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The Influence of Prices on the Persistence of Adult Undergraduates

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This article examines the influence of tuition charges and the amounts of grants, loans, and work awarded on within-year persistence by adult undergraduate students (over 22 years of age) enrolled in public and private four-year colleges. The findings include: 1) adult undergraduates are more likely to be from disadvantaged backgrounds than traditional college-age students; 2) adult undergraduates seem to be more responsive to tuition charges than traditional college-age students; and 3) adults enrolled in public colleges are more sensitive to tuition charges than those enrolled in private colleges.

During the 1980s, an increased participation rate for adults helped public and private four-year colleges maintain their enrollment levels, despite prior predictions that enrollments would decline (Gerald and Hussar, 1990). Since adult students (over 22 years of age) generally did not receive as much student aid as their traditionally-aged counterparts, many college and university administrators assumed they were not sensitive to price. Therefore, research that explicitly examines the influence of prices on persistence by adult students can inform institutional pricing policies.

Unfortunately, persistence by adult students has seldom been examined in national studies. The national longitudinal studies used most frequently for national persistence studies (Carroll, 1987; St. John, 1989, 1990; St. John, Kirshstein, and Noell, 1992; Terkla, 1985), did not include data on adult students. However, the National Postsecondary Student Aid Survey of 1986-87 (NPSAS-87), can be used for this purpose. Our study uses NPSAS-87 to examine the influence of tuition charges and the amounts of student aid awarded on persistence by adult students enrolled in public and private four-year colleges.

Background

There has been major progress in national persistence research over the past few years. Until recently, there have been lingering doubts about the effectiveness of student aid programs, especially loans (e.g. Astin 1975; Pascarella and Terenzini, 1991; Peng and Fetters, 1983; Tinto, 1987). More recent research helps resolve some of the reasons for doubt. In an analysis of the effects of aid packages on persistence in the 1970s and 1980s, St. John (1989) found that packages with loans only were negatively associated with first-to-second-year persistence for students in the early 1970s, but not in the early 1980s. He concluded

that changes in loan policy and student attitudes about debt combined to influence this shift in the effectiveness of student loans.

More recent studies that examined the influence of prices and price subsidies on persistence (Andrieu and St. John, 1993; St. John, 1990; St. John, Oescher, and Andrieu, 1992), illustrate that institutional aid policies can have an influence on the effectiveness of student aid. These studies have established that the amounts of tuition charged and student aid awarded influence persistence. They indicated that the amounts of grants and loans awarded in the early 1980s were positively associated with year-to-year persistence (St. John, 1990). However, studies of within-year persistence in the early 1980s indicated more complicated interactions between the amounts of aid awarded and within-year persistence.¹ In particular, St. John, Oescher, and Andrieu (1994) found a positive association between the amounts of grant received and within-year persistence by traditional college-age students enrolled in private four-year colleges, but a negative association between the amount of grant awarded and within-year persistence by similar students in public four-year colleges.

This study explores whether there are differences between public and private colleges in the influence of prices and price subsidies on persistence by adult students. The persistence model developed for NPSAS-87 to examine the influence of student aid on persistence by traditional college-age students was adapted to adult students by Starkey (1993). The current study extends prior research by examining and comparing the influence of prices and price subsidies on within-year persistence by adult students in public and private colleges.

Research Approach

This study views students' persistence decisions as a function of social background, economic background, college characteristics, college experience, aspirations, prices, and student aid. The NPSAS-87 database, the statistical methods, model specifications, and study limitations are described briefly below.

NPSAS-87 Database

The availability of the NPSAS-87 database provides an opportunity to examine a range of research questions related to the influence of student aid on within-year persistence. NPSAS-87 is well suited for research on within-year persistence because the sampling procedure included college students in the fall of 1986, then followed up with student surveys in the spring of the same academic year. A total of 59,886 students enrolled at 1,074 postsecondary institutions as of October 15, 1986 were surveyed (Korb, Schantz, and Zimble, 1989). The sample for the present study consisted of a subset of the undergraduate population surveyed for NPSAS-87, composed of adult students in four-year colleges and universities. The overall response rate was approximately 72%.

Statistical Methods

Logistic regression was used in this study because it is an appropriate statistical method for analysis of dichotomous, qualitative outcomes,

such as persistence. Logistic regressions estimate how various factors will influence the probability that a particular outcome will occur.

Changes in probability measures (delta-P statistics) were estimated for each variable in each logistic regression analysis using a method recommended by Petersen (1984). For dichotomous variables the delta-P statistic provides a measure of the extent to which the outcome is likely to change if the "average" individual has the characteristic being measured. When continuous variables are used in a logistic regression analysis, the delta-P statistic can be interpreted as meaning that a change in a unit measure of that variable changes the probability that the outcome measure will happen by a specific percentage.

If a significant delta-P statistic for the tuition variable (actual tuition was divided by 1,000) has a value of -0.0055 , it can be interpreted as meaning a \$1,000 tuition differential would decrease the probability of persistence by 5.5 percentage points; or that a \$100 differential would decrease the probability by .55 percentage points. Thus, the delta-P statistic is similar to standardized student price-response coefficients, which are defined as the change in probability that students will enroll for each \$100 change in price (see, Leslie and Brinkman, 1988).

In addition, $-2 \log$ likelihood (log L) statistics were presented for each version of the analysis. The $-2 \log L$ provides an indication of fit, with smaller values indicating better fitting models (Aldrich and Nelson, 1989). Two proportional reduction-in-error measures were used. The first was a "pseudo R^2 ," with a larger pseudo R^2 between models indicating a reduction in unexplained error. However, since a pseudo R^2 is usually smaller than an ordinary least squares (OLS) R^2 (Aldrich and Nelson, 1989), a second proportional reduction-in-error measure, a Somer's D statistic, is also presented. The Somer's D is usually higher than an OLS R^2 . Additionally, a measure of the percentage of cases predicted correctly for each version of the model is used as a further indicator of the quality of the models.

This study tested the null hypothesis that adult students are not sensitive to differences in tuition. Such an analysis was timely and important because state officials have frequently assumed that students are not sensitive to price changes (e.g., State Higher Education Executive Officers, 1988). The study findings are discussed in relation to recent studies of persistence by traditional college age students using NPSAS-87 (e.g., Kaltenbaugh, 1993; St. John, Oescher, and Andrieu, 1992).

Model Specification

This analysis treats within-year persistence as a function of social background, economic background, college characteristics, college experience, aspirations, prices, and student aid. Persistence was defined as re-enrollment for the spring semester after being enrolled in the fall semester. If seniors indicated that they had received a degree or had met their educational goals, they were also counted as persisters.² This dichotomous outcome measure is compatible with the structure of the NPSAS-87 database, which included student record data from a fall sample and student questionnaire data from a spring survey.

"The adult students were from lower socio-economic backgrounds, which could have influenced their delayed college entry and/or slower rate of progress through college."

“Many adults attend less expensive colleges than traditional college-age students.”

Eleven social background variables were analyzed, including variables related to ethnicity, gender, mother's education, age, high school, and marital status. Ethnicity and mother's education were recoded into sets of dichotomous variables. The only variable related to high school experience was high school degree; consequently other related variables, such as high school grades and track, were not considered.

Five variables related to economic background were included: three income variables, dependency status, and employment status. Economic background was considered as distinct from social background because these questions relate to the current financial status of the students, rather than to the economic status of the family before college.

A single variable related to college characteristics—enrollment in a private college—was used to distinguish between students enrolled in public and private colleges. Therefore, it is not included in the logistic analysis.

Variables related to college experience included: full-time status, grades, and year in college. Grades and year in college were converted to sets of dichotomous variables.

The aspirations variable was treated as a separate factor. NPSAS-87 featured an aspirations question. Since this question was asked in college, we did not think it was appropriate to be included as a social background variable. Responses to this question were transformed into a set of three dichotomous variables.

Four price variables were examined, including tuition, grants, loans, and work. The actual dollar amounts were divided by one thousand, a conversion that results in easily interpreted price-response measures. This approach has been used in a few recent persistence studies (Andrieu and St. John, 1993; St. John, 1990; and St. John, Oescher, and Andrieu, 1992).

Limitations

NPSAS-87 does have a number of limitations for persistence research. First, NPSAS-87 did not include all the types of information that would be needed for an “ideal” persistence study. In particular, prior analyses of NCES national longitudinal studies used test scores and additional variables related to high school experiences (e.g., academic track). These data are entirely missing from NPSAS-87. However, since the influence of these variables diminish as students persist through college (St. John, Kirshstein, and Noell, 1991), the absence of these variables is not considered a serious problem.

Second, NPSAS-87 was a fall sample and is not representative of all college students. This is a less serious problem for four-year colleges, where most students enroll in the fall semester, than for other types of colleges. It is more problematic for two-year colleges and proprietary institutions, in which students enroll year round. Therefore, this analysis was limited to students enrolled in four-year colleges.

Third, there is an overlap between the background variable for working and the receipt of college work-study. This occurred because most students with work-study aid responded affirmatively to the ques-

tion asked about current work. This is a minor limitation since the effects of both variables are considered.

Fourth, the delta-P statistic for a given independent variable is usually for the otherwise "average" sample member. However, this measure is of questionable validity when sample members are at extremes on variables. Therefore, this condition limits the applicability of the delta-P statistic in extreme cases.

Analysis

First, adult students enrolled in public and private four-year colleges and universities are compared to traditional college-age students enrolled in these institutions. Then the logistic analyses of adult students in private four-year colleges are presented.

Comparison of Traditional and Adult Students

In addition to being older than traditional college-age students, a larger percentage of adult students were African Americans, had mothers with less than a high school education, were working, were married, and had low incomes (Table 1). In addition, a larger percentage of the adult students were independent.³ Thus, the adult students were from lower socio-economic backgrounds, which could have influenced their delayed college entry and/or slower rate of progress through college.

Traditional college-age and adult students also faced different prices. On average, adults attended less expensive institutions. The traditional college-age students in public colleges paid an average tuition of \$1,484, compared to the average tuition of \$1,098 for adult students who attended public colleges. The difference was even more pronounced in private colleges: the average tuition paid by an adult student was \$3,610, compared to an average of \$6,364 paid by traditional college-age students. Thus, many adults attend less expensive colleges than traditional college-age students.

Adult students also received different aid packages than did traditional college-age students. The average grant awards were substantially lower for adult students in private colleges (\$1,282), than for traditional college-age students (\$2,506). There was also a difference in the grant awards at public colleges (\$670 for adult students, compared to \$743).⁴ However, adult and traditional college-age students had similar loan awards. Thus adult students received a larger percentage of their aid packages in the form of loans rather than grants.

The Influence of Prices and Student Aid

Logistic regression analysis (Table 2) was used to examine persistence by adult students in public and private colleges. Two levels of significance are presented (.01 and .05). No social background variables and only one economic background variable were significant. Working adults in private colleges were less likely to persist. This is in contrast to the traditional college-age undergraduates who are more likely to persist if they work (St. John, Andrieu, and Oescher, 1992). These findings may be attributable both to the fact that a large percentage of the adults in private colleges work and to the fact that adults attending

TABLE 1
Comparison of Traditional College-Age and Adult Undergraduate Students in Four-Year Colleges

	Traditional College-Age		Adult	
	Private Mean	Public Mean	Private Mean	Public Mean
Social Background				
Ethnicity				
African American	6.7%	7.8%	9.5%	9.1%
Hispanic	3.7	3.6	3.9	4.6
Male	47.7	47.2	46.1	49.1
Mother's Education				
Less than High School	6.1	8.0	19.3	18.5
Some College	23.0	25.3	18.2	21.8
College Degree	22.5	20.3	13.7	13.1
Master's	11.9	8.4	5.3	6.4
Advanced	7.7	4.0	4.3	4.2
Age	19.7 yrs.	19.9 yrs.	30.8 yrs.	29.2 yrs.
High School Degree	98.4	98.0	96.7	96.6
Married	2.3	3.3	44.7	38.8
Financial Background				
Working	50.6%	51.4%	72.6%	65.9%
Independent	3.7	5.3	61.0	58.2
Income				
Below \$11,000	11.0	14.3	28.0	31.3
\$30,000-\$60,000	40.6	43.1	29.1	28.8
Above \$60,000	23.9	16.2	11.5	7.5
Full-Time Attendance	95.4	90.4	52.8	60.4
College Experience				
College Grades				
Less than C	4.7	9.3	3.2	6.7
C Average	33.0	39.5	27.7	41.4
A Average	2.0	13.8	6.3	4.2
Year in College				
Sophomore	25.9	26.0	19.0	15.0
Junior	24.7	27.3	29.0	26.6
Senior	19.3	17.6	27.6	32.6
Aspirations				
Some College	2.1	2.6	6.4	4.4
Master's Degree	40.6	35.6	38.7	36.9
Advanced Degree	21.8	13.3	17.4	14.1
Prices*				
Tuition \$	\$6,364	\$1,484	\$3,610	\$1,098
Grant \$	\$2,506	\$ 743	\$1,382	\$ 670
Loan \$	\$1,326	\$ 600	\$1,263	\$ 707
Work \$	\$ 212	\$ 86	\$ 76	\$ 56
Number	8,083	8,138	2,924	3,685

*Divided by 1,000 in logistic regression analysis.

Source: Analysis of Traditional College-Age Students from St. John, Oescher, and Andrieu (1992).

private colleges probably held higher paying jobs than those attending public colleges and universities.

Several variables related to college experience were significantly associated with persistence by adult students. First, full-time enrollment was positively associated with persistence by adult students in private

TABLE 2
Analysis of Within-Year Persistence by Adult Students in
Four-Year Institutions

	Private Delta P	(Sig.)	Public Delta P	(Sig.)
Social Background				
Ethnicity				
African American	0.030		0.039	
Hispanic	-0.009		-0.003	
Male	0.010		0.020	
Mother's Education				
Less than High School	0.009		0.003	
Some College	-0.006		-0.007	
College Degree	-0.013		-0.006	
Master's	-0.025		0.015	
Advanced	0.040		0.021	
Age	-0.000		0.001	
High School Degree	0.029		-0.009	
Married	-0.013		0.007	
Financial Background				
Working	-0.035	.05	0.013	
Independent	0.007		-0.001	
Income				
Below \$11,000	0.016		-0.015	
\$30,000-\$60,000	-0.016		-0.022	
Above \$60,000	0.001		-0.026	
College Experience				
Full-Time Attendance	0.038	.05	-0.007	
College Grades				
Less than C	0.036	.01	0.054	.01
C Average	-0.001		-0.021	
A Average	-0.020		-0.013	
Year in College				
Sophomore	-0.001		0.023	
Junior	0.013		0.019	
Senior	-0.072	.01	-0.055	.01
Aspirations				
Some College	0.070	.01	0.031	
Master's Degree	-0.034	.05	-0.033	.01
Advanced Degree	-0.021		-0.060	.01
Prices*				
Tuition \$	-0.064	.01	-0.103	.01
Grant \$	-0.006		-0.022	.01
Loan \$	0.004		-0.016	.05
Work \$	-0.056	.05	-0.050	
Pseudo R ²	0.2407		0.254	
Baseline P	0.876		0.8893	
-1 log L.	1655.658		1913.456	
df	30		30	
Somer's D	0.683		0.710	
Model N	2,924		3,685	
Concordant	0.84		0.85	

*Divided by 1,000 in logistic regression analysis.

colleges. Further analysis would be needed to determine why this variable was significant.

Second, one variable related to year in college was significant for adult students. Adult seniors in public and private colleges were less

“Full-time enrollment was positively associated with persistence by adult students in private colleges.”

likely to complete the academic year than freshmen, a finding that is in contrast to the analysis of traditional college-age students (St. John, Oescher, and Andrieu, 1992). Possible explanations for this phenomena include: some adults with several years of college may be taking courses to help them with their employment opportunities, rather than to receive a degree; and/or adults who are close to graduation may delay their completion for personal or economic reasons.

Third, college grades had an influence on persistence by adult students. Adult students enrolled with less than C grades were more likely to persist than students with B grades,⁵ a finding that is consistent with prior studies (Andrieu and St. John, 1993; St. John, Oescher, and Andrieu, 1992). We attribute that phenomenon to institutional policies that make it difficult for students with low grades to re-enroll if they stop out with low grades.

Finally, aspirations had an influence on persistence. For adult undergraduates in private colleges, those who aspired to attain some college were more likely to persist than those who aspired to attain a college degree, and adults who aspired to attain a masters were less likely to persist. The design set for aspirations compares the coded variables to aspiring to a college degree.

Adult students in public colleges who aspired to attain a masters or an advanced degree were even less likely to persist. Thus adults, as well as traditional college age students, are more likely to complete the academic year when they have short-term goals. We reached this conclusion because student aspirations were derived from a question asked after students made their persistence decisions. In other words, some students indicated they had long-term aspirations even after they stopped out.

The Influence of Prices and Price Subsidies

The analysis indicates that there were some significant differences between the two populations. First, grant awards were significantly and negatively associated with persistence by adults in public colleges, but not significant in private colleges. This finding is similar to a prior study, by St. John, Oescher, and Andrieu (1992), which concluded that grant awards were inadequate at public institutions.⁶

Second, the amounts of loan awarded were significantly and negatively associated with persistence by adult students in public colleges and not significant in private colleges, a finding that was consistent with the prior study of traditional college-age undergraduates. This suggests that loans have a negative association with persistence for adults in public colleges.

Third, work-study dollars were significantly and negatively associated with persistence by adult students in private colleges. This finding is also consistent with a prior study of traditional college-age undergraduates (St. John, Oescher, and Andrieu, 1992). Presumably, the hourly wage was not sufficient to promote persistence.

Finally, tuition was significantly and negatively associated with persistence by adult undergraduates in both public and private colleges. The average adult undergraduate in private college was .6 percentage

point less likely to persist for each \$100 increase in tuition differential, while the average adult undergraduate in a public four-year institution was 1.0 percentage point less likely to persist for each \$100 of tuition differential. Both of these price-response measures were substantially higher than for traditional college-age undergraduates (St. John, Oescher, and Andrieu, 1992).

Conclusions and Implications

There are four conclusions from these analyses. First, more adult undergraduates in four-year colleges were from disadvantaged backgrounds than their traditional college-age peers: their mothers had less education; more were low-income, working, and independent.

Second, adults students were responsive to the amount of tuition charged, which lead us to reject the null hypothesis. The fact that adults are price sensitive indicates that colleges and universities with large percentages of adult students should consider the influence of tuition on adult enrollments when they make their annual tuition decisions.

Third, adult students were actually more responsive to tuition charges than their fellow students of traditional college age. In fact, the delta-P statistics for the adults in both public and private colleges were substantially larger than the delta-P for traditional college-age African Americans ($-.043$) (Kaltenbaugh, 1993) or low-income students ($-.035$) (St. John and Starkey, 1995). Adults are probably more sensitive to prices than traditional college-age students because they are more likely to attend part-time and less likely to receive student aid.

Fourth, the effectiveness of financial aid strategies does vary for public and private colleges. This study found that grant and loan awards had a negative association with persistence for adult undergraduates in public four-year colleges, while neither were significant for adults in private colleges. In addition, the amount of work-study was negatively associated with persistence in private colleges but not public colleges. These findings are consistent with a prior study of within-year persistence by college-age undergraduates in private colleges (St. John, Andrieu, and Oescher, 1992). Also consistent with the prior results, was this study's finding that the set of prices and subsidies⁷—the average amount of tuition charged and aid awarded—facing adult students in public colleges was more problematic than the combination of prices facing adult students in private colleges.

These findings have implications for pricing policy. For policymakers in government agencies, the research suggests that cost provisions in grant programs can diminish the effectiveness of these programs if institutions do not increase their spending on grants as they increase their tuition charges (St. John, 1993). Further, this research, coupled with other recent studies using NPSAS-87, indicate that the ongoing debate about whether student aid is effective (e.g., Leslie and Brinkman, 1988; Pascarella and Terenzini, 1991; Tinto, 1987) may be missing a crucial point. It appears that the effectiveness of student aid and prices are relative, rather than absolute; that the effectiveness of student aid can change, based on funding levels, prices, and the populations being served, an argument that has been made only occasionally in the past (Dresch, 1975; Hearn and Longanecker, 1985; St. John, 1993; St. John

and Starkey, 1995). For aid administrators, these findings imply that limited grant dollars should be targeted toward the populations which are most likely to benefit from assistance.

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Notes

¹In studies using the longitudinal databases (the National Longitudinal Study of the High School Class of 1972 and High School and Beyond), it was possible to assess year-to-year persistence. However, in studies using NPSAS-87 it was necessary to examine within-year persistence, due to the timing of the sample. It has been argued that within-year persistence is an appropriate outcome measure for assessing the effects of student aid, since it measures whether the amount of aid was sufficient to enable students to persist through the academic year (Carroll, 1987; St. John, Oescher and Andrieu, 1992).

²This adjustment was made so that graduating seniors would be counted as persisters. The question asked on NPSAS-87 did not distinguish between receiving a degree and meeting educational goals.

³Students would not be designated as independent unless they applied for student aid.

⁴These allocations of aid dollars would seem attributable to the need analysis methods and the embedded expectations of student contributions. For example, more adults were part-time. This would reduce their grant award in most instances.

⁵Recall that the set of design variables used for college graduates essentially compared students within a specified category (e.g., below C grades) to students in the unspecified category (i.e., B averages).

⁶This issue, whether negative grant coefficients are attributable to unmet need, was examined in another recent study (St. John and Starkey, 1995), which also reached this conclusion.

⁷We use the term "set of prices and subsidies" rather than "net price" because research indicates students respond to a set of prices and subsidies rather than to a net price (St. John and Starkey, 1995).