
Affordability

Family Incomes and Net Prices at Highly Selective Private Colleges and Universities

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ABSTRACT

Working from the financial aid records of individual students at 28 highly selective private colleges and universities, we were able to calculate both the price the low-income students at these schools actually pay for a year's education, net of financial aid grants, and how the schools differentiate net price in recognition of their students' different family incomes—their pricing policies.

I. Introduction

With access to unique information on nearly 240,000 individual financial aid decisions from 28 highly selective colleges and universities, we address two questions: “What are the pricing policies with respect to family incomes at the nation’s premier private colleges?” and “To what extent do those prices make that kind of education affordable to a highly talented low-income student?” Not many

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students meet the admission standards of these selective schools, but affordability for those who do goes to the heart of the time-honored ideal of equality of opportunity.¹

There are tricky economic issues lurking behind most of this analysis that can make extrapolation of familiar micro theory quite misleading. Most of them derive from the fact that price rarely covers production costs, leaving a major role for nonprice revenues (from gifts, endowment earnings, government appropriations, etc.) (Winston 1999). Institutional price discrimination between student-customers, in turn, may serve quite different purposes in colleges: It can be used, familiarly, to maximize revenues by exploiting students' different price elasticities; it can be used to bid for student peer quality as a productive input to education (Winston 2003); or it can benefit low-income students in service of institutional values that include equality of opportunity. The second of these generates merit aid; the third, need-based financial aid.

All the schools in this study give need-based aid and many combine it with need-blind admission. It is important that this practice—in which an institution differentiates its prices in order that its customers at different income levels can afford to buy the product—is highly unusual, embodying a “distributional objective” (Steinberg and Weisbrod 2002) that appears to be confined to the nonprofit-charity sector. That generosity is not without benefit to the schools, of course, because the larger applicant pool it supports allow greater selectivity and higher student peer quality. Still, it remains quite different from business firms' use of price discrimination to maximize profits or colleges' use of merit aid to attract individually superior students. In this paper, then, we consider only the pricing implicit in need-based financial aid grants.

II. Pricing and Need-Based Financial Aid

In awarding need-based financial aid, the school examines a family's economic circumstances—including income, wealth, number of children in school, regional cost of living, unusual medical or retirement demands, etc.—to determine how much it can reasonably afford to pay for the student's year of education.² Subtracting that from the sticker price (plus an allowance for other costs) establishes the size of the financial aid award that is then “packaged” in some combination of grants (price discounts), loans, and on-campus job. So the first step is determination of a family's need (“need analysis”); the second step is determining how that need will be packaged: a school's pricing policies are embedded in both of those decisions.

This study focuses on schools' net pricing (grant) policies within financial aid that determine how much they charge their students at different levels of family income. Although we recognize the other side of financial aid policy and practice—how

1. Whether students *know* the facts about actual prices is a different question: This paper focuses on revealing those facts, not on their dissemination.

2. The complexities of determining what is “affordable” have been well analyzed for national health care by Bundorf and Pauly (NBER 2003), who pay special attention to the role of preferences. But the present context both simplifies the issues (as need-analyses are made for individual families on the basis of a good deal of personalized information) and complicates them (as relative preferences for higher education versus other expenditures are confounded by relative preferences for these highly selective colleges versus others). Under need-based financial aid, “need analysis” is the process of deciding how much is too much sacrifice to ask of a family applying for financial aid.

schools help students to pay the resulting net price—and the potential significance that those nonprice measures may have for student equity and behavior, it is pricing, per se, that remains the more fundamental aspect of financial aid policy and the subject of this paper. Furthermore, the press, the public and politicians focus on pricing.³ And while the description of the financial aid award process above makes clear that income is only one of a host of family characteristics on which aid awards and their packaging—hence net prices—are based, it remains the most basic to evaluating access and need-based aid policies.

Important economic differences that can be obscured within “a financial aid award” are seen more clearly in an ordinary transaction. If one were sold a \$30,000 car for \$20,000, that price discount would be equivalent to grant aid. With a loan, the car would be sold for \$30,000, but the buyer would be allowed to pay off, say, \$10,000 of it over a few years’ time. With job aid, the car would still cost \$30,000 but he would pay only part up front, then work for the dealer until it was fully paid off. So the separation of financial aid into net price, on the one hand, and “self-help”—loan and job—on the other hand, is fundamental. “Net price” is simply what the student and/or his family actually pay for a year of college (full-time room, board, tuition, and fees), net of price discounts (financial aid grants).⁴

Although we concentrate on pricing policies, self-help raises important questions for need-based financial aid policy, too. The effects of accumulated loan burden on a student’s graduate education or occupational choice are of wide concern as are, with less intensity, the hours for work that can divert a student’s energies from education (Baum and Saunders 1997). And while both loans and work are often praised as requiring a beneficial personal commitment by the student—“sweat equity” through the job and an investment in their future income through the loan—it is less clear why a school’s pricing and aid policies should restrict that benefit to low-income students.

Affordability, then, is judged by the net price that students actually pay for a year of college, relative to their family incomes. It has been popular in the press to report schools’ sticker prices—the maximum price they charge—relative to U.S. median family income, implying that a family at that level will spend a large fraction of its total income to send one child to college—66 percent at the average school in this study. But that is misleading since a student from a median income family will not pay the sticker price at a school with need-based financial aid—his average *net* price at these selective schools in 2001–2002, in fact, was \$11,556, which is just 34 percent of their average sticker price and 23 percent of the U.S. median family income. (At one school, indeed, the average student from the bottom quintile of the family income distribution paid \$796 or about 2.5 percent of the sticker price, for a year of education.) Our data allow us to compare the price each student actually paid, net of financial aid grants, with his family’s income. We can both report the net prices paid by low-income students, relative to their families’ incomes, and describe schools’ pricing

3. Studies of student response to (net) price by income level have played a central role in evaluating the effect of student aid policies (Avery and Hoxby 2003, Kane 1995, McPherson and Schapiro 1998, and Ehrenberg 1984, *inter alia*).

4. Since the college’s financial aid policy determines a student’s appropriate net price, both institutional and external grant aid are included as discounts.

policies across the range of family incomes as the prices charged their students differ for different incomes.

III. Schools, Students and Data

We have data from the financial aid records of individual matriculated students at 28 of the 31 COFHE colleges and universities.⁵ While some of these schools provided as many as 11 years' data, we focus on the academic year 2001–2002 since that gives the most current picture that is informed by the largest number of schools. It was a condition of our access to these data that individual schools' results not be identified. Thus, in what follows, we report averages for the whole population and for the four COFHE school types along with, frequently, some sense of range or distribution of results. In no case is an individual school's behavior evident. For the academic year 2001–2002, we had 41,401 usable financial aid records in a population of 108,721 matriculated U.S. undergraduates at these schools.⁶

The admission standards at these schools are among the most demanding in the country and not many students—rich or poor—are able to satisfy them. We are dealing, then, with a small and entirely atypical population. However, it is a population with importance quite out of proportion to its numbers, both because COFHE schools are highly visible—to the public, policy makers, and other schools—and because of the social importance of low-income access to these schools.⁷ Given the high correlation between family income and academic preparation, most of these students are from high-income families—only a handful of low-income students will have passed the first hurdle—admissions. So it becomes of particular importance to find out whether those few high achieving low-income students who *do* make it past the admissions barrier are then blocked by a price barrier.

Table 1 describes the population of undergraduate students at these schools and its distribution by family income, aggregated over all schools together and over the four COFHE school types, separately. Foreign students are excluded from the data and analysis. At the top of the table are the numbers of aided students in each income quintile, along with Total Aided Students,⁸ Full Pay Students, and Total Enrollment. In the second panel, these are reported as percentages of total enrollment. We do not have information about family income for those students who did not apply for financial aid, but given the strongly need-based financial aid policies of these schools, we assume throughout that those who did not apply for aid have family incomes that put

5. "COFHE" is the Consortium on the Financing of Higher Education that includes: *Coeducational colleges*: Amherst, Carleton, Oberlin, Pomona, Swarthmore, Trinity, Wesleyan, and Williams; *Women's colleges*: Barnard, Bryn Mawr, Mount Holyoke, Smith, and Wellesley; *Ivy League universities*: Brown, Columbia, Cornell, Dartmouth, Harvard, Penn, Princeton, and Yale; *Non-Ivy universities*: Chicago, Duke, Georgetown, Johns Hopkins, MIT, Northwestern, Rice, Rochester, Stanford, and Washington University. Three schools did not participate in the study, leaving us with data for 28 schools for 2001–2002.

6. See the appendix.

7. See Carnevale and Rose for discussion of both the existence of low income students who can qualify for selective schools and why we should care about whether they can and do attend (Carnevale and Rose 2003).

8. Because of ambiguous income data for a few of the aided students, the quintile columns do not add up to the "Total Aided Students"—1,737 students, 2 percent, were involved. See the appendix.

Table 1
The Distribution of Students by Family Income (2001–2002)

	Family Incomes of Aided Students				Total Aided Students ^a	Full Pay Students ^b	Total Enrollment
	Low	Lower-Middle	Middle	Upper-Middle			
Income							
Lower Bound	—	\$24,001	\$41,001	\$61,379	High	95th percentile	
Quintile Median	\$15,347	\$32,416	\$50,890	\$74,418	\$91,701	\$160,250	
Number of students							
COFHE schools	5,086	5,956	8,053	12,086	15,868	59,935	108,721
Coed colleges	698	958	1,242	1,951	2,211	8,290	15,471
Women's colleges	532	641	752	962	884	4,631	8,620
Ivy league universities	2,079	2,290	3,130	4,747	7,020	25,850	45,609
Non-Ivy universities	1,777	2,067	2,929	4,426	5,753	21,165	39,022
Percent of total enrollment							
COFHE schools	5%	5%	7%	11%	15%	55%	100%
Coed colleges	5%	6%	8%	13%	14%	54%	100%
Women's colleges	6%	7%	9%	11%	10%	54%	100%
Ivy League universities	5%	5%	7%	10%	15%	57%	100%
Non-Ivy universities	5%	5%	8%	11%	15%	54%	100%

a. Total Aided Students includes students for whom family income information is not available
 b. Full Pay Students = Total Enrollment less Aided Students

them in the top income quintile. Family incomes are divided into quintiles based on U.S. census data, so the divisions used here represent the national distribution of pre-tax family income. The ranges that define those quintiles are reported in Table 1 along with the median income of each quintile.⁹

Of the 108,721 American undergraduate students who matriculated at these schools in 2001–2002, most of them were at the eight Ivy League schools (42 percent) and the eight non-Ivy universities (36 percent). The four women's (8 percent) and eight liberal arts colleges (14 percent) have considerably smaller shares of this population. But the clearest information in Table 1 is simply the high levels of family income typical of these students. Over the whole of this population, only 45 percent qualified for financial aid¹⁰ and only 10 percent came from families in the low- and lower-middle-income quintiles—the bottom 40 percent of the national family population.¹¹ Most of these students had high enough incomes to pay a sticker price that averaged \$33,831. That pattern is replicated for the four school groups taken separately, though the coed and women's colleges have, on average, slightly larger shares of lower-income students. Behind these figures, individual schools show more variation in student incomes.¹²

IV. Findings

Table 2 summarizes the facts that emerge from these data relevant to pricing policies and affordability. Across the columns are the family-income quintiles for the aided students with average net price (p_n) in the first panel, net price as a share of sticker price (p_n/p_s) in the second, and net price relative to quintile median family income (p_n/qmi) in the third panel.^{13, 14}

Full-pay students have, of course, a wide range of family incomes, but we can illustrate their price relative to family income, too, by using the lower bound of the 95th percentile of the U.S. family income distribution (\$160,250); their average net price, then, is the full sticker price. Note that all averages reported in Table 2 are student-weighted to describe what faces the typical student.¹⁵ The rows of Table 2 reveal the schools' pricing policies while the first two columns describe affordability for low- and lower-middle-income students. Again, average prices are reported for all 28 schools together and separately for the four school types used by COFHE: coed and women's colleges, and Ivy and non-Ivy universities.

9. For details see the data appendix.

10. Figures on the number of financial aid students include those getting only loans or jobs.

11. This imbalance is generating a great deal of research, asking "Why?" Considerable progress is being made by Bowen (2004) and Carnevale and Rose (2003), *inter alia*.

12. Between 3 and 8 percent are in the lowest income quintile while 55 percent to 77 percent are high-income students (aided students in Quintile 5 plus nonaided students, together).

13. Net price as a proportion of sticker price—the second panel—is the complement of the familiar average "price discount" for aided students: $p_n/p_s = 1 - (p_s - p_n)/p_s$.

14. The 2 percent of enrolled aided students for whom we have no reliable family income data are not included in the analysis of prices and pricing policies.

15. For simplicity, we will stick to student weighting even when we turn, below, to the question of college policy where college-weighted averages might be used. The differences between them are minimal.

Table 2
The Distribution of Net Prices by Family Income (2001–2002)

Income	Family Incomes of Aided Students					Average Aided Student	Sticker Price
	Low	Lower-Middle	Middle	Upper-Middle	High		
<i>Lower Bound</i>	—	\$24,001	\$41,001	\$61,379	\$91,701	\$113,689	
Quintile Median	\$15,347	\$32,416	\$50,890	\$74,418			
Average net price							
COFHE schools	\$7,552	\$8,547	\$11,557	\$16,365	\$23,690	\$23,690	\$33,831
Coed colleges	\$5,487	\$7,280	\$10,374	\$15,259	\$22,738	\$22,738	\$33,403
Women's colleges	\$7,863	\$9,676	\$13,134	\$18,297	\$25,663	\$25,663	\$33,708
Ivy League universities	\$8,169	\$9,200	\$11,893	\$16,499	\$23,949	\$23,949	\$34,508
Non-Ivy universities	\$7,495	\$7,956	\$11,238	\$16,249	\$23,399	\$23,399	\$33,167
Net price/sticker price							
COFHE schools	22%	25%	34%	48%	70%	70%	100%
Coed colleges	17%	22%	31%	46%	68%	68%	100%
Women's colleges	23%	29%	39%	54%	76%	76%	100%
Ivy League universities	24%	27%	34%	48%	69%	69%	100%
Non-Ivy universities	22%	24%	34%	49%	70%	70%	100%
Net price/quintile median family income							
COFHE schools	49%	26%	23%	22%	21%	21%	21%
Coed colleges	36%	22%	20%	21%	20%	20%	21%
Women's colleges	51%	30%	26%	25%	23%	23%	21%
Ivy League universities	53%	28%	23%	22%	21%	21%	22%
Non-Ivy universities	49%	25%	22%	22%	21%	21%	21%

Clearly, in the top panel of Table 2, lower average net prices are charged of low- and lower-middle-income students implying larger discounts for them from sticker price. Looking across the table, over increasing incomes, higher-income families pay higher net prices. Over all 28 schools, a low-income student pays, on average, \$7,552 or 22 percent of the sticker price while an aided high-income student pays \$23,690 or 70 percent. A full pay student pays 100 percent of the \$33,831 average sticker price.

More revealing of both affordability and schools' pricing policies are the data in the bottom panel of the table that show the proportions of family income that these net prices represent—as shares of quintile median family income. They drop markedly and almost monotonically as incomes increase. On average, the low-income student pays 49 percent of his quintile median family income while both the aided student from a high-income family and the full-pay student at the 95th income percentile pay 21 percent.

V. Low-Income Affordability

There is marked variety in the net prices charged the low- and lower-middle-income students among these 28 schools. Averaged over the COFHE groups, low-income students pay net prices that range from \$5,487 at the coed colleges to \$8,169 at the Ivy universities—almost 50 percent more. The treatment of lower-middle-income students (the second column) is not as varied across these school types: From the lowest average net price (\$7,280 at coed colleges) to the highest (\$9,676 at women's colleges) is an increase of about a third. And price as a share of family income falls sharply as we move up to lower-middle-incomes from the lowest income families: overall, that share drops from 49 percent to 26 percent and for the Ivy universities from 53 percent to 28 percent.

Figure 1 reveals the variety across schools that lies behind the aggregated average prices reported in the Table. It shows a set of box plots for prices at the 28 schools, one for each family income quintile of aided students as well as one for the full-pay students. Figure 1a describes schools' average net prices while Figure 1b shows their net prices relative to quintile median family incomes. The variety of net prices across these individual schools is clearly substantial. The one with the lowest average net price for low-income students (those earning less than \$24,001 a year) charged less than \$800 for a year while the school with the highest average net price for those students charged \$11,390, nearly 15 times as much. For lower-middle-income students net prices range from \$2,891 to \$12,817—four and a half times as much—representing 8 percent to 37 percent of sticker price at these schools. That more moderate variation among schools continues over the rest of the income range.

For students from the lowest-income families, then, the average net price they pay is lower than other students' but varies a great deal between schools—measured as a share of median family income for this quintile (\$15,347), net prices range from 5 percent to 74 percent. So the institutional variety of Figure 1b is a major fact about affordability but it is a fact that includes some very low net prices for low-income students. It is important to note that even the school charging these students the highest net price is still giving a substantial price reduction with a ratio of net to sticker price (p_n/p_s) of 35 percent, implying an average price discount of 65 percent. Most students

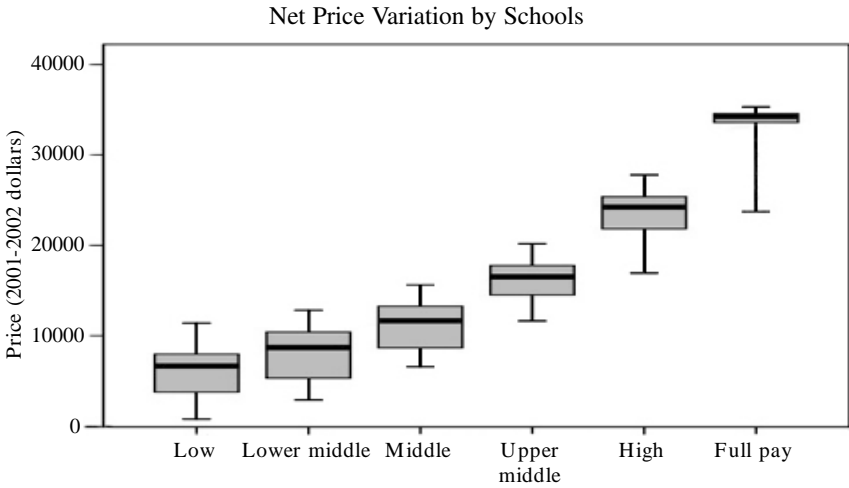


Figure 1a
Average Net Price

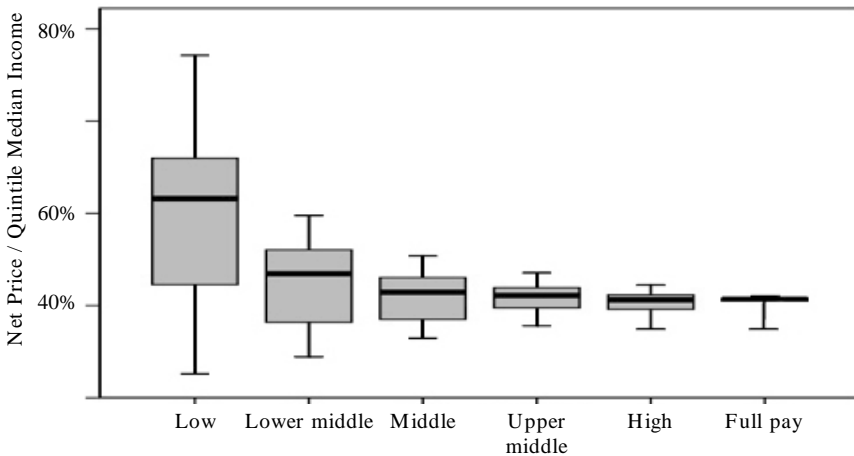


Figure 1b
Net Price as a Share of Family Income

would appear able to pay the yearly price of the lowest priced of these schools out of pocket but would have to turn to loans and jobs to pay the net price at the most expensive. The students with slightly higher incomes will experience both more consistency in pricing across schools and, on average, a lower proportional drain on family income.

VI. Schools' Pricing Policies with Respect to Family Incomes

How do schools differentiate their net prices among students with different family incomes? Looking across the columns of Table 2 shows average net prices for aided students in the five income quintiles as well as the sticker price for full pay students at the 95th income percentile (\$160,250).

In the top panel of Table 2, average net prices rise monotonically with rising income. Aided low-income students, averaged over all these schools, are asked to pay a net price of \$7,552 while aided high-income students pay \$23,690—214 percent more. Average net prices over all students, including full pay students, varied over the income quintiles by 348 percent. For COFHE schools grouped separately, the range of average net prices over income quintiles varied from 509 percent for the coed colleges to 322 percent for the Ivies (the universities at 343 percent and women's colleges at 329 percent are in between).¹⁶ That picture of net price increasing with incomes remains intact when we look at the middle panel with its average net price relative to sticker price across family incomes—over all schools, net price as a share of sticker price rises monotonically with family income from 22 percent to 100 percent.

But looking at price as a share of income in the third panel of Table 2, the picture is reversed; the lowest income students pay the largest share of family income—49 percent on average—and that share declines monotonically as incomes rise—to 26 percent, 23 percent, 22 percent, and 21 percent, among aided students, and finally, to 21 percent for full pay students at the 95th income percentile. So price as a fraction of family income is higher for lower-income students. This pattern holds for each of the four school groups considered alone, as reflected in Figure 2, and it appears in the declining means and interquartile range of price-income ratios for the individual schools across quintiles in Figure 1b.

The other important fact about price revealed by both the table and figures is that most of the increase in the income share of net prices charged of lower-income students appears between the low-income and lower-middle-income quintiles. Net price as a share of family income falls from an average of 49 percent for low-income students to 26 percent for lower-middle-income students then it drops to 21 percent for the aided high-income students and stays at 21 percent even for full pay students in the 95th income percentile. Among COFHE groups, the least severe decline in income share between first and second quintiles is at the coed colleges but even there, low-income students pay 36 percent of their family incomes while lower-middle-income students pay 22 percent and that share persists to the highest incomes.

It would be useful to have a bar graph that would picture the pricing policies of each individual school across all of its students. It would look like one of the school groups in Figure 2 with bars describing net price as a share of family income for each income quintile and the full-pay students. A school whose six price/income bars

16. These are, as noted, student-weighted averages so the large universities have more influence on the overall pattern than the small coed and women's colleges.

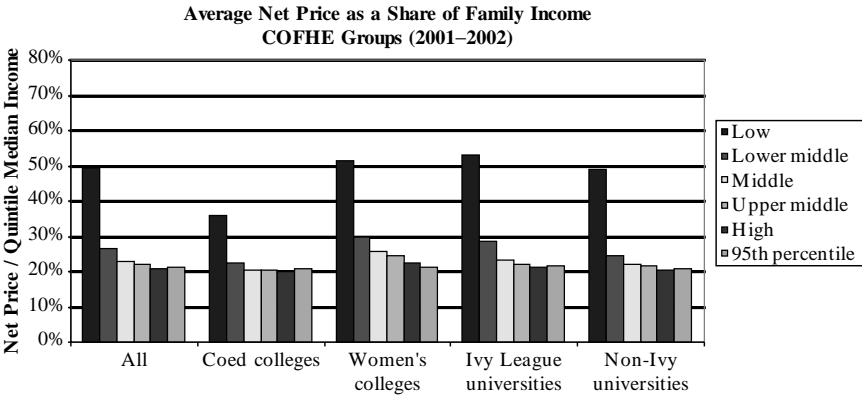


Figure 2
Schools' Pricing Policies With Respect to Family Incomes

were of the same height would be charging its students the same share of family income regardless of income level; a school whose price/income bars fell with income would have a pricing policy in which higher-income students pay a smaller share of their incomes; and a school with bars that rose with increasing family income would have a policy in which low-income students not only paid a lower tuition, per se, but paid a smaller share of family income than did students from higher-income families.

But only about a third of these schools exhibit pricing policies that match such stylized patterns. Therefore, to say something more precise about individual schools' policies, we sought a measure that would both describe a school's overall pricing with respect to family income and allow meaningful comparison among schools. Our solution was to run a simple linear regression of each school's average net price/income ratios on median incomes over the five quintiles and the 95th percentile and treat the t-statistic on the income coefficient as an indicator—an index—of pricing policy. So we take the best linear fit over a school's bar graph and then take the significance of the slope seriously: A slope that is not significantly different from zero describes a proportional pricing policy; a significantly negative slope describes a policy that reduces price as an income share with higher incomes and a significantly positive slope describes a policy with net price a rising share of income. Using this classification, seven of the 28 schools have decreasing-share pricing policies; most don't differ significantly from proportionality and four charge prices that represent increasing shares of income, all as reflected by single-tailed *t*-tests at the 95 percent level.¹⁷

17. The aggregation of individual schools in Figure 2 paints a more regressive picture as statistical significance is neglected. Furthermore, given the (slight) progressivity of the U.S. tax system in toto (Pechman 1983), our use of pretax family incomes makes all our estimates less progressive than they would be on an after-tax basis.

VII. The Influence of Schools' Wealth on Pricing Policies

Although it could be a paper in itself, one plausible story appears to help understand what lies behind these schools' quite different net price policies for students from different family incomes. Schools differ markedly in the wealth that supports each of their students.¹⁸ Even among these relatively wealthy schools, endowment per student ranges from \$51,259 at one end to \$1,264,000 at the other.¹⁹ A school's per-student wealth translates directly into an ability to subsidize its students—to set an average net price below production costs. Between two schools with the same educational costs per student, the one with the greater wealth can charge its students the lower average net price (or provide a more costly education at the same price). The most direct effect of wealth on pricing, then, is simply that the wealthier school can set a lower average net price and, other things being equal, offer the lowest prices to its low-income students.

But there is an indirect and possibly more important connection between a school's wealth and its pricing policy that works through selectivity. More wealth supports larger general student subsidies and those subsidies act, in turn, much like a wage payment to students for their peer quality (Winston 2003): Very high subsidy payments will generate long queues of students from which a school can choose those who bring it the highest peer quality. That student selection process, of course, is reflected in schools' admission standards—the one with the most wealth can pay the largest student subsidies so is able to set the highest standards for admission. But, finally, the well-known positive correlation between applicants' academic qualifications and family incomes (Carnevale and Rose 2003) means that the schools with the most demanding admission standards will accept a student body that has the highest share of high-income students and the fewest low-income students.

It is no accident, then, that in these generally wealthy and selective schools, the proportion of students from low- and middle-income families in Table 1 is overwhelmed by those from high-income families. Overall, most of the students who can pass these admissions criteria are from high-income families—recall that only 45 percent of the students in these schools qualify for financial aid relief from an average sticker price of \$33,831 a year, and even some of these aided students are in the highest-income quintile.

But, among the 28 schools, there is a lot of variation in the income distribution of their student populations and those variations translate directly into the cost of a given pricing policy. A school with only a few low- and lower-middle-income students can afford to be generous, giving them low net prices, while a school with a higher proportion of low-income students could be so generous only at a higher cost. A large share of high-income students cuts the cost of a generous pricing policy not so much

18. See Carbone and Winston (2004).

19. http://www.nacubo.org/accounting_finance/endowment_study/. Note that these numbers describe only endowment wealth, leaving out a part of their financial wealth as well as the considerable value of their physical capital (Winston and Lewis 1997).

by providing more revenues but by reducing the draw by low-income students on limited nontuition resources.²⁰

In the bar graphs of Figure 3, schools are arranged by increasing endowment per student and divided into four groups. Each group, as in Figure 2, shows average net price as a share of family income for the five income quintiles of aided students along with the full-pay students at the 95th percentile. It is clearly the wealthier schools that, on average, give their poorest students the lowest prices relative to family income and the less wealthy schools that ask them to pay relatively the most. Simple regressions of the index of pricing policy (described above) and of the share of low-income students on institutional wealth tell the same story with significant coefficients (positive and negative, respectively) on both price policy and low-income share.²¹

The indirect story, then, is that less institutional wealth per student gives a school the ability to pay only a smaller subsidy to its students, on average. This leads to a shorter queue of applicants and consequently lower admission standards. In turn, that means that relatively more low-income students matriculate and therefore the cost for any pricing policy that favors low-income students will be higher.

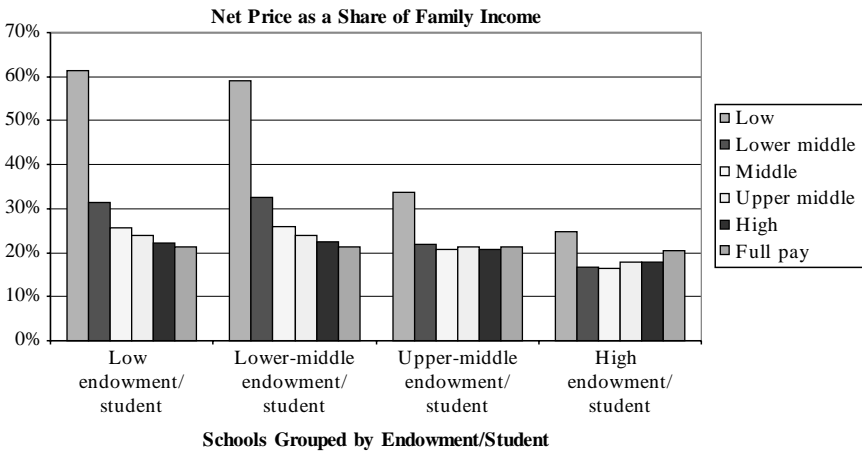


Figure 3
Net Price as a Share of Family Income

20. Note that what looks like subsidizing low-income students from revenues provided by high-income students—"RobinHooding"—neglects the central fact that all students, rich and poor, are being heavily subsidized. At these schools, the "general" subsidy for even the students paying the full sticker price is on the order of \$50,000 a year. Educational costs include the cost of capital services (Winston and Yen 1995).

21. Price index = $-2.088872 + 0.0000034$ Endowment per student, $R^2 = 0.268$; Share of population in Quintiles 1 and 2 = $0.11188135 - 3.295e8$ Endowment per student, $R^2 = 0.187$. We get similar results whether we use the t-statistic or coefficient on income as the index.

VIII. Trends

Pricing policies in these schools have been changing. In 1998, Princeton announced that it would shift all loans to grants—net price reductions—for students whose family incomes were below the national median. Harvard, Amherst, Swarthmore, and Yale, among others, followed with policy modifications affecting their net prices (Brownstein 2001). The earlier study of Williams' prices that initiated this current work described a thirteen-year history of falling relative net prices for the lowest-income students (Hill and Winston, forthcoming). So it would be useful to be able to trace the pricing policies of the rest of these 28 schools through an equally long period to see if the Williams pattern of falling net price shares for low-income students is, as we suspect, typical. We do not, however, have sufficient longitudinal data.

What we do have is ten schools that provided five years' financial aid records, from 1998–99 to 2002–2003,²² and while they are not necessarily representative of the population, their data are revealing.²³

The trends in pricing for these schools are apparent in Figure 4a where average net price for each quintile is plotted in constant 2001–2002 dollars, along with the sticker price over the period and in Figure 4b where those quintile net prices are expressed as shares of family income. The most interesting fact in Figure 4a is the contrast between the (gentle) increase in sticker price, on the one hand, and the fall in constant dollar net prices, on the other. For four of the five quintiles, real net prices fall over these five years, and for the fifth (the high-income quintile), average net price rose by only \$188 (on a \$24,217 base). The increase in sticker price that captures the public imagination, in contrast, was \$2,991. So, while average sticker price went up by 9 percent in real terms over five years for these ten schools, the net prices they charged their aided students went down with one exception and that exception saw a rise of 0.8 percent. Because sticker price grew faster than any of the net prices, their share of sticker price declined over the five years. Indeed, the average net price for low-income students fell (monotonically) from 29 percent of sticker price to 22 percent—roughly a 25 percent decline.

These real price trends are more evident in the next figure where quintile net prices are expressed as shares of quintile median family income (Figure 3b). The net price for low-income students at these schools fell from 69 percent of quintile median family income to 49 percent—nearly a 30 percent drop. And while it is clear from the graph that the most dramatic decline in net price relative to quintile family income was at that low income level, all the others fell, too. Even the sticker price declined relative to a rising family income at the 95th percentile, though almost imperceptibly (from 22.1 percent to 21.7 percent). When examined separately, each of the ten schools shows declining average net prices relative to income for low-income students and for no school does that share end the period higher than it started. At the same time, the dispersion of average low-income net prices has increased.

22. Amherst, Barnard, Cornell, Mt. Holyoke, Pennsylvania, Pomona, Princeton, Stanford, Wellesley, and Williams.

23. Data on average net prices and their shares of sticker price and quintile median family income for the five years and five income quintiles are reported in Table A1 in the Appendix.

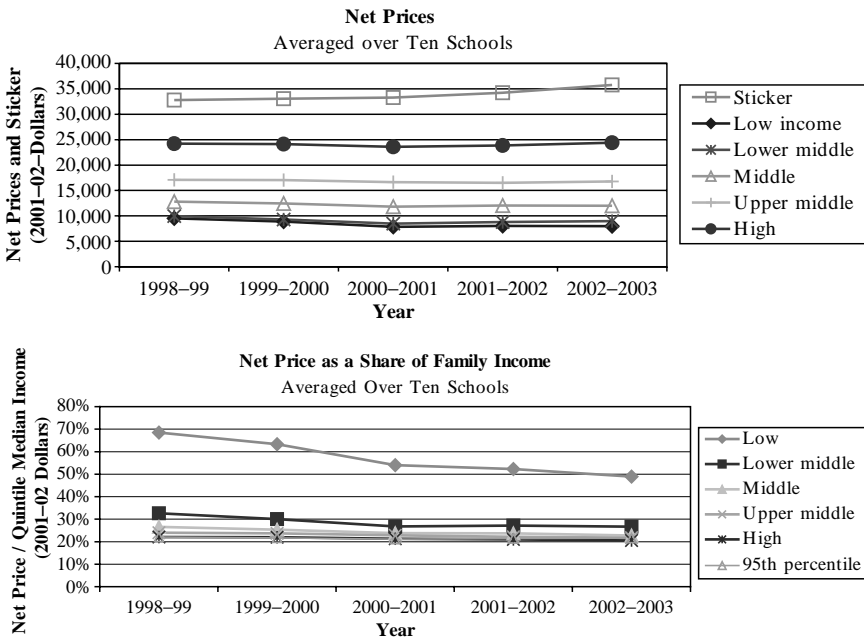


Figure 4 a and b
Trends in Prices, 1998-9 to 2002-3

IX. Conclusions

With unique data on individual financial aid awards and family incomes at 28 schools, we have been able to address two questions. Are the nation's most expensive and selective private colleges and universities affordable to highly able low-income students? And how do these schools set their prices with respect to the incomes of their students?

On the first question—affordability for low-income students—the main conclusion is one of optimism and variety. Some of these 28 schools charge their low-income students very little for a year's tuition-room-board-and-fees. At one, that price was less than \$800; for the lowest-priced 25 percent of these schools, it averaged \$2,365. There are also schools that charge a good deal more: the highest net price for low-income students here is more than \$11,000 and the average of the top 25 percent is \$10,169. Except for a few of the lowest-priced schools, of course, students turn to loans, campus jobs, or other sources with which to pay the price, while high net prices remain. For comparison with these highly selective private schools, the average price at a four-year public college was \$9,008 (for tuition, room, and board).²⁴

The answer to the second question—how do these schools structure their prices in recognition of different family incomes—reflects similar variety. Four schools' pricing

24. College Board: www.collegeboard.com/press/cost01/html/TrendsCP01.pdf

behavior shows that low-income students pay the smallest share of family income to go to college with the share generally increasing with increasing family incomes. Most schools have broadly proportional prices in which aided students, on average, pay about the same share of family income (and it is about the same for full pay students from all but the wealthiest families). Seven charge net prices such that low-income students pay a larger part of family income than do high-income students, pushing them to loans and jobs. It appears that, at base, a school's wealth goes far to determine the shape of its pricing policy.

This study has something important to say to low-income students, to those setting pricing policies for schools like these and to those judging the social role of access to selective higher education. Its findings should be encouraging to ambitious low-income students, telling them that efforts of many of these schools to achieve equality of opportunity have been successful: As a student, if you are good enough to get in, you will almost certainly be able to afford to go, often through price reductions alone. And the findings should be useful in informing college pricing policies, in framing an effective way both to understand and to monitor those policies and in providing benchmarks in the form of other schools' behavior.

Appendix 1

National Family Incomes

In order to use a common measure across all schools we based the analysis on the distribution of pretax income of all U.S. families by quintiles as reported by the U.S. Census. The upper and lower bounds of those quintile ranges are taken from Census data (<http://www.census.gov/hhes/income/histinc/f01.html>); extrapolation from those boundaries gave us estimates of the median income appropriate to each quintile (<http://www.census.gov/hhes/income/histinc/f23.html>). All intertemporal income comparisons were adjusted to 2001–2002 dollars. In order to include the whole of the student population in the analysis of pricing policies relative to family incomes, we assumed that family income at the lower bound of the 95th percentile was representative of unaided students who pay the full sticker price.

Appendix 2

Individual School Data

Information on each school's sticker price was requested for each year for which the schools provided student financial aid records (2001–2002 and 2002–2003) were requested from all schools with more years encouraged if it was easy to do), along with total Fall enrollment of dependent undergraduates. Again, all money values were expressed in year 2001–2002 constant dollars. Data on total undergraduate enrollment and enrollment of foreign students were provided for each school by COFHE: Their difference is reported as total enrollment of dependent American undergraduates in Table 1. Two schools provided data on only one or two classes, so their enrollment figures were multiplied by four and two, respectively, to approximate total enrollment.

Appendix 3

Individual Financial Aid Records

Schools provided data from all individual records of undergraduate American (or permanent resident) dependent financial aid applicants to include the student's family income, grant, academic year, aid status (whether awarded aid or not) and, if possible, to indicate if the student studied abroad, attended the school only part time or part year, and if the reported parental income was not the basis for the financial aid award. Other data were reported at the discretion of each school: students' job and loan amounts, parent and family contributions and net worth.

Concentrating on the academic year 2001–2002, which gave us the largest number of most recent aid decisions, 56,018 records were submitted which produced 41,401 that could be used in the calculation of net price and income relationships, after the adjustments enumerated in Table A1.

Bringing together data from the financial aid records of individual students from 28 schools' institutional records left some inevitable incomparabilities, but they do not cast serious doubt on the conclusions of the study. The nature and magnitudes of these adjustments are described in Table A1.

In a study of family income and price, it is predictable that the two major data problems will involve income and price.

Family Income

Schools were asked to provide the family incomes on which their grant aid decisions were based. Three kinds of problems appeared: the income of a noncustodial parent, in cases of divorce, was (i) sometimes reported along with that of the custodial parent (ii) sometimes not reported but the student's record indicated that it had been considered in setting his net price, and (iii) sometimes neither reported nor identified in the student record as having played a role in pricing. Furthermore, some family incomes were reported as negative or were simply left blank in the records we were sent.

These records with unreliable family incomes were not used in describing the distribution of students by income in Table 1 in the text. They were counted in "total aided students" (where appropriate) but they were not assigned to an income quintile—so the figures under "Total Aided Students" are larger than the sum of the numbers in the quintile columns. Overall, 2 percent of the enrolled students fell into this ambiguous income category. For individual schools, between 0 percent and 9 percent of their aided students' records were eliminated from the study on this account. Records that recognized noncustodial income in the needs analysis but neither reported it nor indicated that it had been used could not, of course, be separated from the rest nor was it possible to estimate the difference these omissions might make in the distribution of students or prices, though it appears to be minimal.

Net Prices

Net prices were calculated as a school's published sticker price, less the grant aid awarded a student—the price he actually paid for a year of education. The institutional

Table A2
Trends in Average Net Prices, (10 Schools^a, Five Years)

Quintile	Family Incomes of Aided Students							Full Pay 95th %tile
	Median	Low	Lower Middle	Middle	Upper Middle	High	Sticker Price	
1998-99		\$13,891	\$30,656	\$48,266	\$71,201	\$109,647	\$148,452	
1999-2000		\$14,026	\$30,970	\$49,194	\$71,939	\$110,006	\$152,832	
2000-2001		\$14,554	\$31,660	\$49,816	\$73,030	\$110,674	\$157,785	
2001-2002		\$15,347	\$32,416	\$50,890	\$74,418	\$113,689	\$160,250	
2002-2003		\$16,392	\$33,722	\$52,830	\$77,076	\$118,630	\$165,460	
Net price								
1998-99		\$9,520	\$9,989	\$12,805	\$17,084	\$24,217	\$32,798	
1999-2000		\$8,882	\$9,292	\$12,439	\$17,048	\$24,121	\$33,066	
2000-2001		\$7,865	\$8,486	\$11,830	\$16,654	\$23,565	\$33,259	
2001-2002		\$8,027	\$8,793	\$12,056	\$16,489	\$23,870	\$34,222	
2002-2003		\$8,013	\$8,989	\$11,986	\$16,773	\$24,405	\$35,750	
Net price/sticker price								
1998-99		29%	30%	39%	52%	74%	100%	
1999-2000		27%	28%	38%	52%	73%	100%	
2000-2001		24%	25%	36%	50%	71%	100%	
2001-2002		23%	26%	35%	48%	70%	100%	
2002-2003		22%	25%	33%	47%	68%	100%	

Table A2 (continued)

Quintile Median	Family Incomes of Aided Students					Full Pay 95th %tile
	Low	Lower Middle	Middle	Upper Middle	High	
Net price/quintile median family income						
1998–99	69%	33%	27%	24%	22%	22%
1999–2000	63%	30%	25%	24%	22%	22%
2000–2001	54%	27%	24%	23%	21%	21%
2001–2002	52%	27%	24%	22%	21%	21%
2002–2003	49%	27%	23%	22%	21%	22%

a. Schools include Amherst, Barnard, Cornell, Mount Holyoke, Pomona, Princeton, Stanford, Wellesley, and Williams.

grants reported by the schools were to be those based on need, not “merit” and included both the institutional and outside grants that determined net price. Two other problems intruded on the calculation of a student’s net price: Those studying abroad were often charged a different price from the sticker price of on-campus students and those studying part time or for only part of the year paid less than the full price (and often received less than the full grant). Students in both of these categories were eliminated from the net price calculations of Table 2 in the text—The Distribution of Net Prices by Family Income—but included in the figures in Table 1—The Distribution of Students by Family Income.

The steps that take the total population from the 56,048 records of financial aid applicants in 2001–2002 through the elimination of foreign students, those who were denied financial aid, and those with problems in calculating income or price produced the 41,401 records used in the price analysis of Table 2.

Table A2 shows the numbers of individual financial aid applicants’ records in each category. Since some schools did not include student records of some categories of students (for example, included only full time students) or did not indicate a particular data problem (for example, that there was a use of noncustodial income), the percentages should be interpreted with care—the table shows that 4 percent of records received were those of study abroad students, for instance, but this should not be interpreted as showing that 4 percent of all aided students were studying abroad.

Appendix 4

Trends in Net Price and Price/Income Ratios

The trends in net prices and price/income ratios for ten schools reported in the text are pictured in Figures 4a and 4b.

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