

A Nonparametric Examination of the Prices Low-Income Students Face

John J. Cheslock
Center for the Study of Higher Education
Penn State University
jjc36@psu.edu

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Abstract: This paper utilizes all six years of available National Postsecondary Student Aid Study (NPSAS) data to examine changes in the U.S. financial aid system between 1986/87 and 2003/04. Nonparametric regressions are used to study how these changes altered the prices faced by full-time full-year dependent students with different levels of family income. The results indicate that federal grants remained concentrated on low-income students, and despite growth in merit aid programs in some states, state grant aid still retained a need-based focus at the national level. Institutional grants, in contrast, were altered so that middle-income students received slightly higher grants on average than their low-income counterparts. This change primarily occurred during the late 1990s and at less selective private institutions. The distribution of government loans across family income levels was also altered towards middle-income students due to the introduction of the unsubsidized Stafford loan program in the mid-1990s.

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Introduction

The structure of the U.S. financial aid system has drastically changed over the last 20 years, and these changes have fundamentally altered the relationship between a student's financial resources and the level of financial aid received. This opening statement summarizes the conventional wisdom flowing from past studies examining particular elements of the financial aid system (Heller, 2002; McPherson & Shapiro, 1999). But no work has thoroughly tested this statement using the wealth of data collected under the National Postsecondary Student Aid Study (NPSAS). This paper addresses this rather large gap in the literature.

NPSAS data exist for the 1986/87, 1989/90, 1992/93, 1995/96, 1999/00, 2003/04, and 2007/08 academic years, so skilled analysis of these data can reveal trends for a twenty-year period and the years within this period when change was most rapid.¹ NPSAS surveys list the aid received from specific federal, state, and institutional programs, so one can identify the primary elements of the financial aid system that are driving changes. These surveys also contain another essential element: detailed information on the financial resources of the student.

These data have been drastically underutilized. Few studies have examined multiple years of NPSAS data, and even fewer have examined more than two years of data.² By demonstrating how to make NPSAS variables comparable across years, this paper will encourage greater utilization in the future. It also promotes a new

¹ Restricted-use NPSAS data for 2007/08 were not made available until the summer of 2009, so this study does not yet contain analysis for this year. Future versions of this paper, however, will include such analysis.

² See Wei, Li, and Beker (2004) for one of the few studies that uses more than two years of NPSAS data. See Heller & Laird (1999) and McPherson and Shapiro (1999) for examples of studies that use two years of NPSAS data.

methodological approach for analyzing NPSAS data: nonparametric regression. Past studies of financial aid trends have simply compared mean figures for each quintile or quartile of the student population, but this form of inquiry could provide a misleading portrait of how financial trends vary by parental income or hide interesting differences within a quintile or quartile. By abandoning the use of functional form, nonparametric regression allows the data to characterize the shape of the relationship between financial aid and a student's financial resources.

While the data and methodological contributions of this paper are important, its primary contribution is to improve our understanding of how the U.S. tuition and financial aid system is changing. As I will discuss in the next section, past research has indicated that low-income students are falling behind their peers in terms of enrollment in higher education. And while the price of higher education is certainly not the only factor influencing access, a gigantic literature supports the notion that it plays an important role (Heller, 1997). Any attempt to redirect the financial aid system to promote greater access would greatly benefit from a clear description of the direction towards which the system is currently heading.

Literature Review

A student's future educational opportunities are heavily influenced by the income of her parents. Using data from the National Education Longitudinal Study for the high-school class of 1992, Ellwood and Kane (1998) found that 66% of students from the highest family income quartile attended a four-year institution within 20 months of high-school graduation, while only 28% of students from the lowest family income quartile

did. Furthermore, Ellwood and Kane (1998) found that these gaps had increased over time; the corresponding figures were 55% and 29% for the high-school classes of 1980 and 1982.

These disparities are not solely due to low-income students' inability to pay the price required to enroll in college. A student's financial resources are correlated with the quality of K-12 schooling they receive and the education level of their parents, which also impacts a student's academic preparation. Sociologists point to the role of social and cultural capital in promoting college enrollment and the relatively low levels of these forms of capital among low-income students.

So, the price of education is clearly not the only barrier facing low-income students seeking to enroll in and persist through college. But price plays an important role. In reviewing the available literature, Heller (1997) and Leslie and Brinkman (1987) find that for every \$100 increase in tuition and fees, enrollment drops by around 0.35 percentage points.³ Heller (1997) also notes that most studies find a much larger price response for lower income students and a much larger response to a \$100 decrease in listed tuition than a \$100 increase in financial aid.

The need for financial aid has clearly grown, because tuition has been steadily rising. Between 1978/79 and 2008/09, listed tuition and fees increased from \$1,095 to \$2,402 in public two-year institutions, from \$2,303 to \$6,585 in public four-year institutions, and from \$9,903 to \$25,143 in private four-year institutions (Baum & Ma, 2008). (All figures in constant (2008) dollars.) The increased need for tuition dollars stems from rising institutional costs as well as declining or stagnant revenues from other

³ These estimates are based on 2005/06 dollars, which explains why the price response coefficient differs so substantially from that reported in Leslie and Brinkman (1987) and Heller (1997).

sources, such as state appropriations. Tuition increases have not been fully offset by increased grant aid. Traditionally, the federal government is the primary source of grants, especially for low-income students. But federal programs have grown relatively slowly over time. The maximum award for the Pell grant, the primary federal source of need-based financial aid, has only increased by 12 percent over the last 25 years (Baum & Steele, 2007).

Loan aid has increased much more rapidly, as many students have used loans to offset the rise in tuition. The federal government helped encourage this trend by expanding access to loans through the introduction of a large-scale unsubsidized Stafford loan program in mid-1990s (Hearn, 1998). The other major change in the 1990s was the introduction of tax credits, which allowed eligible students to deduct up to \$1,000 to \$2,000 from their tax burden.⁴ Eligibility was concentrated on middle-income families as lower-income families did not have tax liability and upper-income families did not qualify.

These adjustments to the U.S. financial aid system would clearly influence the average net price faced by postsecondary students. This paper is primarily concerned with whether this impact varied by the financial resources of the student. The available literature does suggest a differential effect. Federal grant programs are clearly targeted at low-income students, but because they did not grow much over time, their impact was relatively small. State grant programs have also been traditionally targeted at low-income students, but after Georgia introduced a large scale merit-aid program in mid-1990s, 13 other states introduced similar policies (Heller, 2004). Merit-aid programs typically

⁴ The actual amount that student and their families can deduct has varied. Initially, students in their first two years could deduct up to \$1,500 while third- and fourth-year students could deduct up to \$1,000. By 2008, the figures were raised to \$1,800 for the first two years and \$2,000 for the last two years.

concentrate funds on middle- and upper-income students, so they should drastically alter the distribution of aid across income levels in these states (Heller, 2002). Of course, 36 states did not introduce these plans, and California substantially expanded their need-based Cal grants program in 2001.⁵ So, the manner in which the national distribution of state grants has changed is unclear.

Past work also suggests that changes occurred in the distribution of institutional financial aid across students (McPherson & Shapiro, 1998). While colleges and universities continue to devote funds for need-based aid, many believe that the competition across schools for top students contributed to growing levels of institutional merit aid. Tuition discounting, which target funds on those students whose enrollment decision will be most impacted by financial aid, is also thought to have risen. This conventional wisdom is difficult to verify, because unlike state and federal governments, higher education institutions do not release the guidelines used to distribute aid. Furthermore, these guidelines can vary drastically across institutions, which complicate predictions for national trends. So, we know much less about institutional grants than other parts of the financial aid system.

While a large number of studies have examined specific financial aid programs, relatively few have examined changes over time in the entire financial aid system. Furthermore, almost none have examined these changes by fully utilizing the best detailed source of financial aid data: the National Postsecondary Student Aid Study (NPSAS). The primary exception is Wei, Li, and Beker (2004). The authors used the 1989/90, 1992/93, 1995/96, and 1999/00 NPSAS surveys to examine how tuition, grants,

⁵ The Cal grant program, however, is likely to be drastically reduced in the near future as California seeks to close its large budget deficit.

loans, net prices, and unmet need changed over their 10 year period. They provide sound and detailed estimates of how various elements of the financial aid system changed for students as a whole, and they also examine how financial aid allocations differ across parental income. For the later work, they present mean figures for each parental income quartile, which produces two concerns. First, the distribution of income changed between 1989/90 and 1999/00, so students in the lowest income quartile in 1989/90 may have different income levels than students in the lowest income quartile in 1999/00. Second, by only examining broad groups of parental income values, the authors' findings could be misleading or overly aggregated. The observed differences by parental income may be fundamentally altered if different categories of parental income (such as quintiles or deciles) are used instead. Furthermore, any interesting differences that exist across the income values within each category cannot be observed.

Some studies examine how tuition and/or financial aid have changed over time and do not use income quartiles; instead, they examine how prices changed for low income, middle income, and upper income students and base their assignment to these groups on income ranges that are consistent over time (Heller & Laird, 1999; McPherson & Shapiro, 1999). But these studies are not comprehensive in that they only present evidence from two years of NPSAS surveys for a few elements of the financial aid system, and they are similar to Wei, Li, and Beker (2004) in that they only study broad ranges of parental income.

This study extends upon this previous work by utilizing all NPSAS surveys and nonparametric methods. Consequently, financial aid trends are revealed for the entire 1986/87 to 2003/04 period, with future version of this paper extending the analysis to the

2007/08 academic year. The relationship between financial aid and a student's financial resources will be examined through nonparametric regression, which will allow the data to determine the shape of the relationship.

Research Questions

This paper examines three sets of research questions:

1. How did changes in the net price of higher education vary across different levels of parental income? How did fluctuations in tuition, federal grants, state grants, institutional grants, and other grants contribute to these changes in net price?
2. Did students' reliance upon loans to pay for their education vary over time? How did these changes over time differ by parental income?
3. Did changes in net price, tuition, grants, and reliance upon loans vary by the type and selectivity of the institution attended?

Originally, this project sought to examine a fourth set of research questions:

4. How did changes in net price alter the level of unmet need for students with different levels of parental income? How did fluctuations in total educational cost, expected family contribution, and total grants contribute to these changes in unmet need?

Analysis of the last set of questions was hindered by substantial changes over time in how the expected family contribution for each student was measured. This problem with the data will be discussed further in the next section.

Data

The analysis in this paper is restricted to full-time, full-year dependent undergraduates who only attend one institution during the academic year. This restriction is commonly made in financial aid studies, because part-time and part-year students differ substantially in terms of the number of classes taken or the number of months enrolled. The removal of part-time, part-year, and independent students does have a substantial cost, however, because these students make up a major and growing portion of the student population. As discussed in the concluding section, future extensions of this study should examine these groups of students.

NPSAS surveys collect information for a large number of undergraduates, ranging from 34,544 in 1987 to 79,852 in 2004. The number of surveyed full-time, full-year dependent undergraduates who only attend one institution is smaller but still quite substantial. This subsample ranges from 14,449 in 1996 to 23,611 in 2004. The number of observations from these subsamples that must be discarded due to missing data for the utilized variables is quite low, averaging only 300 observations per survey.

This study examines a number of elements of the financial aid system: tuition and fees, non-tuition costs, total grants, total loans, total work study, federal grants, state grants, institutional grants, other loans, Pell grants, SEOG grants, Stafford subsidized loans, and Stafford unsubsidized loans. Two measures, parental income and expected family contribution (EFC), were selected to portray a student's financial resources.

Valid comparisons over time require identical measurement across surveys for key variables. Our first attempt to ensure comparability was to scrutinize the available documentation and adjust variables when differences exist, but this approach failed

because the documentation was often limited, especially for 1987 and 1990. But NCES staff and contractors have access to more extensive information, and they have utilized it to update variables to allow for comparability. While these updated variables are not included in the restricted-use CDs, they are available through the NCES Data Analysis System (DAS). And restricted-data users can request selected DAS variables and merge them with the original data.

The variable names and documentation within DAS sometimes identify which variables have been updated but not always, so identification efforts also included comparisons of mean values listed within the DAS system to means computed using the restricted-use CD. All variables deemed to be updated were then requested. Table 1 lists the specific variables used for each NPSAS survey and the source for each variable. The source varied drastically across years. Updated DAS variables comprised 100% of the variables for NPSAS: 87 but 0% for NPSAS: 00 and NPSAS: 04. For other years, the share of variables that were updated ranged from 6% (NPSAS: 96) to 39% (NPSAS: 93) to 78% (NPSAS: 90).

All variables were transformed into 2003/04 dollars using the Consumer Price Index. Table 2 contains the descriptive statistics for these variables for each NPSAS survey. Estimates were produced using the appropriate weights. The results indicate two potential problems with comparisons over time. The expected family contribution (EFC) fluctuates substantially over time, dropping from \$15,929 to \$13,968 to \$12,193 to \$10,512 over the first four NPSAS years, before rising to the low \$12,000s in the last two years. Because parental income did not similarly fluctuate over this period, these changes likely represent changes in the EFC formula over time, most notably in the valuation of

housing equity. An initial investigation into the alterations made to the EFC formula revealed tremendous complexity that makes the development of a standardized EFC measure a difficult task. Consequently, this paper utilizes parental income as the sole measure of a student's financial resources, and leaves the standardization of EFC variables within NPSAS as a task for future research.

The other concern regards data for NPSAS: 87. Flaws in the initial NPSAS survey caused multiple researchers to recommend that I abandon its use, but I hoped that the utilization of DAS variables would allow for full utilization. The results in Table 2, however, suggest that some concerns continue to exist. Both grants and loans drop substantially between 1987 and 1990, which differs drastically from the positive trend observed for all other time periods. This anomalous trend could also be caused by inaccuracies in NPSAS: 90. Consequently, all analysis conducted for the full period, 1987 to 2004, will also be conducted for shorter periods, such as 1990 to 2004 or 1993 to 2004, to ensure that results are not due to data inaccuracies. When the results vary by the years used, the results for the shorter periods will also be reported.

The other results contained in Table 2 appear accurate and consistent with prior research. Parental income changed little over the period, which reflects stagnant incomes within the U.S. for most of the income distribution. Because NPSAS topcodes income, the growth in the upper tail of the income distribution is not captured by the NPSAS parental income variable. Tuition and fees did change rapidly over the period, and the high rates of growth are consistent with past research. Grant and loan estimates are also consistent with previous work: Both financial aid sources increased over the period, but not by the same amount as tuition and fees. The increase in grants was primarily driven

by growth in institutional grants while the increase in loans primarily resulted from the introduction of a large scale unsubsidized Stafford loan program in the mid-1990s.

Methods

This project examines how key elements of the U.S. financial aid system vary with the parental income of a student. As discussed in the literature review section, previous research has simply examined the mean level of selected variables for various groupings of parental income. The results of such analysis, however, are heavily dependent upon the groupings used for parental income; alternative grouping could produce substantially different findings. Furthermore, such analysis can conceal interesting differences across income levels within the same grouping.

An alternative approach is to use regression analysis, where parental income is the independent variable and the other variables alternate as the dependent variable. One cannot use a basic linear regression, however, because the effect of income on variables such as federal grants is likely to be highly non-linear. While one could try to address potential non-linearities through the use of alternative functional forms, the optimal approach would be to abandon the use of functional forms altogether through the use of nonparametric regression techniques. Nonparametric regressions allow the data to characterize their own shape.

Substantial improvements in available software and computing power have made nonparametric regression accessible to a wide range of researchers (DiNardo & Tobias, 2001). This paper uses the most common nonparametric approach, local linear regression, which estimates separate kernel regressions for a number of different values of parental

income. Kernel regressions are essentially weighted least squares regressions, where the data points farther away from the particular value of parental income receive less weight than closer data points. For all regressions discussed in this paper, an epanechnikov kernel function and the rule-of-thumb (ROT) bandwidth estimate was used.

For each dependent variable, regressions were estimated separately for each NPSAS year and the results across years were compared to detect structural change. Three types of comparisons were performed. Overall comparisons were made by contrasting results for 1987 and 2004.⁶ Comparisons across adjoining NPSAS surveys were also conducted to see if particular moments within the 17-year period contained the most change. The timing of the NPSAS surveys allowed me to examine the 1987-90, 1990-93, 1993-96, 1996-00, and 2000-04 periods. The final set of comparisons was for periods of special interest due to the timing of major policy changes. For example, state grant aid and unsubsidized Stafford loan programs were substantially altered after the 1993 survey, so the 1993-04 period is of special interest.

To answer the research questions motivating this paper, only the basic relationship between parental income and the other variables of interest needs to be estimated. In other words, controls for additional variables do not need to be included in the regression analysis. This work, however, could easily be expanded to include a set of control variables through the use of partially linear or semilinear regression models. (See pages 24-26 of DiNardo and Tobias (2001) for a discussion of these techniques.) Such an approach may prove useful for one future extension to this project: an examination of

⁶ As noted earlier, comparisons of 1990 and 2004 as well as 1993 and 2004 were also conducted due to concerns about the validity of 1987 data. In this paper, I typically report the results for the 1987-2004 period, but whenever the results for 1990-2004 or 1993-2004 substantially differ, I also report these.

how financial aid varies by parental income when the effect of differences in college choice by parental income is removed.

Results

Figure 1 presents the results for two nonparametric regressions that examined the relationship between family income and tuition and fees. These regressions were run using 1986/87 data and 2003/04 data and demonstrate substantial growth in listed tuition and fees over this period. The results also demonstrate that in both years, upper-income students were more likely to attend high-tuition institutions than lower-income students.

The regression results for family income and total grants in Figure 2 trend downwards rather than upwards due to the continuing presence of need-based aid in the financial aid system. In both 1986/87 and 2003/04, students with family incomes below \$50,000 receive substantially more grants than other students. In percentage terms, the differentiation of grants by family income lessened over time. In 1986/87, students with family incomes below \$50,000 received grants between \$2,000 and \$4,000 while students with incomes above \$100,000 received grants close to \$1,000. By 2003/04, the former group of students received grants between \$3,000 and \$6,000 while the latter group received around \$2,500. So, low-income students went from receiving grant aid that was 100% to 400% higher than that received by upper-income students to receiving aid that was 20% to 140% higher.

The weakening relationship between family income and grant aid also occurred between \$50,000 and \$100,000. In 1986/87, a downward trend existed across this range, but the line is much flatter in 2003/04. The positive slope below family incomes of

\$15,000 is also worthy of comment. The lower grant aid for students with family incomes close to zero may indicate that these students are not successfully navigating the financial aid system relative to those with slightly higher income levels.

The trends for total grants combine individual trends for federal, state, institutional, and other grants. Figure 3 demonstrates that federal grant aid has consistently focused on low-income students. Average grant awards are minimal above \$50,000 of family income in both 1986/87 and 2003/04. The awards in 1986/87 for that income range do appear to be slightly higher, but the results in Figure 4 demonstrate that no differences exist above \$50,000 when 1989/90 is used as the beginning year. In general, the shape of the distribution of federal grants has changed little; the only pertinent change is the slight increase in average awards for those with family incomes below \$50,000.

Figure 5 reveals that low-income students also receive higher state grants than their high-income counterparts, but the differences are less drastic than for federal aid. This weaker relationship partially reflects the size of the awards for low-income students, which are much less, on average, than the federal grants they receive. But the awards obtained in others parts of the family income distribution also play a role. Students above \$50,000 do receive some state grant aid, and in percentage terms, this aid grew substantially over the period. In dollar figures, however, the growth above \$50,000 was relatively slight, so the overall need-based focus of state grant awards has mostly continued. These patterns continue even when the period of inquiry is 1992/93 to 2003/04, as shown in Figure 6. This period is of special interest because it housed rapid growth in large-scale state merit programs.

Unlike federal and state aid, lower-income students did not receive substantially higher amounts of institutional aid than that enjoyed by upper-income students. Figures 7 (for 87-04) and 8 (for 90-04) indicate that lower-income students did receive slightly higher amounts of aid in the late 1980s, but that was no longer the case by the 2003/04 academic year, when students with family incomes between \$80,000 and \$100,000 received the highest amount. Comparisons of adjoining NPSAS surveys identify the years containing the largest adjustment to the distribution of institutional aid. The results only indicate substantial change during one period: 1995/96 to 1999/00. As Figure 9 demonstrates, institutional aid grew rapidly for students with family incomes above \$60,000 during that period.

The trend revealed in Figure 10 suggests that substantial changes have occurred in the loan sector between 1986/87 and 2003/04. In the mid-1980s, lower-income students received larger loan amounts than upper-income students, but the relationship between family income and loans had become mostly flat by the mid-2000s. This change becomes even clearer when 1989/90 is used as the base year as in Figure 11.

This trend did not occur due to fundamental changes in the subsidized Stafford loan program. The results in Figure 12 revealed substantial consistency in this program between 1986/87 and 2003/04. The unsubsidized Stafford loan program is a different story. The introduction of this program in the mid-1990s drastically changed the distribution of federal loans. Figure 13 compares the distribution of unsubsidized Stafford loans in 2003/04 with the 1989/90 results for the program it replaced, the supplemental loans for students (SLS). The results indicate a gigantic increase in loans, especially for students with family incomes above \$50,000.

The analyses contained in Figures 1-13 was also run separately for students at public institutions and for students at private institutions, but the results differed little across these two samples as the trends highlighted above were present in both the public and private sectors. Separate analysis was also conducted at different levels of institutional selectivity, and some differences did exist among private institutions. The most substantial finding was in terms of institutional grant aid. These grants remained targeted at low-income students at selective private institutions, while less selective private institutions disproportionately increased grant aid for upper- and middle-income students.

Implications/Future Research

I find substantial changes to the grant system within U.S. higher education. The average institutional grant increased by 140% between 1986/87 and 2003/04, while the corresponding figures for federal and state grants are 35% and 46%. Because institutional aid is not targeted on low-income students, as federal and state grants are, the growth in institutional grants fundamentally changes the distribution of grant aid across family income levels.

The distribution of grants also changed within each grant type, although the changes in federal aid were extremely small. This form of grant aid remains targeted on low-income students, so the main issues with federal grants concern their size and transparency. Both of these issues are receiving substantial attention during the first year of the Obama administration.

The trends for federal grant aid may not be especially surprising, because the formulas underlying the Pell grant, the primary source of federal grants, is well known. Formulas underlying the distribution of state grants are also publicly available, but one must aggregate 50 different policies to understand how these rules impact distribution patterns at the national level. Such aggregation is complicated by the drastic differences across states. During the period of study, 12 added large-scale merit aid programs, while others, such as California, retained or strengthened its focus on need-based aid. The introduction of new merit-aid programs has received substantial attention in the literature, so many readers may have expected major changes in the national distribution of state grants. But I find somewhat mild changes in the distribution, which may not be surprising when you remember that these twelve states contain a minority of students.

Of course, if more states implemented merit-aid programs, the distribution of state grants may start to change more drastically at the national level. To examine this possibility, I analyzed those 12 states that added merit-aid programs. Surprisingly, I did not find substantial differences for these states, but a more comprehensive study is required before any definitive claims can be made.

The institutional grant sector is by far the most complex. The policies of thousands of colleges and universities must be aggregated, and these institutional policies are not public knowledge. Often, institutions are seeking to meet multiple goals when allocating financial aid. They wish to meet social goals by following a need-based financial aid system, but they often also wish to use aid to shape their student body, most notably by improving its academic profile. Less selective institutions may also utilize

financial aid to entice undecided students to fill enrollment slots that would otherwise go unfilled.

Given this complexity and our poor understanding of institutional grants, the analysis of these grants is the most important element of this paper. The results indicate substantial changes, with students from families with incomes between \$60,000 and \$100,000 increasingly receiving institutional aid. This transformation occurred most rapidly between 1995/96 and 1999/00 and most intensely at private less-selective institutions. The growth in the late 1990s is particularly interesting, because this was a period of strong financial times for colleges and universities. Future inquiry into this period may produce insights into the primary motivations underlying institutional grants.

To fully understand changes in the distribution of institutional grants, the role of college choice must be recognized. Growth in financial aid for students of a particular income level could occur because individual institutions increased their financial aid allocations to these students or because these students increasingly attend institutions that provide greater levels of aid. Future work should decompose the growth in institutional aid at various income levels into these two categories.

Because loans primarily occur at the federal level, they are easier to examine. This work demonstrated substantial changes in loans, and the results indicate that the introduction of a large-scale unsubsidized Stafford loan program in the mid-1990s was the primary driver of these changes. Unfortunately, the analysis in this paper did not speak to the other major change to the financial aid system in the 1990s: the introduction of tax credits. Berkner and Wei (2006) find that the tax credit information in NPSAS: 04 is extremely problematic. Forty percent of students did not know whether any federal

education tax benefit was claimed, and of those who did say that a tax benefit was claimed, one-fourth to two-third appeared to be ineligible to receive such a benefit. Consequently, any analysis of tax credits within NPSAS must come from imputations of expected amounts. Because tax credits are concentrated on middle-income families and substantial in size, their inclusion into any analysis of financial aid trends can substantially alter the distribution of aid. So, efforts to improve the use of tax credit information alongside NPSAS are vital.

Analysis of NPSAS can also be improved by expanding the population of students that are examined. Like almost all of the previous studies of financial aid trends, this paper restricted its analysis to full-time, full-year undergraduates who only attend one institution during the year of study. (Heller & Laird, 1999; McPherson & Shapiro, 1999; Wei, Li, and Berkner, 2006). Part-time, part-year, and multiple-institution students can differ substantially in their price of attendance as they vary in the number of courses taken or the number of months enrolled. To simplify analysis and ensure valid comparisons over time, researchers consequently ignore these students. But these students are an important and growing portion of the student population, and analysis that omits them may obscure important inequities within the financial aid system. Future work needs to develop methods that simplify their inclusion.

Analysis of how financial need has changed over time is also complicated by data challenges. The substantial changes in the formula underlying the expected family contribution (EFC) necessitate efforts to create a standardized EFC measure across years. Such an effort was more complicated than originally anticipated, but progress on this front is vital for future work. To understand how far the current financial aid system is from

the ideals underlying a traditional need-based financial aid system, consistent measurements of unmet need is required.

Given the drastic underutilization of NPSAS data, great progress is needed for the full benefits of the NPSAS surveys to be realized. This paper has partially addressed this gap by demonstrating an effective approach towards standardizing restricted-use data for all NPSAS surveys. The resulting data set revealed a number of interesting insights into how the U.S. financial aid system has changed since the mid-1980s. But the work also revealed a number of opportunities for further progress, and I hope this paper helps stimulate additional work along these lines.

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Table 1: Variable Names and Sources

Variable	<u>1986/87</u>		<u>1989/90</u>		<u>1992/93</u>	
	Name	Source	Name	Source	Name	Source
Parental Income	depinc	DAS	depinc	DAS	depinc	Original
Expected Family Contribution	efc4	DAS	efc4	DAS	efc4	Original
Tuition & Fees	tuitfees	DAS	tuition2	DAS	tuition2	DAS
Total Grants	totgrt	DAS	totgrt2	DAS	totgrtr	DAS
Total Work Study	totwkst	DAS	totwkst	Original	totwkst	Original
Total Loan	totloan	DAS	totloanr	DAS	totloanr	DAS
Federal Grants	tfedgrt	DAS	tfedgrt	DAS	tfedgrt	Original
State Grants	stgtamt	DAS	stgrt2	DAS	stgtamt	Original
Institutional Grants	ingrtamt	DAS	instgrt2	DAS	ingrtamt	Original
Other Grants	othgtamt	DAS	othgrt2	DAS	othgtamt	DAS
Pell Grants	pellamt	DAS	pellamt	Original	pellamt	Original
SEOG Grants	seogamt	DAS	seogamt	Original	seogamt	Original
Subsidized Stafford	staffamt	DAS	staffr	DAS	staffr	DAS
Unsubsidized Stafford	Not Available		slsr	DAS	slsr	DAS
Perkins	ndslamt	DAS	perkamt	Original	perkamt	Original
Other Costs	srnontaj	DAS	sbnontun	DAS	sbnontar	DAS
Total Costs	totcosta	DAS	budgetft	DAS	budgetar	DAS

Variable	<u>1995/96</u>		<u>1999/00</u>		<u>2003/04</u>	
	Name	Source	Name	Source	Name	Source
Parental Income	depinc	DAS	depinc	Original	depinc	Original
Expected Family Contribution	efc4	Original	efc4	Original	efc	Original
Tuition & Fees	tuition2	Original	tuition2	Original	tuition2	Original
Total Grants	totgrt	Original	totgrt	Original	totgrt	Original
Total Work Study	totwkst	Original	totwkst	Original	totwkst	Original
Total Loan	totloan	Original	totloan	Original	totloan	Original
Federal Grants	tfedgrt	Original	tfedgrt	Original	tfedgrt	Original
State Grants	stgtamt	Original	stgtamt	Original	stgtamt	Original
Institutional Grants	ingrtamt	Original	ingrtamt	Original	ingrtamt	Original
Other Grants	othgtamt	Original	othgtamt	Original	othgtamt	Original
Pell Grants	pellamt	Original	pellamt	Original	pellamt	Original
SEOG Grants	seogamt	Original	seogamt	Original	seogamt	Original
Subsidized Stafford	staffsub	Original	stafsub	Original	stafsub	Original
Unsubsidized Stafford	staffunsb	Original	stafunsb	Original	stafunsb	Original
Perkins	perkamt	Original	perkamt	Original	perkamt	Original
Other Costs	sbnontaj	Original	sbnontun	Original	budnonft	Original
Total Costs	budgetaj	Original	budgetft	Original	budgetft	Original

Table 2: Weighted Descriptive Statistics

Variable	1986/87	1989/90	1992/93	1995/96	1999/00	2003/04
Parental Income	70,160 (65,441)	71,013 (68,034)	71,536 (66,806)	69,453 (76,825)	71,595 (52,295)	71,063 (53,116)
EFC	15,929 (22,820)	13,968 (17,598)	12,193 (15,113)	10,512 (12,814)	12,052 (13,208)	12,334 (15,475)
Tuition & Fees	4,903 (4,671)	5,613 (5,680)	6,821 (6,657)	7,309 (6,795)	7,829 (7,587)	8,388 (7,921)
Net Tuition (Grants)	3,309 (4,016)	4,102 (4,956)	4,857 (5,848)	4,972 (5,794)	4,975 (6,262)	5,285 (6,512)
Net Tuition (Grts/Lns/WS)	2,546 (3,743)	3,399 (4,771)	3,935 (5,599)	3,632 (5,488)	3,422 (5,812)	3,541 (5,969)
Total Grants	1,955 (3,454)	1,777 (3,467)	2,278 (4,108)	2,680 (4,485)	3,371 (5,318)	3,703 (5,246)
Total Work Study	164 (642)	156 (575)	202 (669)	206 (668)	241 (746)	298 (858)
Total Loan	1,205 (2,097)	949 (1,951)	1,244 (2,261)	1,910 (2,703)	2,371 (3,536)	2,639 (3,963)
Federal Grants	582 (1,471)	447 (1,071)	539 (1,194)	553 (1,162)	616 (1,291)	783 (1,555)
State Grants	403 (1,102)	297 (935)	309 (978)	421 (1,130)	490 (1,269)	590 (1,391)
Institutional Grants	822 (2,386)	873 (2,603)	1,248 (3,293)	1,481 (3,565)	1,877 (4,263)	1,971 (4,128)
Other Grants	148 (851)	160 (882)	182 (1068)	225 (1154)	388 (1556)	359 (1352)
Pell Grants	381 (946)	375 (895)	445 (954)	462 (944)	532 (1,105)	694 (1,376)
SEOG Grants	84 (380)	69 (370)	81 (409)	83 (407)	77 (375)	78 (367)
Stafford - Subsidized	940 (1,694)	719 (1,517)	975 (1,753)	1,286 (2,080)	1,193 (1,932)	1,131 (1,811)
Stafford - Unsubsidized	n/a	16 (275)	28 (345)	419 (1,277)	639 (1,565)	714 (1,591)
Perkins	142 (531)	133 (542)	120 (508)	138 (537)	137 (574)	152 (592)
Other Costs	6,493 (3,468)	7,731 (1,910)	8,067 (2,165)	7,871 (2,388)	8,787 (2,503)	9,241 (2,532)
# Observations	17,047	14,397	14,007	15,499	14,449	23,611

Notes: Means and standard deviations (in parenthesis) are reported. For other costs and total costs, the number of observations was 12,881 in 1990, 13,991 in 1993, and 14,311 in 2000, but identical for the other three years.

Figure 1: 1986/87 and 2003/04 Tuition and Fees

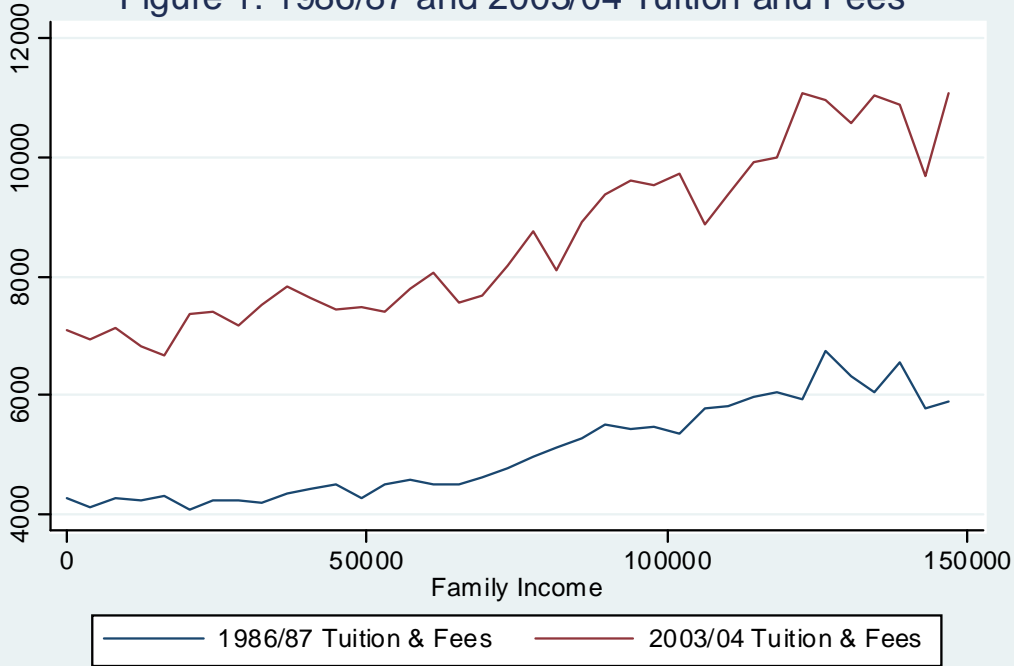


Figure 2: 1986/87 and 2003/04 Total grants



Figure 3: 1986/87 and 2003/04 Federal grants

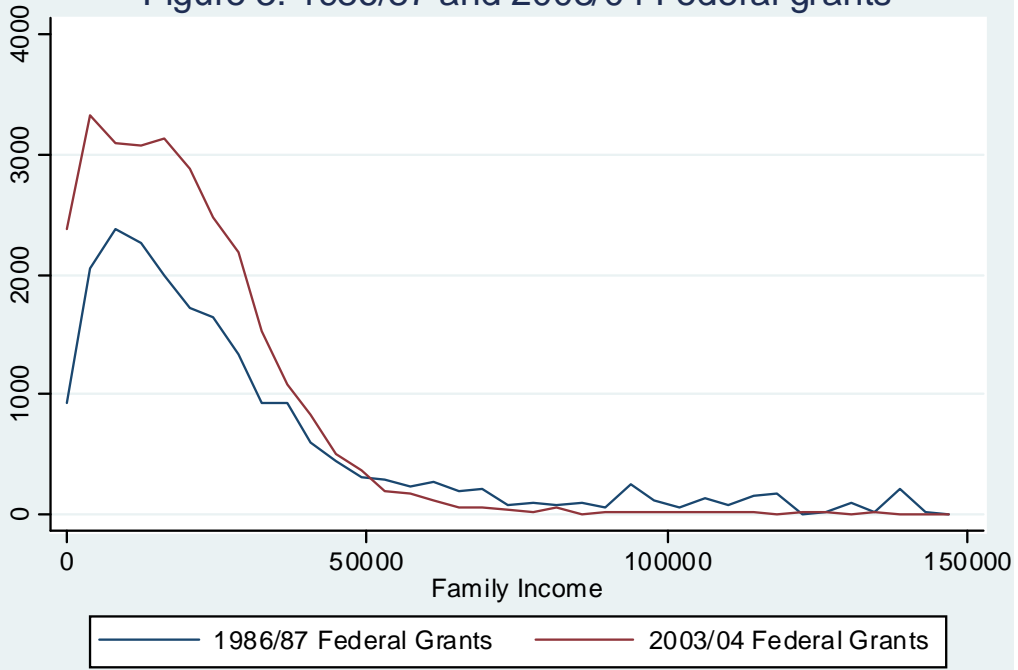


Figure 4: 1989/90 and 2003/04 Federal grants

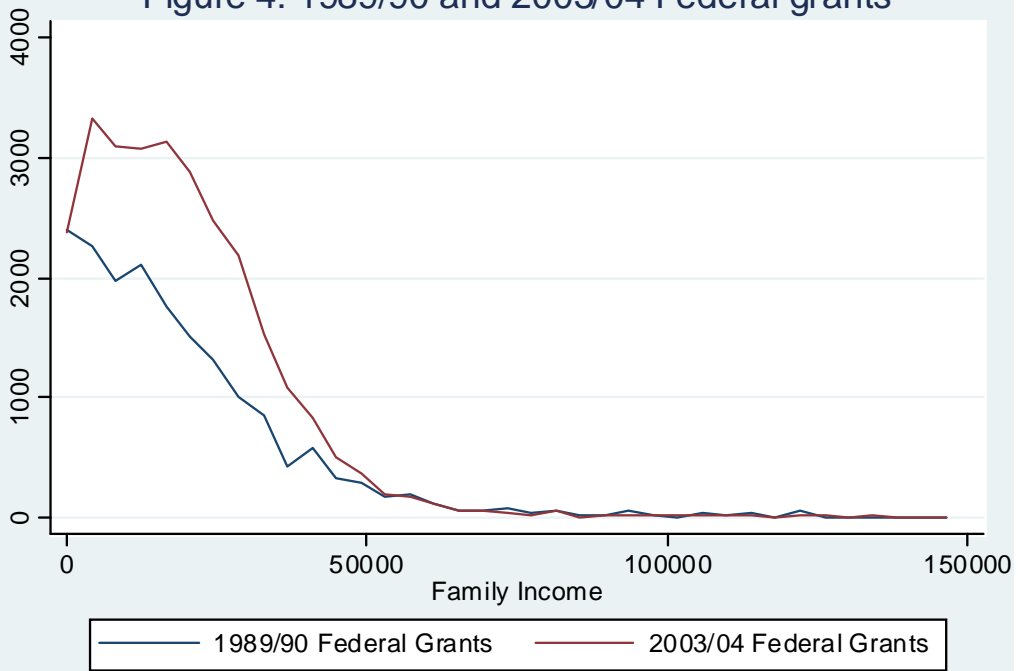


Figure 5: 1986/87 and 2003/04 State grants

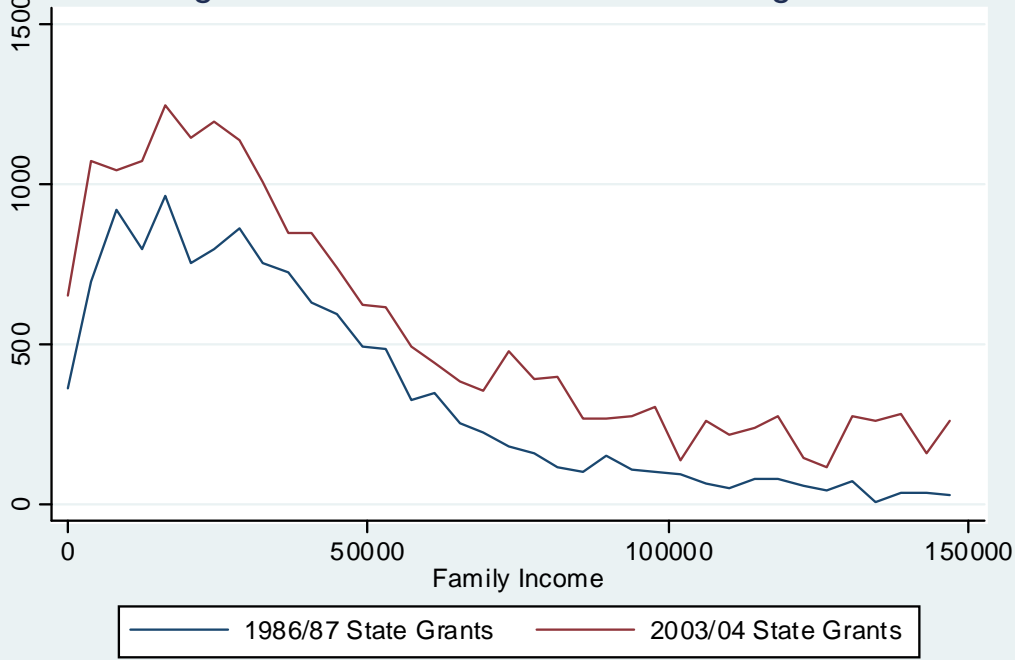


Figure 6: 1992/93 and 2003/04 State grants

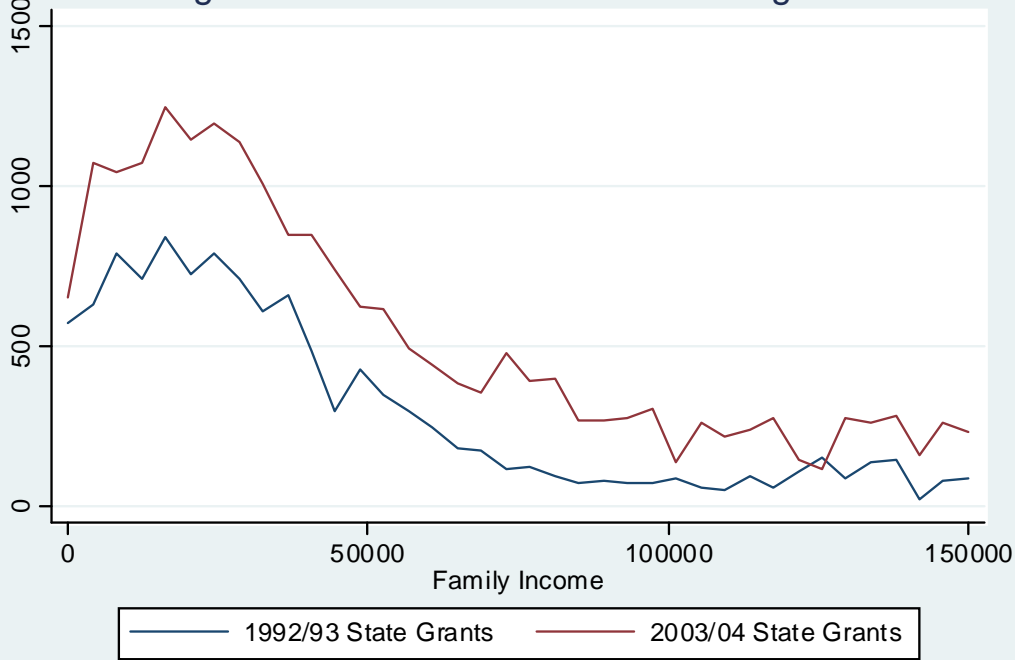


Figure 7: 1986/87 and 2003/04 Institutional grants

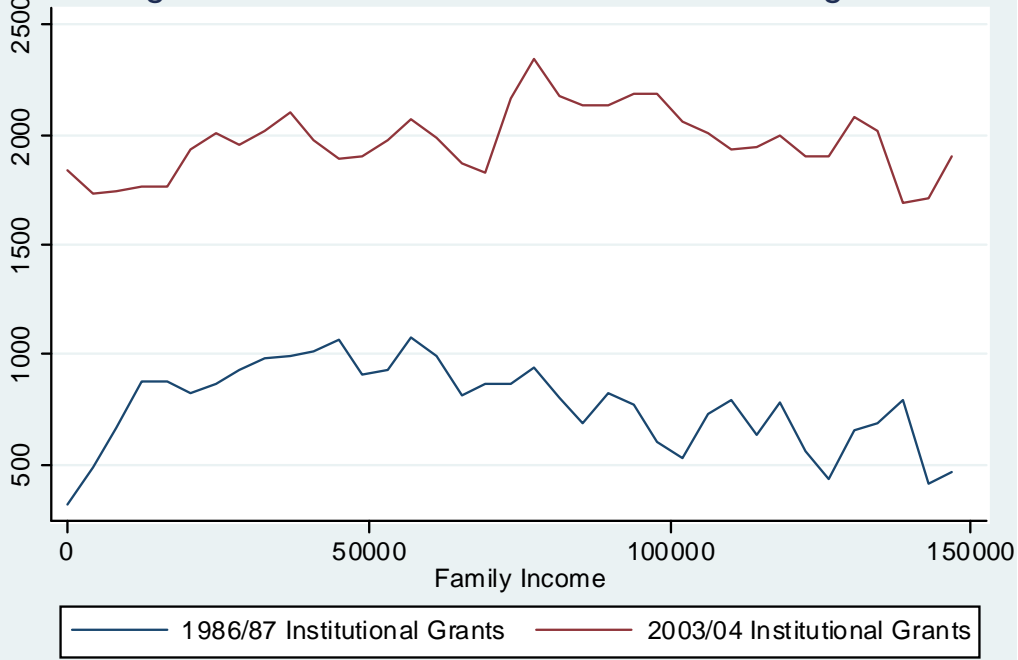


Figure 8: 1989/90 and 2003/04 Institutional grants



Figure 9: 1995/96 and 1999/00 Institutional grants



Figure 10: 1986/87 and 2003/04 Total Loans



Figure 11: 1989/90 and 2003/04 Total Loans



Figure 12: 1986/87 and 2003/04 Total Subs. Stafford Loans



Figure 13: 1989/90 and 2003/04 Stafford Unsubs. Loans

