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AUTHOR Heller, Donald E.
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ABSTRACT

This study examined student price responsiveness by comparing the tuition and financial aid sensitivity of first-time college enrollees with that of continuing college students. Data were obtained from the National Center for Education Statistics Higher Education General Education Information Survey (HEGIS) and Integrated Postsecondary Education Data System (IPEDS) surveys for 1976 through 1994; Bureau of the Census and intercensile population estimates; annual surveys of tuition prices; surveys of state grant program expenditures; and Bureau of Labor Statistics. Cross-sectional and time-series econometric techniques revealed that for most racial groups and at most levels of public institutions, tuition price responsiveness was greater for continuing students than for first-time enrollees, with the largest difference in the community college sector. State grants appeared to help students attend college for the first time but were not as influential in the continuing enrollment of most groups of students. State grants appeared to be most influential in the first-time college attendance of Hispanic students, particularly those in community colleges. (Contains 27 references and 5 data tables.) (MDM)

# A Comparison of the Tuition Price and Financial Aid Responsiveness of First-Time Enrollees and Continuing College Students

Paper Presented at the Annual Meeting of the
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Donald E. Heller
Assistant Professor of Higher Education
Center for the Study of Higher and Postsecondary Education
University of Michigan
610 East University, 2108D SEB
Ann Arbor, MI 48109-1259
734-647-1984
dheller@umich.edu

ASHE *Association for the Study of Higher Education*

Headquartered at the University of Missouri-Columbia • College of Education • Department of Educational Leadership and Policy Analysis • 211 Hill Hall, Columbia, MO 65211 • 573-882-9645 • fax 573-884-5714

**This paper was presented at the annual meeting of the Association for the Study of Higher Education held in Miami, Florida, November 5-8, 1998. This paper was reviewed by ASHE and was judged to be of high quality and of interest to others concerned with higher education. It has therefore been selected to be included in the ERIC collection of ASHE conference papers.**

**Abstract**

This study expands on the existing body of student price responsiveness research by comparing the tuition and financial aid sensitivity of first-time college enrollees with that of continuing college students. Data on public college enrollments over a 20-year period are used to examine differences in price responsiveness between these two groups. In addition, differences in price and financial aid responsiveness among students from different races are also analyzed.

## 1. INTRODUCTION

There is an extensive body of research on the sensitivity to tuition prices of prospective college students. Three reviews of much of this research have been conducted over the last two decades by Jackson and Weathersby (1975), Leslie and Brinkman (1987), and Heller (1997b). These studies have confirmed the existence of a downward-sloping demand curve for higher education, i.e., as tuition prices increase, the probability that a prospective student will enroll in college decreases, *ceteris paribus*. Many of the articles cited in these reviews have examined the enrollment effects of different measures of the price of college. Some have included the posted tuition rate as the key question variable, while others looked at the effectiveness of financial aid in lowering the net price paid by students.

Almost all these studies have one common characteristic that limits our knowledge of the effects of price on the college participation of all students. Most have used longitudinal surveys collected by the National Center for Education Statistics to examine the enrollment decisions of students attending college for the first time. Such surveys as the National Longitudinal Survey of 1972, the National Longitudinal Survey of Youth, the High School and Beyond Survey, and the National Educational Longitudinal Survey of 1988 provide an opportunity for researchers to examine the detailed postsecondary enrollment behavior of recent high school graduates attending college for the first time.

One limitation of these types of studies is that they tell us little about how tuition prices and financial aid effect the continuing participation of students who are already enrolled in college. One would expect first-time enrollees to be more price sensitive, because as pointed out by Leslie and Brinkman, "Upperclassmen are less responsive to price changes because their investment has already begun and because they will not have to pay the higher price for as many years." (Leslie & Brinkman, 1988, p. 125) Yet there has been little research that has attempted to compare the price responsiveness of these two groups at the same point in time in order to

confirm this supposition made by Leslie and Brinkman and others.[1] In addition, many studies have looked only at students in the aggregate, with no comparison of the price responsiveness of students from different racial or ethnic groups.

This paper seeks to expand on knowledge of price responsiveness by comparing the sensitivity to tuition prices and state grant spending of first-time enrollees in public colleges and universities with those of continuing college students. The study overcomes the limitations of most earlier studies by examining enrollment behavior of both types of students over a two-decade period, and by looking at differences among students from different races. The specific research questions addressed in this paper include:

- How does the tuition price and state grant responsiveness of first-time enrollees in public colleges and universities differ from that of continuing students?
- Do these price responsiveness measures vary for students from different racial/ethnic groups?
- Are these price responsiveness measures different in 2-year and 4-year institutions?

## 2. METHODOLOGY

Most of the previous research on the effects of tuition and financial aid on college participation has used either cross-sectional or time-series methodologies to address these issues. Both methodologies have weaknesses which limit their usefulness in analyzing college enrollment behavior. While cross-sectional studies often have large sample sizes, and therefore much statistical power to examine subsets of data (e.g., racial or income categories), they commonly measure tuition sensitivity only at a single point in time. In addition, they usually measure only the tuition sensitivity of first-time enrollees in college. Time-series analyses measure how enrollment changes in response to different tuition prices in multiple years, but often are unable to track changes in the choices of individual students or groups of students. The analysis here combines

[1] There are some notable exceptions to this limitation. See for example Lee and St. John (1996), St. John (1990a), and St. John (1990b).

both cross-sectional *and* time-series econometric techniques through panel data analysis to take advantage of the strengths of each to address these research questions.

Undergraduate enrollment data by race for the even years from 1976 to 1994 have been collected for each of the public postsecondary institutions in each state in the U.S., along with information about tuition prices, need-based financial aid expenditures, unemployment rates, and population estimates in each state. These data were organized into a panel dataset consisting of 50 states and nine years.

During this two decade period, states have pursued different policies in pricing tuition and funding financial aid programs. These differing policies have provided a natural experiment to examine whether states with higher tuition prices have negatively impacted the enrollment of students more than states with lower prices. The combining of time series and cross-sectional data into a panel dataset provides a powerful tool to test the findings of previous studies that have used only one of these methodologies and have focused on the tuition and financial aid sensitivity only of first-time enrollees in college.

The general form of the fixed-effects model used in the study is:

$$r_{it} = \beta_0 + \beta_1 c_{it} + \beta_2 a_{it} + \beta_3 j_{it} + \mu_i + \phi_{dt} + \rho\varepsilon_{it-1} + \upsilon_{it} \qquad (1)$$

where $r_{it}$ = Public undergraduate college participation rate in state $i$ in year $t$ (number of students enrolled divided by the 18 to 24 year-old population in the state)

$c_{it}$ = Vector of public tuition prices in state $i$ in year $t$

$a_{it}$ = State need-based grant expenditures (per 18 to 24 population) in state $i$ in year $t$

$j_{it}$ = Unemployment rate in state $i$ in year $t$[2]

$\mu_i$ = State fixed effects

$\phi_{dt}$ = Year effects, which are allowed to vary by census region $d$

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2 Since attending college can be a substitute for entering the workforce, many researchers have hypothesized that unemployment may be positively associated with college enrollment, i.e., as employment possibilities lessen, individuals may be more likely to enter college as their opportunity cost of college attendance declines. A countervailing force is that fewer employment possibilities mean that students and their families may have fewer resources for financing a college education. See for example Corazzini, Dugan, and Grabowski (1972), Blakemore and Low (1983), Jackson (1988), and Ahlburg, McPherson, and Schapiro (1994).

$\rho$ = a parameter, rho, representing the strength of the influence of the previous period

$\varepsilon_{it-1}$ = error component for state *i* in year *t–1*

$\upsilon_{it}$ = random disturbance for state *i* in year *t*

Fixed-effects models were fit for the college participation of first-time freshman students, and for students continuing their college careers.[3] The models were weighted by the size of the 18 to 24 year-old population in each state in the 1990 census.

Enrollment data for this study come from the National Center for Education Statistics HEGIS and IPEDS surveys for 1976 through 1994 (National Center for Education Statistics, various years). Population data have been collected from the Census Bureau 1980 and 1990 censuses, along with inter-censile population estimates (United States Bureau of the Census, 1996a; United States Bureau of the Census, 1996b; United States Bureau of the Census, 1996c; United States Bureau of the Census, 1996d). Tuition prices have been obtained from an annual survey conducted by the Washington State Higher Education Coordinating Board (1996). Data on state grant program expenditures come from the National Association of State Scholarship and Grant Programs (Various years). State unemployment data were obtained from the United States Bureau of Labor Statistics (Various years).

A key issue with Equation 1 is the estimation of the parameter $\rho$, rho. If rho is zero, i.e., there is no autocorrelation, then the error terms for each state are not correlated, and Equation 1 becomes a standard fixed-effects model. First-order autocorrelation can be detected through calculation of the Durbin-Watson statistic. Bhargava, Franzini, and Narendranathan (1982) generalized the Durbin-Watson test for use with panel data:

$$d_p = \frac{\sum_{i=1}^{I}\sum_{t=2}^{T}\left(\tilde{u}_{it}-\tilde{u}_{it-1}\right)^2}{\sum_{i=1}^{I}\sum_{t=1}^{T}\left(\tilde{u}_{it}\right)^2} \qquad (2)$$

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3 The National Center for Education Statistics defines a first-time freshman student as:
An entering freshman who has never attended any college. Includes students enrolled in the fall term who attended college for the first time in the prior summer term. Also includes students

where $\tilde{u}_{it}$ = the OLS residuals from estimating the fixed-effects model in Equation 1

Bhargava, Franzini, and Narendranathan provide tables for testing the significance of the null hypothesis at the 5% level that rho = 0, i.e., no autocorrelation exists. For the models fit in this study, first-order autocorrelation was found.[4]

Because the panel data are serially correlated, ordinary least squares regression cannot be used to fit the models. In order to account for the autocorrelative nature of the enrollment data, general estimating equation models (GEE), as developed by Liang and Zeger (1986), were used to estimate the fixed-effects model shown above. GEE models are a form of general linear models for use with panel data that allow the specification of the particular covariance structure, including autocorrelation, for the dataset, so that the heteroscedasticity assumptions in ordinary least squares regression can be relaxed in estimating standard errors. A first-order autocorrelative covariance structure was specified in fitting the models.

Table 1 provides summary statistics of the public college and university participation rates of first-time college freshmen. Means and standard deviations are presented both unweighted and weighted by the 18 to 24 population in each state in the 1990 census. College participation rates for each racial group are shown as a percentage of the 18 to 24 population in each state, and are shown for all public institutions, 4-year colleges and universities only, and community colleges only. The same measures for the enrollment of continuing students (those not attending a college or university for the first time) are shown in Table 2. Table 3 presents descriptive statistics of the key question and control variables used in this study.

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who entered with advanced standing (college credits earned before graduation from high school). (Broyles & Vanderhorts, 1992, p. 8)

4 See Heller (1997a) for details of the measures of first-order autocorrelation found in the models used in this study.

**Table 1: Descriptive Statistics of Public Participation Rates for First-time Freshmen, Even Years 1976 to 1994**

| Measure (in percentage points) | Unweighted Mean (SD) | Weighted* Mean (SD) | Minimum | Maximum |
|---|---|---|---|---|
| **Participation in all public institutions** | | | | |
| First-time freshmen participation rate, all races | 6.66 (2.35) | 6.55 (2.23) | 1.72 | 19.85 |
| First-time freshmen participation rate, Asian-American | 8.17 (3.67) | 8.52 (3.61) | 0.78 | 26.43 |
| First-time freshmen participation rate, Black | 5.77 (2.97) | 5.66 (2.72) | 0.44 | 22.13 |
| First-time freshmen participation rate, Hispanic | 1.66 (0.44) | 3.52 (1.56) | 0.44 | 11.38 |
| First-time freshmen participation rate, White | 6.91 (2.67) | 6.88 (2.52) | 1.70 | 23.47 |
| **Participation in 4-year institutions** | | | | |
| First-time freshmen participation rate, all races, | 3.25 (1.40) | 2.89 (1.18) | 0.65 | 17.69 |
| First-time freshmen participation rate, Asian-American | 4.39 (1.89) | 4.30 (1.72) | 0.00 | 14.39 |
| First-time freshmen participation rate, Black | 2.66 (1.56) | 2.33 (1.28) | 0.13 | 9.49 |
| First-time freshmen participation rate, Hispanic | 1.54 (0.96) | 1.41 (0.83) | 0.11 | 6.81 |
| First-time freshmen participation rate, White | 3.37 (1.55) | 3.02 (1.27) | 0.60 | 21.10 |
| **Participation in community colleges** | | | | |
| First-time freshmen participation rate, all races, | 3.46 (2.35) | 3.68 (2.33) | 0.00 | 17.48 |
| First-time freshmen participation rate, Asian-American | 3.85 (3.29) | 4.25 (3.34) | 0.00 | 21.14 |
| First-time freshmen participation rate, Black | 3.17 (2.84) | 3.36 (2.73) | 0.00 | 20.67 |
| First-time freshmen participation rate, Hispanic | 1.93 (1.52) | 2.13 (1.49) | 0.00 | 10.66 |
| First-time freshmen participation rate, White | 3.60 (2.58) | 3.88 (2.57) | 0.00 | 20.52 |

* Values weighted by the 18 to 24 population in each state in the 1990 census

† All races category includes Native American and foreign students

**Table 2: Descriptive Statistics of Public Participation Rates for Continuing Students, Even Years 1976 to 1994**

| Measure (in percentage points) | Unweighted Mean (SD) | Weighted* Mean (SD) | Minimum | Maximum |
|---|---|---|---|---|
| **Participation in all public institutions** | | | | |
| Continuing student participation rate, all races | 25.02 (8.17) | 25.31 (8.04) | 11.94 | 53.43 |
| Continuing student participation rate, Asian-American | 30.23 (12.03) | 34.53 (13.21) | 6.13 | 85.30 |
| Continuing student participation rate, Black | 18.62 (7.78) | 19.54 (7.95) | 3.70 | 53.27 |
| Continuing student participation rate, Hispanic | 11.70 (5.71) | 12.88 (5.51) | 1.01 | 30.12 |
| Continuing student participation rate, White | 26.70 (9.63) | 27.76 (9.94) | 11.81 | 60.98 |
| **Participation in 4-year institutions** | | | | |
| Continuing student participation rate, all races, | 15.25 (5.60) | 12.81 (3.91) | 7.76 | 43.29 |
| Continuing student participation rate, Asian-American | 19.41 (7.71) | 19.26 (6.59) | 4.98 | 59.90 |
| Continuing student participation rate, Black | 11.08 (6.40) | 8.88 (3.71) | 1.04 | 46.89 |
| Continuing student participation rate, Hispanic | 6.66 (3.87) | 5.92 (3.00) | 0.71 | 24.16 |
| Continuing student participation rate, White | 16.32 (6.57) | 13.99 (4.32) | 6.36 | 51.47 |
| **Participation in community colleges** | | | | |
| Continuing student participation rate, all races, | 9.91 (6.87) | 12.52 (7.83) | 0.92 | 34.60 |
| Continuing student participation rate, Asian-American | 10.99 (8.64) | 15.29 (10.57) | 0.00 | 45.78 |
| Continuing student participation rate, Black | 7.66 (6.11) | 10.68 (7.78) | 0.00 | 33.65 |
| Continuing student participation rate, Hispanic | 5.12 (4.27) | 6.97 (4.75) | 0.00 | 23.20 |
| Continuing student participation rate, White | 10.53 (7.66) | 13.80 (9.32) | 1.01 | 40.27 |

* Values weighted by the 18 to 24 population in each state in the 1990 census
† All races category includes Native American and foreign students

**Table 3: Descriptive Statistics of State-level Question and Control Variables, Even Years 1976 to 1994**

| Variable and Measurement Unit | Unweighted Mean (SD) | Weighted* Mean (SD) | Minimum | Maximum |
|---|---|---|---|---|
| **Question Variables** | | | | |
| Resident community college tuition (thousands of 1994 dollars) | 1.00 (0.43) | 0.99 (0.46) | 0.00 | 2.46 |
| Resident comprehensive university tuition (thousands of 1994 dollars) | 1.68 (0.64) | 1.72 (0.67) | 0.39 | 3.89 |
| State need-based grant spending per 18-24 year-old (hundreds of 1994 $) | 0.44 (0.54) | 0.54 (0.63) | 0.00 | 3.80 |
| **Control Variables†** | | | | |
| Annual unemployment rate, age 16+, all races (percentage points) | 6.68 (2.09) | 6.83 (2.04) | 2.20 | 15.50 |
| Annual unemployment rate, age 16+, Black | 13.64 (4.54) | 13.80 (4.53) | 4.58 | 33.30 |
| Annual unemployment rate, age 16+, Hispanic | 10.03 (3.92) | 10.06 (3.70) | 1.10 | 28.90 |
| Annual unemployment rate, age 16+, White | 5.87 (1.96) | 5.92 (1.91) | 2.10 | 14.70 |

* Values weighted by the 18 to 24 population in each state in the 1990 census

† The unemployment rate used for the all races model is the overall annual unemployment rate in each state each year (for all workers age 16 and over). Ideally, the unemployment rate for workers 18 to 24 would be used as a better indicator of opportunities in labor markets, but these data are not available by state and race from the Bureau of Labor Statistics. For the models of each racial group, the unemployment rate for that group in each state was used, with the exception of Asian-Americans. Until 1989, the Bureau of Labor Statistics did not code Asian-Americans separately in the Current Population Surveys, the source of the data for calculation of unemployment rates (Asian-Americans were counted in the "Other race" category). I examined CPS data from 1989 to 1993 and found that the unemployment rate of Asian-Americans tracked very closely (within 0.6 percentage points) that of Whites. Thus, for the model of Asian-American enrollments, the unemployment rate for Whites was used.

## 3. FINDINGS

A 3 X 5 matrix of the model shown in Equation 1 was fitted for the college participation of first-time freshman students, with the first dimension being the college sector (all public institutions, 4-year only, and community colleges only), and the second dimension being the racial group (all races, Asian-American, Black, Hispanic, and White students). A similar matrix of models was fitted for the participation of continuing students. A few notes are relevant to the fitting of the models:

1. As described in Tables 1 through 3, the participation rates are expressed in percentage points, and tuition amounts are in thousands of 1994 dollars. Thus, a coefficient of -2.0 on one of the tuition measures should be interpreted as indicating a drop in the participation rate of two percentage points for every $1,000 increase in tuition.
2. The tuition prices used in these models include the resident student community college tuition and the comprehensive university tuition in each state for each year, obtained from the Washington State Higher Education Coordinating Board (1996). Flagship university tuition prices tend to be highly correlated with those of comprehensive universities in each state, so that including both 4-year prices in models introduces problems of collinearity. In addition, the majority of students who attend 4-year institutions in each state attend comprehensive universities, so it is reasonable to assume that the tuition level there is the price "signal" to which the majority of students respond.[5]
3. State financial aid spending is expressed in hundreds of 1994 dollars for every 18 to 24 year-old in the state. A coefficient of 1.0 would indicate that a $100 increase in grant spending (per 18-24 year-old) is related to a participation rate increase of one percentage point.

By definition, the participation rates of freshman students will be less than those of all continuing students; therefore, an adjustment must be made to compare the relative price sensitivity of these two cohorts. For example, over the entire period from 1976 to 1994, the mean annual (weighted) freshmen participation rate for students of all races in all public institutions (shown in Table 1) was 6.55 percent, i.e., 6.55 percent of all 18 to 24 year-olds in each state were enrolled in a public institution as a first-time student. In comparison, the mean participation rate for continuing students (of all races) was 25.02 percent.

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5 This formulation is used by other researchers, including Rouse (1994) and Kane (1995). The models were also fit using lagged tuition prices, but no improvement in the models' explanatory power and no substantive changes to coefficients were found. This is likely because of the strong correlation in year-to-year tuition prices in each sector. With both the community college and comprehensive university tuition prices included in each model, it was found that the predominant tuition price responsiveness was as follows: enrollment in all public institutions – community college tuition; enrollment in 4-year institutions – comprehensive university tuition; and enrollment in community colleges – community college tuition.

In order to compare which coefficient or set of coefficients represents a larger effect size, the coefficients for each set (freshmen versus continuing students) can be divided by the mean enrollment rate for that group. This calculation then provides an estimate of the size of the effect relative to the mean enrollment rate. As described above, the mean freshmen participation rate of students of all races in all institutions was 6.55 percent. Dividing the model coefficient estimate of -0.27 by the mean participation rate indicates that a community college tuition increase of $1,000 is related to a participation rate drop of 4.1 percent.[6]

The coefficient estimates of the tuition effects of both sets of models are shown in Table 4. Also shown in Table 4 are the estimated enrollment effects of each model, which enrollment effect is larger, and the results of a $\chi^2$ test of the null hypothesis that the magnitude of the two enrollment effects are the same. Panel I in Table 4 shows that for enrollment in all public institutions, only among Black students are freshmen more price responsive than continuing students. For the other groups, while continuing students exhibit a greater level of price responsiveness, the predicted enrollment effects of the two cohorts are not different at a level of significance greater than 0.05. Among freshmen, minority students (Asian-Americans, Blacks, and Hispanics) all exhibit price responsiveness greater than White students.

In 4-year institutions (Panel II), only among Hispanic and Asian-American students do freshmen show a higher level of price responsiveness than continuing students (the difference for White students is not significantly different from zero). For Asian-Americans, however, the price effect is in the opposite direction from what one would expect. An increase in 4-year institution prices is related to an *increase* in the enrollment of Asian-Americans in this sector. This type of result has been noted by other researchers. Behrman, Kletzer, McPherson, and Schapiro (1992) analyzed the National Longitudinal Survey of 1972, comparing the tuition sensitivity of White students with that of a sample of Black and Hispanic students together. They found that White enrollments in 2-year institutions did not respond to changes in tuition, but interestingly enough, White enrollments in 4-year colleges reacted *positively* to tuition increases there. They concluded that for these students, "price is capturing a quality effect here for which we are unable to control" (p. 14). In other words,

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6 Note the distinction here between a *percentage point* change, as measured by the coefficient estimate, and a *percentage* change in the participation rate, as measured by the ratio of the coefficient estimate to the mean participation rate.

**Table 4: Fixed-Effects Model Coefficient Estimates — Tuition Effects**

| Model | First-time Freshmen Coefficient (SE) | First-time Freshmen Enrollment Effect | Continuing Students Coefficient (SE) | Continuing Students Enrollment Effect | Larger Effect | Prob($\chi^2$) |
|---|---|---|---|---|---|---|
| I. All Institutions — Response to community college tuition price | | | | | | |
| All Races | -0.27<br>(0.45) | -4.1% | -2.31**<br>(0.89) | -9.1% | Continuing | 0.46 |
| Asian-American | -3.14**<br>(0.87) | -36.9% | -14.88**<br>(2.45) | -43.1% | Continuing | 0.54 |
| Black | -1.35**<br>(0.41) | -23.9% | -1.64<br>(1.02) | -8.4% | Freshmen | 0.03 |
| Hispanic | -0.89*<br>(0.39) | -25.3% | -4.67**<br>(0.86) | -36.2% | Continuing | 0.33 |
| White | -0.21<br>(0.50) | -3.1% | -2.59**<br>(0.91) | -9.3% | Continuing | 0.39 |
| II. 4-year institutions — Response to comprehensive university tuition price | | | | | | |
| All Races | -0.06<br>(0.15) | -2.1% | -0.34<br>(0.23) | -2.6% | Continuing | 0.35 |
| Asian-American | 0.55**<br>(0.21) | 12.8% | 0.54<br>(0.83) | 2.8% | Freshmen | 0.04 |
| Black | 0.01<br>(0.12) | 0.4% | 0.15<br>(0.31) | 1.7% | Continuing | 0.81 |
| Hispanic | -0.24*<br>(0.10) | -17.0% | -0.19<br>(0.28) | -3.3% | Freshmen | 0.05 |
| White | 0.10<br>(0.16) | -3.3% | -0.42~<br>(0.22) | -3.0% | Freshmen | 0.96 |
| III. Community colleges — Response to community college tuition price | | | | | | |
| All Races | -0.07<br>(0.42) | -1.9% | -2.63**<br>(0.67) | -21.0% | Continuing | 0.06 |
| Asian-American | -2.13*<br>(0.84) | -50.1% | -12.96**<br>(1.89) | -84.7% | Continuing | 0.08 |
| Black | -1.07**<br>(0.38) | -31.9% | -1.53*<br>(0.77) | -14.4% | Freshmen | 0.12 |
| Hispanic | -0.95**<br>(0.36) | -44.6% | -4.79**<br>(0.85) | -68.8% | Continuing | 0.16 |
| White | 0.14<br>(0.45) | 3.6% | -2.90**<br>(0.69) | -21.0% | Continuing | 0.02 |

~ = p≤.10, * = p≤.05, ** = p≤.01

they theorized that higher-priced institutions were sending a signal of higher quality to White students, thus providing more incentive for them to enroll there. This incentive had to have been large enough to offset any negative effect caused by students' inability or unwillingness to pay the higher tuition. This effect was also noted by Breneman (1994) in private liberal arts colleges.

In community colleges (Panel III), for those groups with a price responsiveness statistically different from zero, the effect is in the expected direction, with tuition increases being related to decreases in the participation rate. For each group with the exception of Blacks, continuing students were more price responsive than freshmen. Among the freshman students, minority students again exhibited a higher level of price sensitivity than did White students.

Table 5 shows the effects of state grant spending. For example, Panel I shows that a $100 increase in state grant spending per 18 to 24 year-old in a state is related to an increase of 9.9 percent in the participation rate of freshman students. The same spending increase is related to an increase of only 3.0 percent in the participation rate of continuing students. For most of the models in Table 5 where a grant effect was found that was significantly different from zero, the effect was larger for first-time freshman students. Note that in 4-year institutions, the effects of state grants among freshmen is in the opposite direction from what one would expect (increases in state grant spending are related to *declines* in the college participation rate). One explanation for this result is that increased state grant spending may help to encourage freshmen to attend a community college, where a state grant may be enough to close the gap between a federal financial aid award and the cost of attendance, but not be enough to close the gap at a 4-year institution (Panel III shows that increases in grant spending are related to increases in the enrollment of freshmen in community colleges).[7] Thus, increased state grant spending may increase enrollment in community colleges at the expense of 4-year institutions.

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[7] Federal Pell Grants are awarded to income-eligible recipients in the amount of the lesser of 50% of the cost of attendance (tuition, room, board, books, and miscellaneous expenses), or the maximum Pell amount. The maximum Pell Grant in academic year 1994-1995 was $2,350.

**Table 5: Fixed-Effects Model Coefficient Estimates — State Grant Spending Effects**

| | First-time Freshmen | | Continuing Students | | | |
|---|---|---|---|---|---|---|
| Model | Coefficient (SE) | Enrollment Effect | Coefficient (SE) | Enrollment Effect | Larger Effect | Prob($\chi^2$) |
| I. All Institutions — Response to state grant spending | | | | | | |
| All Races | 0.65* (0.27) | 9.9% | 0.76 (0.54) | 3.0% | Freshmen | 0.10 |
| Asian-American | 0.63 (0.48) | 7.4% | 3.54** (1.34) | 10.3% | Continuing | 0.62 |
| Black | 0.51* (0.24) | 9.0% | 2.31** (0.59) | 11.8% | Continuing | 0.50 |
| Hispanic | 0.57** (0.20) | 16.2% | 0.68 (0.45) | 5.3% | Freshmen | 0.06 |
| White | 0.77* (0.31) | 11.2% | 0.36 (0.57) | 1.3% | Freshmen | 0.03 |
| II. 4-year institutions — Response to state grant spending | | | | | | |
| All Races | -0.29* (0.14) | -10.0% | 0.68** (0.23) | 5.3% | Freshmen | 0.001 |
| Asian-American | -0.17 (0.18) | -4.0% | 1.26~ (0.74) | 6.6% | Continuing | 0.01 |
| Black | -0.08 (0.12) | -3.4% | 0.64* (0.32) | 7.2% | Continuing | 0.04 |
| Hispanic | -0.15~ (0.09) | -10.6% | 0.45~ (0.27) | 7.7% | Freshmen | 0.003 |
| White | -0.37** (0.14) | -12.3% | 0.29 (0.22) | 2.0% | Freshmen | 0.003 |
| III. Community colleges — Response to state grant spending | | | | | | |
| All Races | 0.69** (0.25) | 18.8% | -0.16 (0.42) | -1.3% | Freshmen | 0.002 |
| Asian-American | 0.60 (0.45) | 14.1% | -0.18 (1.00) | -1.2% | Freshmen | 0.15 |
| Black | 0.53** (0.22) | 15.8% | 1.03* (0.45) | 9.7% | Freshmen | 0.35 |
| Hispanic | 0.71** (0.19) | 33.3% | 0.17 (0.44) | 2.4% | Freshmen | 0.0004 |
| White | 0.76** (0.28) | 19.6% | -0.10 (0.44) | -0.8% | Freshmen | 0.003 |

~ = p≤.10, * = p≤.05, ** = p≤.01

## 4. SUMMARY AND IMPLICATIONS

A key finding of this study is that for most racial groups and in most levels of public institutions, tuition price responsiveness is greater for continuing students than for first-time enrollees (though the differences in tuition sensitivity between the two cohorts is largest in the community college sector).

The effect of state grant spending, however, is in general most pronounced among freshman students. State grants appear to be helping students to attend college for the first-time, but are not as influential in the continuing enrollment of most groups of students once they have already begun their college careers. State grants appear to be most influential in the first-time college attendance of Hispanic students, particularly those in community colleges, with the other three racial groups showing similar levels of enrollment response to state grants.

One way for states to operationalize these findings would be to focus state financial aid awards on students attending college for the first time, as a way of encouraging them to begin their college careers. While some state grant programs award need-based financial aid only to freshman students, most programs award aid to students during their entire undergraduate careers. Focusing the bulk of state aid on new students may better leverage limited state resources to help accomplish the goal of increasing access to college.

In addition, state policy makers can use this information to encourage enrollment behavior in different sectors of public higher education. Since present levels and structures of state grant expenditures appear to be most useful at encouraging students to enroll in community colleges, policy makers should examine whether large increases in the amount awarded to students attending 4-year institutions would be sufficient to help close the gap between financial aid and the price of tuition in that sector.

While many authors have speculated that first-time college attendees should be more price responsive than students already enrolled in college, there has been little research that has utilized methodologies that allow for the direct comparison of the price responsiveness of these two groups. This study has done this by examining the enrollment behavior of both groups from the same universe of students at the same points in time. The findings from this study help expand our understanding of the effects of tuition and financial aid on the college enrollment of different types of students in each sector of public higher education.

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