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Student Persistence in a Public Higher Education System

Understanding Racial and Ethnic Differences

The past two decades witnessed some fundamental changes in American postsecondary educational finance (McPherson & Schapiro, 1991, 1998; Orfield, 1992; St. John, 1994; Slaughter & Leslie, 1997). The federal government shifted the means of fulfilling the commitment to equal opportunity in postsecondary education from primarily using grants to mainly using loans (St. John, 1994). State support for public colleges and universities decreased as an overall trend across the United States (Callan & Finney, 1997). This policy shift at the state level was alleged to lead to the sustained increase in the tuition charges in public institutions (Paulsen, 1991). At the institutional level, concerns about student enrollment have triggered the bidding war in recruiting and retaining academically well-prepared students. Thus, tuition pricing and the awarding of financial aid increasingly play the role as institutional levers in enrollment management (McPherson & Schapiro, 1998).

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As a result of these policies, the burden of paying for college was shifted from the general public to individual students and their families (Callan & Finney, 1997; Mumper, 1996). Educational attainment for minority and low-income students is a particularly important issue in the new financing environment (Baker & Vélez, 1996; Carter & Wilson, 1996; Orfield, 1992). On the one hand, numerous studies suggest that minority students are competitively disadvantaged in access to higher education, choice of colleges, and degree completion in American postsecondary education (Baker & Vélez, 1996; Carter, 1999; Carter & Wilson, 1996; Castle, 1993; Pascarella & Terenzini, 1991). On the other hand, economists consistently confirm the high earning premium of college degree recipients in the labor market compared to nonrecipients (Becker, 1992; Murphy & Welch, 1992; Leslie & Brinkman, 1988). If the policy changes have disproportionally negative effects on educational attainment of minority students, then the economic and social well-being of minority students and society as a whole will inevitably be imperiled.

Previous studies confirmed that students indeed respond to college tuition prices and financial aid awards (Heller, 1997, 1999; Leslie & Brinkman, 1988). Research also indicates that minority students are more sensitive to prices and less willing to use educational loans (Kaltenbaugh, St. John, & Starkey, 1999; St. John, 1991; St. John & Noell, 1989). Further understanding of the influence of financial aid awards on persistence by diverse groups can help inform policymakers and institutional administrators about strategies that can equalize opportunity and improve institutional diversity.

This study assesses the impact of policy shifts in financial aid in a state higher education system on within-year persistence by different racial/ethnic groups. There are strong theoretical arguments that ability to afford continuous enrollment is best measured within year (Carroll, 1987; Dresch, 1975). Traditional college-age students often reflect on the academic and social aspects of their college experience between years, when they return home, which is a good reason why some researchers consider year-to-year persistence (Pascarella & Terenzini, 1980, 1991). However, analysts who have compared within-year and year-to-year persistence models have found that the within-year is generally better at measuring the effects of student aid (Somers, 1992; Somers & St. John, 1997), but both approaches have value. This article examines student within-year persistence in a state public higher education system. We focus on persistence of African Americans and Hispanics, and use White students as a comparison group. Specifically, we try to answer these research questions: (1) Did changes in the combination

of federal and state aid programs affect the adequacy of financial aid awarded to students from diverse groups in persisting in the state higher education system? and (2) Were there other factors that could help understand the disparity in aggregate persistence rates among racial/ethnic groups?

Research Approach

The Indiana Commission for Higher Education's Student Information System (ICHE-SIS) provided comparable, accurate enrollment and financial aid information. In order to examine the possible influence of policy shifts in financial aid awarding on student persistence, three cohorts of full-time resident undergraduate students enrolled in Indiana's four-year public institutions (of the academic years 1990–91, 1993–94, and 1996–97) were selected and examined. For the analyses of African Americans and Whites we used random samples of full-time resident students enrolled in the fall terms of these academic years. For Hispanics, all full-time resident students without missing values for the variables in the models were included in the analysis. We compared the effects of financial aid packages on student persistence for three different racial/ethnic groups to gain insights about the adequacy of financial aid awarded to students from diverse groups over time. Further, in connection with results from other studies using the same database, we drew insights to understand the disparity in the aggregate persistence rates among racial/ethnic groups.

Model Specification

This analysis used a model for assessing the effects of student aid that was originally proposed by St. John (1992) and was tested in a series of studies (St. John, 1998, 1999; Somers, 1992; Somers & St. John, 1997). These analyses indicate that extant student record systems are reliable data sources for studying the impact of student aid. The outcome variable is whether or not students persisted through the entire academic year. Past studies have demonstrated that within-year persistence is an appropriate outcome measure in assessing the effects of financial aid (Somers, 1992; St. John, 1999). Students who enrolled in the fall semester and then reenrolled or graduated in the spring semester were counted as persisters; otherwise, they were counted as nonpersisters. The model in this study treats within-year persistence as a function of:

- Student background (age, ethnicity, dependency status, and income);

- College experience (college grades, type of institution attended, housing status, and year in college); and
- Financial aid (an aid packages model was used in this article because of uncertainties about the amounts of aid reported.[1] In this analysis the effects of the receipt of each type of aid package is compared to the effects of not receiving aid).

The dichotomous characteristics of the outcome variable are observed in the coding scheme, where the outcome of student persistence is coded as 1, whereas nonpersistence is coded as 0. Logistic models were adopted in data analysis (Aldrich & Nelson, 1986; Cabrera, 1994; Long, 1997). Logistic regression provides an appropriate statistical method for analyzing how a set of variables in a logical model influences the probability that a particular educational choice will be made (Cabrera, 1994). In the logistic models, males were compared to females and self-supporting aid applicants were compared to others (dependent aid applicants and non-aid applicants).[2] Further, aid applicants in four income categories were compared to students who did not apply for aid. Breaking this group into income categories provided a method of controlling for the relative levels of need. The four income categories used in our analyses varied across the four years. Our analyses divided the students with reported incomes into four quartiles, an approach compatible with prior studies (St. John, 1999; Somers, 1992). The four income quartiles were determined using the statewide income classification for all students in each respective year:[3]

- 1990–91: less than $8,742 (low), between $8,742 and $19,667 (lower middle), between $19,667 and $34,100 (upper middle), and over $34,100 (high);
- 1993–94: less than $6,903 (low), between $6,903 and $20,225 (lower middle), between $20,225 and $37,292 (upper middle), and over $37,292 (high); and
- 1996–97: less than $14,740 (low), between $14,740 and $33,068 (lower middle), between $33,068 and $58,047 (upper middle), and over $58,047 (high).

Moreover, we controlled for the variables related to college experience, an appropriate strategy in light of our goal to assess the direct effects of student aid. Grades were coded into a set of design variables that compared students who received below-C grades, C grades (2.0 to 2.5), and A grades (above 3.5), to students who had B averages (greater than 2.5 to 3.5). We compared students attending research university cam-

puses to students attending other four-year campuses. Students who lived on campus were compared to students who lived off campus.

Finally, we used the aid package approach in specifying the aid variable. Because only the amounts of aid received by students were reported in ICHE-SIS, this leaves uncertainty about the amounts of aid awarded to students who departed. So we adopted the aid package model in this study. Students who were recorded receiving financial aid from federal, state, or institutional sources were categorized as receiving grants only, loans only, grants and loans, and other packages, and were compared to students who did not receive aid. Grants students received could be merit-based, but mostly are from need-based programs by the federal government, state, or institutions.

Change in probability measures (delta-p statistics) were calculated and presented instead of beta coefficients for the variables in each of the logistic models according to the method proposed by Peterson (1985) and recommended by Cabrera (1994). For dichotomous variables the delta-p statistics provide a measure of the extent to which the outcome is likely to change if the individual has the characteristics being measured. For example, if the aid package of grants only is significant and the delta-p is 0.09 as in 1996–97 for African Americans, this can be interpreted to mean that African American students who received financial aid in the form of grants only were nine percentage points more likely to persist than otherwise average nonrecipients (Table 2).

Limitations

Several limitations should be kept in mind when interpreting the findings from this study. First, our analysis in this study helped to examine the effects of financial aid programs on student persistence in a state public higher education system, but may limit the generalizability of the findings. In many aspects, Indiana's postsecondary education system is different from other states. It is one of a few states where commitment to funding student aid was maintained over the decade (Hossler & Schmit, 1995; Hossler, Schmit, & Vesper, 1999). Further, Indiana is not as ethnically diverse as the nearby states of Illinois, Michigan, and Ohio (Hossler, Schmit, & Vesper, 1999), which may in some way affect the racial/ethnic differences documented in this study.

A second limitation is that we do not have comprehensive measures of academic and social integration. However, we include sufficient controls for academic experience (i.e., college grades) to assess the direct effects of student aid. Further, the workable models approach (St. John, 1992) does incorporate data on income, which is needed to assess the direct effects of student aid (St. John, Cabrera, Nora, & Asker, 2000).

A third limitation of these analyses is that we lack measures of student performance in high school. Fortunately, we do have good measures of college grades and, in general, high-school and college performance are correlated and have similar effects (St. John, Kirshstein, & Noell, 1991). Indeed, researchers have found that when college grades were included for a freshman sample, student standardized test scores (i.e., SAT scores) do not have a significant influence on within-year persistence by freshmen (St. John, Hu, Simmons, & Musoba, 2001). Therefore, we do not expect this data problem to limit the model's viability in estimating the direct effects of student aid.

Findings

For each ethnic/racial group, we examined the trends of student characteristics and financial aid awards as well as the impact of aid packages. The trend analysis considers the characteristics of full-time students that could influence persistence, as well as trends in financial aid awarding. These trends are important because it is possible that both changes in student characteristics and changes in prices and price subsidies could influence the decline in the within-year persistence rate.

Persistence by African American Students

Trends. The descriptive statistics on student characteristics and financial aid trends for African American students across three academic years are presented in Table 1. The persistence rate for African Americans declined slightly in the early 1990s, from 87.2% in 1990–91 to 86.0% in 1993–94 and to 85.9% in 1996–97, with a total drop of 1.3% over six years.

There was a slight increase in the percentage of males among all African Americans over time. The analysis of family income for African Americans reveals that the percentage of African Americans who did not report their family income[4] was highest in 1993–94 (20.6% vs. 16.2% in the other two years). College academic achievement for African Americans increased slightly in 1996–97; the proportion of students gaining C averages and below-C averages decreased, and the proportion of students receiving B averages and A averages increased. The percentage of African Americans enrolled in research universities declined.

The percentage of non-aid recipients was 11.0% in 1990–91, 16.6% in 1993–94, and 13.0% in 1996–97. Key trends in aid packages for African American students were: (1) a decline in the percentage of recipients of grants only (to 19.6% in 1996–97 from 34.7% in 1990–91) and of other packages (to 13.5% in 1996–97 from 16.4% in 1990–91);

TABLE 1

Trends of Student Characteristics and Financial Aid for African American Students

Variable	1990–91 %	1990–91 Mean	1993–94 %	1993–94 Mean	1996–97 %	1996–97 Mean
Gender						
Male	35.7		37.3		38.5	
Female[a]	64.3		62.7		61.5	
Age						
Age (years)		21.9		22.4		22.3
Dependency						
Self-supporting	25.0		27.6		27.4	
Dependent & nonaid applicant[a]	75.0		72.4		72.6	
Income						
Low income	30.0		23.7		33.8	
Lower middle	23.1		23.9		25.8	
Upper middle	17.9		16.9		14.0	
High income	12.7		14.8		10.2	
Nonaid applicant[a]	16.2		20.6		16.2	
College GPA						
Below C	31.5		32.0		30.7	
C average	36.4		35.8		32.3	
B average[a]	30.7		30.5		34.2	
A average	1.5		1.7		2.8	
Institution Type						
Research university	49.7		47.7		46.9	
Other four-year[a]	50.3		52.3		53.1	
Student Level						
Freshman[a]	33.4		32.2		36.6	
Sophomore	26.6		24.6		21.1	
Junior	17.1		17.0		17.7	
Senior	22.9		26.2		24.5	
Housing Status						
On-campus	37.9		32.8		32.2	
Other[a]	62.1		67.2		67.8	
Aid Packages						
Grants only	34.7		24.0		19.6	
Loans only	4.2		6.9		11.3	
Grants and loans	33.7		36.7		42.7	
Other package	16.4		15.7		13.5	
No aid[a]	11.0		16.6		13.0	
Persisting (%)		87.2		86.0		85.9
N		3,540		4,882		4,828

[a]Indicates the uncoded variable in the sets of design variables used in the logistic regression models.

and (2) an increase in percentage of students receiving loans only (to 11.3% in 1996–97 from 4.2% in 1990–91 and grants and loans (to 42.7% in 1996–97 from 33.7% in 1990–91).

Persistence analysis. There were some differences in the influence of

background variables on persistence in 1993–94 compared to the other two years (Table 2). Male African American students were 2.7 percentage points less likely to persist than females. Low-income students were less likely to persist compared to students who did not report family income. African American students at research universities were 4.7 percentage points less likely to persist than were those in other four-year institutions. In addition, older students in 1993–94 and 1996–97 were less likely to persist.

TABLE 2

The Impact of Aid Packages for African American Students

Variable	1990–91 Delta-P	Sig.	1993–94 Delta-P	Sig.	1996–97 Delta-P	Sig.
Gender						
Male	–0.016		–0.027	*	0.003	
Age						
Age	–0.002		–0.006	***	–0.008	***
Dependency						
Self-supporting	–0.015		0.000		0.008	
Income						
Low income	–0.001		–0.125	***	–0.043	
Lower middle	0.021		–0.052		–0.027	
Upper middle	0.032		–0.045		–0.074	
High income	0.029		0.007		–0.033	
College GPA						
Below C	–0.460	***	–0.493	***	–0.434	***
C average	–0.096	***	–0.092	***	–0.073	***
A average	–0.005		0.007		–0.140	**
Institution Type						
Research university	–0.019		–0.047	***	–0.023	
Student Level						
Sophomore	0.006		0.024		0.012	
Junior	0.053	***	0.065	***	0.053	***
Senior	0.059	***	0.089	***	0.096	***
Housing Status						
On-campus	–0.027		–0.024		0.016	
Aid Type						
Grants only	0.030		0.068	***	0.090	***
Loans only	0.051		0.066	*	0.108	***
Grants and loans	0.060	*	0.100	***	0.110	***
Other package	0.087		0.109	***	0.111	***
Baseline *P* (%)	87.2		86.0		85.9	
R^2	0.124		0.158		0.143	
–2 Log L	2239.7		3119.3		3177.3	
Pct. cor. pred. (%)	87.2		86.4		86.4	
N	3,540		4,882		4,828	

*Beta significant at 0.05. **Beta significant at 0.01. ***Beta significant at 0.001.

There were also common findings across years. Lower college academic achievement (below-C or C average grades) was significant and negatively associated with persistence. The otherwise average student receiving a below-C average was substantially (between 43 and 49 percentage points) less likely to persist. Further, a student with a C average was somewhat (between 7 to 9 percentage points) less likely to persist. The otherwise average student with an A average was also less likely to persist in 1996–97.[5] Juniors and seniors were more likely to persist than freshmen, while sophomores did not differ significantly from freshmen.

The analysis of the aid packages reveals an increase in the efficacy of aid packages (size of delta-p) for African Americans. In 1990–91, the statistically nonsignificant coefficients for aid packages such as grants only, loans only, and other packages suggested that recipients of these three packages persisted as well as non-aid recipients. However, recipients of packages with grants and loans were more likely to persist than non-aid recipients. In the other two years, the average recipient of any type of aid package persisted better than the otherwise average non-aid recipient. The sizes of delta-p statistics for each type of financial aid package increased over time, suggesting the effects of financial aid on student persistence increased across these three years for African American students.

Persistence by Hispanic Students

Trends. Student characteristics and financial aid trends for Hispanic students across three academic years are presented in Table 3. The persistence rate for Hispanic students declined 6.2% over six years, from 93.5% in 1990–91 to 89.4% in 1993–94 and to 87.3% in 1996–97.

There was a slight decrease in the percentage of males among all Hispanics over time. In 1993–94, a substantial higher proportion of Hispanics did not report their family income (38.2% in 1993–94 in contrast to 26.2% in 1990–91 and 28.1% in 1996–97). Over time, the proportion of students with below-C averages increased (to 22.6% in 1996–97 from 19.8% in 1990–91 and 21.9% in 1993–94), while those who gained C average decreased (to 24.9% in 1996–97 from 29.1% in 1990–91 and 28.0% in 1993–94). The combined percentage of students receiving B and A averages slightly increased in 1996–97.

The percentage of Hispanics who did not receive aid increased from 20.0% in 1990–91 to 31.4% in 1993–94, then decreased moderately to 25.1% in 1996–97. Key trends in aid packages for Hispanic students were: (1) a decline of the percentage of recipients of grants only (to 21.2% in 1996–97 from 36.1% in 1990–91 and 26.6% in 1993–94) and of other packages (to 7.4% in 1996–97 from 10.9% in 1990–91 and

TABLE 3
Trends of Student Characteristics and Financial Aid for Hispanic Students

Variable	1990–91 %	1990–91 Mean	1993–94 %	1993–94 Mean	1996–97 %	1996–97 Mean
Gender						
Male	46.1		46.0		43.7	
Female[a]	53.9		54.0		56.3	
Age						
Age (years)		21.5		21.6		21.4
Dependency						
Self-supporting	21.3		18.5		18.5	
Dependent & non-aid applicant[a]	78.7		81.5		81.5	
Income						
Low income	17.1		10.9		20.1	
Lower middle	15.6		14.4		16.2	
Upper middle	19.3		15.9		21.4	
High income	21.8		20.6		14.2	
Non-aid applicant[a]	26.2		38.2		28.1	
College GPA						
Below C	19.8		21.9		22.6	
C average	29.1		28.0		24.9	
B average[a]	44.0		44.4		46.1	
A average	7.1		5.7		6.4	
Institution Type						
Research university	47.5		39.6		41.7	
Other four-year[a]	52.5		60.4		58.3	
Student Level						
Freshman[a]	31.5		37.6		38.7	
Sophomore	26.7		20.7		21.3	
Junior	19.2		18.9		18.5	
Senior	22.6		22.8		21.6	
Housing Status						
On-campus	29.3		20.9		20.7	
Other[a]	70.7		79.1		79.3	
Aid Packages						
Grants only	36.1		26.6		21.2	
Loans only	6.1		9.0		15.1	
Grants and loans	26.9		24.0		31.2	
Other package	10.9		8.9		7.4	
No aid[a]	20.0		31.4		25.1	
Persisting (%)		93.5		89.4		87.3
N		945		1,581		1,786

[a]Indicates the uncoded variable in the sets of design variables used in the logistic regression models.

8.9% in 1993–94); (2) an increase of recipients of loans only (to 15.1% in 1996–97 from 6.1% in 1990–91 and 9.0% in 1993–94) and of grants and loans in 1996–97 (to 42.7% from 33.7% in 1990–91 and 36.7% in 1993–94).

Persistence analysis. Male students were less likely to persist than their female counterparts in 1996–97. Compared to students who did not report family income, lower-middle income students were less likely to persist in 1993–94, and low-income students were less likely to persist in 1996–97. Older students were less likely to persist across all academic years.

Lower grades were consistently significant and negatively associated with persistence. Having below-C grades substantially reduced the prob-

TABLE 4

The Impact of Aid Packages for Hispanic Students

Variable	1990–91 Delta-P	Sig.	1993–94 Delta-P	Sig.	1996–97 Delta-P	Sig.
Gender						
Male	−0.036		0.020		−0.059	**
Age						
Age	−0.006	*	−0.007	**	−0.007	*
Dependency						
Self-supporting	0.032		−0.043		0.038	
Income						
Low income	−0.041		−0.110		−0.165	*
Lower middle	−0.036		−0.156	*	−0.044	
Upper middle	0.013		−0.039		−0.083	
High income	0.019		−0.036		−0.047	
College GPA						
Below C	−0.333	***	−0.373	***	−0.317	***
C average	0.001		−0.076	*	0.009	
A average	0.064		0.082		−0.027	
Institution Type						
Research university	−0.057		−0.008		−0.032	
Student Level						
Sophomore	0.028		0.042	*	0.049	*
Junior	0.048	*	0.038		0.059	*
Senior	0.042		0.074	***	0.087	***
Housing Status						
On-campus	0.023		0.007		0.019	
Aid Type						
Grants only	0.009		0.063	*	0.073	*
Loans only	0.052		0.052		0.082	*
Grants and loans	0.021		0.091	***	0.102	***
Other package	0.042		0.072	*	0.115	***
Baseline *P* (%)	93.5		89.4		87.3	
R^2	0.109		0.125		0.139	
−2 Log L	343.3		855.0		1089.5	
Pct. cor. pred. (%)	93.8		89.4		88.1	
N	945		1,581		1,786	

*Beta significant at 0.05. **Beta significant at 0.01. ***Beta significant at 0.001.

ability of persistence (by between 32 and 37 percentage points), and having a C average modestly reduced the probability of persistence (by 7.6 percentage points) compared to otherwise average students with a B average in 1993–94.

Year in college was also significant. Juniors in 1990–91, sophomores and seniors in 1993–94, and sophomores, juniors, and seniors in 1996–97 were more likely to persist than freshmen in each respective year.

The analyses of aid packages reveal the growing importance of aid for Hispanics. In 1990–91, no form of aid package was significantly associated with persistence. In 1993–94, aid recipients of all types except loans only persisted better compared to non-aid recipients. In 1996–97, the receipt of all types of aid packages was significant and positively associated with persistence. The significance and the increased sizes of delta-p for each type of financial aid package indicate that the effects of financial aid on student persistence increased across these three years for Hispanic students.

Persistence by White Students

Trends. The persistence rate for White students declined slightly across the years, from 93.2% in 1990–91 to 91.9% in 1993–94 and to 91.0% in 1996–97, for a total drop of 2.2% over six years (Table 5). This drop was smaller than it was for Hispanics but larger than for African Americans.

The percentage of Whites whose income was reported was lowest in 1993–94 and highest in 1996–97. The percentage of White students who received below-C grades and A averages increased in 1996–97, but the percentage receiving C averages and B averages decreased. The proportion of White students in research universities increased slightly over time.

The percentage of Whites who did not receive any aid packages was 40.2% in 1990–91, 47.9% in 1993–94, and 38.2% in 1996–97. Thus, the highest proportion of White students who received some kind of aid was in 1996–97. The percentage of recipients of grants only declined, whereas the percentage of recipients of loans only increased across time. In addition, the proportion of White students who received packages with grants and loans was at the highest point at 24.2% in 1996–97.

Persistence analysis. Older students were less likely to persist in all three academic years (Table 6). White students at research universities in 1993–94 were 2.5 percentage points more likely to persist than were those in other four-year institutions.

Lower college academic achievement (Below-C or C average grades) was significant and negatively associated with persistence. Compared to

TABLE 5

Trends of Student Characteristics and Financial Aid for White Students

Variable	1990–91		1993–94		1996–97	
	%	Mean	%	Mean	%	Mean
Gender						
Male	43.2		46.6		45.7	
Female	56.8		53.4		54.3	
Age						
Age (years)		21.5		21.8		21.5
Dependency						
Self-supporting	16.2		14.1		14.1	
Dependent & non-aid applicant[a]	83.8		85.9		85.9	
Income						
Low income	11.1		6.9		11.9	
Lower middle	11.0		9.8		12.0	
Upper middle	14.5		12.4		17.2	
High income	15.5		16.7		14.8	
Non-aid applicant[a]	47.9		54.2		44.1	
College GPA						
Below C	12.7		12.4		14.5	
C average	23.1		20.2		19.9	
B average[a]	52.7		55.0		51.5	
A average	11.5		12.3		14.2	
Institution Type						
Research university	48.1		51.5		52.3	
Other four-year[a]	51.9		48.5		47.7	
Student Level						
Freshman[a]	24.8		25.3		28.6	
Sophomore	25.0		22.9		20.6	
Junior	20.7		19.9		20.8	
Senior	29.5		31.9		30.1	
Housing Status						
On-campus	28.7		26.7		29.0	
Other[a]	71.3		73.3		71.0	
Aid Packages						
Grants only	28.6		20.1		17.4	
Loans only	5.5		8.5		16.3	
Grants and loans	20.8		20.0		24.2	
Other package	4.9		3.6		3.9	
No aid[a]	40.2		47.9		38.2	
Persisting (%)		93.2		91.9		91.0
N		2,358		3,239		3,378

[a]Indicates the uncoded variable in the sets of design variables used in the logistic regression models.

students with B averages, students with below-C grades were substantially less likely to persist (by 28.5 to 45.5 percentage points), and students receiving C averages were somewhat less likely to persist in 1990–91 (by 4.3 percentage points) and in 1993–94 (by 12.4 percentage

points). Students receiving A averages were as likely as those with B averages to persist in all three years. Sophomores, juniors, and seniors in 1990–91 and juniors and seniors in 1996–97 were more likely to persist than freshmen during the same time periods.

Only a few aid packages were significantly associated with persistence for White students. In 1990–91 and 1996–97, White students who received packages with grants and loans were slightly (about 5 percentage points) more likely to persist. White students who received other

TABLE 6

The Impact of Aid Packages for White Students

Variable	1990–91 Delta-P	Sig.	1993–94 Delta-P	Sig.	1996–97 Delta-P	Sig.
Gender						
Male	0.010		0.006		0.003	
Age						
Age	−0.004	**	−0.004	***	−0.005	***
Dependency						
Self-supporting	−0.005		0.015		0.012	
Income						
Low income	−0.082		−0.050		−0.022	
Lower middle	−0.051		−0.070		−0.013	
Upper middle	−0.028		−0.006		−0.008	
High income	−0.006		−0.015		0.010	
College GPA						
Below C	−0.285	***	−0.455	***	−0.366	***
C average	−0.043	*	−0.124	***	−0.032	
A average	0.011		0.035		0.010	
Institution Type						
Research university	0.002		0.025	**	−0.005	
Student Level						
Sophomore	0.026	*	0.018		0.020	
Junior	0.048	***	0.026		0.036	**
Senior	0.052	***	0.025		0.061	***
Housing Status						
On-campus	0.021		0.029	*	0.014	
Aid Package						
Grants only	0.029		0.019		0.032	
Loans only	0.006		0.030		0.031	
Grants and loans	0.048	*	0.039		0.046	*
Other package	0.045		0.053		0.060	*
Baseline *P* (%)	93.2		91.9		91.0	
R^2	0.090		0.103		0.104	
−2 Log L	952.0		1468.8		1676.1	
Pct. Cor. Pred. (%)	93.2		92.0		91.0	
N	2,358		3,239		3,378	

*Beta significant at 0.05. **Beta significant at 0.01. ***Beta significant at 0.001.

packages were slightly (6.0 percentage points) more likely to persist in 1996–97. The lack of significance of other aid packages indicates that student aid for Whites was sufficient to equalize persistence for students with aid compared to students who did not receive aid.

Comparison of the Analyses Across Racial/Ethnic Groups Across Years

A comparison of the results from trend analysis and logistic analysis provides a few insights on student persistence for three different racial/ethnic groups. Before we discuss the differences in the effects of financial aid on student persistence, we first consider trends in student characteristics and college experiences for three groups over three academic years.

Trends. Two general patterns emerged from the comparison of student characteristics, college experiences, and financial aid. First, as expected, the income composition of students in the three groups was different. Across all three years, the cross-group comparison of student income indicated that more African-American students were from poorer families, more White students were from relatively wealthy families, and Hispanics were in between. Further, a larger percentage of African American students received some type of financial aid while a smaller percentage of Whites received financial aid. Hispanics were in between these two groups. This pattern of financial aid awards is consistent with the philosophy of need-based financial aid programs.

Second, the composition of college grades for racial/ethnic groups differed substantially. African Americans had higher percentages of below-C and C grades, followed by Hispanics, then Whites. Conversely, higher percentages of Whites had A and B averages, followed by Hispanics, then African Americans. College grades had substantial influence on persistence. Differences in college grades among racial/ethnic groups help explain the difference in average persistence rates for three racial/ethnic groups.

Financial aid packages. The type of financial aid packages had different effects on students in three racial/ethnic groups, and the effects changed across time (Table 7). To better understand and correctly interpret the coefficients of financial aid packages for different racial/ethnic groups, it is noted that we compared the probability of persisting by the aid recipients (of any type of package) to non-aid recipients within each racial/ethnic groups, assuming aid recipients and non-aid recipients had similar characteristics of all other factors. Therefore, the shift of significance of aid package variables across time indicated the changing probability of persisting of aid recipients compared to non-aid recipients within each racial/ethnic group.

TABLE 7
Comparisons of the Effects of Aid Package on Persistence by Different Population

Packages	1990–91 Delta-P	Sig.	1993–94 Delta-P	Sig.	1996–97 Delta-P	Sig.
African Americans						
Grants only	0.030		0.068	***	0.090	***
Loans only	0.051		0.066	*	0.108	***
Grants and loans	0.060	*	0.100	***	0.110	***
Other package	0.087		0.109	***	0.111	***
Hispanics						
Grants only	0.009		0.063	*	0.073	*
Loans only	0.052		0.052		0.082	*
Grants and loans	0.021		0.091	***	0.102	***
Other package	0.042		0.072	*	0.115	***
Whites						
Grants only	0.029		0.019		0.032	
Loans only	0.006		0.030		0.031	
Grants and loans	0.048	*	0.039		0.046	*
Other package	0.045		0.053		0.060	*
All Students						
Grants only	0.051	**	0.026		0.030	
Loans only	0.037		0.048		0.033	
Grants and loans	0.053	**	0.061	**	0.059	**
Other package	0.077	**	0.060	*	0.091	***

NOTE: Statistics for "all students" were adopted form St. John, Hu, Weber (in press).
*Beta significant at 0.05. **Beta significant at 0.01. ***Beta significant at 0.001.

Previous studies suggested that when coefficients for aid variables are negative, it could mean that aid is insufficient (St. John, Andrieu, Oescher, & Starkey, 1994; St. John, Oescher, & Andrieu, 1992; St. John & Starkey, 1995). Meanwhile, when coefficients for aid variables are neutral, it may well mean that aid amounts awarded to students are sufficient in achieving equal opportunity in persistence. When coefficients for aid variables are positive, it may mean that aid amounts awarded to students helped students who received aid to persist better. This method of interpretation has a solid empirical base (e.g., Somers & St. John, 1997), but merits further exploration.

The results from this study indicate that financial aid in Indiana was sufficient in achieving equal opportunity to persist for aid recipients and non-aid recipients within each group. In fact, African American and Hispanic aid recipients persisted better than their non-aid recipient counterparts in 1993–94 and 1996–97. For African American students, in the 1990–91 academic year, recipients of grants and loans persisted better than non-aid recipients, while aid recipients of grants only, loans only, and other packages persisted as well as non-aid recipients. In the 1993–94 and

1996–97 academic years, aid recipients of any type of aid package persisted better than non-aid recipients. For Hispanics in the 1990–91 academic year, recipients of all types of packages persisted as well as non-aid recipients. In the 1993–94 academic year, aid recipients of grants only, grants and loans, and other package persisted better than non-aid recipients, whereas recipients of loans only persisted as well as non-aid recipients. In the 1996–97 academic years, aid recipients of all types of aid package persisted better than non-aid recipients. For White students, only recipients of grants and loans in 1990–91 and 1996–97 and other packages in 1996–97 persisted better than non-aid recipients. Aid recipients of any other type of aid package just persisted as well as non-aid recipients.

Another analysis of persistence by all resident students in the public system (St. John, Hu, & Weber, in press) revealed that African Americans, Hispanics, and students of other racial ethnic background had the same probability of persisting, controlling for other variables in the model, as did Whites. These findings indicate that aid is adequate and a much more substantial influence on persistence by minorities than by Whites. This supports arguments that student aid plays an important role in equalizing opportunity.

Discussion

The overall persistence rates across the three years slightly declined for all three groups. How to explain this phenomenon if aid recipients of any other type of aid package persisted better than or as well as non-aid recipients for all three groups, particularly for African Americans and Hispanics in 1993–94 and 1996–97? This paradox points to the conclusion that non-aid recipients within the three groups had lower probability to persist compared to their peers with comparable background characteristics and college experiences in earlier years. The higher probability of persisting by African American, Hispanic, and White aid recipients than by non-aid recipients within groups was mainly due to the declining probability of persisting by non-aid recipients, rather than gains in probability of persisting per se. Therefore, overall persistence rates declined by all groups. The overall decline in persistence rates could be due to the increase of tuition and net tuition facing all students, particularly the non-aid recipients who could face the largest net tuition hikes. A time series analysis, which could include change of tuition and variables concerning the economy and the labor market changes, may be able to shed light on this phenomenon.

This study also suggests that by and large the equal opportunity to persist within each group has been maintained in Indiana, given that the aid recipients persisted as well as (or even better than) non-aid recipi-

ents, at least when the influence of other factors was controlled for. This pattern held across the three ethnic groups. Had equality of opportunity to persist been achieved among racial/ethnic groups in Indiana? To answer this question, we need additional information to make a judgment. In another study using the same data base and the same modeling strategy on representative samples from ICHE-SIS, St. John, Hu, and Weber (in press) found that African Americans in all three years and Hispanics in 1993–94 were less likely to persist than White students, when only student background variables were included in the models. However, when college grades and other college experience variables were included, the significant differences in probability of persisting for different racial/ethnic groups disappeared. Further, no significant differences in the probability of persisting among different racial/ethnic groups were found after controlling for student background information, college experiences, and financial aid variables. In addition, financial aid packages were largely neutral or marginally significant for Whites in this study and the entire population in the prior study (See Table 7). Thus, taking an entire population, aid recipients have about the same probability of persisting as non-aid recipients.

In combination, these findings suggest that disparity in persistence among racial/ethnic groups existed in Indiana, but financial aid did not appear to be the source of the disparity. Rather, the findings from this study point to the importance of improving student college grades and college experiences, particularly for African Americans and Hispanics, as a means of improving opportunity to persist among racial/ethnic groups. The gap in aggregate persistence rates could result from the differences in a set of variables among students from different racial/ethnic groups. For example, we found that there is a relatively large gap in college grades across racial/ethnic groups. The gap in student college grades would in part explain the differentials in aggregate persistence rates among students from different groups, consistent with the findings from an earlier study (St. John, Hu, & Weber, in press). To really achieve equal opportunity to persist in postsecondary education, public policy with focus on financial affordability is essential, but not the entire solution (see, for example, Mumper, 1998). Perhaps intervention that focuses on enhancing student college achievement by minorities would help level off the remaining inequality in persistence rates.

Conclusion and Implications

Our conclusion is that the state of Indiana has been able to maintain grants at a level sufficient to equalize the opportunity to persist in the

public system of higher education within and among all three racial/ethnic groups in this study, particularly at a time when federal commitment to financial aid programs eroded (St. John, Hu, & Weber, 2000, in press). However, there was slight erosion in the opportunity to persist for all three groups over time. The slight decline in the overall persistence rates over time by all three groups may have been influenced by the decline in total grants relative to the costs of attending college. As tuition increased, the probability of persisting for non-aid recipients could decrease. The relative gain in probability of persisting by aid recipients in relation to non-aid recipients was, therefore, largely due to the declining probability of persistence by non-aid recipients, rather than gains in probability of persisting per se. Further, declines in the probability of persistence by non-aid recipients could be attributable to price increases. Thus, high-tuition high-aid policy could lead to erosion in overall persistence rates.

We also conclude that adequate student aid can help equalize opportunity to persist, both within groups and among groups. However, public and institutional policies should go further than just focusing on financial aid. Clearly, financial assistance is critical for students to afford to attend and persist in postsecondary opportunity. That is why financial analysis is so important. However, a variety of factors can contribute to the actualization of students' postsecondary opportunity. This study suggests that student college grades and other college experiences also make differences in probability of persisting by students. Indeed, the disparity of overall persistence rates among racial/ethnic groups is largely explained by the differences in college grades and other college experience variables. Therefore, public and institutional policies that could help enhance students' college achievement and college experiences will help achieve equal opportunity to persist among racial/ethnic groups and diversity in the state higher education system.

More generally, these findings have important implications for public policy in higher education across the United States. First, it is crucial that states maintain adequate student aid if their goal is to equalize opportunity. This confirms other research that concludes federal student aid is no longer adequate to equalize opportunity.

Second, states or university systems may need to take a more activist role in promoting academic improvements that equalize educational opportunities. Given that students of color, as well as students with below-C averages, were less likely to persist, remediation may not be an adequate policy. Rather, it is important for educational systems to assess how well they support the learning needs of diverse students and then use this information to develop more workable strategies.

Finally, this study raises questions about the efficacy of high tuition,

high aid within public systems. Although it is possible to equalize opportunity if states provide adequate grant aid, it appears that persistence rates for students who do not receive aid may be negatively influenced by tuition increases. Therefore, states should assess the relative costs and benefits of high tuition when they increase tuition or decrease institutional subsidies.

Notes

[1]In order to assess the effects of financial aid amounts, we should use the aid amounts awarded (offered) to students, rather than the amounts students actually received, because dropouts do not receive a full year award. However, only the amounts of aid received by students were reported in ICHE-SIS. This leaves uncertainty about the amounts of aid awarded to students who departed.

[2]Controlling for dependency status is necessary given that two different types of income were reported (parent income for dependent students and personal income for self-supporting students).

[3]Statewide income classification in each year was determined from four-percentile categorization of income for students who reported income and had no missing variables out of a random sample of 10,000 students.

[4]Colleges and universities derive income from aid applications for the state information system.

[5]Drop out by higher achieving students could be attributable to transfer decisions. Further inquiry into this phenomenon is desirable.

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