfer or coenroll in multiple institutions, this analysis includes only the student's first transfer/coenrollment. Because student transcripts do not consistently identify the origin of transfer credits for students with multiple transfer records, all analyses focus on students' first transfer experiences unless otherwise noted.[12] This restriction allows for the examination of the relationship between credit transfer and the institutional characteristics of the origin and destination institutions.[13]

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[12] Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred (defined as an "incidental transfer" in this report). Incidental transfer is not counted when determining the student's "first transfer."

[13] For about 67 percent of the students who transferred, the first transfer is the only time they transferred between institutions. For 33 percent of the students who transferred, this analysis does not take into account their subsequent institutional movements. Appendix D includes information comparing students who transferred once to students who transferred multiple times given the information that is lost from subsequent transfer activity. Because the analysis is using the first known transfer activity, students who transferred multiple times are still included in the analysis.

- **Key information not consistently included on transcripts, and therefore unavailable for analysis:** Transcripts inconsistently report information that may be of high analytic interest to researchers. Examples include academic factors (e.g., change in major, number of credits earned in high school, etc.), relationship between institutions (e.g., institutional enrollment agreements, articulation agreements, etc.), course attributes/classifications (e.g., honors, capstone, co-op, field work, independent study, internship, research, independent study, vocational, etc.), and academic actions (e.g., academic warning, academic probation, dean's list, honor roll, President's list, Chancellor's list, etc.). See chapter 3 for more information on how this limitation impacts the multivariate analysis.
- **Information on student intent to transfer:** The analysis cannot determine whether a student who intended to transfer was discouraged from doing so based on misinformation or other reasons and, therefore, made no attempt to do so.
- **Transcript data are not imputed:** Transcript data are not imputed for item nonresponse as was done for the BPS:04/09 student interview. A missing case analysis was conducted to ensure that cases dropped from the regression analysis are representative of the population.

Despite these limitations, this report is able to yield reliable estimates about credit movement for most of the transfer/coenrollment events of first-time beginning undergraduate students. Additionally, this analysis is able to examine many policy-relevant factors that are of high interest to researchers and policymakers related to the transfer of credits between postsecondary institutions. Finally, multivariate statistical techniques are used to account for a student's intent to transfer even though that information was never collected in the student interview.

The following sections of this report examine the volume of student and credit transfer, bivariate relationships between student and institutional characteristics on credit transfer, and the joint effects of these characteristics on credit transfer.

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Chapter 1. Frequency of Student and Credit Transfer

How often do members of a cohort of beginning college students transfer or coenroll between postsecondary education institutions during their undergraduate years?

How often, and in what amounts, do credits transfer when students move from one institution to another?

This chapter provides descriptive statistics on the frequencies of student transfer/coenrollment (i.e., multi-institutional postsecondary attendance) and credit transfer (i.e., the recognition of credits by a postsecondary institution that are applied toward a degree or certificate as a result of postsecondary coursework taken prior to enrollment). Due to limitations in determining the transfer of credits to multiple institutions of attendance, this chapter focuses primarily on students' first transfer or coenrollment.

Student Transfer/Coenrollment

While 65 percent of first-time beginning students in 2003–04 attended only one institution, the remaining 35 percent transferred or simultaneously enrolled at multiple institutions at some point within 6 years of entering postsecondary education (table 4). Among those students who transferred, the majority of students transferred or coenrolled just once (68 percent). Only 9 percent of students who transferred or coenrolled attended four or more institutions (9 percent calculated from table 4).

Table 4. Among first-time beginning undergraduate students in 2003–04, the percentage of students attending multiple institutions, by transfer status: 2003–04 to 2008–09

Number of known institutions attended	All students	Students who transferred or coenrolled
One	65.4	†
Two	23.4	67.5
Three	8.2	23.7
Four	2.3	6.6
Five or more	0.8	2.2

† Not applicable.
NOTE: Detail may not sum to totals because of rounding. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. These students are classified as having attended one institution.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

As shown in table 5, students transferring from public 2-year institutions made up a higher percentage of transfer students than those transferring from all other sectors except private, nonprofit less-than-4-year. The highest percentages of students transferring or coenrolling were students who began in

- public 2-year institutions (42 percent of students transferring/coenrolling [42 percent is derived from table 5]);
- private nonprofit less-than-4-year institutions (41 percent of students transferring/coenrolling [41 percent is derived from table 5]); and
- private nonprofit 4-year and public 4-year institutions (33 percent of students transferring/coenrolling [33 percent is derived from table 5]).

The lowest percentages of students transferring or coenrolling were students who began in

- public less-than-2-year institutions (16 percent of students transferring/coenrolling [16 percent is derived from table 5]);
- private for-profit less-than-4-year institutions (16 percent of students transferring/coenrolling [16 percent is derived from table 5]); and
- private for-profit 4-year institutions (11 percent of students transferring/coenrolling [11 percent is derived from table 5]).

Differences in transfer rates by control and level are explored later in this report.

Table 5. Number and percentage distribution of first-time beginning undergraduate students in 2003–04, by transfer/coenrollment status within sector: 2003–04 to 2008–09

Adjusted sector of first institution of attendance	Total students (thousands)	Attended one institution or returned to origin in less than 4 months	Attended multiple institutions		
		No student transfer or coenrollment	One transfer/co-enrollment	Two or more transfers/co-enrollments	Unable to determine number
Total	**3,614.0**	**65.4**	**21.4**	**10.5**	**2.7**
Public 4-year	864.4	66.7 *	18.4	12.7	2.3
Public 2-year (comparison group)	1,686.3	58.2	26.9	11.8	3.1
Public less-than-2-year	34.4	84.0 *	11.4!	‡	‡
Private nonprofit 4-year	407.6	67.3 *	18.0	11.2	3.5
Private nonprofit less-than-4-year	30.7	59.2	28.6	9.9!	‡
Private for-profit 4-year	132.9	88.8 *	8.2!	‡	‡
Private for-profit less-than-4-year	359.9	83.8 *	11.9	2.4	‡

! Unstable estimate (relative standard error for estimate exceeds 30 percent).
‡ Reporting standards not met. Either there are too few cases or the relative standard error for the estimate is 50 percent or greater.
* Estimate is significantly different from the students at public 2-year institutions, shown in italics ($p < .01$).
NOTE: Detail may not sum to totals because of rounding. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Institutions that offer 4-year degrees but are predominantly associate's institutions were classified as 2-year. The term "adjusted level" is used so that users can distinguish the INSTCAT adjusted level from the LEVEL variable in the Integrated Postsecondary Education Data System (IPEDS). The term "adjusted sector" is used to note differences by the sector variable as well.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Credit Transfer

For the subset of students who elected to move from one postsecondary institution to another, credit transfer was not guaranteed. As shown in table 6, on average students lost 13 credits as a result of their first transfer or coenrollment. For about 39 percent of students, no credits transferred between the origin and first destination institution, with an average loss of 27 earned credits. Almost a third of students transferred all the credits they had earned at their origin institution to their first destination institution, retaining an average of 24 credits.

Table 6. Among first-time beginning undergraduate students in 2003–04 who transferred to/coenrolled in another institution, the mean number of credits earned at origin institution, transferred to destination, and the difference between credits earned and transferred during the first transfer, by volume of credits transferred

Credits transferred	Total students percent[1]	Total credits per student		
		Earned at origin institution	Transferred to destination institution	Difference between credits earned and transferred
Total	**100.0**	**29.6**	**16.9**	**12.7**
No credits transferred	39.4	26.6	#	26.6
Some credits transferred	28.2	46.3	33.4	12.9
All credits transferred	32.4	24.2	24.2	#

Estimate rounds to zero.
[1] Percentages in this table do not match other similar estimates in this publication due to the removal of cases with missing values for either credits earned at the origin institution and/or credits transferred to the destination institution (both were used to compute the difference between credits earned and transferred). See appendix B and table B-3 for more information.
NOTE: Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Postsecondary Education Transcript Study (PETS): 2008–09 (Beginning Postsecondary Students Longitudinal Study 2004/09 Component).

As noted earlier, at least some credit loss may be due to students' failure to advise their destination institution of prior academic work. While the magnitude of this effect is difficult to quantify, there was at least some evidence to suggest it was not trivial. For example, Cominole et al. (2006) reported that almost 31 percent of students identified by institutions as first-time beginners during sampling for the base year of BPS:04/09 actually had prior postsecondary enrollment. Either these students never informed the sampled NPSAS institution of prior enrollment or these institutions did not have mechanisms in place to capture such information.

Conclusion

Here are key findings from this chapter:

- A large minority of students attended more than one institution. Approximately 65 percent of all postsecondary students attended only one institution, 21 percent transferred once, and an additional 11 percent transferred more than once.
- Of the students who did transfer, approximately 39 percent transferred no credits, 28 percent transferred some credits, and 32 percent transferred all previously earned credits in the first transfer. On average, students lost approximately 13 credits following the first transfer.

Chapter 2. Relationship Between Credit Transfer and Characteristics of Institutions and Students

What characteristics of institutions (i.e., control, level, accreditation, and selectivity) and students (i.e., GPA and degree/award level of program) are related to credit transfer?

This chapter examines institutional and student factors related to the transfer of credit. The first part of the chapter examines credit transfer by select institutional characteristics including control, level, sector, and accreditation status. The second part focuses on the relationship between student enrollment characteristics and credit transfer, including academic performance and degree program. Because student and institutional characteristics may jointly impact credit transfer, the final chapter of the report describes the results of a multivariate analysis on the joint effects of the comparisons made in this chapter.

Transfer Activity by Type of Origin Institution

As shown in the previous chapter, student transfers/coenrollments were not proportionally distributed across institutional types. The majority of transfer activity observed in the BPS:04/09 sample was for students transferring from public 2-year institutions. Table 7 summarizes the transfer activity (both potential transfer opportunities and number of credits transferred) and is not limited to the student's first transfer (i.e., it includes all recorded potential transfer opportunities and credit transfers). The 1.4 million potential transfer opportunities and 19.1 million credits transferred from public 2-year institutions were (a) almost triple the volume of student and credit transfers from public 4-year institutions (683,000 transfer opportunities 7.0 million credits transferred); (b) more than five times greater than private nonprofit 4-year (310,000 transfer opportunities; 3.1 million credits transferred); and (c) greater than 10 times all remaining sectors, including for-profit institutions.

Because of these disproportionate transfer rates, factors that may influence the transfer of credit (such as the characteristics covered in this chapter) may affect some

groups of students more than others. The analysis of institutional sector, for example, should be viewed in light of the relatively high number of student transfers/coenrollments from public 2-year institutions and the low number of student transfers/coenrollments out of for-profit institutions. In tables 8 through 12, a column indicates the percentage of students in each group to provide context to the estimates.

Table 7. First-time beginning undergraduate students in 2003–04 who transferred or coenrolled: Number of credit transfer opportunities and credits, by sector: 2003–04 to 2008–09

Institution relationship	Number (thousands)
Number of credit transfer opportunities	
Public 4-year to all others	682.8*
Private nonprofit 4-year to all others	310.2*
Private for-profit 4-year to all others	34.0*
Public 2-year to all others (comparison group)	1,449.8
Private nonprofit less-than-4-year to all others	28.5*
Private for-profit 2-year to all others	63.5*
Public less-than-2-year to all others	7.5*
Private for-profit less-than-2-year to all others	32.9*
Number of credits transferred	
Public 4-year to all others	6,980.5*
Private nonprofit 4-year to all others	3,113.5*
Private for-profit 4-year to all others	125.7!*
Public 2-year to all others (comparison group)	19,079.3
Private nonprofit less-than-4-year to all others	337.8!*
Private for-profit 2-year to all others	175.1*
Public less-than-2-year to all others	‡
Private for-profit less-than-2-year to all others	0.3!*
Unknown origin due to bulk credit transfer	164.9*

! Unstable estimate (relative standard error for estimate exceeds 30 percent).
‡ Reporting standards not met. Either there are too few cases or the relative standard error for the estimate is 50 percent or greater.
* Estimate is significantly different from the comparison group shown in italics ($p < .01$).
NOTE: This table includes all transfer events and may include multiple transfer events per student. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Institutions that offer 4-year degrees but are predominantly associate's institutions were classified as 2-year. The term "adjusted level" is used so users can distinguish the INSTCAT adjusted level from the LEVEL variable in the Integrated Postsecondary Education Data System (IPEDS). The term "adjusted sector" is used to note differences by the sector variable as well.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Characteristics of Origin Institutions and the Transfer of Credit

As noted in table 6, two-thirds of students experienced some credit loss during their first transfer. This chapter explores the relationship between credit transfer and characteristics of students' origin and destination institutions. Specifically, the analysis focuses on the relationship between institutional characteristics and (a) the proportion of students for whom no credits transferred from their institution of origin to their destination institution, and (b) the number of credits lost during the first transfer or coenrollment. The variables selected for this analysis are consistent with the literature on student transfer.[14] *A priori*, the analysis is based on the hypothesis that institutional characteristics were unrelated to both outcomes.

Institutional Control

To begin exploring the relationship between the loss of credits and institutional characteristics, tables 8 and 9 separate students into groups representing the relationship between the control[15] of students' origin and destination institutions. Seven groups were formed:

- public institutions to (1) other public institutions, (2) nonprofit institutions, and (3) for-profit institutions;
- nonprofit institutions to (4) public institutions, (5) other nonprofit institutions, and (6) for-profit institutions; and
- because of the small number of students transferring from for-profit institutions, (7) for-profit institutions to any other types of institutions.

Two statistical tests were used in this (and subsequent) chapters to explore the relationship between student or institutional characteristics and transfer of credit outcomes. One test examined differences in the percentages of students for whom no credits transferred between their origin and destination institutions, and another test was used to determine if there were differences in the number of credits lost during the first transfer or coenrollment.

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[14] These variables are consistent with the literature on student transfer, especially about the effect of institutional level on transfer (Bradburn and Hurst 2001; Townsend and Dever 1999; de los Santos and Wright 1990). Institutional characteristics are also explored in other studies when examining other factors such as socioeconomic status, academic preparation, and curricula in the context of institutional characteristics (Cabrera, Burkum, and La Nasa 2005; Freeman, Conley, and Brooks 2006; Goldrick-Rab 2006; Goldrick-Rab and Pfeffer 2009; Li 2010). In addition to the literature, the inclusion of control, selectivity, and accreditation status in this analysis is a result of federal policymakers seeking to identify efficiencies in the credit transfer process regardless of different institutional contexts (GAO 2005).

[15] Institutional control is the classification of whether an institution is operated by publicly elected or appointed officials and derives its major source of funds from public sources (public control) or by privately elected or appointed officials and derives its major source of funds from private sources (private control).

Table 8. Among first-time beginning undergraduate students in 2003–04 who transferred or coenrolled, the percentage distribution of transfer students and the percentage of students with no credits transferred, by control, level, and sector relationship: 2003–04 to 2008–09

Institution relationship	Total transfer or coenrolled students (percent)	Transfer/coenrolled students with no credits transferring (percent)
Total	**100.0**	**41.4**
Control relationship		
Public to public (comparison group)	62.0	38.1
Public to private nonprofit	14.3	25.7*
Public to private for-profit	5.4	68.5*
Private nonprofit to public	8.2	46.6
Private nonprofit to private nonprofit	3.4	30.6
Private nonprofit to private for-profit	0.4	‡
Private for-profit to all other control groups	6.3	83.0*
Adjusted level relationship		
4-year to 4-year	21.4	27.5*
4-year to 2-year	14.0	65.5*
2-year to 4-year (comparison group)	40.1	20.9
2-year to 2-year	20.4	67.6*
All others to/from less-than-2-year	4.1	96.5*
Adjusted sector relationship		
2-year public to 4-year public (comparison group)	27.9	19.3
2-year public to 2-year public	15.0	63.8*
4-year public to 4-year public	9.4	24.7
4-year public to 2-year public	8.9	63.6*
2-year public to 4-year private nonprofit	9.0	21.2*
4-year private nonprofit to 4-year public	3.9	22.5
4-year public to a 4-year private nonprofit	4.0	31.6
4-year private nonprofit to 2-year public	3.6	68.6
4-year private nonprofit to 4-year private nonprofit	3.0	31.2
Other institution to 4-year private for-profit	3.1	40.3
Other institution to 2-year private for-profit	3.4	88.9
Other institution combination	8.7	75.1

‡ Reporting standards not met. Either there are too few cases or the relative standard error for the estimate is 50 percent or greater.
* Estimate is significantly different from the comparison group shown in italics ($p < .01$).
NOTE: Detail may not sum to totals because of rounding. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit. Institutions that offer 4-year degrees but are predominantly associate's institutions were classified as 2-year. Institutions that offer 4-year degrees but are predominantly associate's institutions were classified as 2-year. The term "adjusted level" is used so that users can distinguish the INSTCAT adjusted level from the LEVEL variable in the Integrated Postsecondary Education Data System (IPEDS). The term "adjusted sector" is used to note differences by the sector variable as well.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Table 9. Among first-time beginning undergraduate students in 2003–04 who transferred or coenrolled, the average credits earned at the origin institution, the average credits accepted at the first transfer destination institution, and the difference between the credits earned and transferred, by control, level, and sector: 2003–04 to 2008–09

Institution relationship	Total credits		Difference between credits earned and transferred
	Earned at origin institution	Transferred to destination institution	
Total	**29.6**	**16.9**	**12.7**
Control relationship			
Public to public (comparison group)	31.3	19.6	11.7
Public to private nonprofit	25.6	17.1	8.5
Public to private for-profit	19.6	5.2	14.4
Private nonprofit to public	32.8	15.3	17.6*
Private nonprofit to private nonprofit	34.0	16.2	17.8
Private nonprofit to private for-profit	24.5	6.9!	17.6
Private for-profit to public	27.0	1.9!	25.1
Private for-profit to private nonprofit	‡	‡	‡
Private for-profit to private for-profit	20.9	3.7!	17.2
Adjusted level relationship			
4-year to 4-year	32.0	21.4	10.6
4-year to 2-year	28.1	6.1	22.1*
2-year to 4-year (comparison group)	34.7	26.5	8.2
2-year to 2-year	20.8	5.7	15.1*
All others to/from less-than-2-year	18.8	‡	17.2
Adjusted sector relationship			
2-year public to 4-year public (comparison group)	37.7	30.1	7.6
2-year public to 2-year public	20.7	6.7	14.0*
4-year public to a 4-year public	35.5	26.2	9.3
4-year public to a 2-year public	27.2	6.3	21.0*
2-year public to a 4-year private nonprofit	28.0	20.0	8.0
4-year private nonprofit to a 4-year public	35.7	25.0	10.7
4-year public to a 4-year private nonprofit	20.4	13.0	7.4
4-year private nonprofit to a 2-year public	31.3	6.8	24.5*
4-year private nonprofit to a 4-year private nonprofit	34.0	15.9	18.1
Other institution to 4-year private for-profit	24.5	11.9	12.6
Other institution to 2-year private for-profit	19.4	1.4!	18.0*
Other institution combination	24.1	5.4	18.7

! Unstable estimate (relative standard error for estimate exceeds 30 percent).
‡ Reporting standards not met. Either there are too few cases or the relative standard error for the estimate is 50 percent or greater.
* Estimate is significantly different from the comparison group shown in italics ($p < .01$).
NOTE: Detail may not sum to totals because of rounding. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit. Institutions that offer 4-year degrees but are predominantly associate's institutions were classified as 2-year. The term "adjusted level" is used so that users can distinguish the INSTCAT adjusted level from the LEVEL variable in the Integrated Postsecondary Education Data System (IPEDS). The term "adjusted sector" is used to note differences by the sector variable as well.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

As shown in tables 8 and 9, differences exist by institutional control relationship and both (a) the possibility of credit transfer and (b) the number of credits lost among those transferring credits.

Proportion of students who transferred without credits. Across all institutional control groups, approximately 41 percent of students who transferred had no credits transfer to their destination institution. As shown in table 8, thirty-one percent of students transferring from private nonprofit to other private nonprofit institutions experienced no transfer of credit, while 83 percent of students transferring from private for-profit to all other control groups experienced no transfer of credit. More students transferred or coenrolled without credits transferring when students moved from public to private for-profit institutions and private for-profit to any other type of institution (69 percent and 83 percent respectively) when compared to students moving from public to other public institutions (38 percent). Finally, students moving from public institutions to private nonprofit institutions had a higher proportion of students transferring credits (74 percent; calculated from table 8) compared to students moving from public to public institutions.

Number of credits not transferred. On average, students lost 13 credits when transferring institutions. Students transferring from public to other public institutions lost just under one semester of coursework (12 credits), which is close to the average of 13 credits lost. This was fewer credits lost than for students transferring from private nonprofit to public institutions (18 credits). While credit loss for students transferring out of for-profit institutions ranged from 17 to 25 credits, there was no measurable difference when compared with students transferring from public to other public institutions. This is likely due to the large standard errors in the for-profit group.[16] On average, there was no detectable difference with the other institutional control groups and the public to public transfer students, with average credit loss ranging from 14 to 18 credits.

Adjusted Institution Level

To explore the relationship between credit loss and level (i.e., 4-year, 2-year, and less-than-2-year) of students' origin and destination institutions, five groups representing specific levels of relationship were formed: (1) 4-year to 4-year, (2) 4-year to 2-year,

[16] When the for-profit to public, for-profit to private nonprofit, and for-profit to for-profit groups are aggregated, the mean credit loss is 22 credits, and it is statistically different from public to public student transfers.

(3) 2-year to 4-year, (4) 2-year to 2-year, and (5) all others (e.g., less-than 2-year to 4-year).[17]

As shown in tables 8 and 9, credit transfer varied by institution level in (a) the possibility of credit transfer and (b) the difference between the number of credits earned at the origin institution and those transferred to the destination institution. The transfer pattern from a 2-year to a 4-year institution, the most commonly occurring level relationship, was set as the reference category to which all other relationships were compared.

Proportion of students who transferred without credits. All groups were statistically different from the 2-year to 4-year vertical transfer pattern in the proportion of students who transferred without any credits. As table 8 shows, 21 percent of students who transferred from a 2-year institution to a 4-year institution experienced no transfer of credit, compared to 28 percent of students who transferred laterally from a 4-year to another 4-year institution. A larger proportion of students (66 percent) who transferred in the reverse direction (i.e., 4-year to 2-year) lost all their credits in the transfer. Approximately 68 percent of students transferred laterally from one 2-year institution to another without any credits transferring from the first institution. Nearly all students (97 percent) moving to or from less-than-2-year institutions had no credits transferred.

Number of credits not transferred. Overall, students transferring or coenrolling vertically from a 2-year to a 4-year institution lost a lower number of credits than all other level groups, except for lateral transfers between 4-year institutions (i.e., 8 and 11 credits). As table 9 shows, eight credits were lost for students who transferred from a 2-year to a 4-year institution, compared with 22 credits for students transferring in the reverse and 15 credits for students transferring from a 2-year to another 2-year institution. There were no measurable differences in the number of credits lost between the students transferring from a 4-year to another 4-year institution with students moving from 2-year to 4-year. Students with a horizontal 4-year transfer lost approximately 11 credits.

Evidence in the analysis by level suggests that deviating from a traditional vertical transfer pattern (i.e., 2-year to 4-year)) resulted in a higher likelihood of no credits transferring, and a higher number of credits lost for students who were able to transfer credit. This finding is consistent with a report from the U.S. Department

[17] Institutions that were classified as 4-year institutions in the Integrated Postsecondary Education Data System (IPEDS) but with a majority of degrees at the associate's degree-granting level were reclassified as 2-year using the institutional category (INSTCAT) variable in the IPEDS data center.

of Education that asserts that purposeful transfers from a community college to a 4-year college or from one 4-year college to another "were positively associated with degree completion, but wandering from one school to another was not" (Adelman 2006, p. xxi).

Adjusted Level and Control Combined: Adjusted Institutional Sector

The preceding chapter provided evidence that the control of students' origin and destination institutions may be related to credit transfer. To determine whether the relationship between credit transfer and adjusted level is consistent across all types of institutional control groupings, students were placed into groups based on the relationship between the sectors of students' origin and destination institutions. As shown in tables 8 and 9, a total of 12 groups were formed (representing adjusted[18] institutional sector):

- 2-year public to (1) 4-year public, (2) 2-year public, and (3) 4-year private nonprofit;
- 4-year public to (4) 4-year public, (5) 2-year public, and (6) 4-year private nonprofit;
- 4-year private nonprofit to (7) 4-year public, (8) 2-year public, and (9) 4-year private nonprofit;
- all institution types to (10) 4-year private for-profit, and (11) 2-year private for-profit; and
- all other combinations (12).

As with level and control, table 8 shows that that the proportion of students with "no credits transferred" varied by sector relationship. Similarly, table 9 shows a possible relationship between sector and credits lost.

Proportion of students who transferred without credits. Table 8 shows that approximately 19 percent of students who transferred vertically from public 2-year to public 4-year experienced no transfer of credit to the destination institution. Consistent with the findings on transfer by adjusted level, the following groups had higher proportions of students without credits transferring compared to students moving vertically from public 2-year to public 4-year institutions:

[18] Institutions that were classified as 4-year institutions in IPEDS but with a majority of degrees at the associate's level were reclassified in the 2-year sector equivalent using the INSTCAT variable in the IPEDS data center.

- reverse transfers from public 4-year to public 2-year (64 percent);
- reverse transfers from private nonprofit 4-year to public 2-year (69 percent); and
- lateral transfers from public 2-year to public 2-year institutions (64 percent).

Students transferring horizontally (i.e., 2-year to 2-year or 4-year to 4-year), regardless of control, did not differ from students transferring from 2-year to 4-year institutions. A higher proportion of students transferring to for-profit institutions did so without credits compared to 19 percent in the public 2-year to public 4-year reference group (89 percent to for-profit 2-year and 40 percent to for-profit 4-year). These findings suggest that institutional level, and not control, may drive credit transfer.

Number of credits not transferred. As shown in table 9, students who moved from public 2-year to public 2-year institutions had a higher number of credits not transferred (14 credits) compared with students who moved from a 2-year public to a 4-year public (8 credits). For the other sector transfer patterns, students transferring from 2-year to 4-year institutions or 4-year to 4-year institutions lost fewer credits, regardless of institutional control. As shown in table 8, horizontal 4-year to 4-year sectors did not differ from public 2-year to public 4-year student transfers (ranging from 7 to 10 credits lost), but students transferring in reverse had a higher number of credits lost (ranging from 18 to 24 credits).

Accreditation Status

Accreditation status refers to whether an institution is recognized by a regional accreditor or a national accreditor.[19] Students were categorized based on the accreditation status of the origin and destination institutions in their first transfer or coenrollment. The categories include (1) regional to regional, (2) national to regional, (3) regional to national, (4) national to national, and (5) other accreditation relationship.

[19] Regional accrediting organizations include (1) Middle States Association of Colleges and Schools (Middle States Commission on Higher Education), (2) New England Association of Schools and Colleges (Commission on Institutions of Higher Education), (3) North Central Association of Colleges and Schools (The Higher Learning Commission), (4) Southern Association of Colleges and Schools (Commission on Colleges), and (5) Western Association of Schools and Colleges (Accrediting Commission for Community and Junior Colleges and Accrediting Commission for Senior Colleges and Universities). Historically each organization was responsible for recognizing organizations within their region. For a list of national accreditors, see http://www2.ed.gov/admins/finaid/accred/index.html.

Proportion of students who transferred without credits. As table 10 shows, 90 percent of students transferred between regionally accredited institutions. Among these students, approximately 37 percent had no credits transferring. All the other accreditation relationship groupings (i.e., national to regional, regional to national, and national to national) had a higher proportion of students without credits transferring (all above 80 percent).

Number of credits not transferred. Table 11 displays the average number of credits not transferred to the destination institution. On average, students lost almost 13 credits after their first transfer. Students transferring from regionally accredited institutions to other regionally accredited institutions lost an average of 12 credits, while those transferring from a nationally accredited institution to a nationally accredited institution lost an average of 4 more credits, for 16 credits total. There were no measurable differences in the number of credits lost in transfers between nationally and regionally accredited institutions (in either direction) and other patterns of transfer, but the standard errors for these smaller groups were larger.

Future research may be able to examine differences in credit transfer among specific regional accreditors.

Selectivity

To explore the relationship between institutional selectivity[20,21] and transfer outcomes, nine categories were created to reflect the selectivity relationship between students' origin and destination institutions. The resulting groups are

[20] The selectivity measure was developed using data from IPEDS using the following criteria: (1) whether the institution was open admission (no minimal requirements), (2) the number of applicants, (3) the number of students admitted, (4) the 25th and 75th percentiles of ACT and/or SAT scores, and (5) whether test scores were required. Open admission institutions were formed into a separate category. For nonopen admission institutions, an index was created from two variables: (1) the centile distribution of the percentage of students who were admitted (of those who applied), and (2) the centile distribution of the midpoint between the 25th and 75th percentile SAT/ACT combined scores reported by each institution (ACT scores were converted into SAT equivalents). The two variables were given equal weight for those nonopen admission institutions that had data for both, and the combined centile variable was divided into selectivity categories: very selective, moderately selective, and minimally selective, based on breaks in the distribution. Institutions that did not have test score data were assigned to the selectivity categories using a combination of percentage admitted and whether they required test scores; institutions that did not require test scores were assigned to the minimally selective category, while the remainder were assigned according to the range of centiles of percentage admitted in which they fell. The method is similar to what is described in appendix E of Cunningham, A.F. (2005). *Changes in Patterns of Prices and Financial Aid* (NCES 2006-153). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

- open admission institutions to (1) other open admission institutions, (2) minimally selective institutions, and (3) selective institutions;
- minimally selective institutions to (4) open admission institutions, (5) other minimally selective institutions, and (6) selective institutions; and
- selective institutions to (7) open admission institutions, (8) minimally selective institutions, and (9) other selective institutions.

Overall, a relationship exists between the selectivity of the origin and destination institutions and credit transfer.

Proportion of students who transfer without credits. As table 10 shows, 66 percent of students transferring from an open admissions institution to another open admissions institution did not transfer credits. This percentage is not statistically different from students transferring to open admissions institutions from other selectivity groups. The proportion of students without credits transferring to an institution with open admissions was 66 percent when transferring from another open admissions institution, 67 percent from a minimally selective institution, and 65 percent from a selective institution. Students transferring to institutions with higher selectivity levels had a lower percentage of students without credits transferring compared to students from open admissions to other open admissions institutions with 21 percent to 40 percent of students transferring without credits for the other selectivity combinations.

[21] Other studies that examined selectivity and student transfer (see Dowd and Melguizo 2008; and Dowd, Cheslock, and Melguizo 2008) on NCES data used Barron's Academic Competitiveness Index. See Schmitt (2009). *Documentation for the Restricted-Use NCES-Barron's Admissions Competitiveness Index Files: 1972, 1982, 1992, 2004, and 2008* (NCES 2010-330). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Less than 35 percent of BPS:04/09 institutions that provided transcripts were included in this index because Barron's does not include institutions below the 4-year level and includes only a minority of public and for-profit institutions. Of those that were successfully matched, the correlation is .65 between Barron's and the selectivity measure used in this study.

Table 10. Among first-time beginning undergraduate students in 2003–04 who transferred or coenrolled, the percentage distribution of transfer students and the percentage of transfer students with no credits transferring, by accreditation and selectivity relationship: 2003–04 to 2008–09

Institution relationship	Total transfer or coenrolled students (percent)	Transfer/coenrolled students with no credits transferring (percent)
Total	**100.0**	**41.4**
Accreditation relationship		
Regional to regional (comparison group)	90.0	36.5
Regional to national	4.2	83.3*
National to regional	4.3	81.4*
National to national	1.4	84.3*
Other relationship	‡	‡
Institution selectivity relationship		
Open admission to open admission (comparison group)	21.9	66.2
Open admission to minimally selective	8.0	32.5*
Open admission to selective	31.4	21.1*
Minimally selective to open admission	5.6	67.0
Minimally selective to minimally selective	1.6	40.2*
Minimally selective to selective	4.5	25.1*
Selective to open admission	10.5	65.0
Selective to minimally selective	3.0	34.4*
Selective to selective	13.6	26.6*

‡ Reporting standards not met. Either there are too few cases or the relative standard error for the estimate is 50 percent or greater.
* Estimate is significantly different from the comparison group shown in italics ($p < .01$).
NOTE: Detail may not sum to totals because of rounding. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit. The "moderately selective" and "selective" classifications were recoded into one "selective" group.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Number of credits not transferred. As shown in table 11, students who transferred to open admissions institutions lost more credits than those transferring to more selective institutions. Students who transferred to an open admissions institution lost an average of 15 credits when transferring from another open admissions institution, twenty-one credits from a minimally selective institution, and 22 credits from a selective institution. Compared to students who transferred from open admissions to other open admissions institutions, students transferring to more selective institutions lost fewer credits, including

- open admissions to minimally selective institutions (9 credits lost);
- open admissions to selective institutions (8 credits lost); and
- minimally selective to selective institutions (9 credits lost).

Table 11. Among first-time beginning undergraduate students in 2003–04 who transferred or coenrolled, the average credits earned at the origin institution, the average credits accepted at the first transfer destination institution, and the difference between the average percentage earned and the average percentage transferred, by accreditation and selectivity relationship: 2003–04 to 2008–09

Institution relationship	Total transfer/ coenrollment students (percent)	Total credits		Difference between credits earned and transferred
		Earned at origin institution	Transferred to destination institution	
Total	**100.0**	**29.6**	**16.9**	**12.7**
Accreditation relationship				
Regional to regional (comparison group)	89.9	30.7	18.6	12.1
Regional to national	4.8	18.7	2.2!	16.6
National to regional	3.9	25.4	4.2!	21.2
National to national	1.2!	17.3	‡	15.7*
Other relationship	‡	‡	‡	‡
Institution selectivity relationship				
Open admission to open admission (comparison group)	21.6	22.4	7.7	14.7
Open admission to minimally selective	7.9	30.7	21.8	8.9*
Open admission to selective	30.2	34.2	26.6	7.6*
Minimally selective to open admission	5.8	25.7	5.1	20.6
Minimally selective to minimally selective	1.5	29.9	15.1	14.8
Minimally selective to selective	4.6	28.1	19.0	9.2*
Selective to open admission	12.1	29.2	7.1	22.1*
Selective to minimally selective	3.1	28.7	15.5	13.2
Selective to selective	13.2	33.8	22.7	11.1

! Unstable estimate (relative standard error for estimate exceeds 30 percent).
‡ Reporting standards not met. Either there are too few cases or the relative standard error for the estimate is 50 percent or greater.
* Estimate is significantly different from the comparison group shown in italics ($p < .01$).
NOTE: Detail may not sum to totals because of rounding. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit. The "moderately selective" and "selective" classifications were recoded into one "selective" group.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/90), Postsecondary Education Transcript Study (PETS).

Student Enrollment Characteristics and Credit Transfer

This section examines the relationship between credit transfer and student characteristics. The analysis looks at (a) degree program change during the transfer, and (b) academic performance as measured by GPA.[22] Credit transfer by degree

[22] Change in major at transfer, which might also be related to the transfer of credits, cannot be explored because field of study was not reliably reported on the transcripts collected.

program change and academic performance as measured by GPA are displayed in table 12.

Degree/Award Level Program Change

Institutions may have program course requirements that differ by degree or award level (i.e., associate's degree, bachelor's degree, or certificate) and may not accept previous college credit if a student elects to change the degree/award level of his or her program. The degree/award level of students' programs, however, is not reliably reported on transcripts, except for students with a degree or certificate awarded by the institution. To create groups representing the relationship between the degree/award level of students' programs before and after transfer, ten categories were created. Six of these categories represent students who had enrolled in a certificate, associate's degree, or bachelor's degree program prior to transfer, the majority of whom had earned a credential. The resulting groups include:

- associate's degree to (1) bachelor's degree, (2) associate's degree, and (3) undergraduate courses/no degree program; and
- bachelor's degree to (4) bachelor's degree, (5) associate's degree, and (6) undergraduate courses/no degree program.

Three include students enrolled in undergraduate courses with no degree program listed on the transcript (many did not complete a credential):

- undergraduate courses/no degree program to (7) bachelor's degree, (8) associate's degree, and (9) undergraduate courses/no degree program.
- The final group included students moving to and from certificate and other programs.[23]

As shown in table 12, a relationship exists between degree/award level program change and the proportion of students without credits transferring and the number of credit not transferred.

[23] Transcripts that indicate a degree other than undergraduate certificate, associate's degree, bachelor's degree, postgraduate certificate, master's degree, professional degree, or doctoral degree were coded as "Other."

Proportion of students who transferred without credits. As shown in table 12, approximately 41 percent of all students attended another institution without the transfer of credits. Students who moved to a higher degree/award level were less likely to lose all their credits when transferring/coenrolling. Specifically, there was a lower proportion of students transferring/coenrolling without transferring credits in the "undergraduate courses/no degree program to a bachelor's degree program" group (which mostly included community college students who had not been enrolled in an associate's degree program) (21 percent) compared to students transferring or coenrolling from associate's to other associate's degree programs (52 percent), and students transferring or coenrolling from a bachelor's degree program to an associate's degree program (54 percent). An even smaller percentage of students transferred or were coenrolled with no credits moving from an associate's degree program to a bachelor's degree program (12 percent).

Number of credits not transferred. When examining the number of credits lost, the students transferring/coenrolling from the "undergraduate courses/no degree program to a bachelor's degree" program lost the lowest number of credits (4), which is below the overall average of 13 credits (table 12). All other degree change groups were near or above the mean and lost more credits, on average, than students transferring from undergraduate courses/no degree program to a bachelor's degree program.

Academic Performance

Credit transfer may be at least partially a function of a student's prior academic performance, as many destination institutions have minimum performance thresholds for transferring credit. Academic performance was measured by the normalized GPA from the origin institution, and GPAs were combined into three groups: (a) 0.00 to 1.99, (b) 2.00 to 2.99, and (c) 3.00 and above. Table 12 lists the percentages of students without credits transferring by GPA group. Overall, the proportion of students without credits transferring decreased across the groups as grades increased, but this pattern is not evident in numbers of credits transferred.

Proportion of students who transferred without credits. As shown in table 12, the higher the GPA, the lower the proportion of students without credits transferring. Approximately 67 percent of students who earned a GPA below 2.00 at their origin institution had no credits transferred, compared with 39 percent of students with GPAs between 2.00 and 2.99, and 31 percent with GPAs above 3.00.

Table 12. Among first-time beginning undergraduate students in 2003–04 who transferred or coenrolled, the percentage distribution of transfer students, the percentage of students with no credits transferred, and the difference between credits transferred and earned, by award level change relationship, and grade point average at origin institution: 2003–04 to 2008–09

Institution relationship	Total transfer/ coenrollment students (percent)	Transfer students with no credits transferring (percent)	Difference between credits earned at origin and credits transferred (number)
Total	**100.0**	**41.4**	**12.7**
Degree/award level change			
Associate's degree to bachelor's degree	9.3	12.1*	10.6*
Associate's degree to associate's degree	2.4	52.3*	18.3*
Associate's degree to undergraduate courses/no degree	6.0	49.4*	20.9*
Bachelor's degree to bachelor's degree	4.1	16.7	9.0*
Bachelor's degree to associate's degree	2.4	53.8*	17.3*
Bachelor's degree to undergraduate courses/no degree	5.3	70.1*	33.0*
Undergraduate courses/no degree to bachelor's degree (comparison group)	33.8	20.6	4.1
Undergraduate courses/no degree to associate's degree	9.0	55.8*	12.3*
To and from undergraduate courses/no degree	16.2	55.1*	13.1*
To and from certificate and other programs	11.4	76.3*	15.8*
Grade point average at origin institution			
0.00–1.99 (comparison group)	16.5	66.5	11.8
2.00–2.99	33.3	38.7*	15.4*
3.00–4.00	50.2	30.6*	12.1

* Estimate is significantly different from the comparison group shown in italics ($p < .01$).
NOTE: Detail may not sum to totals because of rounding. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Number of credits not transferred. Among students who transferred credits, despite statistical differences by GPA group, the differences for all groups were near one semester of coursework for a full-time student, with credit loss ranging from 12 credits in the 0.00 to 1.99 group and the above 3.00 group to 15 credits in the 2.00 to 2.99 GPA group.

Conclusion

The descriptive statistics in this chapter demonstrate that multiple factors may contribute to the transfer of credits. These include institutional factors such as institutional level relationship (i.e., transfer direction), institutional control relationship, accreditation status, institutional selectivity relationship, and accreditation relationship. Student factors such as academic performance and changing award/degree programs may also be related to the transfer of credits. The next chapter of this report uses multivariate statistical techniques to examine which factors are associated with credit transfer when considered jointly.

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Chapter 3. Joint Effects of Institutional and Student Characteristics on Credit Transfer

The analyses reported in the prior chapter focused on the bivariate relationships between institutional or student characteristics and credit transfer, and did not consider how those relationships might change when these characteristics are considered jointly. This chapter examines whether deviations from traditional patterns of student transfer account for the variability in credit transfer after controlling for other variables.

This chapter first presents two tables to better understand the joint effect of independent variables on credit transfer by examining the number of credits transferred within each transfer direction or pattern. Next, this chapter describes the descriptive multivariate technique used to explore the joint relationship of student and institutional characteristics on transfer outcomes. Finally, the chapter concludes by comparing the multivariate findings with the findings in the previous chapters.

Credit Transfer and Traditional Student Transfer/Coenrollment Patterns

As demonstrated in the previous chapter, the descriptive statistics provide evidence that traditional transfer/coenrollment patterns (i.e., vertical 2-year to 4-year transfers) promote the transfer of credits, even when taking into account institutional control. Tables 13 and 14 examine whether a possible relationship exists between credit transfer and other covariates by the direction of transfer (i.e., the level relationship between institutions):

- vertical (2-year to 4-year);
- horizontal or lateral (4-year to 4-year or 2-year to 2-year); and
- reverse (4-year to 2-year).

Table 13. Among first-time beginning undergraduate students in 2003–04 who transferred/ coenrolled, the percentage of students without transfer credits in the students' first transfer institution within each transfer direction, by institution/academic characteristics: 2003–04 to 2008–09

	Percent with no credits transferred			
Institution relationship	Total	Vertical transfer	Reverse transfer	Horizontal or lateral transfer
Total[1]	**38.8**	**20.9**	**65.5**	**47.1**
Control				
No change in control (comparison group)	37.9	19.5	63.6	47.9
Change in control	41.0	24.3	69.4	45.4
Accreditation				
No change in accreditation (comparison group)	36.4	19.8	64.5	43.5
Change in accreditation	76.0*	47.0*	92.0*	82.5*
Selectivity				
Transfer to open/minimally selective institutions (comparison group)	55.2	26.0	65.7	59.9
Transfer to selective/moderately selective institutions	22.2*	19.0	‡	27.6*
Grade point average prior to transfer				
0.00–1.99 (comparison group)	64.9	47.3	65.7	69.8
2.00–2.99	36.9*	20.9*	65.0	43.2*
3.00–-4.00	27.8*	15.9*	64.5	35.2*
Degree/award level change				
No change in degree/certificate observed (comparison group)	48.0	38.2	65.2	46.9
Change in degree/certificate program	43.4	17.0*	69.0	69.4*
Undergraduate course/no program to a degree/certificate program	29.7*	18.7*	62.1	36.1*

‡ Reporting standards not met. Either there are too few cases or the relative standard error for the estimate is 50 percent or greater.
* Estimate is significantly different from the comparison group shown in italics ($p < .01$).
[1] Overall (reading across the row), the percentage of students with no credits transferring are statistically different from each other, with vertical transfer students having the lowest proportion of students and reverse transfer students having the highest proportion of students transferring with no credits.
NOTE: Detail may not sum to totals because of rounding. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit. Institutions that offer 4-year degrees but are predominantly associate's institutions were classified as 2-year. The term "adjusted level" is used so that users can distinguish the INSTCAT adjusted level from the LEVEL variable in the Integrated Postsecondary Education Data System (IPEDS).
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Table 13 displays the percentages of first-time beginning undergraduate students who transferred or coenrolled with no credits transferring to the destination institution for each transfer/coenrollment direction, by

- control relationship change (no change in control versus change in control after transfer);
- accreditation relationship change (no change in accreditation versus change in accreditation after transfer);

- selectivity relationship change (transfer to open admissions/minimally selective versus selective/moderately selective);
- award level of program change (no change in award level, change in award level, and undergraduate courses/no degree to a degree program); and
- GPA prior to transfer (three levels).

Proportion of Students Who Transfer/Coenroll Without Credits

Overall, 66 percent of students who transferred or coenrolled in reverse (i.e., from 4-year to 2-year institutions) did not have credits transfer. This is higher than students who transferred or coenrolled vertically (i.e., from 2-year to 4-year institutions) with 21 percent of students without credits transferring. Among students who transferred or coenrolled to institutions within the same level (i.e., horizontal transfers), 47 percent had no credits transfer. Table 13 shows that the relationship between covariates (such as selectivity, GPA prior to transfer, and change in degree/award level following transfer) and credit transfer depends on transfer direction. For students transferring in the reverse direction, there is no measurable difference in the percentage of students without credits transferring and institutional control, selectivity, GPA, and change in degree/award level, with percentages ranging from 62 to 69 percent. Transferring vertically or horizontally does vary by multiple covariates, including GPA, award level change, and accreditation. The multivariate analysis accounts for the complexity of the variable relationships on credit transfer.

Number of Credits Not Transferred

Table 14 shows the average number of credits transferred[24] by institutional characteristics and student enrollment characteristics. Overall, the number of credits transferred varied by transfer direction. Students who transferred/coenrolled from 4-year to 2-year institutions (i.e., reverse transfer) transferred the lowest number of credits (18), while students who transferred/coenrolled between institutions at the same level (i.e., horizontal transfer) yielded 24 credits. Transferring or coenrolling from a 2-year to a 4-year yielded the highest number of credits, with 32 credits transferring.

[24] This is a different measure from that used in previous tables. Measuring the number of credits lost is ideal for statistical tests because the construction of the variable controls for the effects of the number of credits a student has taken. Otherwise, the length of time a student is enrolled in postsecondary education confounds the other variables because the more credits the student earns, the more credits are available for transfer and the more credits that can be lost. The total number of credits transferred does not control for the length of time a student is enrolled.

Table 14. Among first-time beginning undergraduate students in 2003–04 who transferred credits, the average number of credits transferred in the student's first transfer, by direction of transfer within control, accreditation, selectivity, grade point average at origin institution, and degree program change: 2003–04 to 2008–09

	Number of credits transferred			
Institution relationship	Total	Vertical transfer	Reverse transfer	Horizontal or lateral transfer
Total[1]	**27.6**	**31.8**	**18.3**	**23.6**
Control				
No change in control (comparison group)	30.0	35.0	18.1	25.0
Change in control	22.0*	23.6*	18.6	20.9
Accreditation				
No change in accreditation (comparison group)	28.0	32.2	18.3	23.9
Change in accreditation	14.7*	‡	‡	16.5
Selectivity				
Transfer to open/minimally selective institutions (comparison group)	23.4	32.5	18.1	19.9
Transfer to selective/moderately selective institutions	30.0*	31.7	‡	26.6*
Grade point average prior to transfer				
0.00–1.99 (comparison group)	14.1	14.3	12.5	15.3
2.00–2.99	29.6*	32.4*	23.9*	27.0*
3.00–4.00	27.3*	31.0*	19.1	22.4*
Degree/award level change				
No change in degree/certificate observed (comparison group)	26.7	23.7	18.9	29.3
Change in degree/certificate program	40.4*	45.4*	21.0	31.9
Undergraduate course/no program to a degree/certificate program	21.1*	22.9	15.3	19.0*

‡ Reporting standards not met. Either there are too few cases or the relative standard error for the estimate is 50 percent or greater.
* Estimate is significantly different from the comparison group shown in italics ($p < .01$).
[1] Overall (reading across the row), the number of credits transferring by transfer direction is statistically different from each other with vertical transfer students having the highest number of credits transferring and reverse transfer students having least.
NOTE: Detail may not sum to totals because of rounding. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit. Institutions that offer 4-year degrees but are predominantly associate's institutions were classified as 2-year when determining transfer direction.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

As shown in table 14, the relationships between control, accreditation, selectivity, GPA, and change in degree/award level program after transfer depend on the direction of transfer. For students transferring vertically, a relationship exists between the number of credits transferred and control, accreditation, selectivity, GPA, and change in degree/award level program after transfer. Similarly, for students who transfer or coenroll in a horizontal direction, a relationship exists between the number of credits transferred and control, GPA, and change in degree/award level program. For students transferring vertically, only academic performance was related to credit transfer.

Both tables 13 and 14, in conjunction with the statistical tests, indicate that complex relationships are present between transfer direction and the covariates. A multivariate analysis takes into account the joint effects of the covariates on the proportion of students transferring without credits and the number of credits transferred.

Multivariate Analysis

Variables Used

The multivariate analysis uses variables from the BPS:04/09 transcript file appended with new measures developed for this analysis (see appendix A for variable descriptions) and is conducted at the student level. The dependent variable in the analysis is the total number of credits transferred in the first transfer. Due to missing data from many origin institutions, the number of lost credits (which was presented in chapter 2) was unavailable for the multivariate model.[25] Independent variables of interest include

- transfer direction (vertical, reverse, and horizontal);
- control of origin institution (public, private nonprofit, private for-profit);
- control of destination institution (public, private nonprofit, private for-profit);
- institutional accreditation (regional to regional, regional to national or other, national to regional or other, national to national or other);
- selectivity (to moderately selective or selective versus to not selective or open admissions);
- GPA prior to transfer; and
- number of months enrolled at first institution prior to transfer.[26]

The variables included in the model are consistent with the literature on student transfer such as transfer direction (by level) (McCormick 1997, 2003; Peter and Forrest-Cataldi 2005; Berkner, He, and Cataldi 2002), nontraditional transfer patterns (e.g., reverse transfer and swirling) (Goldrick-Rab 2006; Goldrick-Rab and Pfeffer 2009; Li 2010), GPA (Graham and Dallam 1992; Nolan 1978), accreditation relationship, and institutional control relationship (GAO 2005). Degree/award level

[25] The number of credits lost has higher missingness because the missing values from the origin institution are added to the missing values in the destination institution in the computation of the variable. While levels of missingness were low enough to provide bivariate estimates, when combined with missing items generated from the independent variables, they contributed to untenable levels of listwise deletion in the multivariate model.

[26] The number of months enrolled at the first institution is included as a control variable to account for the amount of time a student has to earn credits, and therefore the increased pool of credits eligible for potential transfer.

change of the academic program was excluded from the model because of the potential to introduce bias from data that are not missing at random because only students who obtained a degree are likely to have a transcripted degree program, resulting in a possible bias in the estimates.

The model includes a second set of independent variables to control for risk factors for dropping out or stopping out:

- dependency status (dependent and independent);
- single parent status;
- responsibility for dependents (does not have dependents and has dependents);
- employment status (no job, part time, and full time);
- high school credential (high school diploma and General Education Development [GED]/other diploma); and
- attendance intensity—first year (full time and part time).

In addition to risk variables, the model includes student demographic variables:

- race (White, Black/African American, Asian, and all other race groups, including more than one race[27]);
- ethnicity (non-Hispanic and Hispanic); and
- gender (male and female).

The control variables included in the model are consistent with the literature on student access and success. The risk factors, which were identified from previous BPS studies (Horn 1996; Berkner, He, and Cataldi 2002), are indicators of leaving postsecondary education without attaining a degree or credential. The demographic characteristics are identified from the literature on college choice; specifically, this says that students with certain characteristics are less likely to have or obtain the information required to navigate administrative processes such as college applications and financial aid (Perna 2006a, 2006b). Both sets of variables are included in the model to control for the lack of credit transfer resulting from the student not being able to navigate the administrative process to request a transcript review. These control variables are excluded from the part of the model that examines the review of credits for transfer, as this review is institutionally driven. A summary of the coding of the variables and the reference groups for categorical variables is displayed in table 15.

[27] Due to the small number of transfer students, certain race groupings need to be combined, including American Indian, Native Hawaiian/other Pacific Islander, other, and more than one race. As a result, findings are limited for examining the transfer of credit by race.

Table 15. Descriptive statistics and variable coding for variables used for multivariate analyses of credit transfer among beginning first-time students: 2003–04 through 2008–09

Variable	Variable coding	Unweighted observations	Mean	SD	Min	Max
Dependent variable						
Total number of credits transferred in first transfer	Continuous	6,120	14.6	22.1	0.0	156.5
Independent variables – transcript						
Control of origin institution						
Public	Reference group	6,310	0.78	0.42	0.0	1.0
Private nonprofit	1 = yes	6,310	0.17	0.38	0.0	1.0
Private for-profit	1 = yes	6,310	0.05	0.22	0.0	1.0
Control of destination institution						
Public	Reference group	6,310	0.70	0.46	0.0	1.0
Private nonprofit	1 = yes	6,310	0.23	0.42	0.0	1.0
Private for-profit	1 = yes	6,310	0.07	0.26	0.0	1.0
Transfer direction						
Vertical (2-year to 4-year)	Reference group	6,280	0.41	0.49	0.0	1.0
Reverse (4-year to 2-year)	1 = yes	6,280	0.16	0.37	0.0	1.0
Horizontal (4-yr to 4-yr or 2-yr to 2-yr)	1 = yes	6,280	0.43	0.49	0.0	1.0
To and from less-than-2-year	Excluded					
Accreditation relationship						
Regional to regional	Reference group	6,100	0.91	0.29	0.0	1.0
Regional to national (or other)	1 = yes	6,100	0.04	0.19	0.0	1.0
National to regional (or other)	1 = yes	6,100	0.04	0.19	0.0	1.0
National to national (or other)	1 = yes	6,100	0.01	0.11	0.0	1.0
Grade point average prior to transfer	Continuous	6,040	2.81	0.88	0.0	4.0
Selectivity						
To selective/moderately selective	Reference group	6,170	0.48	0.50	0.0	1.0
To open admissions/minimally selective	1 = yes	6,170	0.52	0.50	0.0	1.0
Log months enrolled prior to first transfer	Continuous	6,650	1.62	1.33	0.0	4.1
Independent variables – risk factors						
Dependency status						
Dependent	Reference group	6,660	0.88	0.33	0.0	1.0
Independent	1 = yes	6,660	0.12	0.33	0.0	1.0
Single parent						
Not a single parent	Reference group	6,660	0.95	0.21	0.0	1.0
Single parent	1 = yes	6,660	0.05	0.21	0.0	1.0
Responsibility for dependents						
Does not have dependents	Reference group	6,660	0.92	0.27	0.0	1.0
Has dependents	1 = yes	6,660	0.08	0.27	0.0	1.0
Employment status						
No job	Reference group	6,660	0.33	0.47	0.0	1.0
Part-time	1 = yes	6,660	0.52	0.50	0.0	1.0
Full-time	1 = yes	6,660	0.15	0.36	0.0	1.0

See notes at end of table.

Table 15. Descriptive statistics and variable coding for variables used for multivariate analyses of credit transfer among beginning first-time students: 2003–04 through 2008–09 —Continued

Variable	Variable coding	Unweighted observations	Mean	SD	Min	Max
Independent variables – risk factors—Continued						
High school credential						
High school diploma	Reference group	6,660	0.93	0.26	0.0	1.0
GED or other diploma	1 = yes	6,660	0.07	0.26	0.0	1.0
Postsecondary attendance intensity in first year						
Full-time	Reference group	6,660	0.82	0.38	0.0	1.0
Part-time	1 = yes	6,660	0.18	0.38	0.0	1.0
Independent variables – demographic characteristics						
Race						
White	Reference group	6,660	0.71	0.45	0.0	1.0
Black/African American	1 = yes	6,660	0.12	0.33	0.0	1.0
Asian	1 = yes	6,660	0.06	0.23	0.0	1.0
All other race groups, including more than one race[1]	1 = yes	6,660	0.11	0.32	0.0	1.0
Ethnicity						
Not Hispanic	Reference group	6,660	0.89	0.32	0.0	1.0
Hispanic	1 = yes	6,660	0.11	0.32	0.0	1.0
Gender						
Male	Reference group	6,660	0.40	0.49	0.0	1.0
Female	1 = yes	6,660	0.60	0.49	0.0	1.0

[1] Includes American Indian, Native Hawaiian/other Pacific Islander, other, and more than one race.
NOTE: SD = standard deviation.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Due to the limitations of the transcript collection, a number of other factors were omitted from the analysis, including but not limited to academic factors (e.g., change in major,[28] number of credits earned in high school) and relationship between institutions (e.g., historically black colleges and universities/Hispanic-servicing institutions [HBCU/HSI] institution status, Carnegie classification, articulation agreements in place, state of institution, and distance between first and second institutions of attendance).

Omitting these variables may lead to some unexplained variability in the multivariate model because these variables may explain why credits may or may not transfer. For

[28] Researchers who are interested in using "field of study" are encouraged to use data from the student interview. Analysts should use caution, however, because the interview represents one point in time, whereas the transcript data cover the entire span of time in this study. Analysts should verify that the institution the student attended in the interview matches the institution in the transcript data.

example, some academic factors, such as changing a program of study, provide institutions with a valid justification for denying the transfer of credit. The proximity of institutions to one another, state regulations, or having articulation agreements in place provide information or standards to allow credits to transfer more easily. Student socioeconomic characteristics or previous academic preparation are latent factors related to student academic performance. Finally, geographic variables may be indicators of a student's familiarity with local institutions.

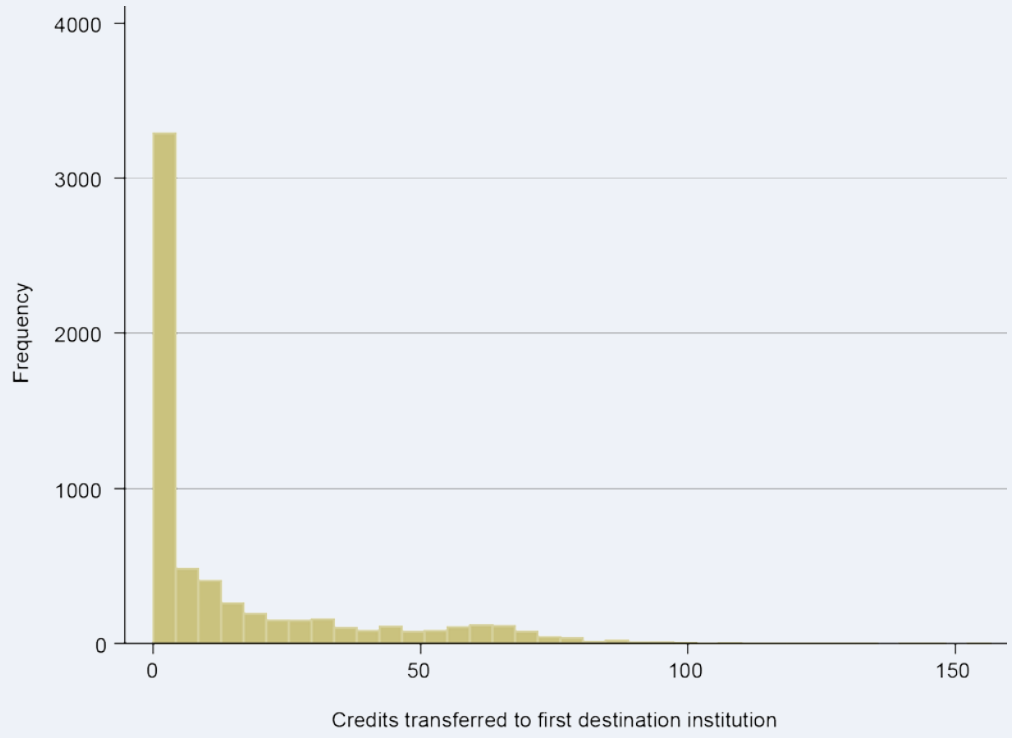
One subset of students—those who transferred to and from less-than-2-year institutions—was removed from the analysis because of the small number of transfers in that sector.

Statistical Technique

As shown in figure 5, the dependent variable (total number of credits transferred) is positively skewed with a high proportion of zero values. This is likely due to two different processes affecting the number of students without credits transferring. Specifically, the zero count in the number of credits transferred is "inflated" due to students who never attempted to transfer credit (e.g., the institution never reviewed courses for possible transfer; Equation 1). The "noninflated" zeros are those where students made an attempt to transfer credit, but zero credits were transferred. This group should be modeled separately along with students who had credits transfer (Equation 2). Because no data were collected to distinguish between the two groups of students, a statistical technique is required to model the number of zeros needed to account for the second process.

The statistical method used to examine dependent variables with this characteristic is Zero-Inflated Negative Binomial regression (ZINB) (Greene 1994; Erdman, Jackson, and Sinko 2008; Long and Freese 2001). The basic assumption of this statistical technique is that the number of zero values is over-represented and that zeros are generated through two distinct processes (similar to what is described above resulting in an excess of zeros). In this case, a logistic regression model, with its own independent variables, is used to model the probability that zero credits transfer due to students who never requested a transcript review versus students who did request credits be transferred, but were denied. The latter group is included in a negative binomial model to describe the number of credits transferred. The first component produces log-odds ratios and the later model yields coefficient estimates in natural log units. A detailed description of the equations used in generating the estimates is available in appendix B.

Figure 5. Histogram of the total number of credits transferred to the destination institution in the first transfer



SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

The two components in the ZINB model can have different sets of independent variables to model the two processes. In modeling the transfer of credit, the independent variables in the logistic component of the model, which predicts the probability of students who never attempted to transfer credit (e.g., the institution never reviewed courses for possible transfer), include

- transfer direction (to test if students transferring through the traditional vertical path are more likely to request to transfer credit because the student planned to transfer);
- institutional control of the origin and destination institutions (to test if students attending certain institutions with lower rates of transfer are less likely to request to transfer credit);
- accreditation relationship (to test if students moving from nationally accredited institutions are not requesting to transfer credits presuming they will not because of their previous institution of attendance);

- selectivity relationship (to test if students coming from institutions with lower selectivity are not requesting credit transfer presuming that credits won't be accepted);
- GPA prior to transfer (to test if students with lower GPAs are less likely to request credit transfers); and
- months enrolled prior to transfer (to control for the amount of time elapsed that the student could potentially aggregate credits).

Additional control variables were added because Equation 1 is dependent on the behavior of the student who needs to interact with the institution during the credit transfer process. These include dependency status, single parent status, responsibility for dependents, employment status, type of high school credential, attendance intensity in the first year, race, ethnicity, and gender.

In the negative binomial component, which predicts the number of credits transferred, the independent variables include

- transfer direction (to test if credits may or may not transfer due to differences in coursework offerings due to changing the level of institution);
- institutional control of the origin and destination institutions (to test if institutions accept transfer credit depending on whether an institution is publicly or privately controlled);
- accreditation relationship (to test if institutions accept transfer credit depending on whether an institution is regionally accredited);
- selectivity relationship (to test if institutions accept transfer credit depending based on their admissions standards, with selective institutions being more discriminating);
- GPA prior to transfer (to control for the academic performance of the student associated with the credits that are transferring); and
- months enrolled prior to transfer (to control for the amount of time elapsed that the student could potentially aggregate credits).

Student demographic characteristics are excluded from the negative binomial component of the model because Equation 2 is primarily institutionally driven.

Listwise Deletion and Missing Case Analysis

While variables derived from the BPS:04/09 student interview and administrative records were imputed, the data from the BPS:04/09 transcript file were not imputed. As a result, a missing case analysis was conducted to test for potential bias related to listwise deletion of missing cases from the multivariate model. The analysis revealed

no statistical differences between the dropped cases and retained cases in the dependent variable (number of credits transferred). A number of independent variables, however, did reveal some statistical differences with demographic variables (which were imputed) and in dummy variables with a small number of cases. Further analysis did not uncover any evidence that the inferences made in the multivariate model are not reflective of the population. A more detailed description of the analysis can be found in appendix E.

Multivariate Findings

The results of the multivariate analysis are displayed in table 16 with the logit or "inflated zeros" coefficient estimates in the first column (which is traditionally not interpreted)[29] and the negative binomial regression coefficients in the second column (modeling the log number of credits transferred). The model as a whole was statistically significant ($F = 111.74$; $p < .001$).[30]

Factors Predicting the Number of Credits That Transfer

The negative binomial component of the model explores the relationship between the number of credits students transferred and student and institutional characteristics. Three factors contributed to the number of credits that transferred:

- institutional control;
- transfer direction; and
- GPA.

A fourth variable, the number of months enrolled prior to the first transfer, was included as a control and also had a significant statistical relationship.[31]

[29] The purpose of the logistic component of the model is limited: to obtain estimates of the probability for zero credits to transfer so that information can be used in the negative binomial component. See appendix F for more information.
[30] A separate ZINB model including all independent variables in both components yielded consistent results in the statistical tests for the model and the contributions of the independent variables.
[31] To ensure that the months enrolled prior to transfer variable was not removing all variability from the model, another analysis without the number of months enrolled prior to transfer was conducted and obtained similar results.

Table 16. Estimated coefficients and standard errors of the Zero-Inflated Negative Binomial regression of institutional and student enrollment characteristics on whether credits transfer for first-time beginning undergraduate students in the 2003–04 academic year: 2003–04 to 2008–09

Variable	Logistic component odds ratios	Negative binomial coefficient estimates
Dependent variable	Inflated zeros in total credits transferred	Log of the total credits transferred
Control of origin institution		
Public (comparison group)	†	†
Private nonprofit	-0.214	0.121
	(0.140)	(0.053)
Private for-profit	0.323	-0.489
	(0.579)	(0.363)
Control of destination institution		
Public (comparison group)	†	†
Private nonprofit	-0.128	-0.207*
	(0.163)	(0.043)
Private for-profit	0.394	-0.516
	(0.295)	(0.141)
Transfer direction		
Vertical (2-year to 4-year) (comparison group)	†	†
Reverse (4-year to 2-year)	1.441*	-0.421*
	(0.168)	(0.076)
Horizontal (4-year to 4-year or 2-year to 2-year)	0.892*	-0.147
	(0.115)	(0.042)
Accreditation relationship		
Regional to regional (comparison group)	†	†
Regional to national (or other)	1.017	-0.192
	(0.434)	(0.189)
National to regional (or other)	1.164	-0.308
	(0.696)	(0.455)
National to national (or other)	0.616	-0.355
	(1.488)	(0.574)
Academic performance		
Grade point average	-0.447*	0.222*
	(0.066)	(0.036)
Selectivity relationship		
To open admissions/minimally selective) (comparison group)	†	†
To selective	-0.620*	0.089
	(0.127)	(0.055)
Risk factors: dependency status[1]		
Dependent (comparison group)	†	†
Independent	0.082	†
	(0.329)	

See notes at end of table.

Table 16. Estimated coefficients and standard errors of the Zero-Inflated Negative Binomial regression of institutional and student enrollment characteristics on whether credits transfer for first-time beginning undergraduate students in the 2003–2004 academic year: 2003–04 to 2008–09—Continued

Variable	Logistic component odds ratios	Negative binomial coefficient estimates
Risk factors: single parent[1]		
Not a single parent (comparison group)	†	†
Single parent	0.112	†
	(0.360)	
Risk factors: responsibility for dependents[1]		
Does not have dependents (comparison group)	†	†
Has dependents	-0.004	†
	(0.449)	
Risk factors: employment status[1]		
No employment (comparison group)	†	†
Part-time	-0.004	†
	(0.111)	
Full-time	0.104	†
	(0.160)	
Risk factors: high school credential[1]		
High school diploma (comparison group)	†	†
Received GED or other diploma	0.373	†
	(0.208)	
Risk factors: enrollment intensity, first year[1]		
Full-time student (comparison group)	†	†
Part-time student	0.084	†
	(0.120)	
Demographic characteristics: race[1,2]		
White (comparison group)	†	†
Black/African American	-0.002	†
	(0.207)	
Asian	0.325	†
	(0.216)	
All other race groups, including more than one race[3]	0.103	†
	(0.174)	
Demographic characteristics: ethnicity[1]		
Non-Hispanic (comparison group)	†	†
Hispanic	0.193	†
	(0.180)	
Demographic characteristics: gender[1]		
Male (comparison group)	†	†
Female	0.014	†
	(0.112)	
Control variable: months enrolled prior to transfer		
Log months enrolled	†	0.552*
		(0.018)

See notes at end of table.

Table 16. Estimated coefficients and standard errors of the Zero-Inflated Negative Binomial regression of institutional and student enrollment characteristics on whether credits transfer for first-time beginning undergraduate students in the 2003–2004 academic year: 2003–04 to 2008–09—Continued

Variable	Logistic component odds ratios	Negative binomial coefficient estimates
Constant	0.093	1.379*
	(0.212)	(0.137)
Number of cases		
Weighted		970,500
Unweighted	1,770	4,870
Diagnostic tests (unweighted ZINB model)		
Vuong test for inflated zeros		31.093*
Likelihood Ratio test comparing ZINB to ZIP		11,074.687*
Model information and fit statistics		
F test		111.737*
Degrees of freedom		188
Variance correction method		BRR
Number of replicates		200
ln(Alpha)		-1.136*

† Not applicable due to being classified as a reference group or because variable was not specified in the model.
* Estimate is statistically significant ($p < .01$). Comparison groups are shown in italics, if applicable.
[1] Risk factor and demographic variables were omitted from the negative binomial component (which tests for the log number of credits transferred) of the model but were included in the logistic component (which tests for the probability of excess zeros due to factors such as not submitting a transcript for review). This decision was made because there was no evidence in the literature that a possible relationship exists between an institution's decision to transfer credits and type of dependency, single parent status, type of high school degree, enrollment intensity, race, ethnicity, or gender. The variables were included in the logistic component of the model to account for possible relationships between these characteristics and whether or not a transcript review occurs (e.g., submitting transcripts for review, navigating administrative processes).
[2] An alternate ZINB model that combined race and ethnicity into one variable (e.g., White non-Hispanic, Black/African American non-Hispanic, Hispanic) yielded identical results.
[3] Includes American Indian, Native Hawaiian/other Pacific Islander, other, and more than one race.
NOTE: ZINB = Zero-Inflated Negative Binomial regression. ZIP = Zero-Inflated Poisson.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

For the institutional control variables, students transferring to private nonprofit and private for-profit institutions were negatively related to the number of credits transferred compared to public institutions. Holding all other variables constant, students transferring to private nonprofit institutions transferred 21 percent fewer credits, on average, than students transferring to public institutions. Students transferring to private for-profit institutions transferred 52 percent fewer credits compared to students sending credits to public institutions.[32] There was no evidence of a relationship between the control of the origin institution and the number of credits transferred.

[32] To put the results into context, readers should note that a small percentage of students transfer out of for-profit institutions. For-profit institutions account for 5 percent of opportunities for credit transfer, with an estimated 130,000 opportunities to transfer credit out of 2.6 million total.

Transfer direction was also related to credit transfer. Students transferring from 4-year to 2-year institutions (reverse transfers) saw 25 percent fewer credits transferred compared to students transferring vertically from 2-year to 4-year institutions. Transferring between institutions at the same level (horizontal) yielded 15 percent fewer credits transferred compared to students transferring vertically.

For GPA, a positive relationship was present, with 22 percent more credits transferring for every one-point increase in GPA. The model did not provide evidence of a relationship by change in accreditation or selectivity relationship.

To better evaluate the practical use of these findings, table 17 presents the coefficients for the statistically significant variables in terms of semester credit hours for a student with a 3.0 GPA after 12 months of enrollment holding all other factors constant. The coefficients from a Zero-Inflated Negative Binomial regression were converted from log credits to credits to evaluate the differences in credit transfer for statistically significant coefficient estimates. The constant represents students transferring vertically (2-year to 4-year) from public to other public institutions—this is set as the reference group, with an average of 23 credits transferring. For students who have a 3.0 GPA, transferring to a private nonprofit institution yields 4 credits less than from public institutions, holding all other factors constant (19 credits versus 23 credits for students vertically transferring from public to public). Transferring to a for-profit yields an estimated 11 fewer credits, holding all other factors constant (12 credits versus 23 credits for students vertically transferring from public to public). Transferring in reverse yields 14 fewer credits and horizontally yields 8 fewer credits (8 credits and 15 credits, respectively versus 23 credits for students vertically transferring from public to public).

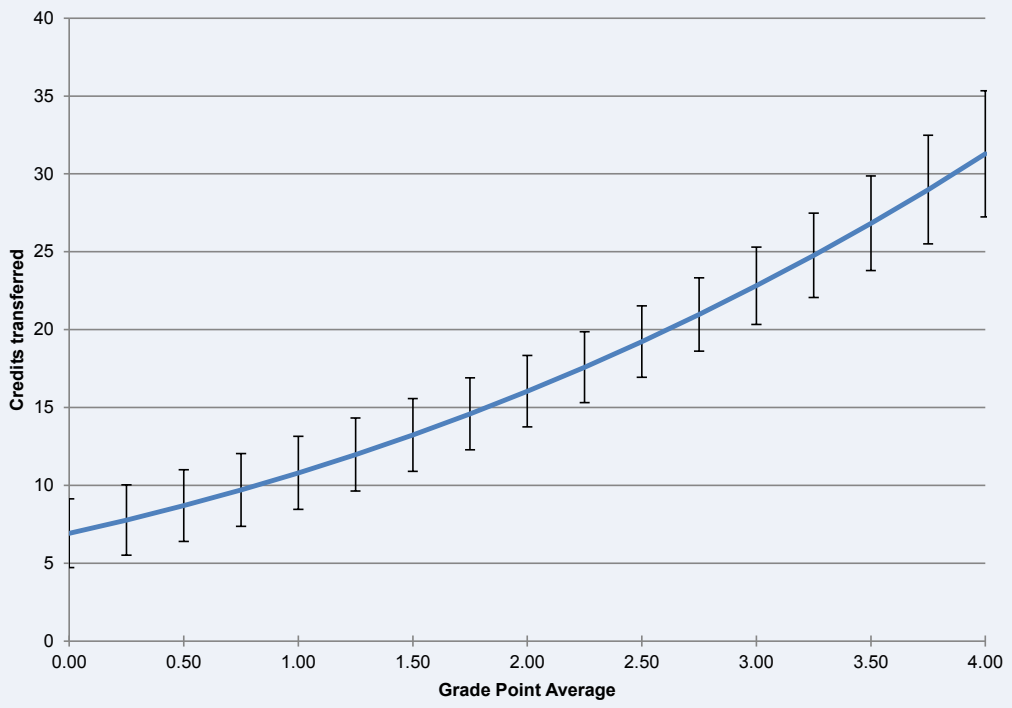
Table 17. Predicted mean number of credits transferring and 95 percent confidence intervals for a student with a 3.0 grade point average enrolled for 12 months prior to transfer and transferring from a regionally to another regionally accredited institution with open admissions/minimum selectivity (derived from coefficients from the Zero-Inflated Negative Binomial regression), by statistically significant institutional and student enrollment characteristics: 2003–04 to 2008–09

Variable	Credits transferring	95 percent confidence interval
Reference group		
Public to public, vertical transfer students	22.81	[20.33, 25.30]
Control of destination institution (Reference: public)		
Private nonprofit	19.11	[16.66, 21.57]
Private for-profit	12.17	[8.95, 15.38]
Transfer direction (Reference: vertical transfer)		
Reverse (4-year to 2-year)	8.35	[6.82, 9.89]
Horizontal (2-year to 2-year or 4-year to 4-year)	14.53	[12.58, 16.48]

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Because GPA is a continuous variable, figure 6 plots the predicted credit transfer values by GPA. The predicted values in figure 6 were generated by setting all dummy variables to zero in the negative binomial regression equation. Therefore, figure 6 represents students who vertically transfer (2-year to 4-year) between public institutions. As GPA increases, the number of credits transferred increases as well, with an estimated 7 credits transferring near a GPA of zero to 16 credits for a GPA of 2.0. A 3.0 GPA yields a predicted 23 credits, and a 4.0 GPA predicts approximately 31 credits transferred.

Figure 6. Predicted mean number of credits transferred and 95 percent confidence intervals by grade point average for a student enrolled for 12 months prior to transfer and transferring from a regionally to another regionally accredited institution with open admissions/minimum selectivity (derived from coefficients from the Zero-Inflated Negative Binomial regression): 2003–04 to 2008–09



SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Conclusion

Two factors consistently contributed to the likelihood of credit transfer, across both the descriptive statistics and the multivariate model. Controlling for other factors, they are

- academic performance prior to transfer (as measured by GPA); and
- transfer direction (e.g., vertical, reverse, or horizontal).

Specifically, higher GPAs were related to lower probabilities that zero credits will transfer and to a higher number of credits accepted. Reverse or horizontal transfer was related to higher probabilities that zero credits will transfer and a lower number of credits accepted at the destination institution.

Institutional control was also related to the number of credits transferred. Transferring to for-profit and private nonprofit institutions was related to a lower number of credits transferred compared to transferring to a public institution.

Accreditation status was not a factor in the multivariate analysis, nor was there a high volume of students moving between nationally accredited institutions and regionally accredited institutions.

Overall, the findings suggest that when student transfer is aligned with how the higher education system is designed to accommodate credit transfer (e.g., from 2-year institution to 4-year institutions), when students perform successfully in their coursework, or when students transfer to a public institution, credit transfer is more likely to occur.

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Appendix A. Glossary

This glossary describes the variables used in this report. The glossary entries are in alphabetical order by variable label (left-hand column).

Attendance pattern first year **ATTNSTAT**
Student's attendance pattern at all institutions attended during the 2003–04 academic year. This variable includes imputed values.

Full-time
Part-time

Gender **GENDER**
Indicates the respondent's gender. This variable includes imputed values.

Male
Female

Dependency status 2003–04 **DEPEND**
Indicates the respondent's dependency status during the 2003–04 academic year. This variable includes imputed values.

Dependent
Independent

Dependents: Has dependents 2003–04 **DEPANY**
Indicates whether the respondent had dependents during the 2003–04 academic year. This variable includes imputed values.

Does not have dependents
Has dependents

High school degree type **HSDEG**
Indicates whether the respondent has graduated from high school and the type of high school diploma received. This variable includes imputed values.

High school diploma
GED or other diploma

Institutional category **INSTCAT**
Institutional category was derived using the level of offerings reported on the Institutional Characteristics (IC) component and the number and level of awards reported on the Completions (C) component.

Degree-granting, graduate with no undergraduate degrees
Degree-granting, primarily baccalaureate or above
Degree-granting, not primarily baccalaureate or above
Degree-granting, associate's and certificates
Nondegree-granting, sub-baccalaureate

Job while enrolled: Work intensity 2003–04 **JOBENR**

Indicates the intensity of work (excluding work-study/assistantship/traineeship) while enrolled during the 2003–04 academic year. This variable includes imputed values.

No job
Part-time
Full-time

Race: Census categories **RACECEN**

Census categories for race of the student, exclusive of Hispanic origin. This variable includes imputed values.

White
Black/African American
Asian
All other race groups, including more than one race (due to low sample sizes, students identifying as American Indian, Native Hawaiian/other Pacific Islander, other, and more than one race were combined into one category for the multivariate analysis)

Race-ethnicity: Hispanic or Latino origin **HISPANIC**

Indicates whether the respondent identified as being Hispanic. This variable includes imputed values.

No
Yes

Single parent status 2003–04 **SINGLPAR**

Identifies independent students who were single parents during the 2003–04 academic year. This variable includes imputed values.

Not a single parent
Single parent

Transcript: Accreditation relationship for first transfer **QDACCREL**

Indicates the accreditation types of the origin and destination institutions during the first transfer. This variable had different categorizations or groupings depending on the table or analysis.

Categorization I
Regional to regional
Regional to national
National to regional
National to national
Other relationship

Categorization II
Regional to regional
Regional to national or other
National or regional or other
National to national or other

Transcript: Accreditation relationship **QGACCREL**
Indicates the accreditation types of the origin and destination institutions.

Regional to regional
Regional to national
National to regional
National to national
Other accreditation relationship

Transcript: Control relationship between schools for first transfer **QDCTLCHG**
Indicates the control of the origin and destination institutions during the first transfer.

Public to public
Public to private nonprofit
Public to private for-profit
Private nonprofit to public
Private nonprofit to private nonprofit
Private nonprofit to private for-profit
Private for-profit to public
Private for-profit to private nonprofit
Private for-profit to private for-profit

Transcript: Control relationship **QGCTLCHG**
Indicates the control of the origin and destination institution.

Public to public
Public to private nonprofit
Public to private for-profit
Private nonprofit to public
Private nonprofit to private nonprofit
Private nonprofit to private for-profit
Private for-profit to public
Private for-profit to private nonprofit
Private for-profit to private for-profit

Transcript: Course credits taken at origin institution first transfer **QDTCRSS**
Total number of credits taken at the origin institution prior to the first transfer.

Transcript: Difference between credits earned and credits transferred **QDTCRDIFF**
The difference in the number of credits earned at the origin institution (QDTCRRS) and the number of credits transferred to the destination institution (QDBTCRRS) for the student's first transfer. Note: This variable was derived for this report and can be computed using the code that accompanies this report.

Transcript: Degree program level transfer type for first transfer **QDPRTYPE**
The type of degree programs the respondent was enrolled in at the origin and destination institutions during the first transfer.

Associate's degree to bachelor's degree
Associate's degree to associate's degree
Associate's degree to undergraduate courses/no degree program
Bachelor's degree to bachelor's degree
Bachelor's degree to associate's degree

Transcript: Degree program level transfer type for first transfer—continued QDPRTYPE

Bachelor's degree to undergraduate courses/no degree program
Undergraduate courses/no degree program to bachelor's degree
Undergraduate courses/no degree program to associate's degree
Undergraduate courses/no degree program to undergraduate courses/no degree program
To and from certificate and other programs

Transfer: First Institution Adjusted Sector TRTYPE_1ST

Indicates the adjusted level (MTLEVEL in the Student Schools dataset), and control (MTCTRL in the Student Schools dataset) of the institution.

Public 4-year
Public 2-year
Public less-than-2-year
Private nonprofit 4-year
Private nonprofit less-than-4-year
Private for-profit 4-year
Private for-profit less-than-4-year

Transcript: Grade point average (GPA) at first institution attended QEGPA1SC

GPA values are calculated using normalized credit values. Normalized credit calculations place hours or credit units received for a course on a common scale so that credit units can be compared across students and institutions.

Categorization I
Continuous

Categorization II
0.00–1.99
2.00–2.99
3.00–4.00

Transcript: Level and control transfer type QGTRTYPE

The level and control of the origin and destination institutions. Note: Four-year institutions that offer predominantly associate's degrees were re-coded to 2-year institutions using the INSTCAT variable in the Integrated Postsecondary Education Data System (IPEDS). This variable had different categorizations or groupings depending on the table or analysis.

Categorization I
Public 2-year
Public 4-year
Private nonprofit 4-year
Private nonprofit 2-year
Private for-profit 4-year
Private for-profit 2-year
Public less-than-2-year
Private nonprofit less-than-2-year
Private for-profit less-than-2-year

Transcript: Level and control transfer type—continued **QGTRTYPE**

Categorization II
Public 2-year
Public 4-year
Private nonprofit 4-year
Private nonprofit 2-year
Private for-profit 4-year
Private for-profit 2-year
Public less-than-2-year
Private nonprofit less-than-2-year
Private for-profit less-than-2-year
Unknown due to bulk credit transfer

Categorization III
Public 4-year to all others
Private nonprofit 4-year to all others
Private for-profit 4-year to all others
Public 2-year to all others
Private nonprofit less-than-4-year to all others
Private for-profit 2-year to all others
Public less-than-2-year to all others
Private for-profit less-than-2-year to all others
All other sector combinations

Categorization IV
Public 4-year to all others
Private nonprofit 4-year to all others
Private for-profit 4-year to all others
Public 2-year to all others
Private nonprofit less-than-4-year to all others
Private for-profit 2-year to all others
Public less-than-2-year to all others
Private for-profit less-than-2-year to all others
Unknown origin due to bulk credit transfer
All other sector combinations

Categorization V
Public 2-year to public 4-year
Public 2-year to public 2-year
Public 4-year to public 4-year
Public 4-year to public 2-year
Public 2-year to private nonprofit 4-year
Private nonprofit 4-year to public 4-year
Public 4-year to private nonprofit 4-year
Private nonprofit 4-year to public 2-year
Private nonprofit 4-year to private nonprofit 4-year
Private for-profit 4-year to other institution
Private for-profit 2-year to other institution
Other institution combination

Transcript: Level relationship between schools for first transfer **QDLVLCHG**

Indicates the level of the origin and destination institutions during the first transfer. Note: Four-year institutions that offer predominantly associate's degrees were re-coded to 2-year institutions using the INSTCAT variable in IPEDS. This variable had different categorizations or groupings depending on the table or analysis.

Categorization I
4-year to 4-year
4-year to 2-year
4-year to Less-than-2-year
2-year to 4-year
2-year to 2-year
2-year to Less-than-2-year
Less-than-2-year to 4-year
Less-than-2-year to 2-year
Less-than-2-year to Less-than-2-year

Categorization II
Vertical
Reverse
Horizontal

Transcript: Level relationship **QGLVLCHG**

Indicates the level of the origin and destination institutions. Note: Four-year institutions that offer predominantly associate's degrees were re-coded to 2-year institutions using the INSTCAT variable in IPEDS.

4-year to 4-year
4-year to 2-year
2-year to 4-year
2-year to 2-year
All others to/from less-than-2-year

Transcript: Overall credits transferred to destination institution **QDBTCRRS**

The total normalized course level or bulk credits accepted at the destination institution from the origin institution during the transfer event. Normalized credit calculations place hours or credit units received for a course on a common scale so that credit units can be compared across students and institutions. This variable had different categorizations or groupings depending on the table or analysis.

Categorization I
Continuous

Categorization II
No credits transferred
Some or all credits transferred

Transcript: Overall credits transferred to destination first transfer **QGBTCRRS**

The total normalized course level or bulk credits accepted at the destination institution during the first transfer. Normalized credit calculations place hours or credit units received for a course on a common scale so that credit units can be compared across students and institutions.

Transcript: Percentage of credits transferred, first transfer **QDTRRAT**
The percentage of credits transferred from the origin institution to the destination institution during the first transfer.

No credits transferred
Some credits transferred
All credits transferred

Transcript: Selectivity relationship for first transfer **QDSELREL**
Indicates the selectivity levels of the origin and destination institutions during the first transfer. This variable had different categorizations or groupings depending on the table or analysis.

Categorization I
Open admission to open admission
Open admission to minimally selective
Open admission to selective
Minimally selective to open admission
Minimally selective to minimally selective
Minimally selective to selective
Selective to open admission
Selective to minimally selective
Selective to selective

Categorization II
To open admission/minimally selective
To selective/moderately selective

Transcript: Total known institutions attended **QDSCHTOT**
Total number of institutions attended.

Weight: BPS:04/09 analysis weight for transcript respondents **WTC000**
The BPS:04/09 panel weight was used to produce this report. This is the longitudinal study weight used for analysis of the 2003–04 first-time postsecondary students who were eligible study respondents and have transcript records.

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Appendix B. Technical Notes and Methodology

Sources of the Data

This report presents data from the 2009 Postsecondary Education Transcript Study (PETS:09). As part of the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), transcripts from all postsecondary institutions attended between July 1, 2003, and June 30, 2009, were requested for the BPS:04 cohort, a sample of students derived from the sample of students selected for the 2003–04 National Postsecondary Student Aid Study (NPSAS:04). The remainder of this appendix describes BPS:04/09 and PETS:09.

Beginning Postsecondary Students Longitudinal Study

The Beginning Postsecondary Students Longitudinal Study (BPS) is conducted for the U.S. Department of Education's National Center for Education Statistics (NCES) to address the need for nationally representative data on key postsecondary education issues. BPS explores topics related to postsecondary enrollment and persistence in the United States and evaluates the benefits of postsecondary education to individuals and society (Radford et al. 2010). BPS:04/09 follows students for 6 years as they navigate the system of postsecondary education, gathering information on transfer patterns, coenrollment, and periods of nonenrollment (stopouts). BPS:04/09 is the third iteration of BPS. The two previous cohorts are BPS:90/94 and BPS:96/2001.

BPS:04/09 Sample Design

The BPS:04/09 sample includes about 18,640 students representing the approximately 3.7 million students who began their postsecondary education in the 2003–04 academic year. BPS sample members were first identified in NPSAS:04, which employed a two-stage sampling design. In the first stage, NPSAS sampled institutions from the universe of all Title IV postsecondary education institutions. In the second stage, BPS sampled students from enrollment lists provided by sampled institutions. A total of 109,210 students were sampled from 1,630 postsecondary

institutions.[1] Of those, the study confirmed that 18,640 students were first-time beginners eligible for the BPS:04/09 sample.

Postsecondary Education Transcript Study

In addition to the student interviews conducted in 2004 and 2009, BPS:04 included the collection of postsecondary transcripts (PETS:09). Transcripts and course catalogs were requested from all institutions attended by the BPS:04 cohort since the first year of enrollment in 2003–04. Institutions were identified during the base-year and follow-up interviews with the sample. For more information about NPSAS and its connection to the BPS, see Cominole et al. (2006). For additional information on BPS:04/09 and the associated PETS:09 transcript collection, see Wine, Janson, and Wheeless (2011).

Data Collection

For the BPS:04 cohort, PETS:09 collected transcripts for 16,960 students from a total of 2,620 institutions. Transcript data collection occurred in two phases. Phase 1, which began in November 2008, collected transcripts from all institutions students reported attending in the first follow-up, BPS:04/06. Similarly, Phase 2, starting in October 2009, collected transcripts from institutions that students reported during the second follow-up, BPS:04/09. In addition, transcripts from transfer institutions listed on any collected transcripts were collected in early 2010. Institutions were provided seven different methods for submitting the requested transcripts, including five secure internet submission options; one option via secure electronic fax; and, when no other method was possible, via FedEx.

[1] The institution-level sampling frame for NPSAS:04 was constructed from the 2000–01 and 2001–02 Integrated Postsecondary Education Data System (IPEDS) Institutional Characteristics files and header files and the 2000 and 2001 Fall Enrollment files. The sample of institutions was freshened using the 2002–03 IPEDS data collection. Students were selected from enrollment lists and were enrolled in either (1) an academic program, (2) at least one course for credit that could be applied toward fulfilling the requirements for an academic degree, or (3) an occupational or vocational program that required at least 3 months or 300 clock hours of instruction to receive a degree, certificate, or other formal award. Students were ineligible for inclusion in the sample if they were concurrently enrolled in high school or in a General Education Development (GED) program. For more information about the sampling design, see the BPS:04/09 Methodology Report (NCES 2012-246).

Institution-Level Response Rates

Of the 3,030 eligible[2] institutions attended by the BPS:04 cohort, 2,620 (87 percent) submitted transcripts for at least one cohort member. Overall, 91 percent of all transcripts requested from these institutions were received. Response rates varied by sector of institution, ranging from 71 percent participation among private for-profit less-than-2-year institutions to 93 percent among private nonprofit 4-year non-doctorate-granting institutions (see table B-1).

Table B-1. Eligible institution participation, by institution type: 2009

Institution type	Total eligible institutions	Institution-level participation[1]	
		Number	Percent
Total	3,030	2,620	86.6
Public			
Less-than-2-year	70	50	77.9
2-year	920	810	88.9
4-year non-doctorate-granting	300	270	90.4
4-year doctorate-granting	260	240	93.4
Private nonprofit			
2-year-or-less	90	80	85.9
4-year non-doctorate-granting	510	460	91.3
4-year doctorate granting	240	210	89.0
Private for-profit			
Less-than-2-year	260	180	70.5
2 years or more	390	310	78.4

[1] An institution was considered a participant if it provided a transcript for at least one student. Sixteen of the participating institutions are not represented in the institution type rows due to unknown institution type.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Postsecondary Student Aid Study (NPSAS:04) and 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Student-Level Response Rates and Bias Analysis

Of the 18,640 students deemed eligible at the end of BPS:04/06, at least one transcript was received for each of 16,960 sample members (91 percent, weighted).[3] As with the institution-level data, response rates varied by institution sector, ranging from 74 percent among private for-profit less-than-2-year institutions to 97 percent among private nonprofit 4-year non-doctorate-granting institutions (see table B-2).

[2] Two percent of the 3,100 institutions attended by BPS:04 cohort students were deemed ineligible because they had closed or because a study respondent had enrolled in, but not attended, the institution.
[3] All response rates reported at the student or item level are weighted.

Table B-2. Unweighted and weighted NPSAS:04 institution response rates and BPS:04/09 student study, interview, panel, and transcript response rates, by type of institution: 2009

Type of institution (base year)	Institution response rate		Eligible sample size	Respondents	Response rate		Overall response rate	
	Unweighted	Weighted			Unweighted	Weighted	Unweighted	Weighted
				BPS:04/09 study respondents				
Total	83.5	80.0	18,540	16,680	90.0	89.2	75.1	71.3
Public								
Less-than-2-year	76.6	74.3	540	430	79.3	79.0	60.7	58.7
2-year	85.4	77.6	6,310	5,570	88.3	87.7	75.4	68.0
4-year non-doctorate-granting	85.1	70.3	1,690	1,590	94.3	93.4	80.2	65.7
4-year doctorate-granting	86.3	87.1	3,070	2,990	97.3	96.7	84.0	84.3
Private nonprofit								
Less-than-4-year	89.0	92.6	530	440	83.4	85.5	74.3	79.2
4-year non-doctorate-granting	81.9	78.1	2,280	2,190	96.1	94.4	78.7	73.7
4-year doctorate-granting	77.7	80.8	1,520	1,490	98.0	97.5	76.2	78.8
Private for-profit								
Less-than-2-year	84.0	82.3	1,450	1,070	74.2	74.3	62.3	61.1
2 years or more	84.4	88.2	1,150	900	78.7	77.9	66.4	68.7
				BPS:04/09 interview respondents				
Total	83.5	80.0	18,540	15,160	81.8	80.2	68.3	64.1
Public								
Less-than-2-year	76.6	74.3	540	420	77.0	77.5	59.0	57.6
2-year	85.4	77.6	6,310	5,010	79.4	78.1	67.8	60.6
4-year non-doctorate-granting	85.1	70.3	1,690	1,430	84.6	82.6	72.0	58.1
4-year doctorate-granting	86.3	87.1	3,070	2,720	88.4	87.2	76.3	76.0
Private nonprofit								
Less-than-4-year	89.0	92.6	530	400	75.7	79.9	67.4	74.0
4-year non-doctorate-granting	81.9	78.1	2,280	1,990	87.2	84.2	71.4	65.8
4-year doctorate-granting	77.7	80.8	1,520	1,340	88.4	86.8	68.7	70.1
Private for-profit								
Less-than-2-year	84.0	82.3	1,450	1,030	70.8	70.6	59.5	58.1
2 years or more	84.4	88.2	1,150	830	72.5	72.2	61.2	63.6

See notes at end of table.

Table B-2. Unweighted and weighted NPSAS:04 institution response rates and BPS:04/09 student study, interview, panel, and transcript response rates, by type of institution: 2009—Continued

Type of institution (base year)	Institution response rate		Eligible sample size		Response rate		Overall response rate	
	Unweighted	Weighted		Respondents	Unweighted	Weighted	Unweighted	Weighted
				BPS:04/09 panel respondents				
Total	83.5	80.0	18,540	16,120	87.0	85.7	72.6	68.6
Public								
Less-than-2-year	76.6	74.3	540	380	70.6	71.3	54.0	53.0
2-year	85.4	77.6	6,310	5,360	85.0	83.6	72.6	64.9
4-year non-doctorate-granting	85.1	70.3	1,690	1,560	92.7	91.7	78.9	64.5
4-year doctorate-granting	86.3	87.1	3,070	2,950	95.9	95.0	82.7	82.7
Private nonprofit								
Less-than-4-year	89.0	92.6	530	420	78.7	80.3	70.1	74.3
4-year non-doctorate-granting	81.9	78.1	2,280	2,170	95.0	92.1	77.8	71.9
4-year doctorate-granting	77.7	80.8	1,520	1,480	97.0	96.5	75.4	78.0
Private for-profit								
Less-than-2-year	84.0	82.3	1,450	950	65.8	64.6	55.3	53.2
2 years or more	84.4	88.2	1,150	860	74.7	74.4	63.0	65.6
				BPS:04/09 transcript respondents				
Total	83.5	80.0	18,540	16,960	91.5	91.4	76.4	73.1
Public								
Less-than-2-year	76.6	74.3	540	400	74.8	74.7	57.3	55.5
2-year	85.4	77.6	6,310	5,840	92.6	91.7	79.0	71.1
4-year non-doctorate-granting	85.1	70.3	1,690	1,540	91.0	90.4	77.5	63.6
4-year doctorate-granting	86.3	87.1	3,070	2,940	95.7	95.9	82.6	83.6
Private nonprofit								
Less-than-4-year	89.0	92.6	530	480	90.0	89.0	80.1	82.4
4-year non-doctorate-granting	81.9	78.1	2,280	2,210	96.8	96.9	79.3	75.7
4-year doctorate-granting	77.7	80.8	1,520	1,440	94.5	95.1	73.5	76.9
Private for-profit								
Less-than-2-year	84.0	82.3	1,450	1,080	74.3	74.0	62.4	60.9
2 years or more	84.4	88.2	1,150	1,030	90.0	89.7	75.9	79.2

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

NCES Statistical Standard 4-4-1 states that "[a]ny survey stage of data collection with a unit or item response rate less than 85 percent must be evaluated for the potential magnitude of nonresponse bias before the data or any analysis using the data may be released" (U.S. Department of Education 2012). At the student level, two institution sectors had response rates below 85 percent; public less-than-2-year and private for-profit less-than-2-year institutions had response rates of 75 and 74 percent, respectively. Nonresponse bias analyses were conducted for each of these institution sectors to determine whether respondents and nonrespondents differed on the following characteristics: institution region and undergraduate enrollment; student dependency, age, gender, high school graduation year, race/ethnicity, income, marital status, and citizenship status; whether a federal financial aid Central Processing System (CPS)[4] record was available for the student at the base year; whether a student had applied for federal aid, was a Pell Grant recipient, or borrowed via a Stafford Loan; and the amount, if any, of a student's Pell Grant or Stafford Loan. Differences between respondents and nonrespondents on these variables were tested for statistical significance at the 5 percent level. Across all institutions, the weight adjustments using WTC000 reduced student transcript nonresponse bias from 41 to 4 percent. For public less-than-2-year institutions, one variable category (1.5 percent) had statistically significant bias after these adjustments. The percentage of categories with statistically significant bias remained constant for private for-profit less-than-2-year before and after the weight adjustments, at 19 percent.

Item Response Rates

For each study item, nonresponse bias analysis could be required at any of three levels: (1) institutions, (2) study respondents, or (3) items. The item-level response rates for the variables used in this report are displayed in table B-3. Most variables used for the analysis in this report have an item-level response rate above 90 percent. The following three variables, however, have item-level response rates below 85 percent:

- QDTRRAT – percentage of credits transferred (first transfer);
- QDTCRDIFF (created for this analysis) – the difference between credits earned (QDTCRSS) and transferred (QDBTCRRS) for the first transfer; and
- QDTCRSS – course credits taken at origin institution of first transfer.

[4] The CPS contains data for students and families who have completed the Free Application for Federal Student Aid (FAFSA).

Table B-3. Item response rates and nonresponse rates for student-level derived variables from the BPS:04/09 transcript data collection: 2003–04 to 2008–09

Variable	Dataset	Description	BPS sample size	Item response rate	Item non-response rate
QDSCHTOT	Derived	Transcript: Total known institutions attended	16,960	100.0	#
HSDEG	NPSAS:04	High school degree type	16,960	99.3	0.7
ATTNSTAT	NPSAS:04	Attendance pattern 2003–04	16,960	98.8	1.2
HISPANIC	NPSAS:04	Ethnicity: Hispanic	16,960	98.5	1.5
SINGLPAR	NPSAS:04	Single-parent independent students 2003–04	16,960	98.6	1.4
DEPEND	NPSAS:04	Dependency status 2003–04	16,960	98.4	1.6
RACECEN	NPSAS:04	Race: Census categories	16,960	97.7	2.3
QGCTLCHG	Transfer	Transcript: Control relationship	13,670	96.8	3.2
QGLVLCHG	Transfer	Transcript: Level relationship	13,670	96.8	3.2
QGTRTYPE	Transfer	Transcript: Level and control transfer type	13,670	96.8	3.2
[calculated]	Derived	Derived: First institution adjusted sector	16,960	96.5	3.5
[calculated]	Derived	Derived: Number of student transfers	16,450	95.8	4.2
QDCTLCHG	Derived	Transcript: Control relationship	6,630	95.2	4.8
QDLVLCHG	Derived	Transcript: Level relationship	6,630	94.7	5.3
QDCTLCHG and QDLVLCHG	Derived	Derived: Institutional Sector (control/level relationship combined)	6,630	94.6	5.4
JOBENR	NPSAS:04	Work intensity while enrolled 2003–04	16,960	94.3	5.7
QGBTCRRS	Transfer	Transcript: Overall credits transferred to destination institution	13,670	94.2	5.8
QGACCREL	Transfer	Transcript: Accreditation relationship	13,670	93.1	6.9
QDSELREL	Derived	Transcript: Selectivity relationship for first transfer	6,630	93.0	7.0
QDBTCRRS	Derived	Transcript: Overall credits transferred to destination first transfer	6,630	92.2	7.8
QDACCREL	Derived	Transcript: Accreditation relationship for first transfer	6,630	92.1	7.9
QDPRTYPE	Derived	Transcript: Degree program level transfer type for first transfer	6,630	91.8	8.2
QEGPA1SC	Derived	Transcript: Grade point average at first institution attended	16,950	90.9	9.1
QDTCRSS	Derived	Transcript: Course credits taken at origin institution first transfer	6,630	74.5	25.5
QDTCRSS and QDBTCRRS	Derived	Derived: Difference between credits earned and transferred	6,630	73.4	26.6
QDTRRAT	Derived	Transcript: Percentage of credits transferred, first transfer	6,340	71.0	29.0

Rounds to zero.
NOTE: Detail may not sum to totals because of rounding. The sample size column contains the number of cases who may have been eligible to "respond" to the item (e.g., the data for the item was reported on the transcript). The item response rates and nonresponse rates were computed using the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09) student transcript analysis weight. The response rate is computed as the number of cases who responded to the item and did not have a legitimate skip for the item divided by the number of cases who did not have a legitimate skip for the item.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Nonresponse bias analysis was conducted to determine if bias was present depending on response status (item respondents versus item nonrespondents) to these three variables as required by NCES standards 4-4-1 and 4-4-3. Differences between respondents and nonrespondents were tested for statistical significance at the 5 percent level on frame variables. A summary of nonresponse bias analysis results for QDTRRAT is presented in table B-4, QDTCRDIFF in table B-5, and QDTCRSS in table B-6. Each of these tables examines the distribution of nonresponses using frame variables from NPSAS:04 (similar to what was done for the BPS:04/09 methodology report):

- institution sector;
- geographic region;
- CPS record match;
- applied for federal aid;
- Pell grant status in base year;
- Pell grant amount in base year;
- Stafford loan status in base year;
- total Stafford loan amount received in base year;
- institutional undergraduate enrollment from NPSAS institution in base year;
- age at base year;
- high school graduation year;
- dependency status in base year;
- income level in base year;
- race/ethnicity;
- gender;
- marital status in base year; and
- citizenship status in base year.

All other PETS:09 variables used in this Statistical Analysis Report had a response rate of 85 percent or higher.

Table B-4. Student item nonresponse bias for responses and nonresponses to the ratio of credits transferred (QDTRRAT) variable, by select variables for all students: 2003–04 to 2008–09

Variable	Unweighted study respondents	Unweighted study non-respondents	Respondent percent	Non-respondent percent	Difference	Estimated bias	*t* test
Sector							
Public less-than-2-year	‡	‡	‡	‡	‡	0.00	2.29*
Public 2-year	2,170	860	53.8	59.2	-0.05	-0.02	1.50
Public 4-year, nondoctorate-granting	580	170	12.8	9.8	0.03	0.01	1.43
Public doctorate-granting	690	190	15.2	12.1	0.03	0.01	2.03*
Private nonprofit less-than-4-year	90	‡	0.6	‡	‡	0.00	0.57
Private/nonprofit 4-year nondoctorate	510	90	8.4	5.3	0.03	0.01	2.89**
Private nonprofit, doctorate-granting	250	100	3.8	5.0	-0.01	0.00	1.25
Private for-profit, less-than-2-year	50	50	1.3	3.2	-0.02	-0.01	1.93
Private for-profit, 2-years or more	150	40	3.8	3.8	0.00	0.00	0.07
Bureau of Economic Analysis region (OBE) code							
New England (CT, ME, MA, NH, RI, VT)	280	130	5.0	5.7	-0.01	0.00	0.64
Mideast (DE, DC, MD, NJ, NY, PA)	650	290	14.2	13.1	0.01	0.00	0.45
Great Lakes (IL, IN, MI, OH, WI)	720	220	16.6	11.4	0.05	0.02	2.76**
Plains (IA, KS, MN, MO, NE, ND, SD)	500	320	7.6	16.2	-0.09	-0.03	2.47*
Southeast (AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV)	1,060	400	23.7	24.3	-0.01	0.00	0.21
Southwest (AZ, NM, OK, TX)	580	190	13.5	11.6	0.02	0.01	0.94
Rocky Mountains (CO, ID, MT, UT, WY)	120	60	3.0	3.7	-0.01	0.00	1.00
Far West (AK, CA, HI, NV, OR, WA)	530	230	15.3	13.4	0.02	0.01	0.99
Outlying Areas (PR)	60	‡	1.2	‡	‡	0.00	1.80
CPS record available at base year							
No	1,200	460	32.4	28.6	0.04	0.01	1.69
Yes	3,290	1,370	67.6	71.4	-0.04	-0.01	1.69
Applied for federal aid							
No	1,020	390	28.5	25.3	0.03	0.01	1.52
Yes	3,470	1,440	71.5	74.7	-0.03	-0.01	1.52

See notes at end of table.

Table B-4. Student item nonresponse bias for responses and nonresponses to the ratio of credits transferred (QDTRRAT) variable, by select variables for all students: 2003–04 to 2008–09—Continued

Variable	Unweighted study respondents	Unweighted study non-respondents	Respondent percent	Non-respondent percent	Difference	Estimated bias	*t* test
Pell grant status							
No	3,070	1,310	71.3	72.5	-0.01	0.00	0.56
Yes	1,420	530	28.7	27.5	0.01	0.00	0.56
Pell grant amount at base year							
0	3,070	1,310	71.3	72.5	-0.01	0.00	0.56
Up to $2,000	460	180	10.7	10.7	0.00	0.00	0.03
$2,001 to $3,700	470	170	9.8	8.9	0.01	0.00	0.71
$3,701 or more	490	180	8.3	8.0	0.00	0.00	0.33
Stafford loan status							
No	2,670	1,090	66.1	66.2	0.00	0.00	0.06
Yes	1,820	740	33.9	33.8	0.00	0.00	0.06
Total Stafford loan amount received							
$0 (zero)	2,670	1,090	66.1	66.2	0.00	0.00	0.06
$1 to $2,624	360	130	7.0	6.9	0.00	0.00	0.13
$2,625	1,110	470	19.8	19.1	0.01	0.00	0.45
More than $2,625	360	140	7.1	7.8	-0.01	0.00	0.46
Institutional undergraduate enrollment (base year)							
0–1,991	1,080	430	20.0	20.1	0.00	0.00	0.05
1,992–6,958	1,310	530	29.2	28.8	0.00	0.00	0.07
6,959–16,918	1,100	430	26.7	26.5	0.00	0.00	0.05
16,919 or more	1,010	450	24.2	24.5	0.00	0.00	0.14
Age at base year							
15 to 18 years old	2,540	1,020	54.4	50.6	0.04	0.01	1.54
19 years old	1,320	530	28.0	27.8	0.00	0.00	0.12
20 to 23 years old	340	120	9.4	8.5	0.01	0.00	0.75
24 to 29 years old	140	80	3.8	6.2	-0.02	-0.01	2.11*
Over 30 years old	150	90	4.4	7.0	-0.03	-0.01	1.83

See notes at end of table.

Table B-4. Student item nonresponse bias for responses and nonresponses to the ratio of credits transferred (QDTRRAT) variable, by select variables for all students: 2003–04 to 2008–09—Continued

Variable	Unweighted study respondents	Unweighted study non-respondents	Respondent percent	Non-respondent percent	Difference	Estimated bias	*t* test
High school graduation year							
Before 1998	90	60	3.1	6.0	-0.03	-0.01	1.97*
1998–2002	500	190	14.3	15.5	-0.01	0.00	0.65
2003–04	3,750	1,500	82.3	78.1	0.04	0.01	2.00*
Did not graduate high school	‡	‡	‡	‡	‡	0.00	0.20
Dependency status at base year							
Dependent	3,990	1,590	85.8	80.7	0.05	0.02	2.34*
Independent	510	250	14.2	19.3	-0.05	-0.02	2.34*
Income level at base year							
Dependent: Less than $10,000	210	60	4.5	3.7	0.01	0.00	0.96
Dependent: $10,000-$19,999	280	100	5.8	4.7	0.01	0.00	1.22
Dependent: $20,000-$29,999	370	130	7.6	6.3	0.01	0.00	1.52
Dependent: $30,000-$39,999	400	140	8.8	7.3	0.02	0.00	1.52
Dependent: $40,000-$49,999	360	140	8.1	6.3	0.02	0.01	2.08*
Dependent: $50,000-$59,999	320	120	7.2	5.5	0.02	0.01	1.85
Dependent: $60,000-$69,999	370	160	8.2	8.8	-0.01	0.00	0.43
Dependent: $70,000-$79,999	300	120	7.2	5.9	0.01	0.00	1.29
Dependent: $80,000-$99,999	510	230	10.2	11.1	-0.01	0.00	0.73
Dependent: $100,000 or more	860	400	18.2	21.2	-0.03	-0.01	1.55
Independent: Less than $5,000	110	50	2.2	2.9	-0.01	0.00	0.90
Independent: $5,000-$9,999	70	30	2.0	2.4	0.00	0.00	0.66
Independent: $10,000-$19,999	120	50	3.2	3.6	0.00	0.00	0.35
Independent: $20,000-$29,999	80	40	2.1	3.1	0.00	0.00	1.16
Independent: $30,000-$49,999	80	50	2.1	3.7	-0.02	0.00	1.94
Independent: $50,000 or more	60	40	2.6	3.6	-0.01	0.00	0.93

See notes at end of table.

Table B-4. Student item nonresponse bias for responses and nonresponses to the ratio of credits transferred (QDTRRAT) variable, by select variables for all students: 2003–04 to 2008–09—Continued

Variable	Unweighted study respondents	Unweighted study non-respondents	Respondent percent	Non-respondent percent	Difference	Estimated bias	*t* test
Race/ethnicity							
White	2,980	1,310	64.1	68.4	-0.04	-0.01	1.73
Black or African American	530	180	12.1	12.9	-0.01	0.00	0.54
Asian	510	160	12.5	9.0	0.04	0.01	2.45*
American Indian or Alaska Native	240	120	6.1	5.8	0.00	0.00	0.30
All other race/ethnicities, including more than one race	230	70	5.1	4.0	0.01	0.00	1.62
Gender							
Male	1,860	690	43.1	38.8	0.04	0.01	2.19*
Female	2,640	1,150	56.9	61.2	-0.04	-0.01	2.19*
Marital status at base year							
Single, divorced, or widowed	4,290	1,720	93.8	90.9	0.03	0.01	1.88
Married	180	100	5.5	8.5	-0.03	-0.01	1.98*
Separated	‡	‡	‡	‡	‡	0.00	0.42
Citizenship at base year							
U.S. citizen	4,240	1,720	93.4	92.7	0.01	0.00	0.58
Resident alien	190	80	4.7	6.0	-0.01	0.00	1.07
Foreign or international student	60	30	1.9	1.3	0.01	0.00	1.24

Rounds to zero.
‡ Does not meet reporting standards because there are too few cases to report.
* $p < .05$
** $p < .01$
NOTE: Standard postal service abbreviations are used. CPS = Central Processing System. Detail may not sum to totals because of rounding. The sample size column contains the number of cases who may have been eligible to "respond" to the item (e.g., the data for the item was reported on the transcript). The item response rates and nonresponse rates were computed using the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09) student transcript analysis weight. The response rate is computed as the number of cases who responded to the item and did not have a legitimate skip for the item, divided by the number of cases who did not have a legitimate skip for the item.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Table B-5. Student item nonresponse bias for responses and nonresponses to the difference between the credits earned at the origin institution and the credits transferred (QDCRDIFF) variable, by select variables for all students: 2003–04 to 2008–09

Variable	Unweighted study respondents	Unweighted study non-respondents	Respondent percent	Non-respondent percent	Difference	Estimated bias	*t* test
Sector							
Public less-than-2-year	‡	‡	‡	‡	‡	0.00	1.48
Public 2-year	2,360	810	53.8	59.8	-0.06	-0.02	1.68
Public 4-year, nondoctorate-granting	610	160	12.6	9.7	0.03	0.01	1.35
Public doctorate-granting	740	180	15.1	12.0	0.03	0.01	1.98*
Private nonprofit, less-than-4-year	90	‡	0.6	‡	‡	0.00	0.54
Private/nonprofit 4-year nondoctorate	530	80	8.2	5.1	0.03	0.01	3.18**
Private nonprofit, doctorate-granting	270	90	3.7	5.0	-0.01	0.00	1.35
Private for-profit, less-than-2-year	60	50	1.3	3.3	-0.02	-0.01	1.95
Private for-profit, 2-years or more	180	40	4.3	3.8	0.00	0.00	0.35
Bureau of Economic Analysis region (OBE) code							
New England (CT, ME, MA, NH, RI, VT)	290	120	4.9	5.7	-0.01	0.00	0.76
Mideast (DE, DC, MD, NJ, NY, PA)	710	270	14.3	12.6	0.02	0.00	0.65
Great Lakes (IL, IN, MI, OH, WI)	770	210	16.3	11.3	0.05	0.01	2.67**
Plains (IA, KS, MN, MO, NE, ND, SD)	540	300	7.7	15.7	-0.08	-0.02	2.19*
Southeast (AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV)	1,160	390	23.9	24.8	-0.01	0.00	0.26
Southwest (AZ, NM, OK, TX)	630	180	13.4	12.3	0.01	0.00	0.51
Rocky Mountains (CO, ID, MT, UT, WY)	130	50	2.9	3.7	-0.01	0.00	1.14
Far West (AK, CA, HI, NV, OR, WA)	580	210	15.6	13.1	0.02	0.01	1.22
Outlying Areas (PR)	60	‡	1.0	‡	‡	0.00	1.55
CPS record available at base year							
No	1,300	450	32.6	28.8	0.04	0.01	1.68
Yes	3,570	1,310	67.4	71.2	-0.04	-0.01	1.68
Applied for federal aid							
No	1,110	380	28.7	25.3	0.03	0.01	1.67
Yes	3,750	1,380	71.3	74.7	-0.03	-0.01	1.67

See notes at end of table.

Table B-5. Student item nonresponse bias for responses and nonresponses to the difference between the credits earned at the origin institution and the credits transferred (QDCRDIFF) variable, by select variables for all students: 2003–04 to 2008–09—Continued

Variable	Unweighted study respondents	Unweighted study non-respondents	Respondent percent	Non-respondent percent	Difference	Estimated bias	*t* test
Pell grant status							
No	3,310	1,250	71.1	72.1	-0.01	0.00	0.45
Yes	1550	510	28.9	27.9	0.01	0.00	0.45
Pell grant amount at base year							
0	3,310	1,250	71.1	72.1	-0.01	0.00	0.45
Up to $2,000	520	170	11.0	10.9	0.00	0.00	0.11
$2,001 to $3,700	520	170	9.9	9.0	0.01	0.00	0.75
$3,701 or more	510	170	8.0	8.1	0.00	0.00	0.09
Stafford loan status							
No	2,910	1,050	66.6	65.9	0.01	0.00	0.27
Yes	1,960	710	33.4	34.1	-0.01	0.00	0.27
Total Stafford loan amount received							
$0 (zero)	2,910	1,050	66.6	65.9	0.01	0.00	0.27
$1 to $2,624	400	130	7.1	7.0	0.00	0.00	0.03
$2,625	1,160	450	19.2	19.2	0.00	0.00	0.01
More than $2625	410	140	7.2	7.9	-0.01	0.00	0.47
Institutional undergraduate enrollment (base year)							
0–1,991	1,190	420	20.6	19.5	0.01	0.00	0.47
1,992–6,958	1,390	520	28.5	30.0	-0.02	0.00	0.31
6,959–16,918	1,190	400	27.0	26.1	0.01	0.00	0.28
16,919 or more	1,090	420	24.0	24.4	0.00	0.00	0.17
Age at base year							
15 to 18 years old	2,720	970	53.5	50.8	0.03	0.01	1.07
19 years old	1,440	510	28.5	26.7	0.02	0.01	0.99
20 to 23 years old	390	120	9.8	8.4	0.01	0.00	1.20
24 to 29 years old	160	80	3.8	6.5	-0.03	-0.01	2.41*
Over 30 years old	160	90	4.4	7.6	-0.03	-0.01	2.17*

See notes at end of table.

Table B-5. Student item nonresponse bias for responses and nonresponses to the difference between the credits earned at the origin institution and the credits transferred (QDCRDIFF) variable, by select variables for all students: 2003–04 to 2008–09—Continued

Variable	Unweighted study respondents	Unweighted study non-respondents	Respondent percent	Non-respondent percent	Difference	Estimated bias	*t* test
High school graduation year							
Before 1998	100	60	2.9	6.3	-0.03	-0.01	2.26*
1998–2002	570	190	14.8	15.6	-0.01	0.00	0.46
2003–2004	4,030	1,430	81.9	77.7	0.04	0.01	2.02*
Did not graduate high school	‡	‡	‡	‡	‡	0.00	0.06
Dependency status at base year							
Dependent	4,290	1,510	85.5	79.6	0.06	0.02	2.59**
Independent	570	250	14.5	20.4	-0.06	-0.02	2.59**
Income level at base year							
Dependent: Less than $10,000	220	60	4.3	3.8	0.01	0.00	0.63
Dependent: $10,000-$19,999	310	90	5.9	4.8	0.01	0.00	1.21
Dependent: $20,000-$29,999	400	120	7.7	6.3	0.01	0.00	1.57
Dependent: $30,000-$39,999	430	130	8.8	7.0	0.02	0.00	1.85
Dependent: $40,000-$49,999	390	130	8.0	6.3	0.02	0.00	1.90
Dependent: $50,000-$59,999	350	120	7.4	5.1	0.02	0.01	2.73**
Dependent: $60,000-$69,999	400	150	8.0	8.8	-0.01	0.00	0.65
Dependent: $70,000-$79,999	330	110	7.2	5.6	0.02	0.00	1.69
Dependent: $80,000-$99,999	550	220	10.0	11.1	-0.01	0.00	0.86
Dependent: $100,000 or more	920	390	18.1	20.7	-0.03	-0.01	1.41
Independent: $5,000-$9,999	80	30	2.0	2.7	-0.01	0.00	0.94
Independent: Less than $5,000	120	40	2.3	2.9	-0.01	0.00	0.80
Independent: $10,000-$19,999	140	50	3.4	4.1	-0.01	0.00	0.59
Independent: $20,000-$29,999	90	40	2.1	3.1	0.00	0.00	1.19
Independent: $30,000-$49,999	80	50	2.2	4.0	-0.02	0.00	2.02*
Independent: $50,000 or more	60	30	2.5	3.7	-0.01	0.00	1.09

See notes at end of table.

Table B-5. Student item nonresponse bias for responses and nonresponses to the difference between the credits earned at the origin institution and the credits transferred (QDCRDIFF) variable, by select variables for all students: 2003–04 to 2008–09—Continued

Variable	Unweighted study respondents	Unweighted study non-respondents	Respondent percent	Non-respondent percent	Difference	Estimated bias	*t* test
Race/ethnicity							
White	3,200	1,260	63.6	68.5	-0.05	-0.01	1.91
Black or African American	580	180	11.9	13.5	-0.02	0.00	0.98
Asian	560	150	13.0	8.6	0.04	0.01	3.24**
American Indian or Alaska Native	260	110	6.0	5.7	0.00	0.00	0.32
All other race/ethnicities including more than one race	260	70	5.4	3.7	0.02	0.00	2.35*
Gender							
Male	2,010	660	42.8	38.7	0.04	0.01	2.06*
Female	2,860	1,100	57.2	61.3	-0.04	-0.01	2.06*
Marital status at base year							
Single, divorced, or widowed	4,640	1,650	93.8	90.5	0.03	0.01	2.18*
Married	190	100	5.5	8.9	-0.03	-0.01	2.27*
Separated	30	‡	0.7	‡	‡	0.00	0.39
Citizenship at base year							
U.S. citizen	4,580	1,650	93.4	92.5	0.01	0.00	0.65
Resident alien	210	80	4.8	6.2	-0.01	0.00	1.08
Foreign or international student	70	‡	1.8	‡	‡	0.00	1.03

Rounds to zero.
‡ Does not meet reporting standards because there are too few cases to report.
* $p < .05$
** $p < .01$
NOTE: Standard postal service abbreviations are used. CPS = Central Processing System. Detail may not sum to totals because of rounding. The sample size column contains the number of cases who may have been eligible to "respond" to the item (e.g., the data for the item was reported on the transcript). The item response rates and nonresponse rates were computed using the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09) student transcript analysis weight. The response rate is computed as the number of cases who responded to the item and did not have a legitimate skip for the item divided by the number of cases who did not have a legitimate skip for the item.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Table B-6. Student item nonresponse bias for responses and nonresponses to the number of credits earned at the origin institution (QDTCRSS) variable, by select variables for all students: 2003–04 to 2008–09

Variable	Unweighted study respondents	Unweighted study non-respondents	Respondent percent	Non-respondent percent	Difference	Estimated bias	*t* test
Sector							
Public less-than-2-year	‡	‡	‡	‡	‡	0.00	1.55
Public 2-year	2,400	770	53.9	60.0	-0.06	-0.02	1.63
Public 4-year, nondoctorate-granting	620	160	12.6	9.5	0.03	0.01	1.39
Public doctorate-granting	750	170	15.1	11.7	0.03	0.01	2.08*
Private nonprofit, less-than-4-year	100	‡	0.6	‡	‡	0.00	0.63
Private/nonprofit 4-year nondoctorate	540	80	8.2	4.9	0.03	0.01	3.40***
Private nonprofit, doctorate-granting	270	90	3.7	5.1	-0.01	0.00	1.37
Private for-profit, less-than-2-year	60	50	1.3	3.5	-0.02	-0.01	2.06*
Private for-profit, 2-years or more	180	40	4.2	4.0	0.00	0.00	0.17
Bureau of Economic Analysis region (OBE) code							
New England (CT, ME, MA, NH, RI, VT)	290	120	4.8	5.9	-0.01	0.00	0.90
Mideast (DE, DC, MD, NJ, NY, PA)	710	270	14.2	12.7	0.02	0.00	0.63
Great Lakes (IL, IN, MI, OH, WI)	780	200	16.2	11.3	0.05	0.01	2.63**
Plains (IA, KS, MN, MO, NE, ND, SD)	550	290	7.9	15.7	-0.08	-0.02	2.04*
Southeast (AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV)	1,180	370	23.9	24.8	-0.01	0.00	0.26
Southwest (AZ, NM, OK, TX)	640	170	13.4	12.2	0.01	0.00	0.58
Rocky Mountains (CO, ID, MT, UT, WY)	130	50	2.9	3.7	-0.01	0.00	1.04
Far West (AK, CA, HI, NV, OR, WA)	590	200	15.5	13.1	0.02	0.01	1.15
Outlying Areas (PR)	60	‡	1.0	‡	‡	0.00	1.41
CPS record available at base year							
No	1,310	430	32.4	29.0	0.03	0.01	1.49
Yes	3,620	1,260	67.6	71.0	-0.03	-0.01	1.49
Applied for federal aid							
No	1,130	360	28.6	25.5	0.03	0.01	1.47
Yes	3,810	1,330	71.4	74.5	-0.03	-0.01	1.47

See notes at end of table.

Table B-6. Student item nonresponse bias for responses and nonresponses to the number of credits earned at the origin institution (QDTCRSS) variable, by select variables for all students: 2003–04 to 2008–09—Continued

Variable	Unweighted study respondents	Unweighted study non-respondents	Respondent percent	Non-respondent percent	Difference	Estimated bias	*t* test
Pell grant status							
No	3,360	1,200	71.1	72.1	-0.01	0.00	0.44
Yes	1,570	490	28.9	27.9	0.01	0.00	0.44
Pell grant amount at base year							
0	3,360	1,200	71.1	72.1	-0.01	0.00	0.44
Up to $2,000	520	170	11.0	11.0	0.00	0.00	0.01
$2,001 to $3,700	530	160	9.8	9.1	0.01	0.00	0.61
$3,701 or more	520	160	8.1	7.8	0.00	0.00	0.24
Stafford loan status							
No	2,950	1,010	66.4	66.3	0.00	0.00	0.06
Yes	1,990	680	33.6	33.7	0.00	0.00	0.06
Total Stafford loan amount received							
$0 (zero)	2,950	1,010	66.4	66.3	0.00	0.00	0.06
$1 to $2,624	400	120	7.2	6.7	0.00	0.00	0.51
$2,625	1,170	440	19.1	19.3	0.00	0.00	0.08
More than $2,625	410	130	7.2	7.7	0.00	0.00	0.31
Institutional undergraduate enrollment (base year)							
0–1,991	1,210	400	20.6	19.3	0.01	0.00	0.55
1,992–6,958	1,410	500	28.4	30.3	-0.02	-0.01	0.39
6,959–16,918	1,210	380	27.0	25.9	0.01	0.00	0.37
16,919 or more	1,100	410	23.9	24.5	-0.01	0.00	0.20
Age at base year							
15 to 18 years old	2,760	930	53.6	50.4	0.03	0.01	1.21
19 years old	1,460	480	28.6	26.6	0.02	0.01	1.06
20 to 23 years old	390	110	9.8	8.5	0.01	0.00	1.09
24 to 29 years old	160	70	3.8	6.7	-0.03	-0.01	2.59**
Over 30 years old	160	90	4.3	7.8	-0.03	-0.01	2.26*

See notes at end of table.

Table B-6. Student item nonresponse bias for responses and nonresponses to the number of credits earned at the origin institution (QDTCRSS) variable, by select variables for all students: 2003–04 to 2008–09—Continued

Variable	Unweighted study respondents	Unweighted study non-respondents	Respondent percent	Non-respondent percent	Difference	Estimated bias	*t* test
High school graduation year							
Before 1998	100	60	2.8	6.5	-0.04	-0.01	2.37*
1998–2002	570	180	14.7	15.9	-0.01	0.00	0.66
2003–2004	4,090	1,370	82.1	77.1	0.05	0.01	2.31*
Did not graduate HS	‡	‡	‡	‡	‡	0.00	0.01
Dependency status at base year							
Dependent	4,360	1,450	85.7	79.0	0.07	0.02	2.83**
Independent	580	240	14.3	21.0	-0.07	-0.02	2.83**
Income level at base year							
Dependent: Less than $10,000	230	60	4.3	3.8	0.01	0.00	0.66
Dependent: $10,000-$19,999	320	90	6.0	4.6	0.01	0.00	1.48
Dependent: $20,000-$29,999	410	120	7.7	6.4	0.01	0.00	1.40
Dependent: $30,000-$39,999	440	120	8.9	6.9	0.02	0.01	2.18*
Dependent: $40,000-$49,999	390	130	8.0	6.3	0.02	0.00	1.79
Dependent: $50,000-$59,999	350	110	7.4	5.1	0.02	0.01	2.65**
Dependent: $60,000-$69,999	410	140	8.1	8.6	-0.01	0.00	0.42
Dependent: $70,000-$79,999	340	100	7.2	5.6	0.02	0.00	1.55
Dependent: $80,000-$99,999	560	210	10.1	11.1	-0.01	0.00	0.82
Dependent: $100,000 or more	930	370	18.2	20.6	-0.02	-0.01	1.25
Independent: Less than $5,000	120	40	2.3	2.9	-0.01	0.00	0.82
Independent: $5,000-$9,999	80	30	2.0	2.8	-0.01	0.00	1.10
Independent: $10,000-$19,999	140	50	3.4	4.1	-0.01	0.00	0.66
Independent: $20,000-$29,999	90	40	2.1	3.2	0.00	0.00	1.21
Independent: $30,000-$49,999	80	50	2.2	4.1	-0.02	-0.01	2.18*
Independent: $50,000 or more	60	30	2.5	3.8	-0.01	0.00	1.21

See notes at end of table.

Table B-6. Student item nonresponse bias for responses and nonresponses to the number of credits earned at the origin institution (QDTCRSS) variable, by select variables for all students: 2003–04 to 2008–09—Continued

Variable	Unweighted study respondents	Unweighted study non-respondents	Respondent percent	Non-respondent percent	Difference	Estimated bias	*t* test
Race/ethnicity							
White	3,260	1,200	63.8	68.1	-0.04	-0.01	1.63
Black or African American	580	170	11.9	13.8	-0.02	-0.01	1.16
Asian	570	140	12.9	8.7	0.04	0.01	3.13**
American Indian or Alaska Native	270	110	6.0	5.8	0.00	0.00	0.24
All other race/ethnicities including more than one race	260	60	5.4	3.7	0.02	0.00	2.18*
Gender							
Male	2,030	640	42.6	38.9	0.04	0.01	1.84
Female	2,910	1,050	57.4	61.1	-0.04	-0.01	1.84
Marital status at base year							
Single, divorced, or widowed	4,710	1,580	93.9	90.3	0.04	0.01	2.31*
Married	200	100	5.4	9.1	-0.04	-0.01	2.38*
Separated	30	‡	0.7	‡	‡	0.00	0.28
Citizenship at base year							
U.S. citizen	4,650	1,580	93.4	92.3	0.01	0.00	0.79
Resident alien	210	80	4.7	6.3	-0.02	0.00	1.24
Foreign or international student	70	‡	1.8	‡	‡	0.00	1.06

Rounds to zero.
‡ Does not meet reporting standards because there are too few cases to report.
* $p < .05$
** $p < .01$
*** $p < .001$
NOTE: Standard postal service abbreviations are used. CPS = Central Processing System. Detail may not sum to totals because of rounding. The sample size column contains the number of cases who may have been eligible to "respond" to the item (e.g., the data for the item was reported on the transcript). The item response rates and nonresponse rates were computed using the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09) student transcript analysis weight. The response rate is computed as the number of cases who responded to the item and did not have a legitimate skip for the item divided by the number of cases who did not have a legitimate skip for the item.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

For more detailed information on nonresponse bias analysis and an overview of the survey methodology, see *2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09): Full-Scale Methodology Report* (http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2012246).

Confidentiality Protection

To protect the confidentiality of NCES data that contain information about specific individuals and to minimize disclosure risks, BPS:04/09 data and, by extension, the associated PETS:09 data, were subject to perturbation procedures. Perturbation procedures, which have been approved by the NCES Disclosure Review Board, preserve the central tendency estimates but may result in slight increases in nonsampling errors.

Weighting

The composition of the sample of students for whom transcripts were collected differed from those who were interviewed, and therefore, a specific weight was constructed for analyzing transcript data. Of the 18,640 eligible students, 16,960 had at least one transcript provided by a postsecondary institution, 110 were deceased, and the remaining 1,580 were considered nonrespondents when calculating this weight. Construction of this weight began with the BPS:04/06 analysis weight. Nonresponse adjustments were implemented using the WTADJUST procedure in SUDAAN and incorporating a model-based constrained logistic weighting procedure. Calibration methods to ensure the weights added to the sum of the BPS:04/09 study weights for eligible cases were also applied.

Statistical Procedures

Bivariate Comparisons

Comparisons of means were tested using an adjusted Wald test for linear hypotheses using Stata's "test" postestimation command. Differences between estimates were tested against the probability of a Type I error[5] or significance level. The statistical

[5] A Type I error occurs when one concludes that a difference observed in a sample reflects a true difference in the population from which the sample was drawn, when no such difference is present.

significance of each comparison was determined by calculating the Wald test for the difference between each pair of means or proportions and comparing the *F* value with published tables of significance levels for two-tailed hypothesis testing. The Wald values were computed to test differences between independent estimates using the following formula:

$$Z_o = \frac{\beta_1 - \beta_j}{SE(\beta_1)} \quad (1)$$

Where Z_o is the Wald Statistic (which can be compared to an *F* distribution; β_1 and β_j are estimates; and $SE(\beta_1)$ is the standard error of β_1, which is in the denominator. The test is "adjusted" because the standard errors were corrected using Balanced Repeated Replication (BRR) weights.

For proportions, a Pearson chi-squared test was computed using the following formula:

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e} \quad (2)$$

Where χ^2 is the chi-squared statistic, f_o is the observed frequency in a table cell, and f_e is the expected frequency in the cell. Chi-square is equal to the sum of the squared difference between the observed frequency (f_o) and the expected frequency (f_e) divided by the expected frequency (f_e). The chi-square, however, does not account for the variance correction procedures to adjust for the complex sampling design. The chi-squared statistic is corrected for the complex survey design using the second-order correction of Rao and Scott (1984). The resulting statistic is an *F* statistic.

There are hazards in reporting statistical tests for each comparison. First, comparisons based on large *t* statistics may appear to merit special attention. This can be misleading because the magnitude of the *t* statistic is related not only to the observed differences in means or percentages but also to the number of respondents in the specific categories used for comparison. Hence, a small difference compared across a large number of respondents would produce a large (and thus possibly statistically significant) *t* statistic. To address this issue, we use variance correction procedures to estimate more accurate standard errors despite the large sample size.

A second hazard in reporting statistical tests is the possibility that one can report a "false positive" or Type I error. Statistical tests are designed to limit the risk of this type of error using a value denoted by alpha. The alpha level of .01 was selected for findings in this report and ensures that a difference of a certain magnitude or larger

would be produced when there was no actual difference between the quantities in the underlying population no more than 1 time out of 100.

When a large number of comparisons in a table are tested, Type I errors become more likely. Therefore, the results of multiple comparison tests should be interpreted with caution. In this analysis, comparisons of student transfers from public less-than-2-year institutions were made both overall and also for each of the other six institution sectors (public 4-year, public 2-year, private nonprofit 4-year, private nonprofit less-than-4-year, private for-profit 4-year, and private for-profit less-than-4-year). As the number of simultaneous comparisons increases, the likelihood of a Type I error also increases. The probability of a Type I error for these comparisons taken as a group is larger than the probability for a single comparison. When more than one comparison between groups of related characteristics are tested for statistical significance, one must apply a standard that assures a level of significance for all of those comparisons taken together. This report uses an alpha level of .01 instead of .05 for all statistical tests except for the nonresponse bias analysis noted above. When test hypotheses indicate alpha values at the .01 level or smaller, the null hypothesis that there is no difference between the two quantities is rejected. Failing to reject a null hypothesis, that is, to detect a difference, however, does not imply that the values are the same or equivalent.

Multivariate Modeling

The model used for the analysis of transfer credit was chosen due to some unique characteristics of the dependent variable. The dependent variable, the total number of credits transferred, is positively skewed with a high proportion of zero values. This is likely due to two different processes impacting the number of students with zero credits transferring. Specifically, the zero count in the number of credits transferred is "inflated" due to students who never attempted to transfer credit (i.e., the institution never reviewed courses for possible transfer; process #1). The "noninflated" zeros are those where students made an attempt to transfer credit, but zero credits were transferred. This group should be modeled separately with students who had credits transfer (process #2). Because no data were collected to distinguish the two groups of students, a statistical technique is required to model for the number of zeros needed to account for the second process.

The statistical method used to examine dependent variables with this characteristic is Zero-inflated Negative Binomial regression (ZINB). The basic assumption of this statistical technique is that the number of zero values is overly represented and that these excess zeros are generated through two distinct processes (similar to what is described above). The ZINB regression technique generates estimates for two

models simultaneously: (1) a logistic regression model, with its own independent variables, which describes the two processes that lead to zero credits transferred as an outcome (the probability that zero credits transfer, presumably from process #1); and (2) a negative binomial model to describe the number of credits transferred (Erdman, Jackson, and Sinko 2008; Long and Freese 2001).

The logistic regression component of the model can be represented by the following equation:

$$\varphi_i = \Pr(always\ zero \mid z_i) = \frac{e^{z_i\gamma}}{1+e^{z_i\gamma}} \quad (3)$$

where φ_i is the probability that a student with an observed count of zero is in the always zero group (due to process #1 – transfer credits never being reviewed). The independent variables, represented by the vector z_i include transfer direction, institutional control of the origin and destination institutions, accreditation relationship, selectivity relationship, grade point average (GPA) prior to transfer, and months enrolled prior to transfer. Additional control variables were added because process #1 is dependent on the behavior of the student, who needs to interact with the institution during the credit transfer process. These include dependency status, single parent status, responsibility for dependents, employment status, type of high school credential, attendance intensity in the first year, race, ethnicity, and gender. The parameter estimates associated with z_i are represented by γ.

The negative binomial component of the model is represented by the following equation and derives the expected number of credits transferred:

$$E(y_i|x_i) = \lambda_i = e^{x_i\beta} \quad (4)$$

where the dependent variable y_i is the natural log of the number of credits transferred and x_i represents the vector of independent variables; x_i can differ from the variables in the logistic function as is the case presented in this transfer of credit model. Independent variables include transfer direction, institutional control of the origin and destination institutions, accreditation relationship, selectivity relationship, GPA prior to transfer, and months enrolled prior to transfer. Student demographic characteristics are excluded from the negative binomial component of the model because process #2 is institutionally driven. The parameter estimates associated with x_i are represented by β. Lambda (λ_i) is a shortened version of the equation.

Equation 4 used in the negative binomial component is identical to the Poisson regression equation. ZINB regression differs from the Poisson in the probability of

observing a specific count given x_i. In Poisson regression, the probability of an observed count of y_i conditioned on x_i is calculated using the following equation:

$$\Pr(y_i | x_i) = \frac{e^{-e^{x_i\beta}}(e^{x_i\beta})^{y_i}}{y_i!} \quad \text{or} \quad \frac{e^{-\lambda_i}(\lambda_i)^{y_i}}{y_i!} \tag{5}$$

ZINB on the other hand, models for the probability of an observed count of y_i on both the vector x_i and the observation not being part of the always zero group due to process #2 (i.e., transfer credits were reviewed). The adjusted equation is as follows:

$$\Pr(y_i \mid x_i, not\ always\ zero) = \frac{\Gamma(y_i + \alpha^{-1})}{y_i!\Gamma(\alpha^{-1})}\left(\frac{\alpha^{-1}}{\alpha^{-1}+e^{x_i\beta}}\right)^{\alpha^{-1}}\left(\frac{e^{x_i\beta}}{\alpha^{-1}+e^{x_i\beta}}\right)^{y_i} \tag{6}$$

An additional measure of dispersion (represented by α) and the gamma distribution of error terms associated with α (represented by Γ), relax the assumption that the variance of the dependent variable must equal the mean. When α is zero (no dispersion in the dependent variable), Equation 6 becomes the Poisson regression equation (Equation 5 above). For a detailed description of the equations used to derive ZINB estimates, see Greene (1994) and Long and Freese (2001).

By distinguishing between zeros produced by two separate data-generating processes, the ZINB model addresses the overdispersion of a distribution as well as a higher number of zeros than would be expected in a normal distribution. Diagnostic tests ensure that distribution of the dependent variable fits the assumptions of the ZINB model, one that tests the null hypothesis that α does not equal zero (i.e., that the data are not overly dispersed) and another that tests the null hypothesis that there are not a higher number of zero values than would be expected in a normal negative binomial distribution (i.e., the Vuong test).

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Appendix C. Figure and Standard Error Tables

Table C-1. Standard errors: Among first-time beginning undergraduate students in 2003–04, the percentage of students attending multiple institutions, by transfer status: 2003–04 to 2008–09

Known institutions attended	All students	Students who transferred
One	1.3	†
Two	1.1	1.2
Three	0.4	0.9
Four	0.2	0.5
Five or more	0.1	0.3

† Not applicable.
NOTE: Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit. The "moderately selective" and "selective" classifications were recoded into one "selective" group.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Table C-2. Among first-time beginning undergraduate students in 2003–04 who transferred, the percentage distribution of all potential transfer opportunities, by control, level, sector, and accreditation relationship: 2003–04 to 2008–09

Institution relationship (using predominate degree level)	Percent of transfer opportunities
Control	
Public to public	1.0
Public to private nonprofit	0.7
Public to private for-profit	0.3
Private nonprofit to public	0.5
Private nonprofit to private nonprofit	0.3
Private nonprofit to private for-profit	0.1
Private for-profit to public	0.3
Private for-profit to private nonprofit	0.1
Private for-profit to private for-profit	0.2
Adjusted level	
4-year to 4-year	0.9
4-year to 2-year	0.6
2-year to 4-year	0.7
2-year to 2-year	0.9
All others to/from less-than-2-year	0.3
Adjusted sector	
2-year public to 4-year public	0.7
2-year public to 2-year public	0.9
4-year public to 4-year public	0.6
4-year public to 2-year public	0.4
2-year public to 4-year private nonprofit	0.7
4-year private nonprofit to 4-year public	0.3
4-year public to 4-year private nonprofit	0.3
4-year private nonprofit to 2-year public	0.3
4-year private nonprofit to 4-year private nonprofit	0.3
4-year private for-profit to other Institution	0.2
2-year private for-profit to other Institution	0.4
Other institution combination	0.6
Accreditation	
Regional to regional	0.7
Regional to national	0.3
National to regional	0.3
National to national	0.3
Other accreditation relationship	†

† Not Applicable.
NOTE: Detail may not sum to totals because of rounding. This table includes all transfer events and may include multiple transfer opportunities per student. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Institutions that offer 4-year degrees but are predominantly associate's institutions were classified as 2-year. The term "adjusted level" is used so that users can distinguish the INSTCAT adjusted level from the LEVEL variable in the Integrated Postsecondary Education Data System (IPEDS). The term "adjusted sector" is used to note differences by the sector variable as well.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Table C-3. First-time beginning undergraduate students in 2003–04 who transferred to another institution: Number of credit transfer opportunities, by sector: 2003–04 to 2008–09

Institution relationship (using predominate degree level)	Number of transfer opportunities (thousands)	Standard error
Public 4-year to all others	**682.8**	**6.87**
Public 4-year to public 4-year	262.6	1.69
Public 4-year to private nonprofit 4-year	105.3	0.28
Public 4-year to private for-profit 4-year	10.0	0.01
Public 4-year to public 2-year	287.1	1.26
Public 4-year to private nonprofit 2-year	‡	†
Public 4-year to private for-profit 2-year	8.5	0.01
Public 4-year to public less-than-2-year	‡	†
Public 4-year to private nonprofit less-than-2-year	‡	†
Public 4-year to private for-profit less-than-2-year	‡	†
Private nonprofit 4-yr to all others	**310.2**	**1.76**
Private nonprofit 4-year to public 4-year	112.0	0.33
Private nonprofit 4-year to private nonprofit 4-year	74.2	0.22
Private nonprofit 4-year to private for-profit 4-year	4.2	0.00
Private nonprofit 4-year to public 2-year	110.2	0.36
Private nonprofit 4-year to private nonprofit 2-year	‡	†
Private nonprofit 4-year to private for-profit 2-year	6.2!	0.01
Private nonprofit 4-year to public less-than-2-year	‡	†
Private nonprofit 4-year to private for-profit less-than-2-year	‡	†
Private for-profit 4-yr to all others	**34.0**	**0.08**
Private for-profit 4-year to public 4-year	‡	†
Private for-profit 4-year to private nonprofit 4-year	‡	†
Private for-profit 4-year to private for-profit 4-year	8.0!	0.01
Private for-profit 4-year to public 2-year	14.0	0.01
Private for-profit 4-year to private for-profit 2-year	‡	†
Private for-profit 4-year to public less-than-2-year	‡	†
Private for-profit 4-year to private for-profit less-than-2-year	‡	†
Public 2-yr to all others	**1,449.8**	**16.87**
Public 2-year to public 4-year	673.9	4.40
Public 2-year to private nonprofit 4-year	219.9	1.46
Public 2-year to private for-profit 4-year	42.1	0.09
Public 2-year to public 2-year	446.0	4.04
Public 2-year to private nonprofit 2-year	16.1!	0.03
Public 2-year to private for-profit 2-year	34.1	0.06
Public 2-year to public less-than-2-year	‡	†
Public 2-year to private nonprofit less-than-2-year	‡	†
Public 2-year to private for-profit less-than-2-year	13.7	0.01
Private nonprofit less-than-4-yr to all others	**28.5**	**0.08**
Private nonprofit 2-year to public 4-year	8.4!	0.01
Private nonprofit 2-year to private nonprofit 4-year	3.9!	0.00
Private nonprofit 2-year to private for-profit 4-year	‡	†
Private nonprofit 2-year to public 2-year	13.4!	0.02
Private nonprofit 2-year to private nonprofit 2-year	‡	†
Private nonprofit 2-year to private for-profit 2-year	‡	†
Private nonprofit 2-year to public less-than-2-year	‡	†

See notes at end of table.

Table C-3. First-time beginning undergraduate students in 2003–04 who transferred to another institution: Number of credit transfer opportunities, by sector: 2003–04 to 2008–09 —Continued

Institution relationship (using predominate degree level)	Number of transfer opportunities (thousands)	Standard error
Private nonprofit less-than-4-yr to all others—Continued		
Private nonprofit 2-year to private for-profit less-than-2-year	‡	†
Less-than-2-year private nonprofit to a 2-year private for-profit	‡	†
Private nonprofit less-than-2-year to private nonprofit 4-year	‡	†
Private nonprofit less-than-2-year to public 2-year	‡	†
Private nonprofit less-than-2-year to private for-profit 2-year	‡	†
Private for-profit 2-year to all others	**63.5**	**0.22**
Private for-profit 2-year to public 4-year	9.3!	0.02
Private for-profit 2-year to private nonprofit 4-year	‡	†
Private for-profit 2-year to private for-profit 4-year	6.5!	0.01
Private for-profit 2-year to public 2-year	24.7	0.04
Private for-profit 2-year to private nonprofit 2-year	‡	†
Private for-profit 2-year to private for-profit 2-year	12.8!	0.02
Private for-profit 2-year to public less-than-2-year	‡	†
Private for-profit 2-year to private nonprofit less-than-2-year	‡	†
Private for-profit 2-year to private for-profit less-than-2-year	‡	†
Public less-than-2-year to all others	**7.5**	**0.01**
Public less-than-2-year to public 4-year	‡	†
Public less-than-2-year to private nonprofit 4-year	‡	†
Public less-than-2-year to private for-profit 4-year	‡	†
Public less-than-2-year to public 2-year	4.3	0.00
Public less-than-2-year to private nonprofit 2-year	‡	†
Public less-than-2-year to private for-profit 2-year	‡	†
Public less-than-2-year to public less-than-2-year	‡	†
Public less-than-2-year to private for-profit less-than-2-year	‡	†
Private for-profit less-than-2-year to all others	**32.9**	**0.05**
Private for-profit less-than-2-year to public 4-year	‡	†
Private for-profit less-than-2-year to private nonprofit 4-year	‡	†
Private for-profit less-than-2-year to private for-profit 4-year	‡	†
Private for-profit less-than-2-year to public 2-year	22.6	0.03
Private for-profit less-than-2-year to private nonprofit 2-yr	‡	†
Private for-profit less-than-2-year to private for-profit 2-yr	‡	†
Private for-profit less-than-2-year to private nonprofit less-than-2-year	‡	†
Private for-profit less-than-2-year to private for-profit less-than-2-year	‡	†
All other sector combinations	No transfer events	

† Not applicable.
! Unstable estimate (relative standard error for estimate exceeds 30 percent).
‡ Reporting standards not met. Either there are too few cases or the relative standard error for the estimate is 50 percent or greater.
NOTE: This table includes all transfer events and may include multiple transfer events per student. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Table C-4. First-time beginning undergraduate students in 2003–04 who transferred to another institution: Volume of credit transfers, by sector: 2003–04 to 2008–09

Institution relationship (using predominate degree level)	Number of credits transferred (thousands)	Standard error
Public 4-year to all others	**6,980.5**	**465.5**
Public 4-year to public 4-year	4,506.9	428.9
Public 4-year to private nonprofit 4-year	1,034.8	128.3
Public 4-year to private for-profit 4-year	56.3!	17.1
Public 4-year to public 2-year	1,341.8	124.4
Public 4-year to private nonprofit 2-year	‡	†
Public 4-year to private for-profit 2-year	‡	†
Public 4-year to public less-than-2-year	‡	†
Public 4-year to private nonprofit less-than-2-year	‡	†
Public 4-year to private for-profit less-than-2-year	‡	†
Private nonprofit 4-year to all others	**3,113.5**	**224.1**
Private nonprofit 4-year to public 4-year	1,708.7	179.8
Private nonprofit 4-year to private nonprofit 4-year	780.8	84.8
Private nonprofit 4-year to private for-profit 4-year	58.4!	19.8
Private nonprofit 4-year to public 2-year	538.9	68.7
Private nonprofit 4-year to private nonprofit 2-year	‡	†
Private nonprofit 4-year to private for-profit 2-year	‡	†
Private nonprofit 4-year to public less-than-2-year	‡	†
Private nonprofit 4-year to private for-profit less-than-2-year	‡	†
Private for-profit 4-year to all others	**125.7!**	**42.9**
Private for-profit 4-year to public 4-year	‡	†
Private for-profit 4-year to private nonprofit 4-year	‡	†
Private for-profit 4-year to private for-profit 4-year	‡	†
Private for-profit 4-year to public 2-year	‡	†
Private for-profit 4-year to private for-profit 2-year	‡	†
Private for-profit 4-year to public less-than-2-year	‡	†
Private for-profit 4-year to private for-profit less-than-2-year	‡	†
Public 2-year to all others	**19,079.3**	**1,060.30**
Public 2-year to public 4-year	13,606.4	725.4
Public 2-year to private nonprofit 4-year	2,932.1	433.4
Public 2-year to private for-profit 4-year	344.8	87
Public 2-year to public 2-year	2,002.5	255.5
Public 2-year to private nonprofit 2-year	143.0!	55
Public 2-year to private for-profit 2-year	50.2!	16.3
Public 2-year to public less-than-2-year	‡	†
Public 2-year to private nonprofit less-than-2-year	‡	†
Public 2-year to private for-profit less-than-2-year	#	#
Private nonprofit less-than-4-year to all others	**337.8!**	**125.6**
Private nonprofit 2-year to public 4-year	198.4!	82.5
Private nonprofit 2-year to private nonprofit 4-year	‡	†
Private nonprofit 2-year to private for-profit 4-year	‡	†
Private nonprofit 2-year to public 2-year	65.6!	32.4
Private nonprofit 2-year to private nonprofit 2-year	‡	†
Private nonprofit 2-year to private for-profit 2-year	‡	†
Private nonprofit 2-year to public less-than-2-year	‡	†
Private nonprofit 2-year to private for-profit less-than-2-year	‡	†

See notes at end of table.

Table C-4. First-time beginning undergraduate students in 2003–04 who transferred to another institution: Volume of credit transfers, by sector: 2003–04 to 2008–09—Continued

Institution relationship (using predominate degree level)	Number of credits transferred (thousands)	Standard error
Private nonprofit less-than-2-year to private nonprofit 4-year	‡	†
Private nonprofit less-than-2-year to public 2-year	‡	†
Private nonprofit less-than-2-year to private for-profit 2-year	‡	†
Private for-profit 2-year to all others	**175.1**	**47.9**
Private for-profit 2-year to public 4-year	‡	†
Private for-profit 2-year to private nonprofit 4-year	‡	†
Private for-profit 2-year to private for-profit 4-year	49.3!	23.6
Private for-profit 2-year to public 2-year	‡	†
Private for-profit 2-year to private nonprofit 2-year	‡	†
Private for-profit 2-year to private for-profit 2-year	‡	†
Private for-profit 2-year to public less-than-2-year	‡	†
Private for-profit 2-year to private nonprofit less-than-2-year	‡	†
Private for-profit 2-year to private for-profit less-than-2-year	‡	†
Public less-than-2-year to all others	‡	**†**
Public less-than-2-year to public 4-year	‡	†
Public less-than-2-year to private nonprofit 4-year	‡	†
Public less-than-2-year to private for-profit 4-year	‡	†
Public less-than-2-year to public 2-year	‡	†
Public less-than-2-year to private nonprofit 2-year	‡	†
Public less-than-2-year to private for-profit 2-year	‡	†
Public less-than-2-year to public less-than-2-year	‡	†
Public less-than-2-year to private for-profit less-than-2-year	‡	†
Private for-profit less-than-2-year to all others	**0.3!**	**0.1**
Private for-profit less-than-2-year to public 4-year	‡	†
Private for-profit less-than-2-year to private nonprofit 4-year	‡	†
Private for-profit less-than-2-year to private for-profit 4-year	‡	†
Private for-profit less-than-2-year to public 2-year	0.2!	0.1
Private for-profit less-than-2-year to private nonprofit 2-year	‡	†
Private for-profit less-than-2-year to private for-profit 2-year	‡	†
Private for-profit less-than-2-year to private nonprofit less-than-2-year	‡	†
Private for-profit less-than-2-year to private for-profit less-than-2-year	‡	†
Unknown origin due to bulk credit transfer	**164.9**	**0.2**
Unknown to 4-year public	‡	†
Unknown to 4-year private nonprofit	‡	†
Unknown to 2-year public	‡	†
Unknown to less-than-4-year private nonprofit	‡	†
Unknown to less-than-2-year private for-profit	‡	†
All other sector combinations	No transfer opportunities	

† Not applicable.
! Unstable estimate (relative standard error for estimate exceeds 30 percent).
‡ Reporting standards not met. Either there are too few cases or the relative standard error for the estimate is 50 percent or greater.
NOTE: This table includes all transfer events and may include multiple transfer events per student. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Table C-5. Standard errors: Number and percentage distribution of first-time beginning undergraduate students in 2003–04, by transfer status within sector: 2003–04 to 2008–09

Sector of first institution of attendance	Attended one institution or returned to origin in less than 4 months: Attended one institution	Attended multiple institutions: One transfer	Attended multiple institutions: Two or more transfers
Total	**0.7**	**0.6**	**0.4**
Public 4-year	1.2	0.9	0.8
Public 2-year	1.2	1.0	0.6
Public less-than-2-year	5.3	4.0!	†
Private nonprofit 4-year	1.4	1.3	0.9
Private nonprofit less-than-4-year	7.9	7.6	3.5!
Private for-profit 4-year	3.1	2.7!	†
Private for-profit less-than-4-year	1.4	1.3	0.5

† Not applicable.
! Unstable estimate (relative standard error for estimate exceeds 30 percent).
NOTE: Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Table C-6. Standard errors: Among first-time beginning undergraduate students in 2003–04 who transferred to another institution, the number of credits earned at origin institution, transferred to destination, and the difference between credits earned and transferred during the first transfer, by amount of credits transferred

Number of credits transferred	Total students: Percent	Total credits: Earned at origin institution	Total credits: Transferred to destination institution	Total credits: Difference between credits earned and transferred
Total	†	0.6	0.5	0.4
No credits transferred	1.1	0.9	#	0.9
Some credits transferred	1.1	1.2	1.1	0.5
All credits transferred	1.1	1.0	1.0	#

† Not applicable.
# Estimate rounds to zero.
NOTE: Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Table C-7. Standard errors: Among first-time beginning undergraduate students in 2003–04 who transferred, the percentage distribution of transfer students and the percentage of students with no credits transferred, by control, level, sector, accreditation, and selectivity relationship: 2003–04 to 2008–09

Institution relationship	Total transfer students (percent)	Transfer students with no credits transferring (percent)
Total	†	**1.0**
Control relationship		
Public to public	1.2	1.2
Public to private nonprofit	1.1	2.4
Public to private for-profit	0.5	4.5
Private nonprofit to public	0.6	3.2
Private nonprofit to private nonprofit	0.3	4.2
Private nonprofit to private for-profit	0.1	†
Private for-profit to all other control groups	0.6	4.4
Adjusted level relationship		
4-year to 4-year	1.1	1.7
4-year to 2-year	0.7	2.1
2-year to 4-year	1.2	1.2
2-year to 2-year	0.9	2.4
All others to/from less-than-2-year	0.3	2.8
Adjusted sector relationship		
2-year public to 4-year public	1.0	1.5
2-year public to 2-year public	0.8	2.6
4-year public to 4-year public	0.8	2.3
4-year public to 2-year public	0.5	2.5
2-year public to 4-year private nonprofit	1.0	2.7
4-year private nonprofit to 4-year public	0.3	3.2
4-year public to 4-year private nonprofit	0.4	4.2
4-year private nonprofit to 2-year public	0.4	3.9
4-year private nonprofit to 4-year private nonprofit	0.3	4.6
Other institution to 4-year private for-profit	0.4	5.9
Other institution to 2-year private for-profit	0.4	3.5
Other institution combination	0.7	3.9
Accreditation relationship		
Regional to regional	0.8	1.1
Regional to national	0.4	4.5
National to regional	0.5	7.1
National to national	0.3	9.6
Other relationship	†	†
Institution selectivity relationship		
Open admission to open admission	1.1	2.3
Open admission to minimally selective	0.8	4.0
Open admission to selective	1.2	1.4
Minimally selective to open admission	0.6	4.6
Minimally selective to minimally selective	0.3	7.0
Minimally selective to selective	0.5	4.2

See notes at end of table.

Table C-7. Standard errors: Among first-time beginning undergraduate students in 2003–04 who transferred, the percentage distribution of transfer students and the percentage of students with no credits transferred, by control, level, sector, accreditation, and selectivity relationship: 2003–04 to 2008–09—Continued

Institution relationship	Total transfer students (percent)	Transfer students with no credits transferring (percent)
Institution selectivity relationship—Continued		
Selective to open admission	0.6	2.4
Selective to minimally selective	0.3	4.6
Selective to selective	0.7	1.9

† Not applicable.
NOTE: Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit. The "moderately selective" and "selective" classifications were recoded into one "selective" group.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Table C-8. Standard errors: Among first-time beginning undergraduate students in 2003–04 who transferred, the average credits earned at the origin institution, the average credits accepted at the first transfer destination institution, and the difference between the credits earned and transferred, by control, level, sector, accreditation, and selectivity relationship: 2003–04 to 2008–09

Institution relationship	Total credits		Difference between credits earned and transferred
	Earned at origin institution	Transferred to destination institution	
Total	**0.6**	**0.5**	**0.4**
Control relationship			
Public to public	0.7	0.7	0.5
Public to private nonprofit	2.6	1.8	1.0
Public to private for-profit	2.1	1.3	1.5
Private nonprofit to public	1.9	1.4	1.9
Private nonprofit to private nonprofit	2.4	1.8	2.6
Private nonprofit to private for-profit	4.7	3.2!	3.8
Private for-profit to public	5.5	0.9!	5.9
Private for-profit to private nonprofit	†	†	†
Private for-profit to private for-profit	3.7	1.5!	3.1
Adjusted level relationship			
4-year to 4-year	1.2	1.3	0.9
4-year to 2-year	1.4	0.5	1.4
2-year to 4-year	1.1	1.0	0.6
2-year to 2-year	1.1	0.8	1.0
All others to/from less-than-2-year	1.9	†	2.3
Adjusted sector relationship			
2-year public to 4-year public	1.2	1.2	0.8
2-year public to 2-year public	1.1	1.0	1.2
4-year public to 4-year public	2.3	2.4	1.2
4-year public to 2-year public	1.3	0.6	1.4
2-year public to 4-year private nonprofit	3.7	2.4	1.5
4-year private nonprofit to 4-year public	1.8	1.9	1.6
4-year public to 4-year private nonprofit	1.8	1.5	1.0
4-year private nonprofit to 2-year public	3.1	0.9	3.4
4-year private nonprofit to 4-year private nonprofit	2.6	1.9	2.9
Other institution to 4-year private for-profit	3.2	2.4	1.9
Other institution to 2-year private for-profit	2.3	0.5!	2.2
Other institution combination	2.9	1.2	2.8
Accreditation relationship			
Regional to regional	0.6	0.6	0.5
Regional to national	2.2	0.9!	1.8
National to regional	2.8	1.6!	2.9
National to national	3.7	†	3.0
Other relationship	†	†	†

See notes at end of table.

Table C-8. Standard errors: Among first-time beginning undergraduate students in 2003–04 who transferred, the average credits earned at the origin institution, the average credits accepted at the first transfer destination institution, and the difference between the credits earned and transferred, by control, level, sector, accreditation, and selectivity relationship: 2003–04 to 2008–09—Continued

Institution relationship	Total credits		Difference between credits earned and transferred
	Earned at origin institution	Transferred to destination institution	
Institution selectivity relationship			
Open admission to open admission	1.3	1.1	1.0
Open admission to minimally selective	2.3	2.5	1.8
Open admission to selective	1.4	1.3	0.7
Minimally selective to open admission	3.1	1.2	3.3
Minimally selective to minimally selective	3.7	2.3	4.1
Minimally selective to selective	2.4	2.3	1.7
Selective to open admission	1.5	0.7	1.6
Selective to minimally selective	2.2	1.9	1.6
Selective to selective	1.5	1.4	1.3

† Not applicable.
! Unstable estimate (relative standard error for estimate exceeds 30 percent).
NOTE: Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Table C-9. Standard errors: Among first-time beginning undergraduate students who transferred in 2003–04, the percentage distribution of transfer students, the percentage of transfer students with no credits transferring, and the difference between credits earned and credits transferred, by degree program change relationship and grade point average at origin institution: 2003–04 to 2008–09

Institution relationship	Total transfer students (percent)	Transfer students with no credits transferring (percent)	Difference between credits earned at origin and credits transferred (number)
Total	**†**	**1**	**0.4**
Degree program change			
Associate's degree to bachelor's degree	0.8	2.2	1.2
Associate's degree to associate's degree	0.4	6.9	2.1
Associate's degree to undergraduate courses/no degree	0.6	4.3	2.4
Bachelor's degree to bachelor's degree	0.5	3.5	1.7
Bachelor's degree to associate's degree	0.3	5.5	2.5
Bachelor's degree to undergraduate courses/no degree	0.5	3.9	3.4
Undergraduate courses/no degree to bachelor's degree	1.1	1.3	0.6
Undergraduate courses/no degree to associate's degree	0.6	3.3	1.2
To and from undergraduate courses/no degree	0.9	2.5	1.1
To and from certificate and other programs	0.8	3.1	1.3
Grade point average at origin institution			
0.00–1.99	0.8	2.1	0.6
2.00–2.99	0.9	1.6	0.9
3.00–4.00	1	1.4	0.7

† Not applicable.
NOTE: Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Table C-10. Standard errors: Among first-time beginning undergraduate students in 2003–04 who transferred, the percentage of students with no credits transferred in the student's first transfer, by direction of transfer within control relationship, accreditation relationship, selectivity relationship, grade point average at origin institution, and degree program change: 2003–04 to 2008–09

	Percent with no credits transferred			
Institution relationship	Vertical transfer	Reverse transfer	Horizontal or lateral transfer	Total
Total	**1.2**	**2.1**	**1.7**	**1.1**
Control relationship				
No change in control	1.5	2.5	2.1	1.2
Change in control	2.4	3.8	2.8	2.0
Accreditation relationship				
No change in accreditation	1.2	2.2	1.7	1.1
Change in accreditation	13.0	5.7	4.8	5.4
Selectivity relationship				
Transfer to open/minimally selective institutions	3.5	2.2	2.2	1.8
Transfer to selective/moderately selective institutions	1.3	†	1.9	1.1
Grade point average prior to transfer				
0.00–1.99	6.5	3.2	3.8	2.3
2.00–2.99	2.3	3.9	2.5	1.7
3.00–4.00	1.5	4.8	2.4	1.5
Degree program change				
No change in degree program observed	4.1	4.5	2.8	2.2
Change in degree program	1.8	3.3	3.6	2.4

† Not applicable.
NOTE: Detail may not sum to totals because of rounding. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit. Institutions that offer 4-year degrees but are predominantly associate's institutions were classified as 2-year. The term "adjusted level" is used so users can distinguish the INSTCAT adjusted level from the LEVEL variable in the Integrated Postsecondary Education Data System (IPEDS).
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Table C-11. Standard errors: Among first-time beginning undergraduate students in 2003–04 who transferred credits, the average number of credits transferred in the student's first transfer, by direction of transfer within control relationship, accreditation relationship, selectivity relationship, grade point average at origin institution, and degree program change: 2003–04 to 2008–09

	Percent with no credits transferred			
Institution relationship	Vertical transfer	Reverse transfer	Horizontal or lateral transfer	Total
Total	1.0	1.0	1.1	0.6
Control relationship				
No change in control	1.1	1.1	1.5	0.8
Change in control	2.2	2.2	1.2	1.3
Accreditation relationship				
No change in accreditation	1.0	1.0	1.1	0.6
Change in accreditation	†	†	2.9	2.4
Selectivity relationship				
Transfer to open/minimally selective institutions	2.9	2.9	1.4	1.3
Transfer to selective/moderately selective institutions	1.2	†	1.7	0.9
Grade point average prior to transfer				
0.00–1.99	3.4	3.4	1.9	1.2
2.00–2.99	1.6	1.6	1.6	1.1
3.00–4.00	1.5	1.5	1.4	0.9
Degree program change				
No change in degree program observed	2.4	2.4	2.0	1.4
Change in degree program	2.0	2.0	3.3	1.7
Undergrad course/no program to a degree program	1.8	1.8	1.2	1.2

† Not applicable.
NOTE: Detail may not sum to totals because of rounding. Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit. Institutions that offer 4-year degrees but are predominantly associate's institutions were classified as 2-year. The term "adjusted level" is used so that users can distinguish the INSTCAT adjusted level from the LEVEL variable in the Integrated Postsecondary Education Data System (IPEDS).
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Appendix D. Multiple Transfer Students

Because itemized transfer credits by course are inconsistently reported on transcripts, the origin institution cannot be identified for some destination institutions. As a result, most tables and statistics in this report censor the data by including only a student's first transfer in the analysis. While students with three or more institutions of attendance are not excluded from the analysis, the author conducted some bivariate statistical tests to better understand how different multi-transfer students are from students who transfer one time.

Table D-1 displays estimates for total postsecondary credits earned, grade point average (GPA), number of remedial courses, number of institutions attended, and level/control of the first origin institution. There were a number of differences between one-transfer and multi-transfer students. Students transferring multiple times were more likely to have more postsecondary credits earned, with 116 versus 101 credits ($F = 51.12$; $p < .001$). Additionally, there were differences by level ($F = 25.59$; unadjusted $\chi^2 = 244.72$; $p < .001$) and control ($F = 10.24$; unadjusted $\chi^2 = 152.53$; $p < .001$). There were no measurable differences in the number of remedial courses taken ($F = 2.66$; $p = 0.106$) and overall GPA ($F = 0.39$; $p = 0.535$).

While differences do exist, these cases are not likely to contribute much bias to the analysis because they are not being excluded from any analyses and they represent only 9 percent of the weighted cases.

Table D-1. Among first-time beginning undergraduate students in 2003–04 who transferred, the average postsecondary credits, grade point average, number of remedial courses, institutions attended, and proportion of level and control by number of times transferred: 2003–04 to 2008–09

Variables	One transfer	Two or more transfers
Academic performance/characteristics		
Career postsecondary credits	101.4	116.5
Grade point average across all institutions	2.9	2.8
Number of remedial courses	1.3	1.5
Number of institutions attended	2.0	2.9
Adjusted level relationship (percent)		
4-year	32.3	44.0
2-year	64.6	54.6
Less-than-2-year	3.1	‡
Control relationship (percent)		
Public	81.6	82.6
Private nonprofit	11.1	14.4
Private for-profit	7.3	3.0

‡ Reporting standards not met. Either there are too few cases or the relative standard error for the estimate is 50 percent or greater.
NOTE: Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Table D-2. Standard errors: Among first-time beginning undergraduate students in 2003–04 who transferred, the average postsecondary credits, grade point average, number of remedial courses, institutions attended, and proportion of level and control, by number of times transferred: 2003–04 to 2008–09

Variables	One transfer	Two or more transfers
Academic performance/characteristics		
Career postsecondary credits	1.13	1.73
Grade point average across all institutions	0.02	0.03
Number of remedial courses	0.05	0.09
Number of institutions attended	0.02	0.03
Adjusted level relationship (percent)		
4-year	0.02	0.02
2-year	0.02	0.02
Less-than-2-year	0.00	†
Control relationship (percent)		
Public	0.01	0.01
Private nonprofit	0.01	0.01
Private for-profit	0.01	0.01

† Not applicable.
NOTE: Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), Postsecondary Education Transcript Study (PETS).

Appendix E. Missing Case Analysis for Multivariate Model

The data from the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09) transcript file were not imputed, so there is potential bias related to listwise deletion from the multivariate model. This appendix presents the results of a missing case analysis to determine the extent to which the results presented in the multivariate model yields accurate inferences of the transfer of credit in the population of first-time beginning transfer students.

As shown in table E-1, the missing cases dropped from the analytic sample are missing not at random (MNAR). There were statistical differences between the analytic sample and the full sample in the following variables after listwise deletion (i.e., the analytic sample):

- control of origin institution (private for-profit) with fewer cases in the analytic sample (5.0 percent versus 6.0 percent);
- transfer direction (reverse) with a higher proportion of cases in the analytic sample (15.2 percent versus 14.3 percent);
- accreditation direction (from regional to national) with fewer cases in the analytic sample (2.5 percent versus 3.0 percent);
- independent status with fewer cases in the analytic sample (12.4 percent versus 15.2 percent)
- student with dependents with fewer cases in the analytic sample (7.1 percent versus 9.0 percent);
- employment status (full-time) with fewer cases in the analytic sample (15.5 percent versus 17.4 percent); and
- months enrolled prior to transfer with a higher proportion of cases enrolled longer (12.8 months versus 11.4 months).

These results indicate that if the multivariate results were biased, it would most likely occur in the for-profit sector, 4-year to 2-year transfers, and regional to national accreditation transfers. The results would likely be biased due to the lower number of independent students, students with dependents, and full-time students in the

analytic sample, who generally attend these institution types.[1] The following research question guided the second part of the missing case analysis:

> If independent students, students with dependents, and full-time students were added back to the sample, to what extent would the multivariate results have changes?

[1] Because the months enrolled variable was added to the model only to account/control for the amount of time available to the student to add credits, it was not deemed to be a significant factor in biasing the model.

Table E-1. Among first-time beginning undergraduate students in 2003–04 who transferred, the mean/percentage estimates for variables used in the multivariate analyses of credit transfer comparing cases in the full sample and the analytic sample: 2003–04 to 2008–09

Variables	Full sample	Analytic sample
Dependent variable		
Total credits transferred	16.5	16.6
Independent variables		
Control of origin institution (percent)		
Public	83.7	83.7
Private nonprofit	12.3	12.8
Private for-profit	4.0	3.4
Control of destination institution (percent)		
Public	75.2	75.9
Private nonprofit	18.8	19.1
Private for-profit	6.0	5.0*
Transfer direction (percent)		
Vertical (2-year to 4-year)	42.2	42.1
Reverse (4-year to 2-year)	14.3	15.2*
Horizontal (4-year to 4-year or 2-year to 2-year)	43.6	42.7
Accreditation relationship (percent)		
Regional to regional	93.8	93.7
Regional to national (or other)	3.0	2.5*
National to regional (or other)	2.5	2.5
National to national (or other)	0.7	0.6
Grade point average prior to transfer	2.8	2.8
Selectivity (percent)		
To selective/moderately selective	51.6	52.2
To open admissions/minimally selective	48.4	47.8
Dependency status (percent)		
Dependent	84.9	87.6
Independent	15.1	12.4*
Single parent (percent)		
Not a single parent	95.1	95.7
Single parent	4.9	4.3
Responsibility for dependents (percent)		
Does not have dependents	91.0	92.9
Has dependents	9.0	7.1*
Employment status (percent)		
No job	31.6	31.9
Part-time	51.1	52.6
Full-time	17.4	15.5*
High school credential (percent)		
High school diploma	91.9	92.2
GED or other diploma	8.1	7.8

See notes at end of table.

Table E-1. Among first-time beginning undergraduate students in 2003–04 who transferred, mean/percentage estimates for variables used in the multivariate analyses of credit transfer comparing cases in the full sample and the analytic sample: 2003–04 to 2008–09—Continued

Variables	Full sample	Analytic sample
Independent variables—Continued		
Postsecondary attendance intensity in first year (percent)		
Full-time	76.0	76.5
Part-time	24.0	23.5
Months enrolled prior to transfer	11.4	12.8*

* Estimate is significantly different from the full sample ($p < .01$).
NOTE: Students who returned to their origin institution after an enrollment spell of less than 4 months at a destination institution are not considered to have transferred. Credit hours have been normalized so that they are comparable across institutions regardless of calendar system or type of credit unit.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09),Postsecondary Education Transcript Study (PETS).

In order to test if the results would change, three Zero-Inflated Negative Binomial (ZINB) multivariate analyses were re-run, adding the following interaction terms to the model:

- Model 1: Control of origin institution by student independent status, control of origin institution by students with dependents, and control of origin institution by full-time employment status;
- Model 2: Transfer direction by student independent status, transfer direction by students with dependents, and transfer direction by full-time employment status; and
- Model 3: Accreditation by student independent status, accreditation by students with dependents, and accreditation by full-time employment status.

In all cases, the models yielded the same results as the multivariate model, with no statistically significant interaction terms in the negative binomial model. The results suggest that if these missing cases were added back to the model, it would not change the results, and that the inferences to the population are not compromised. The syntax used to generate these models can be found at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2014163.

Appendix F. Factors That Predict the Probability of Inflated Zero Credits Transferring

Table 16 in chapter 3 presents the results of the two components of the Zero-Inflated Negative Binomial (ZINB) regression. The first column presents the coefficient estimates (in log-odds) for the logistic regression component, and the second column presents the results of the negative binomial component. The logistic regression component is traditionally not meant to be interpreted, but is included to ensure that the negative binomial component produces accurate estimates.

Unlike most ZINB models, however, the logistic model is guided by a theory. Students may not transfer credits because the institution doesn't know of previous coursework (i.e., the student never informed the institution) or because the institution evaluated the credits and did not transfer them. Therefore, appendix F presents a limited interpretation of the logistic results of this model. The interpretation of the logistic portion of the model is the probability that a zero value is attributed to the institution not being informed of credit transfer (i.e., the "inflated zeros") versus students who formally request credits to transfer but lose all credits (i.e., "legitimate" zeros to be included in the negative binomial component).

The logistic regression component of the results demonstrates that three factors were related to a higher number of zero credits transferring than would be expected if multiple processes were not occurring.[1] These are

- transfer direction;
- grade point average (GPA); and
- selectivity relationship.

Controlling for other factors, the direction of transfer (i.e., vertical, reverse, or horizontal) significantly predicted the probability of zero credits transferring as a result of the institution not knowing about previous coursework. The reference group for this variable was vertical transfer (i.e., from a 2-year to a 4-year institution).

[1] The model presumes that multiple processes are contributing to inflate the zero values. In this case, it is hypothesized that zero values are inflated due to (1) the institution never getting an opportunity to review transcripts for the transfer of credit and (2) the institution reviewing/evaluating courses to transfer credit but not recognizing the credits.

Students transferring in reverse and horizontally had a higher likelihood of zero credits transferring compared to students transferring vertically. A student who transferred in reverse from a 4-year institution to a 2-year institution had an estimated 323 percent increase[2] in the odds that zero credits transfer compared to students transferring vertically. Students transferring horizontally (2-year to other 2-year or 4-year to other 4-year institutions) had a 144 percent increase in the odds that zero credits transfer. This finding was consistent with the earlier findings that indicated that a higher proportion of students transferred zero credits when they deviated from more traditional transfer patterns (2-year to 4-year institutions).

A relationship also existed between GPA and zero credits transferring. Higher GPA values decreased the likelihood of zero credits transferring. Specifically, every one point increase in GPA resulted in a 36 percent decrease in the odds that a student will have no credits transfer.

Selectivity was also related to zero credits transferring. Students transferring to a selective or moderately selective institution rather than to an open admissions or minimally selective institution had a lower probability of zero credits transferring with 46 percent lower odds that zero credits transfer compared to open admissions institutions.

The model did not uncover any relationship between the likelihood of zero credits transferring and student risk factors (i.e., dependency status, being a single parent, having dependents, employment status, type of high school credential, or first year attendance intensity) or demographic characteristics (i.e., race, ethnicity, or gender).

[2] The percentage change in the probability is determined by taking the coefficient from the logistic model (table 16) and taking the inverse log to get the odds ratio. For this example, the inverse log of coefficient for reverse transfer, 1.441, is 4.225. This is 4.225 times the vertical transfer student likelihood of transferring zero credits, or 4.225:1. The percentage change is calculated by subtracting 1 from the odds ratio 4.225 (the odds for vertical transfer [the comparison group]), and multiplying that value by 100, which yields 323 percent.