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**Access:
Net Prices, Affordability, and Equity
At A Highly Selective College**

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Abstract

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All of the financial aid decisions at Williams College for the past fourteen years – nearly 14,000 of them – were used to see how much students actually paid for tuition, room, board, and fees to go to that highly selective and expensive school – their net prices. Williams practices need blind admission with full need-based financial aid and gives neither merit nor athletic scholarships – a family’s economic circumstances are the only reason for a price adjustment. So these data can answer the motivating question of the study, “Can highly able low income students reasonably aspire to go to the best and most expensive colleges in the country?” Does need-blind admission and full need financial aid, in other words, really work to serve merit and equity at the same time?

With income and net price data on all aided students and income data for families at the 95th and 99th percentiles of the US income distribution who pay the full sticker price, we can describe the net price pattern across the whole student population as pricing policies have evolved at Williams (and similarly at other highly selective schools). The end point – in the current academic year – sees a remarkable similarity in the shares of income paid for a year at Williams. Aided students across the five income quintiles pay, on average, 11% to 19% of their pretax family incomes – the lowest income quintile paying the smallest share – while those at the 95th and 99th percentiles, paying full price, spend 21% and 9% of their family incomes, respectively, for a year at Williams. One usefully concrete number: the average student in the bottom twenty percent of the income distribution pays \$1,683 while the full tuition is \$32,470.

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This is a study of college pricing as revealed in 13,419 financial aid decisions over 14 years at an expensive and highly selective private college, Williams. The school practices need-blind admission, full need aid and gives no “merit scholarships” so a family’s economic circumstances are the only criteria for adjusting a student’s net price, for financial aid. The paper does not, of course, describe “access to US higher education” in any broad sense, but it does describe affordability at a school that appears to be representative of most of the highly selective private colleges and universities in the country – Stanford and Yale and Swarthmore and MIT and the rest.¹ So it is relevant to the socially and politically important question: “Can a high-achieving student from a family with low or modest income reasonably aspire to go to one of the best colleges in the country?”

^{*} We want to acknowledge, once again, the importance of financial support from the Andrew W. Mellon Foundation and Atlantic Philanthropic Services through the Williams Project on the Economics of Higher Education. Research assistance was ably provided by Georgi Zhelev and Patrick Frey, while data were made available and intelligible by Michelle Waryjasz and Paul Boyer of Williams’ Financial Aid Office. Al Goethals, Henry Bruton, Steve Sheppard, Jon Bakija, Ron Ehrenberg, and John Chandler were helpful in various ways in bringing the paper into being.

¹ Which, of course, can’t be established convincingly until other such schools produce similar data.

These data let us address two related questions: how well does the financial aid system work to make selective colleges college affordable and, looking at students across all income levels, how are net prices distributed relative to family incomes?

Access to higher education has two parts: admission and affordability – can a student get into a college and if so, can she afford to go? Here we deal only with the second of these – what a student pays for tuition, room, board, and fees relative to family income – so admission is a prior question. All students in our data were matriculated at Williams after an admission process that has typically accepted fewer than 25% of the applicants – by the crude measure of average combined SATs, Williams students score above 1400 -- so the population is quite atypical in selectivity and academic preparation.² Which is both a strength and a limitation of the study.

Our data show how much students at different levels of family income *actually* paid for a year of expensive education – their net prices. The sticker price for tuition, room, board, and fees at Williams is (in 2001-02) \$32,470 but the average student pays \$24,220. Our data, then, show how those actual prices are distributed by family income levels. They describe what public finance economists call “vertical equity” – how differently families are treated at different incomes³ – and they describe the crucial issue of low income access; “what does a poor kid pay to go to a rich school?”

Two issues are addressed in turn: after describing the data, we look at financial aid recipients, those students for whom price is adjusted, by family income level; then, in conclusion, turn to the broader question of pricing across the whole student population – what part of their family incomes do students pay among both aided and full-pay students?

² On the complex admission dimension of access, see Klitgaard, Duffy-Goldberg, Bowen-Bok, and Shulman-Bowen, Kane, McPherson-Schapiro, *inter alia*.

Data

All 13,419 pricing – financial aid – decisions made at Williams between academic years 1988-89 and 2001-02 were available to us and enter the analysis. Between 45 and 52 percent of Williams’ students applied for financial aid and 37 to 44 percent of them got it. Each data point – a student’s financial aid record for an award year – gives information on total pre-tax family income and on the amount of any awarded grant, loan, or campus job.

We use net price – the sticker price less all *grant* aid. That is what the student actually pays to go to college. Within a “financial aid package,” as usually conceived, there are two economically distinct elements: on the one hand, grant aid *reduces* price, on the other hand, student loans and campus jobs are *ways to pay* that remaining price.⁴ Two other widely used measures of access and affordability should be noted as the source of some confusion. One concentrates on “financial aid awards,” rather than on their net effect in lowering price, to include grants along with loans and income from campus jobs, willy-nilly [Singell].⁵ But the most widely reported measure is the published sticker price – tracked by press and politicians – and the increases that are reported as percentage change or changes relative to median family income. The problem created by the spread between sticker price and average net price – noted above for Williams as a \$32,470 sticker price and a \$24,220 average net price over all students – indicates something of

³ The “right” degree of progressivity is no clearer here than in taxation – though it may be easier in this context, given college’s declared interest in low income access, to say what is a wrong degree of progressivity.

⁴ The subsidy value of a loan that accumulates no interest while the student is in college is sometimes included as a price reduction, not of the college’s price, but of the economic price of borrowing. While job and eased terms on loans may well influence student behavior, we concentrate here on prices. And were more than one school involved in this analysis, it would be necessary, of course, to recognize differences not just in what a student pays, but in what she gets. With institutional expenditures as a crude measure of what a student gets, student subsidies become the appropriate measure of price and quality – the difference between cost and net price or a net price/cost ratio. One of us has written extensively on price, costs, and subsidies among US colleges and universities [Winston, 1999, 1998, ___ and Zimmerman, 2000]. At a more fundamental level, additional complications are introduced by recognizing that the price we observe is the net result of two simultaneous transactions as students buy educational services from a college while the college buys peer quality from the students [Rothschild-White, 1995, Winston, 1999, Epple-Romano] For a single school without merit aid awards, that complication can, thankfully, be ignored.

⁵ See Dynarski for discussion and estimates of the subsidy value of loans.

the magnitude of error in these numbers. Schwartz and Scafidi have corrected the higher education component of the Consumer Price Index, replacing sticker with net price with significant effect. And expression of sticker price increases or price discounting as percentages of a sticker price creates misleading (and often alarming) headlines. So, for instance, this year's College Board announcement of 2001-02 tuitions showed an alarming 7.7% increase for public four year colleges that turned out to be \$267 a year (and a 5.8% increase at public two-year schools that came to \$96 a year). As is made apparent below, addressing low income access to higher education by looking at a sticker price relative to median family income errs in both numerator and denominator since a student from a family with median income will not pay the sticker price at high priced schools and since the low income kid doesn't come from a family with a median income.

For each year, those students in the Williams data who received financial aid awards were segmented into income quintiles according to the pre-tax family income boundaries published by the US Census. All values were expressed in year 2000 dollars (except those for the current award year, 2001-02). We faced a quirky timing issue in the data since financial aid decisions for an academic year (say '91-2) are based on family incomes reported for the preceding calendar year ('90). Ignoring any one-year inflation, we simply joined those data as of the award year and adjusted them to constant year 2000 dollars. More substantial manipulation was needed both to generate median family income estimates for each income quintile (for each year) and, in the last part of the paper, to calculate across the whole of the income range the entire pricing pattern with comparable pre-tax family incomes within the top quintile, at the 95th and 99th percentile lower boundaries. The full data by income quintile and by year are reported in Appendix Table A.

Net Prices and Family Incomes

We will first report on recent history with the broad patterns of net prices and family incomes for the period over which we have comparable numbers – 1988-89 to

2000-01 – as averages over the period and then year by year. After that, we add the results for the current award year, 2001-02, that reflect a substantially changed financial aid policy. These initial data include only the financial aid recipients in the Williams student population – the students, and the only students, for whom we have reliable family income data. So the analysis of pricing can be extended to the whole of the student population – in the last part of the paper – only suggestively, though that suggestion is well served by incomes of families at the 95th and 99th percentile of the US income distribution (reported by the CBO) and what part of their pre-tax family income were represented by Williams’ sticker price. At those income levels, with very few exceptions, sticker price *is* net price – since there is no merit aid, those families don’t get financial aid price reductions. So we feel that we’ve generated a usefully broad picture of this school’s net pricing and affordability over all income levels where only financial need is used to justify departures from the published sticker price.

From 1988 to 2001

Table 1 reports constant dollar average net price over the thirteen years from academic 1988-9 to 2000-1 along with their relation to sticker prices and to average median family incomes for each income quintile. Also reported there are the average Census boundaries that define each income quintile. So Table 1 combines both information about the US distribution of income over that period – quintile boundaries and median incomes – and information about Williams and its aid recipients by income – the net prices they paid and how those related to sticker price and to family incomes.

Because there’s a lot going on, even when we suppress yearly variations under the thirteen year average, the essential facts about pricing over this period are summarized in two pictures. Figure 1 shows average net prices by income quintile as they range from \$6,850 in the lowest quintile to \$20,956 for those students in the top quintile who received financial aid. The need-based aid policy is clear in the systematic stairstep of

Table 1
 Williams' Aid Recipients
Net Prices by Family Income
 13 year average, 1988-89 to 2000-01
 (Year 2000 dollars)

Income Quintile	Income Range ¹	Quintile Median Income (QMI)	Net Price	Net Price as a Share of Sticker Price	Net Price as a Share of QMI
Low	\$0-\$21,102	\$12,199	\$6,850	23%	57%
Lower Middle	\$21,103-\$36,735	\$27,764	\$8,148	28%	29%
Middle	\$36,736-\$54,392	\$45,255	\$11,024	38%	24%
Upper Middle	\$54,393-\$80,079	\$68,191	\$14,984	51%	22%
High	\$80,080-	\$101,711	\$20,956	71%	21%
Sticker Price	---	---	\$29,571	100%	---

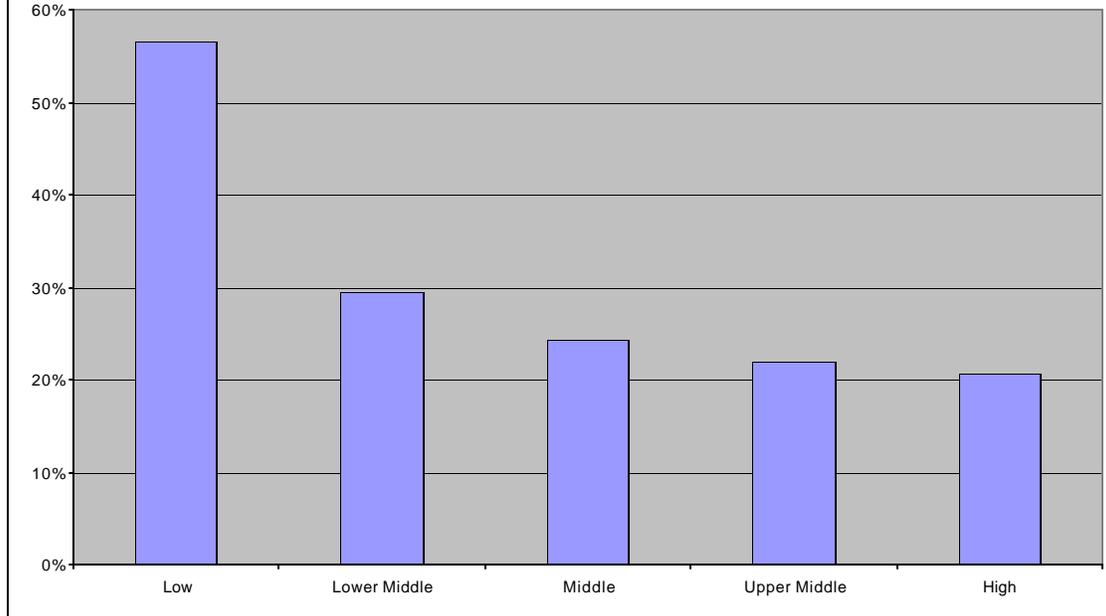
¹ These refer to national family income ranges as provided by Census.

increasing net price as we move from low to high family income across the figure. And if we'd done a graph of the next column of Table 1 – where net price is expressed as a percent of sticker price⁶ – it would have looked much the same.

But Figure 2 tells a different and less reassuring story about need-based aid. There, average net prices over the decade are expressed as shares of average quintile median income for each income level and the picture is clearly reversed. Now the lowest income families – those with incomes between 0 and \$21,102 over the 13 year average – pay the largest percentage by far (57%) of quintile median family income (\$12,199) with their \$6,850 net price for a year at Williams. For the other four quintiles – from the second up to the fifth – the share of their quintile median family incomes being spent on Williams' education declines monotonically, but from highest to lowest within that group, the income share stays in the range of 21%-29%. So it appears that in terms of quintile incomes, Williams' pricing was regressive – if “need” were defined (simplistically, but usefully) in terms of share of family income, the policies in place met need more generously for higher income families.

⁶ That's (1-percentage discount) in the language of price discounting.

Figure 2
Williams' Aid Recipients
Net Price by Income Quintile as Share of Quintile Median Income
13 year average, 1988-89 to 2000-01



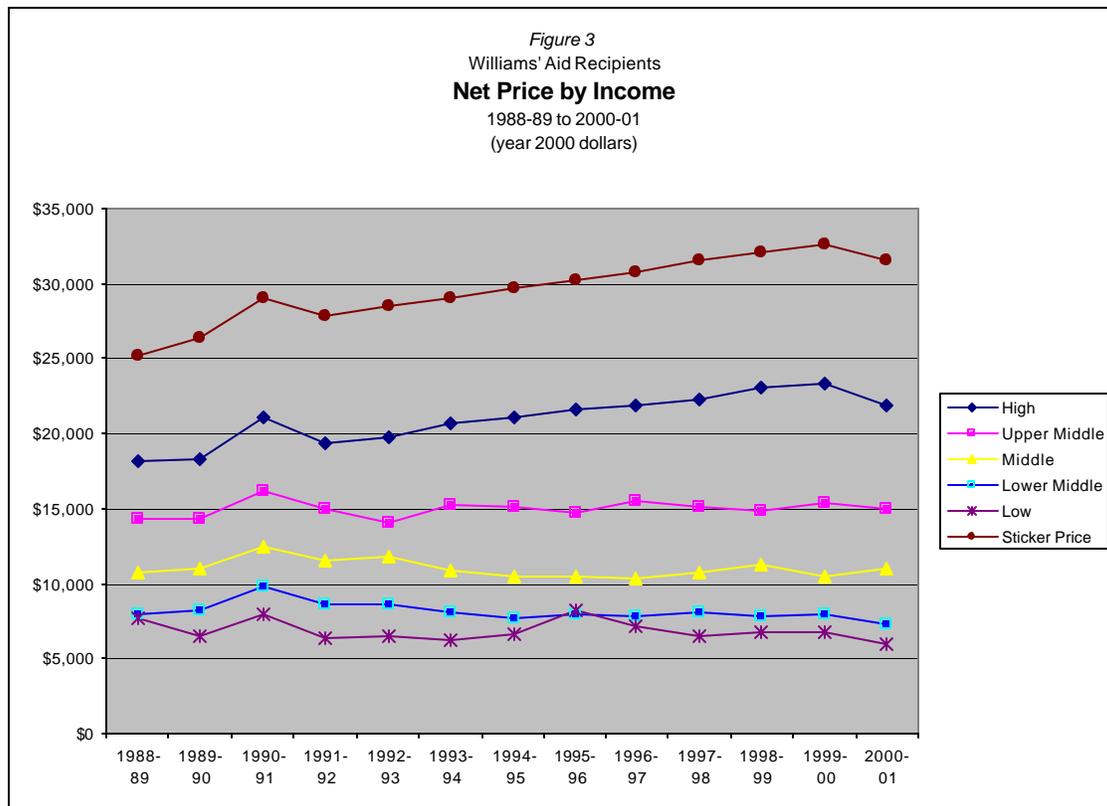
The next three tables and figures fill in the yearly detail that was suppressed by the averages of Table 1 to give a useful picture of trends.

Table 2
Williams' Aid Recipients
Net Prices by Family Income
(1988-89 to 2000-01, year 2000 dollars)

Income Quintile	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
Low	\$7,667	\$6,541	\$7,911	\$6,382	\$6,436	\$6,294	\$6,633	\$8,206	\$7,133	\$6,492	\$6,749	\$6,696	\$5,907
Lower Middle	\$7,991	\$8,166	\$9,750	\$8,599	\$8,622	\$8,137	\$7,700	\$7,907	\$7,846	\$8,088	\$7,842	\$7,978	\$7,300
Middle	\$10,794	\$11,054	\$12,427	\$11,492	\$11,794	\$10,860	\$10,492	\$10,498	\$10,384	\$10,772	\$11,277	\$10,413	\$11,048
Upper Middle	\$14,312	\$14,333	\$16,235	\$14,939	\$14,067	\$15,297	\$15,135	\$14,651	\$15,529	\$15,088	\$14,823	\$15,410	\$14,975
High	\$18,114	\$18,289	\$21,027	\$19,367	\$19,740	\$20,681	\$21,118	\$21,624	\$21,815	\$22,302	\$23,077	\$23,328	\$21,938
Sticker Price	\$25,224	\$26,379	\$28,979	\$27,809	\$28,536	\$29,065	\$29,699	\$30,259	\$30,785	\$31,490	\$32,095	\$32,579	\$31,520

In Table 2 constant dollar net prices are reported by income level, along with the prevailing sticker price and in Figure 3 the average relationships between net prices by

income levels are apparent as constant dollar net prices over the period shift upward systematically with rising income. Except for one year, 1995-96, low income students paid a lower net price than lower-middle income students and so on from bottom to top.⁷ But Figure 3 is most useful in illustrating the time shape and distribution of the upward changes in real net prices. So while full-pay students saw a pretty consistent rise in their real net price, or sticker price, (by 25% from beginning to end) – as did those aided students in the top income quintile (by 21%) – for the four lower income levels, constant dollar net prices drifted along with little change (fourth quintile) or went gently downward (first, second and third). So statements based on sticker price trends that purport to describe the movement of college prices over time would be, here as in so much of higher education, quite misleading in describing the net price many students were actually paying. [Swartz-Scafidi].

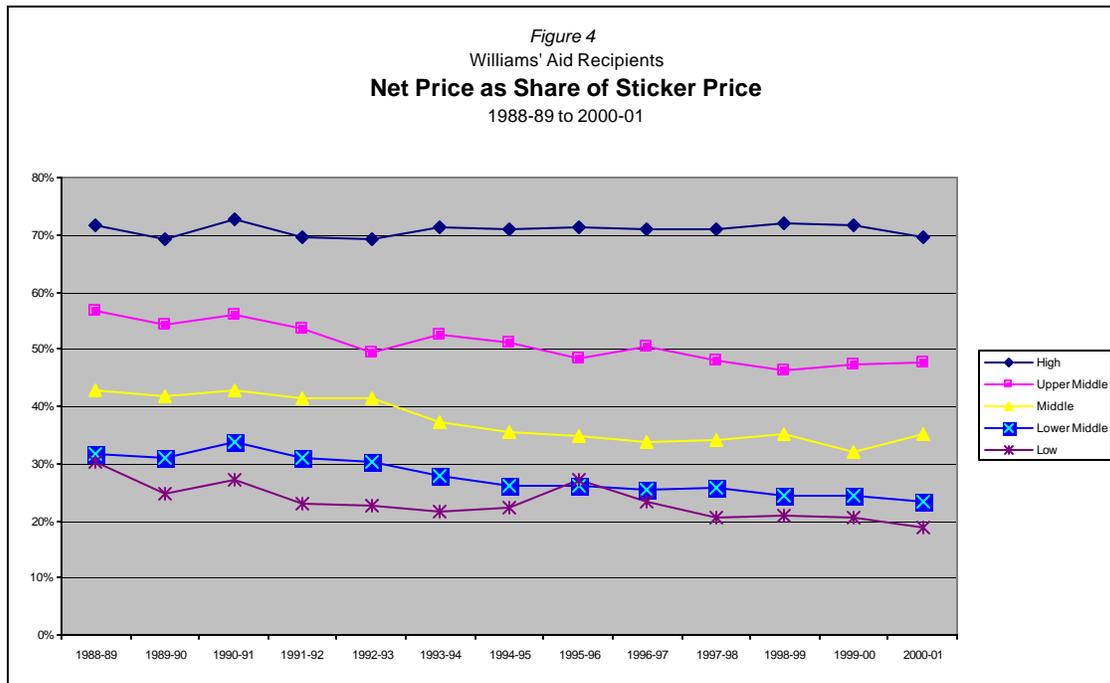


⁷ That one year – was apparently one in which average incomes of students in the lowest quintile fell markedly while the College’s grant aid didn’t keep up with that fall.

Table 3
Williams' Aid Recipients
Net Prices by Income as a Share of Sticker Price
(1988-89 to 2000-01)

Income Quintile	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
Low	30%	25%	27%	23%	23%	22%	22%	27%	23%	21%	21%	21%	19%
Lower Middle	32%	31%	34%	31%	30%	28%	26%	26%	25%	26%	24%	24%	23%
Middle	43%	42%	43%	41%	41%	37%	35%	35%	34%	34%	35%	32%	35%
Upper Middle	57%	54%	56%	54%	49%	53%	51%	48%	50%	48%	46%	47%	48%
High	72%	69%	73%	70%	69%	71%	71%	71%	71%	71%	72%	72%	70%
Full Pay	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

When those net prices are expressed as a percent of sticker price in Table 3 and Figure 4, of course, the time trends are all being divided by a rising sticker price so the lines describing net prices as shares of sticker price are all rotated downward. Some of the increases in discounting are quite significant. Low income students saw the proportion of the sticker price they paid fall from 30% at the beginning of the period to 19% at the end; aid recipients at the other income levels saw reductions from 32% to 23%, 43% to 35%, 57% to 48% and, for those in the top income group getting aid, 72% to 70%.

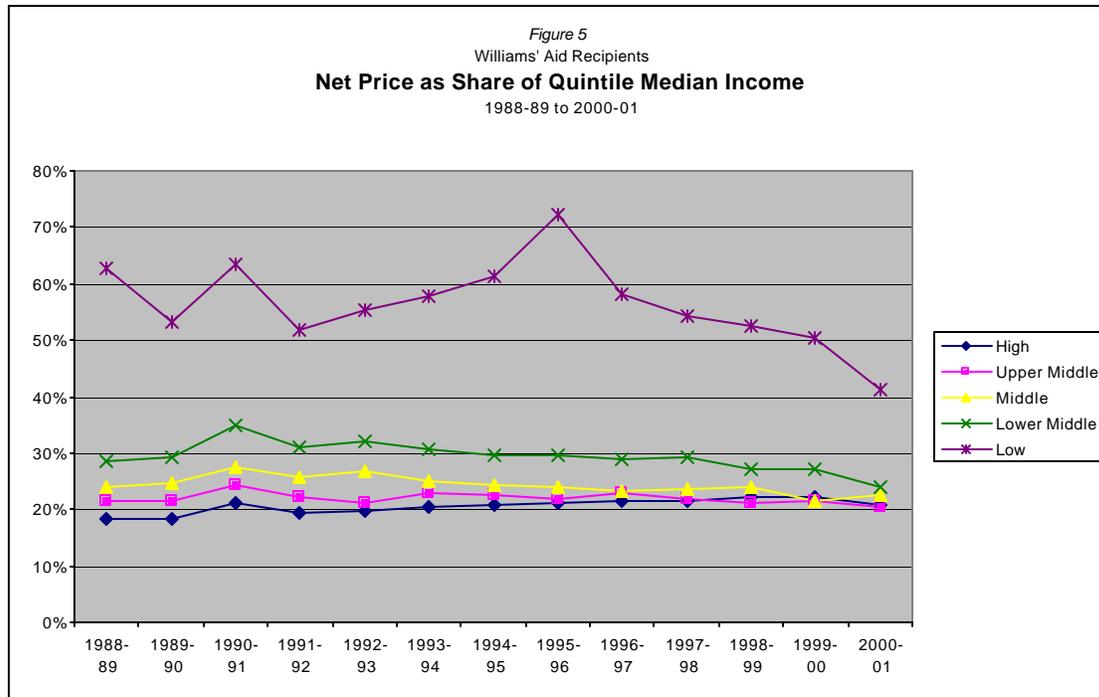


But the real meat for the question of affordability is in Table 4 and Figure 5 where, again, net prices are expressed as shares of each quintile's median family income and tracked over the 13 years. Again it is clear that low income students paid the largest share of their income over the whole of the period, but the peak of 72% in 1995-96 stands out. Indeed, the first seven years saw an uneven upward movement in the income share represented by net prices for this low income group that was offset by a sharp decline in share during the last six years. From 1995-6 to 2000-01, net price fell from 72% to 41% of income. It's important, though, not to overlook the trend in affordability for the other four income quintiles over this period where the shares of net prices in median quintile incomes didn't so much fall or rise, but, instead, converged so that by the end of the period Williams' net prices were a very similar share of income across the (remainder of the) income distribution: 24%, 23%, 21% and 21% from lower-middle to high income quintiles, respectively.

Table 4
Williams' Aid Recipients
Net Prices by Income as a Share of Quintile Median Income
(1988-89 to 2000-01)

Income Quintile	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
Low	63%	53%	63%	52%	55%	58%	61%	72%	58%	54%	53%	50%	41%
Lower Middle	29%	29%	35%	31%	32%	31%	30%	30%	29%	29%	27%	27%	24%
Middle	24%	25%	28%	26%	27%	25%	24%	24%	23%	24%	24%	22%	23%
Upper Middle	21%	22%	24%	22%	21%	23%	23%	22%	23%	22%	21%	22%	21%
High	18%	18%	21%	19%	20%	21%	21%	21%	21%	22%	22%	22%	21%

It's easy to summarize financial aid and its consequent net pricing in this period. There were three main facts: one saw the trend of increasing sticker price that has received so much attention in all of higher education; another saw the real net price paid by financial aid students hold steady or fall while those net prices represented a modest or declining share of income; and throughout the period, among aided students, those with the lowest income paid the largest share of income for tuition, room, board, and fees, though that share declined noticeably toward the end of the period.



With that, we turn to data from the present award year – in an important sense, the end of the story of net price trends for aided students.

Net Prices in 2001-02

There are two good reasons for separating out the current year, 2001-02, to summarize the pricing policy that results from a commitment to full need aid. Technically, the dollar values aren't and can't be made entirely comparable with those for the earlier 13 years – until this year ends, we can't put current values into constant historical dollars because we don't yet know the year's inflation rate. But much more important is the fact that these data embody the end results of a series of evolving financial aid policies that describe the net prices facing students now and in the future.⁸

⁸ Williams made a significant change in its financial aid policies effective 2001-2002 for all students. That followed a more modest adjustment two years earlier that was still being phased in. The policy changes replaced some loans and jobs with grants, within existing definitions of need, and by larger amounts for lower income students. Starting from average four-year loan burdens of almost \$18,000 for all financial aid students, the changes reduced these to about \$4,000 for the lowest income students, \$8,000 for other low income students, and \$14,000 for other financial aid students. These represent a significant increase in

Because of that, our analysis seems to represent a very useful template for understanding and evaluating need-based financial aid policies and one that should be of value to other schools.

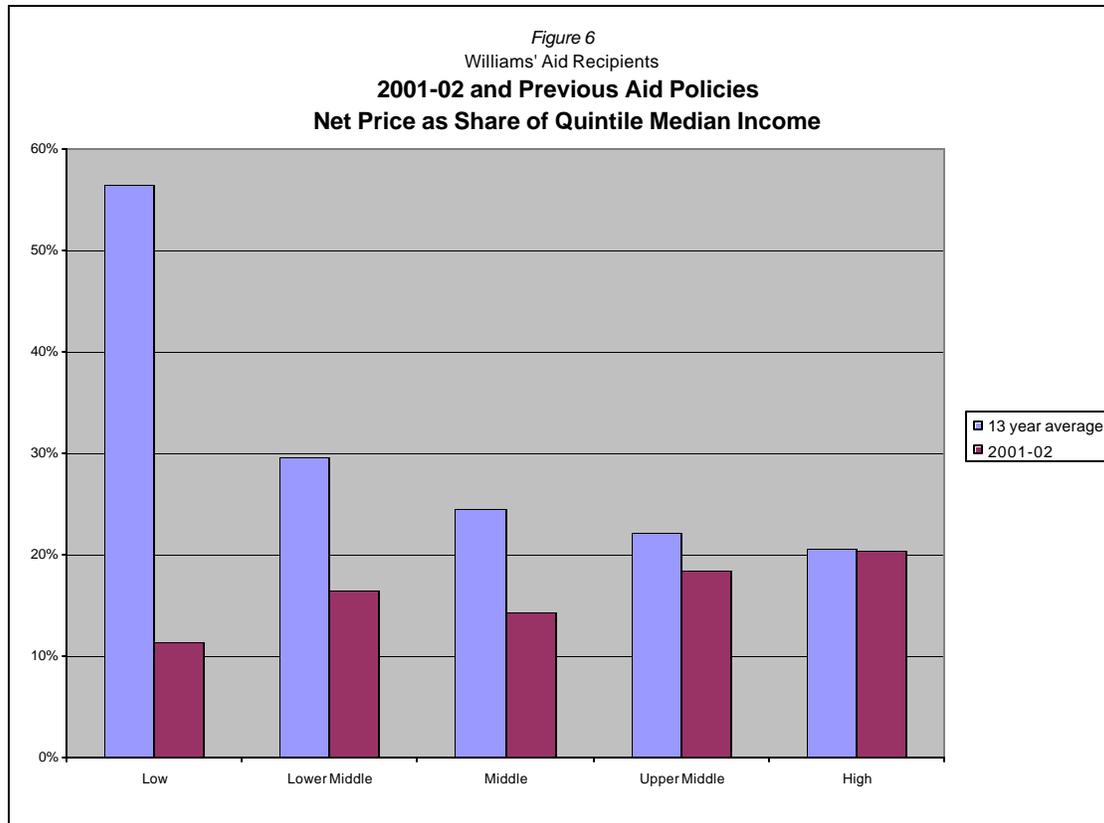
So Table 5 reports net prices in current dollars by family income for students receiving financial aid in 2001-02. Like Table 1, it combines Williams data on net price, sticker price and aid recipients' family incomes with Census-based data on the US family income distribution. Figure 6 graphs the distribution of net prices by income quintile for Williams students in 2001-2002 (the dark bars) and, for comparison, the distribution that was shown in Figure 1 for the prior 13 year averages.

Table 5
Williams' Aid Recipients
Net Prices by Family Income
Award Year 2001-02
(Current Dollars)

Income Quintile	Income Range	Quintile Median Income (QMI)	Net Price	Net Price as a Share of Sticker Price	Net Price as a Share of QMI
Low	\$0-\$23,593	\$14,765	\$1,683	5%	11%
Lower Middle	\$23,594-\$40,931	\$31,548	\$5,186	16%	16%
Middle	\$40,932-\$61,397	\$50,595	\$7,199	22%	14%
Upper Middle	\$61,398-\$91,043	\$75,262	\$13,764	42%	18%
High	\$91,044-	\$108,736	\$22,013	68%	20%
Sticker Price	---	---	\$32,470	100%	---

The distribution of net prices now looks at least mildly progressive – the poorest students pay the lowest net prices and the smallest share of the sticker price, as they have all along, but they now pay the smallest share of family income, too. By quintile, net prices for a year at Williams range from \$1,683 for students in the bottom 20% of the family income distribution to \$22,013 for those in the top 20% who get financial aid.

grant aid and thus reduction of net price, particularly for lower income families. Other schools have adopted similar policies during this period.



Those at the bottom pay 5% of the posted sticker price while those aided students at the top pay 68%. But, again, as pictured in Figure 6, the numbers most relevant to affordability are those that describe the proportion of family income an aided student had to pay for tuition, room, board, and fees – net price as a share of median family income – and that share now rises from 11% for families in the bottom income quintile to 20% for those in the top. The share of net price in income generally rises with income but it rises gently and is therefore pretty close to the same for all aided students. If, again, “need” is to be defined as a fraction of family income, it is now being met in much the same way over all aided students’ income levels with a slight tilt toward those with the lowest incomes.⁹

⁹ It has been noted frequently that low income families typically have much less flexibility and often greater demands on a student’s potential earning so even a share of family income going to net tuition that slightly favored low income students might not be enough to achieve a realistic “equality of opportunity.”

The early motivation for this study was that simple question, “How much does a very able low income student pay to go to a high-priced college?” How effective, in other words, are the efforts of highly selective colleges to achieve something like equality of opportunity through their need-based financial aid? The answer embedded in Table 5 is clearly “They don’t pay much.” As we’ve seen, with a sticker price of \$32,470, a student from the bottom income quintile pays, on average, less than \$1,700 for a year at Williams.

Too, the information from Table 5 lets us evaluate the error implicit in the popular statistic that purports to describe access to higher education or affordability by expressing sticker price as a fraction of median family income. To say it again, low income kids don’t come from families with the median income and those who do come from median income families don’t pay the sticker price. Table 5, shows that the truly low income students in our data pay 5% of the sticker price, the median income kid pays 22% (\$7,199 on \$32,470), and the sticker price is 64% of median family income.

The Overall Pattern of Net Prices – Pricing Policy

We’ve answered the question of low income access to a high-priced education, across those who get financial aid. But it’s useful to extend this kind of analysis to see, too, what share of family income goes to pay Williams’ price among those whose incomes are too high to qualify for financial aid – the full-pay students. Then we can see something about “affordability” over the whole of the population.

Though we know family incomes for only that roughly half of the student population that applies for financial aid, we can get a reasonable picture of the pattern of pricing over all income levels by recognizing that those who don’t apply for aid are, with few exceptions, from high income families who pay the sticker price.

For high income families that don’t apply for aid, two pieces of the data we’ve reported above are trivially easy – their net price *is* the sticker price so for them, net price

is 100 percent of the sticker price – but in order to see how net price compares to income, we need the missing family income information. To that end, two points of high income within the top quintile can be derived from Census and CBO statistics – pretax family income at the lower bounds of the 95th and 99th percentiles.¹⁰ Combined with the results for aided students, these give us a usefully broad picture of net price, net price/sticker price, and net price/family income, taking those two levels of high income as representative of Williams non-aided students.¹¹

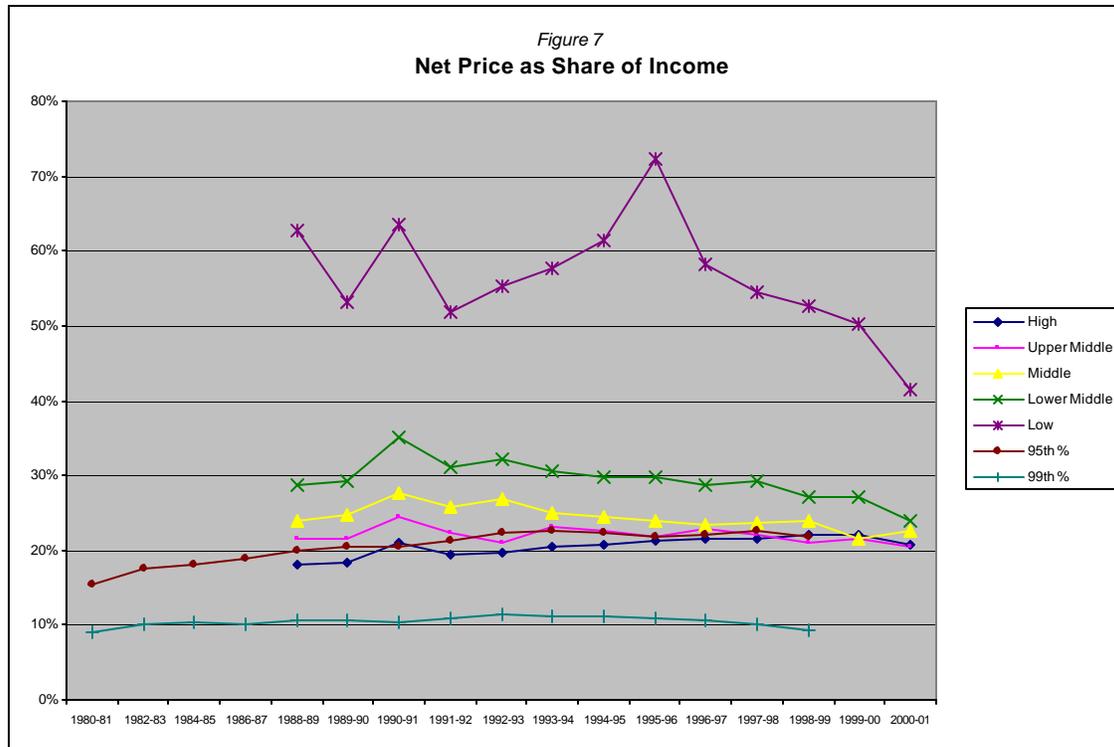
Table 6
Sticker Price as a Share of High Incomes
95th and 99th Percentile Lower Bound
 (1980-81 to 1998-99, constant year 2000 dollars)

	1980-81	1982-3	1984-85	1986-87	1988-89	1990-91	1992-93	1994-95	1996-97	1998-99
95th	\$112,210	\$109,127	\$114,456	\$121,185	\$126,805	\$133,449	\$127,356	\$133,127	\$138,845	\$146,672
99th	\$195,839	\$190,154	\$199,806	\$227,703	\$237,884	\$262,211	\$252,559	\$263,533	\$286,010	\$347,754
sticker price	\$17,442	\$19,078	\$20,641	\$22,842	\$25,224	\$27,352	\$28,536	\$29,699	\$30,785	\$32,095
sticker price/95th	16%	17%	18%	19%	20%	20%	22%	22%	22%	22%
sticker price/99th	9%	10%	10%	10%	11%	10%	11%	11%	11%	9%

Table 6 shows sticker (net) price in constant year 2000 dollars along with income levels at the 95th and 99th percentiles and, for each, the share of family income the sticker price represents. It's unfortunate that the period for which we have this information doesn't exactly match that of Williams' financial aid data, but we usefully superimpose those two series with their ten years of overlap which seems enough to give some sense of trends for the five income quintiles and, within the top quintile, the 95th and 99th percentiles. These are graphed in Figure 7.

¹⁰ With some complications in merging Census and CBO data sources – family versus household income and pre-tax versus after tax incomes – that are described in the Appendix. Furthermore, we noted above (p. 4) that timing of income and price data for aid recipients present a problem since financial aid awards for an academic year are based on family income for the previous calendar year. To maintain consistency, we used the same timing in calculating price as a share of income for full-pay students at the 95th and 99th percentiles – sticker price for the academic year 1991-2, for instance, was divided by family income for calendar year 1990 and reported in tables and graphs for 1991-2.

¹¹ Over these fourteen years, no aided students had family incomes in the 99th percentile and very few were in or above the 95th percentile (the main explanation for any such wealthy families getting aid being multiple students in college).



It's easy to focus too much on the low – and in the end, declining – share of 99th percentile income that the (more slowly rising) sticker price represents – it's apparent that the explosion during the late 90's in the highest US incomes messes up an otherwise relatively even distribution of shares. (Nor is that increase fully conveyed by the pretax incomes utilized here as the relative share of taxes declined, too, at the top – so sticker price as a share of *after* tax income would show a steeper decline in the last part of the period.¹²) The only way Williams could, of course, have retained the relatively high maximum share (11%) of income that the sticker price represented for that top 1% in 1991-5 would have been by raising the sticker price a good deal faster than it did to match the impressive growth in the highest incomes.

Interestingly, a policy of sharply increased sticker price combined with financial aid grants that kept net prices much as they were for all aided students (a population that would have been markedly expanded, of course, by larger sticker price increases) would have been necessary to maintain a more egalitarian distribution of net price by income.

¹² Shapiro, et al.

The relatively modest growth in sticker prices (relative to the income growth of many of those who pay them) served to benefit high-income affordability at the same time that changing financial aid policies were benefiting low and middle income access and affordability. It is interesting too, though, that a combination of sticker price policy and financial aid policy that best served egalitarian aims would have recommended even sharper increases in sticker price to track the increase in top 1% incomes.

Table 7
Pricing and Affordability
Net Price as a Share of Income

Income	13 year average ²	2001-02 ¹
Low	57%	11%
Lower Middle	29%	16%
Middle	24%	14%
Upper Middle	22%	18%
High	21%	20%
95th percentile ²	22%	22%
99th percentile ²	11%	9%

¹ For the 95th and 99th percentiles we use sticker price and income values for 1998.

² For the 95th and 99th percentiles income the average is based on 1988-89, 1990-91, 1992-93, 1994-95, 1996-97, and 1998-99 only.

Williams overall pricing policy is, we think, well summarized in Table 7 that shows net prices as shares of income for all seven income levels – the five quintiles used to describe the aided population where net price is less than sticker price and the two high incomes where net price is the sticker price. The table describes, pretty well, where the school is now¹³ with the financial aid/pricing policies now in place. The most outstanding fact, we think, is that there is relatively little difference in “affordability” by income level at this very expensive school – that the policy of need-blind admission and full-need aid appears, after some adjustments over time, to make a Williams education available on much the same terms across the whole of the income range.

Access to schools like Williams is determined by admission, not by affordability. The question we posed at the outset – “Can a highly able low income kid reasonably aspire to go to an expensive and highly selective college?” is clearly “yes.”

¹³ Hedging is required by the fact that the 99th percentile data used in Table 7 ends with 1998-99.

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APPENDIX

Data

Table A reports the data that underlie the financial aid tables and narrative in the text. Once again, these data are partly from Williams' financial aid decisions (number of applicants and awards by year, aid recipients' family incomes, grant aid and sticker price), partly from Census (pre-tax family income boundaries for quintiles by year, quintile median incomes), and partly from their merging (number of aid recipients by income quintile, average grant aid by quintile). Data are reported for aid recipients. Data for full-pay students at the 95th and 99th percentiles are reported in Table 6 in the text.

Interpolation for quintile median income

Census income data report, for each year, a percentage distribution of the population by income. From these, we interpolated quintile median incomes for all but the third quintile (where the Census reported national median was used).

For instance, the median income for the second quintile will be at the 30th percentile. For 1998, the Census reported that 23.5% of families earned less than \$25,000 (in 1999 dollars) and 36.0% earned \$34,999 or less so 12.5% had earnings within that \$10,000 range. Since each percentage point between \$25,000 and \$34,999 represented \$800 – assuming linearity – the quintile median, the 30th percentile, is at $\$34,999 - 6.0(\$800) = \$30,199$. This same kind of interpolation was used to generate quintile median incomes for all years and all quintiles but the third.

Estimation of pre-tax family incomes for the 95th and 99th percentiles – Census and CBO

The Census data used to classify incomes into quintile distribution for the aided student population were yearly *family* incomes, *pre-tax*. Census reported quintile boundaries along with the lower bound of the 95th percentile and did it for both family and household income.

In order to extend the analysis to unaided students who paid the sticker price, we used a recent Congressional Budget Office report on higher incomes. The CBO reported *after-tax household* incomes for both the 95th and 99th percentiles (lower bounds) for the odd years between 1979 and 1997 (since we compare these incomes with sticker prices, we aren't limited to those years for which we have financial aid data).

To make incomes comparable over quintiles and the 95th and 99th percentiles, we had to put the CBO figures in pre-tax, family terms. To do this, we used the fact that both the CBO and Census reported incomes for the 95th percentile and Census reported both family and household incomes. So we could (and did) estimate the difference between family and household incomes using the 95th percentile figures from Census and found that family incomes were 108% of household incomes with a standard deviation of 3%. We simply adjusted the CBO household numbers into a family income equivalent by multiplying by 1.08.

Adjustment from after-tax (CBO) to pre-tax was a bit less straightforward since we couldn't get tax figures at the 99th percentile lower bound – to add to after-tax incomes - but only an average tax paid by all those above that lower bound. So, again, we used the fact that the 95th percentile incomes appeared in both sets of data to fit, for that 95th percentile, after-tax (CBO) to pre-tax (Census) incomes. With the declining share of income going to taxes in the top income levels during this period, it was important that we not use – as we had with the family-household conversion – a single

average adjustment. So our estimate was that pre-tax income = 19818 + 1.144 after-tax income.

As a check on all this, we used CBO data and these coefficients to estimate the 95th percentile pre-tax family incomes that were in fact reported by Census and found that the largest error introduced by our method – the largest difference between our estimate and Census reports – was under 10%. Since, in the analysis, we use these income figures relative to price and for those in the 99th income percentile where price represents 8-10% of income, a full 10 % error in measuring income would produce at most a 1% error in the price/income ratio we're interested in, leaving all the conclusions of the text unchanged.

Note that Census data were used for incomes at the 95th percentile while the adjusted CBO data were used for the 99th percentile.

Appendix Table A

Williams Financial Aid by Recipient's Real Family Income (constant year 2000 dollars, 2001-02 is current dollars)

Income		1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	13 year average	2001-02
	Sticker Price ¹	\$25,224	\$26,379	\$28,979	\$27,809	\$28,536	\$29,065	\$29,699	\$30,259	\$30,785	\$31,490	\$32,095	\$32,579	\$31,520	\$29,571	\$32,470
Low Income: 1st Quintile	Lower Income Quintile Bound ²	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Quintile Median Income(QMI) ³	\$12,203	\$12,325	\$12,465	\$12,295	\$11,667	\$10,908	\$10,797	\$11,335	\$12,243	\$11,933	\$12,828	\$13,305	\$14,285	\$12,199	\$14,765
	Quintile Upper Income Bound	\$21,249	\$20,972	\$21,084	\$21,299	\$20,865	\$19,917	\$19,718	\$20,271	\$20,930	\$21,115	\$21,748	\$22,326	\$22,826	\$21,102	\$23,593
	Aid Applicants	91	82	94	93	95	77	85	83	93	96	103	111	106	93	108
	Aid Recipients	83	79	91	92	93	74	84	82	93	96	100	109	105	91	106
	Percent of Applicants Awarded Aid	91%	96%	97%	99%	98%	96%	99%	99%	100%	100%	97%	98%	99%	98%	98%
	Average Grant	\$17,557	\$19,838	\$21,068	\$21,426	\$22,101	\$22,771	\$23,066	\$22,054	\$23,652	\$24,998	\$25,346	\$25,884	\$25,613	\$22,721	\$30,787
	Net Price (Sticker Price less Grant)	\$7,667	\$6,541	\$7,911	\$6,382	\$6,436	\$6,294	\$6,633	\$8,206	\$7,133	\$6,492	\$6,749	\$6,696	\$5,907	\$6,850	\$1,683
	Net Price as Percent of QMI	63%	53%	63%	52%	55%	58%	61%	72%	58%	54%	53%	50%	41%	57%	11%
	Net Price as Percent of Sticker Price	30%	25%	27%	23%	23%	22%	22%	27%	23%	21%	21%	21%	19%	23%	5%
Lower Middle Income: 2nd Quintile	Lower Income Quintile Bound	\$21,251	\$20,974	\$21,086	\$21,300	\$20,867	\$19,918	\$19,719	\$20,272	\$20,931	\$21,116	\$21,749	\$22,327	\$22,827	\$21,103	\$23,594
	Quintile Median Income(QMI)	\$27,865	\$27,833	\$27,828	\$27,698	\$26,876	\$26,542	\$25,935	\$26,583	\$27,239	\$27,628	\$28,882	\$29,495	\$30,522	\$27,764	\$31,548
	Quintile Upper Income Bound	\$36,655	\$36,359	\$36,891	\$36,721	\$35,730	\$35,362	\$34,858	\$35,367	\$36,202	\$36,816	\$38,032	\$38,959	\$39,600	\$36,735	\$40,931
	Aid Applicants	75	83	93	99	83	90	92	87	101	110	94	108	114	95	97
	Aid Recipients	74	83	92	98	81	90	90	86	101	110	93	107	114	94	97
	Percent of Applicants Awarded Aid	99%	100%	99%	99%	98%	100%	98%	99%	100%	100%	99%	99%	100%	99%	100%
	Average Grant	\$17,234	\$18,212	\$19,229	\$19,209	\$19,914	\$20,929	\$21,999	\$22,352	\$22,939	\$23,401	\$24,253	\$24,602	\$24,220	\$21,423	\$27,284
	Net Price (Sticker Price less Grant)	\$7,991	\$8,166	\$9,750	\$8,599	\$8,622	\$8,137	\$7,700	\$7,907	\$7,846	\$8,088	\$7,842	\$7,978	\$7,300	\$8,148	\$5,186
	Net Price as Percent of QMI	29%	29%	35%	31%	32%	31%	30%	30%	29%	29%	27%	27%	24%	29%	16%
	Net Price as Percent of Sticker Price	32%	31%	34%	31%	30%	28%	26%	26%	25%	26%	24%	24%	23%	28%	16%
Middle Income: 3rd Quintile	Lower Income Quintile Bound	\$36,657	\$36,361	\$36,892	\$36,722	\$35,731	\$35,364	\$34,859	\$35,368	\$36,203	\$36,818	\$38,033	\$38,960	\$39,601	\$36,736	\$40,932
	Quintile Median Income(QMI)	\$45,081	\$44,704	\$45,077	\$44,698	\$44,111	\$43,583	\$42,945	\$43,821	\$44,571	\$45,384	\$47,084	\$48,308	\$48,950	\$45,255	\$50,595
	Quintile Upper Income Bound	\$53,568	\$53,465	\$53,755	\$53,152	\$52,777	\$52,435	\$52,322	\$53,106	\$53,762	\$54,810	\$56,642	\$57,903	\$59,400	\$54,392	\$61,397
	Aid Applicants	113	129	125	104	113	128	135	120	131	128	147	142	142	127	124
	Aid Recipients	108	127	120	99	109	123	132	119	129	127	145	142	141	125	123
	Percent of Applicants Awarded Aid	96%	98%	96%	95%	96%	96%	98%	99%	98%	99%	99%	100%	99%	98%	99%
	Average Grant	\$14,430	\$15,325	\$16,552	\$16,317	\$16,743	\$18,205	\$19,207	\$19,761	\$20,401	\$20,717	\$20,818	\$22,167	\$20,472	\$18,547	\$25,271
	Net Price (Sticker Price less Grant)	\$10,794	\$11,054	\$12,427	\$11,492	\$11,794	\$10,860	\$10,492	\$10,498	\$10,384	\$10,772	\$11,277	\$10,413	\$11,048	\$11,024	\$7,199
Net Price as Percent of QMI	24%	25%	28%	26%	27%	25%	24%	24%	23%	24%	24%	22%	23%	24%	14%	
Net Price as Percent of Sticker Price	43%	42%	43%	41%	41%	37%	35%	35%	34%	34%	35%	32%	35%	38%	22%	

Income		1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	13 year average	2001-02
	Sticker Price ¹	\$25,224	\$26,379	\$28,979	\$27,809	\$28,536	\$29,065	\$29,699	\$30,259	\$30,785	\$31,490	\$32,095	\$32,579	\$31,520	\$29,571	\$32,470
Upper Middle Income: 4th Quintile	Lower Income Quintile Bound	\$53,570	\$53,467	\$53,756	\$53,153	\$52,778	\$52,436	\$52,323	\$53,107	\$53,763	\$54,811	\$56,643	\$57,904	\$59,401	\$54,393	\$61,398
	Quintile Median Income(QMI)	\$66,720	\$66,628	\$66,601	\$66,760	\$66,766	\$66,356	\$67,229	\$67,565	\$68,010	\$68,803	\$70,584	\$71,648	\$72,815	\$68,191	\$75,262
	Quintile Upper Income Bound	\$77,628	\$77,637	\$78,458	\$77,743	\$77,313	\$76,328	\$77,611	\$79,092	\$79,306	\$80,806	\$84,515	\$86,506	\$88,082	\$80,079	\$91,043
	Aid Applicants	229	187	200	208	203	178	204	214	189	198	236	251	244	211	234
	Aid Recipients	218	176	192	196	196	169	194	201	184	191	231	247	239	203	231
	Percent of Applicants Awarded Aid	95%	94%	96%	94%	97%	95%	95%	94%	97%	96%	98%	98%	98%	96%	99%
	Average Grant	\$10,912	\$12,046	\$12,744	\$12,870	\$14,469	\$13,769	\$14,564	\$15,609	\$15,256	\$16,401	\$17,272	\$17,169	\$16,545	\$14,587	\$18,706
	Net Price (Sticker Price less Grant)	\$14,312	\$14,333	\$16,235	\$14,939	\$14,067	\$15,297	\$15,135	\$14,651	\$15,529	\$15,088	\$14,823	\$15,410	\$14,975	\$14,984	\$13,764
	Net Price as Percent of QMI	21%	22%	24%	22%	21%	23%	23%	22%	23%	22%	21%	22%	21%	22%	18%
	Net Price as Percent of Sticker Price	57%	54%	56%	54%	49%	53%	51%	48%	50%	48%	46%	47%	48%	51%	42%
Lower Income Quintile Bound	\$77,630	\$77,639	\$78,460	\$77,744	\$77,314	\$76,329	\$77,612	\$79,093	\$79,307	\$80,807	\$84,516	\$86,507	\$88,083	\$80,080	\$91,044	
High Income: 5th Quintile	Quintile Median Income(QMI)	\$99,553	\$99,202	\$99,534	\$99,882	\$100,541	\$100,457	\$101,385	\$101,819	\$101,802	\$102,963	\$104,728	\$105,173	\$105,200	\$101,711	\$108,736
	Aid Applicants	407	401	384	413	426	435	406	432	461	496	481	452	412	431	414
	Aid Recipients	254	277	268	254	293	297	271	271	315	349	323	307	266	288	270
	Percent of Applicants Awarded Aid	62%	69%	70%	62%	69%	68%	67%	63%	68%	70%	67%	68%	65%	67%	65%
	Average Grant	\$7,111	\$8,090	\$7,952	\$8,442	\$8,796	\$8,384	\$8,581	\$8,635	\$8,970	\$9,187	\$9,017	\$9,251	\$9,582	\$8,615	\$10,457
	Net Price (Sticker Price less Grant)	\$18,114	\$18,289	\$21,027	\$19,367	\$19,740	\$20,681	\$21,118	\$21,624	\$21,815	\$22,302	\$23,077	\$23,328	\$21,938	\$20,956	\$22,013
	Net Price as Percent of QMI	18%	18%	21%	19%	20%	21%	21%	21%	21%	22%	22%	22%	21%	21%	20%
Net Price as Percent of Sticker Price	72%	69%	73%	70%	69%	71%	71%	71%	71%	71%	72%	72%	70%	71%	68%	
All Aided Students	Median Income	\$45,081	\$44,704	\$45,077	\$44,698	\$44,111	\$43,583	\$42,945	\$43,821	\$44,571	\$45,384	\$47,084	\$48,308	\$48,950	\$45,255	\$50,595
	Aid Applicants	915	882	896	917	920	908	922	936	975	1028	1061	1064	1018	957	977
	Aid Recipients	737	742	763	739	772	753	771	759	822	873	892	912	865	800	827
	Percent of Applicants Awarded Aid	81%	84%	85%	81%	84%	83%	84%	81%	84%	85%	84%	86%	85%	84%	85%
	Average Grant	\$11,501	\$12,650	\$13,434	\$13,716	\$14,128	\$14,110	\$15,050	\$15,230	\$15,548	\$15,972	\$16,492	\$17,196	\$17,156	\$14,783	\$19,544
	Net Price (Sticker Price less Grant)	\$13,724	\$13,729	\$15,545	\$14,093	\$14,409	\$14,955	\$14,649	\$15,029	\$15,237	\$15,517	\$15,603	\$15,384	\$14,364	\$14,787	\$12,926
	Net Price as Percent of Median Income	30%	31%	34%	32%	33%	34%	34%	34%	34%	34%	33%	32%	29%	33%	26%
	Net Price as Percent of Sticker Price	54%	52%	54%	51%	50%	51%	49%	50%	49%	49%	49%	47%	46%	50%	40%
Sticker Price as Percent of Median Income	56%	59%	64%	62%	65%	67%	69%	69%	69%	69%	68%	67%	64%	65%	64%	

- Sources:
1. Sticker Price and data on number of aid applicants and recipients, grants were provided by the Williams College Financial Aid Office.
 2. U.S. Census Bureau; "Historical Income Tables – Families, Table F-1. Income Limits for Each Fifth and Top 5 Percent of Families (All Races): 1947 to 2000" <<http://www.census.gov/hhes/income/histinc/f01.html>> - Data on upper income limits for the first four quintiles.
 3. U. S. Census Bureau; "Money Income in the United States: 1999;" Appendix B Table B-4;

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