

Preliminary Draft

Comments Welcome. Please Do Not Cite Without Permission

## **The Differential Impact of College Cost on the Enrollment of Students from Different Socioeconomic Backgrounds**

By

Jennifer Ma  
Research Economist  
TIAA-CREF Institute  
[Jma@tiaa-cref.org](mailto:Jma@tiaa-cref.org)

April 2001

### **Abstract**

While numerous studies have estimated the impact of college cost on enrollment rates, very few have used the duration of enrollment or completed schooling as an outcome measure. This paper examines the impact of public in-state tuition cost and state grant aid on the enrollment rates and duration of enrollment, paying particular attention to the differential impact of cost on students from different income and race groups. Results suggest that public in-state two-year tuition has a strong impact on enrollment rates while public in-state four-year tuition generally has negligible impact on enrollment rates. Further, the enrollment rates of low-income and middle-income students are more sensitive to public two-year tuition cost than that of high-income students. The enrollment rate of black students is more sensitive to tuition cost than that of white and Hispanic students. Further, the enrollment rates of middle-income students and Hispanic students appear to be most sensitive to state grant aid. Results from enrollment duration models suggest that tuition cost and financial aid in general have small or negligible impact on the duration of enrollment. This is consistent with the argument that there is a barrier to college entry. Once students cross that barrier, tuition does not seem to matter much to completed schooling.

*The views expressed in this paper are those of the author and not necessarily those of TIAA-CREF. My acknowledgement to Mark Warshawsky, John Ameriks, Doug Fore, and Stuart Gillan for helpful comments and suggestions.*

## 1 Introduction

Federal and state governments play an important role in the financing of higher education. During the 1999-2000 academic year, the total amounts of federal grant aid and subsidized loans to students were over \$47 billion.<sup>1</sup> During the 1995-96 academic year, the direct appropriations from state governments to colleges and universities were over \$40 billion.<sup>2</sup>

It is not surprising why education issues are so important to policymakers. Education outcomes have important economic and social consequences. It is well-documented that college graduates earn more than high school graduates. Figures 1 and 2 plot the ratio of median annual earnings of all wage and salary workers ages 25-34 whose highest education level is grades 9-11, some college, or a bachelor's degree or higher, compared with those with a high school diploma or GED, for male and female workers, respectively.<sup>3</sup> For both genders, annual earnings are positively related to education attainment. In 1997, the median annual earnings of male college graduates ages 25-34 were fifty percent higher than those of male high school graduates. For females, the gap is even larger – the median annual earnings of female college graduates ages 25-34 were ninety percent higher than those of female high school graduates. These figures also show that the wage gap between college and high school graduates has widened for both genders in the past two decades.

Given the benefits of a college education, society has an interest in making it accessible to those who can benefit the most, regardless of their family background. Yet, the

---

<sup>1</sup> Source: *Trends in Student Aid 2000*, The College Board.

<sup>2</sup> Source: *Digest of Education Statistics 2000*, Department of Education.

<sup>3</sup> Source: *The Condition of Education 1999*, Department of Education.

college enrollment rates of children are positively correlated with their socioeconomic background such as family income and parental education level. Data from the National Education Longitudinal Study of 1988 suggest that there are tremendous differences between the enrollment rates of students with different socioeconomic status (Table 1). The college enrollment rate of students from the top-quartile of socioeconomic status is 25 percentage points higher than that of students from the two middle quartiles and 52 percentage points higher than that of students from the lowest quartile. Table 1 also shows that Asian and white students are more likely to enroll in college than black or Hispanic students. The enrollment gap between students with different socioeconomic status exists even after taking into account students' preparedness for college as measured by their previous test scores (Table 2).

The positive correlation between family income and enrollment has convinced many policymakers that the lack of financial resources impedes low-income students' college attendance. Because education achievement has an important impact on labor market outcomes, income distribution, and social mobility, one of the major goals of government financial aid policy is to promote equal educational opportunity for students of all economic and social backgrounds and thus reduce wage inequality and intergenerational income inequality. If economically disadvantaged students or their families cannot save for college or are subject to borrowing constraints, and their enrollment rates are indeed sensitive to college cost, then government financial aid programs targeted at these students may be an effective way to promote access to college for them.

A substantial amount of empirical research has been devoted to estimate the importance of college cost on enrollment decisions. While most of these studies have focused on the impact of tuition cost on enrollment rates, a few studies have focused on the impact of

financial aid on enrollment rates. Results of these studies have been somewhat mixed. While most cross-sectional studies of tuition cost and enrollment find significant impact of tuition cost on enrollment rates, most time series studies of federal financial aid and enrollment find no strong impact of federal financial aid on enrollment. Further, most empirical studies in the literature have focused on the impact of tuition cost or financial aid on enrollment rates. Very few studies have looked at the impact of tuition cost or financial aid on the duration of enrollment or completed schooling, even though enrollment duration has strong implications for future earnings.<sup>4</sup>

The purpose of this study is to examine the differential impact of tuition cost and financial aid on the college attendance of students with different socioeconomic backgrounds. Two outcome measures will be considered: the probability of enrolling in college and the duration of college enrollment. Results suggest that public two-year tuition has a strong impact on enrollment rates while public four-year tuition has negligible impact on enrollment rates. Further, low-income and middle-income students are more responsive to public two-year tuition than high-income students. Results from duration model suggest that neither public two-year or four-year tuition has a significant impact on enrollment duration.

The remainder of the paper is structured as follows. Section 2 reviews some selected empirical studies on the impact of tuition cost or financial aid on college enrollment behavior. Section 3 describes the model and data. Section 4 discusses the results. Section 5 provides some concluding remarks.

---

<sup>4</sup> For example, Kane and Rouse (1995) find earnings are positively correlated with total credits taken in college.

## 2 Selected Studies on the Impact of College Cost on Enrollment

There have been numerous empirical studies using various data sets and methods to estimate the importance of tuition cost or financial aid on students' college enrollment behavior. Most studies on tuition cost and enrollment find that the enrollment rates of low-income students are more sensitive to tuition cost than those of middle-income and high-income students. However, studies on federal financial aid and enrollment usually find no strong impact of federal financial aid on the enrollment rates of low-income students. Kane (1999b) conducts both a cross-sectional analysis (using variation in college costs across states) and a time series analysis (using variation in federal aid policies over time) to estimate the effect of college cost on entry decision. His cross-sectional analysis suggests that the college enrollment rates in different states are negatively related to their tuition costs, especially the costs of public two-year colleges. Further, estimates by socioeconomic status provide support for the argument that short-term borrowing constraints play an important role in low-income youths' college entry. However, results from time series analysis provide no strong evidence that federal financial aid (the Pell grant specifically) has a significant impact on the college enrollment rates of low-income students.

Cameron and Heckman (1999a) estimate the impact of family income on college attendance for different race groups. Their results show that family income has a positive impact on college entry for all race groups. However, after taking into account students' previous test scores, the importance of family income diminishes. Because previous test scores are influenced by family income and other background factors, the authors conclude that family income has long-term cumulative effects on children; it affects students' outcomes at every stage of their life cycle and not just college entrance.

Dynarski (1999a) examines the sensitivity of the schooling of students from middle-income and high-income families to college costs by evaluating Georgia's HOPE Scholarship program. Georgia's HOPE (Helping Outstanding Pupils Educationally) Scholarship was initiated in 1993 and is funded by a state lottery. The program allows state residents with at least a B average in high school to attend Georgia's public colleges for free. Using a set of nearby states as a control group, she finds that Georgia's HOPE program has had a surprisingly large impact on the college attendance of middle-income and high-income youths and widened the gap in college attendance between blacks and whites and between those from low-income and high-income families.

Using pooled time-series data from the Current Population Survey and the American Freshman Survey, McPherson and Schapiro (1991) estimate the impact of net college cost on enrollment rates. Only white students are considered in their study, due to the small sample size of minority students. They find that net college cost has a negative impact on low-income whites' enrollment rates. A \$100 (in 1982-83 dollars) increase in net cost results in a 1.6 percent enrollment decline for low-income whites.

Most studies in the literature have focused on the impact of tuition cost or financial aid on enrollment decisions. In contrast, very few studies have used enrollment duration or completed schooling as an outcome. A study which did investigate duration is Dynarski (1999b) in which she estimates the impact of aid eligibility on enrollment rates and completed education, using the elimination of the Social Security Benefit Program in 1982 as a source of variation in federal aid policy. She finds that a \$1,000 increase in grant aid increases the probability of students attending college by four percentage points and educational attainment

by 0.16 years. In this paper, I estimate the impact of tuition cost and financial aid on the probability of enrolling in college as well as the duration of college enrollment.

### 3 Model and Data

#### 3.1 Model Framework

The economic model of human capital investment (Becker, 1993) suggests that individuals choose whether or not to enroll in college on the basis of the expected returns from that investment. The marginal benefit of enrolling in college is higher expected future earnings. The marginal cost of enrolling in college includes both direct costs (tuition, fees, etc.) and indirect costs (forgone earnings). Theoretically, an individual would equate marginal benefit with marginal cost when making a decision on attending college. Other things equal, the higher the tuition a student has to pay, the less schooling he would choose to have. Financial aid reduces the cost of attending college and thus may increase the schooling level of aid recipients.

Both Dynarski (1999a) and Card and Lemieux (2000) develop a human capital investment model. The essence of their models is that aid increases the level of schooling by reducing the present price of attending college. In this section, I present a modified version of their models. Suppose earnings are an increasing, concave function of schooling:

$$Y(S) = \alpha + \beta S - \gamma S^2$$

where  $S$  is years of schooling and  $Y(S)$  is the present discount value of lifetime earnings.  $\beta > 0$  and  $\gamma > 0$ . The marginal benefit of schooling is therefore:

$$MB = Y'(S) = \beta - 2\gamma S$$

The marginal cost of schooling includes net tuition cost, forgone earnings, and the

ease with which a student can succeed in college:

$$MC = T - Aid + FE - g(Ease)$$

where  $T$  is the full price tuition,  $Aid$  is the total amount of aid received,  $FE$  is the forgone earnings, and  $g(Ease)$  is an increasing function of the  $Ease$ .  $Ease$  is individual specific and positively related to a student's ability, preparedness for college, etc. Empirically,  $Ease$  can be proxied by a student's test scores, and  $FE$  can be proxied by local labor market condition (for example, unemployment rate).

Students equate MB and MC when determining the amount of schooling to obtain:

$$S - 2(S = T - Aid + FE - g(Ease))$$

$$S = (Aid - FE + g(Ease) - T + \$)/2($$

From the above optimal condition, it is easy to see that tuition cost has a negative impact and financial aid has a positive impact on schooling. In this paper, I estimate the impact of tuition cost and financial aid on two outcomes: enrollment decision and enrollment duration. In these models, I include as covariates indicators for family income and parental education (to control for family characteristics), individual characteristics, previous test score, and indicators for region and urbanicity. I also control for in-state public tuition level, state grant aid, and state unemployment rate in the relevant year, as described below.

### 3.2 Data

The data used for this study are drawn from the National Education Longitudinal Study (NELS) conducted by the National Center for Education Statistics. NELS is the first nationally representative longitudinal study of eighth grade students in public and private schools. This survey is designed to study the educational, vocational and personal development of students at various grade levels, and the personal, familial, social,



institutional, and cultural factors that may affect their development. The 1988 base-year survey interviewed a national probability sample of nearly 25,000 eighth graders from 1,052 grade schools. Parents, teachers, and school principals were also surveyed. Schools with high percentages of minority enrollments were over sampled. Three follow-up surveys were conducted in 1990, 1992 and 1994, when most students were in tenth grade, twelfth grade, and two years after high school graduation, respectively. A stratified, random sample of base-year respondents was included in the follow-ups as the “core” sample, while some new students were also added to “freshen” the sample so that the whole sample can be considered nationally representative. A fourth follow-up survey was scheduled for 2000 and the data will be released in late 2001.

NELS gathered a wide range of information on individual and family characteristics, students’ school work, aspirations and social relationships, parents’ attitudes and behaviors on educational choices, school policies, school climate, and teacher background. In the base-year and first two follow-up surveys, students were also given a series of curriculum-based tests administered at in-school or off-campus survey sessions. The third follow-up, which took place in 1994 when most sample members had completed high school, provides data for postsecondary school access and choice, employment, earnings, family formation, and other activities and experiences relevant to individuals as they are about to enter their adult lives. This follow-up also provides financial aid information for students who were enrolled in a postsecondary institution as of 1994.

The sample in this study includes students who participated in both the base year and the third follow-up surveys. Because students’ base-year test scores are used as a measure of their ability as well as preparedness for college, those students who did not complete the base-

year standardized tests are excluded from the sample. Observations with missing values for important demographic variables are also eliminated. For the enrollment models, only those students who held a high school diploma or GED are included. For the duration models, only those students who reported having enrolled in college are included. The final sample sizes are 14,629 and 8,126 for enrollment and duration models, respectively.

The public release versions of the NELS data do not identify states of residence. This information is necessary to identify in-state public tuition cost. Through a special agreement with the Department of Education, I obtained the restricted use version of the NELS data that contains information on states of residence. This information is then used to merge the NELS data with data on state tuition, grant aid, and unemployment. The 1992-93 in-state public two-year and four-year tuition and the state grant aid data are obtained from the *Digest of Education Statistics 1994*. The 1992 state unemployment rate information is available from the Bureau of Labor Statistics.

Table 3 provides the definition and descriptive statistics of the key variables used in this study. Students are defined as having enrolled in college if they reported any college enrollment before August of 1994, two years after high school graduation. Duration of enrollment is measured by the total months of college enrollment between June of 1992 and August of 1994, because the college completion information is not currently available from the NELS data. Because students may start attending college at different time after high school, the total months of college enrollment is highly correlated with the starting month of college attendance. In order to address this measurement error issue, I include in the regression only those students who started college in August of 1992 or September 1992.

Table 3 indicates that within two years of high school graduation, about 73 percent of

high school graduates and GED holders in the sample have enrolled in a postsecondary education institution, with an average enrollment of 21 months. The average public four-year in-state annual tuition across states was \$2,336 and the average public two-year in-state annual tuition was \$1,213. It is worth noting that both the public two-year and four-year tuition levels vary widely across states. The public two-year tuition ranges from \$208 in California to \$2,555 in Vermont. The public four-year tuition ranges from \$1265 in North Carolina to \$5,314 in Vermont. In 1992-93 academic year, the average state need-based grant aid per undergraduate student was \$148, with Nevada having the lowest state grant aid per undergraduate student (\$4) and New York having the highest (\$1028). The average unemployment rate across states in 1992 was 6.9 percent.

## 4 Results

### 4.1 Enrollment Decisions

The first two columns of Table 4 report results from basic linear probability enrollment models in which both public 4-year and 2-year tuition were included as covariates. Column 1 includes two indicators for family income and three indicators for parental education, while Column 2 includes only two indicators for family income. The purpose of estimating these two specifications separately is to examine whether family income still plays an important role in a student's enrollment decision after parental education is taken into account. Because parental education influences parental attitude and involvement towards education, models that do not control for parental education tend to overestimate the importance of family income on enrollment rates.

Most of the parameter estimates in Columns 1 and 2 of Table 4 have the expected

signs and are statistically significant. Clearly, a student's eighth grade test score is a strong predictor of college enrollment. A ten-point (or one standard deviation) improvement in eighth grade test score is associated with a more than ten percentage point increase in the probability of enrolling in college. Results in Column 2 suggest that family income plays an important role in a student's enrollment decision. Students from middle-income families are more than ten percentage points more likely, while students from high-income families are approximately 17 percentage points more likely to enroll in college than those from low-income families. Family income remains important even after parental education is controlled for, as shown in Column 1. Results in Column 1 also suggest that students whose parents have a college degree are nearly 18 percentage points more likely to enroll in college than students whose parents did not complete high school.

Column 1 also indicates that holding everything else equal, Asian, black, and Hispanic students are approximately five percentage points more likely to enroll in college than white students, while native American students are more than eight percentage points less likely to enroll in college than white students. The estimates on the FEMALE dummy variable suggest that other things equal, female students are approximately five percentage points more likely to enroll in college than male students.

The marginal effects of public four-year tuition are small and statistically insignificant in both Columns 1 and 2. However, the public two-year tuition costs have a negative and significant impact on college enrollment. On average, a \$1000 increase in public in-state two-year tuition will lower the probability of students enrolling in college by more than 4 percentage points. This estimate is consistent with those from past studies (Leslie and Brinkman, 1988). Note that the average 1992-93 public two-year tuition across states was

\$1,213.

The state unemployment rate has a small and positive impact on college enrollment. The state unemployment rate can be considered as a measure of local economic conditions. A high unemployment rate means fewer job opportunities and thus lower opportunity costs for students enrolling in college. Therefore, an increase in local unemployment rate is associated with an increase in enrollment rates.

Columns 1 and 2 also suggest state grant aid has a large and positive impact on enrollment. A \$1000 increase in state grant aid per undergraduate student will increase the probability of students enrolling in college by more than eleven percentage points.

Observing the fact that the public four-year tuition and two-year tuition in a state are highly correlated (the correlation coefficient between the two variables is 0.8), estimates from models that control for both tuition levels are less precise and difficult to interpret (Kane, 1999b). Therefore, I also estimate enrollment decision models that include only public two-year tuition level and report the results in Columns 3 and 4 in Table 4. Table 4 suggests that when public four-year tuition variable is excluded from the model, the impact of public two-year tuition on enrollment decisions remains unchanged. The coefficient estimates of other variables in the model also remain unchanged.

In addition to tuition costs, unemployment rates, and grant aid, there may exist other unobserved state-specific characteristics that may affect a student's enrollment decision. In order to control for these unobserved state-specific variables, I estimate the enrollment equations with state fixed-effects models. The last two columns in Table 4 present the results from fixed-effects estimates. These estimates are very close to those reported in Columns 1-4, indicating that enrollment decisions do not seem to be correlated with unobserved state

characteristics.

*Estimates by Income Group*

In order to examine whether students from low-income families are more sensitive to tuition cost and financial aid, I estimate the enrollment model for three income groups separately. Students with family income less than \$25,000 are in the low-income group, students with family income between \$25,000 and \$50,000 are in the middle-income group, and students with family income above \$50,000 are in the high-income group. These income groups roughly represent families at the lowest one-third, middle 40 percent, and top 25 percent of the income distribution.<sup>5</sup> Table 5 presents the results. When both public 4-year and 2-year tuition variables are included in the model, students from middle-income families seem to be most sensitive to public two-year tuition cost. A \$1000 increase in public in-state two-year tuition cost will lower the enrollment rates of low-income, middle-income, and high-income students by 3.0, 5.6, and 4.0 percentage points, respectively. The enrollment rates of middle-income students are also more sensitive to state grant aid than those of low-income and high-income students. A \$1000 increase in state grant aid per undergraduate student will increase the enrollment rates of middle-income students by nearly 18 percentage points, while it will only increase those of high-income students by less than 5 percentage points. The state grant aid does not seem to affect the enrollment decision of low-income students.

The last three columns of Table 5 report regression results from the enrollment model in which public four-year tuition variable is not included as a covariate. Results suggest that when public four-year tuition variable is excluded from the model, low-income students

become most sensitive to public two-year tuition cost. The estimates suggest that a \$1000 increase in public two-year tuition will lower the probability of low-income students enrolling in college by 4.4 percentage points. Although a \$1000 increase in public two-year tuition has a similar impact on the probability of middle-income students enrolling in college, the tuition price elasticity for low-income students is considerably larger because the mean enrollment rate of low-income students is much lower than that of middle-income students.

The state unemployment rate has the largest impact on the enrollment rate of low-income students. A one-percent increase in the state unemployment rate is associated with a two percentage point increase in low-income students' enrollment rate. This is not surprising because, the opportunity cost of attending college as measured by forgone earnings is particularly important for low-income students. An increase in unemployment rate means lower opportunity cost and leads to higher enrollment rates.

#### *Estimates by Race Group*

Because low-income students are predominantly black or Hispanic, I also estimate enrollment equations separately for three race groups: non-Hispanic white, black, and Hispanic. Table 6 presents the results. These estimates suggest that the enrollment rate of black students is most sensitive to public two-year tuition cost. Estimates from models that include both public 4-year and 2-year tuition suggest that a \$1000 increase in public two-year tuition cost will lower the enrollment rate of black students by 4.0 percentage points, lower that of white students by 3.7 percentage points, while have a positive but statistically insignificant impact on that of Hispanic students. However, the enrollment decisions of

---

<sup>5</sup> Because the family income variable is categorical, it is not possible to break down the income distribution so that the three income groups can represent the bottom one-third, middle one-third, and top one-

Hispanic students appear to be significantly influenced by public four-year tuition level. A \$1000 increase in the public four-year tuition level will lower the enrollment rate of Hispanic students by more than twelve percentage points.

When public four-year tuition variable is excluded from the regression, the impact of public two-year tuition on black students' enrollment decisions becomes even stronger. A \$1000 increase in public two-year tuition cost will lower the enrollment rate of black students by 5.5 percentage points. A \$1000 increase in public two-year tuition cost will lower the enrollment rate of white students by 3.1 percentage points, while has statistically insignificant impact on the enrollment rate of Hispanic students.

Hispanic students are most sensitive to state grant aid and unemployment rate. Estimates suggest that a \$1000 increase in state grant aid per undergraduate student will increase the probability of Hispanic students enrolling in college by 38 percentage points, increase that of white students by 9.3 percentage points, and have negative and statistically insignificant impact on that of black students. A one-percent increase in state unemployment rate will increase the probability of Hispanic students enrolling in college by 3 percentage points (as shown in the last column), while has very small and statistically insignificant effect on the enrollment decisions of white and black students.

*Estimates by Type of First Postsecondary Institution Enrolled*

For students who are at the margin of enrollment, they will probably enroll in a public two-year college if they choose to enroll. Therefore, it is likely that the enrollment rate at public two-year colleges is more sensitive to tuition cost than that at public four-year colleges. To examine this issue, I estimate the enrollment equations for public two-year and four-year

---

third of the distribution.



colleges separately.

Table 7 presents the regression results. Not surprisingly, the public two-year tuition has a very large and significant impact on the enrollment rate at public two-year colleges. A \$1000 increase in public two-year tuition will lower the enrollment rate at public two-year colleges by approximately 9 percentage points. This is a very significant impact, given the mean of the dependent variable is only 23 percentage points.

The estimates of public four-year enrollment model suggest that the public four-year tuition has a small and statistically significant impact on the enrollment rate at public four-year colleges. Results also suggest that the enrollment rate at public four-year colleges is positively correlated with public two-year tuition. This is the case because, many students choose to attend a two-year public college to take advantage of the low tuition cost. If the two-year public tuition goes up considerably, some students may decide to attend a four-year public college instead.

Table 7 also suggests that the impacts of state grant aid and unemployment rate on enrollment rates are different for public two-year and four-year colleges. State grant aid has a large and positive impact on public two-year enrollment rate, but a large and negative impact on public four-year enrollment rate. An increase in local unemployment rate is associated with an increase in public two-year enrollment rate, but a decline in public four-year enrollment rate.

#### 4.2 Duration of Enrollment

In the section, I present results from enrollment duration equations. As mentioned earlier, the duration of enrollment is measured by the total months of college enrollment within two years of high school graduation. The sample includes only those students who

started college in August of 1992 or September 1992.<sup>6</sup> The model specifications are the same as those for enrollment decisions.

Results in Table 8 show that the duration of enrollment is positively correlated with student test score, family income, and parental education. Within two years of high school graduation, students whose parents hold at least a college degree will have enrolled in college two months longer than those whose parents did not finish high school. A ten-point (or one standard deviation) increase in test score increases the length of enrollment by one month. Other things equal, Asian and black students have longer enrollment than white students, while Hispanic students' length of enrollment is approximately the same as that of white students. Female students have longer enrollment than male student, the difference is about a quarter of a month.

Table 8 also indicates that public four-year tuition has a negligible impact on students' enrollment duration. The marginal effect of public two-year tuition is negative and small, yet statistically significant. A \$1000 increase in public two-year tuition will shorten students' college enrollment by half a month. The marginal effect of state grant aid is close to zero and statistically insignificant. Furthermore, excluding public four-year tuition from the model does not change the estimates of other coefficients.

As in the enrollment model, I estimate the duration equations with state fixed-effects models to control for unobserved state characteristics. The regression results are presented in the last column of Table 8. Clearly, these estimates are similar to those reported in the first two columns.

---

<sup>6</sup> The mode of the duration of enrollment variable is 25 months.

### Estimates by Income Group

Table 9 presents regression results from separate estimates for three income groups. For all three groups, the marginal effects of public four-year tuition on enrollment duration are negligible. The marginal effects of public two-year tuition are in general statistically insignificant for low-income and middle-income students. Public two-year tuition seems to have a negative and statistically significant impact on the college duration of high-income students. This result should be interpreted with caution. The state grant aid variable appears to have insignificant impacts on the duration of enrollment for all income groups.

Results in Table 9 also suggest that an increase in local unemployment rate is associated with longer enrollment for low-income students. However, the estimates have large standard errors.

It is worth noting that test score seems to have the largest impact on the college duration of low-income students. A ten-point (or one standard deviation) increase in test score will increase the length of enrollment by approximately one month and half for low-income students, one month for middle-income students, and four-fifths of a month for high-income students.

### Estimates by Race Group

Table 10 presents regression results from separate estimates for three race groups. Again, the public four-year tuition level appears to have a close to zero impact on the duration of enrollment for all race groups. The public two-year tuition level appears to have a negligible impact on the enrollment duration for whites and black, and a moderate and negative impact on the enrollment duration of Hispanic students. However, the standard errors are very large.

State grant aid has a positive and statistically insignificant impact on the college duration of whites and Hispanics. Surprisingly, state grant aid seems to have a negative and statistically significant impact on the college duration of blacks. Further, the college duration of black and Hispanic students appear to be more sensitive to local unemployment rate than that of white students. However, the estimates are statistically insignificant.

*Estimates by Type of First Postsecondary Institution Enrolled*

Table 11 presents regression results from separate estimates by type of first postsecondary institution enrolled. For this exercise, I include only public two-year tuition in the two-year model and public four-year tuition in the four-year model. This is reasonable because after students enroll in a school, the tuition that is most relevant to their duration is the tuition charged by the school enrolled.

Estimates suggest that the public two-year tuition has a small and insignificant impact on the enrollment duration at public two-year colleges. A rise in local unemployment rate is associated with longer enrollment in public two-year colleges. State grant aid has a negative and insignificant impact on enrollment duration at public two-year higher education institutions.

The second column of Table 11 suggests that public four-year tuition has a small, negative and statistically insignificant impact on the enrollment duration at public four-year colleges. The impact of state grant aid is positive but insignificant. The marginal effects of local unemployment rate are positive and significant. It is also worth noting that family income plays a more important role in the duration of enrollment at public two-year colleges than that at public four-year colleges.

## 5 Summary and Conclusions

To summarize, this paper examines the impact of tuition cost and financial aid on the enrollment rates and enrollment duration, paying particular attention to the differential impact on students from different income and race groups. While numerous studies have focused on the impact of college cost on enrollment rates, very few have used enrollment duration or completed schooling as an outcome measure.

Using sample drawn from the NELS data, I find that there is considerable heterogeneity in the sensitivity of students' enrollment rates to tuition costs and financial aid. Results from enrollment models suggest that low-income and middle-income students are more sensitive to tuition cost than high-income students. The enrollment rates of black students are more sensitive to tuition cost than that of white and Hispanic students. Further, middle-income students and Hispanic students appear to be most sensitive to state grant aid.

Results from enrollment duration models suggest that tuition costs and financial aid in general have small or negligible impact on college duration. This is consistent with the argument that there is a barrier to college entry. Once students cross that barrier, tuition does not seem to matter much to completed schooling.

## References

- Becker, Gary S., *Human Capital*, third edition, University of Chicago Press, Chicago, 1993.
- Cameron, Stephen V. and James J. Heckman, “Can Tuition Policy Combat Rising Wage Inequality?” in *Financing College Tuition: Government Policies and Educational Priorities*, edited by Marvin H. Koster, American Enterprise Institute, Washington, DC, 1999a.
- Card, David and Thomas Lemieux, “Dropouts and Enrollment Trends in the Post-war Period: What Went Wrong in the 1970s?” NBER working paper 7658, Cambridge, 2000.
- Dynarski, Susan M., “Hope for Whom? Financial Aid for the Middle Class and Its Impact on College Attendance,” working paper, Harvard University and NBER, Cambridge, 1999a.
- Dynarski, Susan M., “Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion” NBER working paper 7422, Cambridge, 1999b.
- Leslie, Larry L. and Paul T. Brinkman, *The Economic Value of Higher Education*, New York: Macmillan, 1988.
- Kane, Thomas J., *The Price of Admission: Rethinking How Americans Pay for College*, Brookings Institution Press, Washington, DC. and the Russell Sage Foundation, New York, 1999a.
- Kane, Thomas J., “Reforming Public Subsidies for Higher Education,” in *Financing College Tuition: Government Policies and Educational Priorities*, edited by Marvin H. Koster, American Enterprise Institute, Washington, DC, 1999b.
- Kane, Thomas J., “Rising Public College Tuition and College Entry: How Well Do Public Subsidies Promote Access to College?” NBER working paper 5164, Cambridge, 1995.
- Kane, Thomas J. and Cecilia E. Rouse, “Labor-Market Returns to Two- and Four-Year College,” *American Economic Review*, June 1995, 600 – 614.
- McPherson, Michael S. and Morton Owen Schapiro, “Does Student Aid Affect College Enrollment? New Evidence on a Persistent Controversy,” *American Economic Review*, March 1991, 309 – 318.

Table 1  
 Percentage of 1988 Eighth Graders Reporting Attendance at a Postsecondary Institution  
 (PSE) by 1994, by Race and Socioeconomic Status

	Did not attend a PSE	Attended at least one PSE
Total	37.3	62.7
<i>Race/ethnicity</i>		
Asian or Pacific Islander	19.5	80.5
Hispanic regardless of race	48.8	51.2
Black not of Hispanic origin	47.1	52.9
White not of Hispanic origin	34.0	66.0
<i>Socioeconomic status (1992)</i>		
Lowest quartile	64.0	36.0
Middle two quartiles	37.0	63.0
Highest quartile	11.7	88.3

Source: NCES, National Education Longitudinal Study: 1988-94.

Table 2  
 Percentage of 1988 Eighth Graders in the Highest 1992 Test Quartile Reporting  
 Attendance at a Postsecondary Institution (PSE) by 1994, by Various Characteristics

	Did not attend a PSE	Attended at least one PSE
Total	7.3	92.7
<i><u>Race/ethnicity</u></i>		
Asian or Pacific Islander	3.7	96.3
Hispanic regardless of race	12.4	87.6
Black not of Hispanic origin	6.9	93.1
White not of Hispanic origin	7.3	92.7
<i><u>Socioeconomic status (1992)</u></i>		
Lowest quartile	23.1	76.9
Middle two quartiles	11.1	88.9
Highest quartile	2.6	97.4

Source: NCES, National Education Longitudinal Study: 1988-94.



Table 3  
Descriptive Statistics  
National Education Longitudinal Study: 1988 Eighth Grade Cohort

Variable Name	Definition	Sample Mean (Std. Dev.)	
		Enrollment Model	Duration Model
<u>(1) Outcome Measures:</u>			
Enrollment	0-1 dummy variable = 1 if student reported having enrolled in college before August 1994	0.733 (0.443)	
Enrollment Duration	Total months of enrollment between June 1992 and August 1994	20.847 (6.667)	
<u>(2) Covariates</u>			
Test_Score	Student's 8th grade test score on standardized test composite (math and reading)	52.188 (9.893)	55.293 (9.501)
Middle_income (a)	0-1 dummy variable = 1 if student's family income at 8th grade was between \$25,000 and \$50,000	0.348 (0.476)	0.375 (0.484)
High_income (a)	0-1 dummy variable = 1 if student's family income at 8th grade was over \$50,000	0.214 (0.410)	0.286 (0.452)
Parent_high_school (b)	0-1 dummy variable = 1 if student's highest parental education is high school	0.179 (0.383)	0.134 (0.341)
Parent_some_college (b)	0-1 dummy variable = 1 if student's highest parental education is some college	0.385 (0.486)	0.380 (0.485)
Parent_college (b)	0-1 dummy variable = 1 if student's highest parental education is college or postgraduate	0.289 (0.453)	0.384 (0.489)
Asian (c)	0-1 dummy variable = 1 if student is Asian	0.081 (0.272)	0.101 (0.302)
Black (c)	0-1 dummy variable = 1 if student is Black	0.102 (0.302)	0.082 (0.275)
Hispanic (c)	0-1 dummy variable = 1 if student is Hispanic	0.127 (0.333)	0.105 (0.307)
Native_American (c)	0-1 dummy variable = 1 if student is Native American	0.012 (0.109)	0.008 (0.086)
Female	0-1 dummy variable = 1 if student is Female	0.515 (0.500)	0.549 (0.498)
Tuition_4yr_public	Average 1992-93 in-state tuition at 4-year public higher institutions (in thousands of 1992 dollars)	2.336* (0.837)	2.336* (0.837)
Tuition_2yr_public	Average 1992-93 in-state tuition at 2-year public higher institutions (in thousands of 1992 dollars)	1.213* (0.491)	1.213* (0.491)
State_unemployment_rate	State unemployment rate in 1992 (percent)	6.860* (1.604)	6.860* (1.604)

State_grant_aid	Average 1992-93 state need-based grant aid per undergrad student (in thousands of 1992 dollars)	0.148* (0.195)	0.148* (0.195)
Urban (d)	0-1 dummy variable = 1 if student's high school is in an urban area	0.279 (0.449)	0.296 (0.457)
Suburban (d)	0-1 dummy variable = 1 if student's high school is in a suburban area	0.397 (0.489)	0.428 (0.495)
Northeast (e)	0-1 dummy variable = 1 if student's high school is in the Northeast	0.182 (0.386)	0.212 (0.409)
West (e)	0-1 dummy variable = 1 if student's high school is in the West	0.195 (0.396)	0.200 (0.400)
Midwest (e)	0-1 dummy variable = 1 if student's high school is in the Midwest	0.256 (0.437)	0.269 (0.443)

Note: Sample size for enrollment rates model: 14,629.

Sample size for duration of enrollment model: 8,126.

- a. The reference group consists students whose family income in 1988 was below \$25,000.
  - b. The reference group consists students whose highest parental education is high school dropout.
  - c. The reference group consists students who are white, non-Hispanic.
  - d. The reference group consists students whose 12th grade high school is in a rural area.
  - e. The reference group consists students whose 12th grade high school is in the South.
- \*. These state level statistics are not enrollment-weighted.

Table 4  
Models of Postsecondary Enrollment of 1988 Eighth Grade Cohort by 1994

Independent Variable	<i>Linear Probability</i>				<i>State Fixed-effects</i>	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-0.0709 (0.0352)	-0.0684 (0.0338)	-0.0691 (0.0350)	-0.0687 (0.0336)	-- --	-- --
Test_Score	0.0111 (0.0004)	0.0127 (0.0004)	0.0111 (0.0004)	0.0127 (0.0004)	0.0110 (0.0004)	0.0126 (0.0004)
Middle_income	0.0768 (0.0088)	0.1046 (0.0087)	0.0768 (0.0088)	0.1046 (0.0087)	0.0775 (0.0088)	0.1055 (0.0087)
High_income	0.1115 (0.0111)	0.1722 (0.0104)	0.1117 (0.0111)	0.1722 (0.0104)	0.1116 (0.0111)	0.1723 (0.0104)
Parent_high_school	0.0063 (0.0149)	-- --	0.0062 (0.0149)	-- --	0.0048 (0.0147)	-- --
Parent_some_college	0.1158 (0.0139)	-- --	0.1155 (0.0139)	-- --	0.1114 (0.0137)	-- --
Parent_college	0.1771 (0.0155)	-- --	0.1769 (0.0155)	-- --	0.1765 (0.0153)	-- --
Asian	0.0483 (0.0135)	0.0571 (0.0136)	0.0485 (0.0135)	0.0571 (0.0136)	0.0425 (0.0138)	0.0515 (0.0139)
Black	0.0542 (0.0126)	0.0582 (0.0127)	0.0546 (0.0126)	0.0581 (0.0127)	0.0463 (0.0127)	0.0500 (0.0128)
Hispanic	0.0451 (0.0121)	0.0245 (0.0119)	0.0447 (0.0121)	0.0246 (0.0119)	0.0376 (0.0125)	0.0162 (0.0124)
Native_American	-0.0861 (0.0329)	-0.0789 (0.0333)	-0.0866 (0.0329)	-0.0788 (0.0333)	-0.0975 (0.0330)	-0.0908 (0.0333)
Female	0.0508 (0.0069)	0.0479 (0.0069)	0.0509 (0.0069)	0.0479 (0.0069)	0.0497 (0.0068)	0.0465 (0.0069)
Tuition_4yr_public	0.0039 (0.0080)	-0.0007 (0.0081)	-- --	-- --	-- --	-- --
Tuition_2yr_public	-0.0434 (0.0124)	-0.0401 (0.0125)	-0.0410 (0.0113)	-0.0405 (0.0114)	-- --	-- --
State_unemployment_rate	0.0055 (0.0032)	0.0048 (0.0032)	0.0060 (0.0030)	0.0048 (0.0030)	-- --	-- --
State_grant_aid	0.1132 (0.0245)	0.1157 (0.0247)	0.1103 (0.0237)	0.1162 (0.0239)	-- --	-- --
Urban	0.0304 (0.0094)	0.0426 (0.0095)	0.0302 (0.0094)	0.0427 (0.0094)	0.0320 (0.0101)	0.0432 (0.0102)
Suburban	0.0229 (0.0086)	0.0308 (0.0087)	0.0231 (0.0086)	0.0308 (0.0087)	0.0193 (0.0092)	0.0267 (0.0093)
Northeast	0.0005 (0.0214)	0.0006 (0.0216)	0.0056 (0.0185)	-0.0003 (0.0187)	-- --	-- --
West	-0.0182 (0.0110)	-0.0119 (0.0111)	-0.0173 (0.0108)	-0.0121 (0.0109)	-- --	-- --

Midwest	0.0015	-0.0024	0.0040	-0.0028	--	--
	(0.0123)	(0.0124)	(0.0111)	(0.0112)	--	--
R-square	0.1650	0.1472	0.1650	0.1472	0.1819	0.1649

Note: standard errors are in parentheses.

Table 5  
 Linear Probability Models of Postsecondary Enrollment of 1988 Eighth Grade Cohort by 1994  
 Estimates by Income Group

Independent Variable	<i>Including 4-yr and 2-yr tuition</i>			<i>Including 2-yr tuition only</i>		
	Income Group			Income Group		
	Low	Middle	High	Low	Middle	High
Intercept	-0.3688 (0.0700)	0.0819 (0.0601)	0.4402 (0.0759)	-0.3787 (0.0696)	0.0903 (0.0599)	0.4511 (0.0755)
Test_Score	0.0151 (0.0009)	0.0115 (0.0006)	0.0061 (0.0006)	0.0151 (0.0009)	0.0115 (0.0006)	0.0061 (0.0006)
Parent_high_school	-0.0135 (0.0228)	0.0083 (0.0312)	-0.0639 (0.0588)	-0.0131 (0.0228)	0.0078 (0.0312)	-0.0659 (0.0588)
Parent_some_college	0.0890 (0.0210)	0.0944 (0.0294)	0.1053 (0.0563)	0.0902 (0.0210)	0.0934 (0.0294)	0.1016 (0.0563)
Parent_college	0.1841 (0.0312)	0.1705 (0.0307)	0.1419 (0.0561)	0.1849 (0.0312)	0.1697 (0.0307)	0.1384 (0.0561)
Asian	0.1767 (0.0313)	0.0298 (0.0231)	-0.0246 (0.0172)	0.1768 (0.0313)	0.0324 (0.0230)	-0.0240 (0.0172)
Black	0.1121 (0.0214)	0.0569 (0.0239)	0.0160 (0.0259)	0.1092 (0.0213)	0.0598 (0.0238)	0.0175 (0.0259)
Hispanic	0.0741 (0.0227)	0.0650 (0.0204)	0.0203 (0.0241)	0.0768 (0.0226)	0.0627 (0.0203)	0.0182 (0.0241)
Native_American	-0.0709 (0.0558)	-0.0544 (0.0680)	-0.2764 (0.0871)	-0.0666 (0.0557)	-0.0566 (0.0680)	-0.2756 (0.0871)
Female	0.0733 (0.0142)	0.0648 (0.0112)	0.0009 (0.0104)	0.0731 (0.0142)	0.0650 (0.0112)	0.0012 (0.0104)
Tuition_4yr_public	-0.0225 (0.0170)	0.0206 (0.0130)	0.0182 (0.0119)	-- --	-- --	-- --
Tuition_2yr_public	-0.0299 (0.0263)	-0.0560 (0.0200)	-0.0401 (0.0181)	-0.0440 (0.0241)	-0.0428 (0.0181)	-0.0286 (0.0164)
State_unemployment_rate	0.0206 (0.0064)	-0.0101 (0.0050)	0.0025 (0.0050)	0.0178 (0.0061)	-0.0074 (0.0047)	0.0047 (0.0048)
State_grant_aid	0.0153 (0.0603)	0.1767 (0.0412)	0.0478 (0.0343)	0.0293 (0.0594)	0.1627 (0.0402)	0.0361 (0.0334)
Urban	0.0316 (0.0187)	0.0380 (0.0157)	-0.0247 (0.0155)	0.0330 (0.0187)	0.0372 (0.0157)	-0.0253 (0.0155)
Suburban	0.0433 (0.0175)	0.0024 (0.0134)	-0.0001 (0.0145)	0.0427 (0.0175)	0.0032 (0.0134)	0.0009 (0.0145)
Northeast	0.0939 (0.0501)	-0.0314 (0.0348)	-0.0324 (0.0285)	0.0620 (0.0439)	-0.0039 (0.0302)	-0.0114 (0.0251)
West	0.0186 (0.0223)	-0.0293 (0.0178)	-0.0496 (0.0171)	0.0122 (0.0218)	-0.0254 (0.0177)	-0.0472 (0.0170)
Midwest	0.0355 (0.0263)	-0.0051 (0.0196)	-0.0266 (0.0178)	0.0211 (0.0240)	0.0075 (0.0180)	-0.0157 (0.0163)
Dependent mean	0.6221	0.7734	0.9017	0.6221	0.7734	0.9017
Number of observations	4072	4987	3063	4072	4987	3063
R-square	0.1376	0.1192	0.0919	0.1372	0.1187	0.0912

Note: standard errors are in parentheses.

Table 6  
 Linear Probability Models of Postsecondary Enrollment of 1988 Eighth Grade Cohort by 1994  
 Estimates by Race Group

Independent Variable	<i>Including 4-yr and 2-yr tuition</i>			<i>Including 2-yr tuition only</i>		
	<i>White</i>	<i>Black</i>	<i>Hispanic</i>	<i>White</i>	<i>Black</i>	<i>Hispanic</i>
Intercept	-0.1678 (0.0412)	-0.0055 (0.1371)	-0.1313 (0.1444)	-0.1635 (0.0410)	-0.0213 (0.1333)	-0.2040 (0.1419)
Test_Score	0.0115 (0.0005)	0.0132 (0.0016)	0.0106 (0.0014)	0.0115 (0.0005)	0.0131 (0.0015)	0.0108 (0.0014)
Middle_income	0.0940 (0.0105)	0.0539 (0.0308)	0.0964 (0.0267)	0.0941 (0.0105)	0.0532 (0.0308)	0.0953 (0.0274)
High_income	0.1401 (0.0128)	0.0575 (0.0476)	0.1375 (0.0422)	0.1404 (0.0128)	0.0562 (0.0475)	0.1339 (0.0434)
Parent_high_school	0.0662 (0.0216)	0.0182 (0.0456)	-0.0125 (0.0346)	0.0662 (0.0216)	0.0189 (0.0455)	-0.0215 (0.0356)
Parent_some_college	0.1908 (0.0209)	0.1109 (0.0423)	0.0210 (0.0284)	0.1906 (0.0209)	0.1125 (0.0422)	0.0151 (0.0293)
Parent_college	0.2466 (0.0221)	0.2057 (0.0542)	0.1260 (0.0410)	0.2464 (0.0221)	0.2080 (0.0539)	0.1148 (0.0421)
Female	0.0502 (0.0080)	0.0797 (0.0245)	0.0416 (0.0221)	0.0502 (0.0080)	0.0799 (0.0245)	0.0429 (0.0227)
Tuition_4yr_public	0.0100 (0.0092)	-0.0132 (0.0266)	-0.1237 (0.0484)	-- --	-- --	-- --
Tuition_2yr_public	-0.0370 (0.0139)	-0.0397 (0.0556)	0.0699 (0.0558)	-0.0309 (0.0127)	-0.0547 (0.0466)	0.0368 (0.0505)
State_unemployment_rate	0.0037 (0.0036)	-0.0073 (0.0129)	0.0444 (0.0174)	0.0049 (0.0034)	-0.0071 (0.0129)	0.0298 (0.0145)
State_grant_aid	0.1001 (0.0271)	-0.0826 (0.1028)	0.2571 (0.1162)	0.0926 (0.0261)	-0.0686 (0.0988)	0.5510 (0.1790)
Urban	0.0201 (0.0113)	0.0552 (0.0320)	-0.0072 (0.0344)	0.0197 (0.0113)	0.0572 (0.0318)	0.0099 (0.0358)
Suburban	0.0187 (0.0095)	0.0609 (0.0341)	-0.0299 (0.0356)	0.0191 (0.0095)	0.0618 (0.0341)	-0.0141 (0.0372)
Northeast	-0.0195 (0.0238)	0.1821 (0.0791)	0.0348 (0.1258)	-0.0060 (0.0203)	0.1683 (0.0740)	-0.1160 (0.0849)
West	-0.0419 (0.0134)	0.0497 (0.0659)	0.0741 (0.0376)	-0.0405 (0.0133)	0.0396 (0.0627)	-0.0771 (0.0478)
Midwest	-0.0087 (0.0137)	0.0124 (0.0444)	0.0914 (0.0802)	-0.0026 (0.0124)	0.0070 (0.0431)	-0.0435 (0.0493)
Dependent mean	0.7626	0.6895	0.6940	0.7626	0.6895	0.6940
Number of observations	9258	1272	1598	9258	1272	1598
R-square	0.1880	0.1487	0.1125	0.1879	0.1485	0.1024

Note: standard errors are in parentheses.

Table 7  
 Linear Probability Models of Postsecondary Enrollment of 1988 Eighth Grade Cohort by 1994  
 Estimates by Type of First Postsecondary Institution Enrolled

Independent Variable	<i>Two-year Public</i>	<i>Four-year Public</i>
Intercept	0.4540 (0.0366)	-0.3030 (0.0390)
Test_Score	-0.0051 (0.0004)	0.0105 (0.0004)
Middle_income	0.0529 (0.0092)	0.0302 (0.0098)
High_income	0.0228 (0.0116)	0.0491 (0.0124)
Parent_high_school	-0.0030 (0.0155)	0.0414 (0.0166)
Parent_some_college	0.0357 (0.0145)	0.0952 (0.0155)
Parent_college	-0.0334 (0.0161)	0.1296 (0.0172)
Asian	-0.0285 (0.0140)	0.0848 (0.0150)
Black	-0.0697 (0.0131)	0.0742 (0.0140)
Hispanic	-0.0284 (0.0126)	0.0603 (0.0135)
Native_American	-0.1069 (0.0343)	0.0173 (0.0366)
Female	0.0107 (0.0071)	0.0017 (0.0076)
Tuition_4yr_public	-0.0050 (0.0084)	-0.0145 (0.0089)
Tuition_2yr_public	-0.0923 (0.0129)	0.0252 (0.0137)
State_unemployment_rate	0.0148 (0.0033)	-0.0049 (0.0035)
State_grant_aid	0.1652 (0.0254)	-0.0882 (0.0272)
Urban	-0.0245 (0.0098)	-0.0062 (0.0104)
Suburban	0.0072 (0.0089)	-0.0019 (0.0095)
Northeast	-0.0721 (0.0223)	-0.0102 (0.0238)
West	0.0688 (0.0114)	-0.0757 (0.0122)
Midwest	-0.0042	-0.0005

	(0.0127)	(0.0136)
Dependent mean	0.2322	0.2986
R-square	0.0566	0.0860

---

Note: standard errors are in parentheses.



Table 8  
Models of Postsecondary Persistence of 1988 Eighth Grade Cohort by 1994

Independent Variable	<i>Linear Probability</i>		<i>State Fixed-effects</i>
	(1)	(2)	(3)
Intercept	12.7597 (0.6955)	12.7348 (0.6926)	
Test_Score	0.1096 (0.0073)	0.1096 (0.0073)	0.1087 (0.0074)
Middle_income	0.4980 (0.1748)	0.4960 (0.1747)	0.3259 (0.2706)
High_income	0.7885 (0.2037)	0.7846 (0.2035)	0.4813 (0.1757)
Parent_high_school	0.7175 (0.3492)	0.7231 (0.3489)	0.7061 (0.3508)
Parent_some_college	1.1232 (0.3246)	1.1306 (0.3241)	1.1445 (0.3262)
Parent_college	2.0696 (0.3401)	2.0771 (0.3395)	2.0632 (0.3424)
Asian	1.2974 (0.2301)	1.2931 (0.2298)	1.3172 (0.2370)
Black	0.6486 (0.2501)	0.6435 (0.2498)	0.5776 (0.2540)
Hispanic	-0.0202 (0.2381)	-0.0124 (0.2372)	-0.0737 (0.2502)
Native_American	-0.5478 (0.7852)	-0.5432 (0.7850)	-0.5954 (0.7972)
Female	0.2758 (0.1267)	0.2747 (0.1266)	0.3071 (0.1270)
Tuition_4yr_public	-0.0578 (0.1476)	-- --	-- --
Tuition_2yr_public	-0.4778 (0.2287)	-0.5151 (0.2078)	-- --
State_unemployment_rate	0.0878 (0.0583)	0.0802 (0.0550)	-- --
State_grant_aid	-0.0076 (0.4290)	0.0392 (0.4120)	-- --
Urban	0.5065 (0.1759)	0.5086 (0.1758)	0.6584 (0.1904)
Suburban	0.1775 (0.1610)	0.1747 (0.1609)	0.2958 (0.1733)
Northeast	0.8298 (0.3755)	0.7572 (0.3265)	-- --
West	-0.7341 (0.2097)	-0.7458 (0.2076)	-- --
Midwest	0.4100 (0.2198)	0.3745 (0.2002)	-- --
R-square	0.0821	0.0821	0.0917

Note: standard errors are in parentheses.

Table 9  
 Models of Postsecondary Persistence of 1988 Eighth Grade Cohort by 1994  
 Estimates by Income Group

Independent Variable	<i>Including 4-yr and 2-yr tuition</i>			<i>Including 2-yr tuition only</i>		
	Income Group			Income Group		
	Low	Middle	High	Low	Middle	High
Intercept	9.5212 (1.6036)	12.9732 (1.1704)	14.5034 (1.7153)	9.3529 (1.6006)	13.1434 (1.1663)	14.3915 (1.7053)
Test_Score	0.1619 (0.0186)	0.0993 (0.0117)	0.0821 (0.0114)	0.1612 (0.0186)	0.0997 (0.0117)	0.0818 (0.0114)
Parent_high_school	0.7470 (0.5816)	0.4380 (0.6806)	1.8620 (1.4451)	0.7735 (0.5816)	0.3860 (0.6801)	1.9092 (1.4428)
Parent_some_college	0.3195 (0.5346)	1.2286 (0.6391)	3.1794 (1.3919)	0.3780 (0.5335)	1.1723 (0.6383)	3.2371 (1.3886)
Parent_college	1.6015 (0.6717)	2.0608 (0.6541)	4.0454 (1.3854)	1.6490 (0.6713)	2.0018 (0.6533)	4.1018 (1.3822)
Asian	3.2197 (0.6111)	0.8583 (0.4092)	0.7632 (0.3119)	3.2402 (0.6112)	0.9154 (0.4079)	0.7578 (0.3118)
Black	1.2110 (0.4844)	1.3645 (0.4520)	-0.2291 (0.4936)	1.1621 (0.4836)	1.4092 (0.4514)	-0.2433 (0.4930)
Hispanic	0.7706 (0.5216)	0.2827 (0.3891)	-0.0915 (0.4669)	0.8555 (0.5190)	0.2272 (0.3878)	-0.0771 (0.4662)
Native_American	-1.1964 (1.6826)	0.1380 (1.3723)	0.5332 (1.8716)	-1.0925 (1.6820)	0.0863 (1.3723)	0.5025 (1.8706)
Female	0.4568 (0.3169)	0.2773 (0.2074)	0.2389 (0.1915)	0.4424 (0.3169)	0.2901 (0.2073)	0.2379 (0.1915)
Tuition_4yr_public	-0.5948 (0.3825)	0.3950 (0.2382)	-0.1335 (0.2178)	-- --	-- --	-- --
Tuition_2yr_public	0.4425 (0.5789)	-0.4631 (0.3738)	-0.9268 (0.3379)	0.0566 (0.5233)	-0.1985 (0.3381)	-1.0122 (0.3078)
State_unemployment_rate	0.1973 (0.1424)	0.0415 (0.0914)	0.0451 (0.0924)	0.1159 (0.1325)	0.0941 (0.0858)	0.0289 (0.0885)
State_grant_aid	-1.6912 (1.2672)	-0.2156 (0.7391)	0.8103 (0.6267)	-1.2849 (1.2405)	-0.5159 (0.7167)	0.8991 (0.6096)
Urban	0.1247 (0.4202)	0.6791 (0.2894)	0.1949 (0.2873)	0.1453 (0.4201)	0.6626 (0.2893)	0.2006 (0.2871)
Suburban	0.1094 (0.3868)	0.2790 (0.2493)	-0.1829 (0.2700)	0.0903 (0.3868)	0.2920 (0.2492)	-0.1903 (0.2697)
Northeast	2.0010 (1.0760)	0.7393 (0.6242)	0.6227 (0.5118)	1.2126 (0.9495)	1.2464 (0.5443)	0.4736 (0.4502)
West	-0.4053 (0.5016)	-0.6425 (0.3438)	-0.7435 (0.3241)	-0.5975 (0.4864)	-0.5712 (0.3412)	-0.7596 (0.3230)
Midwest	0.8469 (0.5732)	0.3587 (0.3547)	0.3842 (0.3209)	0.4643 (0.5179)	0.5839 (0.3277)	0.3085 (0.2962)

Dependent Mean	20.1144	21.2129	22.4237	20.1144	21.2129	22.4237
Number of Observations	1696	2987	2273	1696	2987	2273
R-square	0.0822	0.0556	0.0682	0.0808	0.0547	0.0681

Note: standard errors are in parentheses.

Table 10  
 Models of Postsecondary Persistence of 1988 Eighth Grade Cohort by 1994  
 Estimates by Race Group

Independent Variable	<i>Including 4-yr and 2-yr tuition</i>			<i>Including 2-yr tuition only</i>		
	<i>White</i>	<i>Black</i>	<i>Hispanic</i>	<i>White</i>	<i>Black</i>	<i>Hispanic</i>
Intercept	11.4493 (0.8955)	11.1813 (2.7836)	10.0246 (3.0818)	11.4243 (0.8919)	10.3456 (2.7154)	10.0728 (3.0442)
Test_Score	0.1072 (0.0086)	0.1332 (0.0286)	0.1533 (0.0280)	0.1071 (0.0086)	0.1326 (0.0286)	0.1534 (0.0279)
Middle_income	0.6430 (0.2151)	1.2186 (0.5862)	0.5763 (0.5498)	0.6421 (0.2151)	1.1420 (0.5838)	0.5756 (0.5494)
High_income	1.1264 (0.2430)	0.1566 (0.8235)	0.6680 (0.8093)	1.1237 (0.2429)	0.0191 (0.8177)	0.6620 (0.8068)
Parent_high_school	2.2719 (0.5791)	1.2669 (1.1527)	0.4785 (0.7930)	2.2785 (0.5787)	1.3160 (1.1529)	0.4827 (0.7914)
Parent_some_college	2.5245 (0.5609)	2.7973 (1.0777)	0.2418 (0.6331)	2.5324 (0.5603)	2.9123 (1.0751)	0.2472 (0.6306)
Parent_college	3.4697 (0.5702)	3.5437 (1.1789)	1.9269 (0.8288)	3.4776 (0.5696)	3.7036 (1.1737)	1.9301 (0.8276)
Female	0.3100 (0.1482)	0.5924 (0.4859)	-0.1539 (0.4598)	0.3094 (0.1482)	0.5938 (0.4862)	-0.1528 (0.4594)
Tuition_4yr_public	-0.0528 (0.1687)	-0.7253 (0.5384)	-0.1126 (1.0917)	-- --	-- --	-- --
Tuition_2yr_public	-0.2406 (0.2587)	0.1318 (1.0929)	-0.9734 (1.2242)	-0.2742 (0.2353)	-0.6735 (0.9156)	-1.0305 (1.0910)
State_unemployment_rate	0.0168 (0.0660)	0.2442 (0.2629)	0.3987 (0.3903)	0.0099 (0.0622)	0.2459 (0.2631)	0.3748 (0.3139)
State_grant_aid	0.2400 (0.4767)	-4.7829 (1.9146)	0.5768 (2.5724)	0.2819 (0.4575)	-4.0250 (1.8313)	0.6817 (2.3614)
Urban	0.4003 (0.2085)	0.4711 (0.6484)	-0.2183 (0.7424)	0.4021 (0.2084)	0.5691 (0.6447)	-0.2195 (0.7419)
Suburban	0.1212 (0.1794)	-0.4719 (0.6842)	-0.7741 (0.7547)	0.1182 (0.1791)	-0.3882 (0.6819)	-0.7797 (0.7523)
Northeast	0.7726 (0.4189)	3.6901 (1.4715)	0.7644 (2.7063)	0.7054 (0.3595)	2.9324 (1.3607)	0.5800 (2.0305)
West	-0.7978 (0.2572)	-1.1941 (1.2849)	-0.7740 (0.8118)	-0.8055 (0.2559)	-1.7721 (1.2120)	-0.8249 (0.6441)
Midwest	0.5300 (0.2464)	-1.3736 (0.8523)	-0.1997 (1.7377)	0.4992 (0.2257)	-1.6951 (0.8188)	-0.3441 (1.0299)
Dependent Mean	21.3890	20.9171	20.0298	21.3890	20.9171	20.0298
Number of Observations	5493	603	771	5493	603	771
R-square	0.0771	0.1257	0.0877	0.0771	0.1230	0.0877

Note: standard errors are in parentheses.

Table 11  
 Models of Postsecondary Persistence of 1988 Eighth Grade Cohort by 1994  
 Estimates by Type of First Postsecondary Institution Enrolled

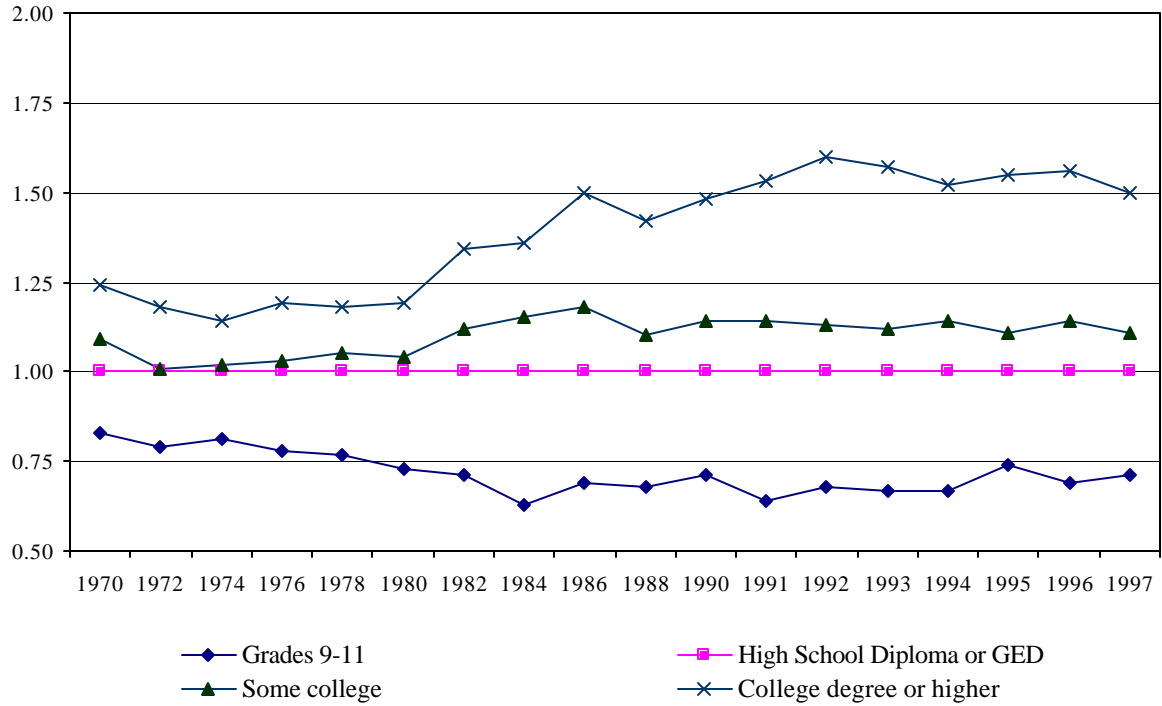
Independent Variable	<i>Two-year Public</i>	<i>Four-year Public</i>
Intercept	11.1723 (1.7700)	15.4885 (0.8908)
Test_Score	0.0852 (0.0202)	0.0677 (0.0098)
Middle_income	1.1598 (0.4034)	-0.2421 (0.2219)
High_income	1.1494 (0.5193)	0.3684 (0.2543)
Parent_high_school	0.5249 (0.7279)	0.9003 (0.4939)
Parent_some_college	0.4286 (0.6639)	1.8758 (0.4653)
Parent_college	0.9845 (0.7352)	2.3125 (0.4775)
Asian	1.4998 (0.6579)	1.0860 (0.2764)
Black	-0.9207 (0.6933)	0.4110 (0.3041)
Hispanic	0.4062 (0.5287)	0.1107 (0.3146)
Native_American	-1.7290 (1.6607)	0.5209 (1.0828)
Female	-0.0560 (0.3248)	0.5930 (0.1585)
Tuition_4yr_public	-- --	-0.1921 (0.1627)
Tuition_2yr_public	-0.3129 (0.5613)	-- --
State_unemployment_rate	0.2564 (0.1481)	0.1319 (0.0666)
State_grant_aid	-0.6032 (1.2662)	0.3605 (0.5642)
Urban	0.6652 (0.4759)	0.3704 (0.2174)
Suburban	0.1878 (0.4009)	0.2961 (0.1986)
Northeast	1.1336 (1.0408)	-0.1190 (0.4710)
West	0.0263 (0.4945)	-0.6771 (0.2484)

Midwest	1.1163	-0.1050
	(0.5229)	(0.2629)
Dependent Mean	19.049	22.325
Number of Observations	1940	3327
R-square	0.0378	0.0579

---

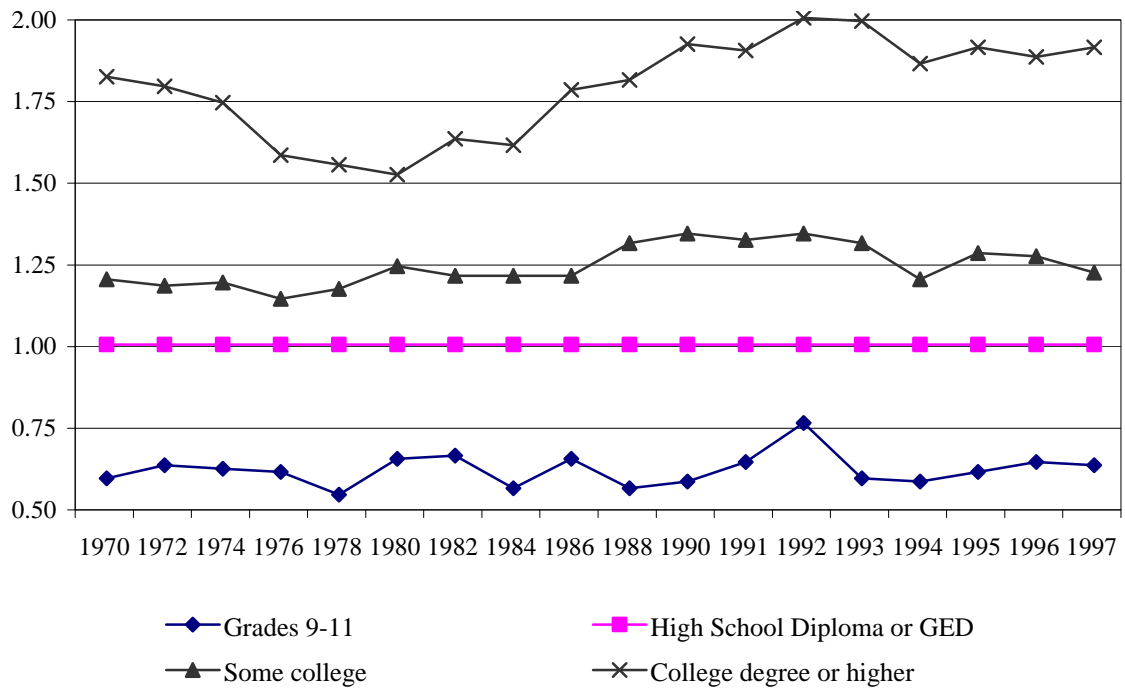
Note: standard errors are in parentheses.

Figure 1. Ratio of Median Earnings of Male Workers Ages 25-34  
 High School Diploma or GED = 1.00



Source: *The Condition of Education 1999*, Department of Education.

Figure 2. Ratio of Median Earnings of Female Workers Ages 25-34  
 High School Diploma or GED = 1.00



Source: *The Condition of Education 1999*, Department of Education.