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ABSTRACT

This report presents seven studies commissioned by the U.S. Department of Education to examine the issue of the rapid rise of college costs during the 1980s and the ability of American students and families to afford higher education. The seven papers are as follows: (1) "The Ability to Afford Higher Education: Past, Present, and Future" (Ralph M. Bradburd et al.) which describes trends in affordability for different types of students and families; (2) "Understanding the Quality Issue in U.S. Higher Education" (Ralph M. Bradburd et al.) which examines measures of educational output (including financial and other measures), analyzes expenditure patterns, and suggests federal policy options and institutional strategies to improve quality at U.S. colleges and universities; (3) "The Market for Higher Education: An Economic Analysis" (Ralph M. Bradburd and Duncan P. Mann) which characterizes the higher education market as segmented due to differences among institutions, the students they serve, the services they provide, and the resources available to them; (4) "Faculty Utilization" (Rita J. Kirshstein and James Fairweather) which focuses on the compensation, activities, productivity, and attitudes of the faculty of U.S. colleges and universities; (5) "Issues in Public Higher Education" (Daniel Sherman et al.) which profiles state-supported higher education institutions, with emphasis on state financing of higher education and the determinants of tuition levels; (6) "Expensive Private Institutions" (Daniel Sherman and Jon Cohen) which focuses on those institutions charging tuition and fees of $10,000 or more in 1988; and (7) "Tuition and Expenditures in Higher Education: An Econometric Model" (Charles L. Masten) which addresses the chicken-and-egg question of whether higher education institutions raise tuitions to cover their expenses, or whether revenue generated from tuition increases fuels expenditure growth. (References accompany each paper.) (GLR)

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BACKGROUND PAPERS PREPARED FOR THE "STUDY OF THE ESCALATING COSTS OF HIGHER EDUCATION"

October 1991

Prepared under contract for
the Department of Education by:

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PREFACE

The rapid rise in college costs during the 1980s generated widespread concern about the ability of many American students and families to afford higher education. Congress shared these concerns and requested the Secretary of Education to address various aspects of rising costs in higher education. The seven papers included in this volume are among the studies commissioned by the Department of Education to examine this issue. These papers and several other studies informed the final report to Congress, entitled The Escalating Cost of Higher Education, released in November of 1990.

Each of the seven papers presented here represents the independent work and opinions of experts in the field of higher education finance. They do not necessarily reflect the views of the Department of Education or the findings presented in The Escalating Cost of Higher Education. The Department of Education specified the subjects addressed in these papers because of their relevance to higher education costs.

The seven papers are as follows:

- The Ability to Afford Higher Education: Past, Present and Future describes trends in affordability for different types of students and families. Among the analyses included in the paper are the effects of student aid on educational attainment, comparisons of price changes to changes in students' and families' abilities to pay for higher education, demographic trends in higher education enrollments, alternative forecasts of tuition and income levels for the future, and an assessment of policies that might preserve or improve the affordability of higher education.

- Understanding the "Quality" Issue in U.S. Higher Education examines measures of educational output (including financial and other measures), analyzes expenditure patterns, and suggests Federal policy options and institutional strategies to improve quality at U.S. colleges and universities.

- The Market for Higher Education: An Economic Analysis characterizes the higher education market as segmented due to differences among institutions, the students they serve, the services they provide, and the resources available to them. Separating institutions into groups according to selectivity, the authors provide analyses of supply and demand for different segments of the higher education market.

- Faculty Utilization focuses on the compensation, activities, productivity, and attitudes of the faculty of U.S. colleges and universities. The paper also addresses current and projected demand for faculty.

- Issues in Public Higher Education profiles state-supported higher education institutions, with emphasis on state financing of higher education and, particularly, determinants of tuition levels. Also included are sections on the history of these institutions, student characteristics, and enrollment patterns.

- Expensive Private Institutions focuses on those institutions charging tuition and fees of $10,000 or more in 1988. It profiles characteristics of these schools and includes data on enrollment composition, financial aid, and student outcomes.

- Tuition and Expenditures in Higher Education: An Econometric Model addresses the chicken-and-egg question of whether higher education institutions raise tuitions to cover their expenses, or whether revenue generated from tuition-increases fuels expenditure growth. This paper explains the methodology and findings of a simultaneous equations model developed to probe this question.

THE ABILITY TO AFFORD HIGHER EDUCATION: PAST, PRESENT, AND FUTURE

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Duncan P. Mann
Michael S. McPherson
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Williams College

July 1990

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THE ABILITY TO AFFORD HIGHER EDUCATION: PAST, PRESENT AND FUTURE

Introduction

The purposes of this paper are (1) to examine trends over time in the capacity of students and their families to pay for higher education, (2) to present alternative forecasts of future trends in the "affordability" of higher education, and (3) to assess policies that might help to preserve or improve the affordability of higher education.

"Affordability" is a more subtle notion than may at first appear. There are important differences between being able to afford the "cheapest" postsecondary option available (which is usually a community college within commuting distance); the most expensive option (typically an elite private institution); or some alternative in between (such as attendance at a state university on a resident basis). The actual price a student must pay for a particular enrollment option will also depend on the student's ability to obtain financial aid from a government, the school, or some other source.

Even when a particular enrollment option with a well defined price is settled on, there can be different views on what it means for a student or her family to be able to "afford" it. One concept would emphasize the amount of cash income the family has available, viewing the education as needing to be financed out of current income. A longer temporal perspective would allow for the possibility of families improving the affordability of college either by saving in advance or by borrowing to spread the costs into the future. The increasing importance of loan finance in postsecondary education complicates the treatment of "affordability" considerably.

Finally, what a particular student can afford will depend on whether or not we consider the resources of the student's parents in judging ability to pay. The traditional view in the U. S.

(unlike some European countries) is that parents should be expected to pay for their children's education at least in the years immediately after high school (Johnstone, 1986). But this notion of parental responsibility does not extend readily to the increasing fraction of adult students who are no longer considered "dependent" on their parents. This paper will adhere to the standard assumption in the U. S. that parents are assumed to have a responsibility to contribute to the costs of the education of their children of traditional college age.

A major part of the paper draws on a variety of data sources to assemble a picture of national trends in higher education prices and the means available to families for meeting those prices. In describing price trends, we disaggregate the data according to institutional type and public vs. private control. In particular we try to keep track of variation over time in the prices of options that might be thought to correspond to the different notions of an affordable college discussed above. We will thus try to track price trends for a least costly alternative, for a typical year in residence at a state university and for a typical or average private college or university.

In presenting simulations of future college prices, student aid, and family income, we emphasize the multiple interdependencies among the variables to be forecast. Inflation plainly affects both family income and college costs; trends in economic growth affect family income as well as the ability and willingness of governments to subsidize higher education. Trends in institutional costs, non-tuition educational revenues, and student aid from Federal and other sources all affect trends in future net prices. We have developed simple models elucidating these relationships which help us to identify the crucial variables that are likely to influence the future affordability of college. Assuming that policies to affect the growth of family income are beyond the scope of this paper, three kinds of policies are relevant to future affordability of college:

1. Policies that affect the future course of resource costs of colleges, either by making colleges more cost-effective or by reducing the range or quality of services they offer;

2. Policies that affect the relative cost of public and private higher education; and

3. Policies that affect the sharing of college costs among families, governments, and private charitable support.

Each alternative has costs, benefits, and distributional consequences which we discuss.

Trends in Affordability

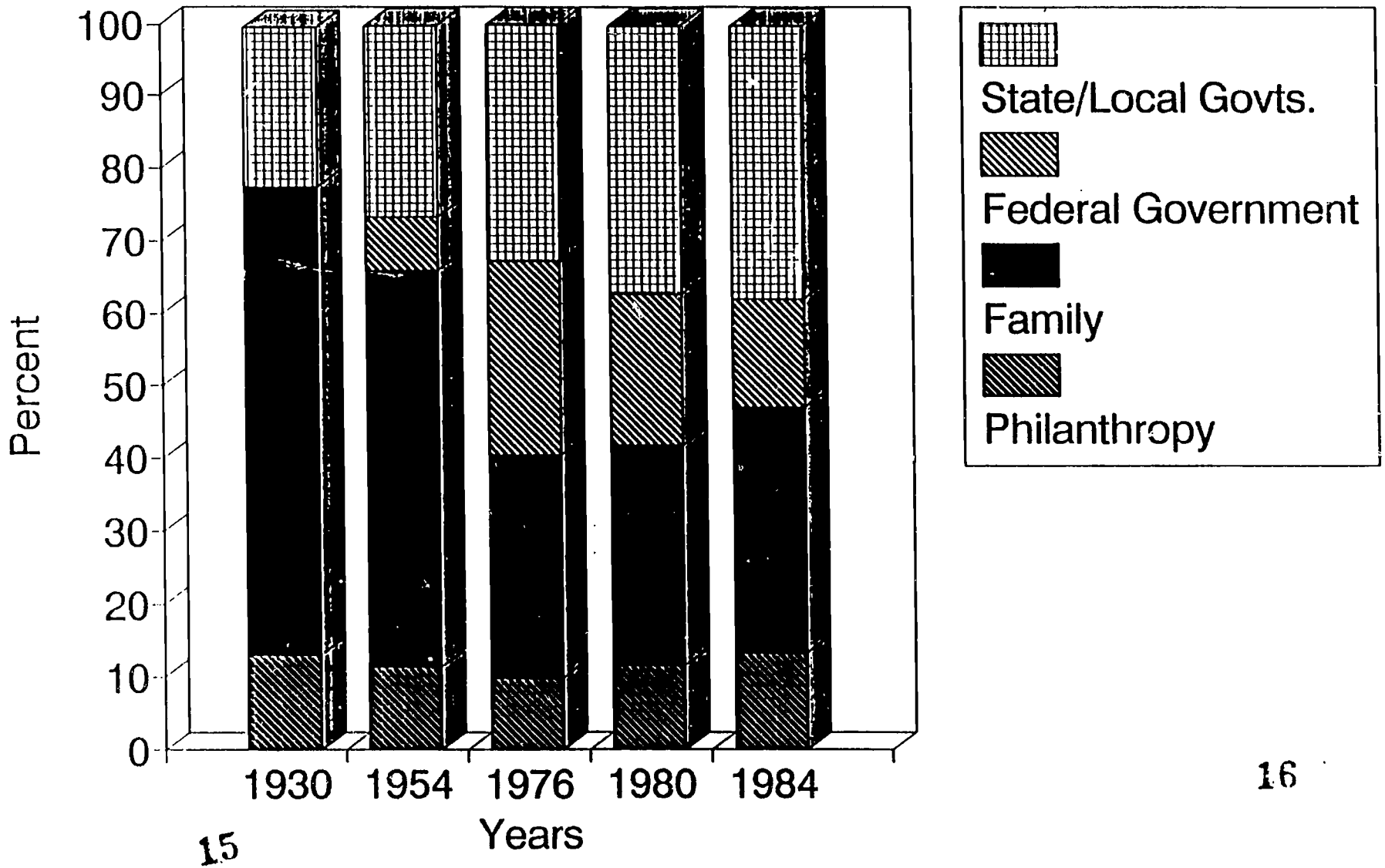
Our discussion focuses on the post-1974 period, during which Federal student aid policy became a major factor in influencing affordability for various categories of students and institutions. It is, however, worth taking a moment to summarize longer run trends in costs of attending college, to put the discussion of more recent developments in a suitable context.

Figure 1 provides a convenient summary of how the costs of college have been shared among various payers over the last sixty years. Over the long run, there has in fact been a fairly substantial shift in the financing role of different groups. Today families pay about a third of the total instructional and living costs of students, state governments pick up about another third--largely through operating subsidies at public institutions--and the Federal government and private philanthropy share the remaining third about equally.

In the 1930's, families paid two-thirds of total instructional and living costs. The declining share of costs paid by families has been matched by a growing share of government support. The states' share grew into the 1970's with the expanding role of state-run institutions, whose enrollment share has gone from around 50 percent in the 1930's to over 75 percent today. Meanwhile, the Federal government has paid a growing share of the tuition bill through expanding student assistance programs, beginning with the GI Bill after World War II, and continuing through the development of the Guaranteed Student Loan (GSL), Campus-Based, and Pell programs in the 1960's and 1970's.

Figure 1.

Who Pays for College:
An Historical Perspective



Over the last fifty years, the instructional costs of colleges and universities have grown at between 2 and 2.5 percentage points per year in real terms-- a pace that has roughly matched growth in family incomes. However, for much of the period, the charges facing students have grown less rapidly than incomes (though faster than inflation) because governments have picked up a growing share of the total bill. This shifting of burdens-- through expansion of both public higher education and Federal student aid--has certainly increased the affordability of college substantially over the last fifty years for a wide segment of the American population. This shift in financing has plainly contributed to the change in our conception of higher education from that of a luxury available only to elites to a normal part of the experience of qualified young adults from all segments of society. Thus, enrollment rates per 100 persons aged 18 to 24 have risen from 18 percent in the mid-1950's to 36 percent at the end of the 1970's and around 40 percent currently.

The long run tendency for the financing burden to shift from families to governments reversed itself rather abruptly at the end of the 1970's. On one hand, the shares of enrollment in public and private higher education stabilized in the early 1970's, tending to cap the state government share. At just about the time this source of expanded government funding was reaching its limits, a major expansion in the Federal effort appeared, with the introduction of Pell and a major expansion of the Guaranteed Student Loan program. This effort (along with a substantial influx of revenues from the Vietnam era GI Bill) carried the momentum of expanded government funding of college costs forward through the 1970's. But then the pattern of strong growth in real Federal spending on student aid came to an abrupt halt at the beginning of the Reagan administration. With a very sharp reduction in the real growth of the Department of Education's student aid programs and the virtual elimination of both GI Bill support and Social

Security payments to children of social security recipients, the Federal share of instructional costs dropped from 21 percent in 1979 to 15 percent in 1984, and has been roughly stable since then.[1]

With this broad background in mind, we turn to a more detailed discussion of affordability trends in the "student aid era", which we might date from the passage of the Higher Education Act in 1965. Since public and private enrollment shares have been fairly stable over this period, it is really changes in Federal student aid policies and spending levels that have had the most visible impact on financing patterns in this period. Table 1 shows the overall magnitudes of Federal and other forms of student aid, expressed in constant dollars, for selected years since 1963. The overall change from the 1970's to the 1980's is dominated by so-called "specially directed aid", funds provided to veterans and to children of social security recipients attending college. Although it makes sense to label each of these programs "student aid", since awards are contingent on college attendance, neither was designed principally with higher education in mind, and neither fits the model of need-based student aid. Both programs were very large in the mid-1970's, and have dwindled to almost nothing in the 1980's.[2]

When these programs are put aside, the "generally available" student aid programs administered by the Office (later Department) of Education predominate. The so-called "Campus-Based" programs (National Defense [later Direct] Student Loans [later Perkins], College-Work Study, and Supplemental Educational Opportunity Grants) have not grown much since their inception in the mid-1960's, with the result that the Guaranteed Student (later

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[1]Supporting documentation for this historical summary is provided in McPherson and Skinner (1986).

[2]The social security benefit to college students was phased out beginning in 1982; the reduction in GI Bill spending results both from changes in the program and from reductions in numbers of young veterans following the end of the Vietnam war.

Table 1: Aid Awarded to Students by Source, Selected Academic Years
(constant 1982 dollars in millions)

Federally Supported Programs	1963-64	1970-71	1975-76	1979-80	1981-82	1983-84	1985-86	Estimated 1987-88
Generally Available Aid								
Pell Grants	-	-	1,629	3,113	2,358	2,648	3,163	3,116
SEOG	-	325	350	414	371	342	364	330
SSIG	-	-	34	95	79	57	67	63
CWS	-	552	513	740	640	648	582	554
NDSL	356	584	800	803	595	647	623	711
GSL, PLUS, and SLS	-	2,466	2,204	4,880	7,407	7,183	7,838	9,393
Subtotal	356	3,927	5,530	10,045	11,450	11,525	12,637	14,167
Subsidy Value of Generally Available Aid *	178	1,850	3,515	6,464	6,809	6,962	7,825	8,561
Specially Directed Aid								
Social Security	-	1,212	1,901	1,972	2,047	209	0	0
Veterans	211	2,724	7,271	2,218	1,385	1,088	753	645
Other Grants	27	39	110	142	112	62	60	60
Other Loans	-	102	78	52	111	250	330	195
Subtotal	238	4,077	9,360	4,384	3,655	1,609	1,143	900
Total Federal Aid	594	8,004	14,890	14,429	15,105	13,134	13,780	15,067
State Grant Programs	176	574	853	979	945	1,049	1,162	1,284
Institutionally Awarded Aid	940	2,343	2,496	2,346	2,304	2,731	3,258	3,805
Total Federal, State, and Institutional Aid	1,710	10,921	18,239	17,754	18,354	16,914	18,200	20,156

Source: Gillespie and Carlson (1983), Lewis (1988)

* Subsidy value calculation values loans at one-half their face value and values work-study aid at $0

Stafford) Loan Program and the Basic Educational Opportunity (later Pell) Grant program have gradually become the main sources of Federal student aid.

The period 1965-85 can in fact be usefully divided into three subperiods. From 1965 to 1973, a fairly modest total of Federal "generally available" aid was divided between GSL and the Campus-Based programs. From 1973-1980, the Federal aid budget grew rapidly, with expenditures on Pell roughly keeping pace with growing numbers of dollars lent through GSL. From 1980 through about 1984, GSL growth continued to be substantial, while real growth essentially stopped in the Pell grant and the Campus-Based programs. In 1979, new guaranteed loans represented about 49 percent of the total volume of generally available Federal student aid; in 1985 they were about 62 percent.[3] Since 1985, there has been modest real growth in both Pell and GSL.

Student aid from state governments and from institutions themselves adds significantly to the funds provided to families to subsidize tuitions. (The most significant contribution states make to helping families cover the costs of higher education is not through this student aid, but through direct operating subsidies to state-run colleges and universities.) The College Board data indicate that these sources of financial support have also fluctuated over this period. Both state and institutional grants grew substantially from the 1960's to the 1970's. From the mid-1970's on, state programs have grown only a little more rapidly than inflation, while institution-based aid, after holding steady in the 1970's, has grown quite rapidly in the 1980's. The bulk of this institution-based aid is awarded by private institutions, with much of it taking the form of tuition discounts.

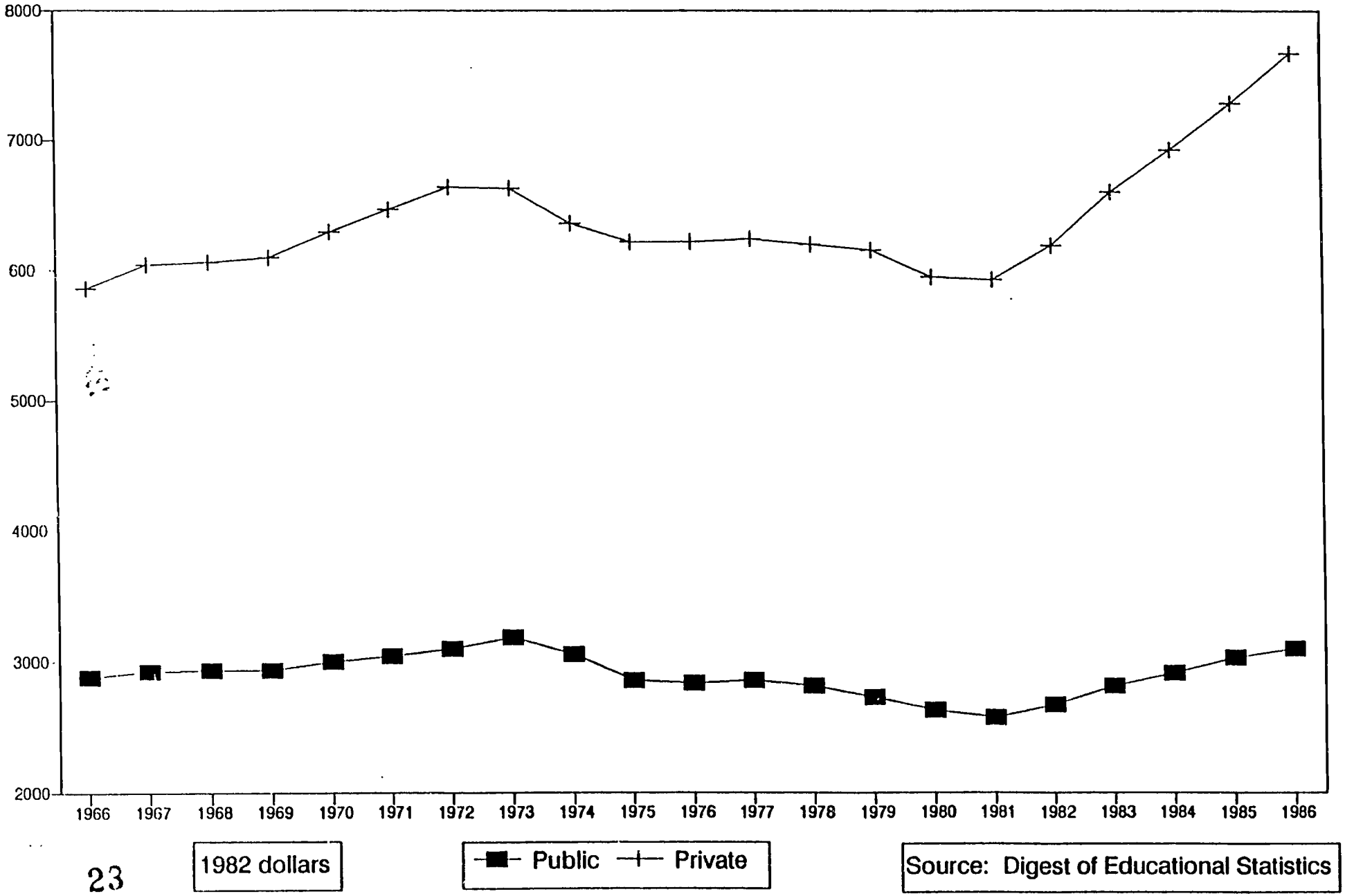
[3]The shift toward loans is more dramatic when social security and the GI Bill are included. In 1979, new guaranteed loans were about 34% of total federal aid, compared to 57% in 1985.

This changing mix and level of Federal and other forms of student aid must be seen against a background of changing tuition prices in higher education. Figure 2 shows the course of public and private tuition charges from 1963 to 1985. Here again three rough periods suggest themselves: from 1963 to the early 1970's tuitions rose relative to the price level, at a fairly modest rate; from the early 1970's until around 1980 they fell behind the rapid inflation of those years, and from 1980 to the present they have been rising rapidly compared to inflation, especially in private higher education. The fact that tuitions and Federal student aid levels have not tended to move parallel to one another over these twenty years (with aid levels rising most rapidly in periods when tuition has been rising slowly) complicates the task of sorting out the forces at work in determining "affordability" as well as in detecting enrollment effects of aid in the data, since it is hard to distinguish the effects of lower tuition from the effects of higher aid and conversely.[4]

These aggregate data mask a good deal of variation in cost variation and aid availability at different types of institutions and for different socio-economic groups of students. A more detailed picture of trends in the level and distribution of generally available aid can be derived from the American Freshman Survey. After 1974, the managers of the American Freshman Survey began to include a series of detailed questions on the sources and amounts of financial assistance received by surveyed freshmen. These responses provide a fairly complete picture for freshmen of their own perceptions of how their education is being financed. It is necessary to be cautious about interpreting these numbers, since students may be unclear not only about the amount but especially about the form (grant vs. loan) and source (Federal government vs. state

[4]McPherson and Schapiro, forthcoming.

Figure 2. Costs of attendance, 1966-86
Public and private institutions



government vs. institution) of the aid they receive.[5] Despite these limitations, however, the American Freshman data, which are used extensively below, provide a helpful baseline for years after 1974 which does not exist for earlier years, and which is not available from other sources of data.

The tables and figures that follow focus on a limited subgroup of American undergraduates: young (ages 18-24), full time freshmen in residence at traditional two year and four year colleges. This is the population that is most reliably sampled in the survey, and it provides a fairly well defined universe for comparisons over time.[6] Still, a great many students are outside this "traditional" category, either because they are older or part time, because they attend non-traditional institutions, or because they commute. Note that all data are reported in dollars of constant 1978 value, relying on the CPI as price index. Income classifications are also based on dollars of constant 1978 value. (Since prices very nearly doubled between 1978 and 1989--the increase in the CPI was 96 percent--roughly doubling the numbers discussed below would convert them to current values.)

Figure 3 summarizes trends in Federal grant and loan awards received by full time freshmen in public and private institutions. (Notice that the reported numbers are averages over

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[5]The survey is also forced to rely on self-reported family incomes. This survey is administered by institutions that elect to participate, and the setting in which it is administered may vary among institutions. The sample of institutions is therefore self-selected rather than random (institutions are only included in the sample if they survey a large fraction of their freshmen), and underrepresents two year colleges substantially. Note also that we focus on data for full-time resident students, who are more representative of public four-year and private institution populations than of public two-year institutions. Proprietary institutions, mostly vocational/technical institutions, are not included.

[6]The specially directed aid programs (principally GI Bill and Social Security) do not appear importantly in these data, apparently for two reasons. First, much of this money probably went to students outside the subsample reported here, which is limited to first-time, full-time freshman resident dependent students ages 24 and below. Second, many students who were recipients of either Social Security survivor benefits or of GI Bill assistance may not have reported it as student aid.

Figure 3. Federal grants and loans per student
Panel A. Public institutions (1978 dollars)

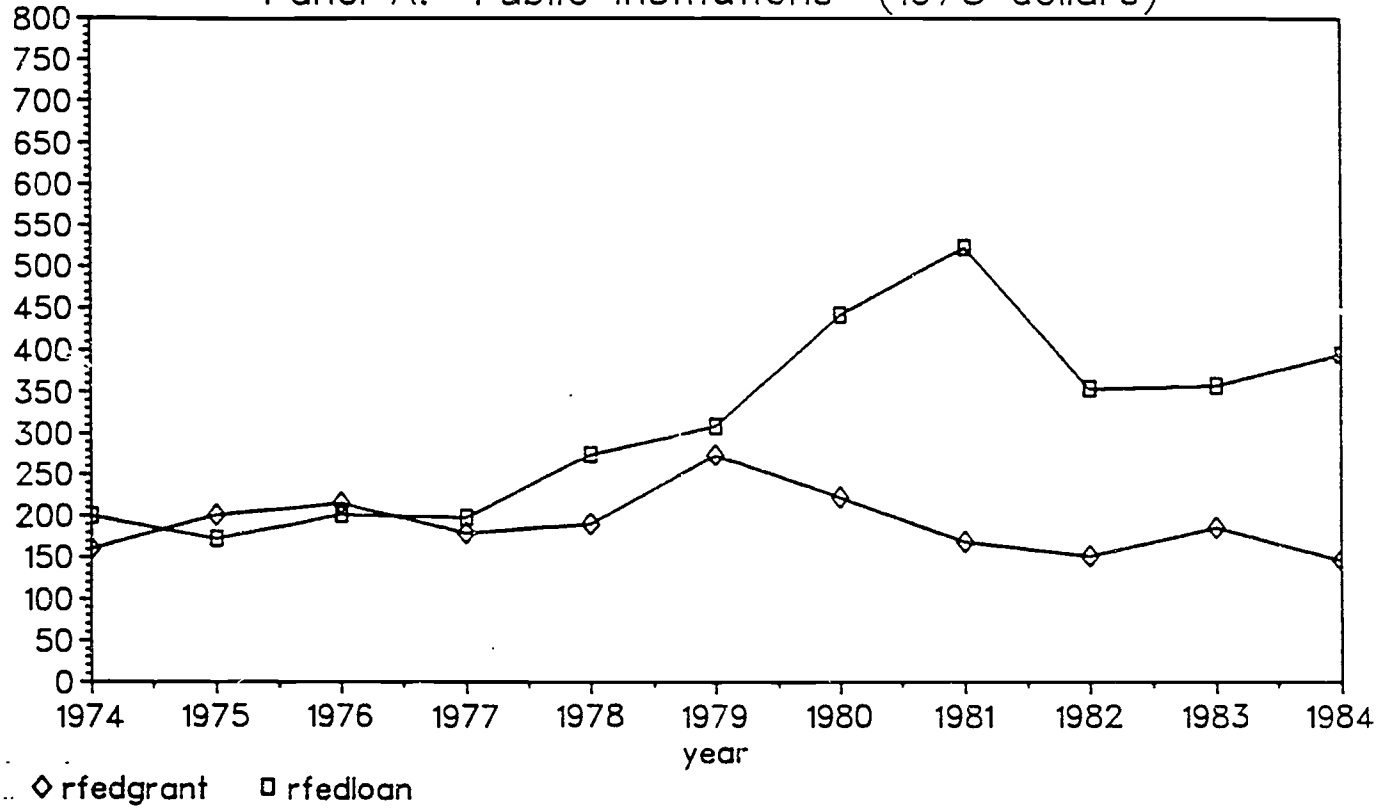
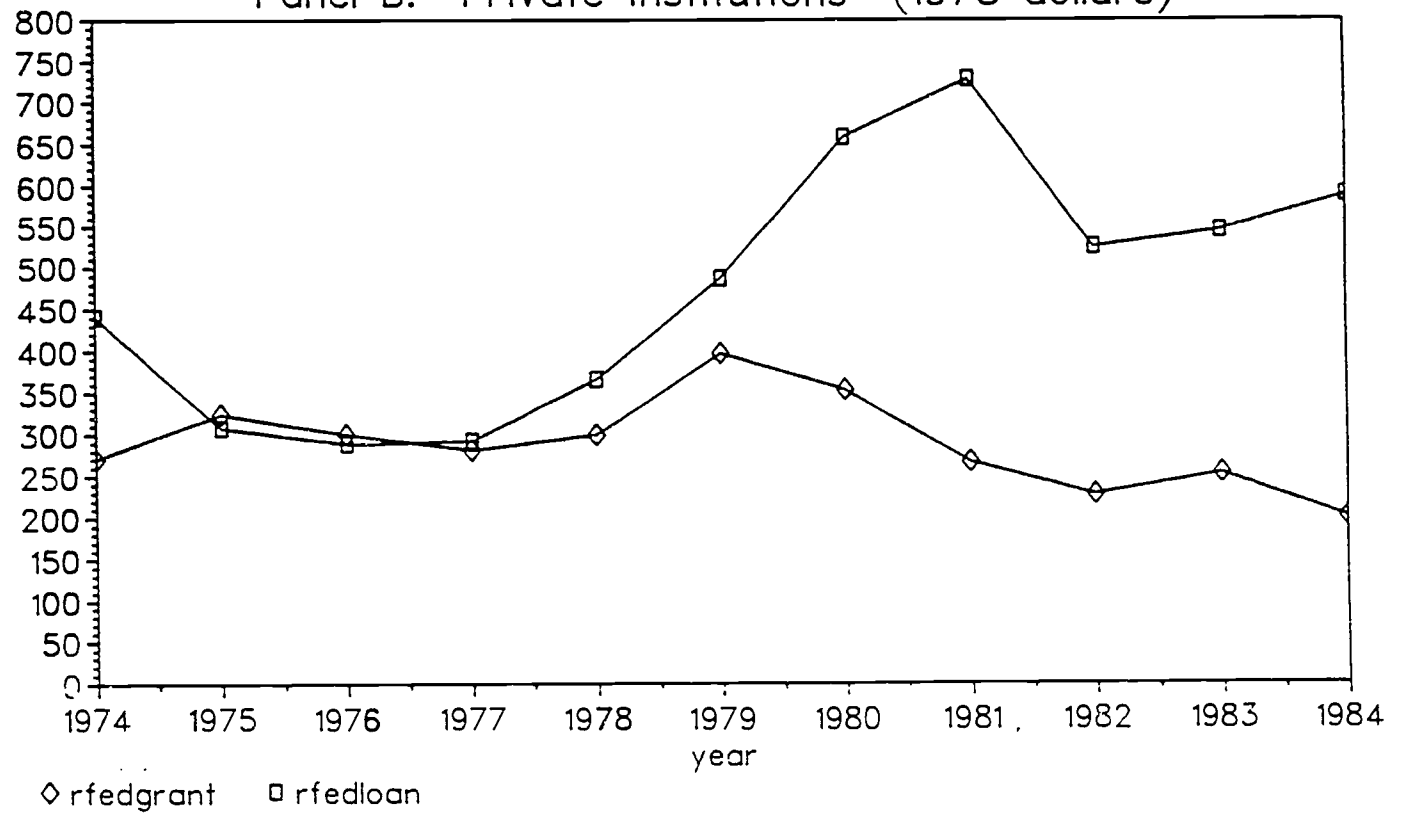


Figure 3. Federal grants and loans per student
Panel B. Private institutions (1978 dollars)

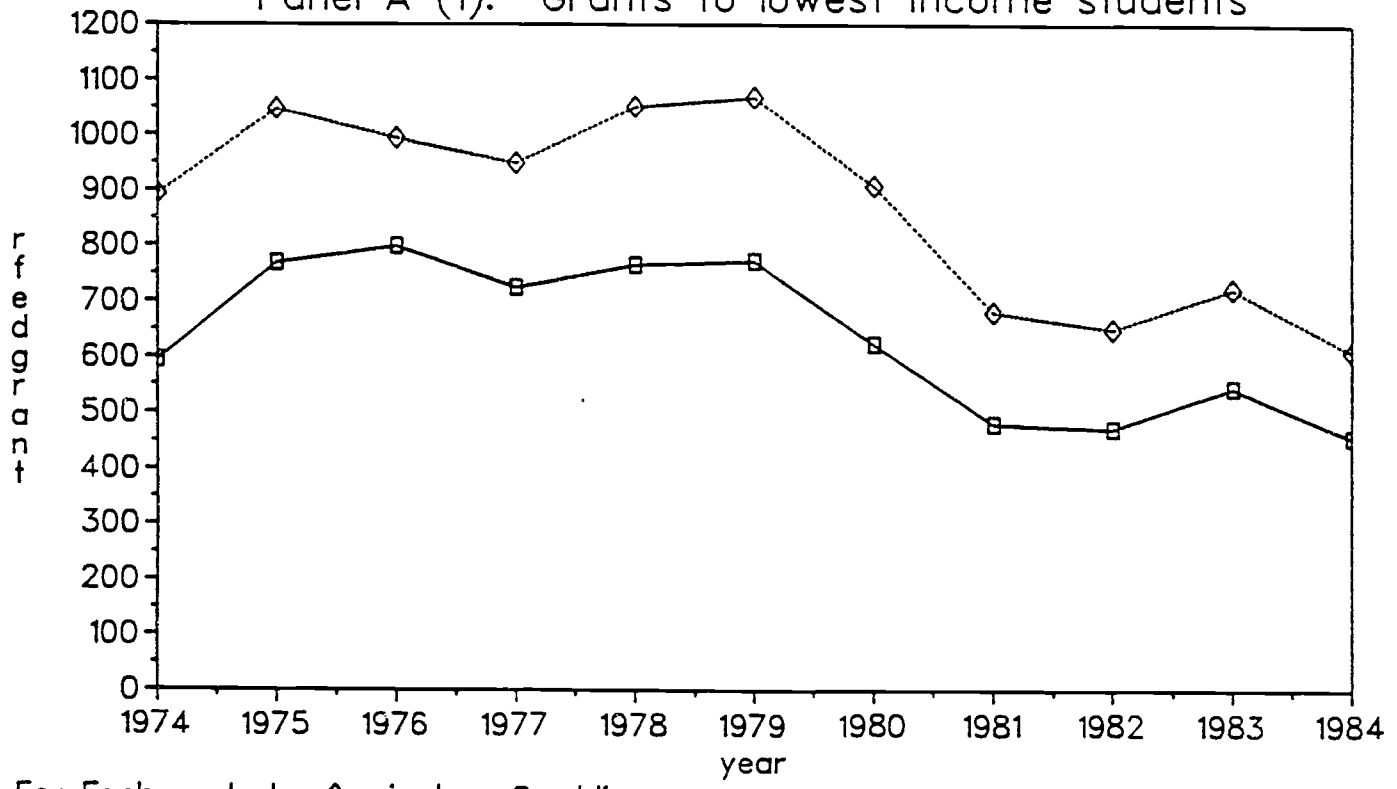


all freshmen, including both recipients and non-recipients of aid.) What stands out is the increase in per student borrowing and the decrease in the real value of grants per student in the 1980's. It should be noted that the decrease in grants per student is larger among this group of young full time freshmen at traditional institutions than it would be among a more broadly defined group, since an increasing percentage of Federal grant money is going to older and part time students, as well as to students at "non-traditional", proprietary postsecondary institutions.

Subdividing the data among groups of students according to their (real) family income allows us to trace changes over time in affordability of colleges by income. The distribution of Federal aid among income classes of students has by no means been constant over time. Figure 4 shows in three panels the experience of students with the lowest incomes ($0-10,000 in 1978 dollars), of middle income students ($20-30,000) and affluent students ($50,000 and above) over the period 1974-1984. One sees the substantial effects of the Middle Income Student Assistance Act of 1978 in increasing the grant and loan money available to middle- and highest-income students - effects which have been gradually reversed in the 1980's, as well as the very substantial real contraction in Federal grant money for the lowest income students in the 1980's.

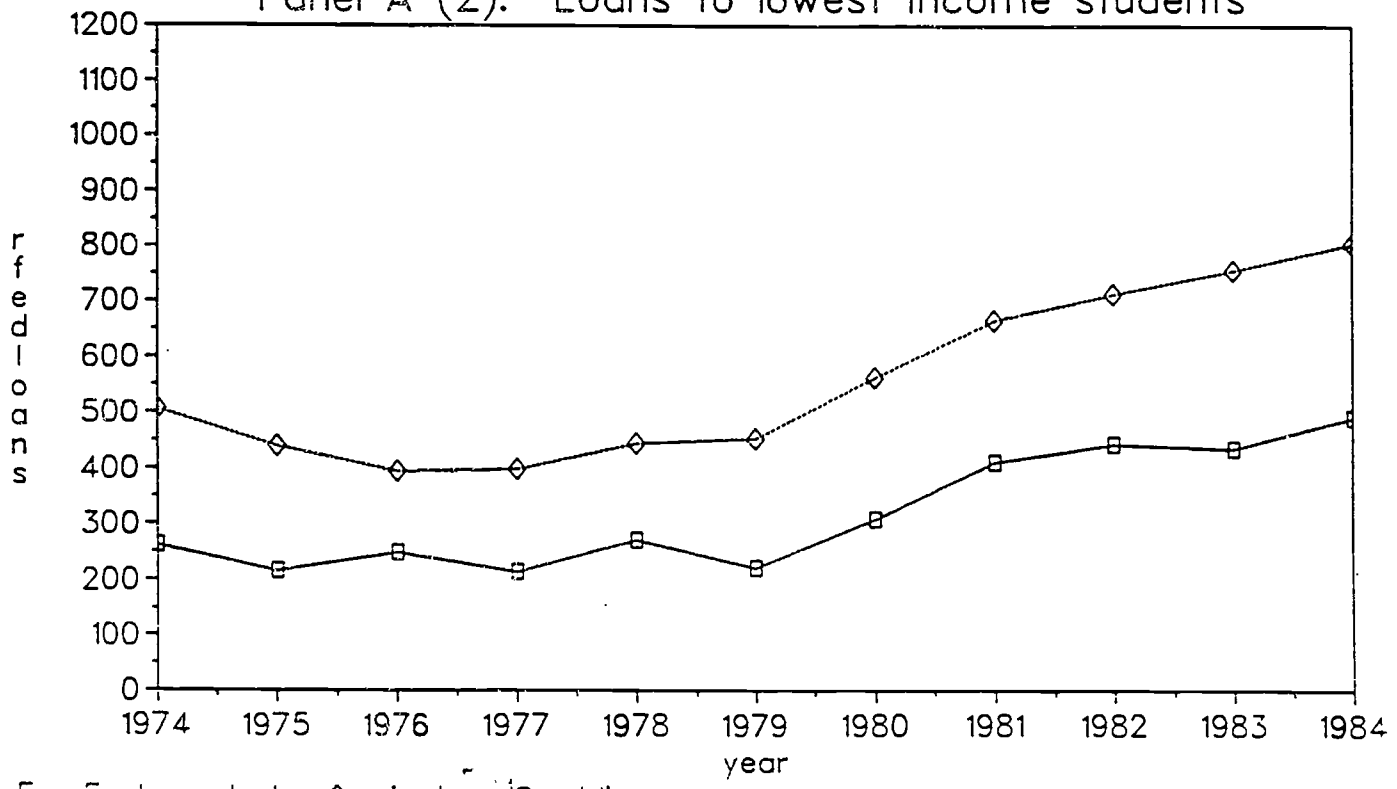
Student opportunities throughout this period were affected not only by changes in Federal student aid policies but by changes in schools' tuition charges and in aid available from non-Federal sources as well. The significance of non-Federal aid is shown in Figure 5, which graphs the amounts of non-Federal grant aid the lowest income students reported receiving in every year. The main source of these funds is the institutions themselves, and it is not surprising that the amounts vary by institutional control, being especially important at private universities. Moreover, it is not only low income students who benefit from non-Federal grant aid. Figure 6 shows the distribution of such aid among income classes at private universities. At these institutions, students with incomes between $10,000 and $20,000 dollars receive almost as much

Figure 4. Real federal financial aid
Panel A (1). Grants to lowest income students



For Each control: ◇ private ▫ public

Figure 4. Real federal financial aid
Panel A (2). Loans to lowest income students



For Each control: ◇ private ▫ public

Figure 4. Real federal financial aid
Panel B (1). Grants to middle income students

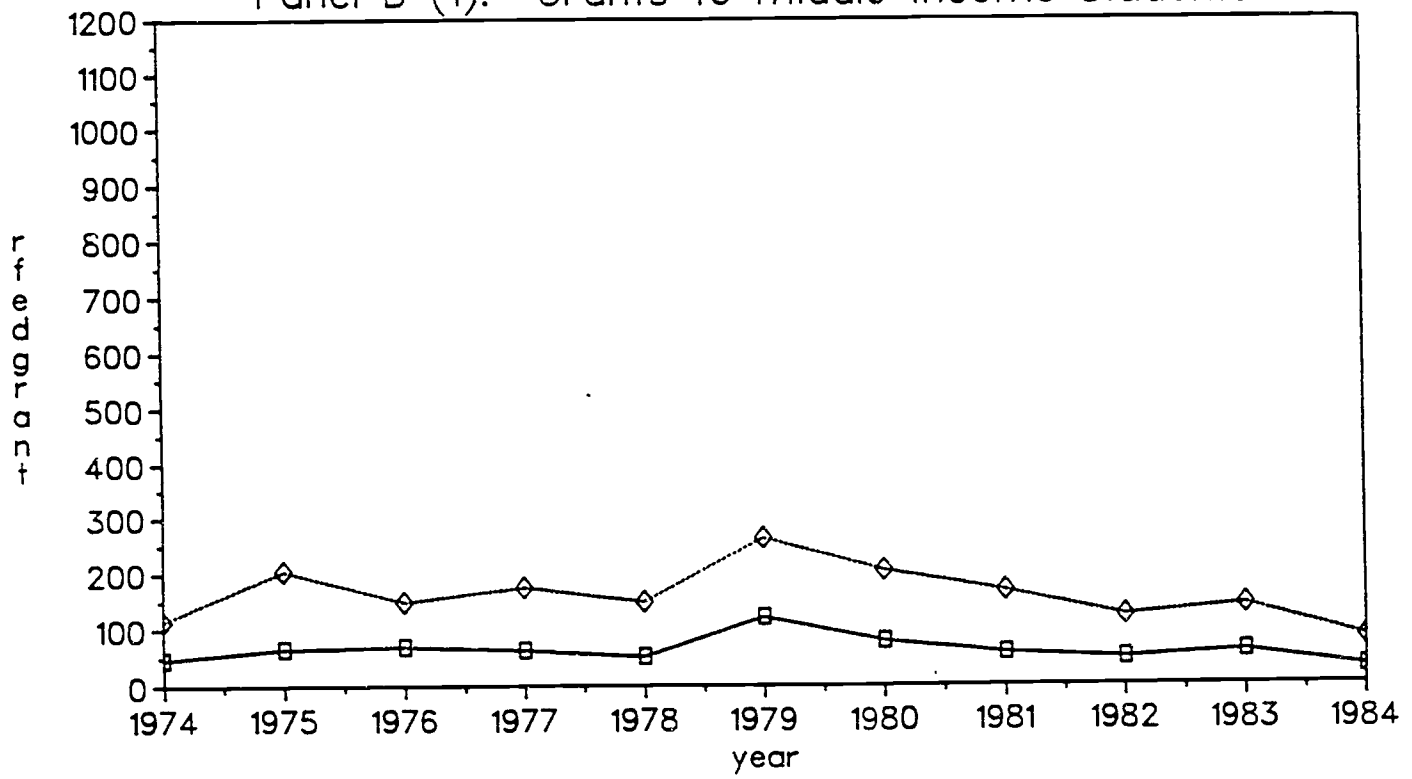


Figure 4. Real federal financial aid
Panel B (2). Loans to middle income students

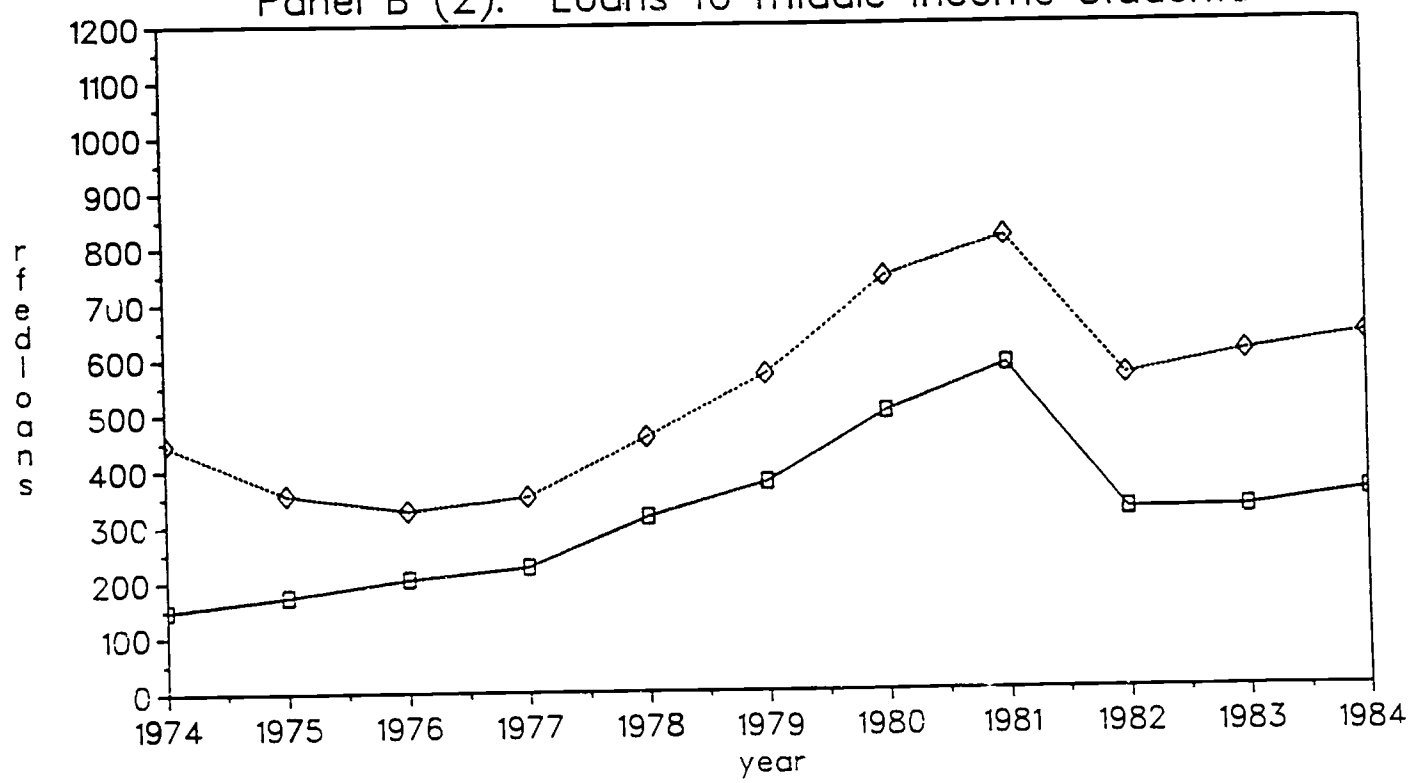


Figure 4. Real federal financial aid
Panel C (1). Grants to highest income students

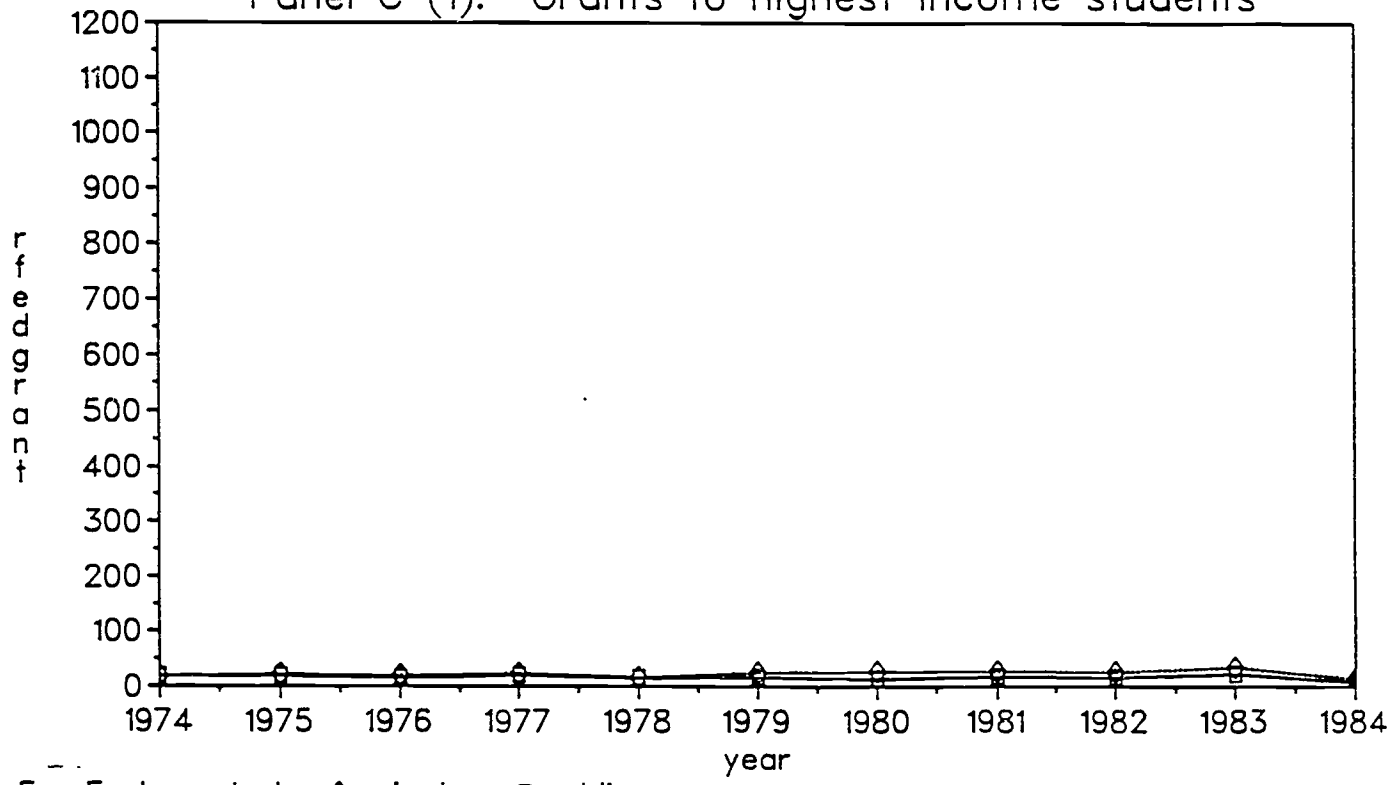


Figure 4. Real federal financial aid
Panel C (2). Loans to highest income students

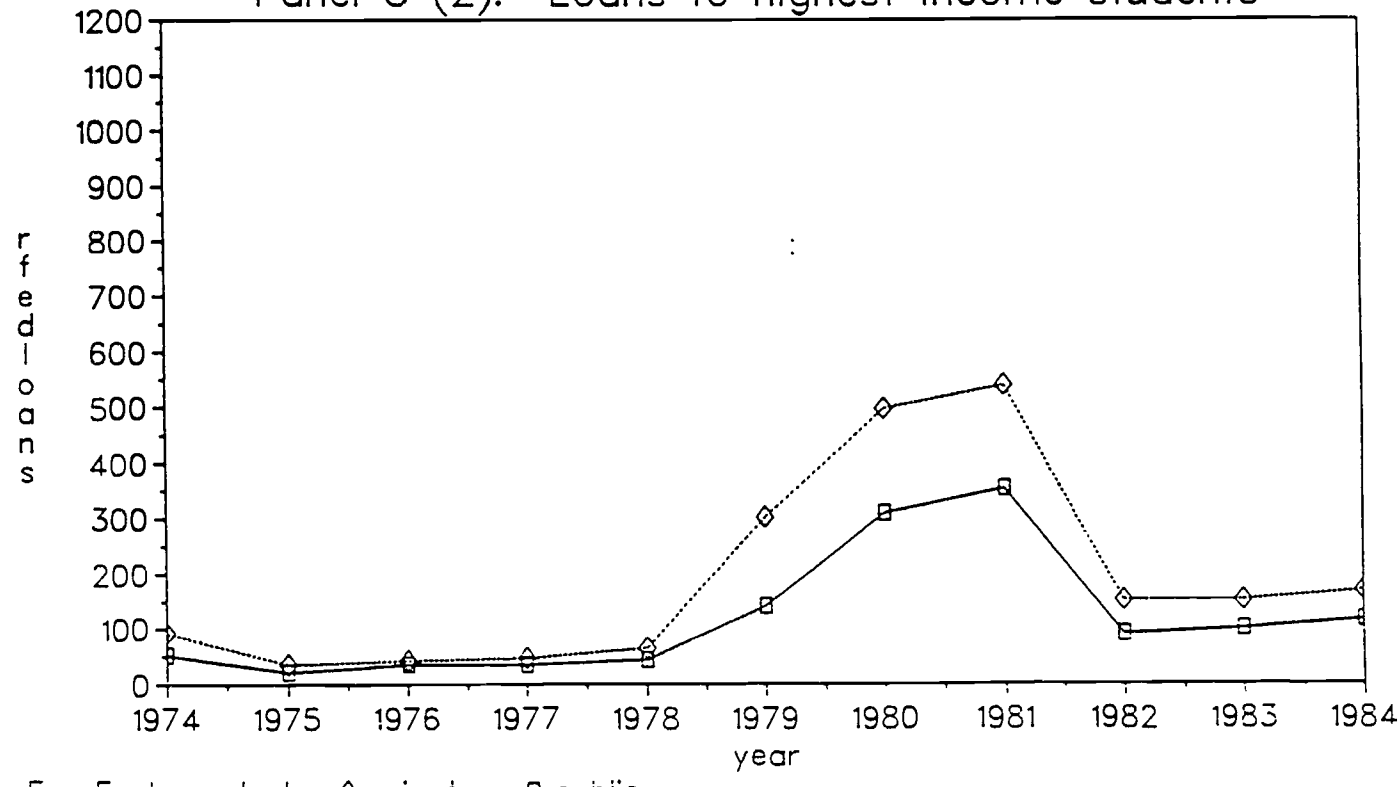
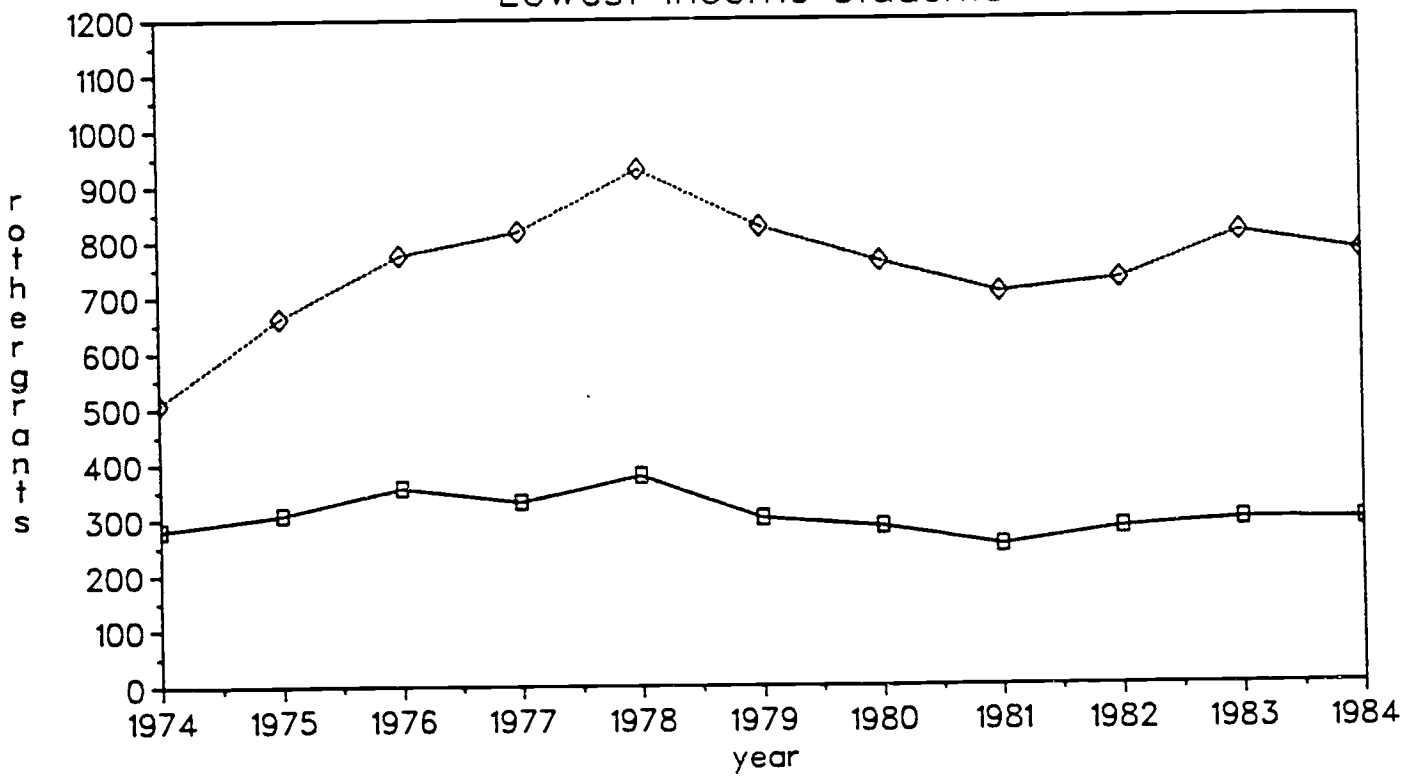
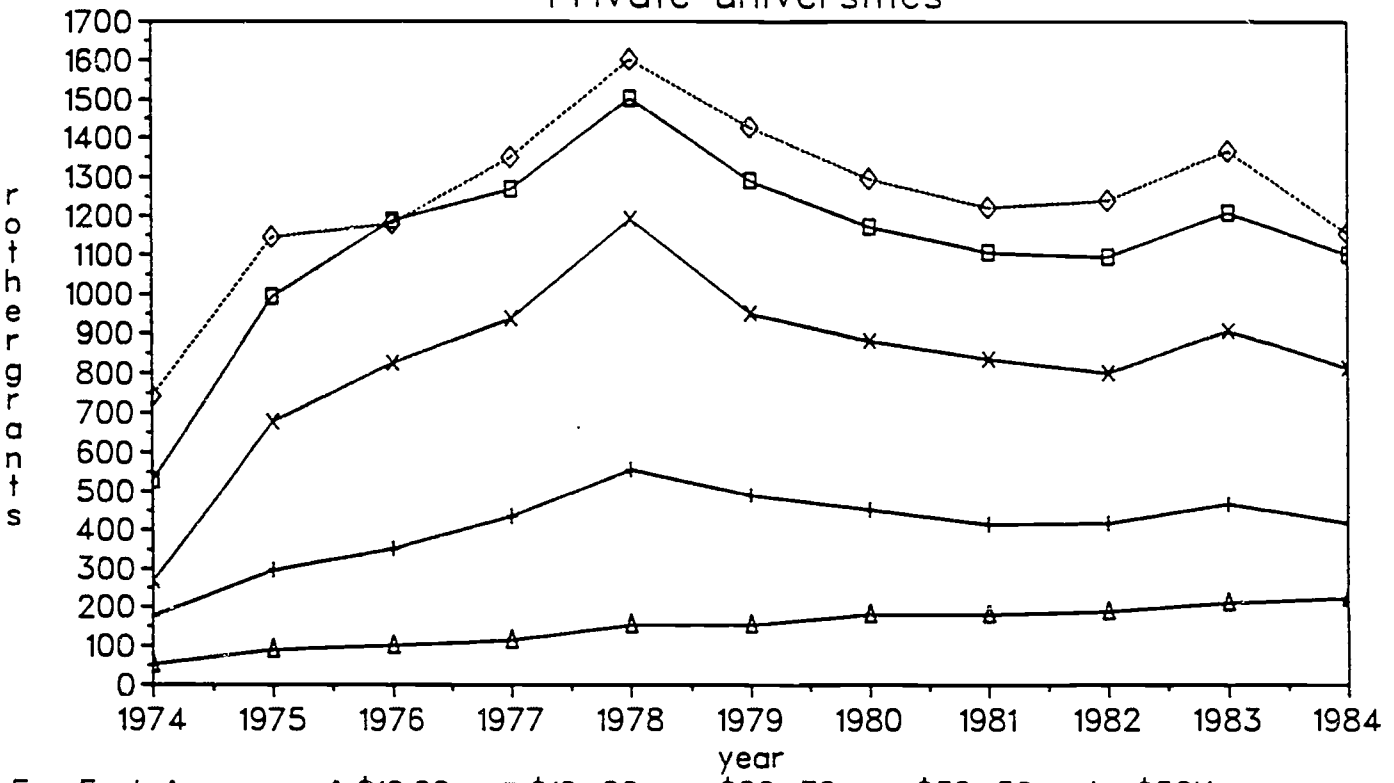


Figure 5. Non-federal grant aid (1978 dollars)
Lowest income students



For Each control: ◇ private ▫ public

Figure 6. Non-federal grant aid by income class
Private universities



For Each income: ◇ $10,00 □ $10-20 × $20-30 + $30-50 Δ >$50K

non-Federal grant aid per student as the lowest income group. It is also clear that the amount of non-Federal aid going to more affluent students (partly in the form of merit grants) has been rising in recent years.

Although no summary measure can be fully adequate, it is helpful to boil down the changes in tuition and in various forms of aid to a manageable index. One way of doing this is to estimate the subsidy value of the aid received by a particular subclass of students, recognizing that the subsidy value of a loan is less than that of a grant. Per student subsidies, combining all sources of aid, and putting the subsidy value of a Federal loan at half the amount lent, are relied on below.[7] These numbers can be combined with estimates of the cost of attendance (including books and room and board as well as tuition) to come up with an estimate of the net cost of attending college.[8] Figure 7 reports these net cost figures for students of different income levels at public and private institutions.

Figure 7 shows that for students at both public and private institutions, and at all income levels, net costs for the 1970's and 1980's have followed a similar U-shaped pattern. Costs in general fell for all groups of students in the latter part of the 1970's and rose in the 1980's, and in many cases, the dollar amounts of cost change for different groups have been roughly similar. One way of putting this is to say that the overall student aid system does not succeed in insulating needier students from changes in the costs of college that affect more affluent students.

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[7] The estimate that the subsidy value of loans is half the face value is roughly consistent with findings reported by Bosworth et al. (1987) and Hauptman (1985).

[8] The net cost figure described here is slightly different from the conception of net cost used in the projections below, since the version used later does not include an estimate of the costs of books.

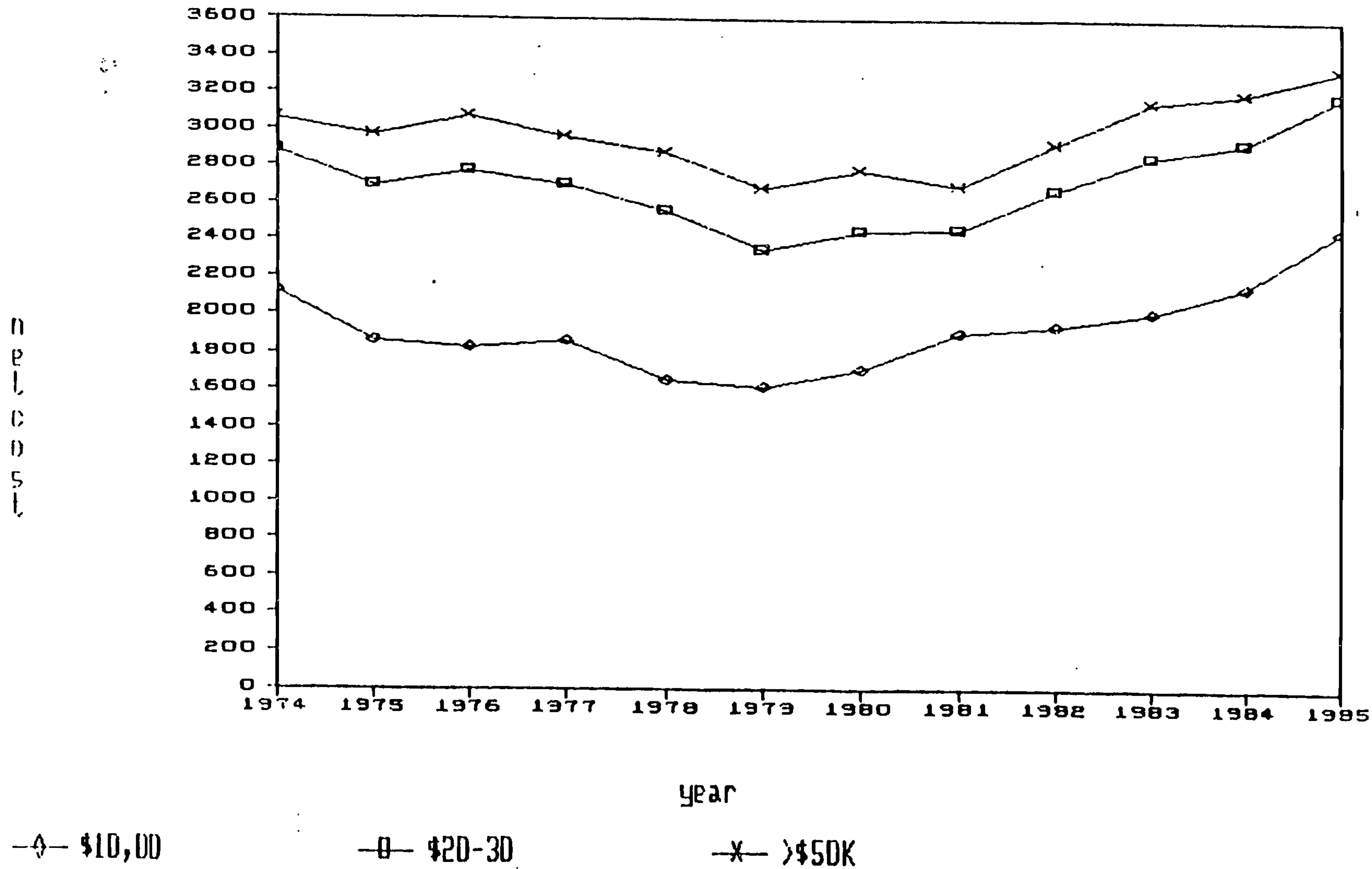

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Figure 7. Panel A — Net cost of attendance for three income groups, in 1978 dollars. Public institutions.

Source: American Freshman S...

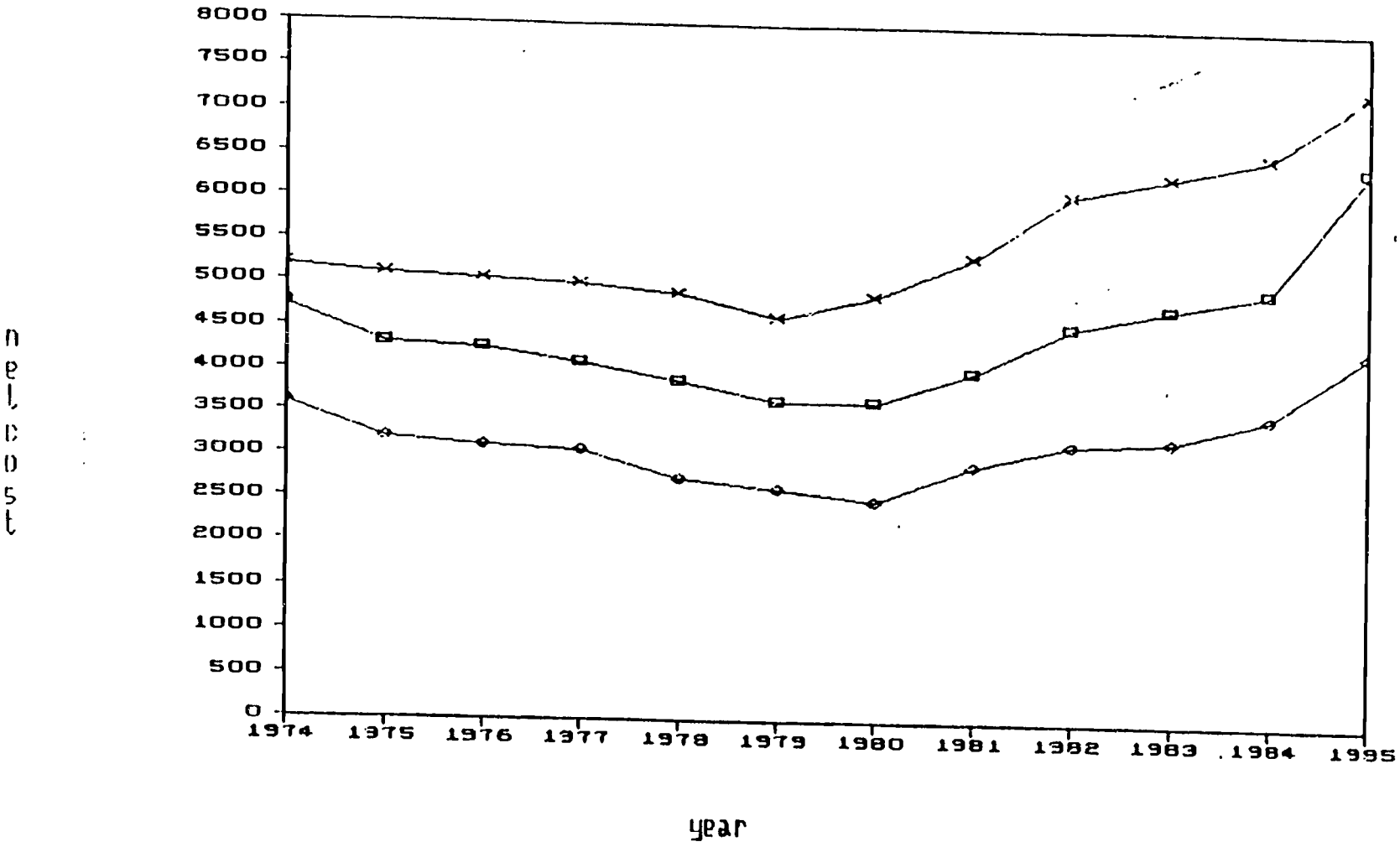

Figure 7. Net cost of attendance for three income groups, in 1978 dollars. Panel B Private institutions.

Source: American Freshman Survey

Still, some significant differences in the experience of different groups are worth noting. First, even when the dollar amounts of cost change are similar for students at different income levels, percentage changes in costs sometimes differ. Thus, for public institutions as a whole the percentage difference in net costs for the lowest income student group in the "best" year (1979) and the "worst" year (1984) was 33 percent, while for the highest income group, the best/worst comparison (1979/1984) yields a percentage difference of just 19 percent. For private institutions, the picture is somewhat different. As net prices at private institutions fell from 1974 to 1980, the percentage drop for the lowest income students was just over 30 percent, while for the most affluent students the drop from 1974 to their best year (1979) was just 11 percent. However, as net prices have risen in the 1980's, the lowest income students have seen prices rise by 42 percent, while the most affluent students have experienced exactly the same 42 percent increase.

These figures also imply that there have been some significant changes in relative prices of different institution types over time. For the lowest income students ($0-10,000 in 1978 dollars), the ratio of private institution to public four year institution net prices has actually fallen from 1974 to 1984 (from 1.75 to 1.52), mainly because of the importance of institution-based aid in private schools. On the other hand, for both the highest income students (above $50,000) and for the "upper-middle" income group ($30-50,000) the ratio of private to public price rose--from 1.67 to 2.01 for the top group and from 1.61 to 1.85 for the "upper-middle" group. This picture of private colleges becoming relatively more accessible to the very lowest income students and relatively less accessible to the more affluent has come in for considerable discussion as a possible threat to the representation of middle-income students in private institutions. We return to this issue in discussing projections and policies below.

The American Freshman data set permits us to examine trends in cost and aid over time for several demographic subgroups and institutional classifications. Appendix A presents a number of tables that permit readers to examine these relationships from a variety of perspectives. Here, we will limit ourselves to summarizing some of the principal conclusions that follow from this more disaggregated look at the data. In general, gender differences in cost and aid trends do not seem to be important. Some significant racial differences appear to be present, but data problems force us to be cautious in interpreting them.[9]

The most important point to note is that the "U-shape" described above is evident for every population subgroup we have examined. That is, when data are cross-classified by gender, race, income, control and type of institution, a pattern of costs falling through the 1970's and rising in the 1980's is consistently evident.

We discover more variation in experience across types of institutions when we compare costs in real terms in the early 1970's to costs in the 1980's. At public four year colleges and universities, real costs for high income white students were about the same in the mid-1970's as in the 1980's--the two ends of the "U" are about the same height. High income blacks faced just slightly lower prices at these institutions in the 1980's than in the 1970's. For low income students at these institutions, costs in the mid-1980's were also very slightly lower than in the 1970's.

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[9]We concentrate in the text and appendix on data for blacks and whites, since the "other" racial category is too miscellaneous in composition to be meaningful. Further, small cell sizes for some of the minority racial categories, particularly at higher incomes, make interpretation hazardous. Finally, some of the income bands we are working with are fairly broad, and it is likely that within any such band, blacks have on average lower income and wealth than their white counterparts. The data seem to suggest that in a variety of cases blacks face lower net costs than whites. but this finding may be at least in part an artifact of this problem with income classifications.

For private four year colleges and universities, costs facing the highest income students were significantly greater in the 1980's than in the mid-1970s: the real increase over the 1974-84 period is more than 25 percent. Student aid, however, largely offset this increase for students at lower income levels. At private four year institutions, net costs were essentially the same in the 1980's as in the mid-1970's for both the lowest income group and for students from families of moderate income.

For whites at public two year colleges, all income groups faced higher real net costs in the 1980's than at any earlier point in our data series. For blacks, however, students from the lowest income families appear to do somewhat better in the 1980's than they had earlier.

What do these various findings imply for "affordability" in the first half of the 1980's compared to earlier periods? First, the increase in real net costs facing low income whites at community colleges is a significant development. Although these schools remain the cheapest alternative for low income students, it is also true that they enroll, on average, many more disadvantaged students, for whom even a moderate increase in real costs may imply real problems of access.

A different sort of affordability problem may be implied by the rise in real costs at private institutions for families earning more than $20,000 (in 1978 dollars--about $38,000 in 1989 dollars). For families in the $20-30,000 bracket this increase is moderate--about 10 percent over ten years; but for families earning more than $30,000 in 1978 dollars ($57,000 in 1989 dollars) the increase is more substantial--on the order of 25 percent or more. Many of these families, although relatively affluent compared to the population as a whole, would still be classified as "middle class". While it could not be said that this increase has damaged this group's access to college--since costs facing these families remain moderate at public institutions, there may well be

an impact on "choice". This increase, in fact, may well be related to the worries about "middle class enrollment melt" at private institutions noted above.

Enrollment Patterns Over Time

Data on trends in enrollment may also shed light on trends in affordability. Certainly over the very long run from the 1930's to the present, the remarkable increase in participation rates and broadening of the range of social groups represented in higher education is testimony to gains in affordability that accompanied the expansion of public higher education and increased Federal aid.

In examining the more recent era, it is useful to divide the historical data on enrollment effects of student aid into three periods: that before 1974, preceding the introduction of the Basic Grants program; that from 1974-1980, when Federal funding for student aid grew sharply in real terms; and that following 1980, when Federal student aid funding first failed to keep pace with inflation and later grew only slowly.

The pre-1974 evidence is scattered. Data on the distribution of student aid by income class are very hard to come by. Evidence on enrollment distributions is also shaky, partly owing to data availability problems, but also owing to the fact that large swings in military personnel levels and recruitment policies complicate the interpretation of available data.

Nonetheless fragmentary evidence suggests that the late 1960's and early 1970's were a period of rapid change in the socio-economic composition of the U. S. college population. Davis and Johns (1982) examined data on the distribution of college freshmen by income class, as reported in the American Freshman survey. They found a marked increase in the fraction of students from families below the median and below the bottom quartile of U. S. incomes in those

years. Similar findings, relying partly on other data, are reported in Carnegie Council, 1980 and in Leslie and Brinkman, 1988.

It seems implausible to attribute very much of this important change to the direct effects of Federal student aid policy. The Federal commitment of dollars to the main Office of Education programs (Educational Opportunity Grants, College Work Study, National Defense Student Loans, and Guaranteed Student Loans) remained modest through this period. Moreover, a large fraction of this Federal support was in the form of guaranteed loans, which were not at that time strongly targeted on the neediest students.

More likely, the proximate causes of the change in enrollment patterns are to be found in changed policies at the state and institutional levels, and in changed social attitudes. The most prominent state level effort was the dramatic expansion in community colleges and urban state-run four year colleges in the 1960's. These institutions were geographically closer to disadvantaged populations than traditional state universities, and often adopted open admissions policies which encouraged the enrollment of educationally disadvantaged students, who are disproportionately from poor economic backgrounds. For many such students, the opportunity to conserve on spending by living at home provides for a dramatic increase in college affordability. Meanwhile, private colleges and universities expanded their own student aid efforts substantially in the late 1960's--by a factor of 2.5 after adjusting for inflation from 1963-64 to 1970-71--and it may be that they targeted their funds more heavily on lower income students. Finally, the strong society-wide concern in the late 1960's for combatting poverty and promoting racial equality should not be neglected. These forces led to stronger recruiting efforts directed toward disadvantaged youth, and probably had effects as well on the college going aspirations of minority and low income students.

While these effects probably outweighed any direct effects of Federal student aid spending in increasing lower income enrollments in the 1965-1974 period, the indirect effects of Federal aid policy on this climate of opinion should not be overlooked. States and private institutions may well have been encouraged in their willingness to expand commitments to education for disadvantaged students by the knowledge that the Federal government was putting some support behind those efforts, and seemed likely to increase that support. Student expectations may have been similarly affected. The anticipation of an expanded Federal role in student finance in the 1970's may have produced some effect on enrollments even before it came into being; it is not possible, however, to measure the magnitude of such a conjectured effect.

The period 1974-1985 saw an expanded Federal aid commitment followed by a decline, as well as a shift in emphasis from grants to loans. As noted earlier, the period of expanding student aid was also a period of declining tuition (in real terms), while in the 1980's tuitions have risen as aid has fallen. As a result, all groups of students faced lower costs in the 1970's and higher ones in the 1980's.

Can we detect the effect of these swings in net costs on enrollment patterns and levels? Figure 8 shows enrollment rates, expressed as percent of the eligible population, for black and white students of different income levels over the 1974-1985 period.[10] In these aggregate enrollment graphs, there is no evident effect of net costs of attendance on enrollment for families with incomes above $30,000 (1978 dollars). For families with incomes between $10,000 and $30,000 there appears to be an effect for black but not for white students - with the enrollment

[10] These data are derived from the U. S. Bureau of the Census Current Population Survey data tapes. Enrollments are full time only, and do not include most proprietary or vocational postsecondary enrollment. The eligible population is defined as persons aged 18-24, financially dependent on their parents, who have completed high school but have not completed four years or more of college. The enrollment figures are for students from this population who are enrolled in college. Figures are reported only for white and black students because the "other" race category provides too small a sample for statistical reliability.

Enrollment rates, 1974–85

blacks and whites, income below $10,000

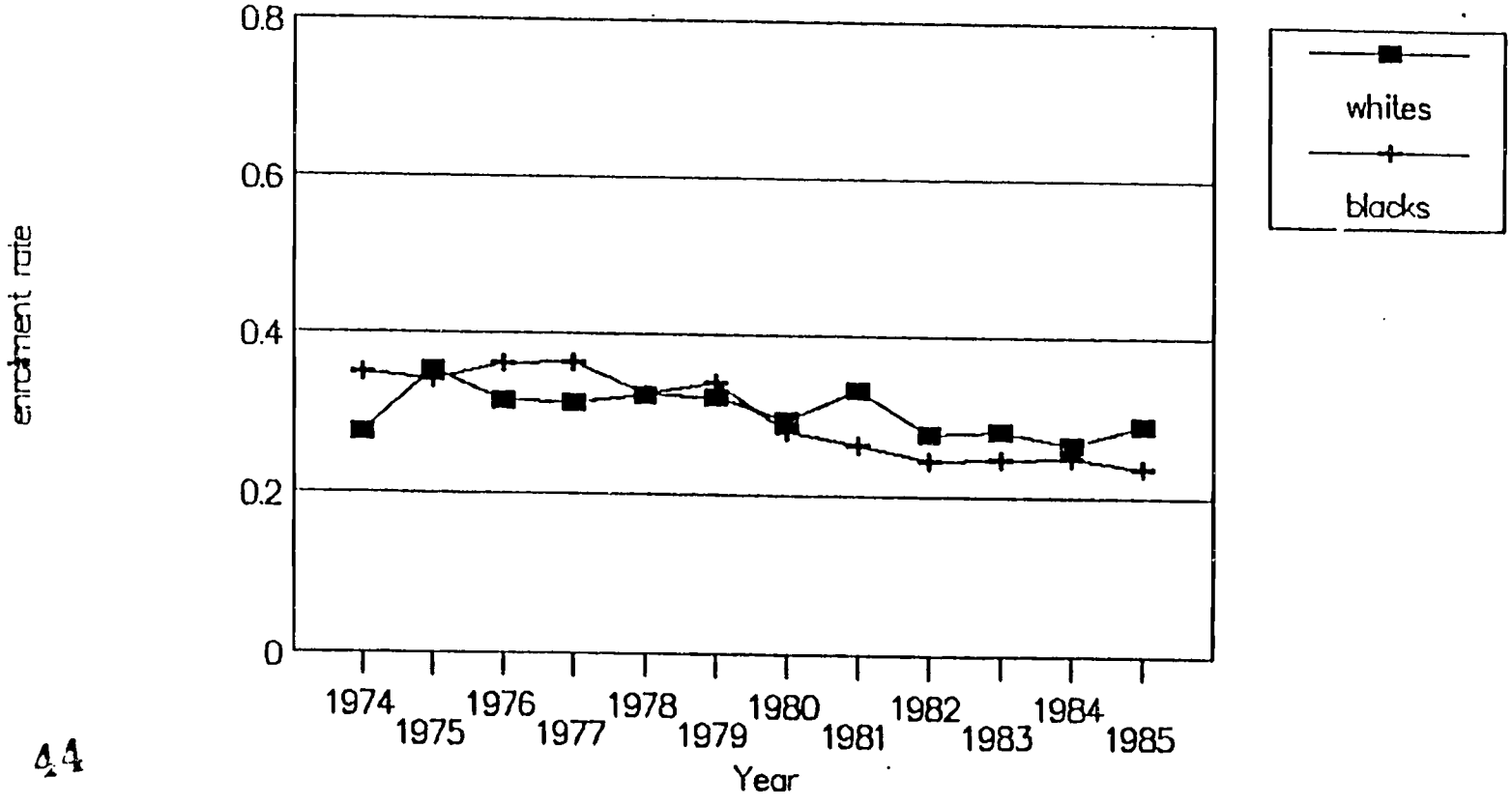

Figure 8. Panel A

Source: Current Population Survey

Enrollment rates, 1974–85

blacks and whites, income $10–$30,000

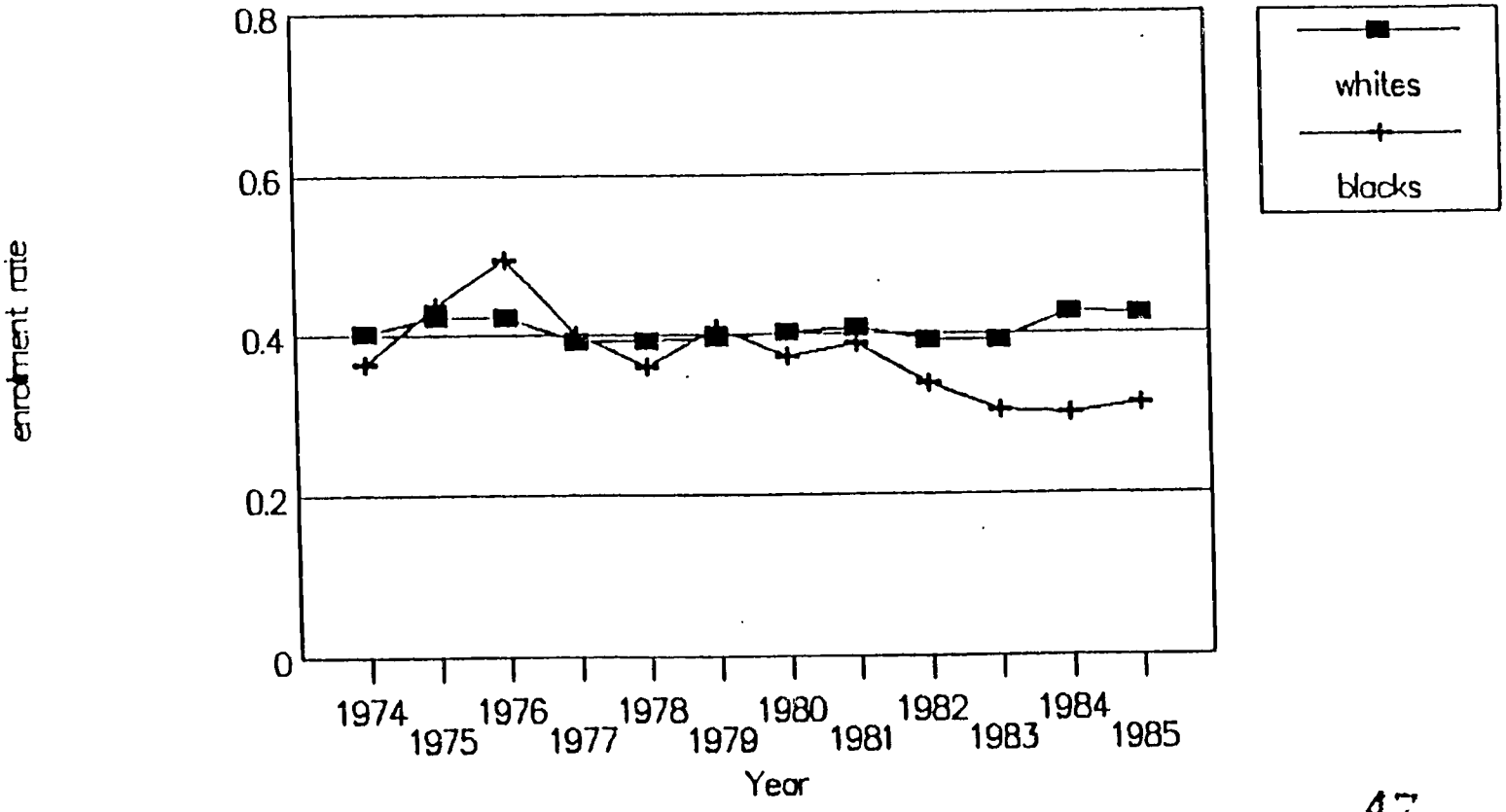

Figure 8. Panel B

Source: Current Population Survey

Enrollment rates, 1974–85

blacks and whites, income above $30,000

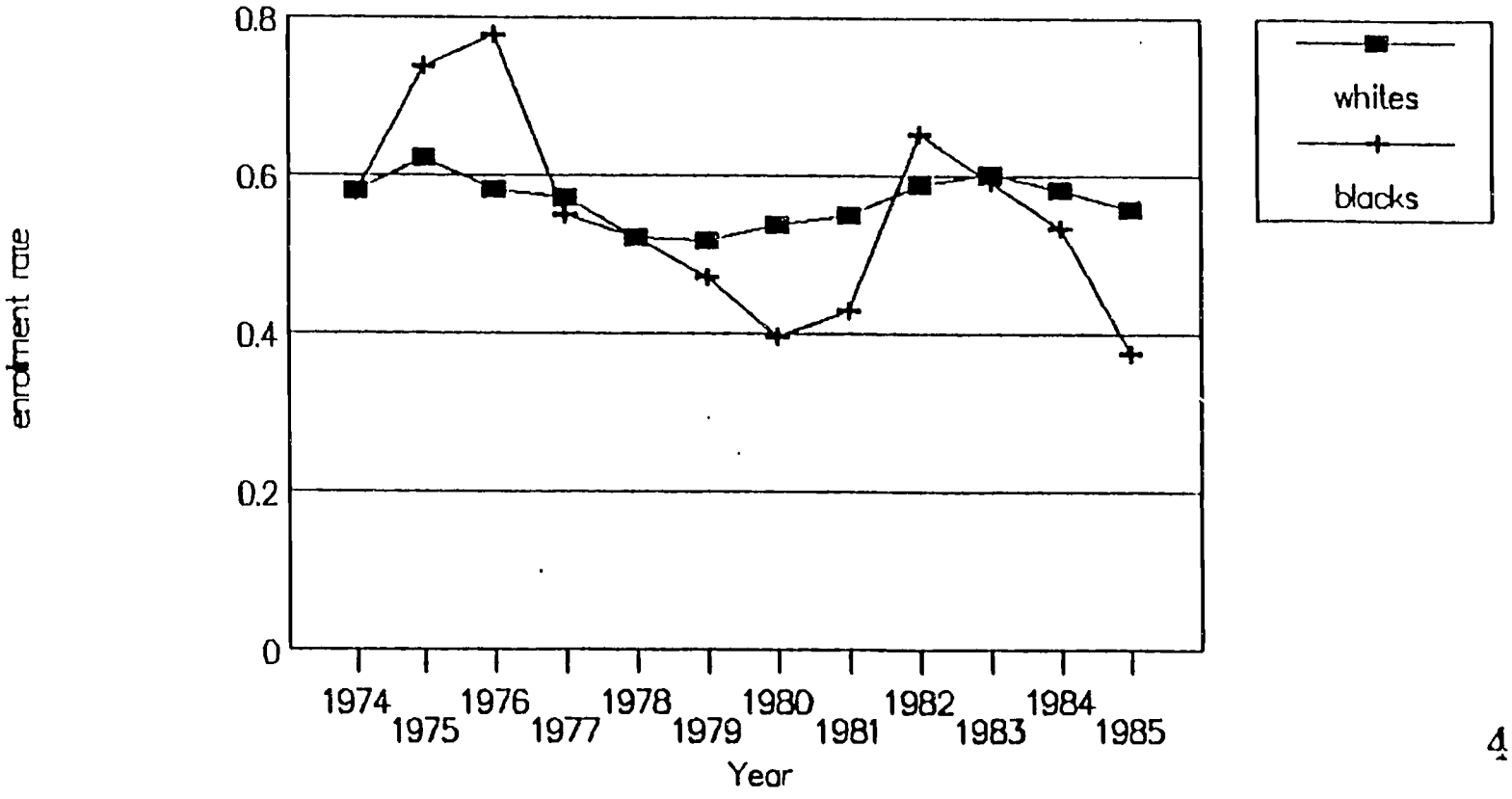

Figure 8. Panel C

Source: Current Population Survey

rate of blacks higher in the 1970's when net costs were lower and lower in the 1980's when net costs rose. From 1975 through 1979 the black enrollment rate among this middle income group averaged 42 percent; from 1981 through 1985 it averaged 33 percent.

An even more distinct swing, involving both white and black students, is evident for the lowest income group, those with incomes below $10,000 in 1978 terms. The white enrollment rate fell distinctly but modestly from the latter half of the 1970's to the 1980's; the 1975-79 average rate was 33 percent, while from 1981-85 the average rate was 29 percent. For blacks, the dropoff is dramatic: average enrollment rates fell from 35 percent to 25 percent between 1975-79 and 1981-85.

This general pattern is consistent with student aid changes having played a significant role. As noted above, net cost changes in percentage terms were somewhat larger for lower income students, and econometric evidence leads us to expect that group will respond more sensitively to relative price changes of given magnitude. It thus seems very plausible that the change in Federal student aid policy, which contributed significantly to the changes in net cost facing lower income students, played a substantial role in reducing lower income enrollment rates in the 1980's.

A recent study undertaken by the authors of this paper provides econometric evidence to support this analysis: we find that low income white students are significantly more likely to enroll in college when the net price falls. We do not, however, find any significant response of enrollment to net price among middle- or high-income students.[11]

It may well be that factors additional to the changes in net price facing low income students have contributed to the enrollment trends we have described. The 1980's have seen a

[11]McPherson and Schapiro, forthcoming. The analysis is limited to white students because of sample size problems for data on other races.

greater emphasis on admissions selectivity at postsecondary institutions, and a less aggressive Federal stance supporting affirmative action in enrollment. Both trends may work against students from educationally and socially disadvantaged backgrounds.

A slightly different way of looking at these data may also prove illuminating. Lee Hansen (1984) has suggested that it is useful to look at relative enrollment rates of more and less affluent students in gauging the impact of Federal student aid, on the grounds that Federal student aid is the most obvious factor that should affect the enrollment behavior of these two groups differentially. Figure 9 displays the ratio of the enrollment rates for the lowest (below $10,000) and highest (above $30,000) income groups over time, looking separately at white and black students. Although the trends are similar for both racial groups, the changes are much sharper for blacks than whites. The late 1970's saw a relative increase in the ratio of low income to high income enrollment, and the 1980's have seen a decrease, with some recovery quite recently. For blacks the swing is marked - low income blacks enrolled at more than 70 percent of the high income black rate in 1979; by 1982 the ratio was below 40 percent. For whites the change in the ratio was from about 60 percent to under 50 percent. This pattern is consistent with student aid having an impact of the expected kind on enrollment patterns.

Projections

Our purposes in this part of the paper are twofold: (1) to present a series of forecasts for key cost ratios over the next twenty years that represent a range of plausible variation in the higher education environment and (2) through comparing these forecasts, to determine the significance of particular cost determinants by contrasting the results of different assumptions about their rates of increase. By identifying key variables and considering factors that are likely

Ratio of low to high income enrollment for blacks and whites, 1974–1985

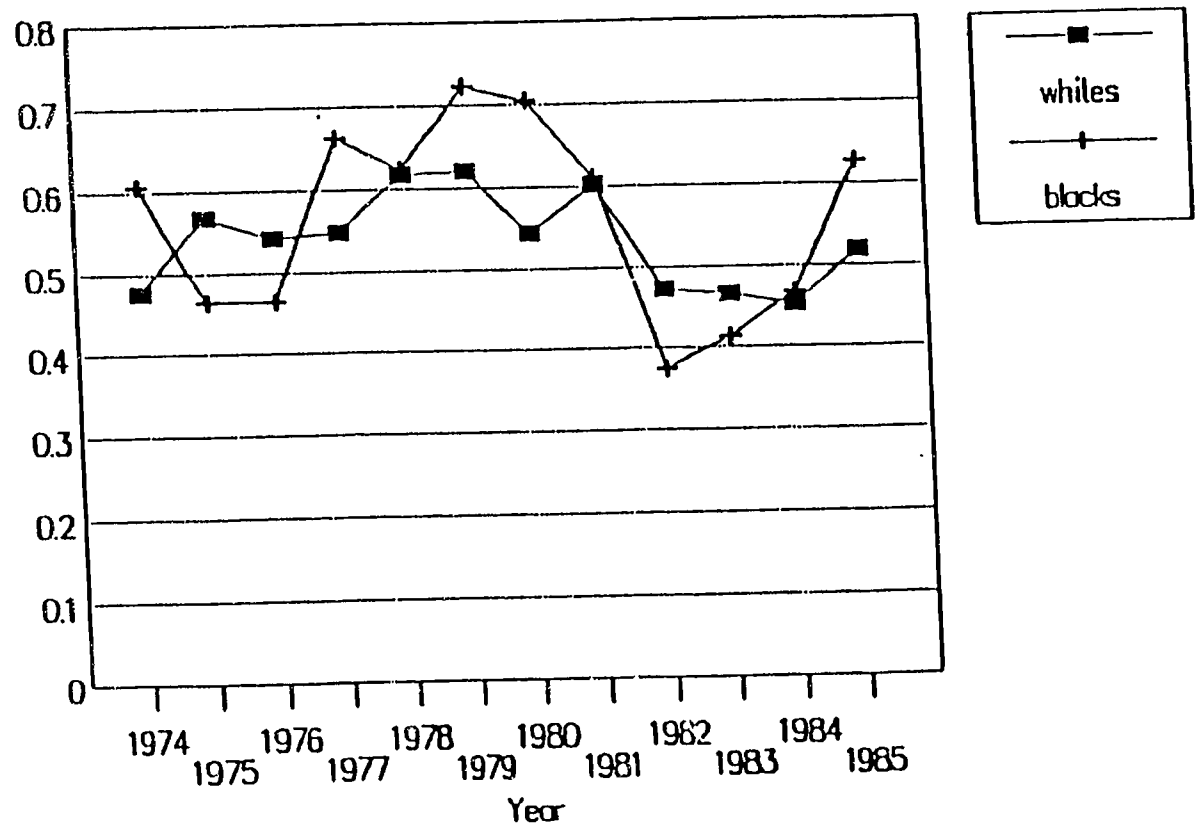

Figure 9

Low income: 0 - $10000 [illegible] dollars

to influence them, we can offer some judgments about which of these forecasts are more likely to be realized.

Our simulation model works from initial conditions that we set based on recent data and assumed rates of growth in those conditions. Any simulation model has imbedded in it certain relationships among the variables and we have tried to create a model that is simple yet captures the main forces at work. In formulating a model of cost determination, we work from the following accounting identity: institutions' educational costs per student equal the sum of tuition revenue (gross of student aid) per student and non-tuition educational revenues per student.[12] We then project educational costs and non-tuition educational revenues separately, and therefore calculate tuition charges as the residual. Our model assumes that "costs of attendance" (from the student's point of view) are equal to the sum of living costs (which we assume will stay constant in real terms) and gross tuition charges (via the residual calculation mentioned above). We project separately per student values for Federal student aid grants, other student aid grants, and loans, and we use these projected values in the calculation of price net of grants and a net price figure which treats the subsidy value of loans as half the award amount.[13]

Simulations could be based on any of several models of institutional behavior. In particular, our decision to make tuition revenue a residual, depending on cost growth and growth of other revenue sources, could be replaced by assuming a rate of growth of tuition directly. With this alternative assumption, either cost growth or growth in non-tuition revenues would become a residual category. The approach that we employ does, however, make it possible to gain a rough sense of the changes in affordability measures that would result if a tuition growth

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[12]This assumes that current revenues equal current expenditures and that auxiliary enterprises break even.

[13]See footnote 7.

rate were assumed directly, since the assumptions of our model will, in each alternative scenario, imply a particular growth rate of tuition.[14] We should note that the set of assumptions we adopt is consistent with the view that college and university tuition-setting are constrained in the long run by trends in underlying costs and available revenues from other sources.

In developing our projections, we establish different initial conditions and growth rates for each of three post-secondary education sectors: public 2-year colleges, public 4-year colleges and universities, and private 4-year colleges and universities.[15] In calculating living costs, we treat students attending public 2-year colleges as commuters, while those attending 4-year institutions are considered to be residents. Thus, for all students board and transportation costs are included in living costs but room charges are applied only to 4-year students.

For comparative purposes we project family incomes for students at these categories of institutions, with initial conditions in each sector set equal to the inflation-adjusted median income of families of freshman students attending that institution type in a recent year. In our projections we track the ratio of net price to family income and the ratio of gross tuition to educational costs. This allows us to forecast two key variables - the burden borne by families and the degree of tuition dependency.

We used a variety of data sources in setting the initial conditions for each variable described above. We relied on the most recent available data found in the College Board's Annual Survey of Colleges (College Board (1988)), Trends in Student Aid (Lewis (1988)), and College Cost Book (College Board (1989)), the Department of Education's HEGIS files, and data

[14]Later in the text, we point out ways to reinterpret some of our projection scenarios in terms of assumed tuition growth rates.

[15]We don't attempt to forecast for the proprietary sector due to a lack of data.

from the American Freshman Survey, and adjusted those values to correspond to the 1989-90 academic year.[16]

We establish a baseline for real rates of growth in each of our variables using data from the 1978-85 period.[17] All variables are expressed on a per full-time-equivalent enrollment basis. The baseline rates of growth are used to provide a baseline scenario over the period 1991 (referring to the academic year 1990-91) to 2010. This baseline is computed simply by applying 1978-85 growth rates to each of the variables discussed in the preceding paragraph, and stepping the calculation forward one year at a time. It is important to note that our baseline scenario assumes a continuation of the recent past, rather than representing our "best guess" of the future. If we were to try to establish such a "best guess" formulation, it would most plausibly be based on a considerably longer time period.

Alternative scenarios examine the consequences of various divergences from these recent growth rates. In each set of scenarios, we hold the values of variables that are not the focus of attention to their baseline trends. Specifically, we examine the results of three broad categories of variation. The first category (Group A) isolates the effect of varying rates of growth of Federal aid support. Scenario A1 assumes no real growth in Federal aid support; scenario A2 assumes growth at an annual real rate of 4 percent; scenario A3 assumes a 2 percent annual real decline in support. Group B varies the performance of the economy. B1 assumes strong economic growth, with median family income increasing at an annual real rate of 2.5 percent and non-tuition revenues growing at a rate of 1 percentage point above the recent growth rate. B2

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[16]For details on the calculation of initial conditions see the footnotes to Table 2.

[17] The choice of a baseline period for establishing historical values is somewhat arbitrary. The endpoint of the period is dictated by availability of financial data; we chose the starting point to provide a period of adequate length which would capture the years during which rapid growth in college costs became an important phenomenon.

assumes weak economic growth, with median family income constant in real terms (this continues the recent trend), and non-tuition revenues growing at a rate of 1 percentage point below the recent growth rate. Note that we assume trends in real cost growth at higher education institutions are unaffected by the overall performance of the economy. Finally, group C examines the effects of various educational cost/institutional aid combinations. C1 and C2 assume a high rate of cost increase equal to 1 percentage point above the recent trend. C1 assumes that institutional aid (institutional aid is the bulk of the "other grants" category in our tables) increases at the recent high rates of real annual growth while C2 assumes no real growth in institutional aid. C3 and C4 assume a low rate of cost increase equal to 1 percentage point below the recent trend. The assumed growth rates for institutional aid for C3 and C4 correspond to those in C1 and C2. Thus, C3 presents a low cost growth/high aid growth scenario while C4 presents a low cost/low aid scenario.

Detailed summaries of the projection growth rate assumptions and results for each of the three sets of assumed variations are reported in Appendix B. We report annual results through 2000, and the years 2005 and 2010. (Obviously, point forecasts for 2010 should not be taken at all seriously. The purpose of extending the projection period is to make trend differences more apparent.)

We begin by examining the baseline projection. The initial conditions and recent growth rates that underlie this projection are reported in the first page of Table 2. The growth rates in our variables over the period 1978-85 show some interesting variation across institutional types. While there were real increases in educational costs in each of the three cases, the annual real increase was much faster at private institutions (3.2 percent) than at public 4-year (2.0 percent) or public 2-year (1.8 percent) schools. Non-tuition educational revenues show a similar pattern. On the other hand, the real rate of growth in Pell support per student was substantial at public

Table 2: Baseline Scenario, p. 1

Growth rates

	pub. 2	pub. 4	private
educational costs(1)	1.018	1.020	1.032
non-tuition ed. revenues (2)	1.015	1.015	1.031
Pell	1.035	1.035	1.000
Other grants	1.017	1.016	1.054
Loans	1.030	1.030	1.050
family income	1.000	1.000	1.000

Initial conditions

educational costs(1)	4200	8500	14600
living costs(3)	2300	3500	3800
non-tuition ed. revenues(2)	3400	6800	5800
costs of attendance(4)	3100	5200	12600
Pell	150	290	320
Other grants	80	320	1580
family income	36600	45400	56100
Loans (5)	140	640	1160

(1) educational costs -- educational and general costs per student, based on HEGIS data. Auxiliary enterprises are excluded, on the assumption that costs and revenues of auxiliary operations are equal.
(2) non tuition educational revenues -- per student revenues from sources other than (gross) tuition. For public institutions, the main such revenue source is state subsidies; for private institutions it is gifts and endowment earnings. Notice that student aid revenues are not included here; they are treated as revenues from students and accounted for separately below. We adjusted figures for educational costs and non-tuition educational revenues to make them reconcile with (a) 1989-90 costs of attendance and (b) 1985-86 ratios of non-tuition educational revenues to educational costs. These numbers yield relationships that are reasonably consistent with relative costs at these categories of institutions in 1985-86.
(3) living costs -- for public two year institutions, we assume commuter status. Living costs include board and transportation costs (from College Cost Book). For public and private four year institutions, we assume resident status. Costs include room and board and transportation from College Cost Book. We assume living costs grow at the general rate of inflation.
(4) costs of attendance -- this is the sum of educational costs and living costs, less non-tuition educational revenues. This figure is checked for consistency with the figures in the College Cost Book.
(5) Loan values from College Board Annual Survey of Colleges. In computing net price, loans are valued at a subsidy rate of 50%.

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Table 2: Baseline Scenario, p. 2

Public four year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	5200	5268	5338	5410	5483	5559	5637	5717	5799	5883	5970	6438	6972
Pell	290	300	311	322	333	344	356	369	382	395	409	486	577
Other grants	320	325	330	336	341	346	352	358	363	369	375	406	440
Loans	640	659	679	699	720	742	764	787	811	835	860	997	1156
income	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400
price net of grants	4590	4643	4697	4753	4810	4868	4929	4990	5054	5119	5186	5546	5955
net price	4270	4313	4357	4403	4450	4497	4547	4597	4648	4701	4756	5048	5378
nominal income	45400	47670	50054	52556	55184	57943	60840	63882	67076	70430	73952	94383	120460
nominal net price	4270	4529	4804	5097	5408	5740	6093	6468	6868	7293	7747	10494	14268
net price/income	9	10	10	10	10	10	10	10	10	10	10	11	12
tuition dependence	20	20	21	21	22	22	22	23	23	23	24	26	27

Private projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	12600	12887	13184	13491	13807	14134	14471	14820	15180	15551	15935	18049	20532
Pell	320	320	320	320	320	320	320	320	320	320	320	320	320
Other grants	1580	1665	1755	1850	1950	2055	2166	2283	2406	2536	2673	3477	4523
Loans	1160	1218	1279	1343	1410	1480	1555	1632	1714	1800	1890	2412	3078
income	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100
price net of grants	10700	10902	11109	11321	11537	11759	11985	12217	12453	12695	12941	14252	15688
net price	10120	10293	10469	10649	10832	11018	11208	11400	11596	11795	11997	13046	14149
nominal income	56100	58905	61850	64943	68190	71599	75179	78938	82885	87030	91381	116628	148850
nominal net price	10120	10808	11543	12328	13167	14063	15026	16042	17133	18298	19541	27122	37542
net price/income	18	18	19	19	19	20	20	20	21	21	21	23	25
tuition dependence	60	60	60	60	60	60	61	61	61	61	61	61	61

Public two year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	3100	3125	3150	3176	3202	3229	3257	3285	3314	3344	3374	3538	3721
Pell	150	155	161	166	172	178	184	191	198	204	212	251	298
Other grants	80	81	83	84	86	87	89	90	92	93	95	103	112
Loans	140	144	149	153	158	162	167	172	177	183	188	218	253
income	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600
price net of grants	2870	2888	2906	2925	2944	2964	2984	3004	3025	3046	3068	3184	3311
net price	2800	2816	2832	2849	2866	2883	2900	2918	2936	2955	2974	3074	3184
nominal income	36600	38430	40352	42369	44488	46712	49048	51500	54075	56779	59618	76089	97111
nominal net price	2800	2957	3122	3298	3483	3679	3887	4106	4339	4584	4844	6392	8449
net price/income	8	8	8	8	8	8	8	8	8	8	8	8	9
tuition dependence	19	19	20	20	20	20	20	21	21	21	21	23	24

Average over sectors	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Cost of attendance	4733	4819	4908	5000	5095	5192	5293	5397	5504	5615	5729	6356	7087
Net price	3947	4000	4053	4108	4163	4220	4277	4336	4395	4456	4517	4837	5176
Nominal net price	3947	4200	4469	4755	5060	5385	5732	6101	6494	6912	7358	10056	13732

institutions (3.5 percent at 4-year and 2-year schools) and non-existent at private colleges and universities. Private institutions, however, had remarkable real growth in institutional aid (other grants), with a growth rate of 5.4 percent compared with 1.6 percent and 1.7 percent at public institutions. Loans also increased at a rapid rate at private schools (5.0 percent annually), while increasing at a slower rate (3.0 percent) in the public sector. Lastly, over this period there was no real growth in the median income of families with household heads aged 45-64 (reflecting very slow growth in productivity in the economy), leading us to adopt zero real growth rates for family income of students attending each type of institution.

Forecasts using the baseline rates (presented on the second page of Table 2) would give us a reasonable picture of the future if these rates were to persist over the next two decades. For public 4-year institutions, costs of attendance would increase from $5,200 in 1990 to around $7,000 in 2010 (in 1989-90 $). The price net of grants is expected to rise from $4,590 to about $6,000 and, most importantly, the net price rises from $4,270 to almost $5,400. In nominal terms, the net price is expected to rise to around $14,300 (assuming, as we do throughout, an annual inflation rate of 5 percent). The first of our two ratios indicates that the burden borne by parents would increase over the period as the ratio of net price to income rises from 9 percent to 12 percent. At the same time, tuition dependency increases from 20 percent to 27 percent. The increase in the burden on families, of course, reflects a forecast of persistent increases in college costs in the face of constant real incomes of families. Growth in tuition dependency reflects a slight lag in the growth of non-tuition revenues relative to educational costs.

Forecasts for private institutions show the same general pattern as that just described. Costs of attendance rise from $12,600 to around $20,500, and the net price increases from $10.120 to about $14,100. The latter figure would be around $37,500 in nominal dollars. The ratio of net price to income increases from 18 percent to 25 percent while tuition dependency

rises from 60 percent to 61 percent. At public 2-year institutions, the net price increases from $2,800 to $3,200 (around $8,400 in nominal dollars), net price/income rises from 8 percent to 9 percent and tuition dependency increases from 19 percent to 24 percent. The average across sectors shows a real increase in net price from $3,947 to about $5,200 ($13,700 in nominal terms).

The baseline projections indicate some reasons to worry about the future of affordability of higher education if recent trends continue although they do not forecast a disaster of catastrophic proportions. The increase in burden borne by parents (for students attending 4-year public and private institutions) may have some unfortunate effects on enrollment rates. In fact, according to estimates from our recent study of the enrollment effects of financial aid (McPherson and Schapiro forthcoming), a real increase in net price of $1,229 (the increase in real net price implied by the baseline projection, averaged over sectors), if shared equally by all income classes, is expected to reduce enrollment rates of students from families with low incomes by 15.3 percent. (Since the baseline projects student aid to rise more rapidly than college costs, the net price increase would in fact be somewhat smaller for low income students than others in this scenario. Thus this estimate is an upper bound of the expected enrollment effect.) In addition to this general problem with affordability, it is important to note that the burden borne by parents of students attending private institutions increases relative to their counterparts with children attending 4-year public colleges and universities - the private burden ratio rises by 7 percentage points to 25 percent while the public burden ratio rises by only 3 percentage points to 12 percent. The growth in the percentage of income spent on private education relative to public education may very well lead to further decline in the share of students educated at private colleges and universities, along with even larger differences in median incomes of parents than at present.

Of course, there is no reason to believe that the recent growth rates used in the baseline model will continue over the next two decades. By varying these rates we produce alternative scenarios that lead to a range of affordability estimates and indicate the importance of different variables.

Group A simulations produce relatively small differences in projections across models assuming wide differences in Federal aid support. Keeping in mind a baseline prediction for net price at private institutions in 2010 of about $14,100 ($37,500 in nominal terms), this number rises to $15,400 ($40,900) with a real decline in Federal support, $15,100 ($40,100) with no growth in support, and falls to $14,000 ($37,200) with rapid growth (see Table 3 and Figure 10 for a summary of the real net price values). The net price/income ratio for this sector is slightly higher with a decline in Federal aid (28 percent) or no real growth (27 percent) relative to either rapid growth or the baseline (25 percent) (see Table 4 and Figure 11). At public 4-year institutions the net price/income ratio varies from 11 percent for the rapid growth scenario and 12 percent for the baseline scenario, to 14 percent for the real decline scenario, with the no growth scenario leading to an intermediate value of 13 percent. A similar pattern is produced at public 2-year colleges. The general lack of response to changes in the amount of Federal aid makes sense in light of the relatively small contribution that this type of aid makes to the determination of net price. As indicated in Table 2, Pell per student in 1989-90 amounted to only $150 at public 2-year colleges, $290 at public 4-year institutions, and $320 at private colleges and universities (in 1978 dollars). Given the fact that comparable net price figures were $2,800, $4,270, and $10,120, the surprise is probably not that Federal aid matters so little, but that it matters as much as it does.

A look at the group B simulations shows considerable differences in net price (Table 3 and Figure 10), net price/income (Table 4 and Figure 11), and tuition dependence (Table 5 and

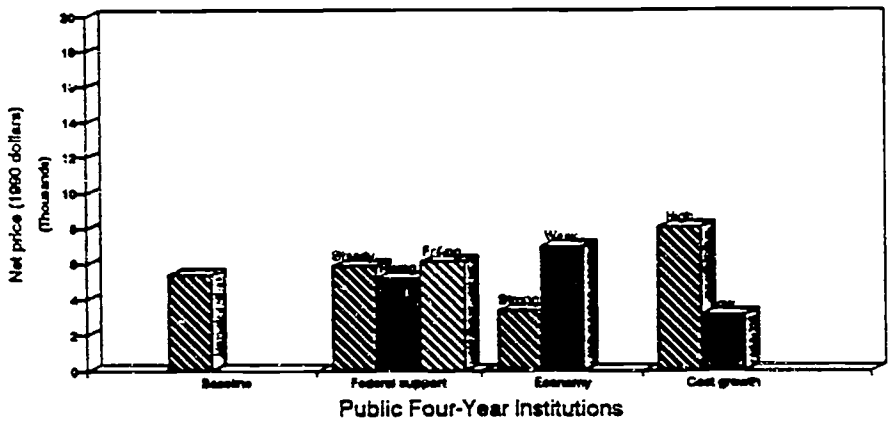
Table 3: Projections summary - real net price, p. 1

Public four year institutions	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Baseline projection													
Historical baseline	4270.1	4313.2	4357.5	4402.9	4449.6	4497.4	4546.5	4596.9	4648.5	4701.4	4755.7	5048.0	5377.5
Varying federal support													
A1 No growth	4270.1	4333.0	4397.6	4464.1	4532.5	4602.8	4675.1	4749.4	4825.7	4904.2	4984.8	5422.4	5922.5
A2 Rapid growth	4270.1	4308.6	4347.9	4388.0	4428.9	4470.7	4513.3	4556.7	4600.9	4646.0	4691.9	4933.9	5196.0
A3 Real decline	4270.1	4345.2	4421.8	4500.0	4579.9	4661.4	4744.7	4829.8	4916.7	5005.6	5096.4	5581.8	6125.2
Varying performance of the economy													
B1 Strong	4270.1	4245.2	4218.8	4190.7	4160.9	4129.4	4096.0	4060.7	4023.5	3984.2	3942.8	3701.2	3393.6
B2 Weak	4270.1	4381.2	4494.9	4611.0	4729.8	4851.2	4975.4	5102.2	5231.8	5364.3	5499.6	6221.3	7022.9
Varying rates of growth in cost and institutional aid													
C1 High/high	4270.1	4398.2	4531.7	4670.9	4815.7	4966.6	5123.6	5287.0	5456.9	5633.7	5817.6	6850.8	8098.9
C2 High/low	4270.1	4403.3	4542.1	4686.5	4836.7	4993.0	5155.6	5324.6	5500.3	5682.9	5872.6	6936.9	8218.5
C3 Low/high	4270.1	4228.2	4184.9	4140.2	4094.0	4046.3	3997.1	3946.2	3893.7	3839.5	3783.5	3476.4	3118.6
C4 Low/low	4270.1	4233.3	4195.3	4155.8	4115.0	4072.8	4029.0	3983.8	3937.0	3888.6	3838.6	3562.4	3238.2

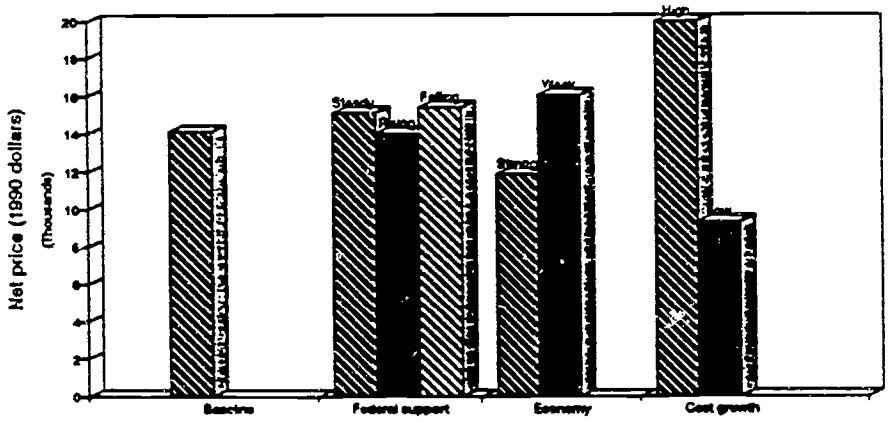
Private institutions	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Baseline projection													
Historical baseline	10120.0	10293.1	10469.5	10649.2	10832.2	11018.4	11207.8	11400.5	11596.2	11794.9	11996.6	13045.9	14149.3
Varying federal support													
A1 No growth	10120.0	10322.1	10528.9	10740.6	10957.2	11178.6	11405.1	11636.6	11873.1	12114.7	12361.4	13671.7	15108.2
A2 Rapid growth	10120.0	10286.1	10455.5	10628.2	10804.3	10983.7	11166.3	11352.2	11541.4	11733.7	11929.2	12950.9	14036.2
A3 Real decline	10120.0	10340.1	10564.6	10793.5	11027.0	11265.1	11507.8	11755.3	12007.4	12264.3	12526.0	13907.0	15407.4
Varying performance of the economy													
B1 Strong	10120.0	10235.1	10349.3	10462.4	10574.2	10684.3	10792.5	10898.4	11001.7	11102.1	11199.0	11617.5	11874.9
B2 Weak	10120.0	10351.1	10588.5	10832.3	11082.7	11339.8	11603.5	11874.1	12151.6	12436.1	12727.6	14293.0	16041.0
Varying rates of growth in cost and institutional aid													
C1 High/high	10120.0	10439.1	10772.3	11120.2	11483.4	11862.6	12258.4	12671.5	13102.7	13552.5	14021.9	16690.6	19980.4
C2 High/low	10120.0	10524.4	10947.5	11390.2	11853.4	12337.9	12844.6	13374.7	13929.1	14509.0	15115.3	18588.1	22923.9
C3 Low/high	10120.0	10147.1	10169.6	10187.2	10199.6	10206.3	10206.9	10201.2	10188.5	10168.4	10140.5	9863.6	9298.5
C4 Low/low	10120.0	10232.4	10344.8	10457.2	10569.5	10681.5	10793.2	10904.4	11015.0	11124.9	11233.9	11761.1	12242.0

Table 3: Projections summary - real net price, p. 2

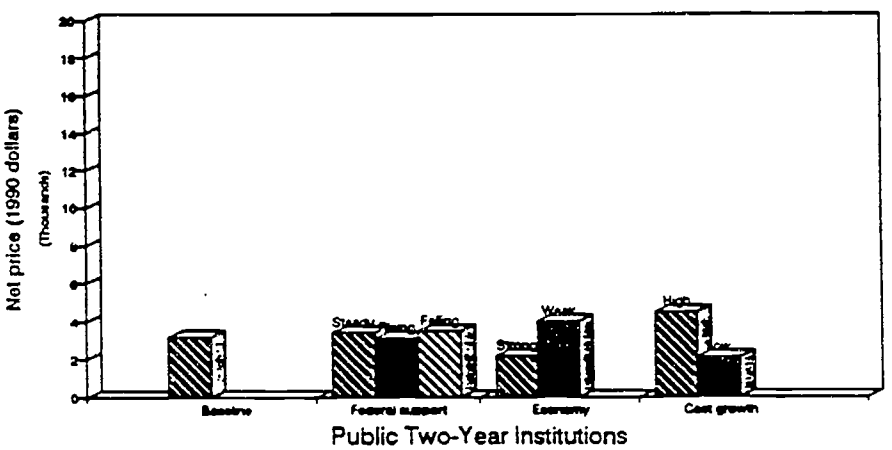
Public two year institutions		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Baseline projection														
	historical baseline	2800.0	2815.9	2832.1	2848.7	2865.5	2882.8	2900.3	2918.2	2936.5	2955.1	2974.1	3074.5	3184.5
Varying federal support														
A1	No growth	2800.0	2823.2	2847.1	2871.5	2896.4	2922.1	2948.3	2975.2	3002.7	3030.9	3059.7	3214.9	3389.4
A2	Rapid growth	2800.0	2814.4	2829.1	2844.0	2859.1	2874.4	2889.9	2905.7	2921.6	2937.7	2954.1	3038.6	3127.3
A3	Real decline	2800.0	2827.6	2855.8	2884.4	2913.5	2943.2	2973.4	3004.2	3035.5	3067.4	3100.0	3272.4	3462.5
Varying performance of the economy														
B1	Strong	2800.0	2781.9	2762.7	2742.5	2721.2	2698.7	2675.1	2650.2	2624.0	2596.5	2567.6	2401.1	2192.5
B2	Weak	2800.0	2849.9	2900.8	2952.7	3005.7	3059.7	3114.7	3170.9	3228.2	3286.5	3346.0	3661.2	4007.1
Varying rates of growth in cost and institutional aid														
C1	High/high	2800.0	2857.9	2918.0	2980.5	3045.4	3112.8	3182.7	3255.2	3330.5	3408.6	3489.6	3941.3	4480.2
C2	High/low	2800.0	2859.3	2920.8	2984.7	3051.0	3119.8	3191.2	3265.3	3342.1	3421.7	3504.3	3964.3	4512.2
C3	Low/high	2800.0	2773.9	2747.0	2719.4	2690.9	2661.6	2631.5	2600.5	2568.6	2535.9	2502.2	2319.1	2109.3
C4	Low/low	2800.0	2775.3	2749.8	2723.5	2696.5	2668.6	2640.0	2610.5	2580.2	2549.0	2516.9	2342.1	2141.4



Public Four-Year Institutions



Private Four-Year Institutions



Public Two-Year Institutions

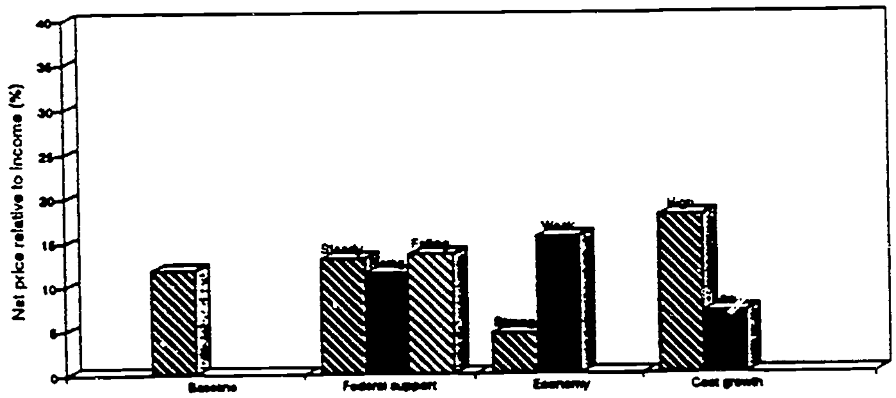
Table 4: Projections summary - net price divided by family income, p. 1

Public four year institutions		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Baseline projection														
	historical baseline	9.4	9.5	9.6	9.7	9.8	9.9	10.0	10.1	10.2	10.4	10.5	11.1	11.8
Varying federal support														
A1	No growth	9.4	9.5	9.7	9.8	10.0	10.1	10.3	10.5	10.6	10.8	11.0	11.9	13.0
A2	Rapid growth	9.4	9.5	9.6	9.7	9.8	9.8	9.9	10.0	10.1	10.2	10.3	10.9	11.4
A3	Real decline	9.4	9.6	9.7	9.9	10.1	10.3	10.5	10.6	10.8	11.0	11.2	12.3	13.5
Varying performance of the economy														
B1	Strong	9.4	9.1	8.8	8.6	8.3	8.0	7.8	7.5	7.3	7.0	6.8	5.6	4.6
B2	Weak	9.4	9.7	9.9	10.2	10.4	10.7	11.0	11.2	11.5	11.8	12.1	13.7	15.5
Varying rates of growth in cost and institutional aid														
C1	High/high	9.4	9.7	10.0	10.3	10.6	10.9	11.3	11.6	12.0	12.4	12.8	15.1	17.8
C2	High/low	9.4	9.7	10.0	10.3	10.7	11.0	11.4	11.7	12.1	12.5	12.9	15.3	18.1
C3	Low/high	9.4	9.3	9.2	9.1	9.0	8.9	8.8	8.7	8.6	8.5	8.3	7.7	6.9
C4	Low/low	9.4	9.3	9.2	9.2	9.1	9.0	8.9	8.8	8.7	8.6	8.5	7.8	7.1

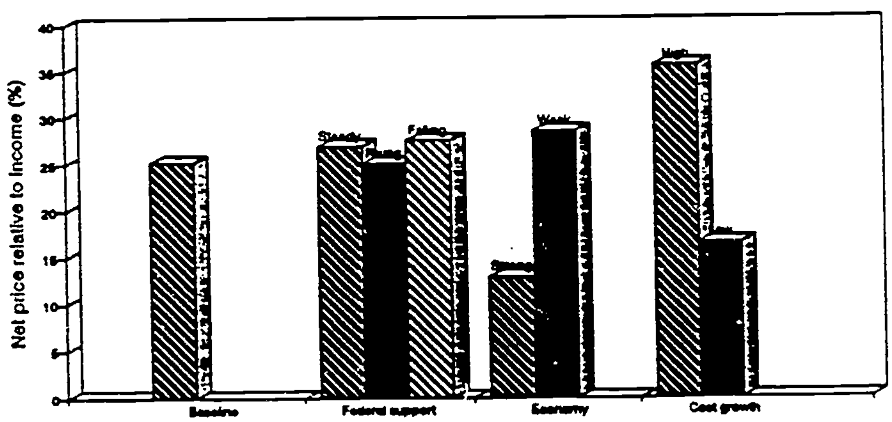
Private institutions		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Baseline projection														
	historical baseline	18.0	18.3	18.7	19.0	19.3	19.6	20.0	20.3	20.7	21.0	21.4	23.3	25.2
Varying federal support														
A1	No growth	18.0	18.4	18.8	19.1	19.5	19.9	20.3	20.7	21.2	21.6	22.0	24.4	26.9
A2	Rapid growth	18.0	18.3	18.6	18.9	19.3	19.6	19.9	20.2	20.6	20.9	21.3	23.1	25.0
A3	Real decline	18.0	18.4	18.8	19.2	19.7	20.1	20.5	21.0	21.4	21.9	22.3	24.8	27.5
Varying performance of the economy														
B1	Strong	18.0	17.8	17.6	17.3	17.1	16.8	16.6	16.3	16.1	15.8	15.6	14.3	12.9
B2	Weak	18.0	18.5	18.9	19.3	19.8	20.2	20.7	21.2	21.7	22.2	22.7	25.5	28.6
Varying rates of growth in cost and institutional aid														
C1	High/high	18.0	18.6	19.2	19.8	20.5	21.1	21.9	22.6	23.4	24.2	25.0	29.8	35.6
C2	High/low	18.0	18.8	19.5	20.3	21.1	22.0	22.9	23.8	24.8	25.9	26.9	33.1	40.9
C3	Low/high	18.0	18.1	18.1	18.2	18.2	18.2	18.2	18.2	18.2	18.1	18.1	17.6	16.6
C4	Low/low	18.0	18.2	18.4	18.6	18.8	19.0	19.2	19.4	19.6	19.8	20.0	21.0	21.8

Table 4: Projections summary - net price divided by family income, p. 2

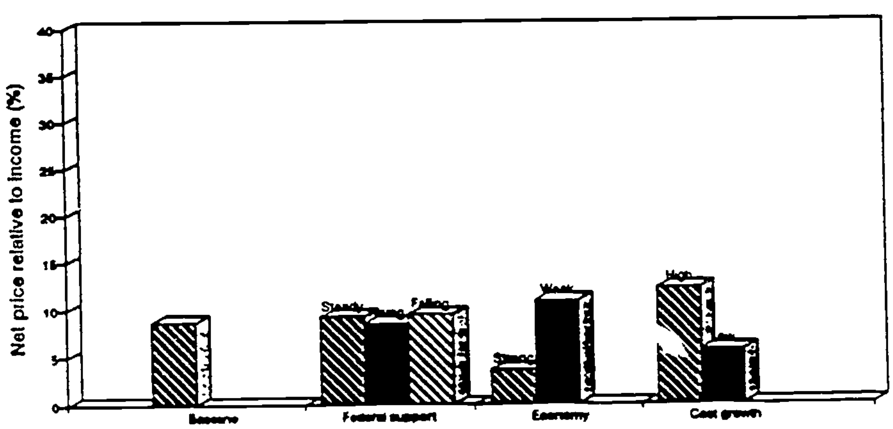
Public two year institutions		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Baseline projection														
	historical baseline	7.7	7.7	7.7	7.8	7.8	7.9	7.9	8.0	8.0	8.1	8.1	8.4	8.7
Varying federal support														
A1	No growth	7.7	7.7	7.8	7.8	7.9	8.0	8.1	8.1	8.2	8.3	8.4	8.8	9.3
A2	Rapid growth	7.7	7.7	7.7	7.8	7.8	7.9	7.9	7.9	8.0	8.0	8.1	8.3	8.5
A3	Real decline	7.7	7.7	7.8	7.9	8.0	8.0	8.1	8.2	8.3	8.4	8.5	8.9	9.5
Varying performance of the economy														
B1	Strong	7.7	7.4	7.2	7.0	6.7	6.5	6.3	6.1	5.9	5.7	5.5	4.5	3.7
B2	Weak	7.7	7.8	7.9	8.1	8.2	8.4	8.5	8.7	8.8	9.0	9.1	10.0	10.9
Varying rates of growth in cost and institutional aid														
C1	High/high	7.7	7.8	8.0	8.1	8.3	8.5	8.7	8.9	9.1	9.3	9.5	10.8	12.2
C2	High/low	7.7	7.8	8.0	8.2	8.3	8.5	8.7	8.9	9.1	9.3	9.6	10.8	12.3
C3	Low/high	7.7	7.6	7.5	7.4	7.4	7.3	7.2	7.1	7.0	6.9	6.8	6.3	5.8
C4	Low/low	7.7	7.6	7.5	7.4	7.4	7.3	7.2	7.1	7.0	7.0	6.9	6.4	5.9



Public Four-Year Institutions



Private Four-Year Institutions



Public Two-Year Institutions

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Table 5: Projections summary - tuition dependency, p. 1

Public four year institutions	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Baseline projection													
Historical baseline	20.0	20.4	20.8	21.2	21.6	21.9	22.3	22.7	23.1	23.5	23.8	25.7	27.5
Varying federal support													
A1 No growth	20.0	20.4	20.8	21.2	21.6	21.9	22.3	22.7	23.1	23.5	23.8	25.7	27.5
A2 Rapid growth	20.0	20.4	20.8	21.2	21.6	21.9	22.3	22.7	23.1	23.5	23.8	25.7	27.5
A3 Real decline	20.0	20.4	20.8	21.2	21.6	21.9	22.3	22.7	23.1	23.5	23.8	25.7	27.5
Varying performance of the economy													
B1 Strong	20.0	19.6	19.2	18.8	18.4	18.0	17.6	17.2	16.8	16.4	16.0	13.9	11.8
B2 Weak	20.0	21.2	22.3	23.5	24.6	25.7	26.8	27.9	28.9	30.0	31.0	35.9	40.5
Varying rates of growth in cost and institutional aid													
C1 High/high	20.0	21.2	22.3	23.4	24.6	25.7	26.7	27.8	28.9	29.9	30.9	35.8	40.3
C2 High/low	20.0	21.2	22.3	23.4	24.6	25.7	26.7	27.8	28.9	29.9	30.9	35.8	40.3
C3 Low/high	20.0	19.6	19.2	18.8	18.4	18.0	17.6	17.2	16.8	16.4	16.0	13.8	11.7
C4 Low/low	20.0	19.6	19.2	18.8	18.4	18.0	17.6	17.2	16.8	16.4	16.0	13.8	11.7

Private institutions	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Baseline projection													
Historical baseline	60.3	60.3	60.4	60.4	60.4	60.5	60.5	60.5	60.6	60.6	60.7	60.8	61.0
Varying federal support													
A1 No growth	60.3	60.3	60.4	60.4	60.4	60.5	60.5	60.5	60.6	60.6	60.7	60.8	61.0
A2 Rapid growth	60.3	60.3	60.4	60.4	60.4	60.5	60.5	60.5	60.6	60.6	60.7	60.8	61.0
A3 Real decline	60.3	60.3	60.4	60.4	60.4	60.5	60.5	60.5	60.6	60.6	60.7	60.8	61.0
Varying performance of the economy													
B1 Strong	60.3	59.9	59.6	59.2	58.9	58.5	58.1	57.8	57.4	57.0	56.7	54.7	52.7
B2 Weak	60.3	60.7	61.1	61.5	61.9	62.3	62.7	63.1	63.5	63.9	64.3	66.2	67.9
Varying rates of growth in cost and institutional aid													
C1 High/high	60.3	60.7	61.1	61.5	61.9	62.3	62.7	63.1	63.5	63.9	64.3	66.1	67.9
C2 High/low	60.3	60.7	61.1	61.5	61.9	62.3	62.7	63.1	63.5	63.9	64.3	66.1	67.9
C3 Low/high	60.3	59.9	59.6	59.2	58.9	58.5	58.1	57.8	57.4	57.0	56.6	54.7	52.7
C4 Low/low	60.3	59.9	59.6	59.2	58.9	58.5	58.1	57.8	57.4	57.0	56.6	54.7	52.7

Table 5: Projections summary - tuition dependency, p. 2

Public two year institutions		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Baseline projection														
	historical baseline	19.0	19.3	19.5	19.8	20.0	20.2	20.5	20.7	20.9	21.2	21.4	22.6	23.7
Varying federal support														
A1	No growth	19.0	19.3	19.5	19.8	20.0	20.2	20.5	20.7	20.9	21.2	21.4	22.6	23.7
A2	Rapid growth	19.0	19.3	19.5	19.8	20.0	20.2	20.5	20.7	20.9	21.2	21.4	22.6	23.7
A3	Real decline	19.0	19.3	19.5	19.8	20.0	20.2	20.5	20.7	20.9	21.2	21.4	22.6	23.7
Varying performance of the economy														
B1	Strong	19.0	18.5	17.9	17.4	16.8	16.2	15.6	15.1	14.5	13.9	13.3	10.3	7.2
B2	Weak	19.0	20.1	21.1	22.1	23.1	24.1	25.1	26.0	27.0	27.9	28.8	33.2	37.4
Varying rates of growth in cost and institutional aid														
C1	High/high	19.0	20.1	21.1	22.1	23.1	24.0	25.0	25.9	26.9	27.8	28.7	33.1	37.2
C2	High/low	19.0	20.1	21.1	22.1	23.1	24.0	25.0	25.9	26.9	27.8	28.7	33.1	37.2
C3	Low/high	19.0	18.5	17.9	17.3	16.8	16.2	15.6	15.0	14.4	13.8	13.2	10.2	7.0
C4	Low/low	19.0	18.5	17.9	17.3	16.8	16.2	15.6	15.0	14.4	13.8	13.2	10.2	7.0

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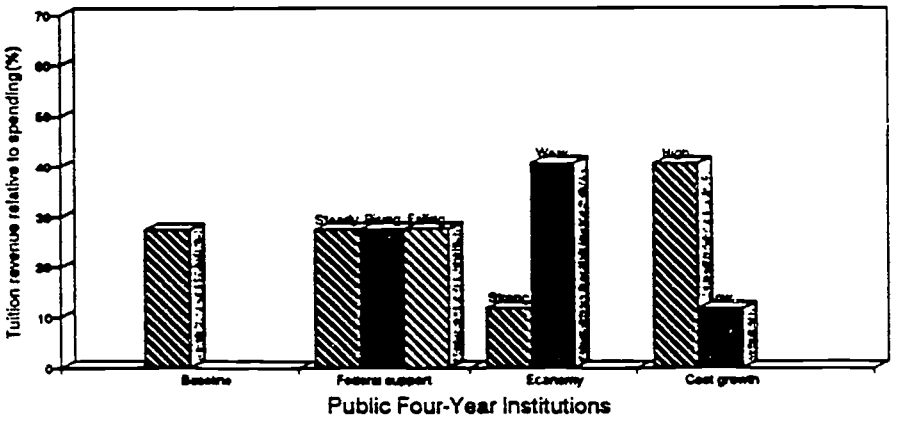
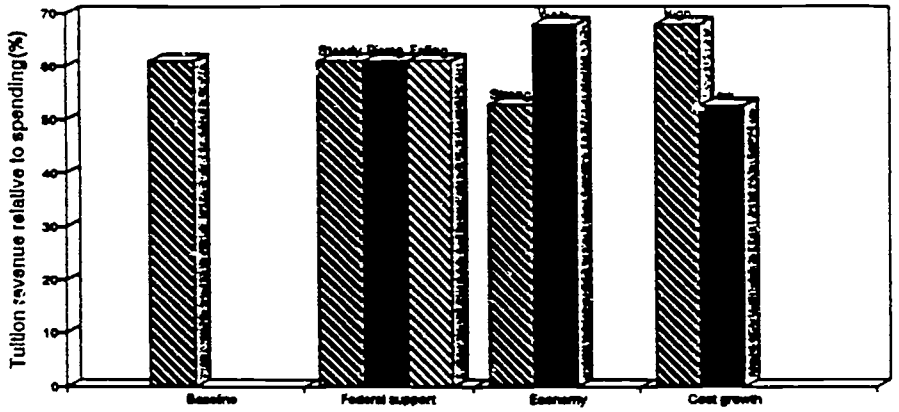
Figure 12) based on the performance of the economy. The baseline values for private institutions of a net price in 2010 of $14,100 ($37,500 in nominal terms), a burden ratio of 25 percent and tuition dependence of 61 percent rise, in the event of a weak economy, to $16,000 ($42,600), 29 percent and 68 percent. For public 4-year and 2-year institutions, these changes are even more dramatic: net price in 2010 for 4-year institutions rises from $5,400 ($14,300) in the baseline scenario to $7,000 ($18,600) for a weak economy, the burden ratio rises from 12 percent to 16 percent, and tuition dependence rises from 28 percent to 41 percent; for 2-year colleges, these values rise from $3,200 ($8,400) in the baseline scenario to $4,000 ($10,600) for a weak economy, 9 percent to 11 percent, and 24 percent to 37 percent. Hence, the educational sector is quite vulnerable to a prolonged recession, particularly the public sector. Of course, strong economic growth would have a highly favorable effect on the future of these cost variables. Net price, net price/income and tuition dependence fall to $11,900 ($31,500), 13 percent and 53 percent for private institutions; $3,400 ($9,000), 5 percent and 12 percent at public 4-year institutions; and $2,200 ($5,800), 4 percent and 7 percent at public 2-year colleges. The affordability implications of economic performance are rather remarkable with the burden ratio varying from 13 percent to 29 percent at private institutions, 5 percent to 16 percent at public 4-year institutions and 4 percent to 11 percent at community colleges, depending on whether the economy is strong or weak. (Tuition dependence tells a similar story with projections ranging from 53 percent to 68 percent, 12 percent to 41 percent, and 7 percent to 37 percent.)

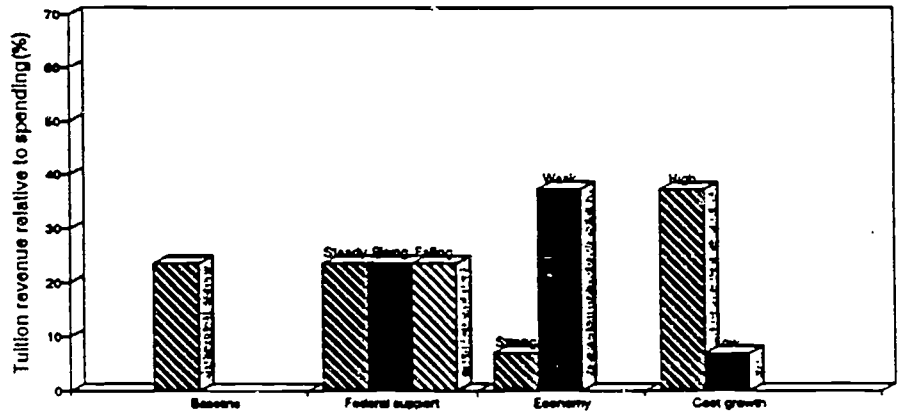
The finding that the future of the educational sector is so strongly tied to the course of an unpredictable economy is obviously quite unsettling. Our projections build in several assumptions about how variations in overall economic performance will impinge on the higher education sector. First, of course, we assume that the growth in family income is closely related



Public Four-Year Institutions



Private Four-Year Institutions



Public Two-Year Institutions

to overall economic conditions. Second, we assume that the growth of non-tuition educational revenues is similarly responsive. For public institutions, this translates into an assumption that state appropriations for higher education are sensitive to economic conditions, while for private institutions we assume that endowment and gift performance are similarly sensitive to economic conditions. We should also reemphasize that we do not assume that college cost growth is sensitive to overall economic conditions. One could argue the reverse: that a strong economy will both raise the demand for and the real resource costs of higher education, resulting in more rapid growth both in educational costs and tuitions. This assumption could easily be incorporated in our projections. Yet it is worth noting that the historical experience is different: the rapid tuition growth of the 1980's has occurred in the face of slow or no growth in productivity and incomes.

Group C simulations highlight the effects of different combinations of cost growth and increases in institutional aid. (Note that Figures 10 through 12 summarize differences in cost growth but do not track variations in institutional aid--both the high cost and the low cost scenarios in the figures assume high institutional aid.) An examination of projections C1 and C2 shows that the assumption of high rates of cost increase leads to a major change from the baseline projections, with institutional aid playing a mediating role. In the worst case scenario - high costs and low institutional aid (C2) - net price in 2010 at private institutions rises to $22,900 ($60,800 in nominal terms) as opposed to $20,000 ($53,000) if institutional aid increases at a rapid rate (see Table 3). In either case, this figure is well above the baseline projection of $14,100 ($37,500). The corresponding net price/income ratios are 41 percent and 36 percent compared to the 25 percent baseline prediction (Table 4). At public 4-year institutions, the high cost/low aid scenario leads to a net price of $8,200 ($21,800) and a burden of 18 percent, quite close to the figures for the high cost/high aid scenario ($8,100 ($21,500) and, again, 18 percent).

both of which far exceed the baseline projections of $5,400 ($14,300) and 12 percent. At public 2-year colleges, for both the high cost/low aid and high cost/high aid scenarios, net price is about $4,500 ($11,900 to $12,000) with a 12 percent burden, compared to $3,200 ($8,400) and 9 percent for the baseline. Hence, while high cost growth has a major effect on affordability in both the private and public sectors, the prominent role of institutional aid at private institutions enables these schools to reduce the effect of cost growth by a non-trivial amount by similarly increasing aid.

The low cost growth scenarios presented in C3 and C4 offer a much rosier view of the future. Even in the case of low institutional aid (C4), the net price for private institutions in 2010 falls to $12,200 ($32,500 in nominal terms), implying a burden of 22 percent. The figures are $3,200 ($8,600) and 7 percent at public 4-year institutions and $2,100 ($5,700) and 6 percent at community colleges. The combination of low cost growth and high institutional aid growth improves these numbers to $9,300 ($24,700) and 17 percent at private colleges and universities, $3,100 ($8,300) and 7 percent at public 4-year institutions, and $2,100 ($5,600) and 6 percent at public 2-year colleges. Again, it is clear that the effects of cost growth dominate those of changes in institutional aid, especially in the public sector.

It is worth noting that each of our simulations can be roughly equated to a simulation which assumes a given rate of growth in tuition, rather than computing tuition as a residual, as is done in the simulations we report. Thus, for example, the baseline assumes that educational costs at public four-year institutions grow at 2.0 percent (over inflation), while non-tuition revenues grow at 1.5 percent. With tuition revenues accounting for only 20 percent of total educational costs in the base year, it is readily calculated that tuition must grow at an annual real rate of 3.6 percent over the twenty year period of the simulations to be consistent with the growth rates assumed in this scenario. At private institutions, the annual real growth rate of

educational costs is 3.2 percent and that of non-tuition revenues is 3.1 percent. To reconcile these, the model implicitly assumes that tuition must grow at 3.2 percent real. The implied tuition growth rate for public two-year institutions in the baseline scenario is 2.9 percent. Similar tuition equivalent growth rates can be calculated for all the scenarios reported here.

The various scenarios described above provide very different pictures of the future of affordability of higher education. Do some of these scenarios seem more likely than others? The most important factor is the economic performance of the nation. Our most favorable scenario - sustained high rates of economic growth - appears unlikely for at least two reasons. For one, we are currently in the eighth year of the longest peacetime economic expansion in history and to assume that this steady growth will be followed by another two decades of economic progress is likely to be overly optimistic. Further, current national policies, including large government deficits and low national investment rates, do not bode well for future growth.

If growth performance is poor, the prospects for avoiding a college affordability problem are not good. In the face of slow or no growth in family incomes, the burden on families of paying for college will probably rise unless one of three things happen: (1) the underlying costs of providing college education do not grow; (2) non-tuition sources of educational revenue grow steadily; or (3) student financial aid, presumably mainly from the Federal government, grows steadily. Since most observers predict shortages in faculty labor markets which are likely to make that major component of college costs grow, it is difficult to see how existing levels of educational costs could be held down without permitting the quality of college education to decline. Few observers would find a solution to college affordability problems which took the form of declining college quality satisfactory. The other two alternatives--growing non-tuition revenues or growing Federal aid support--are themselves likely to depend on a healthy economy.

It thus appears that a promising future for college affordability depends critically on good performance of the economy in the coming decades.

That said, what other factors will crucially impinge on future affordability? It is clear in our simulations that the next most important factor (after overall economic performance) is the behavior of the educational costs of institutions. Over twenty years, the burden on families of paying for college differs by a factor of around two or more depending on whether college costs rise at a percentage point above or below the trend established in the 1978-85 period. As noted earlier, there has been a quite persistent tendency for college costs to grow more rapidly than inflation over the last fifty years. The reasons for this long run tendency are fairly fundamental, having to do with the slow rate of technical progress in this industry compared to the economy as a whole. What is distinctive about the 1980's, however, is a pattern of rapid real cost growth in colleges during a period when productivity was fairly stagnant in the rest of the economy. Beginning in the mid-1990's, growth in the population of young people is likely to lead to fairly rapid increases in college enrollment (although not so rapid as in the 1960's). The resulting growth in demand may lead to pressures for cost increases as colleges attempt to expand facilities and numbers of faculty in response. On the other hand, the intensity of competitive recruiting efforts at the highest price colleges will be likely to abate, and this may reduce cost pressures at these highly visible institutions. Our best judgment is that the most likely future trend would have college costs grow ahead of inflation, but probably less rapidly than their unusual behavior of the 1980's. Thus, the most likely picture would probably lie somewhere between the baseline and the "Low Cost, High Institutional Aid" scenario, C3.

Policy Implications

Our projections lead us to focus on three principal concerns about future affordability. First, if the economy is persistently weak over the foreseeable future, families' burden of paying for college is likely to increase at all types of institutions. Depending on decisions about state and Federal policy, the result could be serious threats to access for some populations. Second, under most of the alternative assumptions we consider, the relative affordability of private four year colleges, compared to public four year and two year institutions, is expected to decline. This could well lead to a further shift of students from private to public higher education. This may in itself be considered a threat to the value of "choice" in higher education; at the same time, since students at public institutions receive larger government subsidies (principally through state government support of these institutions), such an enrollment shift would have significant budgetary implications for the nation. Third, cost patterns in American higher education reflect basic choices about how the burden of paying for college should be shared among families, state governments, the Federal government, and private charities. A number of Federal policies could be employed to reallocate that burden.

Urgent Problems if the Economy Stays Weak

A persistently weak economy is very likely to lead to tuition increases outpacing increases in family incomes; at the same time, a weak economy will imply that resources to subsidize such rising tuitions will be very scarce at both the state and Federal levels. The most important implication of these facts is that such a development will compel governments to make hard choices about which categories of students and institutions they wish to support.

For example, our "weak economy" projection (B2) has the financing burden at public two year colleges rising by two percentage points, relative to the baseline, over the next twenty years. At public four year institutions and at private institutions, the difference in the burden

under the two scenarios is four percentage points. How much difference can Federal aid support make in influencing these trends? Comparing scenarios A2 (rapid growth in Federal support) and A3 (real decline in Federal support) suggests that a strong versus a weak Federal effort can influence the burden modestly for the average student, with a strong effort reducing the burden by about two percentage points at public and private four year institutions, and by about one percentage point at public two year institutions. This would be the result if the incremental Federal resources were spread equally over all students. Obviously, under existing policies, these resources would be focused to some degree on needier students. The more sharply these resources are focused on the neediest students, the more these limited Federal resources can do to reduce the burden facing that group. This is particularly important given the evidence that enrollment decisions of needier students are much more affected by changes in net price than are those of their more affluent counterparts (McPherson and Schapiro, forthcoming).

Governments may also face tough choices about which sectors of higher education to support. A heavy emphasis on access at the Federal level might argue for concentrating resources on community colleges and low cost public four year institutions, while a concern with choice might argue for devoting more Federal resources to private institutions. States face similar dilemmas in allocating their higher education funds among sectors. Of course, these dilemmas always exist, but a persistently weak economy will make the decisions more difficult and more contentious.

Declining Relative Affordability of Private Institutions

Our baseline projection indicates that the ratio of prices at private vs. public four year institutions will rise from 2.37 currently to 2.63. A number of the other scenarios would result in similar increases in the ratio of private to public institution costs of attendance and net prices.[18]

Such a development might well lead to a further decline in the share of private enrollment in total enrollment--a share which declined substantially from 1960 to the early 1970's but has been rather stable since then. Such a trend would be almost sure to increase the already substantial difference in median income levels in the two sectors (as detailed in the initial conditions of our projections). It further seems likely that such a shift of enrollment between sectors would be concentrated on "middle class" students. This would tend to make private colleges and universities into places attended by very needy and very affluent students. The "missing middle" is considered by many observers a serious threat to the viability and educational effectiveness of private higher education.

These considerations highlight the importance of policies that might help keep the costs of private higher education within reach of the middle class. Strong economic growth, and policies to encourage it, would obviously be highly desirable in this respect, but this is plainly beyond the range of policy options the higher education community or the parts of government directly responsible for higher education can control.

One set of possibilities involves direct Federal intervention to influence trends in educational costs, especially at private colleges and universities. These policy options are discussed in detail in our paper on "Quality", and will be only briefly reviewed here. One policy option would be to impose price ceilings on colleges and universities, or, less stringently, to

[18]The "weak economy" scenario (B2), however, has the ratio of private to public net price falling slightly, to 2.28 (because of the importance of non-tuition educational revenue at public institutions).

legislate maximum rates of increase in prices. These policies raise considerable difficulties, regarding possible threats to academic freedom, bureaucratic problems, and incentives for schools to set up accounting systems that evade the intent of the controls. Perhaps most importantly, such regulations would in effect confer on the Federal government the power to determine the directions of change in program and mission for all the colleges and universities in the nation. A second option would be to tie Federal student aid to institutions' cost control performance. However, as our projections illustrate, Federal student aid is not a very important revenue source for private colleges--especially the more expensive private colleges, and it is therefore not clear that this sort of policy would have much leverage.

There are also some more indirect approaches the Federal government could use to influence cost trends. An important possibility here is that of encouraging a better flow of information about the quality and educational effectiveness of college to potential students. The resulting improvement in the working of the market should help to ensure that high priced institutions in fact deliver a product that justifies the cost, and will tend to discourage schools from kinds of spending that may serve simply to "signal" quality in the absence of more objective and reliable measures. The idea would be to use Federal resources to encourage the provision of publications analogous to "Consumers' Reports" for colleges. A second, somewhat counterintuitive possibility, is that cost performance might be improved by reducing the dependence of private colleges on tuition revenues for their financing. Although the need to attract enough "paying customers" obviously can work as a force keeping costs under control, in the higher education marketplace there is some reason to worry that tuition dependency may have the opposite effect, at least for some categories of institutions. The need to attract students through expensive marketing campaigns and the provision of amenities that students value other than for their educational consequences may have the effect of pushing up costs without adding

commensurately to educational effectiveness. The provision of Federal support which is not tied directly to the market for students would tend to ease this pressure. It is worth noting that our projections suggest that in our baseline projection, as well as under circumstances either of a weak economy or of more rapidly rising educational costs, the already considerable tuition dependency in private higher education may be expected to rise further in the years ahead.

A related and perhaps more realistic set of policy options concerns the degree to which the Federal government encourages or discourages cooperation among institutions in setting prices, aid policies, and spending policies. There is reason to suspect that, particularly at more prestigious colleges and universities, competition for students focuses more on "quality" than price. Schools may compete, for example, in offering more attractive dormitories or athletic facilities, or in "bidding" for outstanding students through merit scholarships. These competitive practices may be a significant factor in making costs rise. Federal policies which attempt to discourage institutional cooperation in the name of preserving competition may then have the perverse effect of heightening the tendency for schools to engage in these practices. On the other hand, efforts to encourage schools to cooperate, in such matters as sharing facilities, limiting investments in "competition-driven amenities", regulating the award of student aid, and even setting prices, may result in some restraint on cost increases.

Sharing the Cost of Higher Education[19]

Future patterns of affordability will be influenced by the shares of costs borne by different groups, including state governments, private philanthropy, institution's own resources, and parents, as well as the Federal government. From the standpoint of Federal policy, it is

[19] See the valuable book of this title by Bruce Johnstone for a comparison of U. S. to European patterns of "burden sharing".

important to consider ways in which the Federal government can influence the behavior of these actors.

The bulk of the state contribution is in the form of a general subsidy to all students attending state institutions - a sticker price that is a relatively small percentage of educational cost. This arrangement has two effects: a substantial gap in prices at public relative to private institutions, and little money left over in most states to distribute to particularly needy students. How can the Federal government affect state actions? One possibility would be to tie Federal support at state institutions directly to their tuition levels (Fischer, 1989). Under this proposal, schools would either be rewarded by the Federal government for raising tuition (reducing the general student subsidy) or penalized for keeping tuition low (maintaining a high general subsidy).

Charitable support for higher education could be affected by Federal tax policy. Some observers have argued that the tax reform act of 1986 substantially reduced incentives for charitable giving. While the magnitude of these effects is debatable, there is little doubt that deliberate Federal policies can substantially influence both the amount and the destination of charitable giving.

Institution-specific financial aid is currently influenced by Federal "over-award" regulations in the Title IV student aid programs. These regulations encourage institutions to limit awards to individual students to the extent of their need. The Federal government could go further in the direction of influencing institutions' aid policies by tying funding directly to institutions' aid allocations or to the composition of their student bodies.

Recently, there has been considerable discussion of policies that might encourage parents to provide more resources for their children's educations. Proposals have focused on programs that subsidize parental saving for college through tax benefits or that encourage such saving by

insuring parents against unanticipated increases in college costs (tuition prepayment programs). Unfortunately, programs that provide significant incentives tend to be quite costly, and to provide substantial subsidies for saving that would have been done even in the absence of the programs.

Conclusions

Affordability of higher education is a major national concern, influencing prospects both for economic growth and economic justice. In this paper we have examined long run trends in affordability briefly and looked in detail at more recent trends.

By examining a variety of alternative scenarios regarding factors affecting future trends in affordability, we have produced a reasonable sketch of likely future developments concerning college costs and family ability to pay, as well as an analysis of the principal factors that will influence these future trends. Finally, we have used this analysis to identify some major concerns about future affordability, and reviewed Federal policy options for coping with these potential problems. Our analysis by no means supports the view that we are facing an immediate "crisis" in college affordability. Nonetheless, we have identified some worrisome trends which argue for close attention to this issue and a serious examination of alternative policies.

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APPENDIX A

Table 1. Net cost by income and year (1978 $)

White men at four year private institutions

	$0-10K	$10-20K	$20-30K	$30-50K	>$50K
1974	3741	4219	4750	4949	5231
1975	3344	3825	4324	4852	5121
1976	3268	3743	4268	4816	5096
1977	3052	3569	4081	4664	5023
1978	2669	3293	3877	4516	4928
1979	2674	3171	3678	4228	4635
1980	2524	3028	3646	4323	4906
1981	3074	3520	4160	4922	5440
1982	3490	4006	4821	5728	6270
1983	3400	4142	4975	5905	6498
1984	3757	4370	5203	6119	6762

Table 2. Net cost by income and year (1978 $)

White women at four year private institutions

	$0-10K	$10-20K	$20-30K	$30-50K	>$50K
1974	3695	4281	4810	4997	5233
1975	3312	3861	4376	4851	5131
1976	3192	3784	4317	4847	5106
1977	3198	3689	4195	4749	5053
1978	2872	3441	3940	4564	4951
1979	2764	3258	3754	4305	4679
1980	2535	3099	3745	4422	4972
1981	3065	3556	4143	4901	5493
1982	3366	3928	4736	5688	6320
1983	3357	4067	4899	5877	6523
1984	3726	4307	5114	6091	6689

Table 3. Net cost by income and year (1978 $)

Black men at four year private institutions

	$0-10K	$10-20K	$20-30K	$30-50K	>$50K
1974	3429	3788	4479	4473	4964
1975	3128	3511	3881	4505	4696
1976	3037	3536	3975	4438	5072
1977	2959	3389	3694	4404	4892
1978	2636	3068	3578	4164	4775
1979	2708	2882	3358	4018	4358
1980	2339	2723	3410	3889	4428
1981	2694	3034	3598	4221	4686
1982	3171	3596	4129	4557	4925
1983	3044	3626	4251	4513	4928
1984	3456	4026	4682	5219	5461

Table 4. Net cost by income and year (1978 $)

Black women at four year private institutions

	$0-10K	$10-20K	$20-30K	$30-50K	>$50K
1974	3385	3930	4468	4636	5087
1975	2974	3411	4015	4514	4858
1976	2951	3371	3998	4444	4914
1977	2953	3373	3820	4400	4823
1978	2616	3140	3493	4067	4727
1979	2637	2933	3394	3870	4479
1980	2299	2864	3421	3911	4637
1981	2743	3237	3684	4307	4694
1982	3068	3582	4219	4703	5062
1983	3086	3653	4393	5045	5413
1984	3436	4056	4682	5404	5993

Table 5. Net cost by income and year (1978 $)

White men at four year public institutions

	$0-10K	$10-20K	$20-30K	$30-50K	>$50K
1974	2182	2722	2949	3001	3079
1975	1957	2506	2770	2937	2992
1976	1928	2521	2848	3032	3106
1977	1980	2526	2792	2930	3002
1978	1826	2360	2650	2803	2913
1979	1755	2180	2444	2612	2718
1980	1782	2180	2463	2662	2759
1981	1985	2316	2499	2645	2717
1982	2099	2460	2758	2911	2963
1983	2073	2505	2852	3045	3152
1984	2144	2604	2938	3115	3172

Table 6. Net cost by income and year (1978 $)

White women at four year public institutions

	$0-10K	$10-20K	$20-30K	$30-50K	>$50K
1974	2254	2737	2985	3039	3107
1975	1955	2515	2802	2967	3039
1976	1977	2569	2894	3066	3135
1977	2075	2554	2830	2967	3044
1978	1888	2415	2695	2859	2952
1979	1813	2191	2452	2631	2735
1980	1817	2204	2556	2763	2892
1981	2025	2294	2491	2627	2737
1982	2085	2446	2710	2878	2949
1983	2072	2515	2840	3050	3148
1984	2163	2563	2913	3127	3198

Table 7. Net cost by income and year (1978 $)

Black men at four year public institutions

	$0-10K	$10-20K	$20-30K	$30-50K	>$50K
1974	1963	2340	2709	2734	2719
1975	1680	2096	2510	2655	2857
1976	1820	2164	2531	2857	3090
1977	1664	2000	2387	2727	2414
1978	1346	1816	2267	2438	2801
1979	1422	1746	2157	2354	2375
1980	1255	1547	1943	2091	2279
1981	1670	1859	2207	2369	2467
1982	1634	2052	2388	2416	2724
1983	1484	2052	2435	2604	2780
1984	1799	2152	2370	2601	2610

Table 8. Net cost by income and year (1978 $)

Black women at four year public institutions

	$0-10K	$10-20K	$20-30K	$30-50K	>$50K
1974	2032	2401	2852	2978	2971
1975	1672	2073	2528	2681	2826
1976	1771	2149	2596	2858	2952
1977	1659	2157	2630	2802	2980
1978	1531	2021	2421	2424	2686
1979	1503	1757	2181	2266	2562
1980	1369	1674	1991	2389	2599
1981	1575	1937	2299	2540	2530
1982	1701	2042	2470	2804	2748
1983	1687	2156	2585	2768	2505
1984	1995	2093	2487	2808	2883

Table 9. Net cost by income and year (1978 $)

White men at two year public institutions

	$0-10K	$10-20K	$20-30K	$30-50K	>$50K
1974	1759	2214	2385	2503	2706
1975	1703	2032	2334	2441	2574
1976	1658	2207	2452	2552	2601
1977	1733	2161	2335	2513	2594
1978	1544	1942	2247	2379	2452
1979	1485	1794	2025	2167	2281
1980	1864	2158	2319	2493	2541
1981	1959	2168	2355	2496	2489
1982	1818	2231	2541	2729	2732
1983	2195	2559	2966	3138	3205
1984	2314	2695	3011	3276	3291

Table 10. Net cost by income and year (1978 $)

White women at two year public institutions

	$0-10K	$10-20K	$20-30K	$30-50K	>$50K
1974	2021	2230	2463	2498	2714
1975	1493	2117	2375	2528	2614
1976	1571	2168	2400	2620	2737
1977	1659	2199	2367	2567	2661
1978	1457	1987	2211	2409	2536
1979	1421	1804	1983	2276	2413
1980	1878	2118	2275	2530	2536
1981	1980	2228	2410	2502	2639
1982	1930	2241	2591	2743	2877
1983	2250	2559	2918	3170	3274
1984	2296	2677	3108	3369	3406

Table 11. Net cost by income and year (1978 $)

Black men at two year public institutions

	$0-10K	$10-20K	$20-30K	$30-50K	>$50K
1974	2206	1986	3106	3274	
1975	2741	2700	2154	2652	
1976	1336	1679	1446	1945	2812
1977	1566	1486	1822	2760	
1978	1840	2187	1955	2666	918
1979	1571	1426	2155	2524	2561
1980	1310	1451	2043		
1981	1327	1638	1953	2638	2664
1982	1544	1887	2428	3094	2930
1983	1858	1832	2658	2788	2688
1984	1874	2322	2505	2735	2785

Table 12. Net cost by income and year (1978 $)

Black women at two year public institutions

	$0-10K	$10-20K	$20-30K	$30-50K	>$50K
1974	2927	2206	2691	2683	
1975	2918	2313	3536	3074	2723
1976	1421	2032	1342		
1977	2077	2238	2984		
1978	934	1859	2178	1791	2666
1979	1421	976	1439		
1980	1412	1804	2212	2088	
1981	1319	1774	2009	1621	2237
1982	1580	2196	2691	2816	2494
1983	1807	2730	2065	1891	2698
1984	2367	2588	3044	3158	3146

APPENDIX B

Appendix B: Table 1 - Projection A1: No growth in federal support, p. 1

Growth rates

	pub. 2	pub. 4	private
educational costs(1)	1.018	1.020	1.032
non tuition ed. revenues (2)	1.015	1.015	1.031
Pell	1.000	1.000	1.000
Other grants	1.017	1.016	1.054
Loans	1.000	1.000	1.000
family income	1.000	1.000	1.000

Initial conditions

educational costs(1)	4200	8500	14600
living costs(3)	2300	3500	3800
non tuition ed. revenues(2)	3400	6800	5800
costs of attendance(4)	3100	5200	12600
Pell	150	290	320
Other grants	80	320	1580
family income	36600	45400	56100
Loans (5)	140	640	1160

(1) educational costs -- educational and general costs per student, based on HEGIS data. Auxiliary enterprises are excluded, on the assumption that costs and revenues of auxiliary operations are equal.
(2) non-tuition educational revenues -- per student revenues from sources other than (gross) tuition. For public institutions, the main such revenue source is state subsidies; for private institutions it is gifts and endowment earnings. Notice that student aid revenues are not included here; they are treated as revenues from students and accounted for separately below. We adjusted figures for educational costs and non-tuition educational revenues to make them reconcile with (a) 1989-90 costs of attendance and (b) 1985-86 ratios of non-tuition educational revenues to educational costs. These numbers yield relationships that are reasonably consistent with relative costs at these categories of institutions in 1985-86.
(3) living costs -- for public two year institutions, we assume commuter status. Living costs include board and transportation costs (from College Cost Book). For public and private four year institutions, we assume resident status. Costs include room and board and transportation from College Cost Book. We assume living costs grow at the general rate of inflation.
(4) costs of attendance -- this is the sum of educational costs and living costs, less non-tuition educational revenues. This figure is checked for consistency with the figures in the College Cost Book.
(5) loan values from College Board Annual Survey of Colleges. In computing net price, loans are valued at a subsidy rate of 50%.

Public four year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	5200	5268	5338	5410	5483	5559	5637	5717	5799	5883	5970	6438	6972
Pell	290	290	290	290	290	290	290	290	290	290	290	290	290
Other grants	320	325	330	336	341	346	352	358	363	369	375	406	440
Loans	640	640	640	640	640	640	640	640	640	640	640	640	640
Income	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400
price net of grants	4590	4653	4718	4784	4852	4923	4995	5069	5146	5224	5305	5742	6242
net price	4270	4333	4398	4464	4533	4603	4675	4749	4826	4904	4985	5422	5922
nominal income	45400	47670	50054	52556	55184	57943	60840	63882	67076	70430	73952	94383	120460
nominal net price	4270	4550	4848	5168	5509	5874	6265	6683	7130	7608	8120	11273	15714
net price/income	9	10	10	10	10	10	10	10	11	11	11	12	13
tuition dependence	20	20	21	21	22	22	22	23	23	23	24	26	27

Private projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	12600	12887	13184	13491	13807	14134	14471	14820	15180	15551	15935	18049	20532
Pell	320	320	320	320	320	320	320	320	320	320	320	320	320
Other grants	1580	1665	1755	1850	1950	2055	2166	2283	2406	2536	2673	3477	4523
Loans	1160	1160	1160	1160	1160	1160	1160	1160	1160	1160	1160	1160	1160
Income	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100
price net of grants	10700	10902	11109	11321	11537	11759	11985	12217	12453	12695	12941	14252	15688
net price	10120	10322	10529	10741	10957	11179	11405	11637	11873	12115	12361	13672	15108
nominal income	56100	58905	61850	64943	68190	71599	75179	78938	82885	87030	91381	116628	148850
nominal net price	10120	10838	11608	12434	13318	14267	15284	16374	17542	18794	20135	28423	40087
net price/income	18	18	19	19	20	20	20	21	21	22	22	24	27
tuition dependence	60	60	60	60	60	60	61	61	61	61	61	61	61

Public two year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	3100	3125	3150	3176	3202	3229	3257	3285	3314	3344	3374	3538	3721
Pell	150	150	150	150	150	150	150	150	150	150	150	150	150
Other grants	80	81	83	84	86	87	89	90	92	93	95	103	112
Loans	140	140	140	140	140	140	140	140	140	140	140	140	140
Income	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600
price net of grants	2870	2893	2917	2941	2966	2992	3018	3045	3073	3101	3130	3285	3459
net price	2800	2823	2847	2871	2896	2922	2948	2975	3003	3031	3060	3215	3389
nominal income	36600	38430	40352	42369	44488	46712	49048	51500	54075	56779	59618	76089	97111
nominal net price	2800	2964	3139	3324	3521	3729	3951	4186	4436	4702	4984	6683	8993
net price/income	8	8	8	8	8	8	8	8	8	8	8	9	9
tuition dependence	19	19	20	20	20	20	20	21	21	21	21	23	24

Average over sectors	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Cost of attendance	4733	4819	4908	5000	5095	5192	5293	5397	5504	5615	5729	6356	7087
Net price	3947	4011	4076	4142	4210	4280	4351	4424	4498	4574	4652	5066	5521
Nominal net price	3947	4211	4493	4795	5118	5462	5831	6225	6646	7096	7578	10531	14649

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Appendix B: Table 2 - Projection A2: Rapid growth in federal support, p. 1

Growth rates	pub. 2	pub. 4	private
educational costs(1)	1.018	1.020	1.032
non tuition ed. revenues (2)	1.015	1.015	1.031
Pell	1.040	1.040	1.040
Other grants	1.017	1.016	1.054
Loans	1.040	1.040	1.040
family income	1.000	1.000	1.000
Initial conditions			
educational costs(1)	4200	8500	14600
living costs(3)	2300	3500	3800
non tuition ed. revenues(2)	3400	6800	5800
costs of attendance(4)	3100	5200	12600
Pell	150	290	320
Other grants	80	320	1580
family income	36600	45400	56100
Loans (5)	140	640	1160

Appendix B: Table 2, p. 2

Public four year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	5200	5268	5338	5410	5483	5559	5637	5717	5799	5883	5970	6438	6972
Pell	290	302	314	326	339	353	367	382	397	413	429	522	635
Other grants	320	325	330	336	341	346	352	358	363	369	375	406	440
Loans	640	665	692	720	749	778	810	842	876	911	947	1152	1402
Income	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400
price net of grants	4590	4641	4694	4748	4803	4860	4918	4978	5039	5101	5165	5510	5897
net price	4270	4309	4348	4388	4429	4471	4513	4557	4601	4646	4692	4934	5196
nominal income	45400	47670	50054	52556	55184	57943	60840	63882	67076	70430	73952	94383	120460
nominal net price	4270	4524	4794	5080	5383	5706	6048	6412	6798	7207	7643	10257	13786
net price/income	9	9	10	10	10	10	10	10	10	10	10	11	11
tuition dependence	20	20	21	21	22	22	22	23	23	23	24	26	27

Private projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	12600	12887	13184	13491	13807	14134	14471	14820	15180	15551	15935	18049	20532
Pell	320	333	346	360	374	389	405	421	438	455	474	576	701
Other grants	1580	1665	1755	1850	1950	2055	2166	2283	2406	2536	2673	3477	4523
Loans	1160	1206	1255	1305	1357	1411	1468	1526	1588	1651	1717	2089	2542
Income	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100
price net of grants	10700	10889	11083	11281	11483	11689	11900	12115	12335	12559	12788	13995	15307
net price	10120	10286	10455	10628	10804	10984	11166	11352	11541	11734	11929	12951	14036
nominal income	56100	58905	61850	64943	68190	71599	75179	78938	82885	87030	91381	116628	148850
nominal net price	10120	10800	11527	12304	13133	14018	14964	15974	17052	18203	19431	26924	37242
net price/income	18	18	19	19	19	20	20	20	21	21	21	23	25
tuition dependence	60	60	60	60	60	60	61	61	61	61	61	61	61

Public two year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	3100	3125	3150	3176	3202	3229	3257	3285	3314	3344	3374	3536	3721
Pell	150	156	162	169	175	182	190	197	205	213	222	270	329
Other grants	80	81	83	84	86	87	89	90	92	93	95	103	112
Loans	140	146	151	157	164	170	177	184	192	199	207	252	307
Income	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600
price net of grants	2870	2887	2905	2923	2941	2960	2978	2998	3017	3037	3058	3165	3281
net price	2800	2814	2829	2844	2859	2874	2890	2906	2922	2938	2954	3039	3127
nominal income	36600	38430	40352	42369	44488	46712	49048	51500	54075	56779	59618	76089	97111
nominal net price	2800	2955	3119	3292	3475	3669	3873	4089	4317	4557	4812	6317	8298
net price/income	8	8	8	8	8	8	8	8	8	8	8	8	9
tuition dependence	19	19	20	20	20	20	20	21	21	21	21	23	24

Average over sectors	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Cost of attendance	4733	4819	4908	5000	5095	5192	5293	5397	5504	5615	5729	6356	7087
Net price	3947	3997	4048	4100	4153	4207	4262	4317	4374	4432	4490	4795	5119
Nominal net price	3947	4197	4463	4746	5048	5369	5711	6075	6462	6875	7314	9969	13583

Appendix B: Table 3 - Projection A3: Real decline in federal support, p. 1

Growth rates

	pub. 2	pub. 4	private
educational costs(1)	1.018	1.020	1.032
non tuition ed. revenues (2)	1.015	1.015	1.031
Pell	0.980	0.980	0.980
Other grants	1.017	1.016	1.054
Loans	0.980	0.980	0.980
family income	1.000	1.000	1.000

Initial conditions

educational costs(1)	4200	8500	14600
living costs(3)	2300	3500	3800
non tuition ed. revenues(2)	3400	6800	5800
costs of attendance(4)	3100	5200	12600
Pell	150	290	320
Other grants	80	320	1580
family income	36600	45400	56100
Loans (5)	140	640	1160

Appendix B: Table 3, p. 2

ublic four year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
sts of attendance	5200	5268	5338	5410	5483	5559	5637	5717	5799	5883	5970	6438	6972
ll	290	284	279	273	267	262	257	252	247	242	237	214	194
ther grants	320	325	330	336	341	346	352	358	363	369	375	406	440
ans	640	627	614	602	590	578	567	555	544	533	523	473	427
come	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400
ice net of grants	4590	4659	4729	4801	4875	4951	5028	5108	5189	5272	5358	5818	6339
t price	4270	4345	4422	4500	4580	4661	4745	4830	4917	5006	5096	5582	6125
minal income	45400	47670	50054	52556	55184	57943	60840	63882	67076	70430	73952	94383	120460
minal net price	4270	4562	4875	5209	5567	5949	6358	6796	7264	7765	8301	11604	16252
t price/income	9	10	10	10	10	10	10	11	11	11	11	12	13
ition dependence	20	20	21	21	22	22	22	23	23	23	24	26	27

ivate projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
sts of attendance	12600	12887	13184	13491	13807	14134	14471	14820	15180	15551	15935	18049	20532
ll	320	314	307	301	295	289	283	278	272	267	261	236	214
ther grants	1580	1665	1755	1850	1950	2055	2166	2283	2406	2536	2673	3477	4523
ans	1160	1137	1114	1092	1070	1049	1028	1007	987	967	948	857	774
come	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100
ice net of grants	10700	10908	11122	11339	11562	11789	12022	12259	12501	12748	13000	14335	15795
t price	10120	10340	10565	10794	11027	11265	11508	11755	12007	12264	12526	13907	15407
minal income	56100	58905	61850	64943	68190	71599	75179	78938	82885	87030	91381	116628	148850
minal net price	10120	10857	11647	12495	13403	14377	15422	16541	17740	19026	20404	28912	40880
t price/income	18	18	19	19	20	20	21	21	21	22	22	25	27
ition dependence	60	60	60	60	60	60	61	61	61	61	61	61	61

ublic two year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
sts of attendance	3100	3125	3150	3176	3202	3229	3257	3285	3314	3344	3374	3538	3721
ll	150	147	144	141	138	136	133	130	128	125	123	111	100
ther grants	80	81	83	84	86	87	89	90	92	93	95	103	112
ans	140	137	134	132	129	127	124	122	119	117	114	103	93
come	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600
ice net of grants	2870	2896	2923	2950	2978	3006	3035	3065	3095	3126	3157	3324	3509
t price	2800	2828	2856	2884	2914	2943	2973	3004	3036	3067	3100	3272	3462
minal income	36600	38430	40352	42369	44488	46712	49048	51500	54075	56779	59618	76089	97111
minal net price	2800	2969	3148	3339	3541	3756	3985	4227	4485	4759	5050	6803	9187
t price/income	8	8	8	8	8	8	8	8	8	8	8	9	9
ition dependence	19	19	20	20	20	20	20	21	21	21	21	23	24

erage over sectors	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
st of attendance	4733	4819	4908	5000	5095	5192	5293	5397	5504	5615	5729	6356	7087
t price	3947	4017	4089	4162	4236	4312	4390	4468	4549	4630	4714	5154	5633
minal net price	3947	4218	4508	4818	5149	5504	5882	6287	6720	7183	7678	10714	14947

Appendix B: Table 4 - Projection B1: Strong economy, p. 1

Growth rates

	pub. 2	pub. 4	private
educational costs(1)	1.018	1.020	1.032
non tuition ed. revenues (2)	1.025	1.025	1.041
Pell	1.035	1.035	1.000
Other grants	1.017	1.016	1.054
Loans	1.030	1.030	1.050
family income	1.025	1.025	1.025

Initial conditions

educational costs(1)	4200	8500	14600
living costs(3)	2300	3500	3800
non tuition ed. revenues(2)	3400	6800	5800
costs of attendance(4)	3100	5200	12600
Pell	150	290	320
Other grants	80	320	1580
family income	36600	45400	56100
Loans (5)	140	640	1160

Appendix B: Table 4, p. 2

Public four year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	5200	5200	5199	5197	5195	5191	5186	5181	5174	5166	5157	5091	4988
Pell	290	300	311	322	333	344	356	369	382	395	409	486	577
Other grants	320	325	330	336	341	346	352	358	363	369	375	406	440
Loans	640	659	679	699	720	742	764	787	811	835	860	997	1156
Income	45400	46535	47698	48891	50113	51366	52650	53966	55315	56698	58116	65753	74393
price net of grants	4590	4575	4558	4540	4521	4500	4478	4454	4429	4402	4373	4200	3971
net price	4270	4245	4219	4191	4161	4129	4096	4061	4024	3984	3943	3701	3394
nominal income	45400	48862	52587	56597	60913	65557	70556	75936	81726	87958	94665	136695	197387
nominal net price	4270	4457	4651	4851	5058	5270	5489	5714	5945	6181	6422	7694	9004
net price/income	9	9	9	9	8	8	8	8	7	7	7	6	5
tuition dependence	20	20	19	19	18	18	18	17	17	16	16	14	12

Private projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	12600	12829	13064	13304	13549	13800	14056	14318	14585	14858	15137	16621	18257
Pell	320	320	320	320	320	320	320	320	320	320	320	320	320
Other grants	1580	1665	1755	1850	1950	2055	2166	2283	2406	2536	2673	3477	4523
Loans	1160	1218	1279	1343	1410	1480	1555	1632	1714	1800	1890	2412	3078
Income	56100	57502	58940	60414	61924	63472	65059	66685	68352	70061	71813	81250	91926
price net of grants	10700	10844	10989	11134	11279	11425	11570	11715	11859	12002	12144	12823	13414
net price	10120	10235	10349	10462	10574	10684	10792	10898	11002	11102	11199	11618	11875
nominal income	56100	60378	64981	69936	75269	81008	87185	93833	100988	108688	116975	168912	243908
nominal net price	10120	10747	11410	12112	12853	13636	14463	15335	16255	17223	18242	24152	31508
net price/income	18	18	18	17	17	17	17	16	16	16	16	14	13
tuition dependence	60	60	60	59	59	59	58	58	57	57	57	55	53

Public two year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	3100	3091	3080	3069	3058	3045	3032	3017	3002	2985	2968	2864	2729
Pell	150	155	161	166	172	178	184	191	198	204	212	251	298
Other grants	80	81	83	84	86	87	89	90	92	93	95	103	112
Loans	140	144	149	153	158	162	167	172	177	183	188	218	253
Income	36600	37515	38453	39414	40400	41410	42445	43506	44594	45708	46851	53008	59973
price net of grants	2870	2854	2837	2819	2800	2780	2759	2736	2713	2688	2662	2510	2319
net price	2800	2782	2763	2743	2721	2699	2675	2650	2624	2596	2568	2401	2192
nominal income	36600	39391	42394	45627	49106	52850	56880	61217	65885	70909	76315	110199	159127
nominal net price	2800	2921	3046	3175	3308	3444	3585	3729	3877	4028	4182	4992	5817
net price/income	8	7	7	7	7	7	6	6	6	6	5	5	4
tuition dependence	19	18	18	17	17	16	16	15	14	14	13	10	7

Average over sectors	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Cost of attendance	4733	4788	4844	4902	4960	5019	5079	5141	5203	5266	5331	5668	6030
Net price	3947	3969	3989	4009	4028	4046	4063	4079	4094	4107	4119	4149	4118
Nominal net price	3947	4167	4398	4641	4896	5164	5445	5740	6048	6371	6709	8626	10926

Appendix B: Table 5 - Projection B2: Weak economy, p. 1

Growth rates

	pub. 2	pub. 4	private
educational costs(1)	1.018	1.020	1.032
non tuition ed. revenues (2)	1.005	1.005	1.021
Pell	1.035	1.035	1.000
Other grants	1.017	1.016	1.054
Loans	1.030	1.030	1.050
family income	1.000	1.000	1.000

Initial conditions

educational costs(1)	4200	8500	14600
living costs(3)	2300	3500	3800
non-tuition ed. revenues(2)	3400	6800	5800
costs of attendance(4)	3100	5200	12600
Pell	150	290	320
Other grants	80	320	1580
family income	36600	45400	56100
Loans (5)	140	640	1160

Public four year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	5200	5336	5475	5618	5764	5913	6066	6222	6382	6546	6714	7612	8617
Pell	290	300	311	322	333	344	356	369	382	395	409	486	577
Other grants	320	325	330	336	341	346	352	358	363	369	375	406	440
Loans	640	659	679	699	720	742	764	787	811	835	860	997	1156
Income	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400
price net of grants	4590	4711	4834	4961	5090	5222	5357	5496	5637	5782	5930	6720	7601
net price	4270	4381	4495	4611	4730	4851	4975	5102	5232	5364	5500	6221	7023
nominal income	45400	47670	50054	52556	55184	57943	60840	63882	67076	70430	73952	94383	120460
nominal net price	4270	4600	4956	5338	5749	6192	6667	7179	7730	8322	8958	12934	18634
net price/income	9	10	10	10	10	11	11	11	12	12	12	14	15
tuition dependence	20	21	22	23	25	26	27	28	29	30	31	36	41

Private projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	12600	12945	13303	13674	14058	14455	14867	15293	15735	16192	16666	19298	22423
Pell	320	320	320	320	320	320	320	320	320	320	320	320	320
Other grants	1580	1665	1755	1850	1950	2055	2166	2283	2406	2536	2673	3477	4523
Loans	1160	1218	1279	1343	1410	1480	1555	1632	1714	1800	1890	2412	3078
Income	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100
price net of grants	10700	10960	11228	11504	11788	12080	12381	12690	13009	13336	13672	15499	17580
net price	10120	10351	10588	10832	11083	11340	11604	11874	12152	12436	12728	14293	16041
nominal income	56100	58905	61850	64943	68190	71599	75179	78938	82885	87030	91381	116628	148850
nominal net price	10120	10869	11674	12540	13471	14473	15550	16708	17953	19292	20732	29714	42561
net price/income	18	18	19	19	20	20	21	21	22	22	23	25	29
tuition dependence	60	61	61	62	62	62	63	63	64	64	64	66	68

Public two year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	3100	3159	3218	3280	3342	3406	3471	3538	3606	3675	3746	4125	4544
Pell	150	155	161	166	172	178	184	191	198	204	212	251	298
Other grants	80	81	83	84	86	87	89	90	92	93	95	103	112
Loans	140	144	149	153	158	162	167	172	177	183	188	218	253
Income	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600
price net of grants	2870	2922	2975	3029	3084	3141	3198	3257	3317	3378	3440	3770	4134
net price	2800	2850	2901	2953	3006	3060	3115	3171	3228	3287	3346	3661	4007
nominal income	36600	38430	40352	42369	44488	46712	49048	51500	54075	56779	59618	76089	97111
nominal net price	2800	2992	3198	3418	3653	3905	4174	4462	4769	5098	5450	7611	10632
net price/income	8	8	8	8	8	8	9	9	9	9	9	10	11
tuition dependence	19	20	21	22	23	24	25	26	27	28	29	33	37

Average over sectors	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Cost of attendance	4733	4850	4972	5097	5226	5359	5497	5639	5786	5937	6094	6956	7966
Net price	3947	4031	4116	4204	4294	4386	4481	4578	4677	4778	4882	5437	6054
Nominal net price	3947	4232	4538	4867	5220	5598	6005	6441	6910	7412	7952	11303	16063

Appendix B: Table 6 - Projection C1: High costs, high institutional aid, p. 1

Growth rates	pub. 2	pub. 4	private
educational costs(1)	1.028	1.030	1.042
non tuition ed. revenues (2)	1.015	1.015	1.031
Pell	1.035	1.035	1.000
Other grants	1.017	1.016	1.054
Loans	1.030	1.030	1.050
family income	1.000	1.000	1.000
Initial conditions			
educational costs(1)	4200	8500	14600
living costs(3)	2300	3500	3800
non tuition ed. revenues(2)	3400	6800	5800
costs of attendance(4)	3100	5200	12600
Pell	150	290	320
Other grants	80	320	1580
family income	36600	45400	56100
Loans (5)	140	640	1160

Appendix B: Table 6, p. 2

Public four year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	5200	5353	5512	5678	5850	6028	6214	6407	6607	6816	7032	8241	9693
Pell	290	300	311	322	333	344	356	369	382	395	409	486	577
Other grants	320	325	330	336	341	346	352	358	363	369	375	406	440
Loans	640	659	679	699	720	742	764	787	811	835	860	997	1156
Income	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400
price net of grants	4590	4728	4871	5020	5176	5337	5506	5680	5862	6051	6247	7349	8677
net price	4270	4398	4532	4671	4816	4967	5124	5287	5457	5634	5818	6851	8099
nominal income	45400	47670	50054	52556	55184	57943	60840	63882	67076	70430	73952	94383	120460
nominal net price	4270	4618	4996	5407	5854	6339	6866	7439	8062	8740	9476	14242	21489
net price/income	9	10	10	10	11	11	11	12	12	12	13	15	18
tuition dependence	20	21	22	23	25	26	27	28	29	30	31	36	40

Private projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	12600	13033	13487	13962	14458	14978	15522	16091	16686	17309	17960	21694	26363
Pell	320	320	320	320	320	320	320	320	320	320	320	320	320
Other grants	1580	1665	1755	1850	1950	2055	2168	2283	2406	2536	2673	3477	4523
Loans	1160	1218	1279	1343	1410	1480	1555	1632	1714	1800	1890	2412	3078
Income	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100
price net of grants	10700	11048	11412	11792	12188	12603	13036	13488	13960	14452	14967	17896	21519
net price	10120	10439	10772	11120	11483	11863	12258	12672	13103	13553	14022	16691	19980
nominal income	56100	58905	61850	64943	68190	71599	75179	78938	82885	87030	91381	116628	148850
nominal net price	10120	10961	11876	12873	13958	15140	16427	17830	19359	21024	22840	34698	53014
net price/income	18	19	19	20	20	21	22	23	23	24	25	30	36
tuition dependence	60	61	61	62	62	62	63	63	64	64	64	66	68

Public two year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	3100	3167	3236	3307	3382	3459	3539	3622	3708	3797	3890	4405	5017
Pell	150	155	161	166	172	178	184	191	198	204	212	251	298
Other grants	80	81	83	84	86	87	89	90	92	93	95	103	112
Loans	140	144	149	153	158	162	167	172	177	183	188	218	253
Income	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600
price net of grants	2870	2930	2992	3057	3124	3194	3266	3341	3419	3500	3584	4050	4607
net price	2800	2858	2918	2981	3045	3113	3183	3255	3331	3409	3490	3941	4480
nominal income	36600	38430	40352	42369	44488	46712	49048	51500	54075	56779	59618	76089	97111
nominal net price	2800	3001	3217	3450	3702	3973	4265	4580	4921	5288	5684	8194	11887
net price/income	8	8	8	8	8	9	9	9	9	9	10	11	12
tuition dependence	19	20	21	22	23	24	25	26	27	28	29	33	37

Average over sectors	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Cost of attendance	4733	4877	5027	5185	5349	5520	5699	5886	6081	6285	6498	7711	9212
Net price	3947	4057	4172	4292	4417	4547	4683	4825	4972	5126	5286	6192	7301
Nominal net price	3947	4260	4600	4969	5369	5804	6276	6789	7346	7952	8610	12873	19371

Appendix B: Table 7 - Projection C2: High costs, low institutional aid, p. 1

Growth rates	pub. 2	pub. 4	private
educational costs(1)	1.028	1.030	1.042
non tuition ed. revenues (2)	1.015	1.015	1.031
Pell	1.035	1.035	1.000
Other grants	1.000	1.000	1.000
Loans	1.030	1.030	1.050
family income	1.000	1.000	1.000
Initial conditions			
educational costs(1)	4200	8500	14600
living costs(3)	2300	3500	3800
non tuition ed. revenues(2)	3400	6800	5800
costs of attendance(4)	3100	5200	12600
Pell	150	290	320
Other grants	80	320	1580
family income	36600	45400	56100
Loans (5)	140	640	1160

Public four year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	5200	5353	5512	5678	5850	6028	6214	6407	6607	6816	7032	8241	9693
Pell	290	300	311	322	333	344	356	369	382	395	409	486	577
Other grants	320	320	320	320	320	320	320	320	320	320	320	320	320
Loans	640	659	679	699	720	742	764	787	811	835	860	997	1156
Income	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400
price net of grants	4590	4733	4881	5036	5197	5364	5538	5718	5906	6100	6303	7435	8796
net price	4270	4403	4542	4686	4837	4993	5156	5325	5500	5683	5873	6937	8218
nominal income	45400	47670	50054	52556	55184	57943	60840	63882	67076	70430	73952	94383	120460
nominal net price	4270	4624	5008	5425	5879	6372	6909	7492	8126	8816	9566	14421	21806
net price/income	9	10	10	10	11	11	11	12	12	13	13	15	18
tuition dependence	20	21	22	23	25	26	27	28	29	30	31	36	40

Private projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	12600	13033	13487	13962	14458	14978	15522	16091	16686	17309	17960	21694	26363
Pell	320	320	320	320	320	320	320	320	320	320	320	320	320
Other grants	1580	1580	1580	1580	1580	1580	1580	1580	1580	1580	1580	1580	1580
Loans	1160	1218	1279	1343	1410	1480	1555	1632	1714	1800	1890	2412	3078
Income	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100
price net of grants	10700	11133	11587	12062	12558	13078	13622	14191	14786	15409	16060	19794	24463
net price	10120	10524	10948	11390	11853	12338	12845	13375	13929	14509	15115	18588	22924
nominal income	56100	58905	61850	64943	68190	71599	75179	78938	82885	87030	91381	116628	148850
nominal net price	10120	11051	12070	13186	14408	15747	17213	18820	20580	22508	24621	38643	60824
net price/income	18	19	20	20	21	22	23	24	25	26	27	33	41
tuition dependence	60	61	61	62	62	62	63	63	64	64	64	66	68

Public two year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	3100	3167	3236	3307	3382	3459	3539	3622	3708	3797	3890	4405	5017
Pell	150	155	161	166	172	178	184	191	198	204	212	251	298
Other grants	80	80	80	80	80	80	80	80	80	80	80	80	80
Loans	140	144	149	153	158	162	167	172	177	183	188	218	253
Income	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600
price net of grants	2870	2931	2995	3061	3130	3201	3275	3351	3431	3513	3598	4073	4639
net price	2800	2859	2921	2985	3051	3120	3191	3265	3342	3422	3504	3964	4512
nominal income	36600	38430	40352	42369	44488	46712	49048	51500	54075	56779	59618	76089	97111
nominal net price	2800	3002	3220	3455	3708	3982	4277	4595	4938	5308	5708	8241	11972
net price/income	8	8	8	8	8	9	9	9	9	9	10	11	12
tuition dependence	19	20	21	22	23	24	25	26	27	28	29	33	37

Average over sectors	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Cost of attendance	4733	4877	5027	5185	5349	5520	5699	5886	6081	6285	6498	7711	9212
Net price	3947	4080	4219	4364	4516	4674	4839	5012	5192	5381	5577	6696	8081
Nominal net price	3947	4284	4652	5052	5489	5966	6485	7053	7671	8347	9084	13921	21441

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Appendix B: Table 8 - Projection C3: Low costs, high institutional aid, p. 1

Growth rates	pub. 2	pub. 4	private
educational costs(1)	1.008	1.010	1.022
non-tuition ed. revenues (2)	1.015	1.015	1.031
Pell	1.035	1.035	1.000
Other grants	1.017	1.016	1.054
Loans	1.030	1.030	1.050
family income	1.000	1.000	1.000
Initial conditions			
educational costs(1)	4200	8500	14600
living costs(3)	2300	3500	3800
non tuition ed. revenues(2)	3400	6800	5800
costs of attendance(4)	3100	5200	12800
Pell	150	290	320
Other grants	80	320	1580
family income	36600	45400	56100
Loans (5)	140	640	1160

Public four year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	5200	5183	5165	5147	5128	5108	5088	5066	5044	5021	4998	4867	4713
Pell	290	300	311	322	333	344	356	369	382	395	409	486	577
Other grants	320	325	330	336	341	348	352	358	363	369	375	406	440
Loans	640	659	679	699	720	742	764	787	811	835	860	997	1158
Income	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400
price net of grants	4590	4558	4524	4490	4454	4417	4379	4340	4299	4257	4213	3975	3698
net price	4270	4228	4185	4140	4094	4046	3997	3946	3894	3839	3784	3476	3119
nominal income	45400	47670	50054	52556	55184	57943	60840	63882	67076	70430	73952	94383	120460
nominal net price	4270	4440	4614	4793	4976	5164	5356	5553	5753	5956	6163	7227	8275
net price/income	9	9	9	9	9	9	9	9	9	8	8	8	7
tuition dependence	20	20	19	19	18	18	18	17	17	16	16	14	12

Private projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	12600	12741	12884	13029	13174	13322	13470	13620	13772	13925	14079	14867	15681
Pell	320	320	320	320	320	320	320	320	320	320	320	320	320
Other grants	1580	1665	1755	1850	1950	2055	2166	2283	2406	2536	2673	3477	4523
Loans	1160	1218	1279	1343	1410	1480	1555	1632	1714	1800	1890	2412	3078
Income	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100
price net of grants	10700	10756	10809	10859	10905	10947	10984	11017	11045	11068	11085	11069	10837
net price	10120	10147	10170	10187	10200	10206	10207	10201	10188	10168	10141	9864	9299
nominal income	56100	58905	61850	64943	68190	71599	75179	78938	82885	87030	91381	116628	148850
nominal net price	10120	10654	11212	11793	12398	13026	13678	14354	15053	15775	16518	20506	24672
net price/income	18	18	18	18	18	18	18	18	18	18	18	18	17
tuition dependence	60	60	60	59	59	58	58	58	57	57	57	55	53

Public two year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	3100	3083	3065	3046	3027	3008	2988	2967	2946	2925	2903	2782	2646
Pell	150	155	161	166	172	178	184	191	198	204	212	251	298
Other grants	80	81	83	84	86	87	89	90	92	93	95	103	112
Loans	140	144	149	153	158	162	167	172	177	183	188	218	253
Income	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600
price net of grants	2870	2846	2821	2796	2770	2743	2715	2687	2657	2627	2596	2428	2236
net price	2800	2774	2747	2719	2691	2662	2631	2600	2569	2536	2502	2319	2109
nominal income	36600	38430	40352	42369	44488	46712	49048	51500	54075	56779	59618	76089	97111
nominal net price	2800	2913	3029	3148	3271	3397	3526	3659	3795	3934	4076	4821	5597
net price/income	8	8	8	7	7	7	7	7	7	7	7	6	6
tuition dependence	19	18	18	17	17	16	16	15	14	14	13	10	7

Average over sectors	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Cost of attendance	4733	4762	4790	4819	4848	4877	4907	4936	4965	4995	5025	5173	5321
Net price	3947	3942	3935	3927	3917	3905	3891	3875	3856	3836	3813	3655	3409
Nominal net price	3947	4139	4339	4546	4761	4983	5214	5452	5697	5950	6210	7597	9045

Appendix B: Table 9 - Projection C4: Low costs, low institutional aid, p. 1

Growth rates

	pub. 2	pub. 4	private
educational costs(1)	1.008	1.010	1.022
non tuition ed. revenues (2)	1.015	1.015	1.031
Pell	1.035	1.035	1.000
Other grants	1.000	1.000	1.000
Loans	1.030	1.030	1.050
family income	1.000	1.000	1.000

Initial conditions

educational costs(1)	4200	8500	14600
living costs(3)	2300	3500	3800
non tuition ed. revenues(2)	3400	6800	5800
costs of attendance(4)	3100	5200	12600
Pell	150	290	320
Other grants	80	320	1580
family income	36600	45400	56100
Loans (5)	140	640	1160

Public four year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	5200	5183	5165	5147	5128	5108	5088	5066	5044	5021	4998	4867	4713
Pell	290	300	311	322	333	344	356	369	382	395	409	486	577
Other grants	320	320	320	320	320	320	320	320	320	320	320	320	320
Loans	640	659	679	699	720	742	764	787	811	835	860	997	1156
Income	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400	45400
price net of grants	4590	4563	4535	4505	4475	4444	4411	4377	4342	4306	4269	4061	3816
net price	4270	4233	4195	4156	4115	4073	4029	3984	3937	3889	3839	3562	3238
nominal income	45400	47670	50054	52556	55184	57943	60840	63882	67076	70430	73952	94383	120460
nominal net price	4270	4445	4625	4811	5002	5198	5399	5606	5817	6033	6253	7406	8592
net price/income	9	9	9	9	9	9	9	9	9	9	8	8	7
tuition dependence	20	20	19	19	18	18	18	17	17	16	16	14	12

Private projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	12600	12741	12884	13029	13174	13322	13470	13620	13772	13925	14079	14867	15681
Pell	320	320	320	320	320	320	320	320	320	320	320	320	320
Other grants	1580	1580	1580	1580	1580	1580	1580	1580	1580	1580	1580	1580	1580
Loans	1160	1218	1279	1343	1410	1480	1555	1632	1714	1800	1890	2412	3078
Income	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100	56100
price net of grants	10700	10841	10984	11129	11274	11422	11570	11720	11872	12025	12179	12967	13781
net price	10120	10232	10345	10457	10569	10681	10793	10904	11015	11125	11234	11761	12242
nominal income	56100	58905	61850	64943	68190	71599	75179	78938	82885	87030	91381	116628	148850
nominal net price	10120	10744	11405	12106	12847	13633	14464	15344	16274	17258	18299	24451	32482
net price/income	18	18	18	19	19	19	19	19	20	20	20	21	22
tuition dependence	60	60	60	59	59	58	58	58	57	57	57	55	53

Public two year projection	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
costs of attendance	3100	3083	3065	3046	3027	3008	2988	2967	2946	2925	2903	2782	2646
Pell	150	155	161	166	172	178	184	191	198	204	212	251	298
Other grants	80	80	80	80	80	80	80	80	80	80	80	80	80
Loans	140	144	149	153	158	162	167	172	177	183	188	218	253
Income	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600	36600
price net of grants	2870	2847	2824	2800	2775	2750	2724	2697	2669	2640	2611	2451	2268
net price	2800	2775	2750	2724	2696	2669	2640	2611	2580	2549	2517	2342	2141
nominal income	36600	38430	40352	42369	44488	46712	49048	51500	54075	56779	59618	76089	97111
nominal net price	2800	2914	3032	3153	3278	3406	3538	3673	3812	3954	4100	4869	5682
net price/income	8	8	8	7	7	7	7	7	7	7	7	6	6
tuition dependence	19	18	18	17	17	16	16	15	14	14	13	10	7

Average over sectors	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2005	2010
Cost of attendance	4733	4762	4790	4819	4848	4877	4907	4936	4965	4995	5025	5173	5321
Net price	3947	3965	3982	3999	4015	4031	4047	4062	4077	4090	4104	4159	4189
Nominal net price	3947	4163	4390	4629	4881	5145	5423	5716	6023	6346	6685	8646	11116

This approach is vulnerable to several strong objections. First, this approach would make the Federal government the ultimate arbiter of the question whether the "best" of American higher education is "too good". In a pluralist society, it is not at all clear that we want a univocal Federal answer to that question. Second, for many high cost institutions, undergraduate education is only one of many activities they undertake, and one that has to struggle for resources and attention with the rest. If the revenues from that activity are curtailed, while others such as graduate education, research and consulting are not, there is likely to be a disproportionate withdrawal of energy and resources from the constrained activity. This might produce a sharper decline in the effectiveness of these institutions' undergraduate efforts than anyone would prefer. Finally, the approach would be a kind of sumptuary legislation with strong paternalistic overtones. If families and private donors want to sustain an educational enterprise at a rather luxurious level, why should they be prevented from doing so? It is hard to imagine Federal efforts to regulate the prices of luxury cars or boats, yet even the most costly higher education seems less extravagant than those.

This last point suggests a more limited direct Federal response to high cost education: to deny or limit Federal student aid to those who elect to attend the highest cost institutions. The argument here would be, "It's fine if some family wants to spend their own money for Maserati-class education, but I'm darned if my tax dollars should support it."

This outlook has, plainly, a certain intuitive appeal. The appeal is partly grounded in the belief that low income students qualify for much more Federal aid by attending high cost institutions. This belief is largely spurious, since most Federal aid is linked to family income levels rather than to institutions' charges. The fact is that it costs the Federal government very little, if any, more to support a student at a high cost, highly selective institution than most other

schools. The bulk of the aid received by needy students at high cost institutions is in the form of institutional discounts and grants, rather than Federal support.

Indeed, denial of Federal support for education at high cost institutions would likely result in more rather than less governmental expenditure on the education of the affected students. For many of these students would likely enroll instead in state run institutions, where state appropriations cover a substantial fraction of costs.

The hope in such a proposal might be, not that these schools would become inaccessible to low income students, but rather that the schools would respond to these rules by containing their own costs. The fact is, however, that Federal student aid support is a relatively small income item at the most expensive institutions, and its threatened loss would not be an overwhelming consideration in the policies of these institutions.

A more subtle way of using Federal aid support to influence college costs would be to link some forms of Federal support, not simply to the level of an institution's spending, but to the way its money is spent. This option would involve the Federal government conditioning eligibility for support--which might be student aid, research funding, or other support--on the distribution of an institution's resources across spending categories. In principle, this has real attractions: imagine, for example, a school which receives large amounts of Federal support building an elaborate new gymnasium or President's house. It would not be unreasonable to argue that the Federal government should judge that such an institution could get by with less Federal funding. The difficulty, however, lies in implementing a policy of this kind even-handedly, and on the basis of adequate information. The Federal government would need to become intimately involved in analyzing the detailed spending decisions of all institutions receiving Federal funds--taking on an administrative and regulatory role that it has systematically eschewed. Such efforts would raise questions about intrusion on institutional autonomy and, just

as important, would be very likely to strain the resources and competence of Federal officials. It is worth noting that most Federal funding for higher education currently is purpose-specific (as in student aid or research support) as opposed to general block grants, such as the states provide to public institutions. Linking support to specific purposes works in somewhat the same way that tying aid to institutional spending patterns would do, by directing resources toward those activities that the government wishes to encourage, thus implicitly discouraging investment in others.

Indirect Strategies

If direct Federal intervention to control college and university costs and prices seems unpromising, as this discussion suggests, there may be steps the Federal government could take to create an environment in which better decisions about cost and quality would be made.

Improving the Flow of Information

If potential consumers of higher education were perfectly informed about the characteristics and the long run benefits of attendance at particular higher education institutions, many of the difficulties that concern us would be less pressing. Market pressures would be more effective in discouraging wasteful spending, because consumers could readily detect spending that was not accompanied by educational improvement. At the state level, if one thinks of legislators as "consumers" of higher education, a similar point would apply to the allocation of public subsidies to state run institutions. Even if improved information did not slow rates of price increase, the availability of good information would make it easier to judge whether the increases were educationally justified. Indeed, with perfect information, rapid price increases would be evidence that consumers in fact valued these expenditures, and would provide a fairly strong presumption that this spending was justified. Perfect information is, of course. a daydream, but even improved information could be an important aid.

Both because it is difficult for schools to convey accurate information about themselves and their competitors in a credible way, and because the production of information is a public good, there is plainly in principle a role for the Federal government in certifying educational quality and disseminating information about educational alternatives. Perhaps the kind of information that would be most useful is that which would help students gauge the "fit" between their needs and capacities and what different schools have to offer. Such information would encourage families to make educational choices less on the grounds of overall institutional prestige and more on the basis of how well a school serves a given student.

It is less clear what practical steps can be taken to advance this goal. Markets for commercial products suffer from the same difficulty. Certain minimal characteristics of a product can be established through regulatory and certification processes: the medicine is very likely not to kill you, the car's wheels hardly ever fall off. But the kind of information that really matters in the choice between products--or between educational institutions--is often subtle, and in the case of higher education varies from one individual to another. The kind of information that might be generated by quantitative studies like those surveyed earlier is likely to be of most use in helping guide decisions among broad categories of institutions--liberal arts vs. technical, two year vs. four year college, and the like. It is much less likely that quantitative assessment measures could meaningfully guide the choice between similar schools in a particular category--for example, Loyola vs. DePaul in Chicago, or the University of Wisconsin vs. the University of Minnesota.

For this more detailed kind of choice, it might be more useful to attempt to improve the channels of information colleges and students rely on now than to introduce new quantitative tools. Thus, efforts, such as those that the College Board has undertaken, to improve the preparation and knowledge base of high school guidance counselors could be helpful. Local.

regional and consortial efforts to sponsor college fairs and encourage other forms of information exchange may be of use in this regard. There may also be value in encouraging colleges and universities to cooperate in the production of guidebooks on a cooperative basis. This might encourage both schools and students to focus on those characteristics of institutions that are most educationally important, and to downplay more superficial features that may be useful in grabbing attention in a competitive environment. There may be a role for the Federal government in helping to support efforts by colleges to communicate more effectively and informatively with high school students.

Modifying the Influence of Different Constituencies on Institutions' Quality and Cost Decisions

We have noted earlier that different constituencies may have differing conceptions of what "quality" is and what sorts of expenditure increases are justified. The Federal government may have some ability to influence cost and quality trends by affecting the impact of certain constituencies on colleges' and universities' decision processes.

The obvious illustration of this, historically, is the Federal government's 1972 decision to expand higher education funding through the use of portable student aid grants, rather than direct institutional aid. (See Gladieux and Wolanin, 1976) This choice increased the effective "voice" of students, and especially lower income students, in the higher education marketplace. By the same token, it is sometimes argued that the large percentage of state higher education budgets which is funded directly by state appropriations reduces the influence of tuition-paying students on public university and college decisions relative to what it would be if they paid more.

It may well be the case that the strong influence of relatively affluent tuition paying students at the more expensive private institutions has been a force making for higher prices in that sector in recent years. These institutions compete intensively for students, and have clienteles which are relatively insensitive to tuition levels, partly because families of modest means

attending these institutions receive substantial institution-based student aid to offset high tuitions. As we have noted, patterns in expenditure change at these institutions seem consistent with this part of the market being importantly driven by "competition-driven amenities", which may be less oriented to raising educational quality than to successful institutional marketing.

On the other hand, patterns of expenditure change at public universities suggest that these institutions may be relatively unresponsive to student demands: a significant fraction of the growth in their expenditures has gone to research spending and institutional support while comparatively little has gone to instruction and academic support.

It thus may be desirable to increase the influence of students as consumers at public universities and to decrease their influence somewhat at the more expensive private institutions. The former move would, it can be argued, tend to raise educational quality at the public institutions, while the latter might help to control costs at private institutions with minimal impact on quality. The Federal government fairly clearly has the ability to influence prices in public higher education by revising its formulas for funding student aid (see the more detailed discussion in McPherson and Schapiro, "Affordability of Higher Education"). Higher prices for undergraduates at these institutions would tend to increase the pressure for high quality education there.

It is not so clear that the Federal government has a ready means to decrease the pressures of enrollment competition that may be leading to "excessive" spending on some activities at private institutions. One policy response would be to provide more "general purpose" subsidies to institutions which are not closely linked to their performance in recruiting students. Such subsidies might either be provided directly or through increased encouragement to private donations. This would tend to increase the influence of faculty and administrators (and possibly trustees) relative to other constituencies in determining internal resource allocation. The

availability of such an autonomous revenue stream would presumably make these institutions somewhat less anxious about student recruitment, and would no doubt redirect spending decisions in some measure. Whether these changes would be judged to have improved "quality", or whether they would result in slower rates of cost increase is a matter about which observers might well disagree.

Regulating Institutional Cooperation

The on-going anti-trust investigation of a number of private colleges and universities has raised the question whether collegiate agreements on financial aid needs analysis, and perhaps on other matters (including price) may constitute a conspiracy in restraint of trade. Without commenting on the legal issues at stake here, we do wish to note that this issue raises the broad question of the roles of competition and cooperation in promoting educational quality at reasonable cost.

Many observers have noted that the intensely competitive arrangements in American higher education are unusual in the world: in most countries higher education institutions are largely nationally governed institutions that are heavily regulated. (See Johnstone 1986). Most observers have further argued that this competitiveness is a great source of strength in American higher education, and this is surely plausible on the whole.[49]

At the same time, it may well be true that in the special circumstances of higher education, some kinds of competitive activities may produce excessive costs. This may be true when competition leads to excessive duplication of such items as library facilities, high powered computers, and the like. It may similarly be true of some forms of marketing and recruitment expense. Although it is somewhat afield from our central themes here, it may also be plausible that the financial aid agreements that are a principal focus of the Justice Department

[49]For a recent and lively defense of this claim, see Rosovsky, 1989.

investigation have the effect, on balance, of reducing college costs and increasing college affordability relative to a situation in which such agreements were outlawed.

There is thus a plausible case for the government allowing and even encouraging a variety of forms of institutional cooperation--activities of a kind that are likely to be discouraged by the on-going investigation.

Options for Institutions

Although the proper Federal role in encouraging greater quality is rather limited, this is much less the case for institutional efforts. Colleges and universities have traditionally devoted considerable energy to self-examination and to efforts at internal reform. However, many of these efforts have been unsystematic and there has been difficulty in drawing lessons from these various institutional reforms which can be transferred among schools. In recent years, more attention has begun to be devoted to designing institutional reforms more systematically and assessing their results in a more controlled manner. Although these efforts have yet to bear much fruit, they do suggest a promising avenue for institutions both to attempt to improve quality and to minimize the negative impact on educational quality of cost reduction efforts.

It is useful to divide these recent efforts into two categories. One involves investigation of particular reforms in curricular content or pedagogical strategies, attempting to determine how most effectively to use resource inputs in promoting learning. The second category of studies involves organizational innovations, attempting to restructure the incentives within institutions to search for improvements in quality.

A widely cited example of the first kind of study is the report of the Harvard Assessment Seminars, an ongoing exploration of teaching, learning and student life. The studies involve a combination of pilot groups and student surveys, aiming to discover factors that influence

effectiveness in teaching and learning. Among the findings are that teaching effectiveness is enhanced by the provision of "immediate and detailed feedback on both written and oral work", of "plentiful opportunities to revise and improve their work before it receives a grade", and of "frequent checkpoints such as quizzes, tests, brief papers, or oral exams". A primary finding of the study is that "students who work in small groups, even when interacting with high tech equipment, learn significantly more than students who work primarily alone."[50] Some reforms guided by these findings might enable schools to achieve more educational output from the same spending levels, but others--such as more intensive feedback on written and oral work--might call for increased expenditures.

Other studies on teaching effectiveness are underway at the National Center for Research to Improve Postsecondary Teaching and Learning. Studies there have examined such issues as how to help students develop thinking skills, how to help instructors prepare syllabi and other teaching materials effectively, and how to use computers and other "high tech" equipment effectively in the classroom.[51]

A different, and possibly complementary, approach to improving quality of instruction is to modify the incentive structures within institutions to encourage a decentralized search for productive innovations. William Massy has argued that two familiar practices in American higher education discourage the search for productivity improvement. One of these is "cost-plus" pricing, in which tuition is set to cover any anticipated increase in cost. The second is an internal resource allocation process that results in most of the gains from productivity improvement accruing to the "center" of the resource allocation process. If, for example, the economics department at a college discovers a way to teach its curriculum effectively with only 75

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[50]Light (1990), pp. 8-9.

[51]NCRIPTAL Update, Vol. 2, No. 2.

percent of the courses now offered, the resource allocation scheme in place at most colleges would reduce the staffing in economics proportionately. The result is that workload would be maintained at the previous level in the department; the institution would benefit but the department would not.

Massy has proposed that universities and colleges could reform both of these practices. In place of cost-plus pricing, he proposes that institutions should set their prices in relation to families' ability to pay, thus severing the link between trends in cost and in available tuition revenue. This would impose more external discipline on college cost increases. Concerning the second point, Massy proposes a number of steps that would help introduce decentralized incentives for productivity improvement and cost control. One is to decentralize decisions as much as feasible, giving control over resources to those who are best able to judge trade-offs. A second is to provide rewards to individuals who generate valuable innovations. A third is to share with groups on campus (such as departments) the gains that result from productivity improvements. If, for example, the economics department is able to teach effectively with 25 percent fewer courses, the department's size might only be cut by 10 percent in the short run, permitting the effective workload of continuing members to be reduced. The success of a scheme of this kind obviously depends critically on having reliable measures of teaching effectiveness. Massy suggests that the sharing of resource gains between the decentralized unit and the center should vary systematically over time, so that most gains would accrue to the decentralized unit in the short run, while over the longer term more of the gains would be transferred to the institution as a whole.[52]

These two approaches might well be complementary in practice. If institutions and groups within institutions are provided with incentives to search for productivity improvements,

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[52]Massy (1989).

they will obviously be interested in learning the results of investigations aimed at determining the effectiveness of particular strategies for improving teaching and learning. There may be further possibilities for the Federal government to encourage and support institutional efforts to improve productivity. One obvious channel is supporting research on productivity improvement. Beyond that, the government may, as we noted above, have some ability to target funding in specific programs toward institutions that are successful in raising productivity, thereby adding to the incentive for institutions to search for productivity improvement.

Conclusion

In this paper we set out to determine the degree to which recent rapid increases in higher education costs have served to improve the quality of higher education. We have noted both conceptual difficulties and empirical limitations in our ability to define and measure quality, but we have also argued that there are good reasons to investigate the issue carefully: there is no reason to believe that the "invisible hand" of the market is an adequate assurance of quality in a market with the special characteristics of higher education.

Our survey of existing literature on output measurement and the study of input-output relationships in post-secondary education reveals that this work is still at an early stage. Nonetheless, certain links between a variety of inputs and student and institutional outcomes have been at least tentatively established. For instance, certain types of institutional expenditures appear to affect student satisfaction, labor market success, learning gains, and progression to graduate school.

In our analysis of changes in expenditures over time, we found that at many categories of institutions major increases of expenditures were directed toward areas which appear to be quality-related. At the same time, within certain categories of institutions, major budgetary

increases were devoted to types of spending that appear to be largely unrelated to the quality of undergraduate instruction. We further found evidence that increases in per student expenditure levels relative to tuition levels across institutions are correlated with students' desires to attend those institutions. This provides some evidence that, at least in students' eyes, expenditures do provide higher "quality".

- Higher education is an important national investment. It is very important that these resources be used productively, and this implies that it is very important that the spending-quality link should be strong. We have reviewed a number of possible Federal policies, attempting to assess their potential for strengthening the cost-quality link. We believe that judicious consideration of the more promising among these policy proposals is in the nation's interest.

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UNDERSTANDING THE "QUALITY" ISSUE IN U.S. HIGHER EDUCATION

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UNDERSTANDING THE QUALITY ISSUE IN U.S. HIGHER EDUCATION

Introduction

The underlying motivation for this paper can be stated in the form of a question: "Have recent rapid increases in higher education costs been used efficiently to improve the quality of higher education, or have they been spent wastefully on academic bureaucracy, frills, or improvements in quality whose value is less than their cost?"

The question is important in light of the growing concern in Congress, in state legislatures, and among parents and citizens that this spending receive careful scrutiny. Even leaving aside the opportunity costs paid by students through withdrawal from the workforce, higher education costs the nation well in excess of $100 billion annually. Although families pay only about a third of this total, they are rightly concerned that they get their money's worth from the money they spend, and both state and Federal governments, which account for the majority of the bill, are also concerned about accountability. Attention focuses especially on the relative handful of highly selective private colleges and universities who have raised their prices unusually fast in the 1980's and who, while enrolling a tiny fraction of the nation's students, dominate the headlines on the college cost issue.

Our motivating question is, unfortunately, much easier to ask than to answer. Anyone who approaches this question is confronted by serious disagreement about what quality is, and equally serious problems in finding variables that can be taken with any degree of confidence to measure important dimensions of quality. Nonetheless, we have resisted the temptation in the following pages to be entirely skeptical or neutral about judging the quality of higher education in the United States and assessing policies to improve it.

We proceed as follows. First we explore some issues regarding the definition of quality for a service like higher education and reviews some special features of the higher education marketplace that may lead to worries about quality. Second, we look more closely at both conceptual and empirical issues in measuring the quality of higher education, as prelude to the next section, which reviews the available literature on links between spending and quality in both elementary-secondary and higher education. We then use data from the Higher Education General Information Survey to provide a fairly detailed breakdown of expenditure trends in various categories of institutions and attempt to link expenditure changes to changes in quality. We also examine relations between student choice and the difference between educational spending and the price charged to students; our aim is to see if students behave as if this subsidy is correlated with educational quality. Next we examine Federal policy alternatives followed by policy alternatives for individual institutions. Finally, we present our conclusions.

Quality in Higher Education: What is it and Why Worry?

"Quality" is a notoriously ambiguous concept. Our purposes in this section are, first, to explore some of the most important ambiguities, in order to clarify our later discussions and, second, to review some reasons for worry about whether the higher education "market" is adequate in its own right to preserve a desirable level and distribution of higher education quality.

What is Quality?

At least three major issues arise in identifying what we mean by quality in higher education: heterogeneity, value, and perception.

Quality and Heterogeneity

There may be some goods and services which can meaningfully and unambiguously be ranked from "best" to "worst", but the services of higher education institutions are surely not among them. Products that can be so ranked are generally quite homogeneous, and can be ranked along a single, measurable dimension, such as chemical purity or butterfat content.

But colleges and universities are too various in their missions and clienteles for any single dimensional ranking to make much sense. In fact, it is important to notice that this heterogeneity is of more than one kind.

First, most colleges and universities are "multi-product firms", aiming to provide more than one, and often many, kinds of services. The large state university, with its concerns for undergraduate, graduate, and professional teaching, for pure and applied research, for public service, for semi-professional athletics, and so on, is the clearest example, but even simpler institutions like community colleges or liberal arts colleges have multiple objectives.

Second, even if we focus on a single broadly defined function--say the improvement of students' writing skills--institutions differ dramatically in the clienteles they serve. A team of instructors who are superbly well qualified to improve the writing performance of students who have completed four years of honors level English in high school may be thoroughly inept at teaching basic grammar and usage to students with poor high school training, and conversely. A high quality education for a particular group of students is one that is well adapted to their needs and capacities, thus frustrating any notion of a single scale of quality.

The closest we can get to a fully unambiguous quality ranking is to focus separately on groups of schools with similar missions and similar clienteles--or, where schools have multiple missions or clienteles, to try to compare their components separately.

Quality and Value

Another "cut" on the quality issue requires distinguishing these questions:

1. "How well does a college do with the resources it's got?"; vs.

2. "How great are this college's resources?"

Back in the 1970's, we tended to think that the Volkswagen Beetle was a very high quality car in the former sense, while the Mercedes or the BMW was plainly a "better" car than the Volkswagen from the latter point of view. Various American car companies at the same time devoted themselves to showing that simply putting a lot of resources into a car was not enough to ensure high quality in either of these senses. Question 1 is often thought of as the question whether a product or service provides "good value for the money". This is closely related to the notion of "productivity": how much output does an institution get from the resources it deploys. This productivity-oriented notion of quality will occupy most of our attention in what follows. The great advantage of this notion is that it recognizes the potential for quality variation all along the higher education spectrum: a very wealthy institution can display low "quality" by using its resources poorly, while even a resource-starved community college may exhibit high quality by using its resources well.

It should be possible, at least in principle, to answer the "productivity" or "value for the money" question for schools that expend about the same amount of resources per student, provided that they have similar clienteles and missions. Similarly, if schools are at least roughly equal in cost-effectiveness (and have similar missions and clienteles), but differ substantially in the resources they make available per student, it should be possible to compare those schools in terms of Question 2. Thus, one would expect the school that was deploying more resources to have smaller classes, better dormitory furniture, a more industrious or learned faculty and the like.

It is of course no easy matter to compare the cost-effectiveness of schools that deploy different amounts of resources--especially since in reality there are always some differences in clientele and mission to deal with as well. Putting those aside, it may be meaningful to say that one school, which "costs" society more, is, in "absolute" terms, higher in quality than another less expensive school. But is the extra expenditure worth it--does the more expensive school provide as good or better "value for the money"? To answer this requires some sort of judgment about what the added quality is "worth", a judgment on which different actors may disagree.

In comparing schools with different missions or clienteles, it is important to focus on the value added by schools, rather than simply on the quality of the students the school attracts. In considering value added, we must expect that the level of resources a school has available, the degree of specialization of those resources to students with different aptitudes, and the nature of peer effects are all important variables. The fact that students have an educational impact on one another--serving in part as producers of one another's educations, as well as "consumers"--is important to the assessment of quality.

Quality and the Eye of the Beholder

Still another complication in judging quality arises from the fact that, even holding constant mission, clientele, and resources per student, quality may be judged differently by different constituencies that matter to a college or university. Parents may feel differently about heavy "homework" assignments than students do; alumni may have a distinctive view of what good teaching is; the public at large may have a stake in educating students for citizenship which is not felt so acutely by other constituencies; faculty often have a distinctive view of their institution's mission and central concerns. A full list of groups with a stake in a college's or university's conduct would surely include, among others: students, parents, alumni, faculty, staff,

trustees or governing board members, legislators, and citizens. What quality is depends on how you perceive and why you care about a college.

Reasons to Worry about Higher Education Quality

One mechanism that helps ensure that consumers of a product receive a level of quality appropriate to what they pay is the competitive forces of the market. Market forces are by no means a guarantee of acceptable "quality" in regard to any product-- even if the standard of quality is taken to be satisfaction of consumer preferences--but there may be special reasons to worry that market forces by themselves will not adequately regulate quality in the special circumstances of the U. S. higher education market. In this section we review some of the principal reasons for this worry.

Not-for-Profit Status

First is the absence at most higher education institutions of a profit motive. Traditional higher education institutions are either run by governments or are constituted as not-for-profit enterprises. There are serious regulatory barriers to the accreditation of any would-be profit-seeking institutions that might attempt to enter this market. Non-profit private and state-run institutions are, of course, not entirely free of pressure from a "bottom-line": they must reliably generate enough revenues to meet their expenses.

Still, there are significant reasons why market discipline may be attenuated in the non-profit environment. One of these is the reduced incentive for entry. In a competitive market, if existing firms are over-charging or using resources wastefully, profit opportunities are created which will induce entry of new firms. Since the non-profit form of organization imposes barriers to extracting such profit opportunities for personal gain, overly high prices or excessive costs of production will not reliably induce entry. Internal incentives for policing costs may also be attenuated by the non-profit form. In profit-seeking firms, there is generally a "residual

claimant"– who may be an owner-manager or the group of stockholders–who will receive as personal income any savings achieved through closer monitoring of costs (ceteris paribus). This party has an economic incentive to monitor costs, reduce waste, and promote effort (Alchian and Demsetz, 1972). Without such a residual claimant, the benefits of more effective cost control are spread diffusely among the participants in the institution–perhaps through higher salaries, or lower tuitions, or expanded services to faculty, staff or students. This greater diffusion of benefits reduces the incentives for cost control.

It is worth noting that these difficulties about measuring and enforcing quality in a not-for-profit regime do not, in our judgment, provide a convincing argument for putting higher education on a "for-profit" basis. There are good reasons for not holding higher education institutions to a market-oriented bottom line. Not only would such a policy impose threats to academic freedom, it would also give consumers a decisive say in decisions institutions take about basic matters of educational policy. This would only be justified if we felt confident that consumers–in this case students–were adequate judges of all the important dimensions of the "product" they were receiving, and if we further felt confident that the interests of immediate consumers adequately reflected the interests society takes in higher education. Not-for-profit status provides a "buffer" between the demands of student-consumers and the decisions taken by faculties and others involved in governing colleges and universities that may be important in promoting dimensions of quality that are undervalued by students. The points made here simply remind us that these potential benefits of not-for-profit status may come at a cost.

Substantial Government Subsidies

Market pressures are further attenuated by the presence of significant government subsidies. These are larger in public than in private higher education, owing to the direct appropriations state legislatures provide to public institutions. Moreover, Federal subsidies to

both public and private institutions largely take the form of what amount either to vouchers that increase the ability of consumers to pay for higher education (as with Pell grants and guaranteed loans) or to fee-for-service payments, as is true at least to some degree of Federal research funding. These kinds of payments do not undercut market incentives to the degree that direct appropriations tend to. Still, all institutions gain revenue benefits from special tax treatment under Federal law, and many receive at least some Federal grant money that is not closely tied to specific performance.

To the extent that institutions receive general subsidy support to their budgets, they will have a reduced incentive to worry about responding to their "customers" effectively or to minimize their costs. (To be sure, institutions will respond to the wishes of their patrons, but there is no guarantee that this "political marketplace" will produce high-quality or efficient operations.)

Low Price Elasticity of Demand

A special feature of some (though not all) parts of the higher education universe is a relatively low price elasticity of demand. There is considerable evidence that affluent consumers at relatively prestigious institutions are highly insensitive to price in deciding whether to attend college, and fairly insensitive to price in deciding where to attend.[1] For institutions that believe themselves to face this kind of demand curve, market pressure provides relatively little incentive to keep prices under control.[2]

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[1]See McPherson (1978) and Leslie and Brinkman (1987).

[2]It is worth noting that schools will only find themselves in this situation -- facing a demand curve with elasticity below one at the prevailing price -- if they are not profit maximizers. For otherwise they could raise total revenue and reduce total cost -- hence increase profit -- by raising price and reducing enrollment.

A related phenomenon is the prevalence of non-price rationing of demand at selective colleges and universities. Because many schools choose among their applicants, they are generally in a position to respond to any decline in demand that might result from a price rise by reducing their admissions standards somewhat. Although schools are loathe to do this, the possibility does provide a safety valve that may allow them to raise prices with relatively little worry about the impact on demand. Schools' ability to do this obviously depends on circumstances. Recent news reports suggest that a number of schools are currently experiencing enrollment shortfalls; a continuation of this trend would plainly reduce their ability to raise prices.

The Absence of Repeat Purchases

In many markets, an important enforcer of quality is the seller's knowledge that her long run revenue stream depends on keeping customers coming back. Any reduction in quality in, for example, the "tastiness" of a candy bar, that is not matched by a price reduction will be "punished" by consumers' decisions to switch brands.

This is much less of a threat in the case of higher education (or other infrequently purchased items like heart surgery or houses). Although families may send more than one child to college and, in principle, a sharply disappointed student may transfer, the response of the market to a decline in (what consumers perceive as) quality is not likely to be as swift or sure in this market as in markets with frequent purchases.[3]

[3]Schools that hope to lure alumni donations must rely on fond recollections of quality. To some extent alumni donations constitute a "repeat purchase" or confirmation of continued high quality.

Difficulty in Observing "Value-Added"

A final, and very important, peculiarity of the higher education market involves the difficulty consumers experience in judging the effectiveness of the education they are receiving or have received. This difficulty has several dimensions.

First, students are important inputs to their own education. A student, or society, really cares how much his or her knowledge, or capacities, were improved by college, but the only thing that is (relatively) easy to measure is how good the student was on emerging from college. This, however, will be a function of the student's qualities on entrance and of how much effort he or she put out, as well as of the contributions the school made. Charles Eliot of Harvard is reputed to have explained that the reason Harvard was such a great storehouse of knowledge is that its freshmen arrive with so much and its seniors depart with so little.

Second, "quality", even as judged by consumers (leaving aside the views of faculty, employers, and society at large) is plainly highly multidimensional. Students may want to improve their employment skills as well as their "liberal" knowledge, to have a satisfying athletic experience and social life as well as good classroom learning, and so on. Any composite judgment of a school's effectiveness in delivering quality at a reasonable price requires assessment on many dimensions that are not easy to compare.

Finally, "value-added" is hard to measure because investments in education take a long time to mature. Many of the real pay-offs to education are found, if anywhere, in patterns of career advancement, in the quality of work a person performs and the quality of leisure she experiences over a lifetime. This imposes real barriers to a student judging the quality of the education he or she has received, as well as making it difficult to judge the quality of a school by looking at the educational results for other students.

In sum, we have no reason to be complacent about the quality of higher education, or its effectiveness in using resources. There is little reason to trust that the "invisible hand" is making all work out for the best, nor are there readily available definitive measures to let us gauge the quality of performance.

Measures of Educational Output[4]

Quality can usefully be understood, as we have noted above, as depending on the relation between inputs and outputs. One can view a product as high in quality, even if it is "cheap", if a good output is obtained from the meager resources that are used. This is obviously different from a conception of quality that focuses simply on how great the output is, without attention to cost. The former conception, for example, would permit us to describe a low-cost community college as high in quality if it is educationally effective with the limited resources available; in contrast, a school like Harvard is almost sure to be high in quality in the second sense simply because it has so many resources at its disposal.

We will proceed at this point to examine the "output" side of the "input-output" relationship: what are the important dimensions of higher education output, and how might they be measured?

Think about how we could describe--or, ideally, measure --the contributions a particular college or university makes to the well-being of society. Some schools make large contributions through their research efforts or through contributions to their communities, but we focus here primarily on the impacts colleges make on the lives of their students. Certainly the most obvious "product" of the university or college is "college graduates", and the key question is how the

[4]Parts of this section draw on McPherson and Schapiro (forthcoming).

college experience affects graduates' capacities and opportunities, and how, in turn, those influences affect society's well being.

Monetary Returns

Perhaps the most obviously significant impact of college on students' lives (at least to an economist) is the earnings differential it permits them to command in the marketplace. A good deal of economic analysis has been premised on this view of the contribution of education to society. The key assumption here is that more education - what most economists call investment in human capital - eventually means higher levels of production in the workplace. There is a massive literature on this topic, devoted mainly to estimating the effect of additional years of schooling on the occupational destination and earnings of workers. Many studies of earnings functions have sought to improve on this aggregate measure by replacing years of education with some measure of individual test scores.[5] A typical assumption here is that the educational experience leads to greater cognitive skills which translate into more productive workers, and that test scores are a better measure of these skills than the number of years of schooling.

Theories of the Education-Earnings Relationship

However, there are problems in interpretation that accompany the analysis of the effects of education on wages, and these are not limited to the usual concerns about adequately controlling for background factors such as native ability. The finding that more years of education (or higher test scores) is associated with higher earnings does not necessarily imply that education makes people more productive workers. Obviously, a link between wages and the value of a worker must be assumed and, even with this assumption, it is not clear whether the effect of education is actually to produce marketable skills.

[5]These include Griliches and Mason (1972), Hause (1972), Hanushek (1973, 1978), Taubman and Wales (1974), and Hansen, Weisbrod and Scanlon (1970).

An alternative hypothesis for why higher levels of educational attainment are often associated with higher wages is that the principal function of education is to screen for individuals with the greatest motivation and innate ability.[6] If this were the case, the private returns to education as indicated by increases in wages would exceed the returns to society because schools would be merely identifying the more able students rather than increasing their skills. The question of how college matters to success is an important one and deserves some further discussion.

Empirical studies in the "human capital" tradition assume that education raises people's incomes by making them more productive, though typically they say little about what it is about education that has this effect--the college is a "black box" from which people emerge more productive than before they went in. Presumably, the implicit story on the human capital view is that education works either by supplying people with specific vocational skills or by improving their more general cognitive and affective capacities in productivity-enhancing ways.

A contrasting view has been labeled the "screening hypothesis": education works to raise an individual's income not by changing the person at all, but simply by identifying and certifying talents he or she already had, thereby making those preexisting capacities more marketable. To the extent that higher education fills such a "credentialing" function, it simply presents itself to the student as an arbitrary set of hurdles that must be got past on the way to a career. This perception is likely to be highly destructive to the social and political attitudes higher education is supposed to promote. In Thurow's apt phrase, higher education will seem a "defensive necessity," engaged in not for its positive value, but to avert the disastrous career prospects awaiting those without the right credentials. Students see themselves running farther and faster to get to the same place in the hierarchy that their parents occupied.

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[6]See, for example, Spence (1973), Wolpin (1977), Riley (1979), and Weiss (1983).

Still a third view, a "radical" view associated especially with Bowles and Gintis (1976), is that education does indeed change people, but not principally or most relevantly in cognitive ways. In this view, education adapts people to specific roles in a class-divided society; in particular, it socializes people into roles as "bosses" and as "workers".

Implications for Social Returns

These contrasting views obviously have very different implications for the social significance of education's economic contributions. In the human capital view, education adds straightforwardly to the nation's wealth. Because education makes persons more productive, the returns they receive from education reflect the greater output they provide. If this view is right, education (both "lower" and higher), is a major contributor to economic growth. But if education mainly screens or filters people, its contributions to economic efficiency are less clear. Plainly, sorting out more productive and less productive workers is worth something, but not necessarily as much as it costs. This is because when one student improves his or her position by passing through the educational "filter", the student will be doing so partly at the expense of others who are thereby pushed back in the employment queue, so that the private return to the student exceeds the social return. Note that these external losses do not emerge under the human capital view. On the screening view, however, extending educational "ladders" - remaining in college, say, for a job that used to require high school - may not improve the sorting process very much while adding considerably to private and social costs.

The screening hypothesis thus suggests that educational investments may at the margin be economically dysfunctional or pointless, although whether this is the case depends on the benefits of more accurate sorting of workers according to ability and on the costs of alternative screening mechanisms. Interestingly, the radical view makes a different claim: educational investments are highly functional within the context of capitalism, for they not only sort people among roles, but

develop in them the noncognitive traits these roles demand. Thus the radical can concede that education has been vital for past economic growth and, further, that educational socialization in some form would be needed in any society. The critical edge arises in the claim that the specific roles themselves are dysfunctional: educational socialization for capitalism is limiting and alienating, when, in a society with a different social structure, it could be liberating.

The choice among these views is remarkably resistant to empirical resolution, in part, no doubt, because each contains some truth as a description of American higher education. Surely, as human capital theory claims, some forms of higher education develop in people cognitive traits of real social and economic value; as advocates of the screening hypothesis contend, education serves in part to test for and to certify preexisting traits; and finally, as the radicals claim, some aspects of higher education serve more to reconcile people to their place in existing social arrangements than to foster their own development.

A simple step beyond this conception of the value of education--more years of education being linked to higher incomes--would be to hypothesize a link between quality of education and eventual earnings. On the "human capital" version of this story, more "effective" colleges add more to their students' cognitive capacities and hence to their economic productivity, thus producing higher eventual earnings. But a screening interpretation is a lively possibility here as well: what "good" schools (as conventionally defined) may do is to select both for admission and for degree completion students who have more capacity to be productive. If this is what is going on, students will find it worthwhile to pay premium prices to attend "high quality" colleges, but the essential service the college performs is not to make the student more productive but to certify her high productivity. The private returns to students from obtaining such certificates will exceed the social returns (although whether they exceed the social costs depends on a comparison of alternatives). Alongside these difficulties stand doubts about the assumption that

wage differences are a good measure of differences in the social contribution of different jobs. It is commonly acknowledged that some specific careers which deserve to be valued highly by society are nonetheless among the lowest paid.

Non-Monetary Returns

Wage gains are, for these and other reasons, obviously a highly indirect and imperfect indicator even of the economic contributions of education. Recently, there has been considerable interest in more direct measures of the effect of higher education on student learning, often relying on standardized tests. Good measures of the changes that actually occur in student capacities through college would be very helpful in understanding just why college graduates earn more than others. Institutions interested in measuring how much their students have learned can contrast the results of standardized tests of their seniors with those from other institutions but, of course, if the entrance standards differ, this comparison is meaningless. The best way to control for pre-matriculation quality is to test the students early on and use these results as a basis for comparison with later tests. This is what has been done, for example, at Northeast Missouri State University, an institution that has been at the leading edge of the assessment movement in this country. Even this sort of measure, of course, is unable to distinguish college effects from the simple effect of aging on maturity and hence test performance.

Standardized Tests

Some of these standardized tests are remarkably ambitious in the range of educational accomplishments they aim to measure. The American College Testing Service, for example, has a broader evaluation tool called the College Outcomes Measures Program's Assessment (COMP) which has been used by over 250 colleges and universities in the U.S. The COMP assessment has three options -the composite exam, the objective test, and the activity inventory. The composite exam covers three "process" areas - oral and written communication, problem solving,

and clarifying social values - and three "content" areas - functioning within social institutions, using science and technology, and using the arts. The objective test covers the same areas except that, unlike the composite exam, it contains no oral section and no essays. The activity inventory covers the same general areas but is aimed at both current students and alumni in seeking to determine what use they are making of their education. Other national organizations and a number of states are actively developing testing instruments that aim to assess the amount of learning accomplished in colleges.

However, some observers doubt whether any standardized exam can be used to measure accurately the output of education. John Chandler, President of the Association of American Colleges, has written that: "The use of standardized tests holds great promise for elevating minimum standards of student performance. But if standardized tests assume too prominent a role in an institution, they can have a stultifying effect on teaching and learning. Such tests are not well suited for permitting a student to demonstrate his or her capacity for aesthetic judgement, critical thinking, moral sensibility, and other more subtle and elusive qualities of mind and character." (1986, pp. 7-8)[7]

The criticism enunciated above is only one of several that are offered against an over-concentration on standardized exams. Another is the fear that faculty members will sacrifice substance in "teaching to the test". Not only is the authority of the instructor undermined by required standardized examinations, but these exams may encourage him or her to gear the

[7]See Boyer (1987) and Adelman (1986) for a similar argument and Wigdor and Garner (1982) for a comprehensive discussion of issues in testing.

course material to the norms of a general test, potentially sacrificing the risk-taking associated with individual prerogative.[8]

Peer Evaluation

An alternative to the use of standardized tests as a measure of the output of higher education is to use either outside evaluators or a panel of on-campus faculty members. A popular complaint about U.S. higher education is that teaching and the certification of learning is usually "bundled", that is, done by the same individual.[9] The use of a senior comprehensive examination or paper where students are evaluated by a panel of examiners would be a step in the direction of separating the teaching from the testing functions.

This is not exactly a novel idea. Swarthmore College, for example, has had an external examination system since 1922 under which faculty from other institutions not only grade a major written exam, but also give an oral examination. The novelty results from the variety of new ways in which external examiners are being used.

The Association of American Colleges is conducting an experiment (funded by the Department of Education) in which participating colleges and universities are grouped by threes according to size, character, and region, and faculty examiners are exchanged among the schools.[10] For each school, a team consisting of faculty members from the other two schools in the group uses oral and written exams to assess how well seniors have been prepared in their major field. The particular assessment tools as well as the areas of coverage are worked out in

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[8]See Rentz (1979) for evidence that this has happened in states where institutional funding is tied to test results. On the other hand, Adelman (1986) argues that there is nothing necessarily wrong with teaching to the test.

[9]See, for example, O'Neill (1983), Wang (1975), Harris (1972, 1986), Troutt (1979), and Chandler (1986). Boyer (1987) provides an historical perspective on this issue.

[10]See Chandler (1986).

advance by the entire team. The idea here is to implement an assessment program that recognizes the value of a curriculum within the major that has some degree of uniformity across similar institutions, but retains a role for individual autonomy.

Surveys

Is it possible to collect information on those aspects of educational output - leadership potential, moral integrity, and the ability to respond to new ideas and opportunities, for example - that cannot be measured on tests, from wage surveys, or from outside examiners? In a series of important and influential contributions, T.W. Schultz, the dean of the human capital school, has put particular emphasis on the last of these qualities, which he styles "the ability to deal with disequilibria"--to do something different when the occasion demands.[11] Education, Schultz suggests, does not so much add to a person's capacity to do particular things as it strengthens his or her emotional and cognitive capacities to perceive and respond to change intelligently and resourcefully.

There are a number of survey instruments that seek to measure attitudes and behavior. These include eleven such surveys from ACT, eight from Educational Testing Service, student outcome surveys from the National Center for Higher Education Management Systems, along with "value inventories" that can be used to examine changes in student values during their academic careers.[12] Of course, in order to measure the effect of education, surveys should usually be completed early in the educational experience and again at a later point, although a meaningful comparison could be made between the results from alumni surveys from different institutions as long as their enrollment pools were similar.

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[11]See Schultz (1971, 1975).

[12]See Harris (1986). Ewell (1983). Pace (1975, 1979, 1983, 1984). and McKenna (1983) discuss the formulation and analysis of student and alumni surveys.

Actual Output Measures

It seems likely that the mix of type of benefits provided by different types of postsecondary education is highly variable. It is plausible that traditional liberal arts colleges put greatest emphasis on "non-economic" components of education and on the longer-run economic components described by Schultz as "dealing with disequilibria". Community colleges, on the other hand, might be thought to put most emphasis on shorter-run vocational benefits. This contrast should not be overdone, however. Courses in history and literature at community colleges may, at the margin, make important contributions to the citizenly capacities of students; at least some students at liberal arts colleges, by contrast, may aim at and get little more than vocational advancement from their studies. In any event, the actual mix of outputs is an empirical question about which we know distressingly little.

This discussion suggests a range of individual and aggregate output measures, some relatively easily quantified (such as wages) but somewhat ambiguously linked to schooling effects; others harder to measure (improved problem solving ability) but more immediately connected to schooling. How should we define "quality" relative to such a range of outputs?

Two important cautions must be registered as we examine the development of appropriate quality concepts in this area. First, it is important not to confuse improvements in indicators of output with improvements in the outputs themselves: doubling the wages of college graduates by fiat would not be a social gain, whereas doubling the productivity of college graduates, with the result that college wages doubled, would be an increase in quality. Second, the multiplicity and the partial incommensurability of the various valued outcomes must be recognized. Improving the economic productivity of college graduates at the expense of, say, their capacity for self-expression or for citizenship, is not an unambiguous gain. Only if we had a clear means of weighing these very different goods from a social point of view could we make a summary

judgment. In the absence of such a weighting scheme, we may be forced to limit ourselves to saying that higher education is of higher quality if it produces more of at least one valued output without producing less of any other (and without using more resources); or, if the system uses fewer resources without producing less of any valued output. This is true, at any rate, if we adopt a definition of quality that focuses on the effectiveness with which inputs are used, rather than only on how absolutely high the output levels are. Notice that these commensurability problems may apply to the problem of comparing gains in education across different individuals as well as making comparisons among different kinds of educational output. How, for example, can one compare the educational gain from teaching elementary algebra to one student to the educational gain from teaching elementary calculus to another?

Of course, taken to extremes, these cautions could drive analysts of educational policy into silence. For some purposes, for example, it may be reasonable to weigh educational gains and losses accruing to different individuals according to their economic value--arguing that a distributional change that raises one person's wage by $10 per hour at the cost of a reduction for another person of $5 should be judged a quality gain. In other cases, a more immediate metric of cognitive achievement may be adequate for quality comparisons. Suppose, for example, that resources could be redistributed in such a way as to reduce the scores of a group of twenty high achievers on some test from 650 to 600 while raising the scores of a group of two hundred students from 500 to 550. Although one would surely want to know some details about the test before reaching a definitive judgment, it would be plausible to believe that this change improved educational quality. Notice that to make a judgment requires some assessment of the marginal social value of the increment from 600 to 650 compared to that from 500 to 550. If the former were more than ten times as great per student, then the change would reduce overall educational effectiveness.

Linking Inputs to Outputs[13]

An increase in output - higher test scores, a higher graduation rate, etc. - is certainly desirable, but at what cost? It is clear that the achievement of high levels of output does not necessarily mean efficient production (getting the most out of the least) and that input use must be carefully identified in order to evaluate productivity.

Issues in Measuring Inputs

One way to begin a discussion of the inputs into the educational production process is to return to the previously mentioned literature on earnings functions. The use of years of education and test scores as explanatory variables was described above but there have been other earnings analyses in which characteristics of individual schools have been used instead.[14] These include school expenditures and measures of specific school resources and of teacher quantity and quality. Expenditure data may take several forms. There are total expenditures which include capital costs and interest on debt, current expenditures which are limited to the operating budget, expenditures on teaching, expenditures on staff, etc.[15]

Measures of school resources tend to be in units other than dollars. Library facilities may be measured in thousands of books, classrooms in square feet, and absolute numbers are often used for computers, administrators, staff, etc. In terms of teacher characteristics, number

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[13]Parts of this section draw on Schapiro, 1988.

[14]See Hanushek (1986) for a summary of this literature. Sample studies include Wachtel (1976), Johnson and Stafford (1973), Ribich and Murphy (1975), Akin and Garfinkel (1977), Welch (1966) and Behrman and Birdsall (1983).

[15]Bowen (1980) contains a detailed compilation of expenditure data.

employed, average salary, degree level, experience, and test scores are some of the measures that have been used.

For all of these inputs, the particular output measure being examined dictates the precise form in which inputs are utilized. For example, a study of test scores would likely put the inputs in per capita terms - faculty per student, staff members per student, computers per student, etc. On the other hand, if the output measure were the number of graduates, then the number of faculty members, staff members, etc., would normally be used as inputs.

The list given above, while certainly not exhaustive, provides an indication of the key inputs identified in the education literature. But there are other inputs that should be considered. One such input is the curriculum. While it is certainly difficult to quantify, it is of obvious importance in the production process. Another is the students themselves. It should be clear that adequate controls for student quality and background are necessary conditions for producing reliable estimates of the educational production function. Further, the opportunity cost of the time of the students reflects the use of a scarce resource and should be considered. Therefore, the total economic cost of education includes direct expenditures by schools, direct expenditures by students, plus the cost of foregone earnings.

There is obviously a major difference between expenditure data and the use of separate inputs. In some analyses of educational productivity, inputs are entered separately and the contribution of each factor to increasing educational output is estimated. On the other hand, it is possible to use a shorthand productivity measure such as the average increase in test scores per additional faculty member or other input. Thus, the increase in test scores per thousand library books, per computer, etc., can be computed. This is obviously not possible if inputs are put into dollar terms and aggregated. An input measure such as total educational expenditures

subsumes information on the size of the faculty, staff, library, etc., but does produce a potentially useful summary measure.

The appropriate treatment of inputs in terms of their degree of aggregation depends on the purpose of the analysis. If there is a meaningful quality adjusted output measure and the goal is to contrast productivity across institutions, then expenditure data may reasonably serve this purpose. If, on the other hand, the goal is to assess the differential impact of various educational inputs, they should be included separately.

Production Function Analysis

Economists use production functions in analyzing productivity at various levels of aggregation. Applications to the study of education have followed suit in examining the relationship between inputs into the educational production function and a variety of outputs. However, the pursuit of useful, realistic estimates of educational production functions has been adversely affected by one critical factor, the lack of a homogenous output measure.

Studies of this type in the United States have had to overcome the notoriety of an early example, the well-known Coleman Report.[16] After collecting information on a large number of students from a variety of primary and secondary schools, the authors examined the contribution of different school-specific inputs to student performance. Their much publicized finding (later to be questioned in a number of studies) was that a large amount of the variation in performance among students was attributable to differences in family background and characteristics of their fellow students rather than differences in expenditures and other inputs that vary across schools.[17]

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[16]See Coleman et. al. (1966).

[17]For criticisms and extensions of this study see Hanushek and Kain (1972), Bowles and Levin (1968), Cohn (1972) and Cain and Watts (1970).

How far have we come from the Coleman report? A recent review of the education literature pointed out that, while there have been a substantial number of studies of the production process in elementary and secondary schooling in the United States, "Economic studies of higher education have been largely concerned with distributional questions related to access and costs faced by different groups, with government subsidy policies, and with attendance decisions; virtually no attention has been given to production processes or the analyses of specific programs."[18] Another summary of U.S. research on higher education agrees that "Remarkably little work has been attempted on relating inputs to outcomes in a systematic way."[19]

Evidence From Studies of Primary and Secondary Education

Given the paucity of empirical results at the level of higher education, it seems reasonable to look first at studies of primary and secondary school education with the aim of determining whether either the findings or the methodology appear to be relevant at a more advanced educational level.

These studies are divided between examinations of individual student performance and aggregate performance of schools or districts.[20] Output measures are typically scores on a

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[18]Hanushek (1986), p. 1143. He notes a few exceptions dealing with graduate school education that are discussed below. Hanushek speculates that the lack of empirical studies results from the fact that the production function approach has not been widely accepted, in part because of the usual finding that schools tend to be very inefficient, but also because of the general reluctance to do any quantitative evaluation of education and the difficulty in formulating meaningful productivity measures. Bok (1986) discusses reasons why the results of serious studies of educational outcomes tend to be ignored within the educational community.

[19]Bourke (1986), p. 16.

[20]Hanushek (1986) reports that, since the Coleman Report came out in 1966, 147 separately estimated public school production functions found in 33 articles and books have appeared in the literature. Samples include Beiker and Anschek (1973), Boardman, Davis and Sanday (1977), Bowles (1970), Brown and Saks (1975), Hanushek (1971, 1972), Levin (1976), Link and Ratledge (1979), Perl (1973), Ribich and Murphy (1975), Sebold and Dato (1981), Summers and Wolfe (1977) and Tuckman (1971). See Hanushek (1986), pp. 1160-67, and Hanushek (1981) for a

standardized test and input measures include the teacher/pupil ratio, teacher education and experience, and expenditures per pupil.

The empirical results show little support for the importance of either the teacher/pupil ratio or teacher education and only mild support, at best, for teacher experience. While higher expenditures per student do seem on the surface to be positively associated with student performance, even this result tends to disappear when family background characteristics are properly controlled for. What, then, does explain the variation in student performance at the primary and secondary school levels?

Family background variables such as the education and income of parents do make a difference. In addition, there is some evidence that characteristics of teachers other than their education and experience play a role, especially their scores on tests measuring verbal ability. What does all of this mean for U.S. higher education?

In terms of the results, it would obviously be of considerable interest to see whether school characteristics such as teacher/student ratios and expenditures per student matter at the post-secondary level. But the greatest lesson derived from this literature may be methodological. In any analysis, family background variables must be adequately accounted for or the results are likely to be misleading (as was the case with expenditures per pupil in some studies of student performance at the primary and secondary levels). Further, the output measure must be homogeneous. That is why it is more common to use the results from standardized tests rather than the number of high school graduates, the dropout rate, or other measures in which the quality dimension can not be controlled for.

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discussion of the results of these and other studies.

Studies of Post-secondary Education

Keeping these lessons in mind, it is easy to see why observers have concluded that, for the most part, existing productivity studies of post-secondary education in the United States leave a lot to be desired. One study looked at a large number of colleges and universities in an effort to determine the relationship between various input measures, the number of senior faculty, for example, and output measures such as the number of full-time undergraduates.[21] The results indicate that there is considerable variation in efficiency across institutions of higher learning. Efficient institutions have far fewer senior faculty than the average institution or, looking at it from the other direction, efficient institutions have far more students for a given number of senior faculty.

This finding is not surprising given the existence of intra-industry productivity differences in other sectors of the economy. In fact, a similar conclusion was reached in another study, this time of Ph.D.-granting chemistry departments.[22] There, the effect of faculty and research expenditures on the number of graduate and undergraduate degrees as well as on the number of faculty publications was considered. Again, productivity among departments was shown to vary considerably. These studies used simple productivity measures, such as the number of graduates per faculty member or the average cost per student, that are readily available and have been used in studies of educational productivity in other nations.[23] When these measures are

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[21]Carlson (1972).

[22]Gray (1977).

[23]See Bowen (1981) for a discussion of the historical trend in cost per student in the United States. O'Neill (1976) uses a unit cost measure as a productivity proxy and examines changes over the period 1930-1967. Her conclusion is that productivity increases within higher education were less than in other industries although she cautions that the use of a better. quality adjusted output measure may alter this finding. Carlson (1976) summarizes several studies that examine expenditures per student.

compared across countries, it appears that productivity in higher education varies widely across nations just as it does across institutions within a given nation. However, do we really learn anything from measures of this sort?

The studies of U.S. higher education reviewed above obviously suffer in comparison with those of primary and secondary education in their use of an output measure that is unadjusted for qualitative differences. A reason why so many institutions have gone to so much trouble to measure value-added, attitudes, etc., is that simple measures such as the number of graduates can not usually be used to compare output across institutions at a given time or even at a particular institution over time. This implies that productivity measures should be more detailed than, for example, the number of graduates per dollar.

One study uses an output measure which does a better job of controlling for quality: the number of alumni from private, undergraduate colleges who went on to receive Ph.D. degrees.[24] Again, input measures reflecting student and faculty quality as well as expenditures per student were tested in a productivity analysis. A number of these variables proved to be significant including academic and administrative expenditures, faculty salaries, class size and library facilities.[25] Curiously, scores on standardized tests (used here as an input) were shown to be insignificant. While this particular output variable is rather limited, the attempt to control for output quality by concentrating, presumably, on high quality graduates, should be applauded.

A more recent study of the plans of graduates of elite institutions to attend graduate school tested the effects of undergraduate debt, sex, race, undergraduate achievement, family

[24]Dolan, Jung and Schmidt (1985).

[25]In a similar study, Perl (1970) found that increases in university expenditures per undergraduate student raised the proportion of graduates who eventually enrolled in graduate and professional schools. Perl (1976) also found that increases in the level of instructional expenditures per student raised the probability that an undergraduate would pursue a graduate degree.

background and income differences among undergraduates as well as variations in characteristics of the undergraduate institution on these progression intentions.[26] The results indicated that strong academic performance as an undergraduate is an important predictor of graduate school attendance, while debt was unimportant. Graduate attendance was positively influenced by average SAT scores at the undergraduate institution, by attendance at a women's college (compared to a coeducational institution), by attendance at a university (compared to a liberal arts college), and by location outside of the Northeast. In addition there are unidentified characteristics of individual institutions that have positive and negative effects even after controlling for student characteristics.

Studies of primary and secondary education recognize the quality problem and normally use test scores as an output measure, not the number of graduates. Does the quality of post-secondary education vary less than at lower levels? We think not, and therefore conclude that productivity analyses that do not attempt to adjust their output measure for differences in quality are of limited value.

There are some studies of U.S. higher education that adjust for quality by examining the effects on standardized tests of different characteristics within institutions and academic departments. A pioneering study examined college-wide test scores in an attempt to identify the important inputs from a list of socio-economic and institution-specific variables.[27] The results indicate that institutional quality measures had little if any impact on increases in test scores during the college years once background factors were included as explanatory variables.

A number of more recent studies have concentrated on particular departments. In one example, four areas - biology, business, math, and psychology - were considered but no significant

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[26]Schapiro, O'Malley, and Litten (1990).

[27]Astin (1968).

associations between departmental characteristics and student performance on these exams were discovered.[28] Another study looked at learning gains of biology students and found that they were associated with several departmental variables including the number of faculty and the percentage of faculty with a doctorate.[29]

Other analyses replace standardized test scores with results from student surveys.[30] In an excellent example of this type of research, a series of departmental outcome measures within a single university, including student satisfaction, graduate school admissions and employment, were examined.[31] An interesting finding is that increases in student satisfaction are associated with reductions in faculty workload but not with increases in the amount of faculty-student contact.

A more unusual output measure is the grade point average (GPA). One study, using data from one of the campuses of the University of California, adjusted GPA scores for grading differences across departments and found that an aggregate proxy for university resources (average class size, support services, etc.) was an important explanatory variable.[32]

A number of other studies have concentrated on scholarly output. One analysis found that faculty publications were related to several variables including the percentage of nontenured faculty in the department.[33] Another looked at the scholarly output of alumni of graduate programs in economics and tested for the effects of departmental characteristics such as program

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[28]Hartnett and Centra (1977).

[29]Hartnett (1976).

[30]See, for example, Gregg (1972) and Heiss (1967).

[31]Bare (1980).

[32]McGuckin and Winkler (1979).

[33]Dressel, Johnson and Marcus (1970).

size and faculty quality.[34] Faculty research activity was shown to have an important positive impact on the eventual publication records of graduate students as does the quality of entering students.

In sum, there are productivity studies in which the output variable is more than just a quantity measure that is unadjusted for quality. However, even here, the output variable is usually far removed from what most people consider to be the more important outcomes of higher education (increased adaptability, greater social awareness, etc.). In addition, many of these analyses suffer from serious statistical problems arising from such factors as collinearity among the independent variables, simultaneous equations bias, heteroscedasticity (unequal variances due to differences in the size of institutions or departments), and the absence of adequate controls for background variables.[35] The lack of technical sophistication probably explains why so many of these studies tend to be ignored in the economic literature on higher education.

Another form of productivity analysis is found in the returns to education literature. As described above, monetary returns can be used as an indicator of educational output and, after computing the rate of return on educational investment, this can be contrasted with the return to other types of investments within a given country or across several countries.

However, as was mentioned previously, there are many problems with measuring educational output in terms of the increase in earnings. The difficulty in controlling for background factors, the assumptions that wages equal the value of the worker and that education increases human capital rather than provides screens, and the fact that certain jobs with relatively

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[34]Hogan (1981).

[35]Chizmar and Zak (1983) discuss alternative ways to estimate educational production functions.

low rates of monetary return are of high value to society (presumably, people who choose to enter these occupations receive compensating differentials in the form of high prestige, security. etc.), can be supplemented with other concerns. Education has a consumption element in addition to being a type of investment. Moreover, it creates positive externalities (by making someone a better citizen, for example). Both of these factors imply that private monetary returns understate the returns to society.[36] In total, there are many good reasons to doubt whether a productivity measure that uses earnings as a proxy for the social returns to education can be used to compare efficiency levels among institutions of higher learning.

In addition to these difficulties, very few studies of monetary returns to higher education distinguish among schools according to their characteristics, or indices of their quality. The standard assumption is that schooling experience can be adequately measured in units of "years". A pioneering study that departs from this tradition is James, et al., 1988. In this study, the authors draw on data from the National Longitudinal Survey of 1972 to relate individuals' labor market experience to their personal characteristics and characteristics of the college they attended. Although this study is acknowledged by the authors to be highly preliminary, it turns up some interesting results. The study found a positive relation between certain institutional characteristics, including size and selectivity, and measured returns to college. These added returns, however, seemed to be largely explained by differences in patterns of majoring and course selection that were correlated with these characteristics. Interestingly, the authors did not find a significant relation between institutions' per student educational and general spending and returns to college.

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[36]See Cohn (1972) for an interesting discussion of the conceptual and statistical limits to the returns-to-education approach. For a clear description of the methodology involved in these studies see Eckaus (1973).

In sum, the conclusion cited above that research on U.S. higher education has not yet reached the level where a significant number of productivity analyses have provided meaningful results seems entirely well-founded. Compared with the study of inputs and outputs, the study of the ratio of the two is just beginning. The scattered evidence that is available does point to the existence of meaningful input-output relationships. Among the more intriguing findings are these:

- Progression to graduate school is importantly related to characteristics of the undergraduate institution attended;
- Although some studies have found that student test scores are unrelated to characteristics either of the institution attended or the major department, at least one study has found that learning gains of undergraduates in biology are associated with several department-level variables, and another study has found significant relationships between student academic performance and departmental characteristics across departments; and
- Several studies have found significant relationships between measures of student satisfaction and characteristics of the institution attended.

These results are fragmentary and sometimes difficult to replicate across studies. The appropriate direction for future research is to incorporate some of the better measures of output discussed above into productivity studies. To do less is to seriously undermine their relevance.

Analysis of Quality and Expenditure Patterns

In this section we draw on data concerning college and university expenditure patterns to shed light on issues of college quality. Ideally, we would want to have data that measure directly expenditures on the particular institutional characteristics that were identified above as being correlated with quality. This would allow us to see to what extent recent expenditure increases in U. S. higher education have been devoted to improving characteristics that are linked empirically with increases in educational output. Unfortunately, data at this level of detail are

not available on a national basis. Even to develop reliable data at this level of disaggregation for a handful of institutions is extremely difficult.[37]

Available data at the national level permit us to distinguish only rather broad categories of expenditures, such as "instruction" and "academic support". Even these broad categories, however, do permit us to draw some inferences about the degree to which increases in spending have been targeted on instruction-related activities, and to what degree they have focused on other aspects of institutional operations. Although caution is required in interpreting the results, we believe the patterns reported on below do support some plausible inferences about effects of recent increases in spending on educational quality.

We base the following analysis of trends in spending on a data set reporting financial information on individual colleges and universities. The data set was constructed by merging three Federally maintained data sets. One, the Financial Statistics report from the Higher Education General Information Survey (HEGIS), describes the basic financial accounts of all public and private non-profit post-baccalaureate institutions in the United States, as well as a handful of "proprietary" trade schools that are run for profit. The second, the Fiscal-Operations Report and Application to Participate (FISAP) data base, provides more detailed information on student aid spending, revenues and of the aided population at colleges and universities which apply for Federal assistance under any of the so-called "Campus-Based" programs (direct loans, SEOG's, and college-work study).[38] The third, the HEGIS Enrollment Survey, reports full and part time enrollment for all institutions, allowing us to construct estimates of full-time-equivalent

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[37]A project under the supervision of Robert Zemsky and William Massy is attempting to do this for several elite colleges and universities.

[38] We are grateful to the American Council on Education for preparing the merged data set for our use. Laurent Ross of the ACE was very helpful to us in programming and documenting the merge.

enrollment, which we use to express the financial data on a per f-t-e enrollment basis. We have these merged data sets for all private non-profit and public colleges and universities for the academic years 1978-79, 1983-84, and 1985-86. Painstaking efforts have been made to clean the data set of reporting and recording errors. In addition, we have dropped all proprietary schools from the sample as well as all schools with fewer than two hundred undergraduates. The data set has been constructed as a panel, so that only schools with data for all three observation years are included.

Tables 1 and 2 provide a summary of these data. They report expenditure information for 1985-86, as well as the percentage change in each variable over the 1978-79 to 1985-86 period. (Note that in the table each academic year is indexed by its ending year: for example, 1978-79 is listed as 1979.) All data are expressed on a per student basis and in constant 1979 dollars (using the CPI as deflator). Over this period, changes in the Higher Education Price Index (HEPI) paralleled changes in the CPI fairly closely-- HEPI increased by 67 percent while the CPI increased by 58 percent.

The top panel of Table 1 presents a number of expenditure categories for different type and control of institutions for 1985-86. The second panel presents percentage changes in each category over the period, while the bottom panel shows how the change in each expenditure category contributes to the overall increase in expenditures over the 1978-79 to 1985-86 period. The format of Table 2 is analogous to Table 1, except that it focuses on private universities and four year colleges, and disaggregates these institutions according to their level of endowment per student in 1978-79.

Expenditure categories are as follows. The first column [netspend] presents the average per f-t-e- student value of educational and general spending net of student aid at the various

Table 1. Expenditure data for public and private institutions by type

1986 levels (1979 dollars)

		N	netspend	instruct	research	pubserv	acadsupp	library	studserv	instsupp	opmnexp	other	student aid spending: sclunres	student aid spending: sclrest	capital spending: plantadd
public	univ	70	6906.73	2752.73	1327.95	604.84	441.82	239.93	276.65	577.39	621.49	63.93	116.94	302.80	1312.85
	four year	278	3979.19	1926.30	164.91	106.79	217.63	165.05	295.55	556.43	448.98	97.56	63.94	281.77	521.21
	two year	650	2652.31	1346.29	2.46	56.94	152.28	78.83	246.83	409.81	319.45	39.42	13.77	216.91	273.24
private	univ	54	11591.27	4715.70	2422.72	346.93	630.54	445.50	481.11	1308.39	1085.25	155.14	722.73	523.62	1616.39
	four year	790	4670.95	1927.50	129.30	55.04	224.37	189.25	506.55	943.45	569.20	126.30	425.71	478.38	641.71
	two year	94	3095.59	1099.07	0.52	14.43	141.60	88.14	438.77	797.86	410.45	104.75	188.06	527.51	384.83

percentage change, 1979-86

		N	netspend	instruct	research	pubserv	acadsupp	library	studserv	instsupp	opmnexp	other	sclunres	sclrest	plantadd
public	univ	70	11.57	8.54	15.97	6.46	14.59	15.70	10.71	26.64	5.89	14.94	38.15	127.76	74.78
	four year	278	9.50	5.97	26.98	28.90	11.79	1.43	9.10	36.08	-1.63	-11.19	54.47	237.32	7.99
	two year	650	6.57	5.68	-46.52	16.71	27.55	-8.98	13.36	8.91	9.43	-43.35	12.90	402.48	-19.68
private	univ	54	20.55	24.05	6.96	39.34	37.52	7.90	38.72	29.35	15.96	15.91	76.39	24.12	119.95
	four year	790	18.40	14.15	11.62	0.97	30.48	9.01	32.38	26.04	12.62	21.55	76.58	118.49	23.93
	two year	94	21.42	15.45	-50.77	-10.95	42.56	7.34	29.48	29.42	16.01	16.90	68.44	275.76	22.67

share in expenditure change, 1979-86

		N	netspend	instruct	research	pubserv	acadsupp	library	studserv	instsupp	opmnexp	other
public	univ	70	100.00	30.26	25.53	5.12	7.86	4.55	3.74	16.96	4.83	1.16
	four year	278	100.00	31.42	10.15	6.94	6.65	0.67	7.14	42.74	-2.15	-3.56
	two year	650	100.00	44.29	-1.31	4.99	20.11	-4.76	17.79	20.50	16.83	-18.45
private	univ	54	100.00	46.26	7.97	4.96	8.71	1.65	6.79	15.02	7.56	1.08
	four year	790	100.00	32.92	1.85	0.07	7.22	2.15	17.07	26.85	8.78	3.08
	two year	94	100.00	26.93	-0.10	-0.32	7.74	1.10	18.29	33.21	10.37	2.77

Table 2. Expenditure data for private universities and four year colleges by endowment per student, 1979-86

1986 spending level (1979 dollars)

type of school	endow/student	N	netspend	instruct	research	pubserv	acadsupp	library	studserv	instsupp	opmnexp	other	student aid spending sclunres	sclrest	capital spendin plantadd
university	250-1000	7	4817.72	2195.23	124.76	53.31	378.63	209.69	379.28	879.58	458.72	138.51	448.65	341.54	682.68
	1000-4000	19	7222.78	3263.48	732.59	104.80	364.56	274.04	443.94	1144.63	769.37	125.36	515.06	314.82	1046.46
	4000-25,000	19	11840.65	4665.24	2561.62	798.04	671.56	397.56	398.21	1106.20	1036.96	205.26	706.76	561.06	1802.69
	>25,000	9	23854.28	9194.51	6908.28	148.97	1239.38	1020.12	771.69	2267.36	2173.74	130.23	1332.22	982.97	2951.14
four year	<250	152	3641.12	1439.89	40.26	31.25	189.54	114.72	393.92	826.28	426.23	179.02	256.40	382.90	481.84
	250-1000	182	4056.49	1699.06	85.69	38.16	188.93	153.25	434.53	861.07	481.68	114.13	360.99	414.93	507.02
	1000-4000	230	4225.50	1783.48	75.47	71.41	195.83	171.75	462.60	857.73	513.26	93.97	405.00	466.57	555.72
	4000-25,000	201	5792.51	2414.70	218.97	68.66	245.33	247.27	639.72	1103.73	720.05	134.08	590.08	581.51	778.68
	>25,000	25	10172.16	3852.23	709.12	63.94	722.69	557.51	1036.67	1728.66	1330.99	170.36	791.96	801.51	2126.61

Growth of real spending, 1979-86

type of school	endow/student	N	netspend	instruct	research	pubserv	acadsupp	library	studserv	instsupp	opmnexp	other	student aid spending sclunres	sclrest	capital spendin plantadd
university	250-1000	7	24.64	12.44	-11.14	34.66	78.05	11.57	54.89	63.63	-1.83	67.55	60.72	183.00	45.77
	1000-4000	19	22.48	22.57	-2.34	94.72	40.38	28.61	44.20	25.83	19.79	28.01	70.37	62.34	81.90
	4000 25,000	19	13.83	11.05	6.01	49.96	29.33	7.67	36.38	15.30	12.01	10.02	68.69	14.76	102.53
	>25,000	9	19.06	36.21	3.25	-46.91	31.70	-5.66	28.25	38.40	14.15	-11.15	86.70	-0.96	205.55
four year	<250	152	17.41	14.40	13.11	-43.62	30.37	2.26	28.63	20.08	14.84	39.23	71.60	153.84	2.91
	250 1000	184	16.75	13.49	-5.74	-22.05	20.36	1.02	32.32	30.25	13.45	-0.55	64.77	145.08	18.98
	1000-4000	230	16.54	11.58	-3.27	35.30	29.67	15.68	31.70	23.29	10.28	11.01	76.42	145.30	25.11
	4000-25,000	201	21.74	18.00	33.83	15.14	31.42	11.79	32.12	27.75	12.97	40.72	83.53	90.06	9.42
	>25,000	25	27.42	20.48	16.12	-8.47	59.12	17.94	53.97	35.10	22.51	22.57	125.19	55.89	197.93

Expenditure data for private universities and four year colleges by endowment per student, 1979-86 (cont.)

Percentage shares of change in ed and general spending (net of student aid spending)

type of school	endow/student	N	netspend	instruct	research	pubserv	acadsupp	library	studserv	instsupp	opmnexp	other
university	250-1000	7	100.00	25.50	-1.64	1.44	17.43	2.28	14.11	35.91	-0.90	5.86
	1000-4000	19	100.00	45.33	-1.32	3.85	7.91	4.60	10.26	17.72	9.59	2.07
	4000-25,000	19	100.00	32.27	10.09	18.48	10.59	1.97	7.38	10.20	7.73	1.30
	>25,000	9	100.00	64.00	5.69	-3.45	7.81	-1.60	4.45	16.47	7.05	-0.43
four year	<250	152	100.00	33.57	0.86	-4.48	8.18	0.47	16.24	25.60	10.20	9.34
	250-1000	184	100.00	34.69	-0.90	-1.85	5.49	0.27	18.24	34.36	9.81	-0.11
	1000-4000	230	100.00	30.85	-0.42	3.11	7.47	3.88	18.57	27.02	7.98	1.55
	4000-25,000	201	100.00	35.62	5.35	0.87	5.67	2.52	15.04	23.18	7.99	3.75
	>25,000	25	100.00	29.92	4.50	-0.27	12.27	3.87	16.60	20.52	11.17	1.43

categories of institutions.[39] "Netspend" is then broken down into the following nine components: instruction and self-supported research [instruct]; sponsored research [research]; public service (including extension services) [pubserv]; academic support other than libraries (computers, deans, etc.) [acadsupp]; libraries [library]; student services (admissions, registrar, counseling, student health, recreation) [studserv]; institutional support (administration, accounting, security, alumni and development) [instsupp]; plant operations and maintenance [opmnexp]; and a residual category [other]. The next two columns divide student aid spending into unrestricted scholarships [sclunres] and restricted scholarships [sclrest]. Additions to land, buildings and equipment (which reflect capital rather than current expenditures) are reported in the final column [plantadd].

Turning first to the top panel of Table 1, we note that in every expenditure category except public service the per student values at private universities far exceed those at public universities.[40] In particular, instructional expenditures at private universities are 71 percent larger than those at their public counterparts. A comparison between private and public four year colleges produces a very different result: most categories of spending are quite similar (with the exceptions being student services and institutional support, where in each case the privates are substantially higher, and public service, where public institutions are much higher). It is notable that per student spending on instruction is virtually identical at public and private four year colleges. At two year institutions, public expenditures on instruction exceed those at private institutions. Private two year colleges, however, spend much more on student services and institutional support than do their public counterparts, so that on balance per student spending is

[39]We have netted out student aid spending because part of this spending is directly "passed through" from federal student aid, and the rest is best seen as foregone institutional revenue, rather than as spending on educational programs.

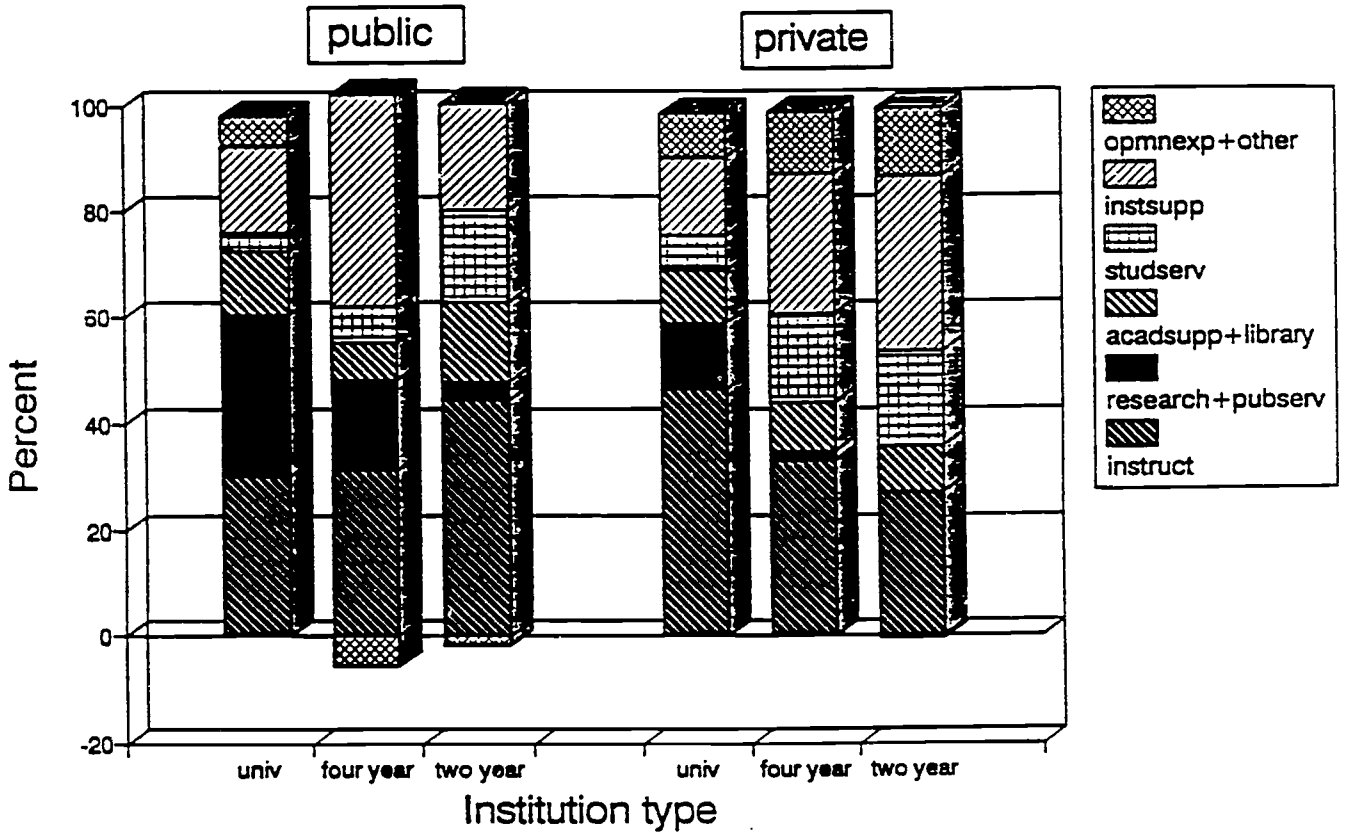
[40]It is possible that some expenditures at public institutions are significantly understated, since in some states costs of employee benefits (such as pension plans) may appear on state government budgets rather than institutional budgets.

higher at private than at public two year institutions. In every spending category except student services, universities spend more than four year colleges, which in turn spend more than two year colleges. Student aid spending is substantially higher at every category of private institution than in its public counterpart. Plant additions are also higher in private institutions, although the differences are smaller. Universities in both sectors spend more than twice as much per student on plant additions as do two year or four year colleges.

An examination of percentage changes in these categories over time, shown in the second panel, indicates that increases in net spending at private institutions exceed those at public institutions. Notable differences exist in rates of growth of instructional spending, student services spending, academic support, and operation and maintenance. Interestingly, research spending grew more rapidly at public than at private institutions over this period. Concerning scholarship spending, unrestricted spending increased faster at private than at public institutions, while for restricted spending the reverse pattern obtained. Spending on new plant and equipment grew somewhat faster at private than at public institutions.

The third panel provides an analysis of shares in expenditure growth that takes into account both the size of a particular expenditure category and its rate of growth. This share analysis is presented graphically in Figure 1. At public universities, for example, 30 percent of the increase in net spending over the period was contributed by the increase in instructional expenditure. The next most important contributors were research (26 percent) and institutional support (17 percent). The contribution of instructional expenditures was even larger at private universities, where it accounted for 46 percent of the increase in net spending, while institutional support provided 15 percent. Increases in research expenditures were far less important at private than at public universities (8 percent vs. 26 percent). Increases in instructional

Figure 1. Share in spending change, public and private insts, 1979-86



expenditure were also quite important at public and private four year colleges. However, the largest contributor at public four year colleges was institutional support (43 percent)--principally administrative expenses. At private two year colleges, institutional support again was the largest factor in cost growth, although instructional expenditures was the prime contributor in the case of two year public institutions.

What does this imply for quality? Drawing a link between expenditures and quality is made difficult by the degree of aggregation of the various expenditure categories. Even the instruction category includes expenditures on self-supported research, as well as provision of instructional services. Such categories as student services include items like counseling and health, which are clearly service-related, with other items like admissions, which may be seen as a marketing expenditure.

Still, the data seem to warrant some conclusions. On the one hand, the relatively strong contribution of instructional expenditures to cost growth is reassuring. On the other hand, looking at growth rates in spending, the rapid increases in research spending and institutional support at public universities and four year colleges accompany relatively slow growth in instructional spending at these institution types. It is worrying that the contribution of research expenditures to cost growth is almost as high as instruction at public universities, and that the contribution of institutional support exceeds that of instruction at public four year colleges. Conclusions about quality at private institutions are better made after we turn to examination of Table 2, which shows the effects of the considerable heterogeneity among private institutions.

The top panel of Table 2 shows that in general the amount spent in any expenditure category is positively related to institutional wealth at both private universities and private four

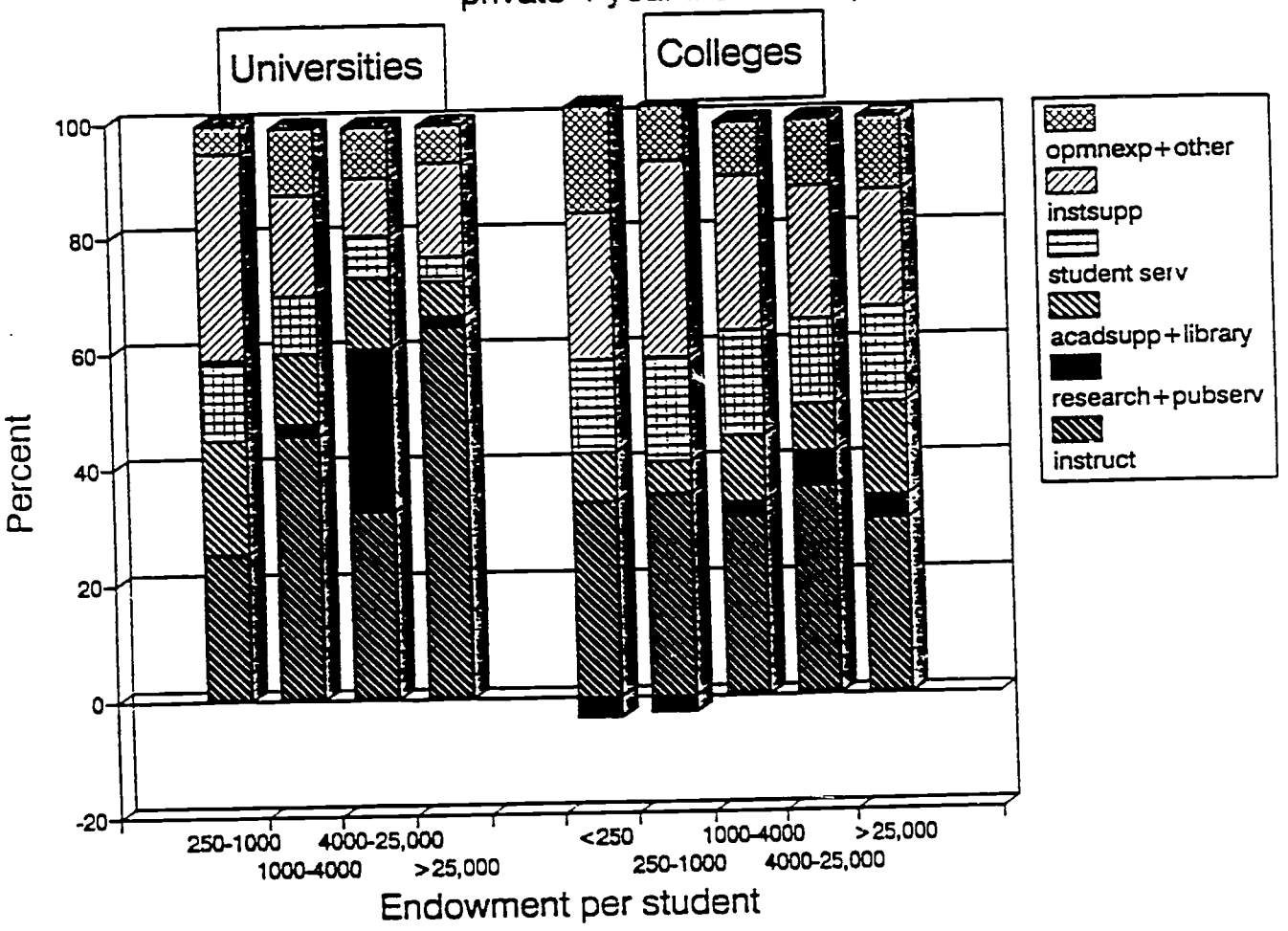
year colleges.[41] This relationship is particularly strong for the important categories of instruction and research. The large differences in spending on new plant are also noteworthy. Indeed, the most striking difference with regard to growth rates is in the plant additions category, where investment in new plant has approximately tripled at the wealthiest private universities and four year colleges. Notice though that at each wealth level, spending on new plant has grown more rapidly at universities than at four year colleges. This may well reflect the increasing cost of research-related capital investments.

Turning to shares of expenditure growth (for a graphical analysis, see Figure 2), instructional spending was an important contributor to cost growth for institutions at all wealth levels. At the least wealthy universities, institutional support was also a very large contributor to cost growth, but at other groups of universities, institutional support played a much less important role. The contribution of instruction (and self-supported research) at the wealthiest private universities is noteworthy: 64 percent of cost growth is accounted for by this one category. At private four year colleges both institutional support and student services are important contributors to cost growth. This growth presumably reflects in part the provision of additional services to students, but it also reflects more intense marketing and fund-raising efforts at private institutions.

A final observation about these tables is the following. Neither library expenditure nor spending on operation and maintenance of plant has been a major contributor to cost growth. Indeed, growth in library expenditures per student in many categories of institutions over this period barely kept pace with the growth in the index of costs of books and periodicals reported in the Higher Education Price Index (9 percent after adjusting for changes in the CPI). This is

[41]There are very few private two year colleges with endowments above $4000 per student, so we have not included breakdowns for this institution type.

Figure 2. Share in spending change, private 4-year institutions, 1979-86



somewhat surprising in light of the tendency of college presidents to cite these costs in explaining rising tuition. Indeed, ironically, library expenditure is one of the few spending categories that has been found in the literature to have a significant relation to educational outcomes (specifically, progression to graduate school). Moreover, spending on both libraries and on plant maintenance may be important to preservation of quality in the longer run. These data suggest the possibility that some categories of institutions may be deferring needed expenditures in these areas, thus contributing to a potential quality problem in the future.

Another way of assessing the significance of expenditure patterns for educational quality is to examine the impact of college expenditure levels on student enrollment choice. Do differences in the expenditure levels of institutions translate into differences in the perceived quality of the institution, as revealed in students' matriculation decisions?

To address this question, we organized per student expenditure data by the selectivity of institutions. (For further discussion of the definition of these selectivity categories, see Bradburd and Mann, "The Market for Higher Education"). Our four "selectivity" categories are: highly selective, moderately selective, less selective, and non-selective. Specifically, the "highly selective" category consists of the fifty institutions whose students had the highest combined verbal and math SAT scores;[42] the "moderately selective" category consists of all schools, excluding the fifty in the top category, that admitted less than or equal to 60 percent of their applicants; the "less selective" category consists of those institutions admitting between 61 percent and 98 percent of their applicants; and the "non-selective" category is comprised of those schools admitting either 99 percent or 100 percent of their applicants. This categorization is clearly not perfect, but when

[42]Some institutions require that applying students provide SAT scores and others require ACT scores. When we analyzed the rankings of schools based on the two measures separately and together, we concluded that incorporating ACT scores into our ranking procedure would not have changed our ranking.

we examined the lists of the schools within each category and their characteristics, we were convinced that the categorization was appropriate.

As we stated above, we defined the highly selective group to include 50 institutions. The moderately selective group contains 176 schools; the less selective group 1296 schools, and the non-selective group 806 schools. Having divided institutions into selectivity groups, we were then able to construct a three way categorization by type, control, and selectivity.

In order to analyze the effect of expenditure variation on perceived quality of institution, we need to control for differences in tuition and fees. To accomplish this, we define the "subsidy" provided by an institution as the difference between its per student expenditure level and its tuition level. Our hypothesis is that students' decisions about where to enroll will be positively influenced by this subsidy level, if in fact greater expenditures are providing improved quality.

Table 3 shows the value of the implicit annual subsidy for E&G activities received by the average student at each category of school. The data show several clear patterns. Examining the annual subsidy by institutional type, we see that the greatest implicit subsidy is provided by universities, followed at a substantial distance by four year and two year colleges. The subsidy at universities, $10,074 per year, is on average more than two and a half times that at both four year and two year colleges[43]; there is no significant difference in the subsidy offered at four year

[43]The true difference in the average annual subsidy between universities and colleges may be larger or smaller than this. First, a number of institutions that most would regard as universities, Princeton for example, are classified as "other four-year institutions" under the HEGIS definitions; similarly, a number of institutions that most would consider to be colleges are classified as universities. Second, the E&G per student figures for universities are an average of the per student figures for undergraduates and graduate students, including law, business, and medical students in many cases. Because E&G per student in graduate programs is likely to be higher than for undergraduates, the latter factor may tend to exaggerate the differences in per student E&G between universities and colleges. Finally, it may well be the case that there are differences in the subsidy per student in the provision of auxiliary services.

TABLE 3
Average subsidy by type and control and segment
Using our fully-coded sample of 2328 schools

		ELITE1				
		HIGHLY SELECTIVE	MORE SELECTIVE	LESS SELECTIVE	NON-SELECTIVE	ALL
		subsidy	subsidy	subsidy	subsidy	subsidy
		MEAN	MEAN	MEAN	MEAN	MEAN
CONTROLE	TYPEE					
PUBLIC	UNIVERSITY	13960.84	9907.65	8366.01	6916.33	8831.94
	OTHER 4-YEAR INST.	4306.72	9935.45	6438.69	4578.73	6598.39
	2-YEAR INST.	.	4731.39	4310.39	4055.55	4114.92
	ALL	11547.31	9352.81	5908.28	4106.54	5106.04
PRIVATE	TYPEE					
	UNIVERSITY	19331.48	9782.35	7726.10	.	11781.17
	OTHER 4-YEAR INST.	5370.62	3879.06	2488.03	4377.47	2916.07
	2-YEAR INST.	.	7036.46	2307.30	3118.56	2652.79
	ALL	10024.24	4467.78	2612.62	4010.29	3257.84
ALL	TYPEE					
	UNIVERSITY	18436.37	9845.00	8169.77	6916.33	10073.72
	OTHER 4-YEAR INST.	5336.30	5800.40	3409.44	4449.62	3847.95
	2-YEAR INST.	.	5243.63	3617.34	3992.58	3903.41
	ALL	10148.57	6236.50	3726.61	4088.88	4179.11

colleges and two year colleges. There are clear differences in the subsidy by control categories as well. The average annual subsidy at public institutions is about $5106, almost 60 percent higher than the average subsidy at private institutions.

The most interesting data for our purposes relate to differences in the annual subsidy per student across selectivity and control categories. The average per student annual subsidy at the 50 highly selective institutions is about $10,149 per year. The subsidy falls to $6,237 at the moderately selective institutions, to $3,726 at the less selective institutions, and then rises slightly to $4,089 at the non-selective institutions. The relation between subsidy per student and selectivity is a very strong one: schools that offer a higher subsidy per student attract a greater number of applicants per admitted student.

Within selectivity categories, there are further differences by institutional type and control. The highest subsidies are provided by the highly selective private universities: $19,331 per student per year. (Note that spending on research is included in the expenditures used in computing the subsidy.) The highly selective public universities follow with an average per student annual subsidy of $13,961. The moderately selective public and private universities, respectively, offer $9,908 and $9,782 subsidies. The highly selective private four year colleges' average subsidy is $5,371, greater than that of the only highly selective public four year college, William and Mary, whose subsidy is $4,307.

Moderately selective private four year colleges provide an average annual subsidy of $3,879, while public colleges in that selectivity category offer a substantially larger average subsidy of $9,935. A similar pattern emerges among the less selective and non-selective categories: in general, within selectivity categories, the annual subsidy per student is greater at public than at private institutions. Interestingly, the smallest subsidies are offered by private less selective four-year and two-year institutions.

These subsidy data may be useful in understanding the process by which students choose which colleges to apply to and attend. As we discussed above, expenditure data may provide useful information on the quality of services provided by institutions. Further, if resources are not being wasted, we might expect that students would earn the highest return on their own educational expenditures by attending institutions that heavily subsidize their education.

To be sure, there are many factors that affect students' application and matriculation decisions, some of which--institutional financial aid for example-- may be of equal or greater importance to students than the average educational subsidy a school provides to all students. It is also likely that students have incomplete information regarding the average subsidies offered by the various schools to which they are accepted. Nevertheless, we might expect that all other things equal, schools' relative attractiveness to potential students should vary with the educational subsidy they offer.

To test this hypothesis, we have chosen to use regression techniques to examine the relation between a schools' yield from admitted applicants and the annual subsidy it offers. We regard our empirical efforts to date as an exploratory analysis, and we fully recognize that there are numerous factors that we ignore in the analysis below, some of which we plan to consider in later work. Ideally, we would want to examine the relation between changes over time in a school's subsidy and its yield. Unfortunately, we only have yield data for a single year, and therefore this analysis is limited to a single cross-section.

One problem that complicates our analysis, and that we can not directly address, is that an institution's yield is affected by the number of schools to which a typical applicant applies. Thus, the highest yields are found among the non-selective institutions because most of their applicants apply to only one school. Unfortunately, we do not have data on the average number of schools to which each institution's applicants applied. For this reason, and because we think

that there may be other systematic effects of market segment on yield, we try to account for the effect of a school's market segment on its yield.

In the regressions below, our dependent variable, the variable to be explained, is YIELD, the ratio of an institution's matriculants to its admitted students. We employ a number of explanatory variables. First, SUBSIDY measures the difference between tuition and E&G per student exclusive of non-restricted financial aid expenditures. Next, we use dichotomous (dummy) variables to indicate whether an institution is public or private, with the dummy variable taking a value of 1 if the institution is public and a value of 0 otherwise. Similarly, we use dummy variables to indicate if an institution is a university, four year college or two year college, and into which selectivity category it falls. The dummy variables that appear in the regressions below are PUBLIC, UNIVERSITY, 4COLLEGE, HSELECT, MSELECT, AND LSELECT.[44] Most of these are self-explanatory.

Table 4 shows the results of estimating these regression equations. Equation 1 in the Table shows the effect of regressing institution yield on institution subsidy only. The subsidy is indeed statistically significant[45] as an explanatory variable, suggesting that student matriculation choices are sensitive to the annual subsidy provided by different institutions. This is of course consistent with the notion that expenditures per student may be some rough proxy for quality.

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[44]For technical reasons relating to the regression technique, there are no dummy variables to designate private institutions, two-year colleges, and non-selective institutions; the dummy variables included in the regression measure the change in the yield that results from having the characteristic indicated by a given dummy variable, all other things equal, relative to what it would be if the institution were a private, two-year, non-selective institution.

[45]The value of what is called the t-ratio for the variable SUBSIDY allows us to determine the probability that the coefficient of SUBSIDY could have its estimated value of .000297 when its true value was zero, given the variability of SUBSIDY. In this case, that probability is less than or equal to .0001, or less than one in 10,000.

TABLE 4

Dependent variable: YIELD

variable	(1) parameter estimate (t for H_0)	(2) parameter estimate (t for H_0)
INTERCEPT	63.5888[a] (120.675)	75.9413[a] (73.402)
SUBSIDY	0.0003[a] (4.041)	0.0004[a] (6.430)
UNIVERSITY	-	-21.7596[a] (-11.630)
4COLLEGE	-	-12.1458[a] (-11.807)
PUBLIC	-	4.2525[a] (4.760)
HSELECT	-	-20.1970[a] (-7.573)
MSELECT	-	-9.9555[a] (-6.331)
LSELECT	-	-9.3306[a] (-9.557)
N	2198	2198
F value	16.332	152.628
R^2	0.0074	0.3279

[a] significant at the 0.01 level

However, even though the subsidy is statistically significant, the R-squared value for the regression, only .01, indicates that the regression equation has very little explanatory power, explaining only about 1 percent of the variability in the yield across institutions. In effect, this means that while an institution's subsidy does seem to affect its yield, it certainly does not come close to fully explaining student choices. The low R-squared is not surprising: as we indicated above, the educational subsidy is only one of many factors affecting students' matriculation decisions.

Equation 2 presents the results of regressing YIELD on the subsidy as well as the other variables described above that indicate the control, type, and selectivity category of each institution. As can be seen in equation 2, the subsidy remains statistically significant in explaining the percentage of a school's admitted applicants that choose to matriculate. The various dummy variables are significant as well. The coefficients for the variables UNIVERSITY and 4COLLEGE indicate that universities' and four-year colleges' yields are, respectively, 22 percent and 12 percent lower than that of two-year colleges, all other things equal.

Equation 2 also indicates that, other things equal, public institutions have higher yields than private institutions, and that an institution's yield may be expected to be lower if it is in a higher selectivity category. These results, as well as those relating to UNIVERSITY and 4COLLEGE, may reflect differences among categories in the average number of schools to which applying students submit applications. As we indicated earlier, we have no data that allow us to directly measure the effect of this variable on an institution's yield from its admitted students.

The explanatory power of equation 2 is surprisingly high for so simple an equation. As shown by the R-squared value of .328, the variables included in equation 2 explain almost a third of the variation in institutions' yield of matriculants from admitted students.

Even though the statistical analysis presented in Table 4 is preliminary, and omits a number of factors that one would expect to affect matriculation decisions, we believe our findings to be significant.

The data presented in Table 3 show that there is a relation between subsidy per student and selectivity. Further, given the strong relation between selectivity and student ability as measured by standardized tests, these data suggest that institutions that offer higher levels of expenditures and subsidy per student have a greater ability to "select" the students they want from among applicants who score higher on standardized tests.

Our results further indicate that matriculation decisions are affected, at least to some extent, by the educational subsidy per student, and by extension, by expenditures per student.[46] Taking these various findings together, they lend some support to the hypothesis that greater educational expenditures, in excess of student charges, attract students, and therefore are at least perceived by those students as providing either educational quality or amenities that students value. These data cannot provide independent evidence about whether these student perceptions are well grounded, nor can they choose between educational improvements and amenities as factors that attract students.

In sum, both the expenditure analysis and the yield-subsidy analysis point toward the conclusion that much higher education expenditure is quality-enhancing, and that differences across schools in expenditure levels reflect quality differences. However, we have noted that at some institution types, a substantial part of expenditure increases have been in categories that are not closely related to instructional outputs. Moreover, the link we have tentatively

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[46] What are the implications of this? Suppose that those responsible for setting tuition somehow intuitively knew what our regression equations reveal. Other things equal, every extra $1000 of subsidy per student only increases a school's yield of matriculants by about four tenths of a percent. This is a relatively modest effect, suggesting that competing for students through subsidies is rather difficult.

established between subsidy and student choice may at least in part reflect the attraction of features of institutions that are not closely related to conventional understandings of educational quality.

Plainly, more study, and the development of data that will permit more detailed analysis of expenditure categories, are called for. While, as discussed above, the empirical literature linking educational inputs to various outputs is at an early stage, it is possible to identify particular types of expenditures that are linked to certain desirable outcomes. Thus, for example, class size (which is related to spending on instruction) appears to be related to progression to graduate study, test scores, student satisfaction, and earnings; while counseling and related student support services are linked to grade point averages. The educational impact of other categories of spending has not been established in the literature but would be well worth investigating. We can cite several examples pertaining to capital expenditures (which, as we note, have grown rapidly at some categories of institutions in recent years). Is there, for example, a significant relationship between expenditures on laboratory facilities and student learning in science; between spending on residential facilities and college persistence; or between investments in computer facilities and measures of student learning? A comparable range of questions could obviously be posed concerning categories of current spending. Studies at this higher level of disaggregation would certainly be helpful.

Along with econometric studies of more detailed data, case studies based on data for individual institutions would also be valuable. A useful illustration is provided in a study by Michael O'Keefe (1987), which reported on expenditure trends and patterns at six institutions. O'Keefe's analysis brings out the great variation in reasons why individual institutions have

allowed their costs to rise, as well as the important differences among different categories of institutions--such as public vs. private and research vs. teaching emphasis.[47]

Federal Policy Options[48]

How do the analytical perspectives and empirical evidence developed above bear on thinking about national policies toward higher education cost and quality, especially at the Federal level? In general, the aim of reasonable policies is to try to promote higher quality at a given cost or to economize on costs without reducing quality. We begin by considering two basic questions: (1) is there evidence that substantial portions of recent expenditure increases have been wasteful; and (2) even if expenditures have not been wasteful in the sense of failing to contribute to better education, have expenditures at some institutions simply reached a level that is beyond what the nation can afford--is the best of American higher education simply too good? Having examined these questions, we go on to consider possible strategies for direct Federal intervention to improve the "quality payoff" of higher education spending by containing cost or price increases associated with expenditures only peripherally related to quality. Following this, we consider more indirect means the Federal government might employ to pursue these goals.

Questions

Question 1: Are substantial proportions of institutions' spending on higher education socially wasteful, in the sense that reductions in spending could be achieved without impairing quality?

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[47]O'Keefe's article also rightly stresses the dangers of relying on HEGIS data at the individual institution level. More aggregated analyses, such as the one we report on here, mitigate these problems to the extent that errors at the individual institution level are unsystematic.

[48]Parts of this section draw on McPherson and Winston (1988).

Our analysis above suggests a mixed answer to this question. On the one hand, student enrollment decisions respond positively to the size of the educational subsidy they receive, indicating that, at least from the students' perspective, these expenditures are quality enhancing. Further, a good portion of increases in educational and general spending per student are allocated to instruction and instruction-related expenditure categories, suggesting that added resources are being targeted at improved quality. On the other hand, we have noted that at some categories of institutions, a sizeable portion of the increase in total expenditures (including capital as well as operating expenditures) has gone into new construction, and it appears that there have also been substantial increases in marketing related expenditures (for example, on student recruiting). Some of this new construction is surely directly related to the instructional mission of the institutions, but it is plausible that a significant fraction of it has taken the form of "competition-driven amenities" such as improved athletic facilities, dormitories, and the like. On the same lines, it is noteworthy that at public universities increases in spending on sponsored research have been a major contributor to increases in educational costs, while expenditures that seem more directly related to instruction have contributed relatively less to cost growth than at private institutions.

Question 2: Is the "best" of American higher education too good?

Few critics of American higher education would put the point this bluntly, but the question is surely worth asking. It emerges most forcefully with public reactions to high cost/high selectivity colleges. Can it really be the case that any college education is worth $160,000 - a fair estimate of the cost of the resources supplied by a college like Williams to an average undergraduate? Some flagship public institutions, sometimes referred to as the "Public Ivies", although not costing their students nearly as much as Williams, also provide quite costly undergraduate educations, and legislators may wonder about the reasonableness of that spending

as well. Even if all the spending at these institutions were devoted to improving their educational "excellence", might it be possible that they are simply aiming at a level of excellence that is beyond what is worth paying for?

It's not clear by what standard such a question can be answered. Certainly a "market" test, combining the willingness of families to pay with the willingness of donors to give, suggests that such educations are seen by their purchasers and supporters as worth the price. They obtain a wide range of benefits from their investment in college, from improved job skills to valuable social contacts, from cultural enrichment to opportunities to participate in athletic programs. Donors presumably gain satisfaction from contributing to these activities and from being made to feel part of the college or university enterprise. Perhaps one can make a similar statement about legislators or citizens who contribute to the supporting of leading public universities.

It's natural to want to duck the hard question about whether these institutions are too good by transforming it. Perhaps these colleges and universities could supply precisely the same range of services at lower costs through becoming more efficient. Or perhaps their costs should be covered differently--say by spending more out of the endowment to lower the cost to families of present education at the expense of higher prices or reduced quality for future generations, or by shifting more costs to governments. However one answers these questions, the more basic question is also worth keeping in focus: perhaps these very expensive colleges and universities really are "over the top" in the quality and variety of services they attempt to provide.

But if this really were the case, wouldn't the market let us know? Our earlier discussion suggests two reasons why the market here may not be a fully adequate means of settling on quality levels in elite higher education. First, the student cost of this kind of education is heavily subsidized, partly by governments but mainly by donors in the case of the selective private

institutions; mainly by state governments in the case of the "public ivies". If students and their families had to bear the full costs of this education, they would be likely to search harder for bargains, and thereby induce cost (and quality) cutting pressures. These pressures would be further increased if need-based student aid were reduced, since that would increase the price sensitivity of an important segment of the market.

This partial insulation of higher education from the market is a product of conscious social policy; public funds and encouragement to private donations are provided because it is thought that families would underspend on higher education without such support, and because it is thought that educational priorities within colleges and universities should not be too much dictated by the market. But it then becomes essentially a political and social judgment how intense or lavish this education should become: there is no magic to the levels of resource use at which we have arrived. Perhaps the only thing to be said is that those who genuinely think these colleges are too good should make some effort to say precisely what they should do less well as a way of saving money, and be prepared to defend that judgment against constituencies for whom those disfavored items are a high priority.

The second weakness of the market solution stems from the "signalling" phenomenon discussed earlier. Poverty of information about college quality encourages institutions to invest in visible, and costly, symbols of quality, one of which is a high price. This is, it is important to stress, not an unchecked process: if the symbols don't correspond to what students discover when they arrive on campus, that word will eventually spread. Still, the importance of signalling in an environment where schools are trying to broaden their client base has a dynamic which bears a certain analogy to the arms race. Each institution may wind up spending more than it wants--indeed charging more than it wants--to offset the signalling efforts of other schools.

To see the problem, imagine a university that believed it could deliver a better product, from students' point of view, at lower cost, through reorganizing in some ways and dispensing with some conspicuous expenditures that had little more than cosmetic value. How does this university get the message out? Surely an announcement that you are cutting price, getting rid of three club sports and two interdisciplinary programs, and replacing your IBM computer facility with two mini's, is likely to send the wrong signal. Saying that you are taking these steps not because you are desperate for students but because you see ways to improve the institution's quality by refining its focus won't cut much ice--because that is precisely what an institution that was desperate for students would say. The competitive dynamic in an information poor environment clearly has aspects that bias institutions toward higher costs and prices.

Policy Options

Direct Federal Intervention

One policy option the Federal government could consider in its worries about college costs is simply imposing price ceilings or cost ceilings on colleges and universities. The hope, presumably, is that such downward pressure on costs would force colleges and universities to curtail the aspects of their spending that are least productive. Few observers have advocated anything so drastic, but it may clarify issues to pose the matter directly. Such action might also raise constitutional questions, which we are not competent to judge, but, those worries aside, is this approach at all feasible or attractive?

The idea of the Federal government literally stipulating prices and/or expenditure levels for the more than 3500 non-profit and public colleges and universities is prima facie absurd. Besides posing enormous bureaucratic difficulties, such a step would fly in the face of traditions of decentralization and pluralism in American higher education.

Two alternatives to this blunderbuss approach are not so categorically unworkable. One would be to legislate maximum rates of increase in costs or prices for all institutions. Any such action always raises complications regarding measurement--which expenditures count; are prices per credit hour or per semester; and so on. Any price control system sets up incentives for sellers to do the accounting in ways that evade the intent of the controls; although not serious in the short run, such distortions become cumulatively more distorting as time goes on.

A more serious problem is that controls that were tight enough to be binding on either price or cost would involve the Federal government quite deeply in the setting of educational priorities for the nation's institutions. Either expenditure or price controls would make it very hard for individual institutions to change their missions and programs substantially, unless there were a system in place for providing approved exceptions to the limitations. But any board empowered to rule on such exceptions would in effect have the authority to determine the directions of change in program and mission for all the colleges and universities in the United States. If price controls extended to public higher education, the Federal government would play a key role in determining the sharing of costs between state governments and students, a role few would find desirable. A second strategy, and one that would likely be more politically popular, would simply be to regulate the costs or prices of the most expensive colleges and universities. A simple version of this regulation would be to say, for example, that no college or university whose total charges (tuition, room and board) exceeded, say, $15,000 could raise its charges by more than, say, 1 percent per year above inflation. Imposing such regulations would compel these institutions either to cut back on quality improvements, find ways to become more efficient, or draw down their endowments more rapidly, or most likely, produce some combination of the three.

THE MARKET FOR HIGHER EDUCATION: AN ECONOMIC ANALYSIS

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Introduction

The market for undergraduate higher education is an important one. In 1985-86, there were more than 3340 non-proprietary undergraduate educational institutions in the United States, enrolling a total of over 12.2 million students. Their total expenditures were over $97 billion, $76 billion of which were educational and general (E&G) expenses.[1] These institutions equip our labor force with skills essential to the functioning of a modern economy, and they play a pivotal role in determining the opportunities available to the disadvantaged.

In this paper we approach the study of undergraduate higher education from an economic perspective. This involves a detailed examination of undergraduate higher education as a market, analyzing the forces that determine how higher educational institutions (HEIs) set their fees, the forces that determine what students (or their parents) are willing to pay to attend the various kinds of HEIs, and how these interact to yield the higher educational system as we observe it. Although there are other approaches that could be used to study undergraduate higher education, we believe that this "supply and demand" analytic framework is most likely to produce useful information about future trends in the costs and prices of higher education and appropriate public policies in this area.

There are several reasons why a market analysis of higher education may be especially illuminating for understanding issues about costs and pricing at universities and colleges. First, the market perspective leads us to examine both the forces that influence institutional pricing and resource allocation decisions and, at the same time, the forces that influence customers'

[1] These data are from the Digest of Educational Statistics.

willingness to pay. It addresses the question of how these supply and demand forces shape trends in pricing, cost and enrollment outcomes.

Second, a market perspective calls attention to the tremendous variety in types of higher education, and in the costs of producing and the prices charged for postsecondary education. Aggregate analyses can easily mask the fact that some institutions charge -- and spend -- a great deal more than others; that some institutions get much of their revenues from governments or from private donors while others get most of their revenue from families' tuition payments; that some institutions concentrate almost exclusively on teaching undergraduates while others "sell" a variety of products ranging from sophisticated scientific research to semi-professional athletic contests; that some kinds of institutions have raised prices dramatically in recent years, while others have experienced much more modest increases. Somehow, all these institutions manage to coexist simultaneously in what is in some sense a single "market"; a market-oriented analysis is useful in sorting out the elements of consumer preference, market segmentation, and institutional cooperation and competition, that help to explain this distribution of institutions.

Finally, a market analysis is useful in framing issues for policy analysis. Markets that satisfy a long list of special assumptions produce outcomes that are "efficient" and therefore, in a somewhat limited sense, socially desirable.[2] We know, for reasons that will be examined below, that the higher education "market" is unlikely to satisfy these assumptions, and that, therefore, higher education will be subject to "market failures" of several kinds.

If the market for higher education is functioning poorly, the social costs are likely to be substantial: Too little or too much education - or the wrong type - may be provided; individuals

[2] For those who have never experienced the joy of taking an intermediate microeconomics course, or for those whose economic knowledge has atrophied with the passage of time and disuse, we provide in Appendix A an abbreviated discussion of what it really means for a market to be "efficient" and the conditions necessary for it to be so.

who could greatly benefit from education may be unable to obtain it; and education may be provided in an unnecessarily costly manner.

Unfortunately, the higher education market embodies a number of characteristics associated with market failure, each of which affects the market in a different way. Imperfect information is an important cause of market failure, and it pervades the market for higher education. Not only is it hard for colleges to ascertain the likely success[3] of students who apply for admission, it is exceedingly difficult for students and their future employers to accurately measure educational output. This has a powerful impact on the ways in which students choose among schools, on the ways in which schools attempt to attract students, and the means by which employers screen job applicants. We will discuss these issues in detail below.

Market failure is also common when behavior gives rise to externalities. Higher education is an activity that generates substantial positive externalities,[4] implying that private choices, even if perfectly informed, would not coincide with what is best for society. The higher education system contributes to the provision of "public goods," such as participation in the political process and upward economic mobility. This suggests that the market may tend to provide less higher education than is socially desirable. We will not devote significant attention in our market analyses to the role played by externalities or public goods, but we must take them into account when we consider policy alternatives.

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[3] "Success" here could mean a variety of different things: ability to satisfactorily complete courses taken, to satisfactorily complete degree requirements, to "do well" in college, to be a success in the world after college, etc. Different types of HEIs could have different criteria for defining success, and any given HEI is likely to be concerned with more than one of them.

[4] A positive externality exists when an action by one economic agent, taken in his own interest, confers a benefit on another for which no remuneration is received. Such externalities are common in education. For example, a person choosing to pursue higher education is unlikely to do so for the purpose of becoming a "better citizen," and yet this is a likely side-effect of education.

Finally, the functioning of the market for higher education is powerfully affected by imperfections in a different market, the capital market,[5] that complicate the process of borrowing money to finance education. Capital market imperfections, basically a situation where a person who "should" get a loan cannot do so, may affect prospective students' decisions at each stage in the matriculation process: whether to apply to college at all; what type of college to consider; and where to matriculate. They also affect institutional decisions regarding the extent and type of financial aid offered. Because schools differ in the extent to which they are able and/or willing to finance students' education from institutional sources--and thereby partially or totally circumvent the problems caused by capital market imperfections--these imperfections may play an important role in the higher education market. The vast majority of private institutions do not have the resources to overcome this market imperfection.

With capital market imperfections, imperfect information, externalities, and public good characteristics all present, the market outcome in higher education is not likely to coincide with what is best for society. The classic response to market failure is to devise public policies that improve the functioning of the market. Even in uncomplicated markets whose functioning is relatively transparent, this is not a trivial exercise. In the case of undergraduate higher education, it is a daunting task. However, an analysis that is sensitive to these dimensions of market "success" and "failure" can shed light on kinds of government interventions that may be useful in influencing the course of higher education costs and prices.

The very first problem that must be overcome is the lack of information. Data relevant to the study of higher education are collected by a variety of organizations, each of which collects

[5] In the context of higher education, the relevant capital market is the one in which people borrow money to finance education. For several reasons, including legal limitations on the collateral that the borrower can provide, lenders are less well able to protect themselves from default on education loans than in most other lending markets, and are therefore reluctant to lend money to finance investments in education.

information for a different purpose. Consequently, data samples overlap but do not coincide; definitions of terms and categories are not consistent across samples; historical data are not preserved or are not retained in computer readable form; survey instruments omit questions that could yield important information; and databases are scattered in a variety of locations, their very existence frequently unknown to many researchers.

Even with adequate data, the market for undergraduate higher education would be difficult to analyze. This is an unusually complex market. Even if we limit ourselves to non-proprietary undergraduate higher education, the market to be analyzed is a highly segmented one. Schools differ in the range of degrees and programs they offer, the geographic markets they serve, the extent to which they provide a residential college experience, the prestige\quality of the education they provide, and the affiliations (for example, religious) if any, they may carry. Most of the competition for students takes place among schools with similar characteristics; therefore, any useful study will have to differentiate among the important segments of the market.[6]

Market segmentation is not the only complicating factor with which we must deal. In contrast to most markets for goods and services, "buying education" is not simply a matter of being willing to pay the going price for it. In fact, almost by definition, the selective schools are not admitting all those who would wish to "buy their product" at the current price. To put it more technically, there is a substantial amount of non-price rationing in the allocation of higher

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[6] Market segmentation is not uncommon. For example, the automobile market is typically divided into six segments by industry analysts; subcompact, compact, sporty, standard, mid-sized and luxury. Because of data limitations, empirical analysis of the functioning of highly segmented markets in the for-profit sector is still very rudimentary. One finding from this literature, described in Bradburd and Ross (1989) that may be relevant to the higher education market is that the strategy of finding and specializing in market "niches" appears to be a successful one, even for small firms with limited resources. Greater specialization and "selective excellence" might be an option that more HEIs should consider.

education services to consumers.[7] The extent of non-price rationing varies considerably across schools, and indeed, selectivity is one of the important characteristics by which market segments are delineated.

The non-profit status of providers of higher education also complicates our analysis of this market.[8] This is so for several reasons. The objectives and behavior of non-profit organizations are different--and less well understood--than those of their for-profit counterparts: higher educational institutions are not likely to set prices that maximize current revenues minus expenditures, nor are they likely to view quality primarily as a marketing device. The non-profit status of higher education institutions is therefore likely to have an important impact not only on the nature of the product provided but also on the nature of the rivalry between institutions.

Non-profit status allows colleges and universities to focus on longer term objectives, difficult-to-value components of quality, and broader social goals. Studies from other industries suggest that there may be some resulting inefficiencies, in a narrow sense, that necessarily accompany a relaxing of attention to the short term bottom line.[9] However, in broader terms, it may be socially desirable to encourage an emphasis on long run achievement in higher education.

The non-profit status of higher education institutions also profoundly transforms the buyer-seller relationship. Donations from alumni(ae) are a prime example of this: no matter how happy they are with the goods provided by for-profit firms, satisfied customers are most unlikely

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[7] In most markets, price is the "rationing device" that determines how many people will purchase a particular product. For example, almost everyone would love to have a Rolls-Royce: it is the price tag that keeps the line of customers from getting too long in front of Rolls-Royce dealers.

[8] The term nonprofit is used here to refer to both private, independent institutions and public colleges and universities.

[9] Several studies in the area of health economics reach this conclusion. See for example. Frech and Ginsberg (1978) or Wilson and Jadlow (1982).

to bestow gifts upon them; for many private educational institutions, the observed relation between current costs and revenues is actually dependent upon the existence of such gifts. In the case of public colleges and universities, the relationship between tuition and costs is importantly affected by state and local appropriations.

Public policies designed to improve the functioning of the market for higher education must reflect its complexity. Higher education is not a monolith: Institutions differ dramatically in terms of the clientele they serve, the nature of the service they provide, and the resources available to them. These differences influence the extent to which institutions are sensitive to policy initiatives and the ways in which they will respond to them. The design of effective policy initiatives must reflect the objectives of the different types of educational institutions in several distinct market segments, as well as the different political and financial constraints that these institutions face in the short and long run.

One of the most newsworthy of recent issues in higher education involves the escalation of tuition at HEI's, particularly private elite HEIs, during the 1980's. An investigation of this issue is provided in the accompanying paper, "The Expensive Schools." Economic analysis, with its notions of supply and demand, provides a framework within which basic market forces, as well as difficult complications, such as imperfect information, nonprofit status, and imperfect capital markets, can be analyzed. This analysis is essential to the development of informed and effective policies to deal with this, as well as other issues.

Any consideration of Federal policy initiatives in the area of undergraduate higher education must recognize that higher education itself serves a number of social objectives, and that not all segments of the market contribute to the attainment of these objectives in the same way. Improving our understanding of the functioning of the higher education market is critical to identifying the tradeoffs among these objectives and to making appropriate choices.

In the sections that follow, we will describe and analyze the functioning of the market for non-proprietary undergraduate higher education in the U.S., with particular attention to the factors that determine tuition and fees. The market perspective, as we develop it here, is more useful for framing questions than for providing definitive answers. As Alfred Marshall, a noted economist from the turn of the century, said, "economics is not a body of concrete truths, but an engine for the discovery of concrete truths". Some of the issues raised in this paper are discussed in more empirical depth in companion papers to this one. Other issues that we identify are poorly understood empirically. The purpose of this paper is much more to frame the issues from a coherent and, we hope, illuminating perspective than to provide conclusive answers.

The next section describes the data that provide the basis for our descriptive statistics and empirical analyses. The following sections depict the higher education market in more detail and examines several dimensions along which it is useful to contrast HEIs; consider the choices facing college-bound students and their families; provide an analysis of the higher education market equilibrium, paying particular attention to the forms of competition; and consider the likely future of HEI's behavior with respect to expenditures, tuition, quality competition and financial aid. The final section concludes with an examination of several directions that policy might take in this area.

The Sample Data

The data used in these analyses are the result of merging the 1985-1986 "Financial Statistics of Institutions of Higher Education" and "Fall Enrollment in Colleges and Universities" data sets, which were produced as part of the Higher Education General Information Survey (HEGIS) program conducted by the National Center for Education Statistics of the U. S. Department of Education. We augmented these records with figures collected by Peterson's, a

publishing company specializing in higher education reference materials. The Peterson's data provided information concerning institutions' admissions processes, including the caliber of students admitted, the percent of applicants accepted, and the percent of accepted students that matriculated. The Peterson's data also provided demographic information.

For these analyses, we deleted records of branch campuses of schools represented elsewhere in the data as well as schools outside of the contiguous United States, Alaska, and Hawaii (195 observations and 390 observations, respectively; the intersection of the deleted groups contains 95 observations). Merging the HEGIS financial and enrollment data sets yielded an intersection of 2503 institutions. With the Peterson's data, we were able to augment 2189 of these records with admissions criteria. Table 1 describes the distribution of these schools by type and control.

We focus on the 1985-1986 academic year because HEGIS financial statistics for the following years have not yet become available, making 1985-1986 the most recent period for which all variables desired in these analyses are available. There is no reason to believe that this year is non-representative. We work with the knowledge that the number of non-proprietary institutions that fold each year is remarkably low and that admissions criteria do not change drastically from year to year. We are aware that the timing of development campaigns among HEIs might affect the relative rankings of schools through the endowment component of wealth (as well as capitalized endowment returns)[10] and thus the wealth classifications we employ, but we do not believe this introduces any systematic biases into our results.

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[10] When economists refer to the "capitalized value" value of income flows that will accrue in the future, they are in effect referring to the lump sum amount of money that one would be willing to exchange today in return for the whole of the future income flows. Crucial to this concept is the fact that money obtained today is worth more than money to be received in the future, because if one has it today, one can earn interest on it.

Table 1
cross tabulations of control by type -- 1985-1986
for complete hegis financial/enrollment merge
using only schools in contiguous US, HI, and AK
own-school e&g

	TYPEE								
	university			other 4-yr institutions			2-yr institutions		
	N	% of column	% total	N	% of column	% total	N	% of column	% total
CONTROLE									
public	54	51.4	2.47	314	25.8	14.3	742	85.7	33.9
private	51	48.6	2.33	904	74.2	41.3	124	14.3	5.66

Our fully-coded file consists of 2189 schools, a remarkably complete sample. It includes 66 percent of all schools accounted for in the Digest of Educational Statistics, 74 percent of all public schools, 59 percent of all private schools, 67 percent of all universities, 65 percent of all four-year colleges, and 66 percent of all two-year colleges.[11]

Supply of Undergraduate Higher Education

Undergraduate higher educational institutions are differentiated in several ways including type, control, wealth, and quality. In this section we describe these characteristics of institutions in detail. We also provide statistical comparisons for some of these characteristics where interesting contrasts and similarities exist. We begin with the most fundamental characteristic of an institution, its "type:" two-year college, four-year college, or university.

The Characteristics of Institutions

Type

The three major types of institutions are distinguished by the degrees they offer to matriculating students: in the main, two-year colleges, sometimes referred to as junior colleges or community colleges, grant Associate degrees as well as providing a variety of non-degree programs; four-year colleges offer Bachelor of Arts and Bachelor of Science degrees; and universities typically offer Bachelors, Masters, Doctoral, and frequently, a variety of professional degrees. Because we are focusing on undergraduate higher education, we will differentiate between two-year colleges, independent four-year colleges (i.e. those with no university affiliation), and university-affiliated four-year colleges. In the United States during the academic

[11] Our sample includes 54% of public universities, 67% of public four-year colleges, and 80% of public two-year colleges. We can also account for 82% of private universities, 65% of private four-year colleges, and 33% of private two-year colleges.

year 1985-86, there were 1311 two-year colleges, 1873 independent four-year colleges, and 156 universities.[12]

The fact that many universities offer a range of graduate and professional degrees complicates our analysis of undergraduate education. There may be spillover effects from graduate to undergraduate education. More importantly for our purposes, because reported data are typically only available in aggregated form, it is not possible to accurately attribute costs to graduate and professional versus undergraduate education.

The categorization of schools by "type" is useful for our purposes, in large part because the different types of schools compete for students in different markets. Two-year schools compete only to a very limited extent with four-year colleges; in fact, given that most two-year schools serve primarily local, commuting students, many of whom are part-time matriculants (38.2 percent of all the students at two-year colleges in our sample were part-time students), their primary "competition" is probably not other two-year schools or four-year colleges, but instead, proprietary schools and employment.[13] Four-year colleges are more likely to compete for students in a regional or national market. Furthermore, many of these students will have already made the decision to matriculate in a non-profit higher educational institution.

The average prices charged by the three types of institution differentiate them as well. The average tuition at two-year colleges is $1,113 per year; at four year colleges it is $4,256 per

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[12] Again, these numbers come from the Digest of Educational Statistics. Our sample is a subset of this group.

[13] In some states, two-year colleges provide a low-cost means of obtaining credit for the first two years of college because students who satisfactorily complete their studies at a two-year college are guaranteed admission to one of the state four-year colleges. However, the vast majority of students at two-year colleges are in vocationally oriented courses rather than pre-baccalaureate programs. According to the National Assessment of Vocational Education. U.S. Department of Education. 1989. p. 17, 78% of less-than-baccalaureate students major in vocational subjects.

year; and at universities it is $4,841 per year. The differences in the cost of attending these institutions serve to further separate the markets in which they compete.

Control

The second important distinguishing characteristic to consider is "control," with two categories: public and private. "Private control" indicates a privately governed entity, and "public control" indicates an entity that is the responsibility of government, whether local, state, or Federal. There are 1842 private colleges and universities in the United States and 1498 public institutions.[14] Nearly two thirds (62.2 percent) of these public institutions are two year colleges. In contrast, a quarter (20.6 percent) of the private colleges are two year institutions. The vast majority of the public institutions are controlled at the state level or shared state and local control. The accompanying paper, "Public Institutions," provides a detailed examination of these important schools.

Control is of interest for several reasons: it affects the nature of the sources of revenue for an institution, and it also may affect the range of an institution's objectives and constraints. As a consequence, the behavior of an institution might be expected to vary with the category of control.

There are dramatic differences in the prices schools charge when we look at public versus private tuition charges within each type. As shown in Table 2 below, public two year institutions charge an average of $787 while their private counterparts average $3062 in annual tuition. For four year colleges, tuition at public institutions averages $1427 while private four year colleges charge an average of $5237. The largest spread in tuition is at the university level where tuition at private institutions averages $7652 while public institutions charge an average of $2186 per

[14] Again, these data are from the Digest of Education Statistics, our analysis is based on a subsample of these schools.

TABLE 2
Mean tuition and fee totals per student by control and type

		HTUIFEE
		MEAN
CONTROLE	TYPEE	
public	university	2186.39
	other 4-yr inst.	1427.26
	2-yr inst.	787.26
private	university	7652.69
	other 4-yr inst.	5237.69
	2-yr inst.	3062.36

year. (Note that these tuition levels are for the academic year 1985-86. Current figures would be higher.)

Public institutions are financed in a large part by legislative appropriations; neither gifts nor endowment income contribute significantly to the operating or capital budgets of more than a few schools.[15] Relative to private institutions, student tuition payments are a smaller percentage of the E&G budget as well. (See Table 3.) At public HEIs, tuition covers an average of only 18 percent of education and general expenses while for private institutions, on average, 60.2 percent of these costs are covered by tuition revenues. Private colleges and universities finance their operating and capital budgets from tuition income, endowment income, and gifts and grants, with only very modest direct support from state governments. In the major public and private research universities, research grants may be a significant source of funding as well, although much of this likely goes either directly toward meeting the costs of funded research or, indirectly, toward the costs of graduate education.

Every institution, no matter how wealthy, is concerned with three aspects of revenue flow: (1) its level; (2) its variability; and (3) the power it has to influence its level and variability. The differences between public and private institutions are greatest with respect to the third. A private institution, even one in a precarious financial situation, can decide to raise or lower tuition, to increase or decrease spending, to save or dissave. Public institutions in many states do not directly control tuition levels or legislative appropriations for operating and capital budgets, although in some states the schools, at least formally, have direct control over tuition. (See Rusk and Leslie, 1978)

[15] These exceptions are the small number of "flagship" state universities.

Table 3
Average Percents of E&G/current fund revenues

	TYPEE													
	university						other 4-yr inst.						2-yr inst.	
	tuition as a % E&G	endowment income as a % of E&G	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G	tuition as a % E&G	endowment income as a % of E&G	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G	tuition as a % E&G	endowment income as a % of E&G
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN
CONTROLE														
public	0.209	0.013	0.539	0.167	0.054	0.982	0.218	0.003	0.611	0.137	0.020	0.989	0.161	0.002
private	0.477	0.053	0.085	0.209	0.098	0.923	0.619	0.057	0.017	0.121	0.138	0.953	0.530	0.033
all	0.340	0.032	0.318	0.188	0.075	0.953	0.516	0.043	0.170	0.125	0.108	0.962	0.214	0.007

Average percents of E&G/current fund revenues

	TYPEE									
	2-yr inst.				all					
	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G	tuition as a % E&G	endowment income as a % of E&G	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN
CONTROLE										
public	0.679	0.149	0.006	0.997	0.180	0.003	0.653	0.146	0.012	0.994
private	0.125	0.161	0.105	0.955	0.602	0.054	0.033	0.130	0.133	0.952
all	0.600	0.150	0.020	0.991	0.388	0.028	0.347	0.138	0.072	0.973

The level of tuition at state and locally funded institutions is a political decision that reflects many objectives, not just educational ones. The same is true of the level of expenditures.[16] This may be one reason that there is a significantly greater gap between sticker price and expenditures per student in the public higher educational institutions than in the private ones. Public schools do appear to have some degree of control over the composition or allocation of spending, even in situations where legislators attempt to direct expenditures to particular ends.[17]

Public control affects the behavior of decision-makers within educational institutions as well. Public institutions may have no formal mechanism for saving, i.e. an endowment, and informal mechanisms, such as agreeing to spend less today on current operations in order to accumulate funds for a capital expenditure at a later time, may be vulnerable to too much political uncertainty to be viable.

The classic bureaucratic response to external control of funding is to spend all the currently allocated funds, and ask for more, because frugality will only be rewarded with a budget reduction in the next period--the "use it or lose it" problem noted by Niskanen (1971). Public institutions presumably are not immune to the incentives that drive other organizations. This would suggest that some benefits might be had from guaranteed multi-year legislative budgeting for higher education.

Public control also affects the objectives of higher educational institutions. Public institutions do not set their own objectives. An HEI mandated to have an open admissions

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[16] This is to some extent true of private schools as well, although the political constraints affecting private HEI's decisions may operate more indirectly.

[17] See Rusk and Leslie (1978) on tuition setting for the public sector. Estelle James (1986) has written on the bargaining that occurs between public HEI's and legislatures on the allocation of resources within the HEI.

policy, or to be other than a top-tier school in a multi-tiered state system, must operate within those constraints, even if legislators sometimes cannot induce public institutions to do exactly what they wish them to. This affects the incentives facing administrators and, to some extent, individual faculty members. For example, an institution that is legislatively constrained not to become more selective might have less of an incentive to allocate extra resources to improving "quality" as a means of competing for better students than a school not similarly constrained, even if the extra resources were provided with that intent, because the constraint reduces the payoff of such expenditures. Conceivably, the money might be spent in ways that improve the lot of faculty and administrators instead. Sound Federal public policies will require sensitivity to the different incentives that govern behavior at the various kinds of institutions.

Wealth

Sophie Tucker once said: "I've been rich, and I've been poor. Believe me, honey, rich is better." Few college presidents would disagree.

Wealth brings several advantages to colleges and universities. At the most basic level, wealth allows colleges to purchase inputs that make possible a better quality product: better faculty, better buildings, laboratories and libraries, and even, through the use of merit aid, better students. It allows them to devote significant resources to long term goals and to avoid having to make budget adjustments in response to short term financial fluctuations.[18] These are very important advantages.

[18] One of the more influential and important works in the economics of higher education was the Ford Foundation report published in 1969 that encouraged schools to move away from basing operating budgets on annual endowment yield, a policy that led to budget whip-sawing, and instead to adopt a system in which some fixed percentage of endowment was to be spent each year. Of course, this recommendation was not of much practical value to the majority of schools that have no significant endowment. (See the data presented below.)

Institutional wealth is easier to recognize than to define, in part because it may take several forms. One form is endowment, especially unrestricted endowment[19]; other forms are physical assets such as buildings and land, annual legislative appropriations, and annual gifts and grants. Each of these embodies, to a different degree, various characteristics that affect the level, the variability, and the extent of institutional control of revenue flows.[20]

Although clearly not a comprehensive measure, for private colleges and universities, unrestricted endowment is nevertheless an excellent indicator of wealth. This wealth is concentrated in the hands of a very few educational institutions.

Table 4 below provides data on the number of public and private institutions that can sustainably finance[21] various percentages of their own annual educational and general (E&G) expenditures from endowment income. These expenditures comprise the budget for instructional and administrative activities at HEIs. These data are very instructive. Of 1079 private colleges and universities in our sample, over 30 percent have no endowment at all. Only 1.4 percent have an endowment sufficient to sustainably finance 20 percent of annual E&G costs per student. Thus, the vast majority of HEIs are very dependent upon public appropriations, tuition and fees, and gifts and grants.

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[19] Even here, one must be careful to distinguish between gross endowment and net endowment, where net endowment is gross endowment minus net indebtedness. See Winston (1988). Data on net indebtedness are available in HEGIS, allowing net endowment to be approximated.

[20] There are some situations in which it would seem reasonable to include future tuition revenues as a form of wealth as well. However, as there tends to be an extremely close relation between increases in tuition revenues and increases in expenditures, we do not view it wise to include the value of future tuition revenues as part of wealth.

[21] We define the sustainable rate of annual availment of endowment to be the maximum rate of availment that will allow the real level of endowment (i.e., accounting for inflation) to be maintained. We will assume that rate to be 5%. This figure reflects the actual behavior of colleges and universities as documented in the 1989 NACUBO Endowment Study.

Table 4
cross tabulations of control by type -- 1985-1986
for complete hegis financial/enrollment merge
using only schools in contiguous US, HI, and AK
own-school e&g

		TYPEE								
		university			other 4-yr institutions			2-yr institutions		
HIENDOW	CONTROLE	N	% of type	percent of universe	N	% of type	percent of universe	N	% of type	percent of universe
5% endow <= 1% of E&G	public	40	38.1	1.83	297	24.4	13.6	732	84.5	33.4
	private	8	7.62	0.37	277	22.7	12.7	67	7.74	3.06
5% endow > 1% but <= 5% of E&G	public	12	11.4	0.55	17	1.40	0.78	8	0.92	0.37
	private	24	22.9	1.10	391	32.1	17.9	46	5.31	2.10
5% endow > 5% but <= 10% of E&G	public	2	1.90	0.09	.	.	.	.	.	.
	private	12	11.4	0.55	133	10.9	6.08	7	0.81	0.32
5% endow > 10% but <= 15% of E&G	public	.	.	.	.	.	.	1	0.12	0.05
	private	5	4.76	0.23	56	4.60	2.56	1	0.12	0.05
5% endow > 15% but <= 20% of E&G	private	1	0.95	0.05	19	1.56	0.87	2	0.23	0.09
5% endowment>20% of annual E&G total	public	.	.	.	.	.	.	1	0.12	0.05
	private	1	0.95	0.05	28	2.30	1.28	1	0.12	0.05

Not all wealth is money in the bank or stocks and bonds. Regular income flows also represent wealth. There is little material difference between having a million dollars and having an assured flow of income equal to what one could annually earn if one had a million dollars. However, the word "assured" in the preceding sentence is very important: the greater the uncertainty attached to the annual flow of income, the less that income flow resembles an endowment.

If regular income flows are also wealth, then Table 4 above may misrepresent the degree to which wealth is concentrated in the hands of a few schools. There are many state schools that receive very large annual appropriations from their state legislature, and the net present value[22] of these appropriations, were they to remain constant after correcting for inflation, might well be larger than the endowments of many colleges and universities that are considered "wealthy." Thus, it is probably more appropriate to measure wealth inclusive both of endowment and of the capitalized value of income flows. Importantly, doing so would also provide a means of comparing the wealth of private and public HEIs.

Legislative appropriations for public institutions are not the only source of non-endowment related regular income flows. For many colleges and universities, annual alumni donations, gifts and grants are an important source of revenue. These too should be considered in measuring HEIs' wealth.

There are clearly problems inherent in any effort to incorporate the capitalized value of future income flows, and so our efforts must be taken as an attempt to do no more than

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[22] The net present value (also called the discounted value or capitalized value) is the current value of a flow of income that accrues over time. To find the net present value of a flow of income, the income accruing in each year in the future is divided by a discount factor appropriate to that year, and the resulting quotients are then summed. The discount factor appropriate to each year is equal to the sum of one plus the interest rate (also called the discount rate), the latter expressed as a decimal number, all raised to the nth power, where n is the number of years between the present and the year in which the income flow occurs.

approximate the wealth of HEIs. One obvious problem is that we have no way of knowing exactly what the future income flows of HEIs will be. Neither do the schools of course, and this is why none of them would regard the present value of anticipated future revenue flows as equivalent to the same dollar amount of endowment. For example, the extent to which public institutions are rightfully described as wealthy depends upon the assurance that the annual legislative appropriations will continue, and perhaps, in some contexts, on the extent to which the continuing flow of money is contingent upon "good behavior" as defined by the controlling political entity.

Ideally, to approximate HEIs' wealth, we would somehow adjust for uncertainty in calculating the net present value of the expected future income flows. However, beyond picking some rather arbitrary adjustment factor, it simply isn't clear how to go about this, and to avoid being misleadingly precise, we will not attempt to do so. In our calculations, we have assumed that each HEI will continue to receive, in perpetuity, the level of public appropriations and gift and grant income that it enjoyed in 1985-86.[23] To arrive at the net present value of these flows, we assume a discount rate of 8 percent. We add current endowment to this net present value to derive our measure of "wealth."

We would expect larger schools to have both greater expenses and larger revenues than smaller schools, and so it is useful to measure wealth on a per student basis. Table 5 below shows that there is also great variability in wealth measured on a per student basis, the first column of Table 5 measures wealth by endowment alone and the second column measures wealth including the capitalized value of other regular income flows. The data in Table 5 show that the wealthiest 10 percent of schools have a level of "inclusive" wealth per student that is more than

[23] Clearly, a problem is created if an HEI was engaged in a major capital fund drive during 1985-86. We have made no attempt to correct for this problem or other randomness introduced by selecting a single year on which to base these measurements.

Table 5
Distribution of endowment and wealth using capitalized flows
-- not including tuition --

	endowment per student	wealth per student
	MEAN	MEAN
WEALTHE		
1st decile	0.00	13440.70
2nd decile	0.00	25845.49
3rd decile	0.00	34890.54
4th decile	6.60	41555.13
5th decile	90.25	47702.09
6th decile	488.95	53674.79
7th decile	1431.23	61662.65
8th decile	3263.12	71353.50
9th decile	6313.11	87539.99
richest 10% of schools	39702.48	167936.74

12 times greater than that of the poorest 10 percent of schools![24] (The dollar figures are $167,937 per student versus $13,440 per student.)

There is a clear relation between HEIs' type and control and their level of wealth. The data in Table 6 give average "inclusive" wealth per student for public and private two year colleges, public and private four year colleges, and public and private universities. Two year colleges are significantly less wealthy than the independent four year colleges. Independent four year colleges appear less wealthy than four year colleges incorporated into universities, but this may simply reflect the fact we were unable to apportion universities' wealth between the graduate and undergraduate divisions.

One of the striking findings shown in Table 6 is that when we employ a more inclusive measure of wealth that includes the capitalized value of annual income flows, public four-year and two-year colleges actually appear to be wealthier on average than private four year and two year colleges. It is only the private universities that are wealthier than their public counterparts. Public perceptions of the relative wealth of public and private institutions are clearly affected by the great wealth of a few elite private institutions. We suspect that most people tend to underestimate the magnitude of direct public subsidies to public colleges and universities.

The reader will note that we have not included buildings and other physical assets in our measure of wealth. There are two reasons for this. First, there is great inconsistency in the way that HEIs value such assets on their balance sheets. Historical cost may be a tiny fraction of the market value or replacement cost of many college and university buildings. Second, many college and university buildings cannot readily be sold. And because owning a building generally also means owning the responsibility of maintaining it, a building, even one with a high replacement

[24]Considering just endowment, the wealthiest 10% of schools have a level of endowment per student that is more than four orders of magnitude greater than that of the poorest 40% of schools -- $39,702. vs. $1.65!

Table 6
Inclusive wealth by control and type

		wealth per student
		MEAN
CONTROLE	TYPEE	
public	university	121147.63
	other 4-yr inst.	74149.16
	2-yr inst.	57579.83
private	university	165495.43
	other 4-yr inst.	51921.37
	2-yr inst.	35686.25

cost, can potentially be a liability. In all likelihood, including such assets in our measure of wealth would only have increased the degree of wealth inequality.

Table 7 shows the proportion of wealth accounted for by legislative appropriations, flows of gifts and grants, and endowment for public and private HEIs by type. As is evident, public appropriations are relatively insignificant for private institutions, and gifts and grants are a relatively minor source of wealth for the majority of public institutions.

Differences in HEIs' level of wealth and its sources may have significant implications for future trends in the costs of providing higher education and tuition levels as well. We discuss these later in our paper.

We show below that there are great differences in the sources of funding for E&G expenditures among HEIs within many of the control and type categories. The more prestigious institutions fund more of their activities from gifts and grants and--especially in the case of private institutions--from endowment income, than less selective HEIs.[25]

Quality

Higher educational institutions presumably also differ in regard to the "quality" of the product they provide. We must be very careful here, however. Making comparisons of quality not only involves intractable measurement problems, but conceptual difficulties as well. Different types of institutions serve different students; the best kind of instruction for gifted students may be inappropriate for less academically oriented students, and vice versa. Ideally, quality would be measured relative to the HEIs' educational objectives.

[25] Ideally, we would wish to distinguish between gifts and grants, as the former is less likely to bring with it an obligation to perform a given activity. Present data limitations prevent us from satisfactorily doing so.

Table 7
Mean components of total capitalized wealth
Appropriations and Gifts, Grants & Contracts are capitalized values

CONTROLE																										
public												private												ALL		
TYPEE												TYPEE												TYPEE		
university			other 4-yr inst.			2-yr inst.			ALL			university			other 4-yr inst.			2-yr inst.			ALL			university		
% Appropriations	% Gifts, Grants & Contracts	% Endowment	% Appropriations	% Gifts, Grants & Contracts	% Endowment	% Appropriations	% Gifts, Grants & Contracts	% Endowment	% Appropriations	% Gifts, Grants & Contracts	% Endowment	% Appropriations	% Gifts, Grants & Contracts	% Endowment	% Appropriations	% Gifts, Grants & Contracts	% Endowment	% Appropriations	% Gifts, Grants & Contracts	% Endowment	% Appropriations	% Gifts, Grants & Contracts	% Endowment	% Appropriations	% Gifts, Grants & Contracts	
MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	
.686	.299	.015	.790	.206	.004	.809	.189	.002	.798	.199	.003	.117	.735	.148	.038	.821	.140	.173	.748	.079	.057	.809	.134	.410	.511	

ALL										
TYPEE										
university	other 4-yr inst.			2-yr inst.			ALL			
% Endowment	% Appropriations	% Gifts, Grants & Contracts	% Endowment	% Appropriations	% Gifts, Grants & Contracts	% Endowment	% Appropriations	% Gifts, Grants & Contracts	% Endowment	
MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	
.080	.232	.663	.105	.719	.269	.013	.433	.500	.067	

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Even here, there are difficult issues to confront. Unless resources are wasted, higher quality can be obtained with greater resource expenditure. Therefore, from a resource allocation perspective, we would want some measure of quality output per dollar of expenditure. An indicator such as this is still more difficult to achieve. (See the companion paper, "Understanding the "Quality Issue in U.S. Higher Education," for a more thorough discussion of the quality issue.)

The fact that quality is difficult to define and measure accurately does not prevent people from forming judgments about schools' relative quality, however well or ill-informed these judgments may be. And for a variety of reasons[26], schools' reputations for quality play a critical role in the higher educational market.

For the purpose of understanding how students sort themselves, and are sorted into, various colleges and universities, it may be best to focus on the role of schools' reputation for quality as opposed to the true level of quality or quality per dollar.[27] This is so for several reasons.

As a practical matter, a student cannot "test drive" a college to develop an accurate measure of its quality. It may take a lifetime to develop an accurate sense of how good an education one received at college. Campus visits provide at most very limited information. Guidance counselors, friends and parents obviously lack direct experience with most schools. College guidebooks suffer from the same limitations; even those that compile information from student surveys are relying on information provided by consumers each of whom has experience with only one school and lack comparative information. As a result, financial and locational

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[26] Most of these reasons have to do with the role of imperfect information in the higher educational market. We will discuss these in detail below.

[27] In contrast, for the purposes of public policy making, we should probably be concerned more with actual quality per dollar than with reputation for quality.

considerations aside, most students make their college application and matriculation decisions on the basis of institutions' reputations. The factors that affect a school's reputation may differ across schools. In two year colleges, job placement rates or prospects for transfer to a four year school may be critical. Class size and instructor quality may be important for schools competing in a national market.

For the purposes of this study, and fully recognizing the limitations of the categories we employ, we will differentiate between four "quality reputation categories." Given the importance of measuring quality relative to educational objectives, we have chosen to describe these categories as "selectivity categories" rather than quality categories.

Our four selectivity categories for higher educational institutions are defined on the basis of average measured student ability (as measured by average SAT scores) and selectivity (the percentage of applying students admitted). They are:

(1) "highly selective" schools: these are the 50 schools with the highest average combined math and verbal SAT scores;

(2) "moderately selective" schools: these schools admit less than 61 percent of all applicants, excluding the 50 schools with the highest average combined SAT scores;

(3) "less selective" schools: those schools that admit between 61 percent and 98 percent of all applicants;

(4) "non-selective" schools: these are schools that admit 99 percent or 100 percent of all applicants.

Certainly other dimensions, such as simple SAT or ACT scores of students or level of E&G expenditures per student, might be used to delineate quality groups. However, selectivity has the advantage of being a market-based criteria; the applications a school receives are indicators of the level of demand for the product an institution is providing. We would expect this demand to be related to an institutions's quality reputation.

For informational purposes, we include below, in Table 8, a listing of the schools in the highly selective group by SAT scores. We appreciate that many schools rely on ACT scores more heavily than SAT scores, but after ranking schools by ACT score, we concluded that the schools with the highest ACT scores that were suited for a list of "highly selective"/elite schools were also among the schools with the highest SAT scores and therefore that our list of "highly selective" schools is a representative one.[28]

Table 9 lists the number of two-year and four-year colleges and universities in each selectivity category, with a further breakdown between public and private HEIs. As is apparent in the table, private colleges and universities dominate the "highly selective" category, both public and private colleges play a significant role in the "moderately selective" category, private four-year colleges dominate the "less selective" category, and public two-year schools dominate the non-selective category.

Reputations for quality vary across institutions from poor to outstanding. Institutions can have national (even international) reputations, or just regional or local reputations. We would expect that there is a strong relation between the geographic reach of institutions' reputations and their level of reputed quality. This is supported by the data in Table 10 which gives the median number of states and foreign countries of origin for students in HEIs by control, type and selectivity category.

We have indicated that selectivity can be a useful means of categorizing HEIs. Table 11 below gives the numbers of all schools admitting less than 50 percent, 50 percent to 60 percent,

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[28] The reader may wonder why we did not simply define the "highly selective" category to be the fifty (or some other appropriate number) most selective schools in our sample. We constructed a list of the 100 most selective schools and found that a very large number were either small religious institutions, fine arts institutions (frequently small), or craft and technical schools with a very narrow orientation. We concluded that the list so constructed did not coincide with the popular conception of the nation's most prestigious HEIs.

Table 8
Most Elite Schools

	NAME	SATM	CONTROL	TYPE
1	Massachusetts Institute of Technology	1371	2	1
2	Harvard University	1351	2	1
3	Princeton University	1349	2	2
4	Harvey Mudd College	1348	2	2
5	Yale University	1346	2	1
6	Williams College	1332	2	2
7	Amherst College	1327	2	2
8	Johns Hopkins University	1314	2	1
9	Swarthmore College	1312	2	2
10	Stanford University	1311	2	1
11	Brown University	1297	2	2
12	University of Pennsylvania	1295	2	1
13	Wesleyan University	1293	2	2
14	Columbia College	1292	2	1
15	Haverford College	1285	2	2
16	Duke University	1280	2	1
17	Carleton College	1272	2	2
18	Bryn Mawr College	1272	2	2
19	Pomona College	1270	2	2
20	Georgetown University	1268	2	1
21	Cornell University	1259	2	1
22	University of Chicago	1256	2	1
23	Vassar College	1248	2	2
24	Reed College	1246	2	2
25	Bowdoin College	1245	2	2
26	Rensselaer Polytechnic Institute	1245	2	2
27	Davidson College	1242	2	2
28	Middlebury College	1233	2	2
29	Wellesley College	1231	2	2
30	Tufts University	1231	2	1
31	Rose-Hulman Institute of Technology	1226	2	2
32	St. John's College	1226	2	2
33	University of Virginia	1223	1	1
34	Northwestern University	1222	2	1
35	University of California at Berkeley	1221	1	1
36	University of Notre Dame	1215	2	1
37	Trinity College	1213	2	2
38	College of William and Mary	1212	1	2
39	St. John's College	1212	2	2
40	Colgate University	1212	2	2
41	Washington and Lee University	1209	2	2
42	Oberlin College	1208	2	2
43	Claremont McKenna College	1208	2	2
44	Brandeis University	1206	2	2
45	Lehigh University	1205	2	2
46	Grinnell College	1204	2	2
47	University of Michigan	1204	1	1
48	Colorado College	1202	2	2
49	Lafayette College	1196	2	2
50	Washington University	1195	2	1

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Table 9
Distribution of schools by control, type, and selectivity

		ELITE1											
		highly selective			more selective			less selective			non-selective		
		N	% of column	% total	N	% of column	% total	N	% of column	% total	N	% of column	% total
CONTROLE	TYPEE												
public	university	3	6.00	0.14	6	3.82	0.27	44	3.59	2.01	1	0.13	0.05
	other 4-yr institutions	1	2.00	0.05	41	26.1	1.87	217	17.7	9.91	55	7.27	2.51
	2-yr institutions	.	.	.	6	3.82	0.27	154	12.6	7.04	582	76.9	26.6
private	university	15	30	0.69	8	5.10	0.37	28	2.29	1.28	.	.	.
	other 4-yr institutions	31	62	1.42	95	60.5	4.34	706	57.6	32.3	72	9.51	3.29
	2-yr institutions	.	.	.	1	0.64	0.05	76	6.20	3.47	47	6.21	2.15

Table 10
Distribution of schools by selectivity, control, and type
disregard the mean statistic label - this is a mean of 1 number
(Number of countries has been capped at 50)
(Number of states has been capped at 54)

		median number of countries			median number of states		
		CONTROLE			CONTROLE		
		public	private	ALL	public	private	ALL
		MEAN	MEAN	MEAN	MEAN	MEAN	MEAN
ELITE1	TYPEE						
most elite	university	50	50	50	53	52	53
	other 4-yr inst.	30	25	28	49	47	48
	ALL	40	38	39	51	50	50
more selective	TYPEE						
	university	50	50	50	47	50	49
	other 4-yr inst.	29	17	23	22	30	26
	2-yr inst.	0	.	0	5	6	6
	ALL	26	34	29	25	29	27
less selective	TYPEE						
	university	50	50	50	50	49	50
	other 4-yr inst.	26	10	18	32	24	28
	2 yr inst.	5	5	5	6	13	9
	ALL	27	22	24	29	29	29
non selective	TYPEE						
	university	50	.	50	48	.	48
	other 4-yr inst.	11	6	9	24	22	23
	2-yr inst.	5	3	4	7	8	8
	ALL	22	5	15	26	15	22

Table 11

Selectivity index -- wealthw by elite by control by type by selectivity
Using only schools in contiguous US, HI, and AK

		SELECT				
		less than or equal to 50% accepted	more than 50%, less than 61% accepted	more than 60%, less than 99% accepted	99% or 100% accepted	ALL
		N	N	N	N	N
CONTROLE	TYPEE					
public	university	5.00	4.00	44.00	1.00	54.00
	other 4-year school	15.00	27.00	217.00	55.00	314.00
	2-year school	2.00	4.00	154.00	582.00	742.00
	ALL	22.00	35.00	415.00	638.00	1110.00
private	TYPEE					
	university	18.00	4.00	29.00	.	51.00
	other 4-year school	60.00	61.00	711.00	72.00	904.00
	2-year school	.	1.00	76.00	47.00	124.00
	ALL	78.00	66.00	816.00	119.00	1079.00
ALL	TYPEE					
	university	23.00	8.00	73.00	1.00	105.00
	other 4-year school	75.00	88.00	928.00	127.00	1218.00
	2-year school	2.00	5.00	230.00	629.00	866.00
	ALL	100.00	101.00	1231.00	757.00	2189.00

61 percent to 98 percent, and 99-100 percent of applicants. It is striking to note that only 100 schools, or less than 5 percent of all institutions, admit fewer than 50 percent of their applicants.[29] Almost a third admit 99 percent or 100 percent of their applicants.

Our quality categorization is strictly based on student ability and selectivity. But not surprisingly, there is a high correlation between institutional wealth and quality reputation. Looking first at private schools only, we see in Table 12 below that of the 46 schools categorized as highly selective, fully 89 percent (41 out of 46) are in the wealthiest 10 percent of schools as measured by our inclusive measure of wealth per student and fully 100 percent (46 out of 46) are in the wealthiest 20 percent of schools. Of the four highly selective public HEIs, three are among the wealthiest 10 percent schools using our more inclusive measure of wealth.

Highly selective schools use their wealth to fund greater educational expenditures per student than is provided by less selective HEIs. As can be seen in Table 13 below, the Educational and General (E&G) expenditures per student across selectivity categories show a clear pattern of higher expenditures in the more selective schools.

The relation between selectivity and wealth should come as no surprise. Wealthy schools have the ability to subsidize students' education by drawing on their wealth, thereby charging students less than the "full cost" of providing their education. That this occurs is easily seen in Table 14 below, which shows the educational subsidy HEIs provide by type, control and selectivity category, where subsidy is measured as the difference between tuition per student and Educational and General expenditures per student, net of financial aid. It is very interesting to note that it is only in the highly selective group that private HEIs provide a higher per student subsidy than public schools.

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[29] We recognize that measures of selectivity ignore the problem of self-selection. Obviously, some students are discouraged from applying to the selective schools precisely because they have high admissions hurdles. There is no obvious way to surmount this measurement problem.

TABLE 12
Distribution of schools by wealth categories, control, type, and selectivity

	CONTROLE						
	public						
	TYPEE						
	university				other 4-yr inst.		
	ELITE1				ELITE1		
	most elite	more selective	less selective	non-selective	most elite	more selective	less selective
	N	N	N	N	N	N	N
WEALTHW							
1st decile	.	.	.	.	.	.	.
2nd decile	.	.	.	.	.	.	.
3rd decile	.	.	.	.	.	.	14.00
4th decile	.	.	.	.	.	4.00	14.00
5th decile	.	.	2.00	.	.	3.00	26.00
6th decile	.	.	1.00	.	.	2.00	30.00
7th decile	.	.	2.00	.	.	4.00	23.00
8th decile	.	.	6.00	.	1.00	11.00	31.00
9th decile	.	2.00	7.00	1.00	.	8.00	42.00
richest 10% of schools	3.00	4.00	26.00	.	.	9.00	37.00

(CONTINUED)

TABLE 12 (cont.)
Distribution of schools by wealth categories, control, type, and selectivity

	CONTROLE						
	public				private		
	TYPEE				TYPEE		
	other 4-yr inst.	2-yr inst.			university		
	ELITE1	ELITE1			ELITE1		
	non-selective	more selective	less selective	non-selective	most elite	more selective	less selective
	N	N	N	N	N	N	N
WEALTHW							
1st decile	.	.	1.00	1.00	.	2.00	5.00
2nd decile	1.00	.	1.00	21.00	.	.	.
3rd decile	2.00	1.00	12.00	59.00	.	1.00	2.00
4th decile	6.00	.	26.00	89.00	.	.	1.00
5th decile	8.00	.	24.00	91.00	.	.	4.00
6th decile	10.00	.	31.00	80.00	.	1.00	.
7th decile	9.00	.	16.00	88.00	.	1.00	1.00
8th decile	10.00	2.00	18.00	77.00	.	.	3.00
9th decile	8.00	2.00	19.00	59.00	2.00	.	.
richest 10% of schools	1.00	1.00	6.00	17.00	13.00	3.00	12.00

(CONTINUED)

TABLE 12 (cont.)
Distribution of schools by wealth categories, control, type, and selectivity

	CONTROLE						
	private						
	TYPEE						
	other 4-yr inst.				2-yr inst.		
	ELITE1				ELITE1		
	most elite	more selective	less selective	non-selective	more selective	less selective	non-selective
	N	N	N	N	N	N	N
WEALTHW							
1st decile	.	22.00	129.00	13.00	.	23.00	15.00
2nd decile	.	12.00	150.00	12.00	.	17.00	3.00
3rd decile	.	2.00	101.00	7.00	.	9.00	8.00
4th decile	.	7.00	58.00	8.00	1.00	7.00	4.00
5th decile	.	4.00	55.00	4.00	.	3.00	3.00
6th decile	.	4.00	56.00	1.00	.	5.00	4.00
7th decile	.	10.00	44.00	7.00	.	7.00	4.00
8th decile	.	5.00	40.00	9.00	.	3.00	3.00
9th decile	3.00	11.00	42.00	8.00	.	.	1.00
richest 10% of schools	28.00	18.00	31.00	3.00	.	2.00	2.00

Table 13
Weighted mean of E&G expenditures per student by selectivity
Net of unrestricted scholarship expenditures
Not weighted by enrollment

ELITE1			
most elite	more selective	less selective	non-selective
EANDGPS	EANDGPS	EANDGPS	EANDGPS
MEAN	MEAN	MEAN	MEAN
20089.06	9609.23	7437.73	5133.10

Table 14
Average subsidy by type and control and segment
Using our fully-coded sample of 2312 schools

		ELITE1				
		HIGHLY SELECTIVE	MORE SELECTIVE	LESS SELECTIVE	NON-SELECTIVE	ALL
		subsidy	subsidy	subsidy	subsidy	subsidy
		MEAN	MEAN	MEAN	MEAN	MEAN
CONTROLE	TYPEE					
PUBLIC	UNIVERSITY	13455.77	11122.84	8315.09	7034.73	8888.95
	OTHER 4-YEAR INST.	5095.82	6115.03	5570.81	4555.36	5462.49
	2-YEAR INST.	.	5023.66	4407.54	4185.67	4238.50
	ALL	11365.79	6558.40	5430.10	4222.01	4810.98
PRIVATE	TYPEE					
	UNIVERSITY	20736.15	7213.57	7200.19	.	11183.45
	OTHER 4-YEAR INST.	6146.07	3959.15	2557.99	3557.48	2907.88
	2-YEAR INST.	.	3207.29	2450.92	2681.91	2544.57
	ALL	10903.71	4202.26	2708.42	3211.67	3257.28
ALL	TYPEE					
	UNIVERSITY	19522.76	8888.97	7881.52	7034.73	10003.42
	OTHER 4-YEAR INST.	6113.25	4609.08	3266.31	3989.63	3566.46
	2-YEAR INST.	.	4764.18	3761.00	4073.31	3995.95
	ALL	10940.67	4997.64	3630.46	4063.18	4045.14

All other things equal, we would expect demand for admission to an HEI to increase with the subsidy per student, as measured by expenditures minus tuition. Because the selective schools only admit a fixed number of students per year, regardless of the number of applicants, the relation between wealth and subsidy and the relation between subsidy and demand together suggest that selectivity should increase with HEI wealth. As we saw in Table 12 above, this is the case.

It is not enough to know that more selective HEIs spend more per student: clearly, it is of great interest to know on what the money is being spent. The HEGIS data do not allow us to answer this question in a fully satisfactory manner, but some of the data are revealing.

Table 15 below provides information on student to faculty ratios for HEIs categorized by type, control, and "quality" groupings. As can be seen in this table, for the two highest selectivity categories, private universities and four-year colleges provide lower ratios of student to faculty than do their public counterparts. For the two lowest selectivity categories this relationship is reversed for these two HEI types. (There is no such clear pattern for two-year colleges.) Further, student to faculty ratios are generally lower for the higher quality schools. Public or private, the difference between the elite universities and the non-selective two-year colleges is quite striking.[30]

[30] The data in Table 15 refer to the ratio of full time faculty to students, and are drawn from the Peterson's Guide data. We performed similar analyses using the total number of faculty to students, and obtained quite different results. The explanation is that the less selective schools teach a far greater number of their classes using part-time faculty, which greatly increases the number of faculty. To test the robustness of the results in Table 15, we created a similar table in which we computed the faculty to student ratios by assuming that the total number of full-time equivalent faculty is equal to the number of full time faculty plus one-half the number of part-time faculty. When we did so, we found a pattern very similar to that in Table 15. Among other things, this suggests that one must be very careful when using faculty\student ratios as an index of quality.

Table 15
Average student/faculty ratios by controle by typee by elite1
Average student/faculty ratios by controle by typee by capitalized wealth per student and by selectivity
data cleaned of medical and small schools

		ELITE1			
		top 50 SAT	more-selective	less-selective	non-selective
		fte student per faculty member	fte student per faculty member	fte student per faculty member	fte student per faculty member
		MEAN	MEAN	MEAN	MEAN
CONTROLE	TYPEE				
public	university	12.54	21.21	15.55	.
	other 4-yr inst.	15.54	18.85	19.71	20.29
	2-yr inst.	.	13.28	22.29	28.00
private	university	12.50	16.58	14.76	.
	other 4-yr inst.	11.78	17.91	20.33	25.30
	2-yr inst.	.	15.37	23.96	27.78

Lower student to faculty ratios presumably imply smaller classes and greater opportunities for students to exchange ideas and obtain extra help from faculty. The positive relation between the cost of higher education and the student to faculty ratio should be at least moderately comforting to policy analysts, not to mention parents who have paid a tuition premium to send their children to a private college or university and/or a highly selective HEI.

How Characteristics Affect HEIs' Economic Behavior

The characteristics of higher education institutions affect their behavior in many ways. We have chosen to confine our attention to non-profit HEIs, and therefore did not discuss non-profit status in the preceding section. But this may be the most important characteristic of all those that affect HEIs' behavior.

Perhaps the most obvious way that HEIs' non-profit status affects their behavior is that for the great majority of schools, tuition is less than E&G expenditures per student. (See Table 3 above.) In other words, price is below cost, in many cases very substantially below cost. Clearly, we would not expect to observe this relation in the case of for-profit firms,[31] and yet we have come to expect it as the norm in the realm of higher education.

A non-profit organization has no stockholders as the rightful claimants of the surplus of revenues over costs. It will not be the target of a hostile takeover. Unless it is essentially insolvent, it will not be dissolved, and if it is, its officers will not receive golden parachutes. In fact, by law, even the remuneration of employees of non-profits is subject to certain limitations so that non-profit status is not used simply as a vehicle for tax avoidance. (At the same time, should the opportunity to do so arise, we would not expect employees of non-profits to be

[31] The exception would be during implementation of a predatory pricing scheme to eliminate competitors. In this case, price is only below cost until the target firm has been eliminated, and then it would be raised to a level above cost. The relation between price and cost in higher education has nothing to do with predatory behavior.

substantially less interested in improving their pay or perquisites than employees of profit oriented organizations.)

All of this implies that non-profit organizations typically expect to function indefinitely and that the decision process is likely to be governed by a very long term perspective. Managers of HEIs are not subject to the same pressure from stockholders or corporate raiders to produce higher profits or sales each year that often prevent managers of profit-oriented firms from attending to important long run decisions and goals. When short-term considerations do govern decisions, it is generally because financial difficulties threaten the organization.

If profit is not to be the factor motivating behavior, something must replace it: performance. The goal of a typical non-profit educational organization is to try to produce educational excellence, defined according to the educational mission of the institution, and to be recognized for doing so.[32] Because of the long term orientation of non-profits, efforts to pursue these goals in the short run are tempered by the constraint that producing excellence today must not jeopardize the ability of the institution to continue to do so in the future. (See Bowen (1981) for some rather critical remarks on educational institutions' pursuit of excellence.)

Describing the Market Segments

We have argued that the higher education market is highly segmented. We have chosen to divide the higher education market into four segments. However, for many colleges and universities, an appropriate definition of the "market" that effectively provides competition may consist of only a few other schools in a small geographical region: in other words within each market segment there are smaller sub-segments that could be delineated. Let us begin by defining the four broad market segments that will be the focus of our analysis.

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[32] This is supported by Steinberg's (1986) finding that education "firms" tend to be "service maximizers."

The "highly selective," or "elite," schools compete for students who, with very few exceptions, have already made the decision to pursue higher education. These schools largely compete for students in a national market, although there are some highly selective schools -- primarily though not exclusively the elite public universities-that attract most of their students from within their own region of the country. The highly selective schools are virtually all four year colleges and universities[33], with a disproportionately large number of technical and engineering schools. Within this selectivity category, public institutions are greatly outnumbered by private universities and colleges.

The "moderately selective" segment of the market, defined above as schools not in the top 50 that admit less than 61 percent of their applicants, consists of about 160 HEIs. This segment too is dominated by four year colleges and universities. Approximately two thirds are private institutions and the balance public institutions. These schools compete for students primarily in regional and state markets.[34]

The "less selective" market segment consists of those HEIs admitting between 61 percent and 98 percent of all applicants, and whose student SAT scores are not among the top fifty ranked schools.[35] The "less selective" category, with over 1200 HEIs, is the largest category in our

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[33] One exception is Deep Springs College in California, a two-year school whose students have the highest average SAT scores of any school in the country. However, this is a very small school with a very specialized educational mission.

[34] There are some exceptions to this, however. A number of these are "Public Ivies," many of which do compete for students in a national market, and which are extremely selective in admitting out-of-state residents. In effect, the constraints imposed on these schools because they are public institutions causes their selectivity to be lower than their national reputations would warrant. Others are schools with a national reputation who for one reason or another have a low ratio of applicants to admits. In some cases, this is the result of self-selection on the part of applicants; other causes might be a degree of programmatic specialization that discourages some students from applying or perhaps an undesirable location.

[35] Only two schools admitting more than 61% of their applicants, Reed and Brandeis, were categorized as highly selective on the basis of average student SATs.

sample. In terms of numbers of institutions, private four-year colleges dominate this category. As in the case of the moderately selective category, with a few exceptions, these schools compete for students largely in regional and state markets.

There are roughly 750 non-selective schools, defined as those HEIs admitting 99 percent or 100 percent of their applicants. These schools comprise the second largest segment. The non-selective schools fall into several categories. First, there are the two-year colleges, which account for over 83 percent of the non-selective schools. Of these two year institutions the vast majority are public colleges. Within our sample, the public, non-selective, two-year schools comprise 92 percent of the non-selective two-year HEIs.[36] These two year schools draw their students from within the state or local area. The second sub-category is the non-selective four year colleges. Most of these serve a local, state, or regional clientele. Our sample contains only one non-selective university.

The competition for students occurs largely within segments, although as might be expected, there is some inter-segment competition for students at the high and low ends of the less selective market. The non-selective market segment is usefully divided into two components: two-year colleges and four-year colleges. For two-year colleges, the potential student's relevant choice is frequently between a two-year college and full-time labor force participation or perhaps attendance at a proprietary school; that is, the "competition" is not another similar school. Non-selective four-year colleges face a more diverse market: they are competing with other four-year colleges for some students, with two-year colleges and proprietary schools for some students, and for still others, with employment or other non-academic alternatives.

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[36] Because of missing data items, our sample omits roughly seventy private two-year colleges.

Table 16 provides data on E&G expenditures per student across the different selectivity, control, and type categories. The differences in E&G per student are very marked. The first thing to note is that, except for two year schools, expenditures per student are higher for private institutions than for public institutions once we take HEI type and selectivity into account. This may reflect economies that can be achieved in very large public universities; or it may reflect a decision by private HEIs to find market niches in which they can compete with taxpayer subsidized public HEIs by providing "personalized service," smaller classes, or costly specialized programs. The argument that this merely reflects the costs of unnecessary luxury amenities is made somewhat less tenable by the fact that the disparity in costs cuts across all selectivity categories, including many private HEIs in the less selective and non-selective categories that are struggling to survive, although in these categories the cost differences are modest.

It is interesting to note that the relative differences in E&G expenditure per student between private and public institutions decline substantially as we move to the less selective market segments. Expenditures per student are 81 percent higher in the most elite private universities than in their public counterparts[37]; the difference between public and private universities in the less selective category is only 32 percent. Again, this might be viewed as lending some weight to the Bennett argument that elite schools in particular are competing for students with amenities. On the other hand, it almost certainly also reflects the fact that HEGIS data do not allow us to calculate a separate cost per undergraduate student in universities, and thus our cost data are contaminated by the very high costs per student of medical schools, law schools, business schools, and graduate programs with very low ratios of students to faculty and high research expenses. If better data become available, this is a subject that clearly merits more attention.

[37] The difference appears even more marked among elite four year colleges. As there is only one public elite four year HEI. we attach little weight to this finding.

TABLE 16
Weighted mean of E&G expenditures per student by control, type, and selectivity
Net of unrestricted scholarship expenditures
Not weighted by enrollment

		ELITE1			
		most elite	more selective	less selective	non-select :e
		EANDGPS	EANDGPS	EANDGPS	EANDGPS
		MEAN	MEAN	MEAN	MEAN
CONTROLE	TYPEE				
public	university	16986.86	13778.53	10357.78	8694.30
	other 4-yr inst.	7760.12	7755.06	7023.57	5700.89
	2-yr inst.	.	6246.54	5380.03	4919.43
private	university	30697.47	14529.17	13712.43	.
	other 4-yr inst.	15653.88	9996.27	7711.01	6732.10
	2-yr inst.	.	4661.75	6248.82	4589.10

Private four year colleges in the highly selective segment spend twice as much per student on E&G expenditures than their highly selective public counterparts. In the less selective category this private/public expenditure difference for colleges falls to less than 10 percent. The high level of spending of the elite private colleges is sustainable, in part, due to the substantial endowments of many of these schools. This is discussed in more detail later.

The differences in E&G spending per student are also striking when we compare E&G expenditures per student across the selectivity categories. For example, on average, E&G expenditures are more than two times higher per student at the highly selective private four year colleges than at the non-selective private four year colleges. Somewhat smaller but similar differences exist for public universities. A student who is admitted to one of the most selective HEIs will have far greater resources devoted to his/her education than a student attending a less selective or non-selective college. This may explain the eagerness with which students seek admission to the most prestigious schools; at the very least, it suggests that the students attending these institutions are not simply being duped: it is not just tuition that is high, but expenditures per student as well.

In this section we have painted a broad outline of the supply side of the market for non-proprietary undergraduate higher education. We have defined the major segments of the market and described the type and control of the schools within each segment. We have also described the relative wealth of HEIs, categorized by type, control, and selectivity. Using several measures of institutional wealth, we described the distribution of wealth among colleges, as well as the relation between wealth and other institutional characteristics.

To understand the functioning of the market for undergraduate higher education, it is not sufficient to analyze the determinants of supply: demand conditions are no less important. It is to these that we now turn.

Demand for Undergraduate Higher Education

Understanding the demand side of the higher education market involves analyzing the sequence of choices faced by high school juniors and seniors and the variety of other individuals who may decide that now is the time to continue their formal education. At the most basic level, this demand process begins with an individual's or family's decision to pursue higher education. Certainly a wide range of factors will be considered at this initial stage. At a minimum, these would include: the expected out-of-pocket price of two or four years of college; the expected future returns from education, both monetary and nonpecuniary; the immediate benefits and costs of student life; and the earnings foregone during attendance at college.

In the second stage of the demand process, individuals must decide what school or schools they want to, or would be willing to, attend and begin the application process. To a large extent this stage can be thought of as an information gathering and matching step. Prospective students "shop" for schools that appear to offer the best package of characteristics, such as cost, location, academic quality, etc., taking into account their financial resources, regional preferences, educational aspirations, career goals, etc.. This shopping step is often severely constrained by imperfect information. Many families do not have an accurate conception of the range and level of financial aid available at many institutions.[35] Additionally, important academic features of some institutions may not be easily discerned.

For some students, particularly those considering attending one of the more selective institutions, this second stage of the process of finding a match with a suitable college can be very involved. However, for many other potential students, it is a very simple one.

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[35] This occurs despite the often substantial resources many institutions devote to recruiting students and the continuing efforts of high school guidance counselors.

Students whose circumstances (or lack of complete information) lead them to only consider attending a public HEI in their own community or state may in some cases simply enroll at a non-selective two-year or four-year institution; there is no application or admissions barrier. If the preferred public HEI does not admit all applicants but only those who meet some specified standard, the student may have to ascertain if he or she meets that standard; here too, the process of gaining access to a HEI is neither expensive or time consuming. When we consider that more than a third of the HEIs in our sample, primarily two-year public colleges, admit all those who request admission, and that about 30 percent of the HEIs in our sample admit more than 98 percent of their applicants, it is clear that for a great many matriculants, particularly those attending public institutions, the process of selecting a college may be less involved than the process of deciding whether or not to pursue higher education at all. The final stage in the matriculation process, assuming that an individual applies to and is accepted at more than one school, involves weighing the relative attractiveness of acceptances at more than one institution. This choice can range from selecting the best financial aid offer among several quite similar colleges to deciding between a state university and a high cost private university. For those students who apply to only one school or are accepted to only one school, this stage poses no new choices and collapses into the previous stage.

From an economic perspective, the product that is typically purchased by a student, a "college education," is an input into future productive activities, or a form of human capital.[39] The value of this investment in human capital is not only a function of the quality of faculty and

[39] To be sure, there is also a pure consumption element to college: proms, sporting events, concerts, and parties, etc. have very little if any effect on future productivity. However, the share of total college expenses accounted for by these activities is quite small, particularly when we take into account the extent of such activity that would take place if the individuals were working rather than attending college. For this reason, we will focus on college as an activity the primary function of which is to improve future productivity.

facilities at the institution attended, but depends as well on the student's own effort during college and on subsequent labor market experience.

Interestingly, what a student gets out of higher education also depends in some ways on the characteristics of other students, for example, their academic ability and motivation. As we will see, this has implications for both the demand process and the admissions behavior of HEIs.

The expected monetary return to higher education can be thought of as the net present value of the difference in lifetime earnings of individuals with a college diploma compared to high school graduates.[40] A larger differential would tend to be associated with a greater demand for higher education. Although this differential has recently grown very sharply[41], it is not clear that high school juniors and seniors are aware of the magnitude of these changes. It is also true that monetary returns vary with a range of variables, including family background, major, student effort, and college control category and selectivity (James, (1989)). In addition, returns vary with race and sex. These differences can be useful in helping to explain differences in demand for higher education across these groups;[42] if women and minorities obtain a lower economic return from investment in the same education as a white male, their demand for higher education would rationally be lower.

Potential matriculants must consider important differences in the perceived and actual returns at different higher education institutions. Clearly, one would expect the monetary return

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[40] Recalling our earlier discussion of the concept of net present value, the net present value of the difference in earnings between someone with and without a college degree would be found by taking the difference in the individuals' earnings each year, applying the appropriate discount factor to each year, and then summing the discounted differences over the individuals' working lifetimes.

[41] For a recent paper that addresses this issue, see Katz and Murphy (1990).

[42] Again according to Katz and Murphy (1990), the male/female wage differential narrowed substantially from 1979 to 1987. Nevertheless, the gap remains significant.

from two years of higher education to be less than the returns from attending a four year institution. Returns would also be expected to vary with the major area of study that students pursue.[43] More interesting, in terms of our demand analysis, is the pattern of variation in expected returns across the market segments that we have identified. At present, there is insufficient information relating to this very important question. Other dimensions of interest include the differences in returns between liberal arts colleges and universities.

There may also be important nonpecuniary returns that higher education provides. For example, students may acquire a "taste" for a variety of cultural and recreational activities that they will continue to enjoy later in life. The type of work an individual engages in as well as future socioeconomic status is in large part determined by his or her level of education. Furthermore, education is positively correlated with several interesting phenomenon: lower incidence of smoking, higher perceived levels of happiness, and higher assessments of health.[44]

In the first stage of the demand process an individual weighs the benefits and costs of attending or not attending a higher education institution. It may well be the case that at this stage the short run opportunity cost[45] of attending college for two or four years plays an important role in determining demand.

When a high school graduate attends college for two or four years, she is foregoing the income that could be earned if, instead, she immediately entered the labor market. Short run opportunity costs depend on a number of factors that determine the wage an individual will receive; these include: current (local or national) labor market conditions and individual skills and

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[43] See Estelle James et. al., op. cit., for some discussion of this factor.

[44] See Farrell and Fuchs (1982) for the evidence relating education to reduced smoking and Grossman (1975) for the association with better health.

[45] The "opportunity cost" of something is that which must be sacrificed to obtain it.

abilities. This foregone income may be a particularly important factor for students from low income families. The reality of another paycheck today, to pay for necessities, may have greater appeal than the promise of a larger paycheck in the future.

The matriculation decisions of "nontraditional" students, who turn to higher education after a significant length of time in the job market or running a household, also depend in important ways on opportunity costs. Often such an individual has to give up a secure job, as well as a substantially higher income than a recent high school graduate. For others, it may involve substituting costly market-provided services, such as daycare or cleaning, for uncompensated household labor.

Opportunity cost is an important influence on demand over which colleges and universities have very little control, other than by trying to schedule classes at more convenient hours or providing on-campus daycare, etc. The opportunity cost issue may be particularly important for two year institutions, many of which provide technical and vocational skills. Similar training may be available to potential students in an on-the-job form by some employers; access to this option may make two years in college decidedly less appealing.

In the latter two stages of the demand process, selecting the segment of the higher education market within which to submit college applications, and, subsequently, selecting an individual institution to attend, quality and perceptions of quality, as well as financial and family constraints, play central roles. As we mentioned earlier, for many potential students, particularly those attending the less-selective and non-selective public institutions, financial and family constraints dominate the college decision process; for others, perceived quality may play a critical role in the matriculation decision..

Quality in higher education is a multi-faceted characteristic that is slippery to define and even more elusive to observe or measure. Nonetheless, the notion of quality is a crucial one for

understanding the demand process and the interaction of demand and supply in the higher education marketplace.

There are a number of related factors that interact to produce what undergraduates and their families perceive as quality. This list at a minimum includes: superior classroom instruction and facilities, fellow students who are motivated and capable, and a history of producing successful graduates. Many of these characteristics associated with higher quality are costly to provide, implying that higher quality must be associated either with higher tuition or with a higher subsidy per student from public or private sources.

Quality in higher education can also be assessed from a social perspective. In addition to the above list we could then also include factors such as instilling civic and ethical values.

As mentioned in the introduction, indicators of quality are extremely difficult and problematic to measure, even for professionals in the field. Furthermore, in important respects higher education may be what economists call an "experience" or good. That is to say, the buyer cannot determine the worth of the product by inspection prior to purchase. Some aspects of a college or institution can only be assessed through the experience of two or four years. Other elements of educational value may only become evident over a lifetime. In some respects, higher education may be what economists call a "credence" good, a good whose quality or worth cannot really be determined after consumption.

It is apparent that the information-gathering process that students and their families face in choosing a college is formidable: there are thousands of schools that could be considered, information is highly imperfect and costly, and the final choice may significantly affect the lifetime earnings of the student. Faced with these difficulties in finding and assessing quality indicators, prospective students and their families can be expected to utilize the most easily quantifiable quality indicators such as the selectivity of an institution or average SAT (or ACT)

scores. Although these two measures have their own difficulties, other components of quality are even more problematic to measure.[46]

As an alternative strategy for dealing with imperfect quality information, prospective students often gauge college quality by the "prestige" or reputation for quality of the institution. Schools that have been high quality in the past, and have developed an excellent reputation, are expected to continue their history of providing quality education. The use of simple indicators or the general reputation of institutions are mechanisms that higher education shoppers have available for economizing on an otherwise very costly or very uncertain search process.

The quality or prestige of an institution also plays a central role in determining an individual's expected return to higher education. Potential employers of higher education graduates are interested in the ability, motivation, and adaptability of recent graduates. However, this information is typically not easily available to a firm in the labor market. Letters of recommendation, interviews, and transcripts may provide only a modest improvement in information. However, if the college application/admission process works in such a way as to sort students on the basis of their ability into a hierarchy of colleges, employers can quickly and inexpensively assess the likely capabilities of a job candidate simply by glancing at the job applicant's resume to note where she/he attended college. (It is critical to note that this whole method of conveying information breaks down to the extent that students are not sorted into colleges on the basis of ability, for example if colleges discriminate in admissions on the basis of race, gender or religion, or if some students are given preferential treatment on the basis of athletic ability, wealth, or alumni connections.) This evaluative approach does not require the

[46] Measures of selectivity suffer from biases that result when individuals "self-select" in the application process and apply only to schools where they know they have a good chance of acceptance. Test scores present only a one dimensional measure of student capabilities. Other skills and interests may be very valuable to fellow students as well.

more time consuming process of deciphering a transcript or letter of recommendation to ascertain a person's actual performance at the college. Further, it avoids some of the problems associated with using a student's grades as a measure of ability. For some individuals, poor relative performance in some college classes may merely indicate that many students in the rest of the class were truly outstanding: an employer may correctly infer that a student with a "C" average at Harvard is more capable and motivated than a student with an "A-" average at Drunkenbash U. For other students, who may do poorly in college because they only became serious in their senior year, the reputation or quality of the school attended may better reflect the individual's ability than grades. Given the positive relation between selectivity and annual E&G expenditures per student[47], and assuming that greater resource input bears some relation to educational output, choosing an employee on the basis of the reputation of the college he/she attended might be quite rational.

In these situations, the reputation of a college, either locally or nationally, performs a what is called a "signalling" function in the labor market. For employers, using the reputation of the college a job candidate attended as an indicator or signal of ability can effectively economize on otherwise quite costly sources of information.[48] In effect, firms can take advantage of the fact that colleges have already performed the costly process of screening applicants for ability. This may help to explain why students often attend the "best" school at which they are accepted, rather than choose a lower quality school where their performance would be relatively better compared to other students at that college. It may also help us understand why high

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[47] See Table 13 above.

[48] This of course assumes that to employers, what students learn while in college is not as important as the ability to learn that they bring to college. Empirically, it is very hard to determine the relative roles of each.

quality\prestige schools can charge a substantial tuition premium without detrimentally affecting the size of their applicant pools or the quality of their matriculants.

The manner in which imperfect or incomplete information enhances the importance of an institution's reputation also provides insights into why college or university administrators might be so concerned about the perceived quality of their institution. The reputation of a college has a very powerful effect on the private economic returns to education[49], and potential students are undoubtedly aware of this. In fact, the reputation of a school may be as important, or more so, than the actual quality of the education it provides.[50] Because quality and reputation take time to develop and take hold, the long run nature of the strategies and objectives that must be adopted by colleges and universities that aspire to high quality is evident.

The second factor that influences matriculation choice in the two latter stages of the demand process is price. The relevant price to consider in this setting is the net price that a student pays, after the several forms of financial aid have been subtracted from tuition, room and board charges, etc.[51] An institution (or governing legislative body) not only sets its own sticker price, but also determines the level and composition of financial aid for each student. For many students this net price may differ greatly from the "sticker price" of a year in college. Net price may range from near zero for students with few financial resources or for students of exceptional

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[49] If "screening" is the primary reason that there are high private returns to attending an HEI with a reputation for high quality, the social returns of such education are likely to be lower than the private returns. This issue is discussed in some detail in Bradburd, McPherson, Mann, and Schapiro, "Understanding the 'Quality' Issue in U.S. Higher Education," 1990.

[50] Although a divergence between the "true" quality and reputation of an institution may persist for a period, over time, if actual performance falls short of expectations, its reputation will erode.

[51] We confine our attention here to out-of-pocket expenses of college. and assume that the "opportunity costs" of the earnings that are foregone during college attendance only play a significant role in the initial stage of the demand process.

mental or physical ability who receive non-need based aid to the full sticker price for students from families with sufficient means. The accompanying paper, "The Ability to Afford Higher Education," provides a closer look at financial aid issues and policies.

The matriculation choices of students who receive financial aid may be affected by the composition of the financial aid packages they are offered as well. Grants and scholarships are certainly more attractive to students than loan aid. The studies surveyed by Leslie and Brinkman (1987) support this point.

The sensitivity of college demand to sticker price is rather low. Wealthy families are not likely to substantially alter their demands for higher education in response to price increases because these expenses may not be particularly burdensome.[52] Further, need based financial aid almost certainly has the effect of reducing the sensitivity of college demand to sticker price. To the extent that institutions insulate financial aid recipients from price increases by raising financial aid, the net price they pay may not change; as a result, the demand of low income families may be quite insensitive to tuition increases if these are offset by increased financial aid.

Another important factor contributing to low price sensitivity is that roughly two-thirds of college students in any given year are not entering college as freshman but instead are returning students. The size of this group of matriculants at any given institution is likely to be quite insensitive to price changes due to the costs[53], financial and otherwise, of transferring between institutions.

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[52] McPherson and Schapiro's forthcoming study finds that the only significant price elasticity of demand for higher education was among students from low income families. The finding that price sensitivity declines as income rises is replicated in a number of other studies. (For a survey, see Leslie and Brinkman, 1988.)

[53] Students might refer to these costs as the "hassles" associated with transferring from one college to another.

Higher education is more than just a vehicle for investment in human capital: it is also a consumption activity. Recognizing this adds a useful perspective to efforts to analyze student matriculation decisions. When students are in college they are not only investing in human capital for their later productive life, they are also consuming a variety of amenities. These range from attending lectures and panels that complement classroom learning to participating in cultural and recreational programs. Students undoubtedly view some of the time spent talking with friends, or just relaxing, as consumption activities as well.

It is apparent that many HEIs --the non-selective HEIs perhaps less than the others-- try to attract matriculants through the consumption side of higher education by offering facilities, programs, and even locations that appeal to students. These amenities are attractive to students, even if they do not always contribute to either educational output or the formation of human capital. Student matriculation choices undoubtedly involve tradeoffs between the consumption and investment aspects of higher education.

Finally, it is useful to recognize that the demand process is usually a joint decision involving both the student and his or her family. This complication can be important at each stage; some families are only going to be concerned with whether or not a student goes on to college, other families may presume this and be more interested in where a son or daughter go to school. Certainly, the fact that college students are often supported in large part by their families helps to explain the prevalence of joint decision making. Even ignoring financial considerations, parents sometimes have rather strong views concerning what type of school a son or daughter ought to attend. An important factor in this regard may be the level and type of education of the parents. A range of other socioeconomic factors may also play a role in the interaction of the preferences of potential students and their families.[54]

[54] These are discussed at some length in McPherson and Schapiro (1990).

Demographic factors significantly affect the total demand for higher education.[55] The size of cohorts moving through the 17 to 22 year old age bracket has varied considerably over the past two decades. Institutions must evaluate the impact of variation in the size of their pool of potential college students over a number of years in order to provide baseline information for estimating changes in demand and planning for these changes.

Much of current Federal policy in the higher education area is demand side policy aimed at lowering the cost of college to low and moderate income families. We can better understand how these programs work by looking at the behavior of schools in the marketplace. Therefore, we next return to the supply side of higher education and examine the behavior of HEIs and the resulting market equilibrium.

The Nature of Competition and Market Equilibrium

In most markets, price adjusts so that the amount of the good producers are willing to provide is exactly equal to the amount that consumers wish to buy. If price were set above the equilibrium price, producers would want to sell more of the good than consumers would wish to buy, and the surplus, the "excess supply," would drive down the price; if price were set below the equilibrium price, consumers would wish to buy more of the good than producers were willing to sell, and the resulting shortage, or "excess demand" would drive up the price. The equilibrium price "clears the market" in the sense that at that price, there are no buyers willing to pay the going rate for the good who are unable to find a seller, and no sellers willing to sell for the going price who are unable to find a buyer. For example, Mazda recently introduced a small sporty car called the Miata that many potential car buyers adore. Dealers have not had enough cars to satisfy consumer demand. Some dealers, in response to this excess demand, have tacked

[55] See Katz and Murphy, op cit., passim.

hefty "adjustments" onto the sticker price of the car. This higher price deters some buyers and brings the quantity demanded more in line with the limited supply.

The market for higher education operates in a very different fashion, and it does not "clear" in the manner described above. We have argued that the higher education market is not really a single market at all; instead, competition occurs within fairly distinct segments and sub-segments that are often very narrowly defined, for example, community colleges in Chicago or comprehensive universities in Florida. Even within these submarkets, the going price typically does not clear the market. The highly selective schools admit only a portion of those who would be willing to pay the going price for attendance, and non-selective schools are unable to enroll as many students as they would like: there is excess demand in one segment of the market and excess supply in the others. Interestingly, it is often some of the most capable and bright students who are "rationed" from highly selective schools, while less capable students (as well as more capable students) are routinely admitted to non-selective schools.

Each of the educational market segments operates in a different manner. The customers are largely distinct groups; the HEIs have different levels of wealth; and there are differences -- some obvious but others more subtle-- in the nature of the service being provided. In effect, the rules of the game are different in each segment, and to understand the higher education market, we must analyze each segment separately.

Highly Selective Schools

We have defined the highly selective schools to be the 50 schools with the highest average combined SATs. (Again, we appreciate that many schools rely on ACT scores more heavily than SAT scores, but after ranking schools by ACT score, we concluded that the schools with the highest ACT scores that were suited for a list of "highly selective"/elite schools were also among the schools with the highest SAT scores and therefore that our list of "highly selective"

schools is a representative one.) Within our sample, 92 percent of these institutions are private. Although we limited this segment to 50 schools, they nevertheless merit attention. First, they have been the focus of a great deal of attention in recent years, from the media, from the Department of Education, and from the Justice Department. Second, through a kind of ripple effect, their actions may affect the pricing and expenditure policies of a vastly greater number of schools.

It is useful to begin our analysis of this segment of the market by examining a few of the more salient aspects of the highly selective HEIs' admissions process. By definition, a highly selective school admits only some fraction of the students who apply for admission. These are called the school's "admits." Other than the students who apply for early decision, who do so on the mutual understanding that they will attend the school if admitted, a college knows that only a portion of its admits will choose to become "matriculants." The portion that does so defines the "yield." Even at the most prestigious schools, the number of admitted students exceeds the number in the entering class.

Constraints with respect to dormitory and classroom space, as well as other considerations, cause there to be costs attached to having too large an entering class as well as one that is too small. Consequently, the number of students admitted is carefully determined on the basis of some expected yield of matriculants from admits. However, there is always some random component to the yield, and this is dealt with by means of the "wait list." The college admits slightly fewer students than the number necessary to fill the freshman class if the average yield were achieved, and some additional number are "put on the wait list," that is, they are informed that they have a chance of being admitted if the college does not fill its class from the admits.

The wait list clearly has great value in protecting HEIs from unexpected changes in their yield from admits. The value of the wait list as a smoothing device probably varies with the prestige of the school. As discussed later, these schools actually have lower yields than less selective institutions. The schools that have a very high yield from admits face less uncertainty in filling their incoming classes.

Let us now turn to the conditions under which the highly selective schools select their students and the students select their schools. As we describe the functioning of this market segment, it is useful to bear in mind that it is composed of only a small number of HEIs.

The highly selective schools compete for students in a national market. Although some locations or settings may be more attractive to students than others, few students admitted to more than one highly selective school base their matriculation decision primarily on location. This leaves price and perceived quality as the means of competing for students.

Price competition does not appear to be an important means of competing for students among the most highly selective schools. There are a number of factors that could explain this, and it is important to know which are playing an instrumental role in this market and which are not. (Note that although we are discussing this issue in the context of the highly selective segment, many of these points carry over to the moderately selective and less selective segments.)

One way to approach the issue of the apparent lack of price competition is to ask why more highly selective colleges don't cut their price as a means of attracting more or better students. We will address this question, but it may be more illuminating to ask a different one: Why do they charge as little as they do? To anyone paying approximately $20,000 a year to send a child to one of the highly selective private schools, this might seem a rather presumptuous, if not an offensive, question. But attempting to answer it raises some important issues.

Most people recognize that tuition at the highly selective public institutions is a bargain; few would use a similar term to characterize tuition at the highly selective private colleges. Therefore, the first thing to note is that although the price of obtaining an education at one of the highly selective private schools is quite high, it is substantially less than the cost of providing one.[56] The average ratio of tuition, endowment income, public funding, and gifts, grants, and contracts to E&G expenditures for each selectivity category are provided in Table 17, parts a, b, c, and d. As 17a shows, the average ratio of tuition revenues to educational and general (E&G) expenses at the highly selective private schools is only 48.8 percent.[57] The balance of the ratio is made up by gifts, grants, and income from endowment. Every student, not just those receiving "financial aid," is being subsidized, not just at the highly selective public HEIs, but at the private ones as well. Why don't schools charge at least what it costs them to provide an education?

The second thing to note is that, given the role that attendance at a prestigious institution plays in "signalling" one's ability to the world, and considering how great the benefits from that may be, it is likely the case that the marginal return from being permitted to buy into the premium end of the higher education market is extremely high[58]. If this is so, then these institutions presumably could capture some of those high returns from their students by raising prices. Yet, as is clear in Table 17a, if we compare tuition per student to E&G per student, expenditures are well above tuition.

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[56] Cost is, of course, substantially greater than price at virtually every public HEI. This is further discussed below.

[57] We exclude here both the costs and revenues associated with room and board and other auxiliary enterprises. In most cases, auxiliary enterprises are roughly a break-even operation. Including them would not materially affect our analysis.

[58] Several faculty at Williams are engaged in a research project to determine the magnitude of the differential return to attendance at various categories of HEIs.

Table 17a
Average percents of E&G/current fund revenues
from highly selective schools

	TYPEE													
	university						other 4-yr inst.						all	
	tuition as a % E&G	endowment income as a % of E&G	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G	tuition as a % E&G	endowment income as a % of E&G	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G	tuition as a % E&G	endowment income as a % of E&G
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN
CONTROLE														
public	0.208	0.030	0.468	0.236	0.078	1.020	0.343	0.014	0.499	0.072	0.053	0.981	0.242	0.026
private	0.356	0.085	0.008	0.293	0.155	0.897	0.583	0.199	0.003	0.080	0.170	1.035	0.509	0.162
all	0.331	0.076	0.084	0.284	0.142	0.917	0.576	0.193	0.018	0.080	0.167	1.034	0.488	0.151

	TYPEE			
	all			
	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G
	MEAN	MEAN	MEAN	MEAN
CONTROLE				
public	0.476	0.195	0.072	1.010
private	0.004	0.150	0.165	0.990
all	0.042	0.153	0.158	0.992

Table 17b
These are average percents of E&G/current fund revenues
from more selective schools

CONTROLE	TYPEE													
	university						other 4-yr inst.						2-yr inst.	
	tuition as a % E&G	endowment income as a % of E&G	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G	tuition as a % E&G	endowment income as a % of E&G	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G	tuition as a % E&G	endowment income as a % of E&G
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN
public	0.225	0.034	0.491	0.161	0.061	0.973	0.220	0.001	0.618	0.127	0.017	0.983	0.200	0.000
private	0.588	0.037	0.090	0.141	0.076	0.931	0.628	0.078	0.035	0.107	0.122	0.970	0.312	0.000
all	0.432	0.035	0.262	0.150	0.070	0.949	0.505	0.054	0.211	0.113	0.090	0.974	0.216	0.000

CONTROLE	TYPEE									
	2-yr inst.				all					
	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G	tuition as a % E&G	endowment income as a % of E&G	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN
public	0.751	0.097	0.001	1.048	0.218	0.004	0.619	0.127	0.020	0.989
private	0.620	0.063	0.000	0.995	0.622	0.074	0.045	0.109	0.117	0.967
all	0.732	0.092	0.001	1.041	0.485	0.050	0.239	0.116	0.085	0.974

Table 17c
These are average percents of E&G/current fund revenues
from less selective schools

CONTROLE	TYPEE													
	university						other 4-yr inst.						2-yr inst.	
	tuition as a % E&G	endowment income as a % of E&G	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G	tuition as a % E&G	endowment income as a % of E&G	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G	tuition as a % E&G	endowment income as a % of E&G
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN
CONTROLE														
public	0.208	0.009	0.550	0.163	0.051	0.981	0.220	0.003	0.610	0.133	0.022	0.988	0.186	0.008
private	0.511	0.040	0.126	0.183	0.074	0.934	0.634	0.050	0.014	0.117	0.136	0.951	0.592	0.042
all	0.326	0.021	0.385	0.171	0.060	0.963	0.537	0.039	0.154	0.121	0.109	0.959	0.320	0.019

CONTROLE	TYPEE										
	2-yr inst.				all						
	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G	tuition as a % E&G	endowment income as a % of E&G	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN
CONTROLE										
public	0.651	0.140	0.006	0.991	0.206	0.005	0.619	0.139	0.019	0.988
private	0.035	0.147	0.117	0.933	0.626	0.049	0.020	0.122	0.132	0.948
all	0.447	0.142	0.043	0.972	0.484	0.034	0.223	0.128	0.094	0.962

Table 17d
These are average percents of E&G/current fund revenues
from non selective schools

CONTROLE	TYPEE: university						TYPEE: other 4-yr inst.						TYPEE: 2-yr inst.	
	tuition as a % E&G	endowment income as a % of E&G	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G	tuition as a % E&G	endowment income as a % of E&G	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G	tuition as a % E&G	endowment income as a % of E&G
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN
public	0.185	0.008	0.519	0.181	0.064	0.957	0.208	0.005	0.611	0.162	0.012	0.998	0.154	0.001
private	.	.	.	.	.	.	0.481	0.042	0.028	0.193	0.175	0.918	0.435	0.020
all	0.185	0.008	0.519	0.181	0.064	0.957	0.362	0.025	0.282	0.180	0.104	0.953	0.175	0.002

CONTROLE	TYPEE: 2-yr inst.				TYPEE: all					
	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G	tuition as a % E&G	endowment income as a % of E&G	public funding as a % of E&G	government grants, gifts, and contracts	private grants, gifts, and contracts as	sum of components of E&G
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN
public	0.686	0.152	0.006	0.998	0.159	0.001	0.679	0.152	0.006	0.998
private	0.260	0.186	0.089	0.990	0.462	0.033	0.120	0.190	0.141	0.947
all	0.654	0.154	0.012	0.998	0.206	0.006	0.592	0.158	0.027	0.990

At the current price, it may not be unreasonable to say that students are getting a good deal. And it is fairly clear that colleges have at least some potential for increasing their revenues in the short run by charging their students more than they are at present. Why don't they do so?

Different motivations govern pricing policies at public and private highly selective schools. In the case of the Public Ivies, tuition is set in a variety of ways: in some states it is set directly by the legislature; in other states it is set by the HEIs or a Board of Regents, presumably with quite close attention to the signals being sent by the state legislature. State legislatures have an incentive to keep undergraduate tuition low, in large part because there is a large upper-middle to lower-middle income constituency with a strong interest in the availability low priced undergraduate education, and this has played a powerful role in keeping tuition low at the highly selective public HEIs.[59]

Private highly selective HEIs set their own prices. One explanation for the gap between price and cost at the private highly selective HEIs is that those responsible for setting private HEI tuition and fees--typically trustees and administrators--do not feel that it would be appropriate to extract the highest price possible from students. It is difficult to gauge the importance of this motivation for price restraint, but it almost certainly plays a role. In effect, this argument assumes that those responsible for setting price try to bring in only as much revenue as is necessary to sustain the current level of operations, or to finance specific new activities that are deemed necessary or desirable. This corresponds to an "expenditure-driven" model of price formation, which in this context may be quite reasonable. Non-profit status is almost certainly a necessary condition for this kind of behavior.

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[59] Hansen and Weisbrod (1969) conclude that families that benefit from public higher education in California have higher than average incomes.

An alternative explanation, one that implies a greater deliberateness in HEI pricing behavior, is that in setting current charges, HEIs act just as do forward looking for-profit firms: instead of setting prices to make a quick killing today, they choose the price that maximizes the long run benefit to the organization.

The institution's decision makers may reason that if they subsidize the education of their students in the present, and perhaps treats them well in other ways as well, the students will develop an emotional bond to the institution, and after graduation will (with sufficient dunning by the development office) make voluntary contributions to it. The administrators may further reason that the less generously they treat their students in the present, the less generous will alumni(ae) be in the future. Thus, raising price today imposes a future cost, and acting rationally, the HEI will not set tuition as high as the market will bear today, but rather at the level that will maximize the present value of the revenues to be obtained from its students over time. Such very long run revenue maximizing behavior may also necessitate non-profit status; few stockholders would be willing to allow managers to base decisions on returns expected to accrue twenty years in the future. This exceptionally long time horizon is also consistent with the fact that today's students may be just as concerned about their alma mater's future reputation as its present one. Such a pricing policy may help convince students and graduates that an administration is committed to quality in the long run.

Looking at HEIs' tuition setting behavior in this way may make it seem less beneficent, but that does not alter the fact that this process can be a very efficient mechanism for overcoming the capital market imperfections that make it difficult to get private educational loans, and that it may therefore be very desirable from a social viewpoint. Endowments and annual alumni giving are a mechanism for passing an affordable educational down through the generations. The students are in effect informed (usually about five minutes after graduation if

not before) that their excellent college education was made possible by the generosity of some worthy souls who went before them, and through their generosity, they make possible a similarly rewarding experience for some worthy souls who will follow them. And for the highly selective private schools, this system seems to be effective. See Table 17a above. For these schools, gifts and grants and endowment income together covers a third of all E&G expenses.

This mutual-generosity model of the pricing process may influence the relative levels of schools' tuition as well. In deciding how high it can raise tuition, an institution may reason that if it prices itself higher than the middle of the pack, or higher than that of schools that are even more prestigious, its students will feel less-well-treated and will therefore be less inclined to be generous themselves.

There are of course other dangers in raising tuition too high. One is that the number of students who apply for admission and/or the number of admitted students who choose to matriculate will fall so much that there will be empty classrooms, dormitory rooms and cafeterias, and revenues will actually fall.[60] This is probably not the most important consideration for the highly selective schools: most could fill their classes even with much higher tuition. The wait list also provides some protection from an unexpected drop in yield. As we will discuss below, the danger of empty spaces is a serious concern for the less selective schools.

A second danger of raising tuition is that as its pool of applicants and its "yield" of matriculants from admitted students fall, the highly selective school will have to admit a higher portion of its applicants to fill its freshman class. This has serious implications for a highly selective school. First, by definition, it will become less selective, and second, the quality of its students, as measured by SAT's or other quantitative ability measures, may fall. Together these

[60] In economist's parlance, this would be a situation where, at current price, the elasticity of demand is greater than one, and where raising price causes revenues to fall.

imply diminished quality/prestige that will have a negative effect on future demand, something that every highly selective school wants to avoid.[61]

We mentioned earlier that potential applicants are forced to judge colleges on the basis of very imperfect information, often using superficial indexes of quality such as average SAT scores of the student body. A consequence of this is that a decline in the SAT scores of one class could have an impact on the yield the following year, and by extension, for the years following. This would lead one to expect that wait list students would have a disproportionate representation of students whose easily quantifiable attributes, such as SAT's, are relatively stronger than their less readily quantifiable attributes. In this way, highly selective colleges could protect themselves from the possibility of a drop in the average "ability" of the freshman class due to a decline in yield. We have no way of knowing whether this behavior actually occurs.

Even though colleges are selling their product for less than it costs, and have incentives not to raise their prices too high, in absolute terms the cost of a year at a private highly selective school is still very high. Further, in recent years it has been rising significantly more rapidly than the general level of inflation. This may seem inconsistent with our arguments about price restraint. However, this ignores the effect of quality competition.

A college that increases the level of amenities it provides or improves the quality of its instruction before or at the same time it raises its price does not have to suffer a reduction in its yield of admitted students. If the perceived value of what it provides increases by more than tuition, the school's yield of matriculants from admitted students should actually increase, and the school will enjoy all the benefits of greater selectivity. It may not even be necessary that

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[61] The SAT scores of a college's student body are provided in most of the college guides, and thus are readily available.

potential students correctly value the improvements in "quality." Given the imperfect information that pervades the market for higher education; if these expenditures serve as signals of quality, this perception will serve as well. (The accompanying paper on, "Understanding the 'Quality' Issue in U.S. Higher Education" provides further discussion of these issues.)

Finally, if students rather than parents play a dominant role in the matriculation decision, the value of the increased quality to the student only has to be greater than the student's valuation of the additional family contribution that pays for it. If students are not fully cognizant of the burden this may place on the family, then this problem may encourage the provision of additional quality and amenities, along with a higher tuition to pay for them.

The arguments above assume that there is some tradeoff between price and quality. Why then do more highly selective schools not choose to cut price and compete on that basis rather than on quality? Aside from the above-mentioned problem, there are several other reasons why highly selective schools are not likely to employ price as the vehicle for competition. These are for the most part related to the fact that student matriculation decisions appear relatively insensitive to price.[62] There are several reasons this may be so.

One reason for student insensitivity to price differences is that a student who chooses a college on the basis of its charging low tuition for one year has no guarantee that the favorable price differential will not disappear or even be reversed in a student's subsequent three years. On the other hand, a reputation for quality or a new gymnasium is very unlikely to disappear in the short to medium run.

There are other reasons as well for student matriculation decisions to be relatively insensitive to price. As was discussed above, the net cost of college to many financial aid

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[62] Leslie and Brinkman (1987) provide a survey of studies that investigate the sensitivity of demand to price.

students will be invariant to the sticker price: increases or decreases in cost will simply be matched by increases or decreases in financial aid. Wealthy students may be insensitive to price for different reasons.

Any tendency toward student insensitivity to price may be exacerbated by the fact that, again because of imperfect information, students may actually employ a college's price as a signal of its quality.[63] Thus the school may gain no competitive edge at all by charging less than its rivals.

Another reason for schools to eschew competing for students by price is that, from the standpoint of the schools, it is not a very efficient method of attracting students. As we mentioned earlier, students do not transfer schools lightly; thus, the major impact of price competition will be noticed in the freshman class. But tuition reductions, or more likely, foregone opportunities to increase tuition, must typically be extended to all students attending a school, and that means that in order to marginally improve the quality of just the incoming class, the school must trade away revenues it could have had from all four classes, including those that are a captive group. This is likely to be an unattractive tradeoff.

All of these factors make price competition relatively unattractive. Quality competition is therefore likely to play a larger role. Another factor may reinforce this tendency: faculty and administrators may themselves derive substantial utility from quality competition. Amenities such as better gymnasiums, theaters, art museums, gracious grounds, concerts, etc., clearly have value to others besides students. Some dimensions of quality, such as smaller classes, have as much or more appeal for faculty as they do for students.

It is of course possible that the reason that we do not observe the highly selective schools competing on the basis of price is that they have a collusive agreement not to do so. This

[63] For formal models of this idea see Cooper and Ross (1984) and Wolinsky (1983).

hypothesis is at the moment the subject of a Federal antitrust investigation. Perfectly legal, but not much different in effect, all the highly selective schools could be independently setting their tuition in some relation to a price-leader, presumably one of the more prestigious schools. It would be very difficult to empirically differentiate this behavior from that based on the motivation to be priced "in the middle of the pack" that we described earlier in this section.

The Moderately Selective Market

We have defined the moderately selective market to include those schools not among the top 50 (by average SAT scores) that reject at least 39 percent of their applicants. For many schools in this market segment, non-price rationing plays a role similar to its functioning in the highly selective market. By accepting only the best qualified applicants, many of the moderately selective schools are able to improve the level of ability of their student bodies. This can provide positive spillover effects or positive externalities for all the students at an institution. In addition, a school may be able to attract and retain better faculty members who may value brighter and more motivated students in their classes and to assist in research. These effects, coupled with merely being labeled a more selective school, can improve an institution's reputation for quality.

For other schools in this market segment, primarily public institutions, extensive non-price rationing may well conflict with access goals dictated to the institution by legislative or executive bodies. In this situation there may be a tension between the objectives of the administrators of a school and the political and social goals espoused through state or local bodies. This conflict may be minimized for many of the schools in the moderately selective market segment that are a part of a state system that includes one or more "flagship" universities, four year state colleges, and public junior colleges. In these systems there is usually a pronounced selectivity/quality pecking order. The flagship universities may be encouraged to be selective if there are other suitable public institutions in a state that are available to students.

As in the highly selective segment, prices in the moderately selective market are also often set below costs. Public institutions receive substantial appropriations from state and local governments that allow the subsidization of the education of all of their students. (See Table 17b above.) As discussed earlier, the tuition setting behavior of public institutions is often driven by legislative mandate that is intended to meet political and social goals like providing access to good quality higher education.

Even public schools that have a two-tiered pricing system for in-state versus out-of-state students substantially "undercharge" out-of-state matriculants. It is unlikely that this phenomenon can be easily explained using a political argument. More likely, this can be explained as an attempt to attract, or at least not discourage, out-of-state applicants who might positively contribute to the quality image of the school.

Although we have noted earlier that price competition within market segments is for a variety of reasons rather ineffective, across market segments price shopping by students may play an important competitive function. One clear constraint on the pricing of the moderately selective schools is the tuition charged by more prestigious institutions. In a similar fashion, the tuition at the less selective schools, many of which are public, constrains the tuition setting behavior of the moderately selective schools.

Financial aid plays a number of different roles in this market segment. Schools in the moderately selective segment often use financial aid to attract highly capable students on a "merit" basis. For public schools this may take the form of a statewide scholarship competition or providing "honors" programs that appeal to this group of students. Need-based financial aid at public institutions serves the standard access goal of reducing the price of higher education to low income families.

To the extent possible both public and private schools in the moderately selective segment also utilize income availed from endowments to finance expenditures and thus reduce the need to generate revenue through tuition. However, although many of these schools have endowments, the size of these funds, particularly on a per student basis, pale in relation to the highly selective segment. (See the data on wealth presented and discussed above.) The ability of private institutions in the moderately selective segment to use these funds to reduce tuition levels substantially below cost is, therefore, severely limited.

The outcome in this market segment exhibits many of the same characteristics as the highly selective market: there is extensive non-price rationing in all but the least selective institutions; price is below cost for virtually all of the public schools and a number of the more well endowed private schools; and quality competition is important. There is an interesting "residual demand" effect that enters into determining an equilibrium in the moderately selective market. Because many of the students apply to more selective schools as a "long-shot," the market outcome in the highly selective segment influences who ends up at the moderately selective schools. This "cascading" effect also carries over to the less selective segment, and to a more limited extent, from the less selective market to the non-selective market.

A demand-side counterpart to the supply-side non-price rationing by colleges and universities occurs at many institutions. Many students apply and are accepted to more than one HEI. Because a student can matriculate at only one school, other institutions that also admitted the student are rejected. Typically the most able students are accepted into a number of HEIs. Each of the accepting schools would like to attract the best students, but since these students go to only one, there is a resulting "most-able-student rationing" that constrains schools from getting all of the students they would like most to attend. Most schools "overadmit," knowing that many of the best students they admit will go elsewhere. The resulting yield ratio varies substantially

within and across market segments. Interestingly, as can be seen in Table 18 below, across market segments, yields are typically lowest among the highly selective and moderately selective schools. This follows from the observation that the students with the highest ability apply to more schools on average. In part this demand-side rationing is a consequence of the supply side non-price rationing by selective schools. Even very capable applicants are not assured of acceptance to any particular one of the highly selective schools. Applying to a large "portfolio" of schools can diminish the chance of not getting into at least one of an individual's preferred institutions.

The Less Selective Market

The less selective market includes all those schools that accept between 61 percent and 98 percent of their applicants. This is the largest segment of schools both in terms of number of institutions and number of enrolling students. It is clear that the less selective schools are a varied sub-group. The "bottom end" of this segment, those schools which admit almost all (95 percent to 98 percent) of their applicants, tends to be dominated by public two year colleges. The "upper end" of this segment, on the other hand, consists predominantly of public and private four year college and universities. Obviously, the selectivity of the schools at one end of the segment differs dramatically from the other end. In addition, some of the schools in this segment, by some measures, are among the wealthiest in the country. These differences may translate into substantially different goals and constraints across the institutions within the segment. As a result, there is likely to be a range of tuition setting behaviors, forms of quality competition, and financial aid policies within the segment.

Some of these schools compete for students with the moderately selective and highly selective colleges and universities while others are competing with non-selective schools. Those that are competing for students with the more selective schools are not dissimilar to them: a

Table 18

Distribution of schools by controle by typee by elite1
disregard the mean statistic label - this is a mean of 1 number

		ELITE1				
		top 50 SAT	more selective	less selective	non-selective	ALL
		mode of yield	mode of yield	mode of yield	mode of yield	mode of yield
		MEAN	MEAN	MEAN	MEAN	MEAN
CONTROLE	TYPEE					
public	university	49	31	50	62	48
	other 4-yr inst.	46	26	65	74	53
	2-yr inst.	.	63	70	100	78
	ALL	48	40	62	79	58
private	TYPEE					
	university	27	33	31	.	30
	other 4-yr inst.	34	34	42	41	38
	2-yr inst.	.	77	71	100	83
	ALL	31	48	48	71	49
ALL	TYPEE					
	university	38	32	41	62	40
	other 4-yr inst.	40	30	54	58	45
	2-yr inst.	.	70	71	100	80
	ALL	39	44	55	75	54

symmetric situation occurs for those less selective colleges on the fringe of the non-selective market: our top fifty school cutoff and the selectivity cutoffs are, after all, rather arbitrary. Under an alternative percentage cutoff for selectivity, some less selective schools would actually be defined as moderately selective. It is also true that the 98 percent cutoff is somewhat arbitrary. Many schools with acceptance rates above 95 percent or so may in fact exclude only a very few students, some of whom probably do not meet minimal academic or other standards, such as completion of high school.

In this subsection we will focus on describing the behavior of the "typical" less selective school and the nature of the resulting market equilibrium. Interesting aspects of the competition and outcomes that result on the fringes of the market segment will be discussed later.

The less selective colleges are more likely than the highly selective schools to compete for students in a regional, state, or local market, not a national market. The geographic size of the market almost certainly varies with the selectivity of the school. (See Table 10 above.) For this reason, the location of an institution may be substantially more important than in the highly selective market. One reason for this may be that in some ways the non-locational differences among these schools are less pronounced than in the highly selective segment. For example, the level and type of amenities offered are likely to more homogeneous across the less selective public colleges and public universities than in private, highly selective colleges and universities. (Certainly in part this results from the less intense quality competition in this segment compared to the highly selective schools.)

Location may also matter more because the expected returns to higher education for students in this segment may be lower than for students in highly selective schools. [Behrman, Kletzer. McPherson and Schapiro will address this in their forthcoming study.] Students would then be less willing to forego the monetary and pecuniary advantages associated with attending a

less distant institution. These could include: the opportunity to obtain inexpensive housing at home, easier and more assured access to summer or part-time employment, and some familiar friends or surroundings in addition to the out-of-pocket transportation costs.

Some students may not only be less willing to attend a distant institution, they may place a high value on a school being located in a favorable environment. Few, if any, schools literally compete for students by moving to a more attractive location. Nonetheless, location does provide important competitive advantages to some institutions and handicaps others. It may be no accident that the newest branch of the University of California system was located in very attractive surroundings on the Santa Cruz peninsula.

Non-price rationing plays a less significant role in the less selective market than in the previous two segments. Schools in this segment accept well over half of their applicants and some schools in the lower end of the segment admit virtually all who apply. The sorting that does occur is motivated by the benefits, discussed above, that schools with better students enjoy. Many public institutions in this segment may well have their admission standards dictated by legislative or executive bodies. Again, there may be a conflict between the objectives of the administrators of a school and the political and social goals espoused through state or local bodies.

As in the more selective segments, prices in the less selective market are also often set below costs. Public colleges and universities as well as public two year institutions receive substantial appropriations from state and local governments that allow these institutions to subsidize the education of all of their students. (See Table 17c above.) As discussed earlier, the tuition setting behavior of public institutions is often driven by legislative mandate that is intended to meet political and social goals like providing access to good quality higher education.

For many of the less selective private colleges and universities, the absence of endowment income and public appropriations complicates the tuition setting and expenditure policies. In order to attract students these schools may have to offer a level of educational services that entails relatively high expenditures per student; however, given the alternatives available - public institutions with lower prices and more prestigious schools with not dissimilar levels of tuition - students may not view the "product" offered by many of these private institutions to be worth this high relative price. As a result, the decisions of administrators and faculties regarding tuition and expenditures to improve facilities or instruction at many less selective private schools are quite constrained. In addition, many of these institutions may not be able to afford the luxury of offering a "need blind" admissions policy. Financial constraints may dictate the socioeconomic composition of the students.

Most private schools in this category do not have the financial resources to provide large amounts of merit-based aid. To the extent that less selective colleges do offer merit-based aid, the goal is clearly to improve the quality of the institutions as measured by student attributes.

Private colleges and universities at the low end of the less selective segment may use some amount of financial aid as inducements to attract additional students. Although these students receive a subsidy from the institution, their net price may still exceed marginal cost. If these schools have difficulty filling classes, then, from a school's financial perspective, these students are desirable.[64]

The more selective schools in the less selective market are not financially threatened by the demand-side rationing described above: these schools utilize over-admission and waiting lists in the same manner as the moderately selective and highly selective schools. However, the less

[64] A school that is designed, in terms of the size of facilities and faculty, to provide an education for a certain number of students may find that the marginal cost of additional students is quite low up to that level of capacity.

selective schools near the fringes of the non-selective market are in a more precarious position. These colleges are already admitting 90 percent and more of their applicants; their waiting lists are not likely to be extensive; and if one should suffer an drop in either the number of its applicants or its yield of matriculants from admits, it may suffer serious economic dislocation as a consequence.

To a much greater extent than the highly selective and moderately selective segments, equilibrium in the less selective market is affected by long run demographic trends that alter the size of the pool of potential college and university students. This is not only because this market segment is the largest in terms of numbers of enrolling students; it also is the result of the residual demand nature of the applicant pool. The more selective segments are essentially unaffected by these demographic phenomena; by and large these schools will be able to fill their classes with students. However, some schools in the less selective segment may find it difficult to fill classes as the pool of potential students shrinks. (This may be compounded if wage rates rise in response to the reduction in the rate of growth in the labor force, although this latter factor probably is more important for the non-selective segment.)

The Non-Selective Market Segment

We have defined the non-selective market segment to be all those institutions that admit 99 percent or 100 percent of their applicants. In our sample, there are 757 such institutions, about a third of the total. According to the 1985-86 Peterson's data, junior colleges dominate the non-selective market segment: more than 78 percent of these schools are public junior colleges and an additional 5 percent are private junior colleges. (It should be noted that our sample underrepresents private junior colleges.) Private four-year colleges account for about 12 percent of the institutions, and public four year colleges another 5.1 percent One university falls into the non-selective market segment.

The non-selective colleges clearly face demand conditions that are different from schools in the other, more selective, market segments. The geographic scope of the markets in which they compete is different, their students have different demographic characteristics, and their quality is measured in different terms.

The non-selective public junior colleges, more than three quarters of the total non-selective market, generally draw their students almost entirely from their immediately surrounding area. The vast majority of their students are commuters, and student travel time between home (or work) and school is an important consideration.

For the most part, non-selective schools do not "compete" with other HEIs for students. Few applicants apply to more than one college. (See Table 18 above for yield data.) Individuals considering attending these colleges are more likely to be choosing whether to pursue higher education at all, or if an affirmative decision has already been made in that regard, how to allocate their time between education, employment or non-market activities such as homemaking. More than half of the students are adults.

The relevant definition of "quality" in this market also differs somewhat from that in the more selective segments of the market. In the case of the junior colleges, a great deal of the education is very specific: accounting or bookkeeping, childcare, communications, data processing, etc. Employers can easily determine if a person has taken a particular course of study. Therefore, to the extent that students pursue non-selective education to improve their job prospects, quality in this context largely translates into providing good career counseling and job placement services and instruction in skills that employers value.[65] Other dimensions of quality

[65] One reason that reputation or prestige counts for so much in the highly selective market is that employers of such schools' graduates are rarely interested in the specific content of the subjects that students studied; the employer is not purchasing a skill so much as the ability to acquire skills.

are of course relevant: students are naturally concerned with the level of available amenities, including athletic facilities as well as general interest courses such as Shakespeare or Film.

The fact that the non-selective schools draw their students from a local market, and that important dimensions of quality are readily observable, suggests that potential students are likely to be reasonably well-informed as to quality. In this respect, one of the important potential sources of market failure present in the more selective segment of the market may be less of a consideration here.

The level of prices, and the constraints that institutions face when setting price, also differ from the more selective segments of the market.

Tuition at the public non-selective schools is typically very low, in part because E&G expenditures per student are lower than in the more selective segments of the market and, more importantly, because of public subsidization of non-selective higher education. (See Table 17d.) Students currently pay a very significant tuition premium to attend a private rather than a public non-selective school. The tuition difference is not matched by a significant difference in E&G expenditures per student. Compare the figures in Tables 13 and 14 above.

Most of the non-selective schools, public and private, have no significant endowment at all. Essentially, all revenues must come from tuition, public appropriations, and gifts, grants and contracts. As can be seen in Table 17d above, private gifts, grants and contracts account for less than 1 percent of E&G expenditures for public schools compared with 14 percent of E&G expenditures for private institutions. However, state and local funding of two-year public HEIs, which provides close to 70 percent of E&G expenditures for the public institutions and only 12 percent at private institutions, far more than compensates for this difference.

Private non-selective HEIs, unless they have a locational monopoly or offer training that public institutions do not, must compete with heavily subsidized public non-selective HEIs.

Presumably, this significantly constrains the tuition they can charge. Many private non-selective colleges are surely kept under constant pressure by the existence of low tuition public competition nearby. They are most unlikely to be offering anything but "no-frills" education.

Although students in the non-selective market may be sensitive to price differences between schools, it is not clear how sensitive attendance is to the average price within the non-selective segment. Opportunity costs, particularly foregone earnings, are a greater component of the total cost of attendance than tuition and fees. Given this, moderate percentage changes in tuition may not have a major impact on the number of matriculants. On the other hand, if the absolute return to non-selective education is modest, or if potential students would have difficulty financing higher priced non-selective education, increases in price might discourage large numbers of potential students from attending.[66]

Even though tuition at non-selective schools is quite modest, capital market imperfections certainly affect demand in this segment of the educational market. A large percentage of the students attending non-selective colleges come from lower-income families that are unable to finance their higher education from savings. More than half the students are adults who may have their own dependents. Neither the public or private non-selective colleges offer any significant amount of institutional aid. Pell grants, although limited to 60 percent of the cost of college attendance, which includes tuition and fees as well as living costs, play a significant role for students attending these schools. In addition, earnings from employment, guaranteed student loans, and state-level financial aid, if any, are potential sources of financing for students at non-selective schools. Nonetheless, it is likely that the matriculation decisions of a substantial number of potential students, especially adults, are affected by financial constraints.

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[66] Studies of the rate of return to higher education rely on Census data which measure only the number of years of higher education. Therefore we do not know the private return to non-selective education.

Concerns with equity, access, and the desirability of encouraging high school graduates to continue their education all argue for keeping the price low and/or finding ways to mitigate the effects of imperfections in the market for private financing of higher education.

What the Future Holds in Store

An economist once said, "Forecasting is difficult, especially if it's about the future." The complexities of the higher education market make this hold doubly. Can we say anything useful about what the next decade or two will bring?

Demographic changes will surely affect the higher education market, though not as powerfully as in some earlier decades. We know that the number of 18 to 22 year olds will decline through about the mid-1990's. This prime college-age cohort will increase again after that, but although there will be an aftershock of the post-war baby-boom, it probably will not necessitate the kinds of major adjustments the higher educational system experienced in the 1960's. Unless there is an unpredictable change in the demand for adult continuing education, adult enrollments should continue to moderate the cyclicality of demand produced by baby booms and baby busts.

We will discuss first the likely impact of the continuing decline in the 18-22 year old cohort on price and quality competition in higher education. The effects of the baby-boom aftershock will be the opposite, and we will therefore discuss them only briefly.

As high school graduating classes continue to shrink in the next five years, colleges may feel greater pressures to "market themselves" to prospective students. This may affect prices in two ways, each of which pulls in a different direction. The excess demand for admission to the more selective schools should shrink, and the excess supply of "slots" in the less selective colleges should grow. In a typical market, the changes would have the effect of moderating any tendency

for prices to increase, and to some extent this may happen in the higher education market. However, if, as we have argued earlier, price competition is ineffective as a means of attracting matriculants, colleges might respond to the demographic changes by increasing the level of quality competition. If prices are expenditure driven, this would create pressures for greater tuition increases.

The response to demographic induced changes in demand conditions will probably differ in the four market segments. The behavior of schools in the non-selective market is likely to be the least affected of the four. Resource-intensive quality competition has not played an important role in the non-selective market, and demographic changes probably will not change this. At the same time, the level of tuition at the non-selective schools, particularly the public institutions, is already quite low, and we would not expect to see it reduced further in response to any increase in the excess supply of slots. As we have argued earlier, other costs, such as foregone wages, may be more crucial for matriculation decisions in this market segment than tuition. On the other hand, this segment of the market may well experience actual declines in enrollment over the next five to ten years. The administrative and legislative response to this possible change will be important for the entire higher education market.

The demographic changes on the horizon are likely to have the greatest impact on the less selective market segment. A decline in the number of students will increase pressure on schools to fill their slots. In addition, schools in the tier that borders the non-selective segment are likely to feel pressure to restrain tuition increases because of the competition they face from low-priced non-selective public HEIs.

Schools in the moderately selective segment may feel pressure to compete via both price and quality, but given that price increases may be necessary to finance quality competition, it is

not clear that they will find quality competition a viable option.[67] As a result, many of these schools are likely to face very difficult choices regarding tuition levels, expenditures for instruction, and financial aid awards; the outcome is uncertain.

It is in the highly selective tier where we would most expect the tuition-increasing effects of quality competition to outweigh the tuition-moderating effects of a decline in the high school graduating cohort. Even here, it is by no means certain that quality competition will play a significant role in increasing expenditures and then, subsequently, tuition. Over the decade of the 1980's the highly selective schools have greatly increased real expenditures per student, particularly outlays for construction (McPherson, Schapiro, and Winston, 1989). If they have not yet reached the point where the marginal gains from quality competition (as a means of attracting students) is exceeded by the marginal cost, they may do so relatively soon. In addition, some of the rapid expenditure growth during the past decade probably represents efforts to recover from relatively low levels of spending and construction in the 1970's. If schools are now "caught up," rates of spending should moderate in the future.

Another reason that we might expect expenditure and tuition moderation in the most highly selective segment is that tuition resistance will increase with the ratio of college cost to disposable family income. In effect, there is some limit to how much can be charged for a college education. We have not reached that limit yet, and given the value of attending a prestige university, might not reach it for some time[68]; however, given that selectivity and having

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[67] Only a very small number of these schools have a large enough endowment to finance resource-intensive quality competition long enough for the improvement in perceived quality to translate into the ability to generate additional revenues.

[68] During the late 1970's, a college president at one of the nation's elite institutions remarked humorously --and somewhat wistfully-- that his financial constraints could be substantially eased if only the last ten slots in each freshman class could be put up for auction. They weren't.

highly able students are both important objectives of the prestige schools, at some point the tradeoff between revenues and these other desiderata will point to tuition moderation.

Efforts to predict changes in demand for the higher education market would benefit from analysis that helps to explain the differential in average wages between high school graduates and individuals with two or four years of college education. Changes in this "return" as well as changes in real wages, the central component of the opportunity costs of college attendance, will be important in understanding future demand changes. These factors will be especially important for the non-selective and less selective market segments.

To this point, we have discussed tuition and expenditure increases as if they affected all students equally. Because some students receive financial aid, this is not the case. The availability of institutional financial aid has allowed colleges to price discriminate, that is, to charge more money to those able to pay for more costly higher education while not increasing the net price to those unable to do so. This has made it possible for some schools to increase tuition revenues without having to sacrifice the socio-economic diversity of their student bodies. In fact, many schools have significantly increased the number of students receiving financial aid over the past ten to fifteen years. Certainly some part of colleges' and universities' escalating tuition charges can be considered the cost of this diversity. However, as tuition levels go up, schools are more and more likely to encounter "middle-class melt," and at some point this will put limits on tuition increases.[69]

Institutional financial aid does not play a big role in the public non-selective market segment, but in parts of the less selective group, and certainly among the moderately selective

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[69] In a recent manuscript, "Tracing the Economic Backgrounds of COFHE Students: Has There Been a Middle-Class Melt," Morton O. Schapiro concludes that a group of expensive institutions has lost middle-class students, primarily at the application stage, to lower cost alternatives.

and highly selective private institutions, it has played a critical role in schools' pricing policies. Therefore, we would expect that middle class melt may serve to moderate tuition increases at the moderately selective and highly selective institutions. Alternatively, for the schools that are able to afford it, financial aide resources may be increasingly directed toward students from middle income families, reducing the pressure for these schools to reign in tuition.

The fiscal condition of state governments could also play a role in shaping higher educational expenditures and tuition. Over 44 percent of undergraduate higher educational institutions are publicly funded, the vast majority at the state level. Until very recently, state governments were on average running budget surpluses, but now states from California to New York are struggling to cope with very large deficits. If fiscal pressures cause states to alter their policies with respect to higher education funding, it could have a significant impact on the market.

There are several mechanisms through which this could occur.
If budgets become tighter at the state level, there will be pressure to increase tuition at the public colleges and universities. This will have the obvious direct effect on tuition at these schools, but it may also lead to tuition increases among private colleges and universities, particularly in the less selective and non-selective segments of the market where private schools' tuition is constrained by the competition from low-priced public HEIs. This might affect the tuition-moderating impact of the next decade's demographic changes. The impact of public sector tuition on the HEIs in the highly selective segment is likely to be modest.[70]

Tighter state budgets could also effect the higher education market through their effect on education and general expenditures, particularly faculty salaries. If salaries are cut, frozen. or

[70] There is a great gap between tuition at the public universities and the highly selective private HEIs. It is unlikely that any reasonable increase in public HEIs' tuition would significantly affect the excess demand for admission to the highly selective private schools.

have their rate of growth reduced in public institutions or student/faculty ratios rise, this will reduce the cost of hiring and retaining faculty in the private institutions. To the extent that tuition increases are expenditure driven, this will have a moderating influence on tuition increases in the private institutions. However, in many disciplines, including the sciences, such salary changes may not be feasible because of competitive constraints posed by non-academic employers; if academic salaries do not keep pace with market wages, schools may lose valuable professors to industry and finance.

The effect of salary restraints in public institutions will not just be felt in the non-selective and less selective market segments but in the highly selective segment as well. A number of state university systems have been aggressively recruiting faculty at all ranks in recent years, and the ensuing bidding has affected salaries and workload even at the most highly selective private institutions.

Together, the factors that we have discussed above suggest a moderating of the rates at which expenditures and tuition grew from the late-seventies to the present. However, there are two factors that could serve to put upward pressure on expenditures and tuition in the relatively near future. One is the increased competition for faculty due to the retirement of those faculty who entered teaching during the expansion of higher education in the 1960's. (See Bowen and Sosa (1989).) It is difficult to know how great this effect may be, and it may be negated by the budget pressures that we anticipate affecting the public institutions, but it is already a matter of concern at forward looking institutions.

The second factor concerns the rate of productivity growth in higher education. Higher education is a service industry, which like other similar services such as health care, is unlikely to keep pace with the rate of overall productivity growth in the rest of the economy. Productivity, in simple terms, is just the ratio of the amount of output produced from inputs. If more output

can be gotten from the same amount of inputs or fewer inputs used to produce the same amount of output, then productivity increases. In education, these gains are hard to come by. As a consequence, the cost of producing higher education relative to the cost of producing other goods, such as automobiles, houses, or food, is likely to rise. It is important to note that this result may occur despite attempts by administrators to cut costs. Productivity, in a very narrow sense, could clearly be increased if class sizes were doubled; however, few would deny that the value or quality of the resulting educational output would dramatically fall as a result.

As mentioned above, the "birth dearth" cohort will be followed by a larger cohort: the children of the baby-boom generation. With the exception of the effects of state budgets becoming tighter, something that we expect to continue for some time, increases in the number of college age individuals in this baby-boom "echo" will likely affect the various market segments beginning in the next millennium.

Nobody can predict the future. However, we have discussed a number of factors that suggest a moderating of the rate of expenditure and tuition increases of the past. This will be small comfort both to those who see tuition as already being too high, and to those who do not see how they can provide acceptable educational services without greater resources than they have at the present. In the next section we will discuss some of the public policy issues suggested by our analyses to this point.

Conclusions and Policy Considerations

There are two broad reasons for public intervention in the functioning of markets: 1. market failure; and 2. dissatisfaction with the distributional consequences of the market outcome.

We have examined the functioning of each of the four segments of the higher education market. We will next discuss the various market imperfections suffered by each segment. the

nature and extent of the resource misallocation they produce, and whether or not public intervention is likely to be productive. We will also discuss some of the distributional consequences of the functioning of the higher education market, and consider whether these suggest a positive role for changes in Federal educational policy.

The Highly Selective Schools

The higher education market has received an unusual amount of public attention in recent years, perhaps inspired by Reagan administration Secretary of Education William Bennett's criticisms of the elite colleges and universities. Bennett's speeches focused on the level and increase in the cost of attending the highly selective private colleges and universities and on the money spent on what he regarded as "frills," those aspects of the higher educational experience that are more "consumption" than "investment." The media, notably the Wall Street Journal, wrote similarly critical articles. Is there a problem and ought something to be done about it?

High prices or the provision of "frills" alone do not justify public intervention in the market. If there were no market imperfections or undesirable distributional effects of the allocation of resources in higher education, public intervention would be inappropriate. Houses in Beverly Hills and Ferrari's are very expensive and even more exclusive than elite higher education, but there is no outcry for government action: our society displays little inclination to interfere with consumer sovereignty. Clearly, to the extent that students and their families pay for higher education themselves, the consumption element of higher education is no more an appropriate public policy concern than consumption of soda pop or designer clothes. If the consumption component of higher education is being directly or indirectly subsidized by taxpayers, the case is more complicated. We must ask if the subsidy to consumption is large enough to actually be a matter of concern. The research by McPherson, Schapiro, and Winston

(1989) on the effects of Federal financial aid on HEIs suggests that any consumption subsidy from this source must be very small, and it is unlikely that research funding or government funds from other sources contribute significantly to subsidizing consumption activities.

Even though the amount of public subsidy to higher educational "consumption" is probably very small, it is still useful to ask if such a subsidy may actually serve a useful purpose. At least two possibilities exist. First, if there are positive externalities from higher education, it is in society's interest to encourage pursuit of higher education, and making the experience more enjoyable for students is one way to accomplish this. Second, HEI expenditures on "extras" may be used by potential students and their families as indicators, or "signals," of the quality of education provided by an institution.[71] When other sources of information are costly and difficult to assess, the signal or indicator that such expenditures may provide can, in fact, be quite valuable.

All this said, it may still be true that the market for higher education functions in such a way that HEIs compete for students with "frills" that students and society value less, both in consumption and information terms, than the cost of providing them. If this is true, there may be some room for improving things. Large gains from policies directed to this aim are very doubtful.[72]

Public intervention may be warranted on the grounds of reducing allocative inefficiency if price is higher than marginal cost, as in a textbook case of monopoly. Our data show clearly

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[71] In effect, the "signalling" argument goes as follows: Under certain conditions, a particular product price or attribute will only improve the seller's circumstance, if the product itself is of high quality. Therefore, a consumer observing that price or attribute can use it as an inexpensive way to judge product quality. See Spence (1973) for a formalization of this idea.

[72] The experience the federal and state governments had in the 1960's and 1970's trying to limit hospital expenditures on construction and equipment through Certificate of Need laws suggests the need for great caution. See Sloan and Steinwald (1980).

that the highly selective HEIs charge substantially less than the average cost of providing their product. Marginal costs in higher education tend to be well below average costs until an institution's capacity is reached, at which point they increase rapidly. Given the large gap between average cost and price, and given that the highly selective schools typically operate at or near capacity (these schools have no "empty slots") it is unlikely that the gap between price and marginal cost is great enough to justify public intervention on the grounds of increasing allocative efficiency.

Imperfect information is a second source of market failure, one that we have argued plays an important role in higher education markets, particularly the highly selective segment. The major problem associated with imperfect information is that, because true quality in higher education is difficult if not impossible to ascertain, consumers and HEIs may resort to using price and conspicuous provision of amenities as "signals" of quality. This could have the effect of reducing the extent of price competition and encouraging quality (amenity) competition.

It is not only the level of quality competition that is a concern, but the form it takes as well. That is, institutions may be providing certain kinds of "quality" in excess. If true quality is difficult to judge, and the contribution of various institutional attributes to educational excellence also difficult to discern, we might expect that colleges seeking to use quality expenditures as a signal to potential students would tend to allocate too many resources to the more visible forms of quality such as faculty research output, athletic facilities, theaters, museums, etc., and too few to the less tangible and less readily quantifiable forms of quality such as fine teaching, individual attention to students, the quality of student counselling, and the like.

In a related vein, one might argue that the combination of non-profit status and a lack of vigorous price competition would encourage HEIs' decision makers, that is, the faculty and administration, to provide themselves with excessive amounts of amenities, under the guise of

competing for students. Light teaching loads, low student\faculty ratios, lavish support for research, and perhaps even the many cultural amenities provided by HEIs might be as attractive, or more so, to the administrators and faculty charged with resource allocation decisions than they are to students.

There is clearly a possibility that there is excess provision of amenities in the highly selective market segment, but it is hard to imagine a helpful policy response to directly remedy this problem.[73] Even if it is true that relatively few students are eager to avail themselves of the amenities provided by quality competition --extensive athletic facilities excepted-- it could be argued that one of the purposes of higher education is precisely to change the tastes of the students. Further, if there are significant economies of scale in providing amenities, it might actually be the case that substituting high levels of amenities for high salaries may be a cost-effective method of attracting and retaining faculty, not just for any given HEI but for the whole system as well. In addition, placing a value on the information signaling function of amenities and quality is extremely difficult.

In effect, because quality provision serves so many purposes, and because the government is unlikely to be significantly better able to judge higher educational quality than individual consumers, and because consumers are heterogeneous in how they value various quality attributes, regulation of quality provision is probably not a sound policy option. Information provision might seem to be a superior alternative, but as is discussed in the accompanying paper, "Understanding the Quality Issue in U.S. Higher Education," even this has the potential for producing harm.

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[73] Analysis of attempts to limit spending on health facilities through Certificate of Need regulation suggest that just the opposite was accomplished. See Sloan and Steinwald (1980).

One potentially attractive policy alternative involving information provision might grow out of research that investigates the different rates of return that individual students might expect to receive from various kinds of higher education, for example, the four market segments identified in this paper or other finer distinctions. Information of this sort would begin to allow families to make more informed college choice decisions when faced with a difficult-to-grasp array of cost and quality alternatives.

Selectivity itself might be regarded as a source of inefficiency in the highly selective segment of the market: at the going price, some willing consumers are being barred by selective HEIs from buying their product. This is clearly a complex issue. One point to consider is that the existence of prestigious and highly selective HEIs almost certainly has the effect of stimulating effort and learning among secondary school students. A more homogenous higher education market would certainly diminish the effectiveness of this incentive. (McPherson and Schapiro discuss this issue in their forthcoming study, "Selective College Admissions and the Public Interest.")

Another potential source of inefficiency is that, at least up to capacity, higher education is a declining cost industry. Therefore, marginal cost pricing will generate insufficient revenues to cover cost. In addition, pricing to cover average costs will not result in optimal production. In this context, state appropriations and income from endowment or gifts can be thought of as subsidies that allow these schools to charge prices to students and their families that may more closely approximate the marginal cost of providing an education while remaining solvent institutions. Interestingly, if it is in general true that the price elasticity of demand[74] for higher education varies inversely with family income, then need-based financial can also be considered

[74] The price elasticity of demand is a measure of how responsive the quantity demanded is to changes in price.

efficiency-enhancing. Happily, in this instance, this efficiency enhancing behavior also has desirable equity implications.

The Moderately Selective Market

The moderately selective market segment is subject to the same sort of market shortcomings as the equilibrium in the highly selective segment: imperfect information that may lead to excessive levels of certain types of amenities; multiple revenue sources that result in prices that differ from marginal costs; and some degree of economies of scale. Excess quality provision is likely to be less of a problem in this market segment than in the elite market segment because schools in the moderately selective segment face greater competition from the less selective, and often less expensive, segments of the market. In addition, the typical school in this segment has fewer resources at its disposal with which to finance such expenditures.

The Less Selective Market

Perhaps the most important role for public policy in this segment of the higher education market is to ensure that any individual with the ability and desire to acquire a college education has access to the necessary financial resources. As mentioned in the introduction, imperfections in capital markets make it highly unlikely that banks or other sources of funds would be willing to extend themselves into the student loan market without some government assurances. For some individuals grants may be a more appropriate form for student aid.

The vast majority of private institutions in the less selective segment do not have the fiscal resources to provide significant amounts of institutional financial aid to prospective students. Federal aid to individual students, therefore, must provide the bulk of the support for students at less selective private HEIs.

Most state governments have long recognized the importance of providing good, low-priced higher education to their citizens and have followed through over the years by subsidizing

public higher education with significant amounts of state appropriations. These funds have allowed state universities and colleges to charge very reasonable tuition and yet provide fine educational services. However, as discussed in the previous section, many states are experiencing severe budget crises and the continued commitment of state resources at a level adequate to maintain low tuition and desired instructional quality is more doubtful now than at any time in the recent past. If direct state aid to public colleges and universities does decline and tuition at these institutions rises, there may well be an appropriate role for increased levels of Federal aid to college students.

The Non-Selective Market

Market failure is not absent from this segment of the market. A great many of the non-selective institutions enjoy a local monopoly: the extra direct and/or opportunity costs of attending a non-selective institution far from home make that choice infeasible for the preponderance of students. In these situations, students are a "captive" audience. As a consequence, administrators and faculty that enjoy this market power may be less responsive to changes in student educational and training needs than is socially optimal. Certainly the potential impact of declining state support to higher education due to budgetary pressures also poses an important problem for the affordability of non-selective higher education. In fact, with an even greater proportion of public institutions in this segment, and students who tend to be more price sensitive than in other market segments, the consequences may be greater.

The Whole Market

In designing public policies to compensate for the higher education market's imperfections, it is important that we not lose sight of the role that externalities play in this market. A positive (negative) externality exists when an action by one individual creates an uncompensated benefit (cost) for someone else; consumption of higher education almost certainly

generates positive externalities. This implies that individuals, who presumably make their education consumption decisions by weighing their private costs and private benefits, fail to account for at least some portion of the actual benefits of their education.[75] In consequence, if they demand the right amount of education from their own perspective, they demand too little from that of society. By subsidizing education, we offset the effect of the gap between its private and social benefit.

In addition to the positive externalities provided by higher education, which cause education's private valuation to be less than its social valuation, there may be important reasons why individuals tend to systematically undervalue even the private benefits of a college education. First, the vast majority of the direct consumers of higher education are recent high school graduates with no significant labor market experience on which to base their human capital investment decisions. Second, and perhaps most importantly, recent high school graduates may systematically underestimate the value of one of the likely benefits of a college education: adaptability to changing economic circumstances.

Both externalities and undervaluation of higher education's private benefits cause private demand for education to be insufficient from a social standpoint. Therefore, while there may be imperfections in the higher education market that might result in excessive expenditures in some circumstances, in general, policies that would restrict the equilibrium consumption of higher educational services are probably ill-advised.

A literate, numerate, and adaptable labor force may well be this country's most valuable resource for dealing with an increasingly competitive and rapidly changing international economy.

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[75] The sources of externalities in education are well known, and we will not belabor them here. For a more thorough discussion of this issue, see the companion paper, "Understanding the Quality Issue in U.S. Higher Education."

The direction of Federal policy toward higher education in the coming decade can help ensure that American workers continue to be the most productive in the world.

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APPENDIX A

Appendix A

A Primer on Economics

Economics has been described as the study of the allocation of scarce resources among alternative uses. Both scarcity and alternative uses are necessary to having an "economic problem." If there is no scarcity, that is, resources are unlimited, there is no need to make choices in allocating resources. Similarly, if there are no alternative uses for resources, there is again no need to make allocation choices. But if resources are not unlimited, and if they can be used in different ways, it is useful to have some general principle for determining the "best" way to use them.

The notion of "best" in resource allocation can clearly subsume a number of different elements. Fairness and avoiding waste are two important ones. Economics' major contribution to guiding resource allocation has not been in defining fairness; rather, it has been in defining allocation principles that avoid waste, or to put it another way, that lead to "efficiency." Many policy issues in higher education, notably access and financial aid, involve issues of fairness. Although economics may not be able to provide answers to such questions as: "How much financial aid is best?" economic analysis can be quite useful in determining what specific policies are likely to be most effective in achieving particular goals.

In the eyes of an economist, an "efficient" allocation of resources is one that maximizes the value of output that can be produced from the available resources.

A discussion of the exact conditions necessary to achieve an "efficient" allocation of resources is beyond the scope of this paper; however, we can briefly and non-technically mention a few important conditions that must hold. The first condition is quite intuitive: producers must

not waste resources in the production of goods and services, that is, use more resources than are necessary to produce whatever they sell.

A second condition is that consumers must allocate their budgets in such a way as to get the most value for their money. Among other things, this requires that consumers be able to judge the true value (to them) of the things they purchase; if they cannot, because of poor information for example, they are not likely to allocate their money in the best possible way, at least in retrospect.

Third, because we want the best resource allocation from a social viewpoint, resource allocation decisions should reflect the social rather than just the private valuation of goods and resources. To take an immediate example, if society reaps some benefits from an individual's education above and beyond the benefits directly obtained by the individual in question, private decisions alone would lead to underconsumption of education.

Last among the conditions we will discuss[1], but certainly not least, is that production of a good should be expanded as long as the value to society of an additional unit of the good is greater than the cost to society of producing it. If this is not the case, society can obtain some additional "net value" by producing another unit, thereby increasing the total value of goods and services.

If all the conditions discussed above are satisfied, economists will view a particular market as functioning properly. If not, the market will not allocate resources efficiently; there will be a "failure of the market" as a mechanism for resource allocation; the market will be viewed as suffering from "imperfections." These market failures, or market imperfections, occur in a variety of markets, and can result in costly misallocations of resources.

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[1] There are others, but we will not discuss them here. The interested reader can find them discussed in almost any intermediate microeconomics textbook in the chapter relating to "welfare economics."

FACULTY UTILIZATION

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Introduction

Attempts to explain why college tuitions have increased so steadily and rapidly throughout the 1980s consistently note growth in faculty salaries (Kirshstein et al., 1990; Hauptman, 1990; Frances, 1990; Schenet, 1988; Hansen, 1988). Study after study documents the slower than inflation increases in faculty salaries throughout the 1970s and the attempts in the 1980s by colleges and universities to "catch up" to early 1970s salary levels. Some view salary growth in the 1980s as "creeping ahead so slowly that, even now, they [faculty salaries] remain approximately 8 percent below, in real terms, what they were in 1971" (Kasper, 1989). Others, however, consider faculty to be "overpaid, grotesquely underworked, and the architects of academia's vast empires of waste" (Sykes, 1988).

Whatever view is taken of faculty and their incomes, one fact is certain: colleges and universities could not exist without them. In 1988-89, there were 467,000 full-time faculty members and another 275,000 part-time faculty employed in institutions of higher education in the United States (U.S. Department of Education, 1989). The labor-intensive nature of higher education makes understanding faculty issues central to any exploration of rising college costs.

There is a mystique, however, which surrounds faculty and the academic profession. Despite dramatic changes in the composition of the academic profession in the last twenty years, an image still persists of a bearded, tweed-coated, blue-jeaned, absent-minded, intellectual, male academic.

In reality, there is no single description of faculty that adequately describes the thousands of professors employed in the United States. Among the ranks of faculty are increasing numbers of women and ethnic minorities, part-time instructors, and persons teaching courses that were

unheard of twenty years ago. There is also no single description of what faculty do. The day-to-day lives of faculty differ considerably depending on a number of factors.

First, the academic profession is a patchwork of numerous and very different disciplines. Engineers, historians, social workers, physical educators, philosophers, and lawyers work side by side as faculty on university campuses. Although they may share the same employer, their knowledge, training, and work activities differ radically from one another.

Colleges and universities also define major differences in the faculty they employ. A sociologist employed by a two-year community college, for example, has a very different work life and salary than a sociologist employed by a prestigious research university. In addition, teaching loads and research expectations are vastly different across institutions.

Differences also exist across faculty ranks. A young, untenured assistant professor experiences an academic world quite unlike that of a tenured, full professor. Although the requirements for tenure differ considerably across campuses and even across disciplines on the same campus, they often drive the early careers of new faculty members.

Despite the many differences among faculty, the academic profession as a whole is still, to a large degree, a world apart from other occupations. As Burton Clark once noted, "The academic profession is an oddity among professions" (Clark, 1987; p. 1). People often do not understand what faculty do, when they do it, how much of it they do, and how they are paid.

This paper examines these and other faculty issues in an attempt to understand the impact of faculty on increasing college costs. First, salary issues are reviewed since what faculty are paid and how salaries have changed over time is central to understanding rising costs and tuitions. However, this paper reviews a number of other key issues which help to delineate what faculty do and what they want. The following section explores such issues as the nature of academic work and the academic workload; faculty productivity and the broad concern about

"quality"; flexibility in academic staffing, particularly the use of part-time faculty; faculty satisfaction with academic life; and the career mobility of faculty. Next, the possibility of future faculty shortages is examined. The final section discusses the impact which faculty could have on future college costs.

Faculty Salaries

Over the past two decades, faculty salaries have experienced periods of dramatic growth as well as periods of erosion. Throughout most of the 1970s, salaries paid to full-time faculty failed to keep pace with inflation. Thus, their real value declined. In the 1980s, however, this trend reversed itself and faculty salaries grew at rates beyond inflation. As of the 1989-90 academic year, faculty salaries had not yet regained their early 1970s value.

These trends in faculty salaries have been thoroughly documented. The American Association of University Professors (AAUP) carefully analyzes faculty salaries and benefits in different kinds of institutions and for different ranks, and also monitors long term trends. Table 1 presents faculty salaries by rank for the 1975-76, 1980-81, 1985-86, and 1989-90 academic years, and Table 2 compares annual increases in faculty salaries to increases in the Consumer Price Index (CPI) from 1971-72 to 1989-90. Together, these two exhibits illustrate that faculty salaries have been growing throughout the 1980s. In every academic year since 1980-81, faculty salaries have increased faster than inflation. This is in contrast to the 1970s when salaries declined relative to the CPI.

Many explanations have been posited for the widespread decline in faculty salaries throughout the 1970s. Hansen (1986) has categorized the many different explanations into market forces, institutional forces, and political and social forces. These are quoted below.

TABLE 1

Average Faculty Salaries by Rank: 1975-76, 1980-81, 1985-86, and 1989-90 (Current Dollars)

	Professor	Associate	Assistant	Instructor
1975-76	$23,233	$17,449	$14,336	$11,607
1980-81	$30,870	$23,290	$18,980	$15,150
1985-86	$42,500	$31,800	$26,240	$20,350
1989-90	$53,540	$39.590	$32,970	$24,890

Source: The Annual Report on the Economic Status of the Profession: 1989-1990, p. 13.

The Annual Report on the Economic Status of the Profession: 1985-1986, p. 9.

The Annual Report on the Economic Status of the Profession: 1980-1981, p. 5.

The Annual Report on the Economic Status of the Profession: 1975-1976, p. 208.

TABLE 2

Yearly Percentage Increase in Average Faculty Salaries and the CPI: 1971-72 to 1989-90

	Increases in:	
	Monetary Salary	Real Terms
1971-72 to 1972-73	4.1%	0.1%
1972-73 to 1973-74	5.1%	-3.5%
1973-74 to 1974-75	5.8%	-4.8%
1974-75 to 1975-76	6.0%	-1.0%
1975-76 to 1976-77	4.7%	-1.0%
1976-77 to 1977-78	5.3%	-1.3%
1977-78 to 1978-79	5.8%	-3.3%
1978-79 to 1979-80	7.1%	-5.5%
1979-80 to 1980-81	8.7%	-2.6%
1980-81 to 1981-82	9.0%	0.3%
1981-82 to 1982-83	6.4%	2.0%
1982-83 to 1983-84	4.7%	1.0%
1983-84 to 1984-85	6.6%	2.6%
1984-85 to 1985-86	6.1%	3.0%
1985-86 to 1986-87	5.9%	3.6%
1986-87 to 1987-88	4.9%	0.8%
1987-88 to 1988-89	5.8%	1.1%
1988-89 to 1989-90	6.1%	1.1%

Source: The Annual Report on the Economic Status of the Profession: 1989-1990, p. 5.

Market Forces

1. Faculty salaries were too high in 1970 and thus the relative decline since then represents the return to a more normal situation that reflects looser labor market conditions.

2. The abundant supply of new Ph.D.s in the 1970s reduced the labor market tightness of the 1970s and has since flooded the market with new Ph.D.s so that it is not surprising that salaries have declined relatively.

3. The slowing growth rate of enrollments in American colleges and universities during the 1970s and early 1980s weakened the demand for new Ph.D.s and thereby depressed the rate of growth of salaries.

Institutional Forces

1. The imposition of various wage control and wage guidelines policies of the 1970s artificially held down the rate of increase in faculty salaries relative to other groups of workers.

2. The slow and cumbersome salary-setting process in public higher education, which dominates the wage-setting process, renders it incapable of responding quickly to sharp inflationary shocks.

3. The academic sector found itself unable to invent an effective method for recommending prospective salary increases that would maintain its salary position.

Political and Social Forces

1. The less buoyant economy of the 1970s and early 1980s limited the revenue-generating powers of states and hence restricted the funds available to support higher education and with it faculty salary increases.

2. The higher priorities for new public programs in the health, welfare, and environmental fields cut into funds that might otherwise have supported higher education.

3. Public support for higher education eroded relative to that which prevailed in the 1960s.

4. Faculty members were not in fact awarded salary increases equivalent to those awarded other state and local employees even though state and local officials frequently claimed they gave the groups equal treatment. (Hansen. 1986. pp. 87-88).

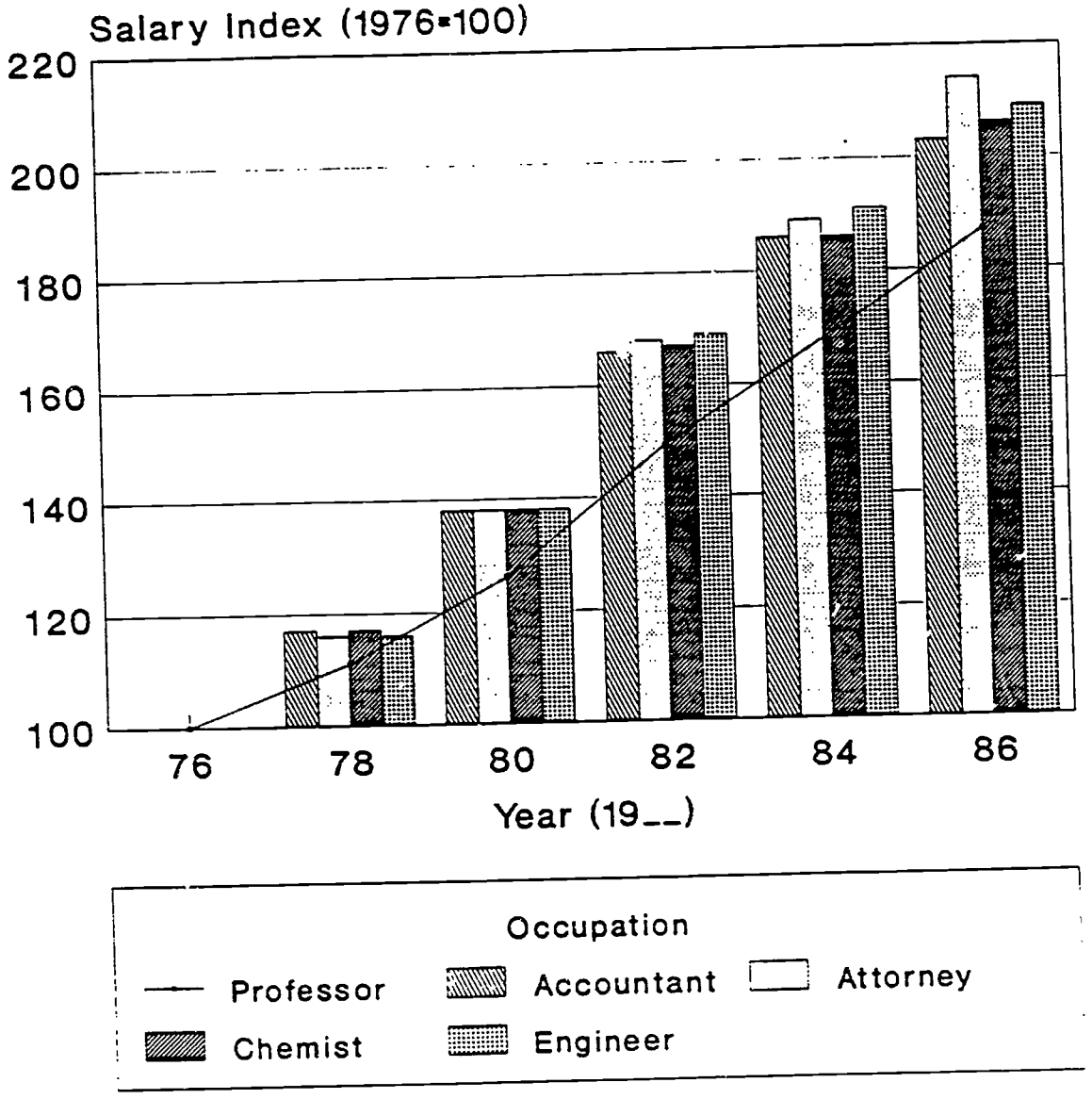
The most common explanation for salary growth in the 1980s is fairly simple: Faculty salaries have been increasing to "catch up" to their real 1970s value. However, this somewhat

simplistic explanation masks the fact that several other conditions changed in the 1980s to make faculty more "marketable" and in demand. In many disciplines, salary increases have been necessary to retain existing faculty and to attract new members to the academic profession. The decline in salaries in the 1970s resulted in competition from non-academic employers for new Ph.D.s. Also, smaller supplies of Ph.D.s in many disciplines resulted in increased competition for faculty both within and outside the academic profession (Fairweather, 1989). While increasing salaries of the 1980s have been criticized, they have also been defended as the only way to stem defections from academia and to attract new Ph.D.s.

Salaries alone are not the only costs to institutions of maintaining a faculty. Benefits also form an important part of total compensation, and they, too, have increased throughout the 1980s. Benefits can include, for example: health, disability, and life insurance; parental leave; retirement plans; and tuition remission programs for family members. In 1975-76 average benefits comprised 14.7 percent of salary. By 1980-81, these benefits increased to 18.2 percent of salary. In the current year, 1989-90, average benefits were valued at $9,540 and represented 23.3 percent of average salary.

Although these increases in faculty benefits have paralleled the growth of benefits in non-academic professions from the early 1960s through the late 1980s (Hamermesh and Woodbury, 1989), base salaries for faculty have risen more slowly than salaries in many other fields. As Figure I indicates, the average faculty salary increased slower than salaries for accountants, lawyers, chemists, and engineers. Between 1976 and 1986, for example, average faculty salaries increased approximately 87 percent in current (unadjusted) dollars. Salaries of accountants, however, increased 103 percent and salaries of engineers grew by 109 percent.

Figure I
Salary Comparisons
Faculty and Other Professions



Source: NCES, The Condition of Education, 1990.

Thus faculty salaries have been increasing considerably faster in the 1980s than they did in the 1970s; benefits paid to faculty increased in both the 1970s and 1980s; yet faculty salaries did not increase as fast as salaries in a number of non-academic professions from 1976 to 1986.

Factors Affecting Salaries

It is clear from the data in Table I that salaries vary considerably by academic rank. Given that ranks represent experience and length of service, these differences are not surprising. Full professors, the highest academic rank, have generally more experience and earn higher average salaries than associate professors; similarly, associate professors' salaries, on average, are higher than those of assistant professors. These overall rank differences in salary also tend to remain fairly constant over time. Salary increases between 1985-86 and 1989-90 were similar for all ranks (between 31 and 33 percent).

Given these salary differences across ranks, a change in the composition of faculty could have serious consequences for instructional expenditures. Such a change in composition did occur between 1975-76 and 1985-86, when the proportion of full professors grew from 28 to 35 percent and the proportion of assistant professors decreased from 33 to 25 percent (Kirshstein et al., 1990). The fact that the most senior (and hence, the most expensive) faculty members were increasing in numbers faster than other faculty ranks fueled growth in instructional expenditures. This "aging of the professoriate" compounded the effects of salary increases in the 1980s.

Geographic region also has some impact on salaries. Academic salaries in the Northeast -- the New England and Middle Atlantic states -- tend to be higher than salaries elsewhere in the Continental United States (AAUP, 1990, p. 15). The lowest salaries tend to be in the East South Central states.[1] For example, whereas the average faculty salary in New England was

[1]The New England States include: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. The Middle Atlantic States are: New Jersey, New York, and Pennsylvania. The East South Central states consist of: Alabama, Kentucky, Mississippi, and Tennessee.

$46,140 in 1989-90, the average salary in the East South Central section of the United States was $35,730.

Institution type is another factor affecting average salaries. Faculty employed by doctoral-level institutions have considerably higher salaries than faculty at comparable ranks employed by comprehensive, general baccalaureate, and two-year colleges.[2] These differences are particularly notable at the full professor level; faculty at this rank in doctoral level institutions averaged $59,920 – over $10,000 more than faculty at this rank in any of the other categories of institutions. Differences at other ranks were not as dramatic, although faculty in doctoral-level institutions do tend to earn higher salaries.

Disciplinary differences can also affect salaries at least as much as rank, geographic region, and type of institution. For the 1989-90 academic year, for example, a full professor in accounting was paid, on average, $55,971 in the public sector and $55,567 in the private sector. In contrast, a full professor in the visual and performing arts was paid an average of $44,505 in the public sector and $42,095 in the private sector (College and University Personnel Association, 1990).

Salary differences across disciplines, in part, reflect the demand for new faculty. In some disciplines, the demand is so great that the average salaries of new assistant professors are higher than those of assistant professors who have been teaching for a number of years. In six of 55 fields identified by the College and University Personnel Association (CUPA), new assistant professors hired by public colleges and universities in 1989-90 received higher average salaries

[2]Doctoral-level institutions include schools which award a minimum of thirty doctoral degrees annually in at least three unrelated disciplines. Comprehensive institutions award fewer than thirty doctoral degrees a year and are characterized by diverse post-baccalaureate programs. General baccalaureate schools primarily emphasize undergraduate education.

than faculty of the same rank hired in earlier years. In the private sector, this happened in ten disciplines. The disciplines in which this occurred are listed in Table 3.

For the most part, disciplines that paid new assistant professors higher salaries than existing assistant professors are also the disciplines in which faculty at all ranks receive higher than average salaries. They are also the disciplines whose members are readily employable outside academe and which tend to attract large numbers of students, both undergraduate and graduate.[3] While paying new faculty higher salaries than existing faculty may be necessary for recruiting new members to academe, this practice could have a negative impact on those already employed as well as the existing salary structure of the institution. Faculty with years of service and experience may not react favorably to their departments' hiring less experienced faculty at higher salaries. These higher starting salaries can result in "salary compression," or relatively small differences between the salaries of junior and senior faculty. Institutions may thus find themselves needing to adjust salaries at all ranks in that discipline to avoid losing existing faculty.

Another factor affecting total faculty earnings is the amount of money received from sources outside academe. Many critics of rising academic salaries argue that faculty have numerous opportunities to supplement their salaries with outside income. However, the availability of outside income varies widely across the academic profession. A recent study of postsecondary faculty indicates that less than half of all full-time faculty (42 percent) received consulting income in 1988, and only 28 percent received other non-consulting, outside income.[4]

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[3]In the private sector, three exceptions occurred: Drawing, Social Sciences, and Theology.

[4]Consulting income was defined as "income received from sources other than the institution for legal or medical services, psychological counseling, outside consulting, consulting business, freelance work, professional performances or exhibitions, speaking fees, or honoraria." Other outside income was considered to be "nonconsulting income received from sources other than the institution, including other academic institutions, self-owned business (other than consulting), royalties, commissions, nonmonetary compensation from other sources, retirement income, grants or research income, or any other employment." (U.S. Department of Education, 1990: p. 26)

TABLE 3

Disciplines in Which Average Salaries of New Assistant Professors Exceed Those of Other Assistant Professors

Public Institutions

	Assistant Professor	New Assistant Professor
Accounting	$40,166	$42,507
Business administration & management	$38,573	$40,025
Business & management	$39,193	$41,515
Computer & information science	$37,548	$39,322
Engineering	$39,468	$39,534
Marketing management	$41,502	$44,606

Private Institutions

	Assistant Professor	New Assistant Professor
Accounting	$36,615	$38,187
Business administration & management	$34,320	$34,360
Business & management	$37,142	$38,015
Business economics	$33,880	$34,134
Computer & information science	$34,385	$34,979
Drawing	$26,939	$27,937
Engineering	$40,264	$41,056
Mathematics	$29,978	$30,209
Social Sciences	$30,142	$30,302
Theology	$26,936	$27,256

Source: College and University Personnel Association, 1989-90 National Faculty Salary Survey by Discipline and Rank in Private Colleges and Universities, 1990.

American Association of State Colleges and Universities and the College and University Personnel Association, 1989-90 National Faculty Salary Survey by Discipline and Rank in State Colleges and Universities, 1990.

Higher percentages of faculty in research universities, both public and private, supplement their incomes with consulting and other outside income than did faculty employed by other types of institutions. High percentages of faculty in the fine arts and health sciences (55 percent in each discipline area) earn consulting income, although the average amount earned by those in the fine arts, $4,184, was considerably less than the average amount earned by faculty in the health sciences, $17,175.

Faculty Issues in the 1980s

While faculty salary issues have direct consequences for college costs, a number of other crucial issues also affect costs indirectly. As already noted, the labor-intensive nature of higher education makes almost any faculty issue a potential cost issue. The overall condition of the professoriate, the quality of research and instruction, and the attractiveness of college teaching as a career can all affect institutions' budgets. The next section of this paper examines several issues which are central to understanding both the academic profession and college costs, including:

- the nature of academic work and the faculty workload;
- faculty productivity and the broad concern about "quality";
- flexibility in academic staffing, especially the use of part-time positions;
- faculty satisfaction; and
- the mobility of faculty.

Faculty Activities and Workloads

Faculty workloads typically entail teaching, advising students, research, and other professional service, and can also include consulting activities related to professional development and administrative activities (Finkelstein, 1984). Determining faculty workloads is important to a

number of different academic concerns. These include collective bargaining (Douglas, Krause, & Winogora, 1980); cost analysis studies (DOI, 1974); equity issues; and even public relations (Yuker, 1984). As Fairweather, Hendrickson, and Russell point out:

> Minimum and maximum workload specifications are central to collective bargaining agreements. Workload studies are also useful to assist faculty and administrators in determining whether race or gender inequities exist at specific institutions. The Office of Management and Budget interest in faculty workload was made clear when it issued an order, subsequently rescinded, to require all faculty receiving funds from federal grants or contracts to report total work hours. Courts and State legislatures have focused on various methods of defining faculty workload. Individual institutions must address faculty workload when justifying budgets and expenditures to relevant constituencies (Fairweather, Hendrickson, & Russell, 1990a).

Faculty workloads, particularly changes in them, are also important to issues of college cost. If faculty are teaching less, for example, then colleges and universities may need to hire more faculty to cover the curriculum.

The Faculty Work Week

NCES data reveal that the average faculty work week in 1988 was 53 hours. This finding is consistent with that of Yuker who reviewed over 100 studies on academic workloads and concluded that faculty members generally work an average of 55 hours per week (Yuker, 1984; p. 63). Yuker also reports that the average number of hours worked per week by faculty is similar to the number of hours worked by individuals in other occupations where people work independently without prescribed work hours (e.g., doctors, proprietors).

The breakdown of the academic work week reveals that 46 of the 53 hours (87 percent) were spent in activities at the institution of employment, 4 hours were spent in other paid activities (7 percent), and 3 hours (6 percent) were spent in unpaid service activities (see Table 4). Faculty in research and doctoral-granting institutions were more likely to work longer than average work weeks, whereas faculty in private comprehensive and public two-year institutions worked shorter than average work weeks (Fairweather, Hendrickson, & Russell, 1990a).

TABLE 4

Workload for Full-time Regular Faculty, by Type and Control of Institution: Fall 1987

Type and control of institution	Total hours worked	Activities at this institution	Other paid activities	Unpaid service
All institutions	53	46	4	3
Public research	57	52	3	2
Private research	56	50	4	2
Public doctoral-granting	55	49	3	2
Private doctoral-granting	53	46	5	2
Public comprehensive	52	46	3	3
Private comprehensive	51	44	4	3
Liberal arts	52	47	3	2
Public two-year	47	40	4	3
Other	50	43	5	2

Source: Fairweather, Hendrickson, & Russell, 1990a

The faculty work week was remarkably similar for academics in different disciplines; total hours worked ranged from 52 hours a week for education faculty to 57 hours per week for faculty in health sciences.

While critics of the academic profession in general and the tenure system in particular have claimed a decline in activity after tenure is granted (Sykes, 1988), data from the NCES survey show little support for this accusation. (See Tables 5 and 6). Professors and associate professors worked at least as many hours as assistant professors, and tenured faculty worked about the same work weeks as their untenured counterparts (53 and 55 hours per week, respectively).

Work Activities and Distribution

Overall, faculty spent more than one-half their time on instruction-related activities, and about one-sixth of their time each on research, administration, and other activities. This distribution varied substantially by type of institution, with faculty in research and doctoral-granting universities spending less than half of their time in teaching activities (Table 7). If distinctions could be made between time spent in undergraduate and graduate teaching, the data would probably show that faculty in these types of institutions spent little time teaching undergraduates. (Fairweather, Hendrickson, & Russell, 1990a).

Faculty in research and doctoral-granting institutions spent large amounts of time in research activities. In research universities, both public and private, faculty spent slightly under a third of their time in research. In doctoral-granting schools, faculty spent around a quarter of their time doing research (22 percent for faculty in public institutions of this type and 27 percent for faculty in private schools).

TABLE 5

Workload for Full-time Regular Faculty, by Academic Rank: Fall 1987

Academic Rank	Total hours worked	Activities at this institution	Other paid activities	Unpaid service
All institutions	53	46	4	3
Professor	54	48	4	3
Associate Professor	54	48	4	3
Assistant Professor	53	48	3	2
Instructor	48	40	4	3
Lecturer	48	42	4	2
Other	46	41	2	2

Source: Fairweather, Hendrickson, & Russell, 1990a

TABLE 6

Workload for Full-time Regular Faculty, by Tenure Status: Fall 1987

	Total hours worked	Activities at this institution	Other paid activities	Unpaid service
All institutions	53	46	4	3
No tenure system at institution	48	42	4	2
No tenure system for faculty status	50	44	4	2
On tenure track but not tenured	55	50	3	2
Tenured	53	47	4	3

Source: Fairweather, Hendrickson, & Russell, 1990a

TABLE 7

Percentage Distribution of Full-time Regular Faculty, by Time Allocation and by Type and Control of Institution: Fall 1987

Type and control of institution	Percentage of time spent					
	Teaching	Research	Admin.	Service	Other Work	Prof. Devel.
All institutions	56	16	13	4	7	5
Public research	43	29	14	3	7	4
Private research	40	30	14	2	11	4
Public doctoral-granting	47	22	14	3	9	5
Private doctoral-granting	39	27	13	2	14	4
Public comprehensive	62	11	13	4	5	4
Private comprehensive	62	9	14	5	6	4
Liberal arts	65	8	14	5	4	4
Public two-year	71	3	10	5	5	5
Other	59	9	15	5	7	6

Source: Fairweather, Hendrickson, & Russell, 1990a

Discipline, too, affects how faculty allot their time across academic activities. Humanities faculty spent the most time teaching, followed by faculty in business, engineering, and the natural sciences. Faculty in the health sciences, agriculture, and home economies spent the smallest percentages of their total working hours teaching, but the most time in research.

A question critical to cost issues is whether faculty are allotting their time differently now than they did in the past. This is particularly important with regard to time spent teaching. Although a number of faculty surveys in the past twenty years have attempted to ascertain how faculty spend their time, the manner in which the question is asked often makes comparisons across time difficult.

Results of a 1978 survey reported in both Bowen and Schuster (1986) and Finkelstein (1984) suggest that there may have been some decline in the percent of time faculty devote to teaching. Whereas the NCES data reveal that faculty spent an average of 56 percent of their time teaching in 1988, the data from 1978 indicate that faculty spent 64 percent of their time in instruction. If total work hours have generally remained the same across these two time periods, a decline in actual teaching time may have occurred.

Faculty Productivity

Rising college costs have resulted in increased scrutiny of academic institutions and the faculty employed by them. As academic institutions increasingly are asked to account for the quality of educational outcomes, faculty productivity has become an important measure of academic success (Bowen & Schuster, 1986). Governmental and private funding agencies and sponsors desire evidence of performance. Academic leaders have responded by citing, often incorrectly or irrelevantly, measures of faculty behavior or reputation presumed indicative of quality of performance. Reputational measures of faculty productivity, such as those developed by the National Academy of Sciences, are particularly favorite proxies for faculty performance

(Fairweather, 1989). Research expenditures are another frequently used measure of overall faculty performance.

As stated by Fairweather and colleagues (1990a),

> The first issue in measuring faculty productivity is to define the production entity. Productivity is not an individual measure; indices of individual faculty performance are "performance measures." Instead, productivity is best seen as a "system" measure. A key analytical question is "at what parts of a system is productivity best measured: the department, college, institution, or all of the above?"
>
> These findings suggest that a study of faculty productivity should (1) specify the appropriate system level for analysis (e.g., department, college, institution, groups of institutions); (2) identify the production process to be examined (i.e., teaching-learning, research-scholarship, internal governance-management, public service); (3) consider the wide array of productivity measures available for each system level and production process; (4) take into account the variety of institutional and faculty-related factors in the analysis; and (5) identify and distinguish between various interested audiences.

The 1988 NCES survey again provides data for assessing faculty productivity in terms of research and scholarship and instruction-related activities.

Research and Scholarship

During the past two years, full-time faculty, on average, produced two articles in refereed journals; approximately one book or monograph, one book review, and one other report; and presented four papers at conferences. Over their careers, full-time regular faculty averaged twelve articles in refereed journals; three books or monographs, three book reviews, and eight other reports; and presented thirty-one papers (Table 8). Across all institutions, 22 percent of faculty had been a principal investigator on a funded research project during their careers. The average research project was about $25,066 (Table 9) (Fairweather, Hendrickson, & Russell, 1990a).

Consistent with the increased amounts of time spent in research activities, faculty in research universities produced higher than average numbers of journal articles and books and gave more presentations than their counterparts in other types of institutions. Faculty in

TABLE 8

Mean Number of Items Published During Career, by Type and Control of Institution: Fall 1987

Type and control of institution	Refereed articles	Books	Book reviews	Other reports	Presentations
All institutions	12	3	3	8	31
Public research	25	5	5	13	38
Private research	27	5	6	10	30
Public doctoral-granting	17	3	4	9	34
Private doctoral-granting	29	4	5	8	29
Public comprehensive	6	2	3	7	31
Private comprehensive	6	1	3	9	29
Liberal arts	3	1	3	5	20
Public two-year	1	1	1	3	14
Other	5	3	4	7	116

Source: Fairweather, Hendrickson, & Russell, 1990a

TABLE 9

Funded Research Activities, by Type and Control of Institution: Fall 1987

Type and control of institution	Percentage principal investigator	Mean total research $
All institutions	22	25,066
Public research	43	57,299
Private research	42	63,554
Public doctoral-granting	29	34,973
Private doctoral-granting	30	53,032
Public comprehensive	14	7,413
Private comprehensive	9	4,358
Liberal arts	11	4,759
Public two-year	6	1,834
Other	6	2,030

Source: Fairweather, Hendrickson, & Russell, 1990a

doctoral-granting institutions also produced above average numbers of refereed articles. Indeed, it is basically faculty in these types of schools who publish most of the articles and books. Faculty in other types of institutions publish relatively little in comparison to these faculty.

Faculty in research universities, both public and private, were also more likely than average to have been a principal investigator on a funded research project. Faculty in comprehensive, liberal arts, and two-year institutions were less likely than average to have been a principal investigator on a funded research project.

Large disciplinary differences also exist in the number of items published during a career. Whereas faculty in the health sciences produced, on average, 27 refereed articles, faculty in the fine arts produced only four such articles. However, fine arts faculty gave over 128 presentations, a number far exceeding that of any other discipline (Table 10). These differences point to the need to consider a variety of outcomes when attempting to measure faculty productivity.

As one would expect, full professors and tenured faculty had more publications and more externally-funded research over their careers than their less senior counterparts (Tables 11 through 14). Data, however, do not indicate any decline in productivity over time. During the past two years, full professors averaged a larger number of referred articles than did faculty at any other rank. Full and associate professors also gave the largest number of presentations (Table 15).

Instruction-related Effort

Instruction-related "effort" was examined by analyzing student contact hours, which were based on the number of hours spent teaching classes multiplied by the number of students in class, and the number of contact hours spent on individualized instruction. Faculty in public two-year colleges had much higher than average student contact hours per week than did faculty

in any other institutional type. Interestingly, faculty in private doctoral-granting institutions, private research universities, and liberal arts colleges had the lowest student contact hours (Table 16). Despite the notable differences in the general missions of these types of schools, and despite the differences in the percent of time faculty spent teaching in these institutions, the common denominator is probably small classes. Faculty in liberal arts colleges may spend a much larger percentage of their time teaching, but by reputation, liberal arts colleges pride themselves in smaller classes.

In four-year institutions, faculty in both the natural and social sciences and in business, averaged over 300 student contact hours per week. Faculty in agriculture/home economics and in education had the fewest average student contact hours per week (Table 17).

Interestingly, tenured faculty had more student contact hours per week than their non-tenured counterparts. Similarly, full and associate professors had an average number of student contact hours per week, not less than average totals. In contrast, untenured tenure-track faculty and assistant professors had fewer contact hours per week than the average, which probably reflected their focus on the research and scholarship necessary to obtain tenure (Tables 8 and 19).

Summary

The NCES faculty survey supports Bowen and Schuster's (1986) claim that the academic profession is a hard-working one, averaging considerably more hours per week than the 40-hour standard. The results also suggest that contrary to Sykes' claims and those of other critics of academe neither faculty workload nor productivity decline with achievement of senior status, whether defined as full professorship or tenure.

TABLE 10

Mean Number of Items Published During Career, by Program Area: Fall 1987

Program area	Refereed articles	Books	Book reviews	Other reports	Presentations
All four-year institutions	16	3	4	9	32
Agriculture/home economics	20	3	1	15	39
Business	6	2	1	10	12
Education	9	3	2	12	33
Engineering	14	2	3	19	17
Fine arts	4	1	3	4	128
Health sciences	27	4	2	7	38
Humanities	9	3	8	5	18
Natural sciences	25	2	3	11	20
Social sciences	13	4	5	9	22
Other	8	3	6	9	23

Source: Fairweather, Hendrickson, & Russell, 1990a

TABLE 11

Mean Number of Items Published During the Career, by Academic Rank: Fall 1987

Academic Rank	Refereed articles	Books	Book reviews	Other reports	Presentations
All institutions	12	3	3	8	31
Professor	26	5	7	13	41
Associate professor	11	2	3	8	31
Assistant professor	4	1	1	5	17
Instructor	1	0	0	3	13
Lecturer	2	1	1	5	27
Other	0	0	0	4	9

Source: Fairweather, Hendrickson, & Russell, 1990a

TABLE 12

Mean Number of Items Published During Career, by Tenure Status: Fall 1987

Tenure Status	Refereed articles	Books	Book reviews	Other reports	Presentations
All institutions	12	3	3	8	31
No tenure system at institution	3	1	1	4	50
No tenure system for faculty status	5	1	1	6	18
On tenure track but not tenured	7	1	1	5	19
Tenured	17	3	5	10	34

Source: Fairweather, Hendrickson, & Russell, 1990a

TABLE 13

Funded Research Activities, by Academic Rank: Fall 1987

Academic Rank	Percentage principal investigator	Mean total research $
All institutions	22	25,066
Professor	30	43,614
Associate professor	26	29,935
Assistant professor	21	13,929
Instructor	4	1,593
Lecturer	12	6,835
Other	8	5,262

Source: Fairweather, Hendrickson, & Russell, 1990a

TABLE 14

Funded Research Activities, by Tenure Status: Fall 1987

Academic Rank	Percentage principal investigator	Mean total research $
All institutions	22	25,066
No tenure system at institution	8	5,330
No tenure system for faculty status	13	18,248
On tenure track but not tenured	25	20,243
Tenured	25	30,889

Source: Fairweather, Hendrickson, & Russell, 1990a

TABLE 15

Mean Number of Items Published During the Last Two Years, by Academic Rank: Fall 1987

Academic Rank	Refereed articles	Books	Book reviews	Other reports	Presentations
All institutions	2	1	1	1	4
Professor	3	1	1	2	5
Associate professor	2	1	1	2	5
Assistant professor	2	0	0	1	4
Instructor	0	0	0	1	3
Lecturer	1	0	0	1	3
Other	0	0	0	0	4

Source: Fairweather, Hendrickson, & Russell, 1990a

TABLE 16

Student Contact Hours Per Week, by Type and Control of Institution: Fall 1987

Type and control of institution	Mean Student Contact Hours
All institutions	302
Public research	259
Private research	229
Public doctoral-granting	285
Private doctoral-granting	201
Public comprehensive	319
Private comprehensive	276
Liberal arts	237
Public two-year	427
Other	329

Source: Fairweather, Hendrickson, & Russell, 1990a

TABLE 17

Student Contact Hours Per Week, by Program Area: Fall 1987

Type and control of institution	Mean Student Contact Hours
All four-year institutions	270
Agriculture/home economics	211
Business	310
Education	231
Engineering	259
Fine arts	267
Health sciences	251
Humanities	242
Natural sciences	325
Social sciences	305
Other	252

Source: Fairweather, Hendrickson, & Russell, 1990a

TABLE 18

Student Contact Hours Per Week, by Academic Rank: Fall 1987

Academic Rank	Mean Student Contact Hours
All institutions	302
Professor	280
Associate professor	312
Assistant professor	262
Instructor	377
Lecturer	462
Other	109

Source: Fairweather, Hendrickson, & Russell, 1990a

TABLE 19

Student Contact Hours Per Week, by Tenure Status: Fall 1987

Tenure Status	Mean Student Contact Hours
All institutions	302
No tenure system at institution	372
No tenure system for faculty status	277
On tenure track but not tenured	247
Tenured	315

Source: Fairweather, Hendrickson, & Russell, 1990a

Flexibility in Staffing: Part-time Faculty

The projected number of faculty who will retire within the decade indicates that academic administrators must examine a wide variety of alternatives for meeting personnel needs. An increasingly common approach is to rely on part-time faculty to fill both short- and long-term vacancies. Since 1960 there has been a three-fold increase in part-time higher education faculty (Gappa, 1984). Moreover, the number of part-time faculty is likely to increase for several reasons: the increase in instruction-related costs relative to revenue, the effort by academic administrators to achieve flexibility in staffing, the number of persons with advanced degrees who have been unable to obtain full-time teaching positions, the shortage of potential full-time faculty in many science and engineering fields, the growth of community and junior colleges, and the expansion of lifelong learning programs (Bowen & Schuster, 1986; Fairweather, 1989; Leslie, Kellams, & Gunne, 1982).

One question of relevance in an era of increasing faculty shortages is whether part-time faculty are best characterized as aspiring academics who are frustrated by the lack of available full-time positions, as individuals who simply want some extra income while maintaining contact with their intellectual interests, or as "gypsy moths" flitting back and forth between various institutions. Another important consideration for institutions is the academic preparation of part-time faculty and the consequences for academic program quality.

The 1988 NCES survey provides recent data on the status of part-time faculty in American higher education (Fairweather, Hendrickson, & Russell, 1990b). Results of interest in this report focus on the highest degree obtained, number and location of part-time faculty, workload, activities, satisfaction, and length of time at institution.

Highest Degree Obtained

In 1988, approximately 70 percent of all part-time faculty had obtained a graduate degree, the majority of which were at the masters level (Table 20). Research universities and doctoral-

TABLE 20

Highest Degree Awarded for Part-time Regular Faculty, by Type and Control of Institution: Fall 1987

Type and control	Highest Degree Obtained: Doctorate	Masters	Bachelors/Other
All institutions	29% (67%)	42%	30%
Public research	56 (90)	30	13
Private research	72 (93)	20	8
Public doctoral-granting	46 (82)	39	15
Private doctoral-granting	51 (89)	17	32
Public comprehensive	36 (69)	49	16
Private comprehensive	27 (72)	58	15
Liberal arts	26 (62)	50	24
Public two-year	12 (19)	46	42
Other	49 (68)	26	25

( ) = Percentage of full-time faculty holding the doctorate

Source: Fairweather, Hendrickson, & Russell, 1990b

granting institutions were more likely than average to have part-time faculty with the doctorate. Public two-year institutions had a higher than average proportion of part-time faculty with bachelors or other degrees and a small proportion (12 percent) with the doctorate.

Number and Location of Part-time Faculty

An estimated 180,000 part-time regular faculty accompanied by another 131,000 part-time temporary faculty (i.e., visiting, acting, or adjunct) were employed in postsecondary institutions in Fall 1987. This represented 22 percent and 16 percent, respectively, of all faculty employed during that period (Russell, Cox, & Williamson, 1990). Additional NCES data revealed that:

- Public two-year institutions were more likely than average to employ part-time regular faculty (34 percent versus an average of 22 percent); and
- Research universities were more likely than other four-year institutions to employ part-time regular faculty; 91 percent of these institutions employed some part-time regular faculty (versus an average of 70 percent).

The distribution of part-time faculty in four-year institutions varied by program area. Among the program areas examined, fine arts had the highest percentage of part-time faculty (26 percent) and social sciences the lowest (12 percent) (Table 21).

Workload

One-half of all part-time faculty (51 percent) had other full-time employment in Fall 1987 (Table 22). Part-time faculty in liberal arts institutions were less likely than average (30 versus 51 percent) to have additional full-time employment; faculty in other institutions (e.g., medical schools, religious institutions) were the most likely to have a full-time job elsewhere (83 percent).

Part-time faculty worked an average of 14 hours per week at the academic institution surveyed, 27 hours per week on other paid activities, and 2 hours per week providing unpaid professional services (Table 23). Part-time faculty in public research universities spent a higher than average time at the surveyed institution (24 versus 14 hours) but less than average time on other paid activities (18 versus 27 hours).

TABLE 21

Percentage Distribution of Part-time Regular Faculty, by Program Area and by Type and Control of Institution: Fall 1987

Program Area	Percentage
All four-year institutions	18
Agriculture and home economics	*
Business	18
Education	15
Engineering	*
Fine arts	26
Health sciences	18
Humanities	15
Natural sciences	14
Social sciences	12
Other fields	25

* = Too few cases for reliable estimate.

Source: Fairweather, Hendrickson, & Russell, 1990b

TABLE 22

Percentage of Part-time Regular Faculty With Other Full-time Employment, by Type and Control of Institution: Fall 1987

Type and Control	Percentage
All institutions	51
Public research	35
Private research	59
Public doctoral-granting	40
Private doctoral-granting	67
Public comprehensive	45
Private comprehensive	45
Liberal arts	30
Public two-year	53
Other	83

Source: Fairweather, Hendrickson, & Russell, 1990b

TABLE 23

Mean Number of Hours Worked by Part-time Regular Faculty, by Type and Control of Institution: Fall 1987

Type and control	At this institution	Other paid activities	Unpaid professional activities
All institutions	14	27	2
Public research	24	18	3
Private research	15	34	2
Public doctoral-granting	21	19	2
Private doctoral-granting	15	35	3
Public comprehensive	17	23	4
Private comprehensive	11	24	1
Liberal arts	15	21	2
Public two-year	12	28	2
Other	11	38	2

Source: Fairweather, Hendrickson, & Russell, 1990b

The proportion of total workload represented by part-time employment at a given institution has a U-shaped distribution (Table 24): part-time faculty were either likely to work less than 40 percent of their total workload teaching at a specific institution (61 percent) or were likely to spend more than 80 percent of their work week teaching part-time at a specific institution (23 percent). It was most common for part-time faculty to work less than 20 percent of their total workload teaching part-time at a specific institution.

This pattern varied somewhat by type of institution. Part-time faculty in public doctoral-granting and research universities were less likely than average to spend 20 percent or less of their work week at the institution. Part-time faculty in private research universities were more likely than average to spend 20 to 40 percent of the work week teaching at the institution. A disproportionately high percentage (21 percent) of part-time faculty in private comprehensives spent 61 to 80 percent of their work week teaching at the institution.

Activities

The percentage of time allocated to teaching by part-time faculty was only slightly higher than the percentage allocated by full-time faculty. Whereas full-time faculty reported spending, on average, 56 percent of their time teaching, part-time faculty reported 59 percent (Table 25). Part-time faculty allotted very little of their time to research and teaching (4 percent to each of these activities), but slightly over a fifth of their time in consulting. Full-time faculty, on the other hand, only averaged 7 percent of their time in consulting activities.

Contrary to conventional wisdom, part-time faculty were not divorced from the publication and professional contribution process. During their careers, over 60 percent of

TABLE 24

Percentage of Total Work Week Represented by Work at This Institution for Part-time Regular Faculty, by Type and Control of Institution: Fall 1987

	Percentage of Total Work Week				
Type and control	0 to 20	21 to 40	41 to 60	61 to 80	80 +
All institutions	43	18	8	7	23
Public research	14	21	17	12	37
Private research	30	44	6	2	18
Public doctoral-granting	18	26	7	11	38
Private doctoral-granting	58	6	15	15	6
Public comprehensive	32	20	9	5	34
Private comprehensive	41	12	11	21	16
Liberal arts	34	9	14	7	36
Public two-year	53	15	6	5	20
Other	50	36	3	4	7

Source: Fairweather, Hendrickson, & Russell, 1990b

TABLE 25

Percentage Allocation of Work, by Type of Appointment, Type of Work, and Type and Control of Institution: Fall 1987

Type of Appointment	Teaching	Research	Admin.	Service	Consult.	Prof. Devel.
All regular faculty	57	13	11	4	11	5
Full-time regular	56	16	13	4	7	5
Part-time regular	59	4	4	4	22	7

Source: Fairweather, Hendrickson, & Russell, 1990b

part-time faculty had contributed at least one article or presentation; almost one-fourth (23 percent) had contributed more than 21 pieces during their careers.

Job Satisfaction

The NCES data do not support the popular assumption that part-time faculty are primarily frustrated full-time faculty, aspiring to academic careers and being dissatisfied when full-time opportunities are not available. In Fall 1987, less than one-fifth of all part-time faculty (15 percent) aspired to obtain a full-time faculty position (Table 26). Despite their higher levels of prestige, research universities and public doctoral institutions were not any more likely than private comprehensives, liberal arts colleges, and public two-year colleges to have part-time faculty who desired full-time status. Public comprehensives, however, had significantly higher percentages of aspiring full-time faculty members; private doctoral institutions had below average proportions of aspiring full-time faculty.

Further, part-time faculty were more likely than full-time faculty to express high levels of satisfaction with their jobs (Table 27). Part-time faculty who were aspiring academics were somewhat more likely than full-time faculty to express a high level of dissatisfaction with their jobs (7 percent versus 3 percent), although the proportion expressing high levels of satisfaction did not vary by part- and full-time status.

Length of Time at Institution

While some view part-time faculty as constantly changing allegiance and source of employment, NCES data reveal that more than one-half of the respondents (52 percent) had been employed at the same institution for four years or longer (Table 28). One-quarter had been employed at the same institution for more than ten years. This did not vary by institutional type with one exception: public doctoral institutions had a less than average percentage of part-time faculty hired at the institution in question for more than 10 years.

TABLE 26

Percentage of Part-time Regular Faculty Who Aspire to Full-time Academic Positions by Type and Control of Institution: Fall 1987

Type and Control	Percentage
All institutions	15
Public research	17
Private research	18
Public doctoral-granting	15
Private doctoral-granting	2
Public comprehensive	26
Private comprehensive	16
Liberal arts	13
Public two-year	15
Other	4

Source: Fairweather, Hendrickson, & Russell, 1990b

TABLE 27

Percentage Distribution of Satisfaction With Job, by Type of Appointment and Type and Control of Institution: Fall 1987

Type of Appointment	Very Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Very Satisfied
All regular faculty	3	11	49	37
Full-time regular	3	12	50	35
Part-time regular				
All	2	9	48	41
Aspiring academics only	7	14	48	32

Source: Fairweather, Hendrickson, & Russell, 1990b

TABLE 28

Percentage of Part-time Regular Faculty, by Years at This Institution and by Type and Control of Institution: Fall 1987

Type and control	Years at Institution				
	Under 4	4 to 6	7 to 9	10 to 19	Over 19
All institutions	48	15	11	18	8
Public research	36	15	6	23	19
Private research	48	6	8	17	21
Public doctoral-granting	46	19	14	20	2
Private doctoral-granting	28	18	13	36	5
Public comprehensive	49	15	12	17	7
Private comprehensive	48	15	8	12	17
Liberal arts	51	12	10	21	7
Public two-year	51	16	11	16	5
Other	50	17	8	18	6

Source: Fairweather, Hendrickson, & Russell, 1990b

Summary

Part-time faculty focus primarily on teaching, although a substantial proportion also contribute to their professional fields by publishing and presenting papers at professionalmeetings. There is little indication that the purported "gypsy moth" phenomenon exists; a large proportion of part-time faculty have worked for the same institution for many years. Finally, part-time faculty seem relatively pleased with their positions; the concept of part-time faculty as frustrated teachers aspiring to full-time positions received little support.

Faculty Attitudes and Satisfaction

Changes in faculty attitudes toward the academic profession and their work are indicators of the general health of the profession. The Carnegie Foundation for the Advancement of Teaching recently surveyed approximately 5,000 faculty in higher education institutions across the country. Similar surveys were administered in 1969, 1975, and 1984. Thus, these data provide a useful source for determining not only how faculty are faring currently, but also how faculty conditions and attitudes have changed over time.

In general, feelings toward the academic profession appear to have improved considerably between 1984 and 1989. Whereas 50 percent of all faculty in 1984 indicated that it "is a poor time for any young person to begin an academic career," this percentage dropped dramatically in 1989, to 20 percent. The percentage of faculty who reported that "if deciding again, I would not become a college teacher," declined slightly between 1984 and 1989, from 21 percent to 15 percent.

However, the percentage of faculty reporting that their jobs were the "source of considerable personal strain" has been inching up since 1975. In 1969, 43 percent of all respondents indicated that this was the case, but by 1975, the percentage had dropped to 36 percent. In 1984 and in 1989, 40 and 44 percent, respectively reported that their jobs were a

source of strain. Similarly, almost half of all faculty consider the job requirements to adversely affect their personal lives (43 percent in 1969 and 44 percent in 1989).

Work activity data also provide some interesting trends. The percentage of full-time faculty reporting that their interests were primarily in teaching has remained fairly consistent in the past two decades, declining only slightly from 76 percent to 71 percent. This contradicts the view that most faculty are primarily motivated by research. What has changed is the importance of promotion and tenure criteria. Fewer faculty believe that teaching effectiveness should be the most important factor in promotion (78 percent in 1969 vs. 62 percent in 1989) whereas more believe that publication is crucial (41 percent in 1969 vs. 54 percent in 1989). This view is also reflected in the fact that almost half of all faculty believe that scholarship suffers because of the lack of time for in-depth study (50 percent in 1969 and 43 percent in 1989).

The 1988 NCES survey provides additional information about faculty job satisfaction (Russell, Cox, Williamson, Boismier, Javitz, & Fairweather, 1990). Across institutions and disciplines, at least 84 percent of full-time faculty were satisfied with control over the content and methods of courses, the freedom to do outside consulting, authority to make decisions about courses taught, the quality of colleagues, the job overall, and job security. Between 70 and 79 percent were satisfied with the quality of graduate students, the time available for working with students, institutional reputation, authority over noninstructional matters, overall benefits, institutional mission or philosophy, workload, spouse employment opportunities, mix of work activities, and spirit of cooperation among faculty. Less than 70 percent were satisfied with departmental leadership, opportunity for advancement, quality of undergraduate students, interdepartmental cooperation, quality of union leadership, teaching assistance, and support services. The lowest rated aspects of the faculty job (rated as satisfactory by less than 50 percent

of faculty) were salary, quality of central administration, faculty-administration relationships, and the quality of support for research.

Full-time faculty at public comprehensive institutions were the least likely to be satisfied with their positions. These faculty were especially unhappy with support for teaching and research. Faculty from other types of institutions did not differ significantly from the overall average in their ratings of job satisfaction; faculty in public two-year institutions had the highest levels of satisfaction.

Faculty Mobility

Academe has experienced a tight job market throughout the 1970s and the early 1980s. This has limited both the transfer of professors from one institution to another and deterred prospective young scholars from entering the academy. It also has resulted in stricter tenure policies, which may in turn contribute to deterring potential faculty members from applying for academic positions (Bowen & Schuster, 1986). In some disciplines, however, the job market is characterized by shortages, not surpluses. In computer and electrical engineering, for example, shortages of Ph.D.s and high salaries offered by industry have resulted in a shortfall of current and potential faculty (Fairweather, 1989). In either case, the impact of mobility (either too much or too little) potentially has profound consequences for the health of the academic enterprise.

Faculty mobility consists of two components: internal (moving within or between academic institutions) and external (moving from academe to industry or government, or vice versa). Regarding internal mobility, during the expansion period in the 1960s approximately eight percent of doctoral faculty changed institutions annually. By 1979, this percentage had dropped to 1.7 percent. Concurrent with the decline in internal mobility has been the adoption of more rigorous criteria for tenure and promotion and an increase in the standards expected of new applicants for faculty positions. In contrast, declining mobility can adversely affect faculty morale.

which may result in a decline in productivity. Declining mobility may also be related to a decrease in the number of applicants for faculty positions.

Quite a different scenario arises when examining mobility between academe and the private sector. In the steady state period of academic growth (1970s and early 1980s), the market for doctorates expanded in industry and government at a much faster rate than in academe (Fairweather, 1989). Salaries in the private sector also outpaced those in academe in many high demand fields. As a consequence, until very recently fields such as engineering and some applied sciences have evidenced a loss of faculty to industry (Fairweather, 1989). Other fields experiencing a larger growth outside of academe include medicine, law, economics, psychology, journalism, accounting, and art (Bowen & Schuster, 1986).

The combination of limited internal mobility and lower-than-market salaries has adversely affected faculty morale and, perhaps, performance. Bowen and Schuster (1986) depict an academic environment characterized by salaries that have not kept pace with inflation, excessively rigorous and rigid tenure and promotion requirements, and declining support for scholarly activities and professional development. This atmosphere may discourage younger applicants, especially underrepresented groups such as minorities and women who may choose to pursue careers in more amenable environments. It may also discourage young, untenured faculty, who may consider leaving academe because of the limited opportunities for advancement (Palmer & Patton, 1981). This situation is in direct contrast to an earlier era of great mobility where experienced assistant professors were more likely to remain in academe because of the opportunity for changing institutions (Aurand & Blackburn, 1973; Brown, 1967; Caplow & McGee, 1958; Clark & Larson, 1972; Fincher, 1969; Marshall, 1964).

Recent reports predict that the oversupply of Ph.D.s in many fields has ended and that even fields such as the humanities will be faced with faculty shortages (Lozier & Dooris, 1988).

This projection suggests that major changes in hiring and in promotion policies may be required, and that greater attention must be paid to the impact of mobility on retention.

Finkelstein (1984) found that faculty mobility is related to two factors: (a) the structure of the academic career, including the tenure and promotion policies in a limited job market, and (b) faculty values and interests over the course of the career. Baldwin and Blackburn (1981) found three career stages during which a faculty member might consider changing jobs: (a) immediately prior to the tenure decision, (b) just prior to coming up for promotion to full professor, and (c) immediately after promotion to full professor. In the current environment, these stages may hold true for mobility within the academic sector. Whether or not they apply to mobility between academe and private industry is unknown.

In a 1976 survey, Ladd and Lipsett confirmed that faculty values and interests were related to decisions about whether or not to change jobs. Faculty who changed positions in academe cited the importance of different duties, greater prestige of the new job and institution, competency of colleagues, and the opportunity for research and development. McGee (1981) found that faculty who remained in their current positions despite attractive job offers cited the importance of strong congruence with institutional philosophy and, to a lesser degree, geography and climate.

The 1988 NCES survey of faculty indicated that one-third of all faculty who left an institution during the 1987-88 academic year did so to assume another position (compared with 55 percent who retired) (Table 29). A separate report based on the NCES data shows a more complete picture of mobility (Fairweather, Hendrickson, & Russell, 1990c). According to Fairweather and colleagues, 5.2 percent of full-time regular faculty left their institutions between 1986 and 1987 for reasons other than retirement. This percentage ranged from a low of 3.0 percent in public two-year institutions to a high of 5.7 percent in private four-year institutions.

TABLE 29

Percentage Distribution of Departing Tenured Faculty, by Reason for Departure

Type of Institution	Retired	Assumed Another Position	Other
All institutions	55	33	12
4-year public	57	32	11
4-year private	52	35	13
2-year public	58	25	16
Other	36	52	12
4-year, by type			
Research	54	35	12
Doctoral	59	32	10
Comprehensive/ liberal arts	57	31	12

Source: Russell, Cox, & Williamson, 1990

When asked about the likelihood of pursuing a different full-time job within three years, 14 percent of full-time faculty indicated a high likelihood of doing so. Low job satisfaction was positively related to the likelihood of pursuing a different job.

Of the 14 percent indicating a high likelihood of changing jobs within three years, 46 percent would definitely stay within academe, 20 percent would leave the postsecondary sector, and 34 percent indicated no clear choice of employment sectors. Thus, at a minimum three percent of full-time faculty expected to leave postsecondary education within three years to pursue a position in industry or government. This likelihood did not vary by type of institution or discipline.

Summary

Faculty mobility increasingly will play a role in academic personnel decisions. As the academic job market opens up, academic administrators will be confronted simultaneously with retaining existing faculty while pursuing a substantial number of replacements in most disciplines.

Faculty Shortages

Recent studies by Lozier and Dooris (1987), Connellan (1987), and Bowen and Sosa (1989) project a significant increase in faculty retirement rates toward the end of the century. The retirement projections, which range as high as one-third of the professoriate, indicate that Federal, state, and institutional policymakers face a personnel shortage, the scope of which exceeds previous experience. Several disciplines show particularly high potential shortages: humanities, mathematics, natural sciences, and engineering.

Adding uncertainty is the pending termination of mandatory retirement for tenured faculty members (Public Law 99-592, 1986). Kastenbaum and Schulte (1988) report that although approximately 85 percent of college and university presidents expect the elimination of age-based

mandatory retirement to affect their institutions, few have implemented policies to address the potential crisis.

Studies of the impact of changes in mandatory retirement legislation on the general workforce suggest that Federal policy is only one factor affecting individual retirement decisions (Burkhauser & Quinn, 1983; Quinn & Burkhauser, 1983; LaRock, 1987). Also important are the perceived adequacy of retirement income, health, and family considerations. Institutional type, including source of control (public/private), also may affect the likelihood of retirement (Consortium on Financing Higher Education, 1987). The availability of early retirement programs, currently offered by about one-half of colleges and universities, also can affect faculty retirement behavior (Chronister & Kepple, 1986). Public universities offer these incentives more often than do private institutions (Chronister & Trainer, 1985; Kepple, 1984; Mortimer, Bagshaw, & Masland, 1985).

As discussed in the previous section, limited mobility can adversely affect the availability of potential faculty. According to Fairweather, Hendrickson, and Russell (1990c):

> During the past two decades, relatively few faculty positions have been available. Stricter tenure policies have accompanied this tight job market. This atmosphere may discourage younger applicants, especially those in underrepresented groups such as minorities and women, from considering a career in academe. It may also discourage young, untenured faculty who may consider leaving academe because of limited opportunities for advancement (Aurand & Blackburn, 1973; Baldwin & Blackburn, 1981; Brown, 1967; Caplow & McGee, 1958; Clark & Larsen, 1972; Fincher, 1969; Finkelstein, 1984; Marshall, 1964; Palmer & Patton, 1981; Toombs, 1979). Evidence suggests that a number of fields indeed have experienced larger growth in industry and government than in academe, and that salaries in the private sector have outpaced those of academe (Bowen & Schuster, 1986; Fairweather, 1989).

Demographic Characteristics of Full-time Faculty

Age Distribution

During the fall term of 1987, 74 percent of full-time faculty were between the ages of 30 and 54; one-fourth were aged 55 or older. Of the latter group, 12 percent were between the

ages of 55 and 59, 9 percent between 60 and 64, and 4 percent aged 65 or older (Fairweather, Hendrickson, & Russell, 1990c).

The percentage of faculty aged 55 and older is similar across institution types (see Table 30), ranging from a low of 21 percent in private research universities to a high of 27 percent in private doctoral-granting universities. In contrast, age distribution varies substantially by program area (see Table 31). Engineering, education, and humanities had the highest proportions of faculty 55 and older, approximately 33 percent. The finding that faculty in engineering and the humanities are older, on average, is consistent with studies projecting shortages in these fields (Connellan, 1984; Lozier & Dooris, 1987). Conversely, few studies have projected shortages of faculty in education, which also has a high proportion of faculty above age 55.

Tenure Status

The percentage of faculty with tenure at any institution affects the number of openings available at any given time. Nationally, the percentage of faculty with tenure within a specific discipline also can influence the decision of students to pursue graduate degrees, which in turn affects the pool of potential faculty members (Bowen & Schuster, 1986).

Sixty percent of full-time faculty nationwide were tenured in Fall 1987. Of faculty who were employed by institutions and in positions where tenure was possible, 73 percent were tenured.

Particularly large percentages of faculty held tenure in the humanities (72 percent) and in the social sciences (70 percent). The percentage of business faculty with tenure (45 percent) was lower than the average.

In sum, the relatively high proportion of faculty in tenure-track positions who were tenured in 1987 (73 percent) suggests that institutional retirement policies will be constrained for the foreseeable future by the decisions faculty make about their retirement. These data also

TABLE 30

Percentage of Regular Full-time Faculty 55 or Older, by Institutional Type

Institutional type	Percentage
All institutions	25
Public research	27
Private research	21
Public doctoral-granting	25
Private doctoral-granting	27
Public comprehensive	26
Private comprehensive	22
Liberal arts	25
Public 2-Year	23
Other	25

Source: Fairweather, Hendrickson, & Russell, 1990c

TABLE 31

Percentage of Regular Full-time Faculty 55 or Older, by Program Area

Program Area	Percentage
All institutions	25
Agriculture/home economics	19
Business	20
Education	33
Engineering	34
Fine arts	21
Health science	24
Humanities	32
Natural sciences	19
Social sciences	22
Other	28

Source: Fairweather, Hendrickson, & Russell, 1990c

suggest that the expected retirement plans for faculty and the factors affecting these plans must be taken seriously by institutional decision-makers.

Retirement

In 1987, the overall ratio of full-time faculty who retired to all full-time faculty was .018 (i.e., 1.8 faculty per 1,000 per year); for full-time tenured faculty the retirement ratio was .027. These retirement ratios do not vary significantly by type of institution.

Relevant faculty perspectives on retirement include expected age at retirement from paid employment, the proportion of faculty expecting to retire within three years, and the relationship between expected age at retirement from paid employment and expected age at retirement from teaching.

Expected Retirement From Paid Employment. As shown in Table 32, in the Spring 1988, 90 percent of full-time faculty who indicated that they expected to retire from paid employment specified an age greater than 60.

One fourth (26 percent) expected to retire between the ages of 60 and 64; 42 percent between the ages of 65 and 69; and 23 percent at age 70 or older. Analyses of expected retirement age by type of institution and program area showed few groups to be different from the overall percentages. Exceptions were as follows:

- Higher than average proportions of faculty in public two-year colleges estimated retirement at ages 55-59 (18 percent compared to the overall average of 8 percent) and 60-64 (33 percent compared to the overall average of 26 percent).
- Faculty in public comprehensive institutions were more likely than average to estimate retirement at age 60-64 (31 percent).
- Across program areas, a higher than average proportion of faculty in the humanities expected to retire at age 70 or older (26 percent compared to an overall percentage of 23 percent).

TABLE 32

Likely Retirement Age From Paid Employment for Regular Full-time Faculty

Age	Percentage
Under 50	1
50-54	1
55-59	8
60-64	26
65-69	42
70 or older	22
Total	100

Source: Fairweather, Hendrickson, & Russell, 1990c

Expected Retirement Within Three Years. When asked about the proximity of retirement, eight percent of all faculty were somewhat likely and seven percent were very likely to retire within three years. With two exceptions, this percentage did not vary by type of institution: private research universities and private comprehensives had smaller percentages of faculty indicating high likelihood of retirement within three years (four and five percent, respectively). Across program areas in four-year institutions, only faculty in education indicated a higher likelihood of retirement in the near future than the average percentage across programs (13 percent were very likely to retire, compared with seven percent for faculty in four-year institutions overall).

Comparing Expected Retirement Age from Paid Employment with Expected Retirement Age from Teaching. To examine expected retirement patterns in more detail, the expected age at retirement from paid employment was compared with the expected age for exiting postsecondary education as a sector of employment. The results show that the correlation between expected age at retirement and expected age at leaving postsecondary education is lower for younger faculty than for older faculty (Table 33). Moreover, 24 percent of faculty expected to stop teaching earlier than they expected to retire. This suggests that retirement projections assuming the equivalence of expected age at retirement and expected age at retirement from academic institutions are incorrect. Instead, models should be adjusted to take into account the possibility that younger faculty may exit the postsecondary education employment sector at an earlier age than their older counterparts.

Projections to the Year 2000

According to Fairweather and colleagues (1990c), by the year 2000. 30 percent of full-time faculty will be at least 65 years old. Moreover. 38 percent expect to retire by 2000. and 51 percent expect to stop teaching in a faculty role by that time (Table 34). These estimates are

TABLE 33

Intercorrelations for Anticipated Retirement Age With Anticipated Age at Leaving Employment in Postsecondary Education (by Age Group)

Age Group	Correlation
Overall	.63
Under 30	.44
30-44	.57
45-54	.64
55-59	.73
60-64	.80
65 +	1.00

Source: Fairweather, Hendrickson, & Russell, 1990c

TABLE 34

Percentages of Full-time Faculty Expecting to Reach Specific Retirement Status Between 1987 and 2000, by Tenure Status

Tenure status	Reach age 65	Expect to retire	Expect to stop teaching
All institutions	30	38	51
No tenure system at school	26	54	38
No tenure system for position	15	24	43
Untenured, on tenure track	7	12	24
Tenured	41	50	60

Source: Fairweather, Hendrickson, & Russell, 1990c

consistent with that Bowen & Sosa's (1989) who estimate that 53 percent of full-time arts and science faculty will leave four-year institutions by 2002.

Although the percentage of full-time faculty who will reach age 65 by 2000 does not vary by type of institution (Table 35), there are differences in the percentages of faculty expected to retire and to stop teaching. Private research universities and liberal arts colleges had the smallest percentages of faculty who expected both to retire and to stop teaching by 2000. On the other hand, public two-year colleges had the highest percentage in both of these categories. Finally, these data indicate that education, the humanities, and engineering are the most likely to face critical shortages by 2000 (Table 36).

Conclusions

There is no question that the academic profession is both complex and changing. This paper has presented a number of different issues that have affected faculty over the past two decades. While it may initially appear that these issues are unrelated, all have implications for institutions' personnel policies and all of them ultimately influence college costs.

Who faculty are, what they do, how much they are paid, and how they feel about their work all affect the general condition of the academic profession. Because higher education is such a labor-intensive industry, college and university administrators, policy analysts, and faculty themselves all carefully monitor faculty issues. In fact, the academic profession has been studied to a greater extent than most other professions. Yet overarching generalizations about the academic profession are inadequate to capture the diversity and continuous evolution that has characterized it. Significant differences appear across ranks, disciplines, institution types, and geographic location. As noted in this paper. these differences to a large extent shape faculty salaries. work activities. productivity, and attitudes.

TABLE 35

Percentages of Full-time Faculty Expecting to Reach Specific Retirement Status Between 1987 and 2000, by Type of Institution

Type of Institution	Reach age 65	Expect to retire	Expect to stop teaching
All institutions	30	38	51
Public research	31	35	44
Private research	26	30	38
Public doctoral	30	36	51
Private doctoral	30	41	58
Public comprehensive	30	43	54
Private comprehensive	28	35	48
Liberal arts	29	32	42
Public 2-year	30	46	60
Other	33	39	60

Source: Fairweather, Hendrickson, & Russell, 1990c

TABLE 36

Percentages of Full-time Faculty Expecting to Reach Specific Retirement Status Between 1987 and 2000, by Program Area

Program Area	Reach age 65	Expect to retire	Expect to stop teaching
All 4-year institutions	30	37	48
Agriculture/home economics	23	32	43
Business	22	25	43
Education	40	49	60
Engineering	40	44	58
Fine arts	26	37	51
Health sciences	28	35	51
Humanities	38	42	49
Natural sciences	25	33	42
Social sciences	25	40	48
Other	32	40	48

Source: Fairweather, Hendrickson, & Russell, 1990c

A central issue that has increasingly attracted the attention of higher education observers is the possibility of future faculty shortages. Will such shortages materialize? Once again, the answer depends largely on discipline. Our conclusions from analyses of the recent National Survey of Postsecondary Faculty support those of Bowen and Sosa: it appears that shortages are most likely to occur in the natural sciences, engineering, and the humanities. Other questions about the future include: Will salary levels and working conditions attract the best and brightest students into academic careers? Will Ph.D.s want to pursue academic careers, or will positions outside academe prove more lucrative and attractive? Will part-time faculty continue to grow in numbers and be hired to replace retiring full-time faculty?

Although only the future holds the answers to these questions, one fact is certain: faculty constitute a major expenditure for higher education institutions and will continue to do so. Indeed, if shortages do materialize, faculty, expenditures may very well increase. Recruiting costs, as well as the costs of retaining existing faculty, will certainly grow. Such shortages will undoubtedly propel continuing increases in salaries.

At the same time, rising tuitions are forcing colleges and universities to account for both the expenditures they make and the educational products that result. Whether public concern over the affordability of a college education will translate into actions on the part of schools to reduce overall faculty costs is an open question. Institutions could, for example, lower faculty costs by relying more on part-time faculty to teach students. Faculty could also be asked to teach more courses or to increase the size of their classes. However, the likelihood that such measures will be adopted is unknown, as are the implications that they would have. It is clear, though, that the academic profession will continue to evolve both to accommodate and shape the future of higher education in the U.S.

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ISSUES IN PUBLIC HIGHER EDUCATION

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ISSUES IN PUBLIC HIGHER EDUCATION

Introduction

The "typical" public higher education institution defies description. Some institutions enroll a few hundred students; others, tens of thousands. Some specialize in management; others, in the arts. Some are among the world's premiere research universities; others are local community colleges.

Yet there can be little doubt that public higher education, as a whole, is one of the most unique elements of the American education system. Together, public institutions educate more than nine million students every year; they enroll the vast majority of all postsecondary students and grant well over half of all doctorates awarded in the country. Their history has been a continuous evolution of blending classical and practical education, along with research, public service, and teacher training. Public institutions have consistently responded to changing conditions in American higher education and society generally.

Much of the diversity among public higher education institutions stems from the states and regions in which they are located. For example, the public sector dominates higher education in several areas of the country, such as the West, while in other parts of the country, such as New England, there is a strong tradition of private higher education. The relative portion of students enrolled in two-year and four-year public institutions, the number and mix of types of public institutions, and the level of institutional autonomy relative to state control also vary by state.

Another key difference among states' public higher education sys ems is the relative cost. In speaking of the "cost" of higher education, we are really speaking of two price tags: first, the total cost of providing higher education to the student; second, the tuition cost to the student of obtaining higher education. In both the public and private sector, tuition covers only a portion of the total cost of education per student. However. tuition represents a substantially smaller share of educational costs in the public sector due to significant state and local government

subsidies of public higher education. These subsidies vary greatly from state to state, thus affecting the relative portions of higher education costs borne by tuition and government appropriations.

Each state aims to ensure equity and access for prospective students and their families. However, there are many different budget strategies that states use to achieve these goals. As a result, the mix of tuition, state appropriations, and, to some extent, student financial aid varies widely across states.

Factors affecting tuition levels at public higher education institutions in nearly all states include competition with other state budget categories for limited state funds, demographic trends, and public pressure to keep public tuitions low and educational quality high. The diversity among public higher education institutions is evident when one surveys the different approaches adopted by institutions to meet these challenges.

The remainder of this paper examines the similarities and differences within U.S. public higher education with particular attention to issues of cost. The first section provides background information on the history of public higher education and profiles public institutions. The next section addresses cost issues in higher education; it focuses on the prices students pay to attend public higher education institutions--both tuitions and "net prices" (tuition less financial aid), the costs to institutions and states of providing higher education, and factors affecting states' determination of the mix of tuition, state appropriations for higher education, and student financial aid. The final section addresses the future of public higher education, including enrollment and state financing of public higher education.

Because higher education is so diverse, data are broken down by state wherever possible. States are also grouped into regions where appropriate. In addition, anecdotal examples from both the state and institutional levels are included to illustrate differences in public higher education across states and institutions.

Background

History

The diversity of American higher education rests partly in its history (Harcleroad, 1988). As a responsibility of the states rather than the Federal government, higher education in the United States has developed uniquely in more than 50 arenas. Nonetheless, Congressional legislation and the evolution of the United States as a nation have also indelibly affected higher education. As a result, higher education institutions exist in every state and share the goals of combining classical and practical education while also serving as centers for the creation and dissemination of knowledge for society at large. However, the means of achieving these goals have evolved differently among states, and differences persist.

The earliest public colleges in the United States were among the first higher education institutions to be established in the 13 original colonies. Only Harvard University, founded in 1636, predates The College of William and Mary, established in the colony of Virginia in 1693 and claimed by the public sector as the first public postsecondary institution in what would become the United States (Harcleroad, 1988). (However, the distinctions between public and private institutions were less explicit in the seventeenth century than they are now; Harvard College itself came into existence through a legislative act passed by the Massachusetts General Court (Rudolph, 1962)).

Even after the Revolution there was little central government initiative for education in the newly independent United States. As Fred Harcleroad of the American Association of State Colleges and Universities and others have pointed out, the word "education" does not appear in any of the articles of the Constitution. The Tenth Amendment therefore reserves this responsibility "to the states" rather than to the Federal government (Harcleroad, 1988; McGuiness, 1981).

The first state-created higher education institutions were normal schools established in the early and middle parts of the nineteenth century to train teachers. Their establishment was

prompted by the expansion of education in the U.S. and the resulting growth in demand for trained educators (Harcleroad, 1988). The second major wave of higher education institutions came in 1862, when the Federal government established the Land Grant Colleges through the Morrill Act. This act provided 17.4 million acres of land which states were to sell and use for:

> the endowment, support, and maintenance of at least one college where the leading object shall be. . . to teach such branches of learning as are related to agriculture and the mechanic arts, **in such manner as the legislatures of the states may respectively prescribe,** in order to promote the liberal and practical education of the industrial classes in the several pursuits and profession of life. (Morrill Act as quoted in National Association of State Universities and Land-Grant Colleges (NASULGC) 1990 Fact Book, p. 11; emphasis added)

The Morrill Act enabled many states to establish new public institutions that complemented the teacher-training role of the normal schools. Several states, particularly in New England, chose to delegate the new responsibilities specified in the Morrill Act to private colleges, such as Brown University in Rhode Island, Yale University in Connecticut, and Dartmouth College in New Hampshire (NASULGC 1990 Fact Book). Although these institutions are no longer considered land-grant colleges, the Massachusetts Institute of Technology, another private higher education institution, has retained its status as such (NASULGC, 1987).

Subsequent legislation concerning the land-grant colleges included the Hatch Act of 1887, which allocated money to states so that the land-grant colleges could conduct agricultural research and disseminate practical agricultural information to the population at large (NASULGC 1990 Fact Book). In 1890, a second Morrill Act provided additional funds to states and territories for the provision of higher education and also served as the impetus for the creation of 17 historically black land-grant colleges in states with large African-American populations. Together, the Morrill and Hatch Acts charged land-grant colleges with the responsibilities of teaching and research. The Smith-Lever act of 1914 added Federal support for land-grant colleges to offer education beyond the campus bounds, as well. (NASULGU 1990 Fact Book). These three duties--teaching, research, and extension or public service--remain the core of land-grant colleges today.

Meanwhile, public normal schools were becoming increasingly "professionalized" into "teachers colleges", and admission standards became more rigorous. Beginning in the early 20th century, pressure grew for even further expansion of program offerings beyond the traditional teacher education curricula. This movement was particularly strong in the Midwest, Far West, and Pacific Coast--all regions that had few private higher education institutions. Curricular diversification at the teachers colleges progressed during the early and middle decades of the twentieth century, and these institutions adopted the title "state colleges". Today, most of these are comprehensive institutions that offer bachelor's degrees in a variety of fields, and many offer master's and doctorate degrees, as well (Harcleroad, 1990; Millett, 1981).

World War II represents a turning point in American higher education, particularly in the public sector. In 1941, only about a quarter of all institutions were public and these enrolled approximately half of all postsecondary students. By 1980, three-fourths of all postsecondary students attended public colleges and universities, which represented almost half of all institutions.

The surge in public college enrollments began with the Serviceman's Readjustment Act of 1944, more commonly known as the "G.I. Bill". This legislation and subsequent laws facilitated college attendance for veterans of World War II and the Korean War. Moreover, following the Soviet's launch of Sputnik in 1957, the Federal government funded the National Defense Education Act of 1958, which provided educational loans, particularly for students studying in areas of national interest, and graduate fellowships, with preference for students headed for teaching careers; loans were forgiven for students who taught after graduation (McGuiness, 1981). All of these measures contributed to the post-war enrollment growth.

Most public higher education institutions grew to absorb the new students. Many new institutions were founded, as well, and the post-war period witnessed the beginning of the boom in community colleges. The first two-year community or junior colleges were established in the early twentieth century in an effort to replicate the German educational system, and for some time remained adjuncts to secondary school programs, under the auspices of local school boards

(Brubacher & Rudy, 1976). However, the 1947 publication of a Presidential commission's report, Higher Education for American Democracy, heralded the arrival of the community college as a major component of public postsecondary education. The report proposed that every state establish community colleges to provide easily accessible and affordable public education through the first two years of college (Brubacher & Rudy, p. 234). Two-year public institutions became, and continue to be, the most rapidly growing sector of higher education in the United States.

Community colleges added a new facet to the diversity within public higher education in the United States. They offered both "career education" (vocational, technical, occupational studies) and the coursework required for the first two-years of a baccalaureate program (Cohen & Brawer, 1989). The debate of whether the junior/community colleges were "expanded secondary schools or truncated colleges" was largely silenced as community colleges passed from the auspices of secondary school districts and local school boards to state-level coordination and control (Cohen & Brawer, 1989). In nearly all states, community colleges are considered part of state postsecondary education systems, and many states have intensified efforts to facilitate student transfers to four-year institutions upon completion of the two-year community college curriculum.

The emergence of community colleges coincided with a movement for greater access to higher education. The new community colleges responded by seeking the enrollment of non-traditional student populations, such as the poor, minorities, students from disadvantaged educational backgrounds, older adults, and part-time students (Cohen & Brawer, 1989; Vaughan, 1985). Many community colleges have accommodated these students by charging low tuitions, being located within commuting distance of large populations of working adults, maintaining open-door admission policies, and offering flexible scheduling.

Federal legislation also responded to the call for increased access to higher education. Beginning with the Higher Education Act of 1965 and Education Amendments of 1972, the Federal government has funded student financial aid on a large scale through need-based grants (primarily the Basic Educational Opportunity Grant Program, or Pell Grants), a variety of

student loans, and work-study programs. McGuiness (1981) summarizes the goals of the Federal aid programs as follows:

- To promote equality of educational opportunity, by helping to remove economic social barriers to access to postsecondary education . . .;
- To reduce the burden of college costs on families with students who would likely continue their education without government assistance. . .;
- To assure a strong system of higher education through the provisions encouraging choice among institutions in the student aid programs and through selected programs of direct grants to institutions (Congressional Budget Office cited in McGuiness, 1981, pp. 168-9).

The growth of Federal aid has opened the door to higher education for "millions of students who, in all probability, would not have attended college were it not for federally funded student aid programs" (Vaughan, 1982, p. 13). As the numbers and types of students seeking higher education has grown, so have the numbers and types of institutions and programs that serve them. The public sector--in community colleges, four-year colleges, and universities scattered throughout the United States--has played a vital role in accommodating these students, thereby responding to a critical challenge of contemporary American society.

Enrollment

By 1987, the public sector enrolled approximately 75 percent of all postsecondary students. However, the numbers and proportions of students attending public institutions vary tremendously among states and regions, as shown in Table 1. The public sector enrolls the largest portions of higher education students in the Middle and Far Western states (Central, Mountain, and Pacific regions). For example, the public institutions in Nevada, Wyoming, New Mexico, Arizona, Montana, North Dakota, and Kansas enrolled 90 percent or more of all full-time equivalent postsecondary students in those states. In contrast, many Northeastern states (New England and Middle Atlantic regions) have a strong tradition of private higher education, and generally enroll the lowest portion of postsecondary students in public institutions. For example, less than half of all FTE postsecondary students enrolled in Massachusetts and Rhode Island attended public institutions.

TABLE 1

Full-time Equivalent Enrollment in Institutions by Control, Type, and State
Fall 1987

	4-Year Public	2-Year Public	4-Year Private	2-Year Private	Public Share of Total	2-Year Share of Public
NEW ENGLAND						
MAINE	22,085	3,466	9,681	835	71%	14%
NEW HAMPSHIRE	18,605	4,324	18,364	1,612	53%	19%
VERMONT	13,241	1,811	10,168	1,690	56%	12%
MASSACHUSETTS	87,239	44,516	182,159	11,365	41%	34%
RHODE ISLAND	18,126	7,173	29,962		46%	28%
CONNECTICUT	46,753	19,957	43,808	1,285	60%	30%
TOTAL	206,049	81,247	294,142	16,787	48%	28%
MIDDLE ATLANTIC						
NEW YORK	260,827	153,655	318,359	27,318	55%	37%
NEW JERSEY	97,796	59,242	42,510	1,997	78%	38%
PENNSYLVANIA	188,169	50,683	169,830	31,111	54%	21%
TOTAL	546,792	263,580	530,699	60,426	58%	33%
EAST NORTH CENTRAL						
OHIO	222,982	68,821	85,020	13,565	75%	24%
INDIANA	130,800	19,878	45,304	3,058	76%	13%
ILLINOIS	161,660	174,421	122,232	8,445	72%	52%
MICHIGAN	197,776	108,349	56,032	2,934	84%	35%
WISCONSIN	130,133	55,972	32,478	1,318	85%	30%
TOTAL	843,351	427,441	341,066	29,320	77%	34%

TABLE 1

Full-time Equivalent Enrollment in Institutions by Control, Type, and State
Fall 1987 (Continued)

	4-Year Public	2-Year Public	4-Year Private	2-Year Private	Public Share of Total	2-Year Share of Public
WEST NORTH CENTRAL						
MINNESOTA	98,413	35,662	40,907	4,382	75%	27%
IOWA	59,859	31,875	36,180	2,986	70%	35%
MISSOURI	91,050	32,389	58,204	3,036	67%	26%
N. DAKOTA	23,926	5,741	2,227	213	92%	19%
S. DAKOTA	19,903		5,731	470	76%	0%
NEBRASKA	43,994	15,645	12,780	401	82%	26%
KANSAS	68,987	26,716	9,948	1,121	90%	28%
TOTAL	406,132	148,028	165,977	12,609	76%	27%
SOUTH ATLANTIC						
DELAWARE	18,193	4,737	4,927		82%	21%
MARYLAND	82,739	48,749	25,360	762	83%	37%
VIRGINIA	126,045	61,858	36,742	1,302	83%	33%
WEST VIRGINIA	46,677	5,935	6,111	1,547	87%	11%
N. CAROLINA	114,128	72,932	50,066	6,490	77%	39%
S. CAROLINA	61,930	25,544	20,297	4,745	78%	29%
GEORGIA	100,997	30,054	36,966	7,021	75%	23%
FLORIDA	114,503	140,216	63,990	4,020	79%	55%
TOTAL	665,212	390,025	244,459	25,887	80%	37%

TABLE 1

Full-time Equivalent Enrollment in Institutions by Control, Type, and State
Fall 1987 (Continued)

	4-Year Public	2-Year Public	4-Year Private	2-Year Private	Public Share of Total	2-Year Share of Public
EAST SOUTH CENTRAL						
KENTUCKY	74,877	17,483	18,905	7,236	78%	19%
TENNESSEE	83,084	30,567	37,834	5,209	73%	27%
ALABAMA	87,896	41,307	15,729	3,325	87%	32%
MISSISSIPPI	44,630	34,320	7,773	2,133	89%	43%
TOTAL	290,487	123,677	80,241	17,903	81%	30%
WEST SOUTH CENTRAL						
ARKANSAS	45,864	9,099	8,227	1,753	85%	17%
LOUISIANA	114,222	8,665	20,239	1,134	85%	7%
OKLAHOMA	75,586	29,921	15,793	4,218	84%	28%
TEXAS	302,307	188,580	74,862	3,403	86%	38%
TOTAL	537,979	236,265	119,121	10,508	86%	31%
MOUNTAIN						
MONTANA	23,386	2,600	2,520	430	90%	10%
IDAHO	23,216	3,549	2,138	7,498	74%	13%
WYOMING	9,103	9,151		621	97%	50%
COLORADO	89,980	28,207	14,296	3,729	87%	24%

TABLE 1

Full-time Equivalent Enrollment in Institutions by Control, Type, and State Fall 1987 (Continued)

	4-Year Public	2-Year Public	4-Year Private	2-Year Private	Public Share of Total	2-Year Share of Public
NEW MEXICO	37,311	17,188	1,361		98%	32%
ARIZONA	71,832	64,384	6,187	1,793	94%	47%
UTAH	40,643	14,768	26,219	962	67%	27%
NEVADA	16,225	9,792	194	25	99%	38%
TOTAL	311,696	149,639	52,915	15,058	87%	32%
PACIFIC						
WASHINGTON	70,323	80,868	24,996	1,371	85%	53%
OREGON	53,552	37,913	16,521	329	84%	41%
CALIFORNIA	413,464	544,065	158,017	10,345	85%	57%
ALASKA	8,020	6,264	739		95%	44%
HAWAII	18,190	12,198	7,382		80%	40%
TOTAL	563,549	681,308	207,655	12,045	85%	55%
U.S. TOTAL	7,047,709	3,355,826	3,556,068	355,429	73%	32%

Source: Digest of Education Statistics: 1989, Table 172, p.190.

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Although the relative proportion of students in the public and private sectors of higher education has remained essentially constant (at least at the national level) since 1970, there has been a shift within the public sector from four-year to two-year colleges. Between the fall of 1970 and the fall of 1987, full-time equivalent student enrollments at public two-year colleges grew nearly four percent annually, and the proportion of FTE students attending public two-year schools rose from 29 to 37 percent of total FTE students. Comparisons of total enrollment growth over the same period reveal even larger discrepancies between the rates at two-year (107 percent growth) and four-year (28 percent growth) institutions, since a large portion of two-year students attends part-time. Figure 1 compares total enrollments in different types of higher education institutions and their growth rates between 1970 and 1987.

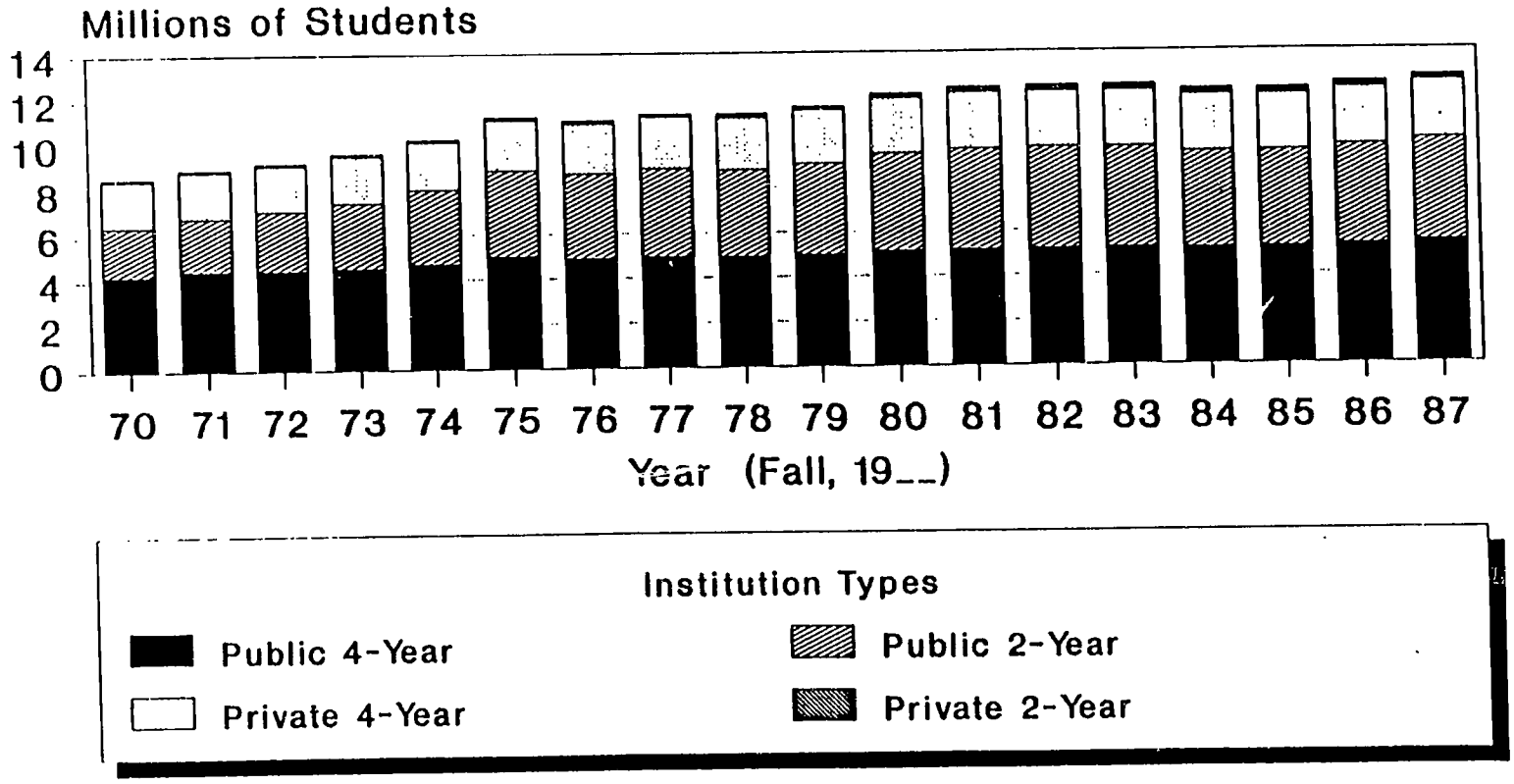
The size of two-year college enrollments within the public sector also varies by state. In most states, about a third of public students are enrolled in two-year schools. However, in some states, such as California and Florida, the majority of students in public higher education institutions attends two-year colleges. In one state, South Dakota, there are no public two-year colleges.

Student Characteristics

Different types of institutions tend to enroll different student populations. One major difference is the extent to which students are dependent on their parents for financial support to attend school. Data from the National Postsecondary Student Aid Study (NPSAS), a nationally representative sample of postsecondary students enrolled in the fall of 1986, indicate that 42 percent of students at public two-year schools depended on their parents for financial support, compared to 73 percent of students at public four-year schools and 76 percent of students at private four-year schools.

These differences in dependency status undoubtedly arise from the fact that a large portion of students at two-year public colleges are non-traditional students, i.e, older students who may also be working part-time. In 1986, students at public two-year colleges were, on average, 28 years old, compared to an average age of 23 among undergraduate students at four-

Figure 1
Total Enrollment in Institutions of Higher Education



Source: National Center for Education Statistics, Digest of Education Statistics 1989 (25th ed.), Table 162.

year institutions (both private and public). Moreover, only 37 percent of public two-year students attended school full-time, compared to 76.5 percent of public four-year public students and 79.5 percent of private four-year students who attended full-time.

Another difference between students attending public and private institutions is that students attending private institutions tended to come from families with significantly higher incomes. Within the NPSAS sample, the average family income for students attending four-year private institutions was $50,000, compared to $41,000 for students attending public four-year institutions and $32,300 for students attending public two-year institutions.

In addition to comparing average incomes, it is also useful to examine the income distribution of students within types of institutions. Table 2 shows the percentage of students within each given institution control/type that has an income within a specified range and confirms that public students tend to come from lower-income families than do students at four-year private schools. The table shows that while 13 percent of dependent students at public, less-than-four year schools came from families with incomes over $50,000, 27 percent of students at four-year public students came from these high-income families as did 36 percent of students at four-year private schools.

Tuition and Financial Aid

In many European countries, higher education is free but limited to a relatively small portion of students (White & Ahrens, 1989). In the United States, there is a different trade-off: some form of higher education is available to nearly all high school graduates, but enrolled postsecondary students--or their families--pay for at least part of their education. At public institutions, the portion of educational costs students contribute is generally small, and tuitions are relatively low compared to those of private institutions. Although higher education systems vary widely across states, citizens across the nation promote and expect (albeit in varying degrees) both access to higher education and a lower cost alternative to private higher education. Fulfilling these expectations is a critical function of public higher education across the nation.

TABLE 2

Income Distribution of Students
By School/Type Control as of Fall 1986

Family Income	Public 2-Year	Public 4-Year	Private 4-Year
Dependent Students			
$0 - 10,000	15.4%	9.0%	7.7%
10,000 - 20,000	20.3	13.3	11.0
20,000 - 30,000	20.8	16.4	14.8
30,000 - 40,000	18.2	18.6	16.2
40,000 - 50,000	12.1	15.9	14.1
50,000 +	13.2	26.8	36.2
	100%	100%	100%
Independent Students			
$0 - 5,000	34.4	39.3	33.1
5,000 - 10,000	20.7	22.1	21.9
10,000 - 20,000	20.1	16.8	21.1
20,000 +	24.8	21.8	23.9
	100%	100%	100%

Source: National Postsecondary Student Aid Survey (1987)

Large state appropriations to higher education enable public institutions to charge tuitions that are considerably lower than those charged by private institutions. In 1986-87, for example, the average tuition at public four-year institutions was approximately $1490, compared an average of $7,200 at private four-year institutions. In the same year, the average tuition at public two-year institutions was under $700, compared to an average of $3,910 at private two-year institutions. These figures reveal significant differences not only between public and private tuition levels, but also between the tuitions charged at two-year and four-year institutions within the public sector. Across all states, the average tuition at public four-year institutions was approximately double that of the average public two-year institution.[1]

Average tuitions in all types of higher education institutions have been increasing since the mid-1960s, but tuition growth has generally been slower in the public sector. In all types of institutions, the average annual rate of increase since 1980 has been higher than in many previous years. In constant dollars, tuition actually decreased in public institutions between 1976-77 and 1981-82, and increased only slightly in private institutions. However, between 1981-82 and 1986-87, tuitions rose between 20 and 37 percent in different types of higher education institutions. Although the rates of tuition growth in public and private institutions were similar in the early 1980s, tuitions have been growing faster in private institutions than in public institutions since about 1985. Table 3 and Figure 2 detail growth in average tuition levels at both public and private institutions.

Different rates of tuition growth in the public and private sectors have further widened the "tuition gap" between the two sectors. By 1987-88, the average tuition of private institutions

[1]We cite the national average of public institution tuition charges from 1986-87 to be consistent with the most recent available state level figures. However, more recent national data from The College Board reveal a continuation of differential pricing policies for public and private institutions, and two- and four-year institutions. In 1989-90, the average tuition cost to students attending two-year public institutions was $842, compared to $1,694 at four-year public institutions. Tuitions for students attending two- and four-year private institutions were $4,713 and $8,737, respectively, in the same year.

TABLE 3

Public and Private Undergraduate Tuitions
1965-66 To 1987-88

CURRENT DOLLARS

Year (July-June)	Median Family Income	Public 4-Year Tuition	Public 4-Year Tuition as % of Median Family Income	Public 2-Year Tuition	Public 2-Year Tuition as % of Median Family Income	Private 4-Year Tuition	Private 4-Year Tuition as % of Median Family Income
1976-77	$14,958	$617	4.1%	283	1.9%	$2,534	16.9%
1977-78	16,017	655	4.1	306	1.9	2,700	16.9
1978-79	17,637	688	3.9	327	1.9	2,958	16.8
1979-80	19,600	738	3.8	355	1.8	3,225	16.5
1980-81	21,032	804	3.8	391	1.9	3,617	17.2
1981-82	22,387	909	4.1	434	1.9	4,113	18.4
1982-83	23,438	1,031	4.4	473	2.0	4,639	19.8
1983-84	24,678	1,148	4.7	528	2.1	5,093	20.6
1984-85	26,453	1,228	4.6	584	2.2	5,556	21.0
1985-86	28,323	1,318	4.7	641	2.3	6,121	21.6
1986-87	29,459	1,414	4.8	660	2.2	6,658	22.6
1987-88	30,853	1,490	4.8	690	2.2	7,200	23.3

TABLE 3 (Continued)

Public and Private Undergraduate Tuitions
1965-66 To 1987-88 (Continued)

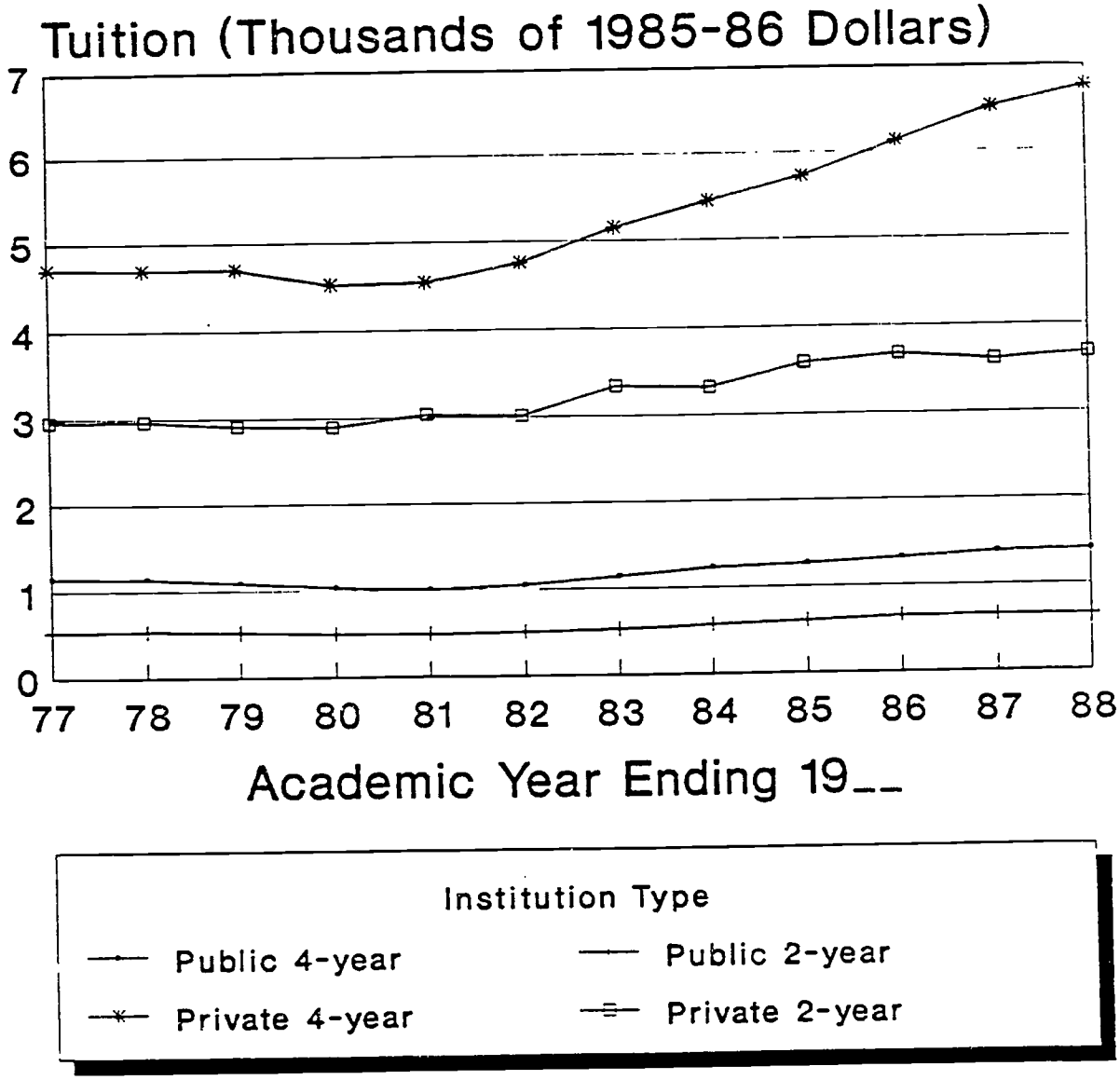
Current Dollars

Year (July-June)	Private 2-Year Tuition	As % of Median Family Income
1976-77	$1,592	10.6%
1977-78	1,706	10.7
1978-79	1,831	10.4
1979-80	2,062	10.5
1980-81	2,413	11.5
1981-82	2,605	11.6
1982-83	3,008	12.8
1983-84	3,099	12.6
1984-85	3,485	13.2
1985-86	3,672	13.0
1986-87	3,684	12.5
1987-88	3,910	12.7

Source: Tuition: NCES (ED), Digest of Education Statistics, 25th edition, Table 258, pp. 281-282.

Income: Bureau of Census (U.S. Department of Commerce), Current Population Reports, Series P-60.

Figure 2
Higher Education Tuition Growth
in Constant (1985-86) Dollars



Source: Digest of Education Statistics, 1989, Table 258, pp. 282-282. Adjusted to current dollars using July-June CPI.

in this country was almost six (5.9) times the average tuition charged by public institutions. This ratio was up from 4.5 to 1 in 1965-66, 5.2 to 1 in 1975-76, and 5.5 to 1 in 1985-86. (See Table 4.)

Despite rapid increases during the 1980s, average tuition at public institutions has remained a basically stable proportion of median family income. The average tuition at public four-year institutions remained between 3.5 and five percent between 1976-77 and 1987-88, and remained approximately two percent at public two-year institutions throughout this period. In contrast, tuition grew from nearly 17 percent of median family income in 1976-77 to 23 percent in 1987-88 at private four-year institutions, and was approximately 11 to 13 percent of median family income at private two-year institutions over this period.

While national averages are informative, they mask considerable variance across states, as shown in Table 5. Public institutions in Northeastern states (New England and Middle Atlantic regions) tend to charge higher tuitions than the national average. These regions contain the three states with the highest tuitions at public four-year institutions in 1986-87: Vermont ($2,942), Pennsylvania ($2,496), and New Hampshire ($2,190). Tuition at two-year institutions in this region were also considerably higher than the national average. Tuitions in the North Central Regions (also known as the Upper Midwest) also tend to be somewhat higher than national averages.

In contrast, tuitions are generally lowest in the South (South Atlantic, East and West South Central regions) and Far West (Mountain and Pacific regions). Only a handful of states in these regions charged tuitions higher than the national average, and among these only Virginia charged more than $2,000. Arkansas, Texas, Wyoming, Nevada, and North Carolina all charged tuitions less than $1,000 in 1986-87. Other states that also had similarly low tuitions were Alaska, Hawaii, Oklahoma.

There are also differences among states regarding the relative tuitions charged at two-year and four-year institutions. However, practices do not appear to be strongly linked to geographic regions. In some states (Mississippi, Arizona, Hawaii, California, New Jersey) tuition

TABLE 4

Undergraduate Tuitions: 1976-77 to 1987-88
In Current (Unadjusted) Dollars

YEAR (JULY-JUNE)	AVERAGE TUITION		TUITION GROWTH FROM PREVIOUS YEAR		RATIO OF AVERAGE PRIVATE TUITION TO AVERAGE PUBLIC TUITION
	ALL PUBLIC INSTITUTIONS	ALL PRIVATE INSTITUTIONS	ALL PUBLIC INSTITUTIONS	ALL PRIVATE INSTITUTIONS	
1965-66	$257	$1,154			4.5
1966-67	275	1,233	7%	7%	4.5
1967-68	283	1,297	3%	5%	4.6
1968-69	295	1,383	4%	7%	4.7
1969-70	323	1,533	9%	11%	4.7
1970-71	351	1,684	9%	10%	4.8
1971-72	376	1,820	7%	8%	4.8
1972-73	407	1,898	8%	4%	4.7
1973-74	438	1,989	8%	5%	4.5
1974-75	432	2,117	-1%	6%	4.9
1975-76	433	2,272	0%	7%	5.2
1976-77	479	2,467	11%	9%	5.2
1977-78	512	2,624	7%	6%	5.1
1978-79	543	2,867	6%	9%	5.3
1979-80	583	3,130	7%	9%	5.4
1980-81	635	3,498	9%	12%	5.5
1981-82	714	3,953	12%	13%	5.5
1982-83	798	4,439	12%	12%	5.6
1983-84	891	4,851	12%	9%	5.4
1984-85	971	5,315	9%	10%	5.5
1985-86	1,045	5,789	8%	9%	5.5
1986-87	1,106	6,316	6%	9%	5.7
1987-88	1,160	6,820	5%	8%	5.9

Source: NCES (ED), Digest of Education Statistics, 1989
25th edition, Table 258, pp. 281-2.

TABLE 5

Average Undergraduate Tuition and Fees
1986-87

	4-year Public	4-year Private	2-year Public	2-year Private	4-year Private: 4-year Public Ratio	Four-year public: Two-year public Ratio
NEW ENGLAND						
MAINE	$1,561	$9,032	$880	$2,067	5.8	1.8
NEW HAMPSHIRE	2,190	8,401	1,514	2,710	3.8	1.4
VERMONT	2,942	6,393	1,966	4,858	2.2	1.5
MASSACHUSETTS	1,388	8,953	750	5,602	6.5	1.9
RHODE ISLAND	1,845	8,187	844		4.4	2.2
CONNECTICUT	1,527	8,534	573	7,367	5.6	2.7
MIDDLE ATLANTIC						
NEW YORK	1,431	7,364	1,340	4,795	5.1	1.1
NEW JERSEY	1,861	8,221	763	1,200	4.4	2.4
PENNSYLVANIA	2,496	7,140	1,626	4,284	2.9	1.5
EAST NORTH CENTRAL						
OHIO	1,982	6,176	1,181	3,380	3.1	1.7
INDIANA	1,627	6,762	1,211	3,800	4.2	1.3
ILLINOIS	1,708	6,560	866	3,614	3.8	2.0
MICHIGAN	1,877	5,093	917	3,648	2.7	2.0
WISCONSIN	1,271	6,055	887		4.8	1.4
WEST NORTH CENTRAL						
MINNESOTA	1,814	6,843	1,229	1,908	3.8	1.5
IOWA	1,385	5,847	1,057	3,180	4.2	1.3
MISSOURI	1,277	5,474	524	3,788	4.3	2.4
N. DAKOTA	1,198	4,162	1,074		3.5	1.1

TABLE 5

Average Undergraduate Tuition and Fees (Continued)
1986-87

	4-year Public	4-year Private	2-year Public	2-year Private	4-year Private: 4-year Public Ratio	Four-year public: Two-year public Ratio
WEST NORTH CENTRAL (Continued)						
S. DAKOTA	$1,409	$5,202	N/A	$3,920	3.7	N/A
NEBRASKA	1,292	5,090	$740	3,180	3.9	1.7
KANSAS	1,271	4,121	537	3,461	3.2	2.4
SOUTH ATLANTIC						
DELAWARE	906	2,794	932		3.1	
MARYLAND	1,682	7,274	906	4,660	4.3	1.9
VIRGINIA	2,070	5,724	775	4,644	2.8	2.7
WEST VIRGINIA	1,003	6,164	517	1,311	6.1	1.9
N. CAROLINA	818	5,597	216	3,635	6.8	3.8
S. CAROLINA	1,733	4,534	645	2,714	2.6	2.7
GEORGIA	1,369	5,688	799	2,626	4.2	1.7
FLORIDA	1,055	1,367	608		1.3	1.7
EAST SOUTH CENTRAL						
KENTUCKY	1,152	3,868	540	3,126	3.4	2.1
TENNESSEE	1,133	5,075	660	2,323	4.5	1.7
ALABAMA	1,275	4,316	666	2,779	3.4	1.9
MISSISSIPPI	1,603	3,890	489	1,733	2.4	3.3

TABLE 5

Average Undergraduate Tuition and Fees (Continued)
1986-87

	4-year Public	4-year Private	2-year Public	2-year Private	4-year Private: 4-year Public Ratio	Four-year public: Two-year public Ratio
WEST SOUTH CENTRAL						
ARKANSAS	$931	$3,310	$472	$2,082	3.6	2.0
LOUISIANA	1,341	6,812	619	N/A	5.1	2.2
OKLAHOMA	757	3,662	456	2,262	4.8	1.7
TEXAS	885	5,510	300	2,184	6.2	3.0
MOUNTAIN						
MONTANA	1,205	3,867	423	953	3.2	2.8
IDAHO	1,036	5,774	690	582	5.6	1.5
WYOMING	778	N/A	516	N/A	0.0	1.5
COLORADO	1,482	7,913	623	586	5.3	2.4
NEW MEXICO	915	3,649	407	N/A	4.0	2.2
ARIZONA	1,136	2,462	358	N/A	2.2	3.2
UTAH	1,159	1,498	884	N/A	1.3	1.3
NEVADA	988	3,100	573	N/A	3.1	1.7
PACIFIC						
WASHINGTON	1,339	6,837	654	N/A	5.1	2.0
OREGON	1,296	7,122	484	N/A	5.5	2.7
CALIFORNIA	1,031	8,073	96	4,655	7.8	10.7
ALASKA	975	3,719	824	N/A	3.8	1.2
HAWAII	972	3,020	281	N/A	3.1	3.5

Source: Digest of Education Statistics: 1989, Table 259, p.283.

at four-year institutions is more than three times that of two-year institutions. However, it must be noted that in nearly all these states, tuition at four-year institutions was still below the national average. (Only in Mississippi were tuitions at four-year institutions slightly higher than the national average.) On the other end of the spectrum, in a number of states tuitions at two- and four-year institutions were more similar. In each of these states (New Mexico, Utah, New Hampshire, Indiana, Iowa, North Dakota, and Alaska), the ratio of four-year to two-year institutions' average tuition was less than 1.5, and the average tuition at two-year institutions was above the national average.

Financial aid further reduces the total higher education bill for many students attending both public and private institutions. NPSAS data show that, on average, financial aid covers about two-third of the total expenses (tuition plus room and board and other expenses) of aid recipients in the public sector. For many of these students, financial aid is greater than tuition since tuitions in the public sector are often less than half of total expenses.

Most financial aid is awarded to meet financial need, and students at private four-year institutions are more likely to receive aid, and larger amounts of it, than are students at public four-year institutions. Students at two-year public colleges are the least likely to receive aid. However, the net price of attending private four-year institutions is still considerably higher than the net price of attending a public institution.

NPSAS data indicate that in 1986, 33 percent of full-time, full-year undergraduate students at public two-year students received some form of financial aid, and the average aid award was $1,622. At four-year public institutions, 49.5 percent of students received financial aid, with an average aid award of $2,867. At private four-year institutions, 68 percent of students receive financial aid, with an average aid amount of $5,025.

Financial aid is available from different sources. The Federal government, state government, and institutions provide the most aid. Aid also comes in different forms, specifically grants, loans, and work. In all types of institutions, the Federal government provides aid to the largest number of students and also provides the largest amount of aid to these students. Of

aided students in public two-year institutions in 1986, 62 percent received Federal aid (mean amount: $1,810); 73 percent of aided students at four-year public institutions received Federal aid (mean amount: $2,600); and 70 percent of aided students at private four-year institutions received Federal aid (mean amount: $3,235).

In the same year, students at public and private institutions are almost equally likely to receive aid from state sources. However, the average aid amount varied by the institution type and control. At two-year public institutions, 30 percent of aided students received state aid (mean amount: $600); at four-year public institutions 32 percent of aided students received this form of aid (mean amount: $955). Among aided students attending four-year private institutions, 30 percent received financial aid from state sources (mean amount: $1,833).

The greatest difference in financial aid packages across different institutions appears to be in institutionally funded aid. Institutional aid is far more common among private institutions and usually takes the form of scholarships, i.e., grant aid. In 1986, private four-year institutions awarded institutional aid to 64 percent of their aided students (mean amount: $2,710). At public two-year and public four-year institutions, only about 30 percent of aided students received this type of aid (mean amounts: $670 for two-year students and $1,580 for four-year students).

State Financing of Higher Education

Tuition levels alone do not tell the whole story of college costs. To students and their families, there are frequently many other costs associated with postsecondary education. These additional expenses include room, board, books, and travel, as well as the opportunity cost of matriculation, i.e., income foregone to attend school. For many students at public institutions, the total costs of attendance, including these auxiliary expenses, can be double or triple the cost of tuition alone. Room and board fees represent a large portion of total attendance costs. since states frequently subsidize tuition to a greater degree than they do bookstores, dining halls, and dormitories. to cite a few examples. In all states. average room and board costs exceed average

tuition costs at four-year public institutions, as shown in Table 6. The ratio of room and board costs to tuition ranges from 1.07 to 1 in New Hampshire to 4.03 to 1 in California.

On the other hand, tuition levels do not come close to meeting the costs of providing postsecondary education. In both the public and private sectors, many additional revenue sources "invisibly" offset the costs of a college education to students and their families. Public institutions receive the majority of current operations revenue from a single non-tuition source: state and local appropriations. In 1985, government appropriations contributed 61 percent of all education and general (E & G) revenues at the average public institution, compared to only 18 percent contributed by tuition and fees. At private institutions, in contrast, government appropriations provided only two percent of total E & G revenues in 1985, and tuition and fees represented 56 percent. Other revenue sources available to both public and private institutions include: government grants and contracts; private gifts, grants, and contracts; endowment income; and the sales and services of educational activities. Figures 3 and 4 illustrate the E & G revenue sources of the average public four-year and two-year institutions, respectively.

In addition to appropriations for current operations, states also provide additional funding to public colleges and universities in the state through separate appropriations for capital outlays or improvement (e.g., new building construction), grants and contracts, or other one-time special expenditures. It is also common practice for state governments to pass legislation that permits institutions to sell bonds to raise revenue for other facilities, such as dormitories and dining halls.

States have different strategies for establishing the proportions of tuition and government appropriations to fund higher education. State legislatures shape the tuitions that are charged at public institutions through the allocations they make to higher education. However, in all but four states, governing boards at public colleges and universities actually set tuition levels, and must take state appropriations into account when doing so (SHEEO, 1988).

Governing boards use several strategies to establish tuitions. One method is to determine tuition as the residual between the costs of providing education and state appropriations. This

TABLE 6

Average Undergraduate Room and Board Rates
at Public Four-Year Institutions
1986-87

	Tuition	Room & Board	Total Attendance Cost (Tuition, Room, and Board)	Room & Board As % of Total Attendance Cost
NEW ENGLAND				
MAINE	$1,561	$2,974	$4,535	66%
NEW HAMPSHIRE	2,190	2,344	4,534	52
VERMONT	2,942	3,415	6,357	54
MASSACHUSETTS	1,388	2,832	4,220	67
RHODE ISLAND	1,845	3,553	5,398	66
CONNECTICUT	1,527	2,790	4,317	65
MIDDLE ATLANTIC				
NEW YORK	1,431	3,273	4,704	70
NEW JERSEY	1,861	3,059	4,920	62
PENNSYLVANIA	2,496	2,651	5,147	52
EAST NORTH CENTRAL				
OHIO	1,982	2,853	4,835	59
INDIANA	1,627	3,195	4,822	66
ILLINOIS	1,708	2,742	4,450	62
MICHIGAN	1,877	2,861	4,738	60
WISCONSIN	1,271	2,326	3,597	65

TABLE 6

Average Undergraduate Room and Board Rates
at Public Four-Year Institutions
1986-87 (Continued)

	Tuition	Room & Board	Total Attendance Cost (Tuition, Room, and Board)	Room & Board As % of Total Attendance Cost
WEST NORTH CENTRAL				
MINNESOTA	$1,814	$2,191	$4,005	55%
IOWA	1,385	2,072	3,457	60
MISSOURI	1,277	2,129	3,406	63
N. DAKOTA	1,198	1,932	3,130	62
S. DAKOTA	1,409	1,999	3,408	59
NEBRASKA	1,292	2,050	3,342	61
KANSAS	1,271	2,258	3,529	64
SOUTH ATLANTIC				
DELAWARE	906	1,120	2,026	55
MARYLAND	1,682	3,643	5,325	68
VIRGINIA	2,070	2,913	4,983	58
WEST VIRGINIA	1,003	3,103	4,106	76
N. CAROLINA	818	2,239	3,057	73
S. CAROLINA	1,733	2,491	4,224	59
GEORGIA	1,369	2,254	3,623	62
FLORIDA	1,055	2,815	3,870	73

TABLE 6

Average Undergraduate Room and Board Rates at Public Four-Year Institutions 1986-87 (Continued)

	Tuition	Room & Board	Total Attendance Cost (Tuition, Room, and Board)	Room & Board As % of Total Attendance Cost
EAST SOUTH CENTRAL				
KENTUCKY	$1,152	$2,121	$3,273	65%
TENNESSEE	1,133	2,242	3,375	66
ALABAMA	1,275	2,131	3,406	63
MISSISSIPPI	1,603	2,262	3,865	59
WEST SOUTH CENTRAL				
ARKANSAS	931	1,862	2,793	67
LOUISIANA	1,341	2,234	3,575	62
OKLAHOMA	757	2,168	2,925	74
TEXAS	885	2,968	3,853	77
MOUNTAIN				
MONTANA	1,205	2,913	4,118	71
IDAHO	1,036	2,708	3,744	72
WYOMING	778	1,088 *	1,866	58
COLORADO	1,482	2,956	4,438	67
NEW MEXICO	915	2,703	3,618	75

TABLE 6

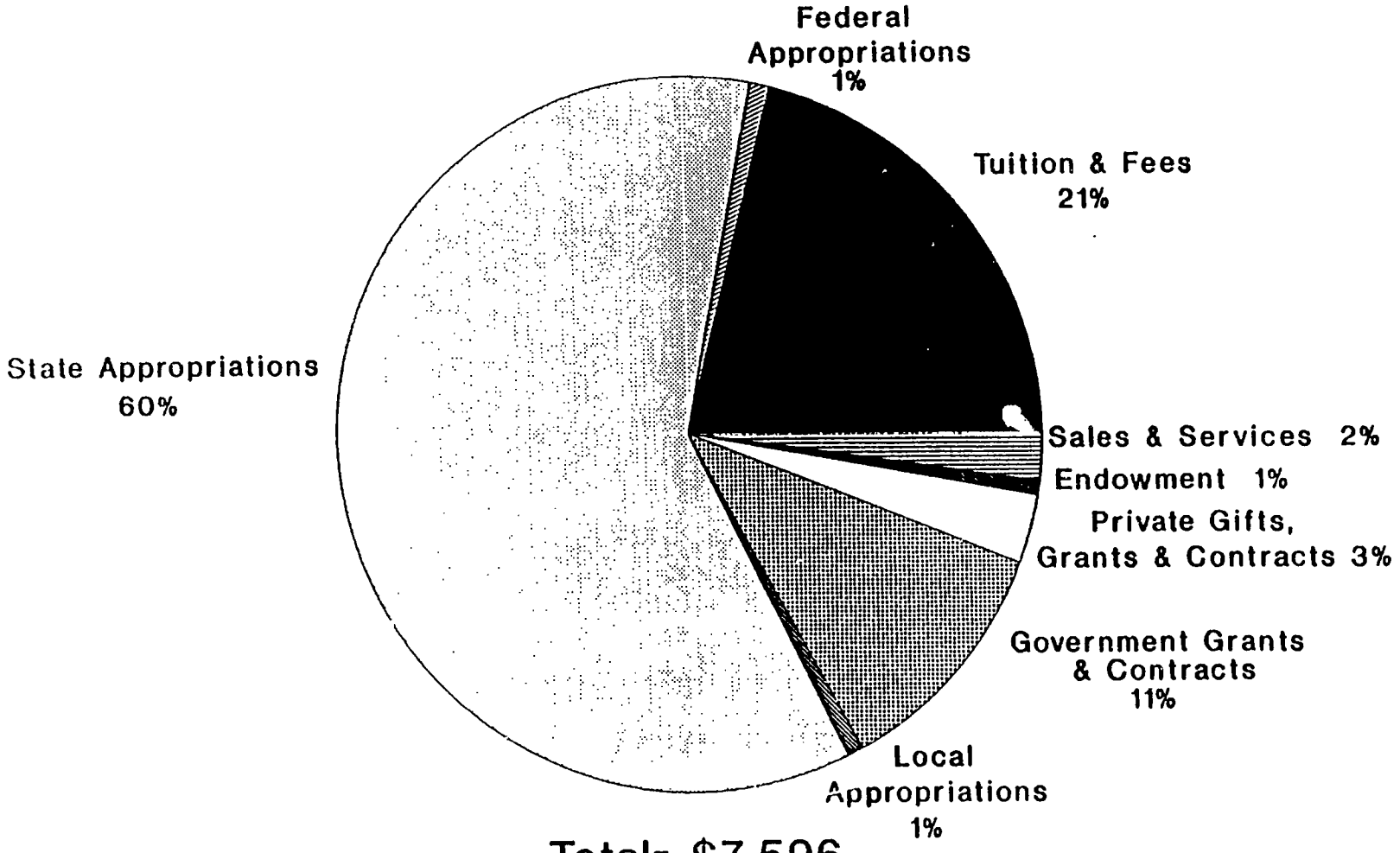
Average Undergraduate Room and Board Rates at Public Four-Year Institutions 1986-87 (Continued)

	Tuition	Room & Board	Total Attendance Cost (Tuition, Room, and Board)	Room & Board As % of Total Attendance Cost
MOUNTAIN (Continued)				
ARIZONA	$1,136	$2,696	$3,832	70%
UTAH	1,159	2,790	3,949	71
NEVADA	988	2,539	3,527	72
PACIFIC				
WASHINGTON	1,339	2,601	3,940	66
OREGON	1,296	2,642	3,938	67
CALIFORNIA	1,031	4,158	5,189	80
ALASKA	975	3,008	3,983	76
HAWAII	972	3,277	4,249	77

* Room only.

Source: Digest of Education Statistics: 1989, Table 259, p. 283.

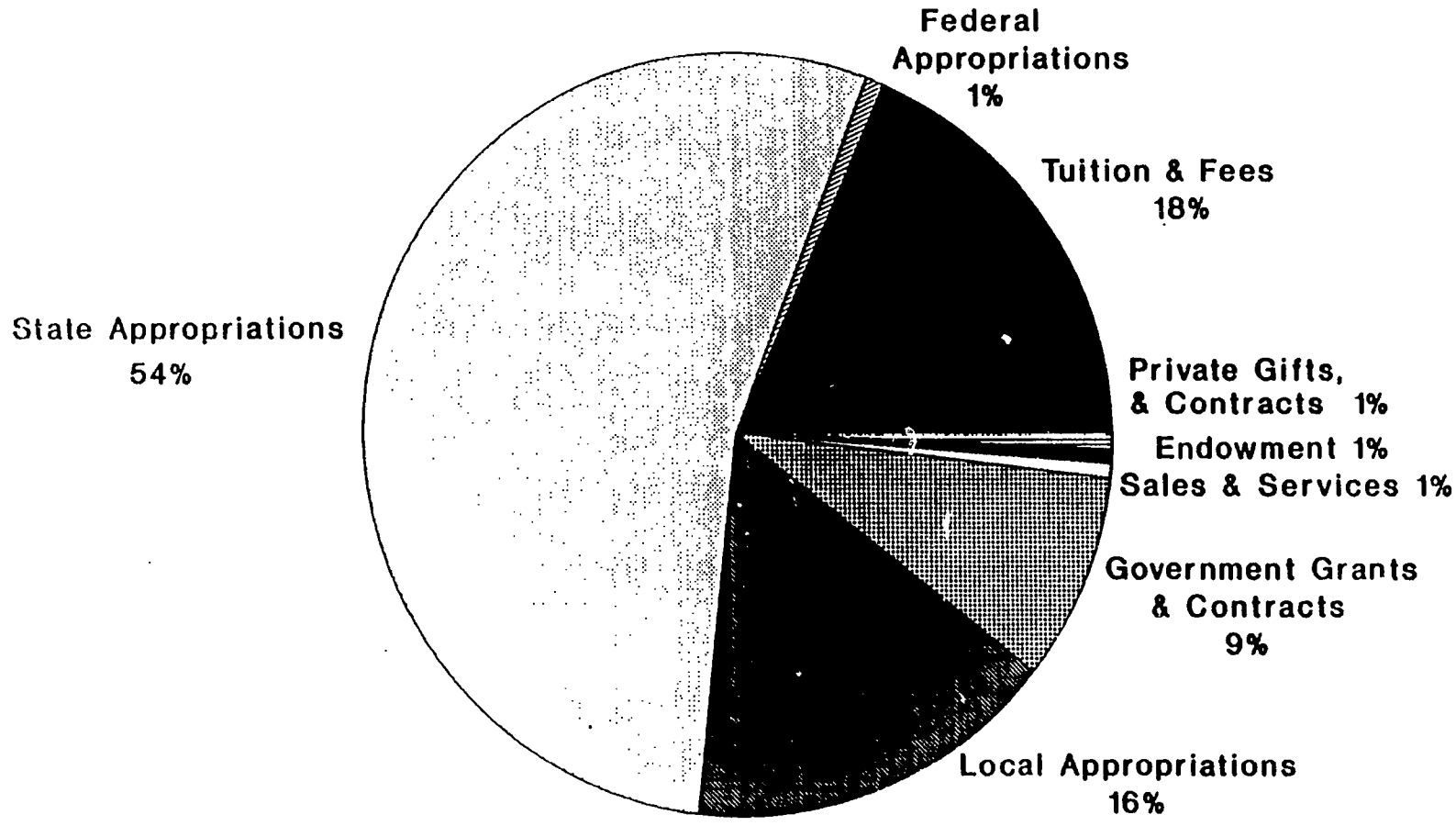
Figure 3
Revenues of 4-Year Public Institutions
1985-86, per FTE



Total= $7,596

Source: Higher Education General Information Survey.

Figure 4
Revenues of 2-Year Public Institutions
1985-86, per FTE



Total= $4,694

Source: Higher Education General Information Survey.

method allows tuitions to be set in the face of changes in appropriations to maintain given levels of educational spending. A recent survey of State Higher Education Finance and Executive Officers (SHEEO, 1988) indicated that in 25 states, tuition and fees were viewed as the difference between institutional needs and state appropriations. In these states, public higher education institutions frequently set tuition rates after they find out how much money they will receive from state appropriations.

In 12 other states, tuition is determined as a specified percentage of either per-student instructional cost or state appropriations, either total or on a per-student-basis. In these states, tuitions rise when state appropriations increase.

In other states, tuitions are set in response to competitive forces or "what the market will bear". In these states, state appropriations are not the direct determinants of tuition levels, although they are an important source of revenue to institutions.

Tuitions/Appropriations/Financial Aid

States differ in their reliance on tuition to cover the costs of providing higher education. Tuition levels alone do not show how much states rely on tuition revenue, since a low tuition may reflect EITHER low per-student expenditures, or a low portion of total revenues borne by tuitions. For example, tuitions in a state may appear high relative to those of other states, but the share of total costs students bear through their tuitions may be low if state and local governments cover a large portion of high educational costs.

Therefore, to show states' reliance on tuition and appropriations to finance higher education, the amounts of revenue generated by each of these sources should be compared to total E & G revenue per full-time equivalent (FTE) student. (FTE student calculations include both graduate and undergraduate students.) The most recent HEGIS financial data that provide this information are from 1985-86, and are presented in Table 7. They reveal that there is substantial variation in the extent to which public higher education systems depend on tuition revenue to finance education. In several states, all in the South or West, tuition revenues comprise less than one tenth of total E & G revenues. In the Northeast and North Central

TABLE 7

Total E & G Revenues and Selected Revenue Categories Per FTE of Public Institutions in 1985-86

State/Region	Tuition Revenue	State & Local Appropriations	E&G Revenue	Tuition as % of E&G Revenue	State & Local Appropriations As % of E&G Revenue
NEW ENGLAND					
MAINE	$1,438	$4,732	$7,617	19%	62%
NEW HAMPSHIRE	2,170	2,880	5,796	37	50
VERMONT	3,136	2,136	7,116	44	30
MASSACHUSETTS	1,065	3,394	5,357	20	63
RHODE ISLAND	1,693	4,119	7,196	24	57
CONNECTICUT	971	2,771	4,121	24	67
MIDDLE ATLANTIC					
NEW YORK	1,560	7,342	10,994	14	67
NEW JERSEY	1,552	3,527	6,067	26	58
PENNSYLVANIA	2,411	2,896	6,230	39	46
EAST NORTH CENTRAL					
OHIO	1,835	2,766	5,351	34	52
INDIANA	1,441	2,948	5,619	26	52
ILLINOIS	924	2,900	4,794	19	60
MICHIGAN	1,439	3,253	5,883	24	55
WISCONSIN	1,299	4,788	7,096	18	67

TABLE 7

Total E & G Revenues and Selected Revenue Categories Per FTE of Public Institutions in 1985-86 (Continued)

State/Region	Tuition Revenue	State & Local Appropriations	E&G Revenue	Tuition as % of E&G Revenue	State & Local Appropriations As % of E&G Revenue
WEST NORTH CENTRAL					
MINNESOTA	$1,314	$3,092	$5,460	24%	57%
IOWA	1,433	3,363	6,279	23	54
MISSOURI	1,150	3,215	5,565	21	58
N. DAKOTA	1,244	3,356	6,020	21	56
S. DAKOTA	1,509	2,799	6,847	22	41
NEBRASKA	1,123	4,787	7,803	14	61
KANSAS	903	4,744	6,859	13	69
SOUTH ATLANTIC					
DELAWARE	1,368	4,702	7,571	18	62
MARYLAND	1,550	4,601	7,549	21	61
DC	878	9,658	11,813	7	82
VIRGINIA	1,274	3,432	5,841	22	59
WEST VIRGINIA	842	3,047	4,782	18	64
N. CAROLINA	470	4,839	6,093	8	79
S. CAROLINA	1,194	5,389	8,059	15	67
GEORGIA	1,243	5,202	8,014	16	65
FLORIDA	954	3,920	5,845	16	67
EAST SOUTH CENTRAL					
KENTUCKY	$1,455	$5,445	$8,643	17%	63%
TENNESSEE	1,086	4,616	8,445	13	55
ALABAMA	875	3,577	5,668	15	63
MISSISSIPI	1,023	4,777	7,472	14	64

TABLE 7

Total E & G Revenues and Selected Revenue Categories Per FTE of Public Institutions in 1985-86 (Continued)

State/Region	Tuition Revenue	State & Local Appropriations	E&G Revenue	Tuition as % of E&G Revenue	State & Local Appropriations As % of E&G Revenue
WEST SOUTH CENTRAL					
ARKANSAS	1,032	5,242	8,943	12	59
LOUISIANA	1,061	5,596	8,279	13	68
OKLAHOMA	568	3,784	5,506	10	69
TEXAS	892	6,175	8,999	10	69
MOUNTAIN					
MONTANA	860	3,541	5,512	16	64
IDAHO	1,183	4,401	7,409	16	59
WYOMING	544	6,286	7,896	7	80
COLORADO	1,682	5,310	9,719	17	55
NEW MEXICO	817	4,093	8,816	9	46
ARIZONA	829	3,245	5,414	15	60
UTAH	1,064	4,060	7,073	15	57
NEVADA	805	3,520	5,584	14	63
PACIFIC					
WASHINGTON	$843	$3,202	$5,110	16%	63%
OREGON	1,223	6,173	10,282	12	60
CALIFORNIA	609	4,560	6,227	10	73
ALASKA	1,105	9,758	12,413	9	79
HAWAII	533	4,583	6,030	9	76

Source: Higher Education General Information Survey

states, tuitions comprise a relatively large portion of revenues--generally 20 percent or more. The two states showing the greatest reliance on tuition are both in New England; Vermont depends on tuition for 44 percent of revenues, and in New Hampshire, tuition contributes 37 percent of public institutions' revenues.

Not surprisingly, there appears to be a trade-off between tuition levels and state and local appropriations. In states where tuition represents a large portion of revenues, appropriations are a relatively small portion, e.g., 30 percent in Vermont and 50 percent in New Hampshire. In contrast, in North Carolina, where tuition revenues provide only 8 percent of total revenues, state and local appropriations contribute 80 percent. In most states, appropriations contribute more than 50 percent of total E & G revenues at public higher education institutions.

Increasingly, states are also figuring financial aid into state financing mechanisms for higher education. In a working paper prepared for the Education Commission of the States, Dennis J. Curry notes that each state's strategy for establishing the appropriate mix of tuition, appropriations, and financial aid:

> is, or should be, based on such considerations as how available higher education should be and to whom, the extent to which the state wishes to encourage student choice among public and independent institutions, and the need for revenue to support quality objectives (Curry, 1988, p. 5).

Data on financial aid reveal large differences in the amounts of state aid provided across states. State aid seems to be strongest in states with relatively high tuition levels and states in which a large portion of students attend private institutions. Unfortunately, the available data do not reveal how state aid is distributed across the public and private sectors. However, in many states the private sector of higher education has successfully lobbied legislators to provide funding for financial aid so that independent institutions can better compete with the subsidized tuitions charged by public institutions. NPSAS data on financial aid indicate that about 25 percent of all students at private four-year schools received some form of financial aid from state sources in the fall of 1986. Table 8 indicates the amounts of state grant aid per FTE undergraduate student enrolled in the state (in both the public and private sectors) in 1989-90.

TABLE 8

State Funding for Student Financial Aid
In 1989-90

STATE/REGION	Undergraduate Grant Aid per Full-time Undergraduate	% of Undergraduates Receiving Aid	State Grant $ as % of Higher Education Appropriations
NEW ENGLAND			
MAINE	$72	16%	1%
NEW HAMPSHIRE	53	5%	2%
VERMONT	509	49%	19%
MASSACHUSETTS	363	20%	11%
RHODE ISLAND	260	22%	8%
CONNECTICUT	449	24%	7%
MIDDLE ATLANTIC			
NEW YORK	729	66%	13%
NEW JERSEY	664	45%	8%
PENNSYLVANIA	405	36%	10%
EAST NORTH CENTRAL			
OHIO	260	38%	5%
INDIANA	379	30%	7%
ILLINOIS	669	44%	12%
MICHIGAN	295	21%	6%
WISCONSIN	238	29%	5%
WEST NORTH CENTRAL			
MINNESOTA	513	46%	7%
IOWA	563	19%	12%
MISSOURI	132	9%	3%
N. DAKOTA	56	9%	1%
S. DAKOTA	27	7%	1%
NEBRASKA	38	5%	1%
KANSAS	95	6%	2%
SOUTH ATLANTIC			
DELAWARE	66	7%	1%
MARYLAND	198	21%	3%
VIRGINIA	153	15%	2%
WEST VIRGINIA	240	11%	5%
N. CAROLINA	263	16%	4%
S. CAROLINA	213	8%	3%
GEORGIA	166	23%	3%
FLORIDA	241	18%	4%

TABLE 8

State Funding for Student Financial Aid
In 1989-90 (Continued)

STATE/REGION	Undergraduate Grant Aid per Full-time Undergraduate	% of Undergraduates Receiving Aid	State Grant $ as % of Higher Education Appropriations
EAST SOUTH CENTRAL			
KENTUCKY	148	25%	3%
TENNESSEE	160	20%	3%
ALABAMA	77	8%	2%
MISSISSIPI	16	3%	1%
WEST SOUTH CENTRAL			
ARKANSAS	85	22%	2%
LOUISIANA	84	5%	2%
OKLAHOMA	334	18%	7%
TEXAS	267	5%	4%
MOUNTAIN			
MONTANA	17	5%	0%
IDAHO	17	3%	0%
WYOMING	16	4%	0%
COLORADO	179	25%	4%
NEW MEXICO	203	23%	3%
ARIZONA	35	5%	1%
UTAH	152	3%	4%
NEVADA	24	2%	0%
PACIFIC			
WASHINGTON	106	15%	2%
OREGON	133	20%	3%
CALIFORNIA	240	12%	3%
ALASKA	23	2%	1%
HAWAII	218	3%	2%

Source: National Association of State Scholarship and Grant Programs, Annual Survey Report, 1989-90 Academic Year, Tables 21, 22, & 23.

Why States Support Higher Education

Although the extent and form of state support of higher education vary, every state helps defray the costs of higher education at public institutions to students and their families by subsidizing tuitions. In fact, spending on higher education is the second largest component of state spending, behind funding for elementary and secondary education. In 1987, approximately 60 billion dollars or 10.5 percent of total spending by state governments was dedicated to higher education (Gold, 1990). There are many commonly held rationales for government subsidies to higher education. Several of these arguments are discussed below.

Higher Education Benefits Society. One argument for the public provision of higher education is that an educated citizen benefits to society, and that without low public tuition, an individual would lack the incentive to obtain the optimal level of higher education for society. A government subsidy that reduces the cost of education can make education a more attractive investment by increasing its rate of return. Examples of potential benefits to states in subsidizing higher education include the higher tax revenues that educated, well-paid individuals pay, and a supply of people trained and employed in critical fields, such as medicine.

This rationale assumes that the total benefits to society of subsidizing public education equal or exceed the costs of providing the subsidy, and that these benefits would not accrue (or would be substantially diminished) absent a subsidy (Leslie and Brinkman, 1988).

Subsidies to Higher Education Promote Economic Development. One possible social benefit of public support of higher education is that it fosters economic development in several ways (Leslie and Brinkman, 1988). Higher education institutions are large employers in the communities where they are located. Higher education can also help to create a trained work force to attract private investment; this investment, in turn, fuels economic development. The resources of higher education institutions--faculty expertise, powerful computer networks, and laboratories, to name a few--can offer the possibility of mutually beneficial arrangements with the business community, such as partnerships with industry, assistance to small business, training and conference facilities, etc. (AASCU, 1987). State higher education systems may also promote other

research and development endeavors and provide valuable public services (e.g., agricultural extension).

The link between higher education and economic development appears to have intensified in recent years. A 1984 survey of comprehensive higher education institutions in the U.S. revealed that institutions varied widely in the type and degree of contact they maintained with industry. The survey identified two broad types of industry-related programs in which institutions participated: collaborative research mechanisms and knowledge transfer mechanisms. Examples of each include:

- Collaborative (Research) Mechanisms
  - Government-Funded University Research Assisting Industry;
  - Industry-Funded University Research;
  - Jointly Owned or Shared Laboratory Facilities;
  - Consortia;
- Knowledge (Transfer) Mechanisms
  - Consultation;
  - Industrial Liaison;
  - Industrial Park;
  - Personnel Exchange (Logan, 1984, p. 2).

In at least one state, South Dakota, higher education institutions have received, along with increased state appropriations and budget flexibility, a challenge from the governor to promote economic development through research, small business development, industrial partnerships, and provision of graduate programs in areas that foster economic progress in the state (e.g., tourism, chemistry, and biological food sciences).

Several states also advertise low tuitions in public colleges and universities to attract new businesses. These states (which include North Carolina, Ohio, Oklahoma, Texas, Wisconsin, and New Mexico) have adopted policies that waive residency requirements for the families of entrepreneurs and employees of companies that move into the state, so that they can benefit from low in-state tuition rates (Blumenstyk, 1989).

Subsidized Tuitions Promote Access to Higher Education. According to some, government subsidies to higher education promote equal educational opportunity. Under this

rationale, qualified individuals who otherwise could not afford to pay the full cost of obtaining a higher education would be shut out of the system without public support in the form of low tuition. Therefore, by keeping higher education costs low for all students, states help ensure access to higher education for students who otherwise could not afford to attend college. One reason that states might consider subsidizing higher education is that many students would not ordinarily be able to borrow funds to pay for the immediate costs of education against the future value of their education (Marshall, King, and Briggs, 1980).

Higher Education Is an Entitlement. Some people believe that higher education should be available to every qualified student, regardless of his or her economic status, much like elementary and secondary education. To meet this goal, states must appropriate large sums of money to public higher education (Atkinson and Stiglitz, 1980).

Subsidies Encourage Students to Stay in State. Another argument for state support of public higher education institutions is that low tuitions encourage students to remain within their home state to attend college, whereas without the enticement of low in-state tuitions, many students might leave the state to attend other higher education institutions.

Low Tuitions Enable Students to Finance Their Own Education. Another argument for state subsidies of higher education is that low tuition is the best way to reduce students' reliance on their parents to meet the costs of obtaining higher education. These critics note that current financial aid formulas determine a student's need by subtracting an expected family contribution from total costs; thus, parents' unwillingness or inability to pay college tuitions can distort students' ability to finance higher education (Bowen, 1971).

Subsidies Give State Governments Control Over Higher Education. Others have advocated state subsidies to higher education to facilitate public control of higher education, which is critical to a variety of short- and long-term societal goals. Supporters of this notion argue that if tuition represented a larger portion of total educational costs, the short-term interests of students might take precedence over the long-term goals and public service responsibilities of higher education that ultimately benefit the state (Bowen, 1971).

None of the rationales for public subsidies of higher education is based solely on empirical evidence, and none is universally accepted. All the arguments are premised on a vision of higher education and the role government should play in it. As suggested by the variation in appropriation levels noted above, states differ in the degree to which they embrace these arguments. Other factors that affect the type and degree of government support to education are the socio-economic conditions of institutions and the states in which they are located. Several of these factors are described below.

Determinants of Tuition Levels and Changes

A variety of factors shape the financing of higher education in each state. The political and economic climate of the state, competition from private higher education institutions, other demands for state dollars, voter/tax-payer interests, demographic trends, and the availability of alternative revenue sources all play roles. Some states have unique considerations, as well; North Carolina, for example, is bound by the state constitution to keep tuitions low for in-state students. The principal factors affecting changes in tuition levels at public higher education institutions are described below.

Fluctuations in State Revenues

The major source of revenue to most public higher education systems is state government appropriations, which are likely to be driven by the total amount of revenue available to a state. Income and sales taxes generate the largest portion of state revenues, and both of these taxes depend on the level of economic activity within a state. If a state is enjoying a period of economic growth accompanied by real increases in income, tuition growth might slow as more revenue becomes available for higher education. Conversely, if state economic growth slows, then less money is likely to be available to higher education and upward pressure may be put on tuition.

The increases in public sector tuitions from 1980 to 1985 (5 percent real annual increases) in the 1980s were in part influenced by the need to rely on tuition to cover shortfalls in state appropriations as the nation experienced a recession and many states suffered slow (or negative)

economic growth. Tuition increases during this period significantly outpaced growth in state and local appropriations to public institutions, indicating that state systems of higher education placed increasing reliance on tuition as a source of revenue.

The American Association of State Colleges and Universities surveys its state representatives annually concerning the fiscal outlook for public higher education institutions in their states. Strong regional variations emerge with respect to the condition of state economies, budget outcomes for higher education and the likelihood of mid-year adjustments, predictions for higher education budgets in the coming year, and the prospect of generating new revenues for higher education. The report states that, "State economies have a direct bearing on state appropriations" but also warns that:

> state economies are too volatile and too closely tied to shifts in the national economy to allow placing a lasting label on a state or geographical region. The Massachusetts miracle can now be declared "a few good years" as the AASCU state [representative] reports not only a poor and uncertain economy but one headed for recession. The much-hailed "bi-coastal economy," from which weakening performances were reported last year by the state reps, now sees an economic downturn in its Eastern Seaboard states that threatens that title (AASCU, 1990, p. 3).

Examples from a variety of states illustrate the strong impact of state economies on public higher education. In the Northeast, particularly New England, higher education has suffered the consequences of the economy's slowing growth. In at least one of the last two years, state appropriations for public higher education have been cut in Massachusetts, Rhode Island, New Jersey, and Vermont. These cutbacks have been attributed to slumps in the Northeastern economy. Public higher education in Massachusetts appears to be among the hardest hit; institutions have lost funding, programs have been cut (which in some cases has lengthened the amount of time required for students to complete degrees), expenditures for library books were the lowest in the nation in 1989-90 and expected to decrease 8 percent in 1990-91, and approximately 1,000 positions have been left vacant.

However, recovering economies in several Midwestern and Western states have facilitated budget increases for higher education institutions there. For example, in Utah, Idaho, Colorado,

South Dakota, and Iowa, public higher education has received significant budget increases in one or both of the last two years. In these states, too, fluctuations in funding for public higher education is considered directly linked to the condition of the state economy.

Competition From Other Areas of Government

Even where strong economies have increased the total amount of revenue available to state and local governments, other areas of government for these funds may absorb the additional funds and prevent any windfall appropriation to higher education budgets. To the extent that other areas of state and local governments make claims to state resources, fewer resources become available for higher education. In North Carolina, for example, repairing damage caused by Hurricane Hugo in 1989 has been a top priority of the state government. The unexpected expense of this project, coupled with lower than anticipated revenues, left fewer resources to divide among other state funding areas, including higher education.

Nationally, two areas of strongest growth within state spending have been Medicaid and corrections. Spending on both of these functions increased by more than 50 percent between 1977 and 1987 as a share of state personal income (Gold, 1990). As these and other government responsibilities tie up state resources, increases in appropriations to higher education are limited, which in turn places upward pressure on tuitions as a source of revenue.

Revenue Amounts From Other Sources

Another factor that contributes to increased reliance on tuition is changes in revenue sources other than tuition and government appropriations. For example, a decline in Federal assistance to states, either in the form of direct assistance to public institutions or broader assistance to the states, can have consequences for public higher education. HEGIS data show that Federal assistance to public four-year schools other than universities (a combination of direct appropriations, grants, and contracts), declined about 10 percent between 1975 and 1985 in real terms. Among public universities, Federal assistance essentially remained constant between 1975 and 1985. Federal awards to public two-year schools also declined by about a third over this time.

The proportion of student financial aid provided by the Federal government has been declining steadily during the 1980s (Lewis, 1989). In contrast, the percentages of aid contributed by states and institutions have both been increasing during the same period, though the Federal government continues to provide approximately three-fourths of total student aid dollars. Between the 1980-81 and 1988-89 school years, state grant programs increased 47 percent to $1.6 billion dollars; these awards represent about six percent of all aid dollars (Lewis, 1989).

Moreover, the relative shift from grants to loans in financial aid program has raised additional concerns about economic barriers to higher education. Several states have strengthened aid policies to reduce these barriers. For example, the Kentucky Higher Education Assistance Authority reports that the state legislature approved a 64 percent increase in state funded student financial aid, from $12.8 million in fiscal year 1990 to $21 million in fiscal year 1991. Most of this increase will fund Kentucky's College Access Program, which provides need-based grants for the first-two years of college; the amount of the grant is $640, the annual tuition charged by community colleges in the state, though the grant is "portable" and can be used at any eligible college in the state.

Public higher education institutions in several states have tapped other revenue sources through aggressive fund-raising efforts. Voluntary contributions to public higher education, especially from corporations, have risen steadily. According to a recent survey conducted by the Council for Aid to Education, public colleges and universities received over half of the corporate dollars to higher education in 1988-89 (though private institutions continue to receive more corporate support per student). Twelve of the 20 colleges and universities reporting the most corporate support are public institutions. Table 9 lists the 20 colleges and universities reporting the most corporate support in 1988-89 and the 20 institutions reporting the most total voluntary support in the same year.

Public Pressures

Taxpayer and voter opinion can also influence state appropriations by promoting either a high or low tuition policy. On one hand, taxpayers favor low tuitions for state residents because

TABLE 9

Corporate and Total Voluntary Support of Higher Education Institutions 1988-89

The 20 Colleges and Universities Reporting the Most Corporate Support in 1988-89 (public institutions in bold)

Massachusetts Institute of Technology	$44,553,383
Cornell University	42,183,453
University of Wisconsin, Madison	**39,576,693**
Stanford University	38,252,921
University of Minnesota	**34,732,843**
Ohio State University	**29,780,406**
Duke University	28,236,970
University of Southern California	28,236,970
University of Washington	**26,689,125**
Texas A & M University	**26,369,554**
University of Pennsylvania	25,698,494
University of California, Berkeley	**25,641,780**
University of Illinois	**25,057,427**
Pennsylvania State University	**23,874,314**
University of Florida	**21,314,067**
Michigan State University	**20,925,803**
Harvard University	19,742,189
Northwestern University	18,174,244
University of California, Los Angeles	**17,124,150**
University of Colorado	**16,695,440**

The 20 Colleges and Universities Reporting the Most Voluntary Support in 1988-89 (public institutions in bold)

Stanford University		$188,635,513
Harvard University		185,353,003
Cornell University		157,072,064
University of Pennsylvania		121,945,814
Columbia University		110,422,711
University of Southern California		102,628,589
University of Wisconsin, Madison		**102,232,856**
Duke University		102,016,708
University of Minnesota		**100,170,258**
Massachusetts Institute of Technology	95,719,423	
The Johns Hopkins University		84,062,176
Princeton University		80,315,536
Washington University		76,411,473
University of Illinois		**73,095,606**
University of California, Los Angeles		**72,324,549**
University of Michigan		**70,711,706**
Ohio State University		**68,522,917**
University of California, Berkeley		**68,282,804**

Source: Council for Aid to Education, Voluntary Support of Education 1988-89 (to be released July 1990).

most people want low college tuitions to be available for themselves, their children, and their grandchildren. On the other hand, the concept of a "user fee"--that the cost of providing a public service should be paid principally by those who use that service--is gaining popularity. The "user fee" notion in public higher education might translate into higher tuitions, which would make students pay a larger portion of the costs of providing their education. This concept may be particularly popular among those who believe that most of the benefits of higher education (e.g., higher pay) accrue to the individual student, rather than to society at large.

In several states, students have been vocal about keeping tuitions low. In New York, a 1989 legislative proposal to reduce higher education appropriations prompted widespread student protests at the City University of New York, where students occupied campus facilities, and sporadic protests throughout the State University of New York system. Following the protests, the governor vetoed the budget cuts and redistributed some funds from the state financial aid budget to public institutions' appropriations to avert any tuition increase. Students have also protested recent tuition increases at public institutions in New Mexico, Massachusetts, and elsewhere.

The increasing costs of providing higher education, which are typically passed on to both students and states, have also prompted a growing concern with accountability. This concern has fueled a widespread assessment movement. Given increasing competition for funding from other areas of state government, accountability measures have become increasingly important to convince policy makers and the public of the importance of investing in public higher education. Assessment measures have generally been initiated through state governors, legislatures, or state coordinating boards to evaluate the performance of higher education institutions (NASULGC, 1988; Munitz & Lawless, 1986).

The Education Commission of the state has surveyed of State Higher Education Executive Officers concerning assessment initiatives. In studying differences across states, they found that "not only do their governance structures for public higher education differ, so too do their political 'cultures.' These cultures dramatically affect how the states respond to the issue of

assessment" (Education Commission of the States, 1987, p. 2). The ECS report highlights the following state assessment programs as examples from the "mosaic of state initiatives" in assessment activities:

- Mandated statewide testing programs;
- Testing for teacher education;
- Early intervention programs;
- Encouraging institutional action;
- Assessment within existing state-wide mechanisms;
- Statewide monitoring of other outcomes (Education Commission of the States, 1987, pp. 4-5);

Mix of Public/Private Institutions in State

The relative sizes of tuition and state appropriations for higher education also appear to be influenced by the mix of public and private institutions in the state. In a number of states with a large private sector of higher education institutions, particularly in the Northeast (New England and Middle Atlantic regions), public institutions' tuitions are higher than the national average but there is a significant amount of state-provided student aid. Such is the case, for example, in New York and Vermont. Unfortunately, available data do not permit analysis of how state financial aid is distributed between the public and private sectors.

Demographic Trends

Demographic trends can also shape state funding to higher education, and patterns of population growth are of heightened importance in states that want to maintain access to higher education for all eligible students. In Utah, for example, the State Board of Regents reported that an increase of nearly eight percent in state appropriations for higher education between 1989-89 and 1990-91 is attributable not only to an improved state economy, but also to the state's efforts to maintain an open access enrollment policy in the face of rapid enrollment growth. The additional funding will be used not only to improve quality but mostly. almost entirely, to handle the additional students.

In Massachusetts, the crisis in higher education funding compelled public higher education institutions to deny admission to approximately 6,000 prospective students in 1989-90, whereas the community colleges had maintained a policy of open enrollment to all eligible students prior to 1989. The Office of Higher Education in Rhode Island reports that despite a significant drop in the number of high school graduates in Rhode Island, enrollments at public higher education institutions have peaked due to increasing numbers of out-of-state students, particularly from Massachusetts and New Jersey.

Future Trends in Public Sector Enrollments and Tuitions

Public higher education in the U.S. has undergone extensive changes over time to meet the need of states and their citizens. There is no indication that the role of the public sector will significantly decrease over time. A common concern, however, is whether tuition increases in the public sector will continue in the future and whether the costs of attending public colleges and universities will be beyond the reach of many American families.

Although it is exceedingly difficult to predict accurately the future course of public higher education, several recent publications have forecasted future enrollments in and expenditures for public higher education. In general, it seems likely that the trend for increasing tuitions in the public sector will continue in the 1990s.

The National Center for Educational Statistics (NCES, 1989) has projected a maximum enrollment growth of 12 percent at four-year public schools and 13 percent among public two-year institutions between 1989 and 2000. These "high" estimates assume that a growing proportion of older students will attend college, thereby offsetting an anticipated decline in the number of students between the ages of 18 and 24. If older students do not enroll in sufficient numbers to compensate for the decline in the number of younger students, NCES projects that enrollments at both public four-year and two-year enrollments will decline by about 5 percent (NCES, 1989).

NCES has also projected per-student expenditures (on a current-fund basis) for four-year and two-year public institutions. Using different assumptions regarding income growth, NCES forecasts that these expenditures will grow between 5.9 and 6.6 percent annually between 1989 and 1994 at four-year public schools and between 7.2 and 8.1 percent at two-year public schools, after inflation (NCES, 1989).

The expenditure increases forecast by NCES are driven in large part by projected increases in disposable income. There is evidence that growth in disposable income is related to increases public appropriations. Using annual appropriations data for each state from 1980 through 1988, we have found (using regression methodology) that a one percent increase in a state's real per-capita disposable income over this time was associated with a 0.93 percent increase in real appropriations after controlling for enrollment levels.

Whether or not increases in income (or other factors that may raise expenditures) will lead to higher tuitions is a difficult question to address, since an increase in appropriations may or may not lead to higher tuitions. Whether or not it does depends largely on how states determine tuition levels. In a state where tuitions are set to cover a specified share of total educational expenditures, higher appropriations will be associated with higher tuitions for students. However, these higher tuitions are not necessarily "bad" from the student's perspective if the higher tuitions and expenditures are buying a higher-quality education.

Conversely, higher appropriations could lead to lower tuitions in states where tuition represents the residual, or difference, between the cost of providing higher education and state appropriations. In these states, however, it is important to realize that tuitions may increase over time as educational expenditures increase. Tuition increases can be averted in a state that is able to increase its appropriations to higher education to match increases in institutional expenditures. But if educational expenditures increase (for example, as a result of increasing staffing costs), states will have to match these increases to prevent tuitions from rising. If a state cannot or will not increase appropriations in the face of higher expenditures. then tuition will likely increase.

There are several indications that states may increase their reliance on tuition in the future. First among these is the fact that many states enacted tax reforms following the passage of Federal tax reform in 1987. As a result, state tax systems have become less "elastic"; that is, a given level of economic growth within a state produces a smaller amount of government revenue than it has in the past (Gold, 1990).

Second, if other publicly provided services continue to grow or require additional funding in the 1990s, higher education will have to compete with other areas of government for state tax revenue. As noted above, higher education already faces increased competition for available state funding from many other budget categories, such as corrections and Medicaid.

Ultimately, though, the extent to which states increase reliance on tuition to cover higher educational expenditures is likely to vary across states and depend largely on the health of individual state economies. Strong economies will be able to moderate tuition increases. However, states with weak economies states will have to reduce the overall expenditures of public higher education systems or seek sources of other revenue to make up for shortfalls in appropriations. The latter route may lead to increased tuitions.

Although tuitions have increased in real terms throughout the 1980s and very well may continue to do so in the future. While this prospect worries some, others argue that charging higher tuitions is not necessarily a bad idea. Under the current system of public higher education, all students attending at a public higher education institution are charged the same tuition; most public institutions' tuitions are lower than most private institutions' tuitions since state and local governments subsidize students through appropriations to higher education. This subsidy is provided to all students, regardless of the student's income or that of his or her family. For example, Table 2 above showed that 27 percent of students at four-year public college came from families with incomes of over $50,000. Presumably some of these families could afford to pay higher tuitions than those charged by most public institutions.

Some critics (e.g., Fischer. 1990) argue that the current method of public subsidy is inefficient and wasteful because it provides equal subsidies to students who can afford the tuition

and to students who cannot. They also allege that the current system works against the poorest students, who cannot afford to pay even the reduced tuitions charged. These critics advocate a policy of higher tuition at public institutions combined with higher need-based student financial aid awards. They argue that such a policy would require students who could afford it to pay for a much larger portion of educational costs, while students who could not pay the full tuition would receive substantial discounts through financial aid awards. According to the theory, the neediest students would ultimately pay less in net tuition expenses than they do currently.

The proposal that states raise their tuition levels to cover a larger portion of costs is certainly not without its critics. One criticism is that needy students might be less inclined to apply to public institutions if they were faced with higher "sticker" prices. Moreover, these individuals might not be aware of the availability of financial aid. Several studies, including the High School and Beyond Survey, a nationally representative sample of high school sophomores and seniors in 1980, have indicated that students are largely unaware of many financial aid programs, including the Basic Educational Opportunity (now Pell) Grant program and the Guaranteed Student (now Stafford) Loan program.

Another argument against raising tuition is that higher tuitions might dissuade prospective students from pursuing higher education. Currently, low tuitions at public institutions encourage students to attend college. If a state were to reduce the subsidy and raise tuition, some prospective students who could afford to pay this higher cost might choose not to; these would either enroll at another school or choose not to attend college at all. For example, the student who considers higher education worth $2,000 a year would enroll if tuition were $1,000 or $2,000, but not if it were raised to $3,000.

Others argue against the high tuition/high aid proposal on the grounds that some individuals who need aid might not receive it. A policy of universal subsidy by definition assures that all students receive at least some subsidy, though at the cost to states of providing subsidies to students who would be able to afford higher education without a large state subsidy.

Although a policy of raising public tuition was extensively discussed in the 1970s, states have not greatly increased their reliance upon tuition as a source of revenue. States may have been reluctant to raise public tuitions for several reasons. One is that citizens in many states have become accustomed to relatively low tuitions, and a policy of increasing tuition would appear to place financial burden on many students and their families. A second reason is that by offering a subsidy to all students, a state gives itself a competitive advantage over more expensive institutions. A state that raised tuition could lose students to private schools or public institutions in other states, thereby losing some of the potential benefits of maintaining public higher education institutions.

The question of whether a state should raise its tuition is in large part a political one that is driven by concerns for affordability within a state and the ability of the state to provide resources for higher education. In the long run, however, fiscal necessity may continue to move states towards policies of raising tuitions. However, given the pre-eminence of equal educational access in discussions of public higher education, provision would probably be made to ensure that financial aid be made available to needy students even if tuition were to increase.

Conclusion

Although public institutions are almost as different as they are numerous, they share many common concerns. Public higher education is frequently charged with the responsibility of promoting educational opportunities for the socially, economically, and academically disadvantaged. At the same time, it is looked to as the vanguard of technology, intellect, and cultural achievement. Moreover, many states view their support of public higher education as an investment in the state's future economic development.

In some states, a single institution or multi-campus system satisfies the many demands of students, state and local governments, and the public. In most states, however, the multiple functions of public higher education are carried out by a variety of very different institutions: two-year and four-year, large and small, urban and rural, residential and commuter. The

stereotypical land-grant state university has not become so much outdated as it has been complemented by a number of other institution types.

Yet among nearly all public institutions, quality and affordability remain prominent issues as the costs of both providing and obtaining higher education have increased sharply throughout the last decade. Current trends suggest that state resources are not likely to grow rapidly in the future, and that pressure on tuitions is likely to mount. Issues of educational equity and financial prudence therefore hold center stage in higher education policy debates, as governments grapple with alternative proposals to guarantee the many benefits of public higher education through careful allocations of scarce resources.

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EXPENSIVE PRIVATE INSTITUTIONS

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EXPENSIVE PRIVATE INSTITUTIONS

Introduction

The American system of higher education is made up of a rich variety of institutions. Some are private schools, governed by boards of trustees; others are public schools, subject to control by state legislatures and governing boards. Within the private sector, there is great diversity among institutions. Some offer liberal arts studies exclusively, while others provide opportunities for vocational training. Some are four-year colleges, others are two-year colleges, while still others are universities with large graduate and professional programs. Some are extremely selective, admitting mainly students with high test scores and exemplary high school records; others open their doors to any high school graduate. Most important for this paper, some well-known, private schools are extremely expensive, with tuitions well over $10,000 a year, while others charge more modest fees, in the range of $4,000 to $5,000 per year.

Although undergraduate tuitions at both public and private institutions have outpaced inflation (as measured by the Consumer Price Index) through the 1980s, tuitions at the most expensive schools have increased faster than have tuitions at other private schools or public schools. Table 1 compares the growth in tuitions at the 130 private schools identified in this paper as the most expensive in terms of their 1988 tuitions to those of other private schools.

Although only a small portion of postsecondary students attend the most expensive private institutions, media reports on the cost of attending college tend to cite the tuitions at a few very expensive private institutions as an indicator of the costs of attending college (Ordovensky, 1989, Vobejda, 1988). It is perhaps because of this media attention that the American public perceives the costs of obtaining a higher education to be much higher than they actually are. A 1988 survey taken by the Gallup organization for the Council for Advancement

and Support of Education (CASE) found that high school juniors and seniors overestimated the cost of tuition, fees and books at private four-year institutions by nearly $3,000.

The high level of tuition along with higher than average growth in tuition at the most expensive private schools raises several questions addressed in this paper:

- What are the characteristics of expensive schools? Are expensive schools distinct from the less-expensive ones based on what they offer their students?
- Does attending an expensive school affect outcomes for students in the years after college?
- Who attends expensive schools? How do students finance attendance at these schools? What types of families and students are willing to pay the cost of attending these schools? Do students from lower- and middle-income students attend these schools and has the ability of these students to afford these schools changed over time?

The definition of what makes a school "expensive" is somewhat arbitrary, in that it requires choosing a tuition level above which schools are considered to be expensive. For this paper, we define expensive schools to be four-year, postsecondary institutions that grant at least a bachelor's degree and had tuitions and fees over $10,000 in 1988. Data collected by the College Entrance Examination Board (henceforth "College Board") were used to identify the 130 institutions (all private) that had 1988 tuitions at this level. These schools enrolled only about three percent of all undergraduates in 1988.

Characteristics of Expensive Schools

Of the 130 institutions identified as most expensive, 44 were universities and 76 were liberal arts colleges. The average enrollment of these schools was 2,550, though actual full-time undergraduate enrollments varied widely across schools. The largest of these schools, enrolled 14,461 in 1988, and the smallest enrolled 332. The average tuition at this group of schools was $11,900. We list these schools along with their 1988 tuition and fees and undergraduate

TABLE 1

Tuition and Fees: Private Expensive and Less Expensive Institutions 1983, 1985, and 1988

(Change from Previous Period in Parentheses)

Year	Less Expensive Tuition	Expensive Tuition
1983	$3,990 (-)	$ 7,830 (-)
1985	4,540 (14%)	9,290 (19%)
1988	5,730 (26%)	11,900 (28%)
Total Change 1983 - 1988	+1,740 (44%)	+4,070 (52%)

NOTE: Tuitions are presented in nominal dollars. Price inflation as measured by the Consumer Price Index (CPI) between 1983 and 1988 was 21% (Economic Report of the President, 1990, p. 362). Average tuitions are calculated from College Board data.

enrollments in Table 2. In 1988, the average tuition at the most expensive private schools was more than twice the average tuition at the other private schools ($11,900 versus $5,730). Also, these expensive schools were more often universities than were the less-expensive schools (334 percent versus 16 percent). On average, the more expensive schools also tended to be larger than the others. The average undergraduate enrollment of the most expensive schools was 2,550, while the average undergraduate enrollment of the other schools was about 1,180.

Colleges and universities have traditionally served a variety of functions for their students. In addition to offering them academic training, they provide an environment in which students live, participate in activities, make friends, and create a social network that may affect their opportunities well into the future. The traditional student attends school full-time shortly after graduating from high school and is dependent upon his or her parents for financial support. On the other hand, non-traditional students tend to be older, to be working while attending school, are less likely to be dependent on their parents for financial support, and more likely to attend school on a part-time basis.

College Board data support the notion that the traditional model of the college is more likely to be found at expensive schools than at either other four-year private schools or at public schools. Students at the expensive schools are younger (20 years of age) on average than students at other schools (22 at other privates, 23 at four-year publics), indicating that they are more likely to attend school consecutively during their first four years away from high school. They are also much more likely to live in college housing: 79 percent, compared to 36 percent in four-year publics and 59 percent in other four-year private schools.

College Board data also permit some comparison among schools on the resources available to students at different types of schools. One difference is in library resources.

TABLE 2

Expensive Private Schools Ranked by 1988 Undergraduate Tuition and Fees

Rank	Name	1988 Tuition and Fees	1988 Undergrad. Enrollments
1	Bennington C	$15,670	560
2	Bates C	13,920	1,500
3	Hampshire C	13,845	1,140
4	Brown U	13,759	5,507
5	Harvard/Radcliffe C	13,665	6,593
6	Bard C	13,560	865
7	MIT	13,400	4,311
8	Princeton U	13,380	4,565
9	Dartmouth C	13,335	3,687
10	Wesleyan U	13,325	2,665
11	U of Chicago	13,285	3,166
12	Sarah Lawrence C	13,280	950
13	Swarthmore C	13,230	1,317
14	Trinity C	13,200	1,733
15	Tufts U	13,162	4,750
16	Cornell U	13,140	
17	Amherst C	13,105	1,616
18	Brandeis U	13,066	2,833
19	Pitzer C	12,986	759
20	Williams C	12,975	1,906
21	Boston U	12,975	13,626
22	Yale U	12,960	5,165
23	Mount Holyoke C	12,940	1,959
24	Oberlin C	12,926	2,788
25	Barnard C	12,918	2,170
26	Columbia U Columb C	12,878	3,100
27	Columbia U Eng/Ap Sc	12,878	
28	Connecticut C	12,800	1,692
29	Haverford C	12,770	1,132
30	Hamilton C	12,750	1,625
31	U of Pennsylvania	12,750	9,444
32	Tulane U	12,730	5,453
33	Colby C	12,620	1,705
34	Hobart C	12,620	1,174
35	William Smith C	12,620	820
36	Rensselaer Poly Inst	12,600	4,458
37	Wellesley C	12,580	2,139
38	Washington U	12,574	4,702
39	Bowdoin C	12,565	1,350
40	Stanford U	12,564	6,571
41	Drew U	12,498	1,425
42	Vassar C	12,490	2,161
43	Carleton C	12,485	1,857
44	U of Southern Calif	12,466	14,461
45	Bucknell U	12,460	3,199
46	Franklin/Marshall C	12,460	1,864
47	Lehigh U	12,450	4,623
48	Skidmore C	12,440	2,191
49	Wheaton C	12,370	1,029
50	Colgate U	12,350	2,712
51	Johns Hopkins U	12,340	2,955
52	Union C	12,313	2,068
53	U of Rochester	12,305	4,622
54	St Lawrence U	12,300	2,073
55	Duke U	12,286	5,824
56	Northwestern U	12,270	6,919
57	New York U	12,250	11,047
58	Dickinson C	12,230	1,982
59	Smith C	12,212	2,622
60	Marlboro C	12,200	226
61	Gettysburg C	12,200	1,981
62	Simon's Rock Bard C	12,180	298
63	Clark U	12,170	2,278

TABLE 2 (cont.)

Rank	Name	1988 Tuition and Fees	1988 Undergrad. Enrollments
64	Bryn Mawr C	$12,155	1,210
65	Pepperdine U	12,115	2,260
66	Harvey Mudd C	12,100	540
67	Carnegie Mellon U	12,080	4,130
68	Occidental C	12,078	1,646
69	Lafayette C	12,025	2,040
70	Stevens Inst of Tech	12,025	1,256
71	Pomona C	12,000	1,407
72	Worcester Polytech I	12,000	2,605
73	Georgetown U	11,990	5,526
74	Vanderbilt U	11,975	5,078
75	U of the Pacific	11,968	3,186
76	Claremont McKenna C	11,870	845
77	Kenyon C	11,840	1,553
78	Scripps C	11,800	572
79	California Inst Tech	11,789	859
80	C of the Holy Cross	11,740	2,595
81	Lake Forest C	11,730	1,116
82	Muhlenberg C	11,720	1,578
83	Columbia U Gen Stud	11,430	585
84	Eastman Sch of Music	11,400	425
85	Babson C	11,392	1,565
86	Denison U	11,360	2,100
87	RI School of Design	11,350	1,773
88	Reed C	11,350	1,210
89	Mills C	11,290	763
90	Emory U	11,210	4,343
91	St John's C	11,200	359
92	Polytechnic U	11,180	1,165
93	Polytechnic U LI	11,180	458
94	U of Redlands	11,110	1,200
95	Boston C	11,076	9,014
96	U of the South	11,050	1,048
97	Simmons C	11,028	1,586
98	Case Westrn Resrve U	11,000	2,489
99	St John's C	11,000	390
100	Alfred U	10,900	1,883
101	Rollins C	10,881	1,400
102	Grinnell C	10,870	1,242
103	New England Con Mus	10,850	332
104	U of Miami	10,801	7,560
105	Whittier C	10,786	1,141
106	Lawrence U	10,770	1,099
107	Wittenberg U	10,702	2,230
108	Pine Manor C	10,700	546
109	Clarkson U	10,665	3,267
110	C of Wooster	10,600	1,815
111	Chapman C	10,600	1,409
112	Earlham C	10,587	1,060
113	Menlo C	10,550	625
114	Macalester C	10,508	1,702
115	American U	10,480	5,172
116	U of Notre Dame	10,472	7,572
117	Antioch C	10,460	491
118	Allegheny C	10,425	1,849
119	Wells C	10,410	400
120	Lewis and Clark C	10,401	1,723
121	Norwich U	10,300	1,549
122	Emerson C	10,275	1,907
123	Ripon C	10,267	827
124	Colorado C	10,240	1,946
125	Davidson C	10,235	1,394
126	Hartwick C	10,200	1,489
127	Goucher C	10,165	739
128	Sweet Briar C	10,140	575
129	Ohio Wesleyan U	10,076	1,657
130	Beloit C	10,004	1,002

Source: College Board

Whereas expensive schools have nearly a million books in their libraries on average, public four-year schools have an average of 640,000 books, while other four-year private schools have only 147,000 books on average. Similar relationships hold for periodicals, and microform materials. Furthermore, expensive schools have considerably more computer resources than do other four-year private schools, including greater availability of computers in dormitories and libraries.

One indication of the resources that are available to students at the most expensive schools comes from Higher Education General Information Survey (HEGIS) data collected by the United States Department of Education. These data include information on the education and general (E&G) expenditures of institutions that include expenditures on instruction, student services, libraries, plant operation, and research. HEGIS data from the 1985-86 school year (the most recent data available) show that E&G expenditures at the most expensive private schools were nearly double those at other private schools on a per-student basis. Whereas these expenditures were about $11,000 per-student at less-expensive private schools, they were over $21,000 per-student at the most expensive private schools.

An important distinction between the most expensive schools and other schools is that the expensive schools tend to be selective, that is they offer admission only to a fraction of those who apply for admission. The most expensive schools offer admission to only about 53 percent of their applicants on average, compared to about 78 percent acceptance among other private schools and 74 percent among four-year publics. Table 3 ranks the most expensive schools on the basis of their selectivity which is measured as the fraction of applicants who are offered admission; schools that accept a lower fraction of their applicants are more selective.

There is a great deal of variation in the selectivity of these schools, with about 50 schools accepting fewer than half of their all undergraduate applicants. with some school accepting fewer than 20 percent of their applicants. The acceptance rates at expensive schools may in fact

TABLE 3

Expensive Private Schools Ranked by 1988 Undergraduate Acceptance Rate

Rank	Name	1988 Tuition and Fees	1988 Undergrad. Enrollments	1988 Acceptance Rate
1	Stanford U	$12,564	6,571	15.19%
2	Harvard/Radcliffe C	13,665	6,593	15.38%
3	Princeton U	13,380	4,565	16.51%
4	Yale U	12,960	5,165	17.68%
5	Dartmouth C	13,335	3,687	20.30%
6	Amherst C	13,105	1,616	21.04%
7	Georgetown U	11,990	5,526	21.22%
8	Duke U	12,286	5,824	21.66%
9	Brown U	13,759	5,507	22.33%
10	Bowdoin C	12,565	1,350	23.47%
11	Williams C	12,975	1,906	23.48%
12	MIT	13,400	4,311	24.78%
13	Columbia U Columb C	12,878	3,100	27.11%
14	Swarthmore C	13,230	1,317	28.24%
15	California Inst Tech	11,789	859	28.45%
16	Cornell U	13,140		29.39%
17	C of the Holy Cross	11,740	2,595	31.02%
18	Haverford C	12,770	1,132	31.32%
19	Colgate U	12,350	2,712	31.34%
20	Wesleyan U	13,325	2,665	32.06%
21	Boston C	11,076	9,014	32.57%
22	RI School of Design	11,350	1,773	33.98%
23	Davidson C	10,235	1,394	35.05%
24	Northwestern U	12,270	6,919	35.16%
25	Bates C	13,920	1,500	35.85%
26	Eastman Sch of Music	11,400	425	37.66%
27	U of Pennsylvania	12,750	9,444	38.05%
28	Franklin/Marshall C	12,460	1,864	38.30%
29	Tufts U	13,162	4,750	38.71%
30	Pomona C	12,000	1,40[illegible]	38.75%
31	U of Notre Dame	10,472	7,572	38.80%
32	Lafayette C	12,025	2,040	39.39%
33	Trinity C	13,200	1,733	39.73%
34	Vassar C	12,490	2,161	39.90%
35	Colby C	12,620	1,705	42.02%
36	Connecticut C	12,800	1,692	42.51%
37	Hamilton C	12,750	1,625	42.62%
38	Babson C	11,392	1,565	43.15%
39	Carleton C	12,485	1,857	43.24%
40	Bucknell U	12,460	3,199	43.24%
41	Columbia U Gen Stud	11,430	585	44.99%
42	Rollins C	10,881	1,400	46.01%
43	Claremont McKenna C	11,870	845	46.95%
44	Wellesley C	12,580	2,139	48.64%
45	Union C	12,313	2,068	48.99%
46	Emory U	11,210	4,343	49.17%
47	Barnard C	12,918	2,170	49.22%
48	Skidmore C	12,440	2,191	49.30%
49	Colorado C	10,240	1,946	49.49%
50	Simon's Rock Bard C	12,180	298	50.00%
51	Macalester C	10,508	1,702	50.64%
52	Dickinson C	12,230	1,982	50.99%
53	U of Chicago	13,285	3,166	51.31%
54	Hobart C	12,620	1,174	51.53%
55	Johns Hopkins U	12,340	2,955	52.65%
56	Bard C	13,560	865	52.82%
57	Vanderbilt U	11,975	5,078	52.91%
58	New England Con Mus	10,850	332	53.39%
59	Kenyon C	11,840	1,553	53.49%
60	Denison U	11,360	2,100	53.49%
61	Hampshire C	13,845	1,140	53.88%
62	Carnegie Mellon U	12,080	4,130	54.00%
63	Pepperdine U	12,115	2,260	54.01%

TABLE 3 (cont.)

Rank	Name	1988 Tuition and Fees	1988 Undergrad. Enrollments	1988 Acceptance Rate
64	Lake Forest C	$11,730	1,116	55.73%
65	Mount Holyoke C	12,940	1,959	56.89%
66	Smith C	12,212	2,622	56.95%
67	U of Rochester	12,305	4,622	57.15%
68	Lehigh U	12,450	4,623	57.81%
69	Boston U	12,975	13,626	58.00%
70	Occidental C	12,078	1,646	58.38%
71	New York U	12,250	11,047	58.98%
72	Brandeis U	13,066	2,833	59.46%
73	Gettysburg C	12,200	1,981	59.49%
74	William Smith C	12,620	820	59.52%
75	American U	10,480	5,172	59.62%
76	Worcester Polytech I	12,000	2,605	59.73%
77	U of the South	11,050	1,048	60.02%
78	Grinnell C	10,870	1,242	61.29%
79	Washington U	12,574	4,702	62.48%
80	Reed C	11,350	1,210	63.08%
81	Pitzer C	12,986	759	63.39%
82	Muhlenberg C	11,720	1,578	63.96%
83	Marlboro C	12,200	226	64.25%
84	Wittenberg U	10,702	2,230	64.26%
85	Rensselaer Poly Inst	12,600	4,458	64.36%
86	Scripps C	11,800	572	64.99%
87	Bryn Mawr C	12,155	1,210	65.27%
88	Whittier C	10,786	1,141	65.91%
89	St Lawrence U	12,300	2,073	68.52%
90	Clark U	12,170	2,278	69.34%
91	Hartwick C	10,200	1,489	70.09%
92	Lawrence U	10,770	1,099	70.37%
93	Tulane U	12,730	5,453	72.01%
94	Polytechnic U	11,180	1,165	72.56%
95	U of Southern Calif	12,466	14,461	73.18%
96	C of Wooster	10,600	1,815	75.41%
97	Emerson C	10,275	1,907	76.14%
98	Ohio Wesleyan U	10,076	1,657	76.16%
99	Drew U	12,498	1,425	76.25%
100	Stevens Inst of Tech	12,025	1,256	77.07%
101	Simmons C	11,028	1,586	77.35%
102	Menlo C	10,550	625	77.41%
103	Sarah Lawrence C	13,280	950	78.11%
104	Alfred U	10,900	1,883	78.52%
105	Polytechnic U LI	11,180	458	79.41%
106	Wheaton C	12,370	1,029	80.00%
107	U of Redlands	11,110	1,200	80.00%
108	Allegheny C	10,425	1,849	80.03%
109	U of the Pacific	11,968	3,186	80.17%
110	Mills C	11,290	763	80.97%
111	Goucher C	10,165	739	81.59%
112	Chapman C	10,600	1,409	81.71%
113	Earlham C	10,587	1,060	81.84%
114	Sweet Briar C	10,140	575	83.58%
115	U of Miami	10,801	7,560	83.79%
116	Lewis and Clark C	10,401	1,723	84.58%
117	Beloit C	10,004	1,002	84.74%
118	St John's C	11,000	390	85.11%
119	Ripon C	10,267	827	85.14%
120	Case Westrn Resrve U	11,000	2,489	85.85%
121	Wells C	10,410	400	86.30%
122	Norwich U	10,300	1,549	86.77%
123	Pine Manor C	10,700	546	89.50%
124	St John's C	11,200	359	96.80%
125	Antioch C	10,460	491	
126	Bennington C	15,670	560	
127	Clarkson U	10,665	3,367	
128	Columbia U Eng/Ap Sc	12,878		
129	Harvey Mudd C	12,100	540	
130	Oberlin C	12,926	2,788	

Source: College Board

understate their selectivity in that these schools typically attract students with higher academic abilities than do other schools. For example, College Board data indicate that 50 percent of the students who applied to expensive schools were in the top tenth of their high-school classes in 1988 compared to 21 percent at other private schools. Lewis (1988) and Manski and Wise (1983) both found that admission rates at selective schools would be lower if only students with average SAT scores were to apply.

There appear to be benefits to students in attending the most expensive schools. In addition to the benefits such as library and computer resources cited above, there are undoubtedly consumption benefits to attending these schools that may include the availability of cultural activities and the amenities (including geographic location) associated with attending these schools. For example, College Board data indicate that expensive schools offer students more chances to participate in intramural and intercollegiate sports than do other private schools (12 sports on average at the most expensive schools compared to three at other private schools).

The most expensive schools include those colleges and universities that are sometimes referred to as "elite", that is schools with "prestigious" reputations that may translate into future occupational and academic success. Students at expensive schools are more likely to consider the reputation of their school to be a very important reason for choosing the school that they attend. Data from the National Postsecondary Student Aid Study (NPSAS), a nationally representative sample of students enrolled in higher education in the fall of 1986, indicate that 68 percent of students at the most expensive schools cited their school's reputation as a "very important" reason for choosing their school. In comparison, 50 percent of students at other private schools and 42 percent of students at public four-year schools indicated that reputation was important in choosing their school.

Although NPSAS data cannot tell us why reputation is important for students, they do indicate that students at expensive schools are more likely to pursue graduate study than are other four-year students, suggesting that the reputation of these schools may be linked to subsequent access to graduate education.[1] Eighty-two percent of students at expensive schools expected to obtain a graduate degree compared to 67 percent of students at other private schools and 52 percent of students at four-year public schools. What is striking among different types of schools is that students at expensive private schools were much more likely to expect to seek doctoral or professional degrees. Forty percent of undergraduate students at expensive schools expected to receive these degrees compared to 19 percent at other private schools and 15 percent at four-year public schools.

Although the definition of prestigious is necessarily arbitrary (and is not undertaken in this paper), we believe that many expensive schools could be considered prestigious. In the next section of this paper, we examine evidence that suggests that there are benefits to obtaining an undergraduate education at these schools.

Outcomes of Attending Expensive Schools

There is both a large economic and sociological literature that examines the benefits of attending college (Leslie and Brinkman, 1988). Although there are competing theories of why college attendance may be associated with higher lifetime earnings, there is strong evidence that college-educated individuals do receive higher earnings, and that attending college is generally a

[1]Litten and Hall (1989) present data from a survey of high ability high school students that show that an important indicator of the perceived quality of an undergraduate institution is whether the school has high admission rates of graduates to top graduate or professional schools.

"good" investment in that the economic payoffs to attending college exceed the costs of attendance.

Some studies of the outcomes of attending college examine the type of college that students attend or the "prestige" of the college as a factor associated with later earnings. There is fairly consistent evidence that the type of college a student attends is ultimately associated with subsequent earnings.

Early research on the topic of the effect of college "quality" generally found no effect of college characteristics on either later income or occupational prestige. For example, Sewell and Hauser (1975), studying a statewide sample of 1957 Wisconsin high school graduates followed for ten years after high school graduation, found that a wide range of college attributes accounted for very little of the variance in subsequent earnings and status attainment.

These findings were challenged by more recent work that accounted for the segmented nature of the labor market (college quality may matter for some occupations and not for others) and for the nonlinear relationship between college characteristics and subsequent attainments (there may be a distinctive impact of a small set of schools, but no average impact throughout the whole range of colleges).

The most recent data that have been used to examine these questions are from the CIRP study of 1971 college freshmen who were resurveyed in 1980. Kingston and Smart (1990) found that students who had attended an elite institution (defined as having students with average SAT scores of over 1,175) had a 1980 income that was almost $3,500 higher than that of students from institutions that were not selective (SAT scores under 950). The income of students who attended elite expensive schools was $2,000 higher than that of students who had attended more selective private schools and $1,000 higher than of those who attended more selective public

schools. One reason that graduates of elite schools had higher earnings was that they were more likely to earn M.D., J.D., or M.B.A. degrees than students at other schools.

Using another labor market division, Kamens (1974) found that among male 1966 college graduates, high prestige schools were more likely to channel students towards academic careers and lower prestige schools more likely to channel students towards professions not requiring a Ph.D. Kamens related this finding to findings about satisfaction with college. Generally, students from high prestige schools reported greater satisfaction with their college experience, with courses, and with the quality of teaching at the institution that they attended. They were more likely to give high ratings to their faculty on teaching (but not informal contact) and more likely to say they were influenced by faculty about subsequent educational and career goals.

A longitudinal study of 1961 college graduates who were resurveyed in 1968 provides another source of evidence on this question. After using the survey data to conduct path analyses separately for those in professional and those in managerial occupations, Tinto (1980) found a sizeable direct effect of college quality (using Astin's 1965 selectivity measure) on subsequent occupational prestige for those in professional occupations. There was no effect for those in managerial occupations. Earlier, Spaeth (1970) found a smaller effect of college quality over the whole range of occupations using the same data.

Although it is now dated and in many respects limited, the NBER-Thorndike Hagen longitudinal survey of World War II aviation veterans (all white males), provides the only data with a general intelligence measure, given before most had completed college. The men were resurveyed in 1968, providing information for about 20 years after college graduation. Taubman and Wales (1974) found that among those with some college and an undergraduate degree, attending a school in the top fifth of academic ratings had a sizeable effect on income. For

those with a graduate degree, attending an undergraduate institution in the top two fifths and a graduate school in the top fifth significantly effected later earnings.

Weisbrod and Karpoff (1968) examined the rate of salary increases for 7,000 employees of AT&T in 1956 subdivided according to four college quality groups and four college class rank groups (16 groups). They found that salary increased with class rank, but that this relation varied with college quality group. Among graduates of the two top college quality groups, salary increases were similar as long as they were not in the bottom third of the class. In the average quality group, salary increments for the top 10 percent in class rank were similar to the increases for the top two thirds in the best and above-average colleges. For the bottom 90 percent, however, they were similar to those in the bottom third of the best and above average schools and similar to those in the below-average schools.

One recent study (James et.al., 1989) examined the relationship between post-college earnings for males who left high school in 1972 and several measures of college quality. After controlling for the student's occupation, undergraduate college-course work and performance, and student background characteristics, they found that graduates college quality did have an effect on earnings. Specifically, they found that students who attended schools with higher average Scholastic Aptitude Test (SAT) scores had higher earnings, even after controlling for the student's own SAT scores. For each 100 point increase in average SAT scores among schools, there was an associated increase in earnings of three percent. In addition, they found that students who attended a private school in the East (which disproportionately includes a large number of expensive schools) had earnings that were about 10 percent higher than other students. These results suggest that attending a private college in the East where students had relatively high SAT scores would produce the greatest increment to income, at least for a given occupation, college major, and college performance.

An additional finding from this study is that students who attended graduate school increase their earnings by an additional 10 percent. It was noted in the previous section that a substantial portion of students at expensive private schools do expect to attend graduate schools. If attending these schools as an undergraduate enhances the likelihood a student will be able to obtain a graduate degree, then there will be a further payoff to attending an expensive private college.

The fact that students who attend the most expensive schools receive higher earnings provides some insight into why students are willing to pay high tuitions to attend these schools. If we view college attendance as an investment in which students receive economic benefits after leaving college, the extra cost of attending expensive schools may be justified by the subsequent increase in earnings associated with attending these schools. As an illustration, if attendance at an expensive school increases annual earnings by $2,000 compared to attending another private school (as suggested by Kingston and Smart), then the "value" of this earnings premium sustained over a worker's lifetime would be about $20,000 (assuming a discount rate of ten percent).

The fact that there appear to be significant economic advantages to attending an expensive school raises the question of whether students from different family income groups attend these schools. The issue of who attends these schools along with how students from different income groups finance their education is discussed in the next section.

Who Attends Expensive Schools?

The comparatively rapid rise in tuitions in the 1980s among institutions that were already among the most expensive raises the concern that the benefits of attending these colleges are beyond the financial resources of all but the most affluent. There is also a concern that middle-income students, unlike students from lower-income families, may not be able to attend these

schools given that they may not be eligible to receive financial aid. In this section of our paper, we examine the extent to which lower- and middle-income students attend these schools, along with the extent to which financial aid facilitates access to these schools.

In order to examine whether students from middle- and lower-income families are able to attend these expensive institutions, we have drawn upon two data bases, the National Postsecondary Student Aid Study (NPSAS), and the Cooperative Institutional Research Program (CIRP). Both databases include information on the family income of undergraduates, along with information on the aid sources upon which students draw. For some years, data on college characteristics from the College Board has been merged with CIRP data on the public-use tapes, although it is not possible to identify the school the student attends.

NPSAS is a nationally representative sample of students enrolled in postsecondary institutions in the Fall of 1986. Although these data contain detailed information on the economic background of college students and the means by which they finance their education, they are limited in that they only cover a single point in time. NPSAS data do not permit analysis of how rising college tuitions may have affected the rate at which students from different income groups have enrolled in different types of institutions over time. On the other hand, the CIRP data represent an annual national sample of full-time, freshman that goes back to 1966. CIRP data are limited, however, in that they are not as detailed as NPSAS data with respect to income and financial aid. We shall therefore primarily rely on NPSAS data to describe student income and financial aid.

Of the 130 schools that we have defined as expensive, 24 were represented within the NPSAS sample. Overall, there are 1025 sample observations for full-time, full-year dependent undergraduates attending the most expensive schools included in the NPSAS sample, and 6,300 students at other private schools. While the number of sampled students at any given institution

may be too small to draw statistical inferences about students at an individual school, there are a sufficient number of these students across schools to make general inferences about students at expensive schools.[2]

NPSAS data reveal that the families of students at expensive private schools were substantially more affluent than students at other private colleges and universities. The average income of families of students at the expensive schools was $70,400, compared to $48,700 at the other four-year private schools. Table 4 compares the income distribution of dependent students at expensive institutions to that of students at other four-year private institutions.

The differences between these groups are notable. Over 37 percent of the dependent students at the expensive schools were from families with incomes of $60,000 or more, compared to 24 percent at other private schools. Furthermore, about 18 percent of students at the most expensive schools were from families with incomes over $100,000, compared to 8 percent of students at other private schools. At the other end of the income spectrum, about 19 percent of students at other private schools are from families with incomes below $20,000, while about 13 percent of the students at the most expensive schools are from families with this level of income.[3]

NPSAS data also indicate that there were differences in the race composition of students who attend expensive schools compared to other private schools. Five percent of the student body at expensive schools was composed of blacks, compared to eight percent at the other

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[2]In order to compare NPSAS data on private schools to the larger universe of private schools presented in the College Board data, we have compared average tuition levels and the percent of students receiving aid; the averages for the two variables across the two datasets are comparable.

[3]NPSAS data also indicate that students at the most-expensive schools are more likely to be dependent on their parents than are students at other private schools. Eighty-seven percent of the students at the expensive schools are dependent, as are 59 percent of the students at the less expensive private institutions.

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TABLE 4

Income Distribution of Students at Private Colleges

(Full-time, Full-year Undergraduates)

	Tuition and Fees	
	< $10,000	> $10,000
Dependent Family Income	Percent of Students	Percent of Students
$0 - 20,000	19.3%	13.4%
20,000 - 40,000	31.7	23.1
40,000 - 60,000	25.4	26.3
60,000 - 80,000	11.9	11.7
80,000 - 100,000	4.0	7.9
100,000+	7.7	17.6
ALL	100.00	100.00

Source: National Postsecondary Student Aid Study:
Independent Computation by Pelavin Associates.

private schools. The more expensive schools enrolled a higher proportion of Asian students than the less expensive schools (11 percent versus 4 percent). Five percent of the students at the most expensive institutions were of Hispanic origin, as are four percent of students at other private schools.

The fact that NPSAS data cover only one year of data prevents us from examining whether price increases have led to changes in the population that attend expensive schools. What this cross-section does indicate is that the students at expensive institutions were, on average, more affluent than students at other private schools, and substantially more affluent than most Americans: the median family income in 1986 (the year the data represent) was approximately $32,200. (Economic Report of the President, 1990, p. 328).

CIRP data show a similar pattern concerning the income distribution of full-time freshman at the most expensive schools in 1986 (see Table 5). Among schools with tuitions of more than $10,000 in 1986 (recall that CIRP does not permit identification of individual schools), 46 percent of freshman (among those who reported family income) at the most expensive schools came from families with incomes over $60,000, and about 25 percent from families with incomes over $100,000.

While these data show that there is a noticeable skew toward higher family incomes among students at the most expensive institutions, NPSAS data show that financial aid did help facilitate enrollments of students from other than affluent families. The measure of cost we are using to define "most expensive" is tuition and fees, which averages over $11,000 at these schools. Without financial aid, more than 20 percent of the household income of students from families with incomes below $50,000 would be needed to cover the tuition at these schools. If we account for the additional costs of books, living expenses, and other incidental costs, the share of income needed to cover the cost of attending these schools was even larger.

TABLE 5

Income Distribution of Freshman Students at Private Colleges (1986)

	Tuition and Fees	
	< $10,000	> $10,000
Family Income	Percent of Students	Percent of Students
$0 - 20,000	17.0%	9.7%
20,000 - 40,000	32.2	22.6
40,000 - 60,000	21.9	20.4
60,000 - 75,000	9.8	10.5
75,000 - 100,000	6.9	10.5
100,000+	12.3	24.9
ALL	100.00	100.00

Source: Cooperative Institutional Research Program: Independent Computation by Pelavin Associates.

Financial Aid at Expensive Schools

Financial aid can come from many sources. The two largest providers of financial aid (in terms of total dollars) are the Federal government and institutions themselves (Lewis, 1989). In general, most Federal financial aid (e.g., Pell Grants, Stafford Loans) is provided to students with financial need, that is the difference between the cost of attending a given school and what the student and his or her family can be expected to contribute to this cost. In awarding students financial aid, a financial aid office may draw upon available Federal aid (if the student qualifies for this aid), along with financial aid from the institution's own funds.

The award of financial aid is a complex process in which students may receive many different types of aid. Financial aid officers have some discretion in the types of aid that students receive. They may offer Federal campus-based aid (Perkins loans, Supplemental Educational Opportunity Grants, Campus Work Study) on the basis of need or they may offer institutional aid to meet the need of students. If these forms of aid are not available to the aid office (or the school chooses not to fully meet student need with these forms of aid), the student may then receive several different types of loans that include Federal Stafford Loans. The form of aid over which schools have the most discretion is institutional aid which usually consists of grants; students who are not eligible to receive Federal need-based aid can receive this form of aid.

By offering students different amounts and types of financial aid, a school makes a price adjustment that lowers their "sticker price". By offering a student financial aid, a school can maintain a relatively high tuition while not pricing anyone out of the market. In short, by offering financial aid, a school can charge students different amounts to attend the school, up to the level of full tuition.

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NPSAS data show that even though financial aid did help reduce the costs of attendance for lower-income families at the most expensive schools, these students still paid more to attend these schools than did similar students at other private schools even after financial aid was taken into account. There is also evidence that higher-income students at the most expensive schools did not receive the financial aid that would have lowered the net price, and that these students did pay substantially more to attend these schools rather than a less-expensive school.

Table 6 presents information on the fraction of students receiving financial aid by income group both for the most expensive schools and other private schools.[4] The table includes information both on the percent of students receiving institutional aid, Federal aid, and any financial aid. It is interesting to note that on average, students at expensive schools were somewhat less likely to receive financial aid, though this may reflect the fact that higher-income students made up a larger share of enrollments at expensive schools. The table does show that in both schools, the share of students receiving aid falls with income, an outcome that undoubtedly reflects the fact that most financial aid awarded on the basis of financial need.

Table 6 shows that students at expensive schools were slightly less likely to receive Federal financial aid than are students at other private schools (54 versus 50 percent). It is interesting to note, however, that students from higher income groups at the most expensive private schools were more likely to receive Federal financial aid. Since a student's need for financial aid increases with the cost of school attended, students from higher income families enrolled at expensive schools are more likely to be eligible to receive need-based Federal aid than if they attended less-expensive schools.

[4]The table also includes information on the number of sample observations used to calculate the statistics presented in Tables 6 through 9. These statistics, however, are calculated using population weights given within the NPSAS data.

TABLE 6

Percent of Students Receiving Financial Aid at Private Schools by Income Category

Tuition	Dependent Family Income	Number of Students	Receives Institutional Aid: Percent of Students	Receives Federal Aid: Percent of Students	Receives Any Aid: Percent of Students
Less Than $10,000					
	0-20,000	1,222	61	79	91
	20,000 - 40,000	2,008	65	69	88
	40,000 - 60,000	1,604	53	48	75
	60,000 - 80,000	744	38	26	55
	80,000 - 100,000	250	29	11	41
	100,000+	472	16	6	22
	All	6,300	53	54	74
Tuition	Dependent Family Income	Number of Students	Percent of Students	Percent of Students	Percent of Students
More Than $10,000					
	0-20,000	140	74	76	84
	20,000 - 40,000	244	79	77	90
	40,000 - 60,000	274	57	59	72
	60,000 - 80,000	121	38	37	60
	80,000 - 100,000	76	27	16	41
	100,000+	170	11	5	17
	All	1,025	52	50	64

Source: National Postsecondary Student Aid Study: Independent Computation by Pelavin Associates.

We next examine the amounts of financial aid that students received, broken down by student income levels and the type of school that the student attends (see Table 7). The table shows that the amount of financial aid awarded to students in 1986 was substantial, particularly in the lower-income groups. The table shows that aid amounts within a given income group were larger at more expensive schools.

An important point from the data in Table 7 is that comparatively large amounts of aid were provided by institutions. The expensive institutions provided, on average, $3,100 more institutional aid to students than the less-expensive schools. In line with the other findings presented here, this difference was much larger for the least affluent students. The difference in the average amounts of institutional aid received by those students in the lowest income group was over $3,900, while in the highest income groups the difference was only $156.

One reason that private institutions, especially expensive institutions, meet need with their own resources is that students are limited in the amount of Federal aid that they can receive. Table 7 shows that the difference between the amount of Federal financial aid awarded at the most expensive schools and other private schools is less than $700 ($3,906 versus $3,422), not enough to cover the differences between the costs of attendance of the two types of schools. The relatively moderate difference (in comparison to cost differences) may reflect limits in the amount of aid that students can receive under different Federal aid programs. For example, the maximum Stafford Loan a student could receive in the Fall of 1986 was $2,500.[5]

One way to combine information on the share of students receiving financial aid and the amounts of aid they receive is to consider the average net tuitions of all students within an income group whether they receive financial aid or not. This combines information on the fact

[5]In addition, the amounts of Federal aid that schools have under campus-based programs (Perkins Loans, Supplemental Educational Opportunity Grants, and College Work Study) are limited: not all needy students can receive these forms of aid.

TABLE 7

Average Amounts of Aid Received From Different Sources at Private Schools by Income Category

		Receives Institutional Aid	Receives Federal Aid	Receives Any Aid
Tuition Less Than $10,000	Dependent Family Income	Average Aid Award	Average Aid Award	Average Aid Award
	0-20,000	$2,437	$3,900	$6,693
	20,000 - 40,000	2,557	3,078	5,543
	40,000 - 60,000	2,526	2,821	4,248
	60,000 - 80,000	2,648	2,782	3,598
	80,000 - 100,000	2,828	2,839	3,241
	100,000+	1,982	3,932	2,798
	All	2,523	3,422	5,193
Tuition Less Than $10,000	Dependent Family Income	Average Aid Award	Average Aid Award	Average Aid Award
	0-20,000	$6,386	$5,157	$11,971
	20,000 - 40,000	6,653	4,075	10,746
	40,000 - 60,000	4,891	3,180	7,421
	60,000 - 80,000	3,594	3,444	5,686
	80,000 - 100,000	4,618	2,831	5,006
	100,000+	2,679	2,797	3,336
	All	5,598	3,906	8,798

Source: National Postsecondary Student Aid Study: Independent Computation by Pelavin Associates.

that some students receive no aid while others may receive a great deal of aid. From the standpoint of a school, an average net tuition figure calculated using institutional aid for all students within an income group represents the average total tuition revenue collected from students after awarding institutional aid. In general, by comparing average net tuitions to average full tuitions for students within an income group, we can obtain a sense of the portion of total tuitions covered by students' own payment, institutional aid, and other sources.

Table 8 presents information on average net tuitions by income category. Consider the sample of students with family incomes less than $20,000 who attended expensive institutions. The average tuition of the schools these students attend was $10,941. If we consider all institutional aid awards these students receive, we see that average net tuition fell to $6,200: institutional aid covered about 44 percent of total tuitions costs for all students in this income group; in effect, institutions used their own resources to "rebate" tuitions to this group.[6] If we then take into account all financial aid, the table shows that students in this group paid less than ten percent ($938/$10,941) of their total tuition bill at the most expensive schools.

The information presented in Table 8 indicates the role that institutional and other financial aid played in reducing the price of expensive institutions for students of varying financial means. Over all income groups, the average tuition, net of all financial aid, for students at the most expensive schools was $5,400 compared to $2,100 at less-expensive private schools. Financial aid cut the average net cost to all students of the most expensive schools roughly in half. For both types of schools, the reduction in cost (in terms of percent total tuition) from

[6]The award of institutional financial aid represents a reduction in price to students on the part of schools in that school must use their own resources to make these awards. The award of financial aid offers schools the opportunity to selectively lower their price to students while charging full tuitions to other students.

TABLE 8

Tuition and Fee Costs Expenses at Private Instituions Net of Financial Aid

		Adjusted Full-Year Tuition & Fees	Tuition and Fees Less Institutional Aid	Tuition and Fees Less All Aid
Tuition Less Than $10,000	Dependent Family Income	Mean	Mean	Mean
	0-20,000	$5,631	$4,142	$-442
	20,000 - 40,000	5,801	4,130	945
	40,000 - 60,000	6,100	4,770	2,900
	60,000 - 80,000	6,434	5,432	4,444
	80,000 - 100,000	6,281	5,469	4,956
	100,000+	6,601	6,288	5,976
	All	6,001	4,669	2,151
Tuition More Than $10,000	Dependent Family Income	Mean	Mean	Mean
	0-20,000	$10,940	$6,199	$938
	20,000 - 40,000	11,022	5,787	1,312
	40,000 - 60,000	11,125	8,345	5,747
	60,000 - 80,000	11,018	9,677	7,650
	80,000 - 100,000	11,092	9,835	9,034
	100,000+	11,068	10,771	10,499
	All	11,051	8,164	5,391

Source: National Postsecondary Student Aid Study: Independent Computation by Pelavin Associates.

financial aid was substantial, though these reductions were much more substantial for students from lower- and middle-income families at both types of schools.

On average, students in the lowest income category faced a final tuition cost of under $1,000 at the most expensive schools. At the less-expensive schools, students in the lowest income category received enough financial aid on average to fully cover their tuitions plus an additional $400 to offset other expenses. The final tuition cost of attending an expensive institution faced by the average student in the bottom income category (0-$20,000 family income) was about $1,400 more than the final cost faced by a similar student at a less-expensive private school. On the other hand, the average final cost faced by students from the top income category attending the most expensive schools is $4,500 more than that faced by similar students attending the other schools.

Table 9 presents the differences in the after-aid tuitions of attending the most expensive schools versus other private schools by income category after accounting for all financial aid. The first column gives the average difference in terms of a percentage of total (tuition) costs that students within an income group paid to attend of one of the most expensive schools. For example, among students with family incomes between $20,000 and $40,000, the average after-aid tuition of students who attended one of the most expensive schools was 39 percent higher than after-aid tuition at less-expensive schools. The second column of the table presents this difference in terms of dollars; among students from families with incomes between $20,000 and $40,000, students paid $367 more on average to attend an expensive school. On average, across all income categories, students paid approximately $3,200 more in tuition to attend the most expensive schools after accounting for financial aid.

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Price Premium of Attending by Income Category After Receipt of Financial Aid

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60,000 - 79,999	72%	3,207
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100,000+	76%	4,534
Average (all students)	52%	$3,252

*Because the average amount of aid for students in this income category exceeded the tuition and fees at the less expensive schools, a percentage could not be computed.

Source: National Postsecondary Student Aid Study: Independent Computation by Pelavin Associates.

the less expensive schools, total financial aid exceeded the average tuitions of these schools, while at the more-expensive schools, aid does not fully cover tuition among these students. The income group that appears to have paid the largest "premium" (in terms of the percentage difference in after-aid tuitions) to attend an expensive school was the $40,000 - $60,000 income group. This may reflect the lower eligibility for Federal need-based financial aid of these students.

The analyses presented above indicate that substantial resources were provided both by institutions and other sources to effectively lower the tuitions of expensive institutions. Despite the presence of financial aid, students from all income groups can, paid more to attend an expensive institution than other private schools. Financial aid did serve to narrow the differences in tuitions among lower-income students. The fact that more institutional financial aid was awarded at the most expensive institutions was a substantial factor in reducing the amount students pay to attend an expensive school; the difference between the average amount of financial aid provided by other sources at the most expensive institutions was only marginally higher than at other private institutions.

Changes in Affordability Over Time

Given that tuitions at the most expensive private schools increased more rapidly than they did at other private schools in the 1980s, the question arises of whether these tuition increases have foreclosed the option of attending expensive schools for students from lower- and middle-income families. One data source that may be used to examine the incomes of students at different types of schools over time is the Annual Freshman Survey collected by the Cooperative Institutional Research Program (CIRP).

One problem in using CIRP data is that family income is reported only in broad categories. It is therefore difficult to make the inflation adjustments that would permit examination of how the income distribution of students at different schools has changed over time. We have made rough adjustments to the CIRP income categories to compare income categories for 1980 and 1986.

Between 1980 and 1986, the proportion of students at expensive private schools from families with incomes over $75,000 (1986 dollars) increased from 24 to 34 percent. Over the same time, students from this income group increased their share of enrollments at other private schools from 14 to 19 percent. In comparison, there was little change in the proportion of students from families with incomes under $30,000 (1986 dollars); it remained constant at about 20 percent. At other private schools, the enrollment proportion of these students increased from 31 to 33 percent. The implication of these changes is that enrollments at private schools, particularly at the more expensive schools, shifted toward enrollments of students from higher income families. This shift occurred as the proportion of students from the $30,000 to $75,000 income group declined at private schools; CIRP data indicate that students from this income group were more likely to enroll at public schools (both four-year and two-year over this time).

Conclusion

In this paper, we have examined expensive private schools from several perspectives, including the benefits that they may provide to students. Even though tuitions at the most expensive schools have increased more rapidly than they have at other private schools over time, it appears that the demand to attend these schools has increased <u>despite</u> the relative increase in tuitions. College Board data indicate that from 1983 to 1988, the number of applications submitted to the most expensive institutions increased by 31 percent compared to an increase of

24 percent at other private schools. One possible explanation for this outcome is that students perceive that the relative benefits of attending these schools have increased at a greater rate than their tuitions.[7]

The expert paper on the market for higher education has examined the lack of incentive that selective schools have to lower tuition and compete on the basis of price to attract students. The competition among these schools to attract students appears to take the form of "quality" competition to provide students with expanded program offerings, smaller classes, additional facilities and so forth. If the value students place on these items is greater than the tuition increases schools charge to cover them, then students will be willing to pay higher tuitions to attend these schools. A question arises of whether tuitions at these schools will continue to rise in the future.

Although expensive private schools enroll only a small share of all undergraduates, there are two central concerns regarding their future pricing. The first is that there are undoubtedly benefits to individuals that accrue to attending these schools; society presumably does not want any group (e.g. students from middle-income families) to be unable to attain these benefits. A second concern is that even if rising tuitions at these schools do not reduce the opportunity of any group of students to attend these schools, continued increases in tuitions at the most expensive schools may serve to "lead" tuitions at other schools.

To make attendance at these schools accessible to students from all income groups, it may be necessary to increase the financial aid available to students from middle-income families. NPSAS data indicate that students from lower-income families were likely to receive large amounts of financial aid from Federal and institutional sources. though students from middle-

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[7]Alternatively, as college costs increase or schools become more selective, students may submit more applications in search of "better" offers of financial aid or to assure that they are offered admission at several institutions.

income families relied more on institutional aid to attend these schools. Part of the shift of students from middle-income families away from private schools indicated by the CIRP data may reflect the slow growth of Federal financial aid during this time (along with its concurrent reliance on loan rather than grant aid).

The second concern with the pricing of expensive schools is that they somehow provide price leadership for other schools, that is, if tuitions increase at expensive schools, other schools may have an incentive to raise their prices to follow perceived price leaders. Common movements of tuition need not involve any explicit agreement on the part of schools to shift prices in concert, but rather could arise from a general incentive not to compete on price. If price leadership has occurred (and has not simply reflected general increases in the costs of providing higher education or general increases in the demand for higher education), then anything that would slow tuition increases of expensive schools would have the effect of slowing tuition increases at other schools.

There are constraints that may serve to moderate future price increases at expensive schools. At some point, some students would find the "sticker price" too high to consider even applying to these schools unless it were made very clear that financial aid were available to reduce the net price to the level of the student's other alternatives. Unfortunately, it is impossible to predict what this price maximum may be. Perhaps the best hope for the future is that these schools will exercise restraint in raising their tuitions to ensure that many of the "best" students do not move to other schools, an outcome that would harm a selective school that raised its prices by too much.

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In this paper, we have examined expensive private schools from several perspectives, including the benefits that they may provide to students. Even though tuitions at the most expensive schools have increased more rapidly than they have at other private schools over time, it appears that the demand to attend these schools has increased <u>despite</u> the relative increase in tuitions. College Board data indicate that from 1983 to 1988, the number of applications submitted to the most expensive institutions increased by 31 percent compared to an increase of

24 percent at other private schools. One possible explanation for this outcome is that students perceive that the relative benefits of attending these schools have increased at a greater rate than their tuitions.[7]

The expert paper on the market for higher education has examined the lack of incentive that selective schools have to lower tuition and compete on the basis of price to attract students. The competition among these schools to attract students appears to take the form of "quality" competition to provide students with expanded program offerings, smaller classes, additional facilities and so forth. If the value students place on these items is greater than the tuition increases schools charge to cover them, then students will be willing to pay higher tuitions to attend these schools. A question arises of whether tuitions at these schools will continue to rise in the future.

Although expensive private schools enroll only a small share of all undergraduates, there are two central concerns regarding their future pricing. The first is that there are undoubtedly benefits to individuals that accrue to attending these schools; society presumably does not want any group (e.g. students from middle-income families) to be unable to attain these benefits. A second concern is that even if rising tuitions at these schools do not reduce the opportunity of any group of students to attend these schools, continued increases in tuitions at the most expensive schools may serve to "lead" tuitions at other schools.

To make attendance at these schools accessible to students from all income groups, it may be necessary to increase the financial aid available to students from middle-income families. NPSAS data indicate that students from lower-income families were likely to receive large amounts of financial aid from Federal and institutional sources, though students from middle-

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[7]Alternatively, as college costs increase or schools become more selective, students may submit more applications in search of "better" offers of financial aid or to assure that they are offered admission at several institutions.

income families relied more on institutional aid to attend these schools. Part of the shift of students from middle-income families away from private schools indicated by the CIRP data may reflect the slow growth of Federal financial aid during this time (along with its concurrent reliance on loan rather than grant aid).

The second concern with the pricing of expensive schools is that they somehow provide price leadership for other schools, that is, if tuitions increase at expensive schools, other schools may have an incentive to raise their prices to follow perceived price leaders. Common movements of tuition need not involve any explicit agreement on the part of schools to shift prices in concert, but rather could arise from a general incentive not to compete on price. If price leadership has occurred (and has not simply reflected general increases in the costs of providing higher education or general increases in the demand for higher education), then anything that would slow tuition increases of expensive schools would have the effect of slowing tuition increases at other schools.

There are constraints that may serve to moderate future price increases at expensive schools. At some point, some students would find the "sticker price" too high to consider even applying to these schools unless it were made very clear that financial aid were available to reduce the net price to the level of the student's other alternatives. Unfortunately, it is impossible to predict what this price maximum may be. Perhaps the best hope for the future is that these schools will exercise restraint in raising their tuitions to ensure that many of the "best" students do not move to other schools, an outcome that would harm a selective school that raised its prices by too much.

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TUITION AND EXPENDITURES IN HIGHER EDUCATION:

AN ECONOMETRIC MODEL

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Introduction

Tuition charges at colleges and universities increased in real terms throughout the 1980s. These tuition increases have been accompanied by real increases in educational and general (E&G) expenditures (defined in Appendix A) and followed flat or negative growth in the late 1970s. Real net tuition revenue (defined as total tuition revenue minus institutional financial aid, corrected for inflation) rose 39 percent at private four-year schools between the academic years of 1980/81 and 1985/86 after falling 4 percent in the previous five year period. At the same time, real E&G expenditures at these schools rose 29 percent between 1980/81 and 1985/86 and fell 1 percent between 1975/76 and 1980/81. Similar trends were observed in the public sector. Exhibit 1 presents these trends.

While the 1970s were a period of relatively high inflation, the increases in tuitions in the 1980s have more than compensated for the declines from the previous decade. Public policy debate has focused on the relationship between the increases in tuition and expenditures in the 1980s. Some argue that tuitions increased to cover rising college costs while others argue that institutions exploited their ability to raise tuition in order to obtain additional revenue needed to increase expenditures.

Many reasons have been put forward to explain rising tuitions. Increases in a number of different expenditures could have forced increases in tuitions. Faculty salaries and administrative growth are two commonly cited expenditures which have grown in the 1980s. It has also been suggested that colleges chose to raise tuition to generate new revenue and cover additional expenditures. Thus, tuition increases are driven by increased costs or by other factors not related to increases in the cost of providing the educational services.

A decade ago, Howard Bowen (1980) posited that tuitions are driven by non-cost factors. Schools, he claimed, will spend all of the money that they can and will raise tuition if possible to

EXHIBIT 1

Trends in Net Tuition Revenue and E&G Expenditures Per FTE (Full-Time Equivalent Enrollment), 1985/86 dollars

Sector	1975/76	1980/81	1985/86	% change 1975 to 1980	% change 1980 to 1985
Private Four-Year					
Net Tuition Revenue	$4,013	$3,835	$5,341	- 4%	+39%
E&G Expenditures	7,813	7,713	9,959	- 1	+29
Budget Share of Tuition	51%	50%	54%		
Public Four-Year					
Net Tuition Revenue	1,117	1,047	1,476	- 6	+41
E&G Expenditures	6,452	6,524	7,884	+ 1	+21
Budget Share of Tuition	17%	16%	19%		
Public Two-Year					
Net Tuition Revenue	693	608	802	-12	+32
E&G Expenditures	3,952	3,870	5,030	- 2	+30
Budget Share of Tuition	18%	16%	16%		

Source: HEGIS tabulations (see Cross-Section Model below for details).

generate extra money to cover additional expenditures. In other words, tuition levels are not set to balance the budget. Rather, they are set to raise as much tuition revenue as possible in order to fund additional programs.

Recently, a Stanford University official stated that Stanford would make decisions about which programs to add by asking the question: "Can we raise tuition to pay for this program?" This would indicate that for Stanford, at least, the answer to the question of whether schools raised tuition as a means of funding additional programs was "yes."

The two suppositions -- (1) increasing expenditures drive tuitions and (2) tuitions increase because of market forces -- are, in reality, not mutually exclusive. As an example, energy costs might go up at the same time that the value of a college degree increased. In this case, higher costs would put upward pressure on tuitions and at the same time schools may have exploited their increased ability to raise tuition. This decomposition of tuition increases is similar to describing price changes as "cost-push" and "demand-pull" inflation. Here, increased expenditures represent cost-push pressures on tuition while Bowen describes demand-pull pressures on tuition levels.

How Do Colleges Behave?

The vast majority of college students in the United States are enrolled in non-profit schools. If colleges were organized as for-profit institutions, their behavior would be significantly altered. For instance, colleges would raise as much tuition revenue as they could (from a group of students with fixed instructional costs) in an effort to maximize the difference between revenues and costs. There would be no incentive to turn away applicants who were willing to pay the full cost of their attendance. Financial aid would be a simple vehicle for price discrimination.

and there would be little incentive to offer merit-based financial aid.[1] There would be "bottom line" pressures to cut programs that weren't "pulling their weight" (fully covering their costs). Colleges would be very concerned with legitimacy, including both accreditation and the perception of the "product" they are "selling" by "customers." They would have incentives to offer the cheapest programs possible without losing their legitimacy.

The standard economic model of the firm must therefore be modified, since these models rely on the firm acting as a profit-maximizing organization. One possibility is to assume that colleges are maximizing utility of administrators and other decision makers. Utility-maximizing colleges could have very posh surroundings, with lots of amenities like health clubs, skybox seats in the athletic stadiums and numerous administrative and faculty perquisites. This model has been suggested for hospitals where fancy equipment which is rarely used is purchased "to keep the doctors happy" (Lee, 1971).

Another model for describing the behavior of non-profit firms assumes that they operate as cost-minimizers. However, this approach suffers from many of the same problems as the profit-maximization model, especially the assumption of unanimity of purpose by the decision makers.[2]

The complications which occur when modelling college behavior arise, in part, because of the extreme diversity represented by the "output" of these organizations. Each of these outputs has its own constituency. Each constituency has varying degrees of influence over the decisions which are reached. These constituencies comprise the college community, which is made up of administrators, faculty, staff, students and their parents, and alumni(ae). This community also includes governing boards as well as Federal, state and local policy makers and the public at large.

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[1] There might be incentives to offer merit-based aid in order to enroll prestige-enhancing students, such as National Merit Scholars.

[2] See Rose Ackerman (1986) for further discussion of the issues involved in economic analysis of non-profit organizations.

A constructive method for thinking about college behavior is presented by McPherson, Schapiro and Winston (1988). Rather than modelling the university as maximizing some objective function, a political model is used to describe the resource allocation process which occurs. A set of objectives which they hypothesize colleges share includes:

1. Maintenance or improvement of the quality of education the institution can offer in the future;

2. Expansion of the applicant pool -- either with the objective of attaining adequate enrollment (for nonselective institutions) or of increasing the institution's capacity to select preferred students;

3. Recruitment of a socioeconomically diverse population of students; and

4. Improvement of the institution's prestige and reputation (McPherson, Schapiro, Winston, 1988; p. 18).

The objectives of the college set up a tension between the desire to obtain more revenue and the desire to keep tuition low. Additional tuition revenue could be used to fund quality/prestige/reputation improvements. Higher tuition could reduce the applicant pool and hurt low-income/minority recruiting as well as angering alumni(ae), students and parents.

Accompanying these objectives are several constraints under which institutions operate. Some of these constraints are material: the condition of the physical assets of the university; the level and type of endowment funds; and outside revenue sources to name a few. Other constraints are institutional -- how each institution defines its mission and the impact of past decisions on current allocation priorities. Each college also operates in an economic, governmental and political environment which can have substantial impact on the decisions which are undertaken.[3]

[3] Paul Brinkman (1988) provides an excellent description of the influences of resource allocation on higher education decisions. Garvin (1980) provides a description of university behavior from an economic perspective.

Recall the two suppositions which this paper examines. The first supposes that increasing expenditures drive tuition increases. This could arise from a budget process which treats tuition as the residual. Expenditure levels are determined, and tuition is used to make up the difference between expenditures and other revenues. Under this scenario, the tuition increases which have been observed in the recent past are related to either increased costs of providing educational services or revenue shortfalls from other sources. This may be especially acute for public institutions since most state and local governments have experienced sustained problems balancing their budgets in the past decade.

The second supposition reverses the direction of causality -- first tuition levels are determined, and the revenue is spent on various programs. This corresponds to tuition being set by market forces and the money being spent for quality/prestige/reputation improvements. Under this scenario, tuition increases of the past decade might be ascribed to increased demand for college arising from higher returns to college education. Tuition increases could also be attributed to prestigious colleges taking advantage of inelastic demand for their services and their ability to raise tuition without affecting their applicant pool. This could have allowed less prestigious colleges to follow their lead and still keep their relative price about the same. For the public sector, increases in the private sector might have made tuition increases more palatable, since the relative "cheapness" of public education is maintained.

In all likelihood, both of these suppositions are operating to a greater or lesser extent at different institutions. Budget committees sort out these issues and arrive at tuition and expenditure levels each year. The task which this paper undertakes is to discover, ex post, how these different objectives and constraints were traded off at colleges and universities over the past decades.

It is an empirical issue whether these effects are present, and what their magnitude is. The model described below is designed to detect and measure each effect separately while taking account of other factors affecting both.

An Empirical Model of College Behavior

The empirical model focuses on the joint determination of tuition and expenditures. Both amounts are arrived at concurrently, with the level of one affecting the other. This structure leads to a fully integrated simultaneous equation system, where tuition is a function of expenditure and expenditure is a function of tuition. Such a structure will allow an empirical test of whether the posited effects existed, and if they changed over time. The coefficient on expenditure in the tuition equation will describe the effect that increases in the cost of providing educational services had on tuition levels. The coefficient on tuition in the expenditure equation will describe the effect that increases in tuition had on expenditure levels.

One complication associated with any treatment of tuition revenue is the distinction between gross and net tuition revenue. Colleges do not receive the full amount of tuition charged – some of it is rebated back to students as tuition discounts or financial aid. This can either be modelled with two equations (one for gross tuition revenue and one for institutional aid) or one (net tuition revenue). This model uses net tuition revenue, or that amount which each school can use to fund its programs.

The use of net tuition revenue involves some tradeoffs. We will be unable to answer some interesting questions regarding the role of institutional aid in offsetting increases in tuition charges. Instead, a constrained solution is estimated which incorporates choices made regarding both the tuition sticker price and institutional aid. This approach was chosen because it provides

the clearest specification for determining the tradeoffs between expenditures and spendable tuition revenue.

Public institutions rely heavily on state appropriations for funding. State legislatures also have varying degrees of control in setting tuition levels. In some states the legislature sets the level of tuition, while in other states the decision is left up to governing boards (SHEEO, 1988). However, it is reasonable to assume that legislatures are aware of the implications their appropriation decisions will have on tuition charges. The empirical model treats state appropriations as a jointly determined variable with tuition and expenditure levels. Since state appropriations are determined before final tuition and expenditure decisions are made, this variable enters the simultaneous equation recursively.[4]

Tremendous diversity is present in the postsecondary sector, both in size and in educational mission. In order to make meaningful comparisons between schools of different sizes, each budget item was divided by the amount of full-time equivalent (FTE) students.[5] However, there may still be some variation across different sized schools which may remain after putting the dollar figures in per-FTE terms. For instance, there may be economies of scale present in the higher education production function (see Brinkman and Leslie 1986). These effects are allowed for by including the number of FTE students as an explanatory variable in the expenditure and state appropriations equations.

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[4] The treatment of state appropriations as a jointly determined variable accounts for unmeasured factors which may affect all three variables that constitute the simultaneous equation system. The recursive nature of state appropriations implies that their level affects tuition and expenditures, but appropriations are not directly affected by these levels except by unmeasured factors.

[5] Following the methodology used by the National Center for Education Statistics, three part-time students are considered equivalent to one full-time student.

Varied educational missions are controlled for by examining separately three broad groups of higher education institutions: public two-year schools, public four-year schools and private four-year schools.[6] Of course, substantial variety still remains within these three groups, especially the private four-year group. It is difficult to divide four-year schools along well-defined lines. One distinction used in the empirical model is between "universities" and "other four-year schools" (using the National Center for Education Statistics definition). A dummy variable for universities was included in the models for four-year schools.[7]

Although state appropriations are not a large revenue source for the private sector, the empirical model still considers them endogenous to the system. If they have no effect, the coefficient estimate will be zero and nothing is lost by estimating this equation (since it enters recursively). However, there is some evidence that public policy at the state level has significant effects on private institutions (Astin and Inouye, 1988). It is also reasonable to assume that these private institutions have at least some influence regarding the level of state appropriations they receive, since they must enter the legislative process in order to win funds from the state budget.

The empirical model has three jointly determined variables: E&G expenditures, net tuition revenue and state appropriations. It is assumed that state appropriations affect the tuition level, but the level of direct state support is chosen before tuition and expenditure levels are set. Tuition and expenditures affect each other. These two variables represent a fully integrated system. The model that is estimated is of the following general form:

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[6] The other two logical groups are private two-year schools and proprietary schools. The private two-year group is too small to yield useful results and no data exists for the estimation of this model on proprietary schools.

[7] Universities represent too small a group to allow separate estimation.

$$E = a_1 \cdot T + a_2 \cdot S + a_3 \cdot X + e_1$$

$$T = b_1 \cdot E + b_2 \cdot S + b_3 \cdot Y + e_2$$

$$S = c_1 \cdot Z + e_3$$

where:

E = E&G Expenditures per FTE;
T = Net Tuition Revenue per FTE;
S = State Appropriations per FTE;
X = Other variables affecting E;
Y = Other variables affecting T;
Z = Other variables affecting S;
a,b,c = Parameters to be estimated; and
e = Random error.

The analytic focus of this research project is the process by which tuition and expenditure levels are determined over time. Dollar figures are in real terms and expressed as natural logarithms, which gives the coefficient estimates the interpretation of being elasticities. An elasticity is the percentage change in one variable which occurs when the other variable changes by one percentage point.

It is also possible to recover the derivatives from the results. The derivative is obtained by multiplying the elasticity by the ratio of the levels of each variable.[8] For the cost derivative, this ratio is the budget share of tuition for each of the two years in the model being estimated. For the non-cost derivative, the ratio is the reciprocal of the budget shares of tuition. Thus, the derivative represents a weighting of the elasticity by the shifting budget share of tuition. If the budget share has risen, the cost derivative will be larger than the cost elasticity and the non-cost derivative will be smaller than the non-cost elasticity.

The specification of dollar figures in logarithms assumes a constant elasticity over the time period under consideration. Since the model is estimated on three different time periods, one

[8] The specification of the model as the difference in the logs is algebraically equivalent to the log of the ratio.

interesting result is whether the elasticities have changed over time. A changing elasticity will indicate a change in the process being modelled.

The empirical model of college behavior provides the basis for the two econometric models estimated below. Each econometric model is modified as necessary to use available data. Both sets are primarily derived from the Higher Education General Information Survey (HEGIS) maintained by the National Center for Education Statistics. The first is a cross-section model which uses institutional level data for three separate academic years: 1975/76, 1980/81 and 1985/86. The second model is a time-series model which uses annual data by sector for 20 years: 1966/67 to 1985/86. Both models can inform the analysis, but the cross-section model provides a much richer description of each college's financial characteristics, as well as other determinants of the process under consideration.

The paucity of data which were available for the estimation of the time-series model leads to results which are not as precisely estimated as the cross-section results. The estimation of the time-series model should be viewed as a method of further examining the process on a different data set. It also serves as a check on the results of the cross-section model estimation. However, the lack of observations requires more careful interpretation of the results.

The next sections describe the cross-section model and the results of the estimation of the model. A discussion of the time-series model follows, and then the results of the two models are compared.

Cross-Section Model Specification

Within the cross-section model, financial variables are specified as the difference in the logs of each dollar amount over five-year periods.[9] The model is estimated on two separate time periods: 1975/76 to 1980/81 and 1980/81 to 1985/86. This specification assumes that the elasticity between tuition and expenditures did not change within each of these periods, but allows the elasticity to change between the two periods.

The three equations -- E&G expenditures, net tuition revenue and state appropriations -- have several variables in common. These are the level of Federal direct appropriations, Federal grants and contracts, local direct appropriations, state and local grants and contracts, and private gifts.[10] This set of variables is expected to have a positive effect on the level of E&G expenditures, since increases (decreases) in these revenue sources ought to lead to increases (decreases) in total expenditures. These variables are expected to have a negative effect on net tuition revenue since increased revenue from other sources should lead to decreased reliance on tuition revenue to fund current operations. The effect of outside revenue on state appropriations is uncertain, since these may either be complements or substitutes for state support of higher education.

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[9] Some schools reported zero amounts in some categories (for instance, numerous schools do not receive direct local appropriations even though this is a significant revenue source for other schools). Since dollar amounts are put in logarithms, these schools would have dropped out of the analysis because the log of zero is undefined. In order to include these schools, they were arbitrarily assigned a value of 1 cent per FTE in the zero category. Schools that reported zero for both years would end up with a zero for that variable in the model when the difference was taken. Schools that either increased from zero or fell to zero are now considered to have increased from 1 cent or fallen to 1 cent. This method for dealing with this data anomaly should not affect the results in a significant manner.

[10] A detailed description of the variables used in this paper can be found in the data glossary contained in Appendix A.

The market value of a schools' endowment is also included in each equation as a proxy for the wealth of the institution. This also captures effects that financial markets may have on the choice variables being modelled. The effect of this variable is expected to have a positive effect on expenditures and a negative effect on tuition for the same reasons cited above for the outside revenue sources. The effect of changes in the market value of the endowment is expected to have a negative effect on state appropriations. States may expect schools to draw down their endowments if their market value has increased, or states may replace lost revenue from reduced endowment value.

Increased resources are included in the expenditures and tuition equations to measure the flow of wealth to the institution.[11] This variable includes gifts to the endowment and operating budget, realized and unrealized capital gains and interest and dividend income. These resources represent discretionary funds which the institution can allocate more or less according to internal priorities. They are expected to have similar effects on tuition and expenditures as other revenue sources. That is, increased resources are expected to have a positive effect on expenditures and a negative effect on tuition.

Total full-time equivalent enrollment is included in both the E&G expenditure and state appropriations equations. Although each budget amount is divided by the number of FTE students, this variable is included to capture any economies of scale which may be present in the supply of educational services. This treatment also helps capture fixed and variable components of state appropriations. Under the assumption of positive economies of scale, this should have a negative effect in these two equations.

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[11] This variable was proposed by McPherson, et al. (1988). The definition used here follows their methodology.

Faculty salaries are one of the independent determinants of the total amount of E&G expenditures. These salaries are set by market forces where colleges are the demanders of faculty services. Treating faculty salaries as independent is the same as assuming that colleges are price-takers in this market.[12] Colleges are able to affect their faculty salary bill by switching from more expensive faculty to less expensive faculty as faculty salaries rise (which is simply a description of downward sloping demand curves). Considering faculty salaries to be independent only assumes that the determinants of faculty salaries exist outside the model being estimated (such as the supply of new Ph.D.s). This variable is expected to have a positive effect on the level of E&G expenditures, since increases in faculty salaries will, other things constant, directly increase the level of educational expenditures.

Admissions policies are expected to affect school's tuition setting decisions. Schools with selective admissions are expected to have higher tuition, since excess demand for these schools is a necessary condition for selective admissions policies. This excess demand provides the opportunity to increase tuition without affecting a school's ability to admit the desired number of applicants. The opposite effect is expected to be operative at schools with open admission policies. An increase in tuition at these schools could be expected to reduce the applicant pool, since the higher price will turn away at least some applicants and affect the school's ability to attain its desired enrollment levels. The measure of admission selectivity present in the HEGIS data sets is self-reported, and is a rough measure at best. However, it is the best measure which

[12] Colleges, in the aggregate, have significant power over the level of faculty salaries since they set the demand schedule for faculty. However, individual colleges have negligible power to affect the market. This is analogous to the situation of the wheat farmer. The price of wheat is affected by the total supply of wheat which is brought to market. But, when an individual farmer brings wheat to market, he or she must take the going price for wheat since any individual farmer's crop will not affect the total supply of wheat in a detectable manner.

was available for this study. Bradburd and Mann (1990) examine the effect of admissions selectivity on tuition levels in more detail in an analysis of the market for higher education.

This model also considers the effect of tuition charges within a particular schools' market segment as a determinant of each school's chosen tuition level. For instance, when other schools within a market segment are raising tuition at double digit rates, it may be easier for a particular school in that segment to raise tuition at similar rates. Similarly, if other schools are only keeping up with inflation, it is more difficult to justify double digit real growth in tuition to the various constituencies which want to keep tuition charges low.[13] This measure is expected to have a positive effect on tuition levels.

State appropriations are determined by per capita disposable income within each state, the percent of the population which is college aged (18-24), and the percent of the population which are college graduates. Income should have a positive effect on appropriations through higher tax collections. College-age population should have a positive effect since states with a high proportion of college-age citizens will have a stronger constituency for state spending on higher education. For the same reason, a positive effect is also expected for the proportion of college graduates in the state's population.

A dummy variable was included for schools identified by NCES as universities. These schools are too small in number to provide sufficient data to estimate separately, but the inclusion of this variable should ameliorate any problems which arise from estimating all four-year schools together. This is included in all three equations, and is expected to have a positive effect on each

[13] It is difficult to determine accurate market segments for each of the colleges in the sample. A perfect measure would be specific to each college. Ideally, administrators would disclose which colleges' tuition they consider when setting their own tuition. The measure used here is much more crude. The sample was divided into 90 subsamples (by control, Census Division and program type). The variable labeled "Tuition at Similar Schools" is the average tuition sticker price at other schools in these subsamples. See the data glossary in Appendix A for more detail regarding the construction of this variable.

jointly determined variable. Universities should have higher expenditures, higher tuition and higher state appropriations than other four-year schools.

The empirical model is presented in Exhibit 2 in tabular form. It is a simultaneous equation system, identified by including variables in some equations that are not included in others. The next section discusses the estimation of this model and the results of that estimation.

Cross-Section Model Estimation and Results

This model is a simultaneous equation system. In order to obtain unbiased and consistent results, the method of two stage least squares was used for the estimation. The primary data used to estimate the model came from the HEGIS surveys. Each variable and its source are discussed in detail in the data glossary, which can be found in Appendix A.

The data set was restricted to exclude schools which do not represent the main higher education market. Schools with less than 200 FTE undergraduates were excluded. Their inclusion would have given undue weight to these schools since each variable was put in per-FTE terms. Foreign schools and schools that offer only special programs of study were also excluded, since these schools do not represent the higher education experiences of the vast majority of college students. The model was not estimated for private two-year schools, since this sector is small and includes many schools with special programs. Data were not available to estimate the model for proprietary schools. In total, there were 550 public two-year schools, 328 public four-year schools and 638 private four-year schools which had complete data for each of the variables used in the model.

The model was estimated using the SAS procedure "SYSNLIN," version 5.18. The full results are presented in Appendix B. The discussion of the results here focuses on the empirical evidence regarding the two suppositions presented in the introduction.

EXHIBIT 2

Cross-Section Model Specification

	E&G Expenditures	Net Tuition Revenue	State Appropriations
Jointly Determined Variables			
E&G Expenditures	I	x	
Net Tuition Revenue	x	I	
State Appropriations	x	x	I
Independent Variables			
Fed. Appropriations	x	x	x
Fed. Grants	x	x	x
Local Appropriations	x	x	x
State & Local Grants	x	x	x
Private Gifts	x	x	x
Increased Resources	x	x	
Value of Endowment	x	x	x
Open Admission=1 *		x	
Select Admission=1 *		x	
Tuition at Similar Schools		x	
FTE	x		x
State Per Capita Income			x
State % College Age Population			x
State % College Graduates			x
Faculty Salaries	x		
University=1 *	x	x	x

NOTES:

* denotes a dummy variable, taking the value of 1 if the school is contained in that category, 0 if not.

An "x" indicates that a particular variable is included in the equation denoted by that column.

The "University=1" variable does not appear in the model for Public Two-Year Schools.

Exhibits 3 and 4 present the calculated elasticities and derivatives associated with each supposition. Recall that the "Cost" effect describes the impact increased expenditures had on tuition, while the "Non-Cost" effect describes the impact that increased tuition had on expenditures.

It is difficult to determine with these estimates which effect was stronger without a theoretical basis upon which to base a statement regarding relative strength. However, the presence of these effects and whether they changed over time can still be examined. In general, both effects were found to be operating. The non-cost effect was rather weak between 1975/76 and 1980/81, but grew in strength between 1980/81 and 1985/86.

The results in Exhibit 3 present the estimated effect that changes in expenditures had on net tuition revenue. The results are described in both elasticity terms and derivative terms. Recall that the elasticity denotes the effect that a 1 percent change in expenditures would have on tuition, in percentage terms. The derivative denotes the effect that a 1 unit (here, dollars) change in expenditures would have on tuition, in per-unit (dollar) terms.

Exhibit 4 presents the estimated effect that changes in net tuition revenue had on expenditures. The results are also described in both elasticity and derivative terms, which have the comparable interpretation that was described above for Exhibit 3.

Private Four-Year Schools

Cost pressures on tuition remained about the same at private four-year schools in the late 1970s and early 1980s. At these schools, roughly half of the increase in tuition is explained by increases in the cost of providing educational services. The estimates of the cost elasticity increased slightly (0.47 compared to 0.54 -- Exhibit 3), but these numbers do not differ enough to claim that a different process was present between these two time periods.

EXHIBIT 3

Estimated Effect of Changes in Expenditures on Tuition (Cost)
Cross-Section Model

	Elasticity	Derivative
Private Four-Year Schools		
1975/76 to 1980/81	0.47 **	0.46 **
1980/81 to 1985/86	0.54 **	0.58 **
Public Four-Year Schools		
1975/76 to 1980/81	0.16	0.15
1980/81 to 1985/86	0.74 **	0.86 **
Public Two-Year Schools		
1975/76 to 1980/81	0.47 **	0.42 **
1980/81 to 1985/86	0.90 **	0.92 **

EXHIBIT 4

Estimated Effect of Changes in Tuition on Expenditures (Non-Cost) Cross-Section Model

	Elasticity	Derivative
Private Four-Year Schools		
1975/76 to 1980/81	0.08	0.08
1980/81 to 1985/86	0.65 **	0.60 **
Public Four-Year Schools		
1975/76 to 1980/81	- 0.09	- 0.10
1980/81 to 1985/86	0.30 **	0.26 **
Public Two-Year Schools		
1975/76 to 1980/81	- 0.31 *	- 0.35 *
1980/81 to 1985/86	0.41 **	0.41 **

Notes:

The elasticity is the estimated coefficient.

The derivative is calculated using the mean tuition and expenditure levels.

* Coefficient estimate is significantly different from zero at the 0.10 level using a two-tailed t-test.

** Coefficient estimate is significantly different from zero at the 0.01 level using a two-tailed t-test.

See Appendix B for the full results of the model estimation.

The budget share of tuition fell from 0.51 in 1975/76 to 0.50 in 1980/81 and rose to 0.54 in 1985/86 (Exhibit 1). This increased the spread between the derivatives over these two time periods. It is reasonable to conclude that there may have been some slight increase in cost pressures on tuition, but the evidence is not strong enough to make a definitive statement. However, we can conclude that these cost pressures do not account for all of the tuition increases which were observed in the 1980s.

Non-cost pressures on tuition changed significantly over the ten year period under consideration. The elasticity estimate for the late 1970s is close to zero, while the estimate for the early 80s is 0.65 (Exhibit 4). This is consistent with a change is the effect of non-cost pressures on tuition levels. While the cost pressures remained fairly constant over time, it appears that the non-cost pressures did contribute to increases in tuition which were observed in the 1980s.

Public Four-Year Schools

Cost pressures on tuition rose at public four-year schools in the 1980s. The estimate from the model is not significantly different from zero in the 1970s, while the estimate for the 1980s is significant and positive. This implies that there was little cost pressure on tuition in the 1970s, while cost pressures emerged in the 1980s. When the elasticities are weighted by the budget shares of tuition (the derivative), the cost pressures are shown to be substantially higher than the elasticity denotes (the elasticity is 0.74 and the derivative is 0.86 for 1980/81 to 1985/86). This occurs because the budget share of tuition rose in the 1980s (from 0.16 in 1980/81 to 0.19 in 1985/86 -- Exhibit 1).

A similar trend is observed in the non-cost pressures on tuition -- the effect is statistically zero for the 1970s and significantly positive for the 1980s. This is consistent with the appearance of non-cost pressures on tuition in the 1980s. The 41 percent increase in net tuition revenue

(Exhibit 1) that was observed at public four-year schools in the first five years of the 1980s seems to have come from both cost and non-cost factors.

Public Two-Year Schools

The results for the public two-year schools are less reliable. Although the budget share of tuition at these schools is about the same as the public four-year schools (between 0.16 and 0.19 - - Exhibit 1), the level is still low in absolute terms. Also, many of these schools have very low tuition levels, which make the interpretation of these results more problematic. Both cost and non-cost pressures grew at these schools between the late 1970s and early 1980s.

One anomaly which arose from the results of the cross-section model for public two-year schools is the estimate of a negative non-cost elasticity for the 1975/76 to 1980/81 time period. There are only two possible situations which could lead to a negative elasticity: either tuition rose while expenditures fell, or tuition fell while expenditures rose (holding all other variables constant). During this period, net tuition revenue fell 12 percent and E&G expenditures fell 2 percent (Exhibit 1) for this group of schools as a whole. It is difficult to determine the exact cause of the negative elasticity, especially since these schools have very low absolute tuition levels.

The results from the estimation of the cross-section model indicate that there was a significant change in colleges' tuition-setting behavior in the 1980s. This change was most noticeable at public four-year schools, where both cost and non-cost pressures emerged in the 1980s. At private four-year schools, cost pressures were about the same during both periods while non-cost pressures on tuition were present in the 1980s.

Time-Series Model Specification

The specification of the time-series model was limited by the paucity of data. Only 20 years of annual data were available, thereby limiting the number of variables that could be included in the model. Financial variables are specified as the natural logarithm of the level for each year, and were estimated on annual data from 1966/67 to 1985/86. This specification assumes that the elasticity is constant throughout this entire time period. There were not sufficient data to test whether the elasticity changed over time, although this would be an interesting question to address. To assess whether the elasticity changed would require several interaction terms which would have reduced the degrees of freedom so severely that the results would have been rendered meaningless. The empirical model was adapted in order to fit the data which were available for estimation to the model. The model described here has three jointly determined variables: E&G expenditures, net tuition revenue, and state and local appropriations. (The data did not allow the decomposition of state from local appropriations, so they were estimated together.) The structure of these three jointly determined variables is the same as that described in the section on the empirical model above.

Lagged values of net tuition revenue and state and local appropriations were included to allow for persistence effects in the level of these variables over time.[14] These are expected to have a positive effect on their respective levels.

Federal appropriations are included as a determinant of E&G expenditures and state and local appropriations. Federal appropriations are expected to have a positive effect on total

[14] When the model was estimated with the lagged value of E&G expenditures included, it failed to converge within 250 iterations. The coefficient on this variable was effectively zero, so it was dropped. Without this variable, the model converged within 18 iterations. See the section on model estimation for a discussion of the convergence criterion.

expenditures. Their effect on state appropriations is uncertain, since Federal spending could be either substitutes or complements with respect to state spending.

The level of the Gross National Product (GNP) is expected to have a positive effect on the level of state and local appropriations. It enters as a measure of the business cycle. In recessions, state and local appropriations are expected to fall while they are expected to rise in times of economic expansion.

This model expresses all dollar figures in per-FTE terms. The total FTE is also included as an explanatory variable in the expenditures and state and local appropriations equations. This serves to capture any economies of scale which may be present. Under the assumption of positive economies of scale, this should have a negative effect in these two equations.

Constants were included in all three equations, to capture time-invariant omitted effects. The model specification is summarized in Exhibit 5.

The time-series model is a simultaneous equation system, identified by exclusion restrictions. The next section discusses the estimation of this model and the results of that estimation.

Time-Series Model Estimation and Results

The model described above is a simultaneous time-series system with lagged endogenous variables. The estimation method must consider the presence of autocorrelation and simultaneous

EXHIBIT 5

Time-Series Model Specification

$$E\&G_t = a_0 + a_1 * NTR_t + a_2 * S\&LA_t + a_3 * FA_t + a_4 * FTE_t + e_1$$

$$NTR_t = b_0 + b_1 * NTR_{t-1} + b_2 * E\&G_t + b_3 * S\&LA_t + e_2$$

$$S\&LA_t = c_0 + c_1 * S\&LA_{t-1} + c_2 * FA_t + c_3 * GNP_t + c_4 * FTE_t + e_3$$

where:

- E&G - E&G Expenditures per FTE;
- NTR - Net Tuition Revenue per FTE;
- S&LA - State and Local Appropriations per FTE;
- FA - Federal Appropriations per FTE;
- FTE - Number of Full-Time Equivalent students;
- GNP - Gross National Product;
- t - Current value;
- t-1 - Lagged value;
- a,b,c - Parameters to be estimated; and
- e - Random error.

equation bias. The treatment of the lagged endogenous variables is different than in the usual case. Kmenta (1986, pages 704-711) describes the problem and its solution in detail.[15]

This model was estimated using aggregate data obtained from the National Center for Education Statistics. This data was based on raw tabulations from the annual HEGIS surveys. In the cross-section model, schools which only offered specialized programs and schools with fewer than 200 FTE enrollment were excluded. It was not possible to constrain the time-series data set to exclude these schools. However, since these schools are small by definition, their inclusion in the aggregate data set should not noticeably affect the results. The results which are described below were estimated with GAUSS386.

The full results from the time-series estimation are presented in Appendix C. Several of the coefficient estimates are not significantly different than zero, using conventional tests for statistical significance. This is undoubtedly due to the low number of degrees of freedom which makes it difficult to declare an estimated coefficient to be significantly different from zero.

The derivatives are calculated using the data points for each year. As noted above, the time-series model has a constant elasticity specification, which is the coefficient estimate. Hence, it should not matter which data points are used in calculating the derivative. In practice, the derivative is not constant, but varies to a slight degree for all three types of schools as the budget share of tuition changes over time.

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[15] Instead of treating the lagged endogenous variables as exogenous variables (which is the usual method), the estimation procedure begins by treating them as if they were endogenous. In the first step, instruments are created for the endogenous and lagged endogenous variables, by regressing these endogenous variables on the current and lagged values of the purely exogenous variables. Second, the endogenous variables on the right-hand side of each equation are replaced with the instruments created in the first step. The model is estimated, and the residuals are used to create estimates for the autocorrelation parameters. In the third step, the autocorrelation parameter estimates are used to correct for the autoregressive nature of the errors. The model is then estimated using these parameters. In order to obtain consistent results, steps two and three are performed repeatedly until all the estimated parameters converge (to 0.001). This includes the autocorrelation parameters and the coefficient estimates.

Exhibits 6 and 7 present the cost and non-cost elasticities and derivatives which were estimated by the time-series model. At both groups of four-year schools, the estimate of the cost elasticity was not significantly different than zero. This may well be due to a changing elasticity over time, which the specification of constant elasticity could not capture.

The non-cost elasticity is statistically significant at both four-year school groups. The elasticity at private four-year schools is larger (0.64) compared to the public four-year schools (0.19). This is a result which was expected, since the flexibility of private schools in setting tuition is greater.

The results for public two-year schools are different. The cost elasticity is statistically significant (0.65). The non-cost elasticity is not distinguishable from zero, although the point estimate is larger than the estimate for public four-year schools (0.54 for public two-year, 0.19 for public four-year schools).

It is difficult to glean any consistent conclusions from the time-series model estimation in isolation. The next section presents those conclusions that can be drawn and compares them to those from the cross-section model.

Comparison of Results from the Two Models

The first point of comparison between the results of these two models is whether one can reliably claim that they both are describing the same process. In Exhibit 8, confidence intervals for the results are displayed. These confidence intervals are constructed from the point estimate and the standard error for each estimate. Each interval begins at one standard error below the point estimate and concludes at one standard error above the point estimate. This represents about a 70 percent confidence interval. using a two-tailed test.

Exhibit 6

Estimated Effect of Changes in Expenditures on Tuition (Cost Effect) Time-Series Model (1966/67 to 1985/86)

	Elasticity	Derivative
Private Four-Year Schools	0.28	0.29
Public Four-Year Schools	0.83	0.85
Public Two-Year Schools	0.65 *	0.65 *

EXHIBIT 7

Estimated Effect of Changes in Tuition on Expenditures (Non-Cost Effect) Time-Series Model (1966/67 to 1985/86)

	Elasticity	Derivative
Private Four-Year Schools	0.64 *	0.63 *
Public Four-Year Schools	0.19 *	0.18 *
Public Two-Year Schools	0.54	0.54

Notes:

The elasticity is the estimated coefficient.

The derivative is calculated using the mean tuition and expenditure levels.

* Coefficient estimate is significantly different from zero at the 0.10 level (using two-tailed t-tests).

** Coefficient estimate is significantly different from zero at the 0.01 level (using two-tailed t-tests).

Exhibit 8

Confidence Intervals for Time-Series and Cross-Section Estimates

ESTIMATE OF EFFECT OF EXPENDITURES ON TUITION (COSTS)

		PUBLIC TWO	PUBLIC FOUR	PRIVATE FOUR
Time-Series	(66-85)	0.40 to 0.90	0.24 to 1.43	-0.06 to 0.63
Cross-Section	(75-80)	0.36 to 0.57	-0.003 to 0.33	0.41 to 0.54
Cross-Section	(80-85)	0.81 to 1.00	0.59 to 0.88	0.48 to 0.60

ESTIMATE OF EFFECT OF TUITION ON EXPENDITURES (NON-COST)

		PUBLIC TWO	PUBLIC FOUR	PRIVATE FOUR
Time-Series	(66-85)	0.17 to 0.91	0.09 to 0.29	0.36 to 0.93
Cross-Section	(75-80)	-0.44 to -0.18	-0.15 to -0.04	-0.02 to 0.18
Cross-Section	(80-85)	0.37 to 0.45	0.26 to 0.34	0.61 to 0.69

The larger standard errors associated with the time-series estimates are probably an artifact of omitted time-varying factors, as well as the paucity of data which were used to estimate the model. The cost elasticity interval for the time-series estimate generally contains the more precise estimates obtained from the cross-section model. The assumption of constant elasticity is probably responsible for the wide interval on the time-series model. If the elasticity did change, as suggested by the cross-section model, then the time-series model will estimate some sort of average effect over the entire period. The conclusion which can be drawn is that the estimates of these two models are consistent.

The non-cost elasticities present a more ambiguous picture. The interval for the time-series estimates generally contains the cross-section interval, but only for the 1980/81 to 1985/86 period. The cross-section interval for the 1975/76 to 1980/81 period is everywhere below the interval surrounding the time-series estimate. If the interval were expanded, for instance to encompass a 95 percent confidence interval, this would disappear.

However, it is consistent with the cross-section results that it is not the absence of this effect in 1975/76 to 1980/81 which gave rise to the estimates of zero, but that the regime changed between 1975/76 and 1980/81. The most generous interpretation that could be drawn is that because 1975/76 was a period of economic adjustment, the presence of uncharacteristically high inflation affected schools' ability to keep ahead of inflation when setting tuition and expenditure levels. Hence, 1975/76 is not a representative year, and the results from the time-series demonstrate that fact. This may be reading too much into these results. A more conservative interpretation is that the regime changed between the two periods in the cross-section model, and that the time-series model estimates are unrealistically high (since the time-series estimate should be some sort of average over the entire period).

The comparison of the results of the two models focuses on the private schools, where the greatest dollar increases in tuition have occurred. These results are summarized in Exhibit 9. According to the time-series estimates, a 1 percent increase in costs is associated with a 0.28 percent increase in tuition. However, the standard error on this estimate was large, which implies that the estimate is not significantly different from zero using conventional tests. This could have occurred due to changing cost pressures over time which were not captured by the model specification. Indeed, since the cross-section results are higher than the time-series estimate of 0.28, it could be that the cost pressures have grown over the time period covered by the model. As noted above, a richer specification would allow the elasticity to change in the time-series model, but there was not sufficient data to estimate such a specification.

The elasticity of the non-cost pressures on tuition was estimated to be 0.64 over the 1966/67 to 1985/86 time period. This was surprisingly similar to the 0.65 estimate obtained from the cross-section model for the 1980/81 to 1985/86 time period. However, the estimate for the 1975/76 to 1980/81 time period was 0.08 and not statistically significant. One interpretation of these results is that the effect of increased expenditures on tuition has remained fairly constant over time, except for the late 1970s.

Why are the estimates for the late 1970s different? One possibility is that this period was a time of rapid changes in relative prices and "stagflation." If schools' response to these economy-wide changes was slow, there may have been some time lag in adjusting to the new realities. Schools could have adjusted at different rates, which would have given the estimate for that time period a large error while the long-run effect remained the same. Time-series models measure long-run trends. Perhaps the 1980s represent a more "normal" period for colleges in terms of their ability to raise tuition to pay for new programs, while the late 1970s were a period of

EXHIBIT 9

Elasticities and Derivatives for Private Four-Year Schools

	Cost Elasticity	Cost Derivative	Non-Cost Elasticity	Non-Cost Derivative
1966/67 to 1985/86				
Time-Series	0.28	0.29	0.64 *	0.63 *
1975/76 to 1980/81				
Time-Series	0.28	0.29	0.64 *	0.63 *
Cross-Section	0.47 *	0.46 *	0.08	0.08
1980/81 to 1985/86				
Time-Series	0.28	0.28	0.64 *	0.64 *
Cross-Section	0.54 *	0.58 *	0.65 *	0.60 *

Notes:

* = Estimate is significantly different from zero at 0.10 level using a two-tailed t-test (the standard error is large relative to the point estimate).

The Time-Series model explicitly assumes a constant elasticity between 1966 and 1985, while the Cross-Section model allows the elasticity to change in the different time periods.

The Time-Series derivative presented here is the average of the annual derivatives for the time-period under consideration.

adjustment to the new economic realities. This conjecture seems to be supported by the results of this model.

The elasticities and derivatives for both models are presented in Exhibit 9.

Conclusion

The econometric model in this paper attempts to unravel the process by which tuition and expenditure levels were set in the 1970s and 1980s, a period of intense public scrutiny. Decisions were made regarding tuition and expenditures. The results shed some light on the tradeoffs which schools made in arriving at these decisions. However, these results cannot be interpreted in isolation from all of the other information which is known about the higher education sector during this period.

Several qualifications must be considered when interpreting these results. As with any econometric model, the results are only as good as the data used to estimate the model. The data which were used come from HEGIS. No better data source exists for this type of analysis, but it is important to remember that the HEGIS data sets consist of unaudited responses by school financial officers, and may not be consistent across all schools.

Another important qualification which must be considered is that the process by which colleges set their tuition and expenditure levels is not well defined. Colleges are vague about the process, and different colleges have distinctly different budgeting processes. The type of analysis which was performed here applies to the higher education sectors in the aggregate -- the process at any particular school may not be reflected in these results.

Tuition and expenditures have increased substantially in the 1980s at all types of colleges. Two general reasons for these increases can be constructed: increased costs were passed on to students in the form of higher tuition; or, increased expenditures were undertaken by choice and

funded by tuition increases. The simultaneous nature of the model estimated here allows each of these effects to be isolated.

While the time-series estimates are of interest, the main conclusions of this paper focus on the cross-section model results. Increased costs of providing higher education contributed to tuition increases in the late 1970s and early 1980s. These effects grew at both public and private four-year schools, which indicates a change in the process by which cost pressures were translated into tuition increases at these schools.

The second effect which this model tests is that increased tuition was being used to fund additional expenditures. No value judgement is made regarding the social welfare implications of these decisions on the part of colleges. That determination is left up to the college community at large, and cannot be made without inspecting the recipients of these additional expenditures.

The empirical evidence indicates that this effect was not a significant determinant of tuition levels in the 1975/76 to 1980/81 time period, but that these non-cost pressures appear in the 1980/81 to 1985/86 period. The magnitude of these pressures was greater at private four-year schools than they were at public schools. This is not surprising, since private schools have more autonomy in setting tuition levels than schools in the public sector.

These results of this model do not allow a definitive statement about the "causes" of rising tuition, or which of the two effects outlined above were stronger. More empirical work needs to be done before the such a statement can be made. This report is a first step in that direction.

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APPENDIX A

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APPENDIX A

Data Glossary

All variables are from HEGIS, except as noted.

E&G Expenditures -- The total amount of current educational and general expenditures. This variable includes expenditures on: instruction, research (but not Federally funded research centers, which are considered independent operations), public service, academic support, libraries, student services, institutional support, plant operation and maintenance, scholarships and fellowships. It excludes expenditures on auxiliary enterprises such as dorms and food service under the assumption that these enterprises are basically self-supporting. It also excludes expenditures from independent operations such as hospitals.

Net Tuition Revenue -- The total amount of tuition and fees assessed against students for current operating purposes, less the amount of institutional financial aid. The institutional aid variable is either scholarship and fellowship expenditures from unrestricted funds (time-series model and 1975-76 cross-section model) or a measure of institutional aid from NCES's Financial Report and Application to Participate (FISAP, which was only available for the cross-section model in 1980/81 and 1985/86).

State Appropriations -- The total amount of direct state appropriations used for meeting current operating expenses and not for specific projects or programs.

Federal Appropriations -- The total amount of direct Federal appropriations used for meeting current operating expenses and not for specific projects or programs.

Federal Grants and Contracts -- Revenues from Federal agencies which are for specific research projects or other types of programs. This figure does not include Pell grants, although other financial aid revenue which is administered by the institution (such as Campus-Based aid) is included. This does not include Federally funded research centers, which are treated as independent operations in the HEGIS surveys.

Local Appropriations -- The total amount of appropriations from local governments used for meeting current operating expenses and not for specific projects or programs.

State and Local Grants and Contracts -- Revenues from state and local agencies which are for specific research projects or other types of programs.

Private Gifts -- Current funds revenues from private donors for which no legal consideration is involved. Only includes revenue that are directly related to instruction, research or public service. Includes gifts and grants received from foreign governments, and the estimated dollar amount of contributed services.

Increased Resources -- Gifts to the endowment plus gifts to the operating budget plus realized and unrealized capital gains plus interest and dividends.

Endowment Market Value -- The reported market value of endowment at the beginning of the fiscal (academic) year.

Open Admission -- Reported admission requirements are "only the ability to profit from attendance."

Selective Admission -- Reported admission requirements are "high school graduation plus an indication of superior academic aptitude (class standing, grades, curriculum, particular school, test scores, etc.)."

(The omitted admission selectivity category is "high school graduation.")

Similar Tuition -- The mean tuition sticker price at all other schools in the same Census Division of the same control and type. There are nine Census Divisions. Types come from classifications created by the Carnegie Commission: Research, Doctoral-Granting, Comprehensive, and Liberal Arts (or Other for public schools). A fifth type was added: Two-Year schools. This yields 90 cells. For the few schools which were the only ones of their type in a particular Division, a zero was used for this variable.

FTE -- Number of Full-Time Equivalent students, in thousands. Calculated by adding the number of full-time students to 1/3 of the part-time students. This is the methodology followed by NCES, since schools have different formulae for calculating their reported FTE.

Per capita income -- State per capita disposable income, from the Digest of Education Statistics (various years).

State percent college age population -- Calculated by dividing the number of 18-24 year olds residing in each state by the total population of that state, from the US Census (State Population Estimates by Age).

State percent college graduates in population -- Calculated by dividing the number of college graduates residing in each state by the total population of that state, from the Digest of Education Statistics (various years) and the US Census (State Population Estimates by Age).

Faculty Salaries -- Constructed by multiplying the average faculty salary for each rank by the number of faculty in that rank. Unranked faculty were excluded from this calculation.

University -- Institutions with at least two first-professional programs (the NCES definition).

GNP -- Gross National Product, from the Economic Report of the President (various years). The Federal fiscal year which corresponded most closely to the academic year was used.

CPI -- Academic year consumer price indices were constructed from monthly data obtained from the US Bureau of Labor Statistics.

Public Two-Year – Control was reported as public. Institution type was reported as two-year, two-year branch of a multi-campus university, or two-year branch of other four-year multi-campus institution. NCES code was not reported as Specialized Program (any) or a US Service school (for the cross-section model only, these schools could not be excluded from the time-series model).

Public Four-Year – Control was reported as public. Institution type was reported as university, other four-year, or other four-year branch of a multi-campus university. NCES code is the same as Public-Two-Year above.

Private Four-Year – Control was reported as private. Institution type is the same as Public Four-Year above. NCES code is the same as Public-Two-Year above.

APPENDIX B

Complete Results of the Cross-Section Model Estimation

ERIC

EXHIBIT B-1

Private Four-Year Schools
Cross-Section Model

Model Summary

Model variables	37
Endogenous	6
Exogenous	31
Parameters	76
Instruments	31
Number of statements	7

2SLS Estimation Summary

Number of observations	638
Parameters estimated	72

Minimization summary

Method	Gauss
Iterations	1
Estimation time	7.127

Final convergence criteria	
R	0
PPC	6.1757E-13
RPC(D18)	55966
Object	0.75691
Trace(s)	10.31468103
Objective	0.4751452564
Objective*N	303.14

2SLS Summary of Residual Errors

EQUATION	DF MODEL	DF ERROR	SSE	MSE	ROOT MSE	R-SQUARE
E&G Expenditures (1975/76 to 1980/81)	12	626	12.72	0.0203	0.1426	0.3445
Net Tuition Revenue (1975/76 to 1980/81)	13	625	14.42	0.0231	0.1519	0.1406
State Appropriations (1975/76 to 1980/81)	11	627	3884.25	6.1950	2.4890	0.1374
E&G Expenditures (1980/81 to 1985/86)	12	626	12.33	0.0197	0.1404	0.2613
Net Tuition Revenue (1980/81 to 1985/86)	13	625	17.11	0.0274	0.1655	-0.1560
State Appropriations (1980/81 to 1985/86)	11	627	2526.32	4.0292	2.0073	0.0427

EXHIBIT B-1 (continued)

Private Four-Year Schools
Cross-Section Model

2SLS Parameter Estimates

Dependent Variable: E&G Expenditures (1975/76 to 1980/81)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Net Tuition Revenue	0.0796	0.1033	0.77	0.44
State Appropriations	-0.0025	0.0090	-0.28	0.78
Federal Appropriations	0.0022	0.0020	1.11	0.27
Fed. Grants & Contracts	0.0044	0.0017	2.51	0.01
Local Appropriations	0.0053	0.0094	0.56	0.57
State&Loc Grants&Contracts	0.0025	0.0022	1.13	0.26
Private Revenue	0.0146	0.0045	3.27	0.00
Increased Resources	-0.0003	0.0034	-0.10	0.92
Endowment Market Value	0.0084	0.0034	2.50	0.01
FTE	-0.4135	0.0373	-11.08	0.00
Faculty Salary Bill	-0.0027	0.0020	-1.36	0.17
University=1	0.0247	0.0250	0.99	0.32

Dependent Variable: Net Tuition Revenue (1975/76 to 1980/81)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
E&G Expenditures	0.4748	0.0625	7.59	0.00
State Appropriations	0.0070	0.0098	0.71	0.48
Federal Appropriations	-0.0049	0.0021	-2.37	0.02
Fed. Grants & Contracts	-0.0038	0.0019	-2.06	0.04
Local Appropriations	-0.0014	0.0100	-0.14	0.89
State&Loc Grants&Contracts	-0.0007	0.0024	-0.32	0.75
Private Revenue	-0.0114	0.0049	-2.31	0.02
Increased Resources	0.0028	0.0037	0.75	0.45
Endowment Market Value	0.0026	0.0035	0.75	0.45

Dependent Variable: Net Tuition Revenue (1975/76 to 1980/81)(continued)

Open Admission=1	-0.0651	0.0410	-1.59	0.11
Selective Admission=1	-0.0536	0.0115	-4.65	0.00
Tuition at Similar School	0.3739	0.2158	1.73	0.08
University=1	0.0916	0.0255	3.59	0.00

EXHIBIT B-1 (continued)

Private Four-Year Schools
Cross-Section Model

Dependent Variable: State Appropriations (1975/76 to 1980/81)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Federal Appropriations	0.0928	0.0303	3.06	0.00
Fed. Grants & Contracts	-0.0165	0.0302	-0.55	0.58
Local Appropriations	-0.0020	0.1638	-0.01	0.99
State&Loc Grants&Contracts	-0.1827	0.0240	-7.61	0.00
Private Revenue	-0.0198	0.0776	-0.26	0.80
Endowment Market Value	-0.0278	0.0488	-0.57	0.57
FTE	-0.2164	0.4949	-0.44	0.66
State per capita income	5.6526	1.9078	2.96	0.00
% College Age Population	-5.4840	3.3316	-1.65	0.10
% College Grads in Pop.	0.8435	1.7821	0.47	0.64
University=1	0.3430	0.4147	0.83	0.41

Dependent Variable: E&G Expenditures (1980/81 to 1985/86)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Net Tuition Revenue	0.6507	0.0366	17.78	0.00
State Appropriations	0.0391	0.0138	2.84	0.00
Federal Appropriations	0.0011	0.0027	0.41	0.68
Fed. Grants & Contracts	0.0026	0.0020	1.31	0.19
Local Appropriations	0.0056	0.0120	0.46	0.64
State&Loc Grants&Contracts	0.0066	0.0017	3.88	0.00
Private Revenue	0.0256	0.0063	4.05	0.00
Increased Resources	-0.0077	0.0049	-1.60	0.11
Endowment Market Value	0.0080	0.0051	1.55	0.12
FTE	-0.2768	0.0337	-8.21	0.00
Faculty Salary Bill	0.1951	0.0311	6.27	0.00
University=1	-0.0691	0.0236	-2.92	0.00

EXHIBIT B-1 (continued)

Private Four-Year Schools
Cross-Section Model

Dependent Variable: Net Tuition Revenue (1980/81 to 1985/86)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
E&G Expenditures	0.5369	0.0576	9.32	0.00
State Appropriations	-0.0490	0.0179	-2.73	0.01
Federal Appropriations	0.0030	0.0033	0.91	0.37
Fed. Grants & Contracts	0.0002	0.0024	0.07	0.95
Local Appropriations	-0.0065	0.0142	-0.46	0.65
State&Loc Grants&Contracts	-0.0043	0.0021	-2.06	0.04
Private Revenue	-0.0267	0.0077	-3.47	0.00
Increased Resources	0.0058	0.0057	1.01	0.31
Endowment Market Value	-0.0029	0.0061	-0.47	0.64
Open Admission=1	0.0813	0.0450	1.81	0.07
Selective Admission=1	0.0369	0.0168	2.20	0.03
Tuition at Similar School	0.8031	0.0850	9.45	0.00
University=1	0.0368	0.0287	1.28	0.20

Dependent Variable: State Appropriations (1980/81 to 1985/86)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Federal Appropriations	0.0827	0.0344	2.40	0.02
Fed. Grants & Contracts	0.0051	0.0288	0.18	0.86
Local Appropriations	-0.1631	0.1691	-0.96	0.34
State&Loc Grants&Contracts	-0.0690	0.0206	-3.36	0.00
Private Revenue	0.0331	0.0909	0.36	0.72
Endowment Market Value	-0.0149	0.0510	-0.29	0.77
FTE	0.2369	0.4433	0.53	0.59
State per capita income	1.1747	1.0105	1.16	0.25
% College Age Population	2.6118	1.1452	2.28	0.02
% College Grads in Pop.	-0.8193	1.7406	-0.47	0.64
University=1	0.1896	0.3353	0.57	0.57

COVARIANCE OF RESIDUALS

S	EX7580	NTR7580	SA7580	EX8085	NTR8085	SA8085
EX7580	0.02033	-.0044133	.00876886	-.0026081	.00314831	-.0042062
NTR7580	-.0044133	0.02308	-0.03761	.00132925	-.0038354	-8.84E-05
SA7580	.00876886	-0.03761	6.19498	0.05276	-0.06636	-1.16037
EX8085	-.0026081	.00132925	0.05276	0.01970	-0.01968	-0.14532
NTR8085	.00314831	-.0038354	-0.06636	-0.01968	0.02738	0.17955
SA8085	-.0042062	-8.84E-05	-1.16037	-0.14532	0.17955	4.02922

EXHIBIT B-1 (continued)

Private Four-Year Schools
Cross-Section Model

CORRELATION OF RESIDUALS

CORRS	EX7580	NTR7580	SA7580	EX8085	NTR8085	SA8085
EX7580	1.0000	-0.2038	0.0247	-0.1303	0.1335	-0.0147
NTR7580	-0.2038	1.0000	-0.0995	0.0623	-0.1526	-0.0003
SA7580	0.0247	-0.0995	1.0000	0.1510	-0.1611	-0.2323
EX8085	-0.1303	0.0623	0.1510	1.0000	-0.8474	-0.5157
NTR8085	0.1335	-0.1526	-0.1611	-0.8474	1.0000	0.5406
SA8085	-0.0147	-0.0003	-0.2323	-0.5157	0.5406	1.0000

EX7580 - E&G expenditures (1975/76 to 1980/81)
NTR7580 - Net Tuition Revenue (1975/76 to 1980/81)
SA7580 - State Appropriations (1975/76 to 1980/81)
EX8085 - E&G Expenditures (1980/81 to 1985/86)
NTR8085 - Net Tuition Revenue (1980/81 to 1985/86)
SA8085 - State Appropriations (1980/81 to 1985/86)

EXHIBIT B-2

Public Four-Year Schools
Cross-Section Model

MODEL SUMMARY

MODEL VARIABLES	37
ENDOGENOUS	6
EXOGENOUS	31
PARAMETERS	76
INSTRUMENTS	31
NUMBER OF STATEMENTS	6

2SLS ESTIMATION SUMMARY

NUMBER OF OBSERVATIONS	328
PARAMETERS ESTIMATED	72

MINIMIZATION SUMMARY

METHOD	GAUSS
ITERATIONS	1
ESTIMATION TIME	3.755

FINAL CONVERGENCE	CRITERIA
R	0
PPC	1.8656E-13
RPC(H21)	20430
OBJECT	0.75052
TRACE(S)	2.091457849
OBJECTIVE	0.1847330609
OBJECTIVE*N	60.59244

EXHIBIT B-2 (continued)

Public Four-Year Schools
Cross-Section Model

2SLS SUMMARY OF RESIDUAL ERRORS

EQUATION	DF MODEL	DF ERROR	SSE	MSE	ROOT MSE	R-SQUARE
E&G Expenditures (1975/76 to 1980/81)	12	316	5.12	0.0162	0.1272	0.4586
Net Tuition Revenue (1975/76 to 1980/81)	13	315	36.03	0.1144	0.3382	0.0369
State Appropriations (1975/76 to 1980/81)	11	317	286.85	0.9049	0.9513	0.1199
E&G Expenditures (1980/81 to 1985/86)	12	316	7.80	0.0247	0.1571	-0.2051
Net Tuition Revenue (1980/81 to 1985/86)	13	315	33.15	0.1053	0.3244	0.1556
State Appropriations (1980/81 to 1985/86)	11	317	293.56	0.9261	0.9623	0.1397

2SLS PARAMETER ESTIMATES

Dependent Variable: E&G Expenditures (1975/76 to 1980/81)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Net Tuition Revenue	-0.0901	0.0641	-1.41	0.16
State Appropriations	0.0296	0.0245	1.21	0.23
Federal Appropriations	0.0063	0.0025	2.49	0.01
Fed. Grants & Contracts	0.0290	0.0053	5.49	0.00
Local Appropriations	0.0115	0.0054	2.12	0.03
State&Loc Grants&Contracts	0.0058	0.0022	2.63	0.01
Private Revenue	0.0025	0.0031	0.82	0.41
Increased Resources	0.0068	0.0034	2.00	0.05
Endowment Market Value	0.0030	0.0033	0.91	0.36
FTE	-0.6885	0.0504	-13.67	0.00
Faculty Salary Bill	-0.0045	0.0034	-1.33	0.19
University=1	0.0485	0.0180	2.69	0.01

Dependent Variable: Net Tuition Revenue (1975/76 to 1980/81)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
E&G Expenditures	0.1636	0.1671	0.98	0.33
State Appropriations	0.0786	0.0633	1.24	0.22
Federal Appropriations	0.0075	0.0067	1.12	0.27
Fed. Grants & Contracts	0.0082	0.0146	0.56	0.57
Local Appropriations	-0.0028	0.0149	-0.19	0.85
State&Loc Grants&Contracts	0.0033	0.0060	0.55	0.58
Private Revenue	0.0051	0.0083	0.62	0.54
Increased Resources	0.0071	0.0090	0.78	0.43
Endowment Market Value	0.0111	0.0086	1.28	0.20
Open Admission=1	-0.2076	0.1719	-1.21	0.23
Selective Admission=1	0.0237	0.0437	0.54	0.59

EXHIBIT B-2 (continued)

Public Four-Year Schools
Cross-Section Model

Tuition at Similar School	0.6024	0.1413	4.26	0.00
University=1	0.0590	0.0517	1.14	0.25

Dependent Variable: State Appropriations (1975/76 to 1980/81)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Federal Appropriations	-0.0498	0.0166	-3.00	0.00
Fed. Grants & Contracts	0.0170	0.0395	0.43	0.67
Local Appropriations	-0.1473	0.0312	-4.73	0.00
State&Loc Grants&Contracts	-0.0144	0.0164	-0.88	0.38
Private Revenue	0.0203	0.0229	0.89	0.38
Endowment Market Value	-0.0095	0.0165	-0.57	0.57
FTE	-0.7592	0.3448	-2.20	0.03
State per capita income	-0.8517	1.0698	-0.80	0.43
% College Age Population	-1.3742	1.8862	-0.73	0.47
% College Grads in Pop.	0.0244	0.8059	0.03	0.98
University=1	0.0698	0.1402	0.50	0.62

Dependent Variable: E&G Expenditures (1980/81 to 1985/86)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Net Tuition Revenue	0.3032	0.0395	7.68	0.00
State Appropriations	0.1029	0.0301	3.41	0.00
Federal Appropriations	0.0141	0.0037	3.76	0.00
Fed. Grants & Contracts	0.0410	0.0161	2.54	0.01
Local Appropriations	0.0163	0.0092	1.76	0.08
State&Loc Grants&Contracts	0.0037	0.0032	1.16	0.25
Private Revenue	-0.0016	0.0043	-0.37	0.71
Increased Resources	0.0035	0.0046	0.76	0.45
Endowment Market Value	-0.0013	0.0045	-0.30	0.76
FTE	-0.1915	0.0755	-2.54	0.01
Faculty Salary Bill	0.2908	0.0494	5.89	0.00
University=1	-0.0027	0.0237	-0.11	0.91

Dependent Variable: Net Tuition Revenue (1980/81 to 1985/86)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
E&G Expenditures	0.7351	0.1445	5.09	0.00
State Appropriations	-0.1347	0.0644	-2.09	0.04
Federal Appropriations	-0.0356	0.0073	-4.86	0.00
Fed. Grants & Contracts	-0.1120	0.0305	-3.67	0.00
Local Appropriations	-0.0308	0.0189	-1.63	0.10
State&Loc Grants&Contracts	-0.0018	0.0067	-0.27	0.79
Private Revenue	0.0120	0.0086	1.39	0.17
Increased Resources	0.0029	0.0095	0.31	0.76

EXHIBIT B-2 (continued)

Public Four-Year Schools
Cross-Section Model

Endowment Market Value	0.0066	0.0092	0.71	0.48
Open Admission=1	0.5100	0.1657	3.08	0.00
Selective Admission=1	0.0386	0.0440	0.88	0.38
Tuition at Similar School	0.8838	0.1368	6.46	0.00
University=1	0.0324	0.0495	0.65	0.51

Dependent Variable: State Appropriations (1980/81 to 1985/86)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Federal Appropriations	-0.0485	0.0196	-2.47	0.01
Fed. Grants & Contracts	0.0568	0.0914	0.62	0.54
Local Appropriations	-0.2252	0.0373	-6.04	0.00
State&Loc Grants&Contracts	-0.0032	0.0198	-0.16	0.87
Private Revenue	0.0052	0.0259	0.20	0.84
Endowment Market Value	-0.0039	0.0223	-0.17	0.86
FTE	-0.6415	0.4308	-1.49	0.14
State per capita income	0.6068	0.6149	0.99	0.32
% College Age Population	-0.7056	0.7419	-0.95	0.34
% College Grads in Pop.	-2.0634	1.1032	-1.87	0.06
University=1	-0.0094	0.1514	-0.06	0.95

COVARIANCE OF RESIDUALS

S	EX7580	NTR7580	SA7580	EX8085	NTR8085	SA8085
EX7580	0.01619	0.01058	-.0097394	-.0057891	0.0049529	0.02009
NTR7580	0.01058	0.11437	-0.05134	0.0038822	-0.03010	0.03942
SA7580	-.0097394	-0.05134	0.90490	0.07084	-0.08435	-0.82263
EX8085	-.0057891	0.0038822	0.07084	0.02469	-0.03781	-0.06643
NTR8085	0.0049529	-0.03010	-0.08435	-0.03781	0.10525	0.07378
SA8085	0.02009	0.03942	-0.82263	-0.06643	0.07378	0.92606

EXHIBIT B-2 (continued)

Public Four-Year Schools
Cross-Section Model

CORRELATION OF RESIDUALS

CORRS	EX7580	NTR7580	SA7580	EX8085	NTR8085	SA8085
EX7580	1.0000	0.2458	-0.0805	-0.2896	0.1200	0.1641
NTR7580	0.2458	1.0000	-0.1596	0.0731	-0.2744	0.1211
SA7580	-0.0805	-0.1596	1.0000	0.4739	-0.2733	-0.8986
EX8085	-0.2896	0.0731	0.4739	1.0000	-0.7417	-0.4394
NTR8085	0.1200	-0.2744	-0.2733	-0.7417	1.0000	0.2363
SA8085	0.1641	0.1211	-0.8986	-0.4394	0.2363	1.0000

EX7580 - E&G expenditures (1975/76 to 1980/81)
NTR7580 - Net Tuition Revenue (1975/76 to 1980/81)
SA7580 - State Appropriations (1975/76 to 1980/81)
EX8085 - E&G Expenditures (1980/81 to 1985/86)
NTR8085 - Net Tuition Revenue (1980/81 to 1985/86)
SA8085 - State Appropriations (1980/81 to 1985/86)

EXHIBIT B-3

Public Two-Year Schools
Cross-Section Model

MODEL SUMMARY

MODEL VARIABLES	36
ENDOGENOUS	6
EXOGENOUS	30
PARAMETERS	70
INSTRUMENTS	30
NUMBER OF STATEMENTS	6

2SLS ESTIMATION SUMMARY

NUMBER OF OBSERVATIONS	550
PARAMETERS ESTIMATED	66

MINIMIZATION SUMMARY

METHOD	GAUSS
ITERATIONS	1
ESTIMATION TIME	6.410

FINAL CONVERGENCE	CRITERIA
R	0
PPC	2.1013E-13
RPC(D18)	18997
OBJECT	0.63025
TRACE(S)	2.652038844
OBJECTIVE	0.2684760864
OBJECTIVE*N	147.66

Exhibit B-3 (continued)

Public Two-Year Schools
Cross-Section Model

2SLS SUMMARY OF RESIDUAL ERRORS

EQUATION	DF MODEL	DF ERROR	SSE	MSE	ROOT MSE	R-SQUARE
E&G Expenditures (1975/76 to 1980/81)	11	539	32.69	0.0607	0.2463	0.0387
Net Tuition Revenue (1975/76 to 1980/81)	12	538	94.23	0.1751	0.4185	0.0167
State Appropriations (1975/76 to 1980/81)	10	540	731.59	1.3548	1.1640	0.0781
E&G Expenditures (1980/81 to 1985/86)	11	539	21.64	0.0401	0.2004	-0.0379
Net Tuition Revenue (1980/81 to 1985/86)	12	538	63.61	0.1182	0.3439	0.0953
State Appropriations (1980/81 to 1985/86)	10	540	487.65	0.9031	0.9503	0.0760

2SLS PARAMETER ESTIMATES

Dependent Variable: E&G Expenditures (1975/76 to 1980/81)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Net Tuition Revenue	-0.3102	0.1319	-2.35	0.02
State Appropriations	0.0844	0.0299	2.82	0.00
Federal Appropriations	0.0025	0.0025	0.99	0.32
Fed. Grants & Contracts	0.0089	0.0034	2.66	0.01
Local Appropriations	-0.0008	0.0067	-0.12	0.90
State&Loc Grants&Contracts	0.0038	0.0025	1.54	0.12
Private Revenue	0.0029	0.0028	1.04	0.30
Increased Resources	0.0009	0.0059	0.15	0.88
Endowment Market Value	-0.0052	0.0061	-0.84	0.40
FTE	-0.6920	0.0682	-10.15	0.00
Faculty Salary Bill	-0.0005	0.0017	-0.28	0.78

Dependent Variable: Net Tuition Revenue (1975/76 to 1980/81)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
E&G Expenditures	0.4662	0.1082	4.31	0.00
State Appropriations	-0.1273	0.0525	-2.43	0.02
Federal Appropriations	0.0016	0.0042	0.39	0.70
Fed. Grants & Contracts	0.0015	0.0056	0.28	0.78
Local Appropriations	0.0139	0.0113	1.23	0.22
State&Loc Grants&Contracts	-0.0042	0.0042	-0.99	0.32
Private Revenue	0.0021	0.0047	0.44	0.66

EXHIBIT B-3 (continued)

Public Two-Year Schools
Cross-Section Model

Increased Resources	-0.0024	0.0100	-0.24	0.81
Endowment Market Value	-0.0102	0.0101	-1.01	0.31
Open Admission=1	-0.0299	0.0384	-0.78	0.44
Selective Admission=1	0.0029	0.2982	0.01	0.99
Tuition at Similar School	0.5360	0.1729	3.10	0.00

Dependent Variable: State Appropriations (1975/76 to 1980/81)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Federal Appropriations	0.0027	0.0121	0.22	0.82
Fed. Grants & Contracts	-0.0090	0.0156	-0.58	0.56
Local Appropriations	0.1332	0.0248	5.37	0.00
State&Loc Grants&Contracts	-0.0243	0.0110	-2.20	0.03
Private Revenue	0.0153	0.0131	1.17	0.24
Endowment Market Value	0.0057	0.0208	0.27	0.79
FTE	-0.0771	0.1915	-0.40	0.69
State per capita income	1.9188	1.1384	1.69	0.09
% College Age Population	-1.5501	1.8600	-0.83	0.41
% College Grads in Pop.	-0.7408	0.8197	-0.90	0.37

Dependent Variable: E&G Expenditures (1980/81 to 1985/86)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Net Tuition Revenue	0.4116	0.0384	10.72	0.00
State Appropriations	0.1214	0.0273	4.45	0.00
Federal Appropriations	0.0065	0.0025	2.59	0.01
Fed. Grants & Contracts	0.0051	0.0032	1.58	0.11
Local Appropriations	-0.0053	0.0044	-1.19	0.24
State&Loc Grants&Contracts	0.0057	0.0023	2.53	0.01
Private Revenue	-0.0008	0.0023	-0.36	0.72
Increased Resources	0.0075	0.0046	1.63	0.10
Endowment Market Value	0.0070	0.0044	1.57	0.12
FTE	-0.0407	0.0500	-0.81	0.42
Faculty Salary Bill	0.3551	0.0353	10.07	0.00

EXHIBIT B-3 (continued)

Public Two-Year Schools
Cross-Section Model

Dependent Variable: Net Tuition Revenue (1980/81 to 1985/86)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
E&G Expenditures	0.9031	0.0975	9.26	0.00
State Appropriations	-0.0403	0.0466	-0.86	0.39
Federal Appropriations	-0.0106	0.0043	-2.46	0.01
Fed. Grants & Contracts	0.0052	0.0056	0.92	0.36
Local Appropriations	0.0130	0.0076	1.72	0.09
State&Loc Grants&Contracts	0.0007	0.0039	0.17	0.86
Private Revenue	-0.0040	0.0039	-1.03	0.30
Increased Resources	-0.0015	0.0079	-0.19	0.85
Endowment Market Value	-0.0044	0.0076	-0.58	0.56
Open Admission=1	0.0907	0.0278	3.26	0.00
Selective Admission=1	0.0627	0.2446	0.26	0.80
Tuition at Similar School	0.1310	0.1563	0.84	0.40

Dependent Variable: State Appropriations (1980/81 to 1985/86)

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Federal Appropriations	-0.0057	0.0117	-0.49	0.62
Fed. Grants & Contracts	-0.0236	0.0148	-1.60	0.11
Local Appropriations	0.0279	0.0206	1.35	0.18
State&Loc Grants&Contracts	-0.0285	0.0101	-2.83	0.00
Private Revenue	0.0171	0.0107	1.61	0.11
Endowment Market Value	-0.0404	0.0147	-2.74	0.01
FTE	-0.8198	0.1997	-4.11	0.00
State per capita income	0.4525	0.4953	0.91	0.36
% College Age Population	-1.0294	0.4829	-2.13	0.03
% College Grads in Pop.	-0.2282	0.8186	-0.28	0.78

COVARIANCE OF RESIDUALS

S	EX7580	NTR7580	SA7580	EX8085	NTR8085	SA8085
EX7580	0.06066	0.04243	-0.06257	.00039486	-0.01153	0.03112
NTR7580	0.04243	0.17514	0.11317	0.01329	-0.03401	-0.03067
SA7580	-0.06257	0.11317	1.35480	0.03140	.00798916	-0.32868
EX8085	.00039486	0.01329	0.03140	0.04014	-0.05140	-0.07141
NTR8085	-0.01153	-0.03401	.00798916	-0.05140	0.11824	-0.01754
SA8085	0.03112	-0.03067	-0.32868	-0.07141	-0.01754	0.90305

EXHIBIT B-3 (continued)

Public Two-Year Schools
Cross-Section Model

CORRELATION OF RESIDUALS

CORRS	EX7580	NTR7580	SA7580	EX8085	NTR8085	SA8085
EX7580	1.0000	0.4117	-0.2183	0.0080	-0.1362	0.1330
NTR7580	0.4117	1.0000	0.2323	0.1585	-0.2364	-0.0771
SA7580	-0.2183	0.2323	1.0000	0.1347	0.0200	-0.2972
EX8085	0.0080	0.1585	0.1347	1.0000	-0.7461	-0.3751
NTR8085	-0.1362	-0.2364	0.0200	-0.7461	1.0000	-0.0537
SA8085	0.1330	-0.0771	-0.2972	-0.3751	-0.0537	1.0000

EX7580 - E&G expenditures (1975/76 to 1980/81)
NTR7580 - Net Tuition Revenue (1975/76 to 1980/81)
SA7580 - State Appropriations (1975/76 to 1980/81)
EX8085 - E&G Expenditures (1980/81 to 1985/86)
NTR8085 - Net Tuition Revenue (1980/81 to 1985/86)
SA8085 - State Appropriations (1980/81 to 1985/86)

APPENDIX C

Complete Results of the Time-Series Model Estimation

EXHIBIT C-1

Private Four-Year Schools
Time-Series Model

Dependent variable: E&G Expenditures

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Intercept	6.2649	1.9779	3.17	0.01
Net Tuition Revenue	**0.6413**	**0.2839**	**2.26**	**0.04**
State & Local Approp.	-0.1895	0.1338	-1.42	0.18
Federal Appropriations	0.2043	0.1238	1.65	0.12
FTE	-0.3342	0.2944	-1.14	0.28

Degrees of freedom: 13

Dependent variable: Net Tuition Revenue

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Intercept	-2.0600	2.9379	-0.70	0.49
Net Tuition Revenue (lagged)	0.9546	0.0595	16.05	0.00
E&G Expenditures	**0.2844**	**0.3466**	**0.82**	**0.43**
State & Local Approp.	-0.0299	0.0395	-0.76	0.46

Degrees of freedom: 14

Dependent variable: State & Local Appropriations

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Intercept	11.3230	4.8533	2.33	0.04
State & Local App. (lagged)	-0.0977	0.2702	-0.36	0.72
GNP	2.2571	0.8308	2.72	0.02
FTE	-3.1944	1.1973	-2.67	0.02

Degrees of freedom: 14

Notes:
This model converged in eighteen iterations.

Significance levels are based on two-tailed tests.

The estimated autocorrelation parameters are:
0.8727 for E&G Expenditures;
0.3381 for Net Tuition Revenue; and
0.5093 for State & Local Appropriations.

EXHIBIT C-2 (continued)

Public Four-Year Schools
Time-Series Model

Dependent variable: E&G Expenditures

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Intercept	5.4672	0.6989	7.82	0.00
Net Tuition Revenue	**0.1861**	**0.0988**	**1.88**	**0.08**
State & Local Approp.	0.3434	0.1264	2.72	0.02
Federal Appropriations	0.0576	0.0859	0.67	0.51
FTE	-0.1310	0.0601	-2.18	0.05

Degrees of freedom: 13

Dependent variable: Net Tuition Revenue

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Intercept	-4.2924	4.0947	-1.05	0.31
Net Tuition Revenue (lagged)	0.9841	0.1336	7.37	0.00
E&G Expenditures	**0.8326**	**0.5928**	**1.40**	**0.18**
State & Local Approp.	-0.3585	0.2606	-1.38	0.19

Degrees of freedom: 14

Dependent variable: State & Local Appropriations

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Intercept	3.2874	1.0059	3.27	0.01
State & Local App. (lagged)	0.3680	0.1644	2.24	0.04
GNP	0.6383	0.1386	4.61	0.00
FTE	-0.3761	0.1246	-3.02	0.01

Degrees of freedom: 14

Notes:
This model converged in eight iterations.

Significance levels are based on two-tailed tests.

The estimated autocorrelation parameters are:
-0.4248 for E&G Expenditures;
-0.3624 for Net Tuition Revenue; and
0.4914 for State & Local Appropriations.

EXHIBIT C-3 (continued)

Public Two-Year Schools
Time-Series Model

Dependent variable: E&G Expenditures

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Intercept	-5.2521	2.4553	-2.14	0.05
Net Tuition Revenue	0.5421	0.3700	1.46	0.17
State & Local Approp.	0.9498	0.3659	2.60	0.02
Federal Appropriations	0.0127	0.0523	0.24	0.81
FTE	0.2954	0.0673	4.39	0.00

Degrees of freedom: 13

Dependent variable: Net Tuition Revenue

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Intercept	7.6024	3.1276	2.43	0.03
Net Tuition Rev. (lagged)	-0.4456	0.3227	-1.38	0.19
E&G Expenditures	0.6511	0.2495	2.61	0.02
State & Local Approp.	-0.4423	0.2682	-1.65	0.12

Degrees of freedom: 14

Dependent variable: State & Local Appropriations

Independent Variables	Estimate	Std. Error	t-ratio	Sig Level
Intercept	-2.2228	1.7537	-1.27	0.23
State & Local App. (lagged)	0.8278	0.0892	9.28	0.00
GNP	0.7621	0.1915	3.98	0.00
FTE	-0.3416	0.0544	-6.27	0.00

Degrees of freedom: 14

Notes:
This model converged in ten iterations.

Significance levels are based on two-tailed tests.

The estimated autocorrelation parameters are:
0.4517 for E&G Expenditures;
0.7200 for Net Tuition Revenue; and
-0.4081 for State & Local Appropriations.