



COLLEGE *of* EDUCATION

CENTER FOR THE STUDY OF HIGHER EDUCATION

Institutional Aid and its Impact on Student Need

Rodney Hughes
Rachel Frick Cardelle
John Cheslock
Donald Heller

Center for the Study of Higher Education
The Pennsylvania State University
400 Rackley Building
University Park, PA 16802
(814) 865-6346

November 2010
Working Paper No. 7

Introduction

In recent years, researchers have documented the detrimental role that unmet financial need plays in determining students' access to college and their persistence once enrolled (Advisory Committee on Student Financial Assistance, 2006; Bresciani & Carson, 2002; Perna, 2006; Long & Riley, 2007). "Unmet need" is the gap between the total cost of attending and the resources available from the student (and her family, if a dependent student) as well as any financial aid. Large amounts of unmet need have been found to force students to drop out or stop out of college, or to enroll in lower-priced institutions. Much of this scholarship has used aggregate measures of unmet financial need, after all types of financial aid, including loan aid, are taken into account, and has examined broad categories of students in certain sectors of higher education.

Other recent studies have documented the increasingly important role that institutional grant aid plays in the financial aid picture in the nation (Heller, 2006; McPherson & Schapiro, 2002; Mundel, 2008). Institutional grant aid is now the single largest source of grant aid to undergraduates (College Board, 2009), and the majority of institutional grant aid is awarded based on merit, rather than on financial need (Heller, 2006). This raises the question of how effectively institutional grants are being used to reduce unmet financial need, rather than for the enrollment management objectives of the institution.

In this study, we use data from the 2007-2008 National Postsecondary Student Aid Study (NPSAS) in combination with other data sources to create a more nuanced portrait of unmet need

for students. The paper describes student financial need within the higher education system, describes how institutional grant aid is provided, discusses how the institutional grant aid fills in the student financial need, and discusses how institutional grant aid fills in the student financial need differently for dependent and independent students, as well as for full-time and part-time students.

Theoretical Perspectives

Historically, publicly funded financial aid was awarded for the purposes of helping students from low- and moderate-income families attend college (Fitzgerald & Delaney, 2002). While some states have developed grant programs with different objectives, the majority of federal and state aid is still focused on these poorer students. Institutional aid, however, has had more varied purposes. Some awards from institutions mirror the purposes of publicly funded aid; others are more focused on helping colleges enroll students with certain characteristics, generally as defined by measures of academic merit (Davis, 2003; McPherson & Schapiro, 1996, 1998; National Association of College and University Business Officers, 2010; Redd, 2000).

The awarding of grant aid to students is based on microeconomic principles (Leslie & Brinkman, 1988). Grant aid serves to lower the net price paid by the student at an institution, thus increasing the likelihood that she will enroll in that institution, or stay enrolled once there. But the negative impact of rising prices on enrollment decisions should vary by income, as the financial consequences of paying higher tuition are more severe for low-income students. Research has indeed shown that students from lower-income families are more sensitive to tuition price increases than are students from wealthier families (Mundel, 2008). Thus, the

ability of grant aid to impact the enrollment of upper-income students is different from that of their less well-off peers.

Our study of the role that institutional grant aid plays on reducing the unmet need of college students is conducted within this framework of microeconomic analysis. The needs analysis system utilized by both financial aid officers and this study is also related to this framework. Each student is assigned an expected family contribution (EFC) which represents their ability to pay for college without suffering undue financial consequences. The difference between the cost of attendance (COA) and EFC is need, and the amount of this difference not covered by financial aid is unmet need.

Determining Financial Need and Financial Aid Eligibility

Financial assistance in paying for college is available from a variety of sources, including the federal and state governments, higher education institutions, and private providers. This assistance is also available in a number of forms, including grants or scholarships, loans, work-study (jobs on- or off-campus whose wages are subsidized through federal or state programs), and tax credits.

Higher education institutions use different criteria to determine the amount of need-based financial aid to award to students to help them pay tuition and fees, room and board charges, books and transportation, and other charges related to participating in postsecondary education. Aid provided by the federal government, for example, has to be determined following strict rules determined by a set of criteria and formula known as the “Federal Need Analysis Methodology,” or “federal methodology” (FM) for short. The FM formulas take into account a variety of demographic and financial characteristics of the student attending college and her parents (if a

dependent student, normally one who is single, under the age of 24, and not a military veteran) or her spouse (if married). These data are used to calculate a standard EFC for the student, or the amount that she and her family are determined to be able to contribute to her educational expenses. The EFC is subtracted from the cost of attending a particular college or university – including all the expenses outlined above – with the resulting amount being the student’s financial need.

However, while the awarding of federal student aid follows these strict guidelines, need-based aid awarded from other sources can be done so using a variety of criteria. Some states award aid using the federal methodology, or a close approximation of it, while others use their own criteria. Institutions have even more latitude in deciding how to determine the financial need of students and therefore the amount of aid for which they are eligible. Non-need aid, those grants or other assistance that *do not consider* the financial circumstances of the student and her family, use separate criteria outside of financial measures.

Figure 1 summarizes the process used in this paper for determining a variety of measures of financial need of students, along with their financial aid awards. Data from the 2007-08 NPSAS survey are used to calculate these measures as described in the methodology section of the paper. The student’s EFC (box B), determined using FM in NPSAS, is subtracted from the cost of attendance at the institution (A) in which the student enrolls to determine his financial need (C). We first examine this financial need before any aid is awarded (C). Next, we look at the remaining need left after federal, state, and other grants (generally private, or employer tuition assistance) are awarded, providing a measure of financial need before institutional grants are provided (D).

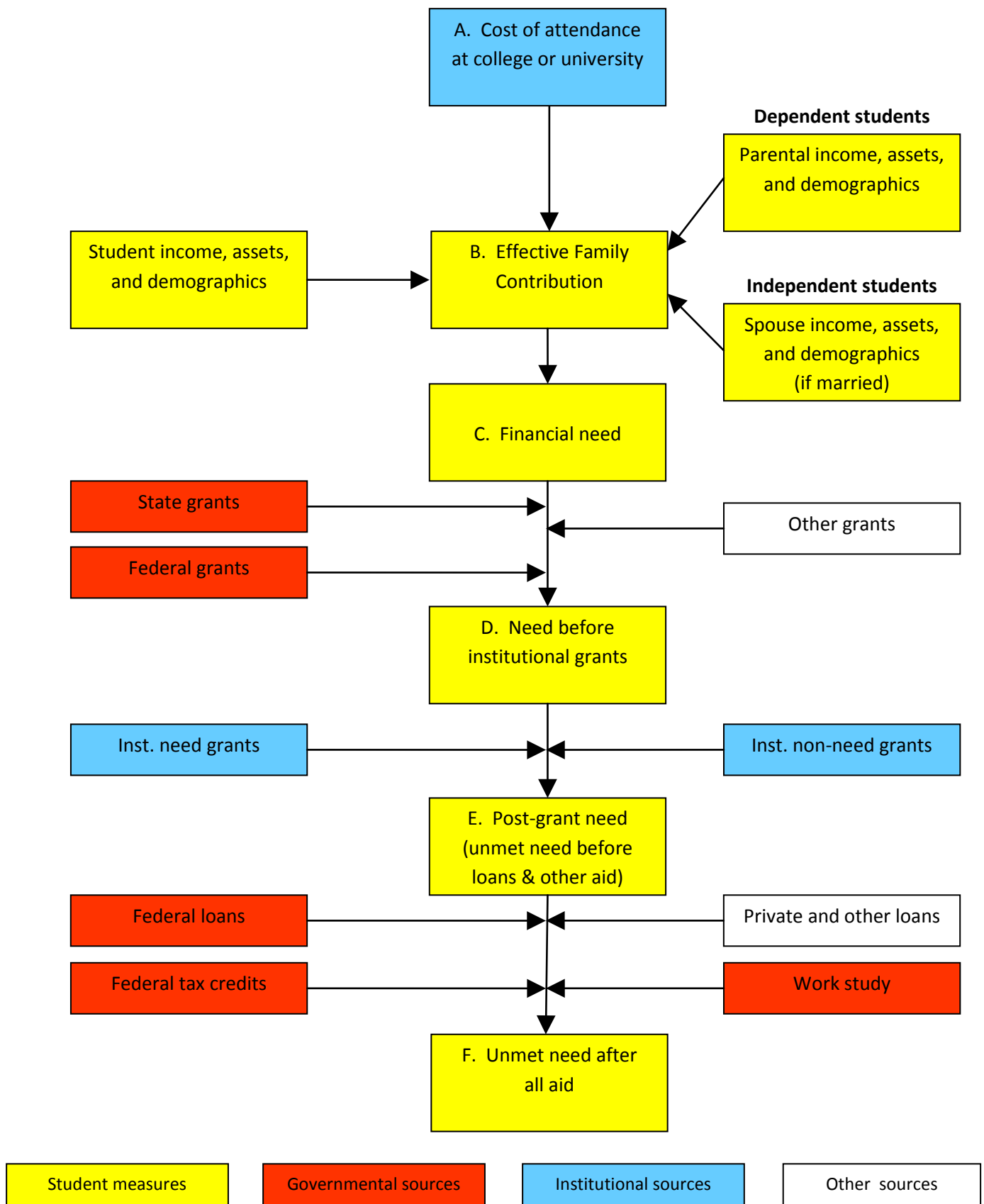


Figure 1: Model for determining financial need and awarding of financial aid

The next step is to examine for each student the amount of institutional need-based and non-need-based grants awarded, leaving a measure of post-grant financial need (E). While it is not a focus of this paper, the remaining steps would be to apply other forms of financial aid – loans, work-study, and tax credits available to the student – to come up with a measure of remaining unmet need after all aid is awarded. It is important to note that this “unmet need” can be negative, i.e., a student may actually receive financial aid *in excess* of his financial need. For example, if a student had overall financial need of \$10,000 (C), and he received \$15,000 in grant aid, then he would have unmet need of -\$5,000 (E).

Data

Within the 2007-2008 NPSAS data, we focus on full- and part-time, dependent and independent undergraduate students. We exclude students who receive athletic scholarships, because their large awards may bias our results for reasons unrelated to the purpose of our investigation. Similarly, we exclude students who receive VA or Department of Defense grant aid (including ROTC) for military service. We restrict our sample to students enrolled at associate’s, baccalaureate, master’s, and research & doctoral institutions according to their Carnegie classifications and students attending institutions in the fifty United States and the District of Columbia.

From the 2007-2008 NPSAS survey, our survey-weighted sample includes 20,074,586 students, excluding students receiving athletic scholarships or military aid, students at non-primary Carnegie institutions, and students outside the U.S. From the original sample of students, 1,602,493 students, including the 1,274,975 students who had attended more than one institution of higher education during the year, were excluded because their total cost data was

missing, leaving a survey-weighted sample of 18,472,093 students. Table 1 below shows the unweighted and survey-weighted numbers of students within each of the sub-groups analyzed in this paper. (Some sums of cells may not match listed totals due to rounding.) At this point, our data and our associated results are preliminary in a very important way. While carrying out data cleaning, we noticed that NPSAS caps its institutional grant variables. We have been in touch with the National Center for Education Statistics, and our contacts there are resolving the issue and will send us uncapped data. Once we receive these uncapped grant variables, we will update our results, so our current results should be taken only as a preliminary indication of our findings and should not be circulated.

We define unmet need for a student as the difference between the total cost of the institution the student will attend and the sum of EFC and any grants received. While loans enable students and their families to borrow money to pay immediate costs of attendance, we focus on financial aid with no expectation of repayment. We also distinguish between pre- and post-institutional need: we define pre-institutional need as the difference between the cost of attendance and the sum of EFC and federal, state, and other private grants received, and we further subtract institutional grants from this amount to capture post-institutional need. While pre-institutional need reflects the condition that a student's need depends on the choice of institution to attend, federal, state, and other grants may not always clear before an aid officer at an institution considers a student's financial aid profile, and sometimes these other awards may not be visible to institutional aid officers at all.

	Dependent	Independent	Total
Full-time/Full-year	32,217 (5,375,542)	12,095 (1,637,744)	44,312 (7,013,285)
Full-time/Part-year	6,534 (1,432,292)	6,685 (1,257,905)	13,219 (2,690,196)
Part-time	11,453 (2,990,235)	23,125 (5,778,376)	34,578 (8,768,611)
Total	50,204 (9,798,068)	41,905 (8,674,025)	92,109 (18,472,093)

Table 1. Student sample (with survey-weighted sample sizes) from 2007-2008 NPSAS

Methods

NPSAS reports need-based (*instneed*) and non-need-based (*instnond*) institutional grants according to institutional criteria, and we examine an alternative procedure for assessing the amounts of need-based and non-need-based grant aid that institutions award. We call our need-based measure *instneed2* and set it equal to the NPSAS institutional grant total (*ingrtamt*) if its amount is less than students' demonstrated need but cap it at the amount of demonstrated need if it exceeds that need. We say *instneed2* is zero if students do not receive any grant aid or if they do not have any demonstrated need. In this way, *instneed2* represents the institutional aid students receive that actually meets their demonstrated need, whether or not institutions classify it as need-based aid or non-need-based aid. In other words, *instneed2* would capture a merit-based institutional grant to a student if that merit-based grant meets demonstrated financial need.

Similarly, we classify non-need-based aid as *instnond2* and use it to capture any institutional aid in excess of demonstrated financial need. If demonstrated need is zero or negative, we set *instnond2* equal to the NPSAS *ingrtamt*. If students receive total institutional grants less than their demonstrated need, *instnond2* is zero, and if students receive grants in

excess of their need, *instnond2* is the difference between the grant amount and demonstrated need. Using these constructs, we describe four cases: *need_need* is aid classified by NPSAS as need-based aid that meets demonstrated financial need; *non_non* is aid classified by NPSAS as non-need-based aid in excess of demonstrated financial need; *need_non* is need-based aid according to NPSAS that exceeds students' demonstrated need; and *non_need* is non-need-based aid according to NPSAS that meets students' demonstrated need.

We compute descriptive statistics for total costs, tuition and fees, other costs, EFC, federal grants, state grants, other grants, institutional grants, and our four derived cases for need-based and non-need-based aid described above. We also compute descriptive statistics for censored and uncensored need before all grants, before institutional grants, and after institutional grants. We examine variation in means across attendance pattern for all students; full-time, full-year students; full-time, part-year students; and part-time students. We also examine variation across institutional types for all institutions; all institutions excluding for-profit institutions; all institutions excluding for-profit and special focus institutions and tribal colleges; in-state students at four-year public institutions; out-of-state students at four-year public institutions; in-state students at two-year public institutions; four-year not-for-profit private institutions; for-profit institutions; special focus institutions; and tribal colleges. Beyond descriptive statistics, we examine distributions of pre- and post-institution need by percentiles across attendance patterns and institutional types, breaking the distribution down by control and also comparing need with associated grant awards.

We employ several different regressions to understand basic relationships between institutional grant awards and demonstrated need across institutional types and student attendance patterns. We use random-effects GLS regression, regression on group means

(between regression), and fixed-effects regression (within regression) on institutions to understand variation between and within institutions. (For example, high-cost institutions might be expected to award more need on average than low-cost institutions, but a single high-need institution may also award aid differently to students with similar financial need based on other characteristics.) We aim to capture the most basic relationships between grant awards and need using OLS regression with and without NPSAS' survey weights. Finally, we account for the large number of students who do not receive any grant awards by employing tobit regression with survey weights, because tobit regression can account for changes in the probability of receiving aid as well as changes in the size of aid awards with changes in demonstrated financial need.

Tobit postestimation in Stata allows for reporting of three kinds of marginal effects. In our example, the first calculates the probability that institutional grants, conditional on demonstrated need, would be observed greater than zero as demonstrated need changes. The second calculates the change in the expected value of aid awards that are not truncated at zero. The third and final marginal effect calculates the change in the expected value of grants including truncation at zero. Our final regression specification adds dummy variables for full-time, full-year independent students, part-time dependent students, and part-time independent students, and the change in the probability of receiving aid is particularly insightful for changes in (0,1) indicator variables rather than continuous variables. We estimate and report results for a fixed-effects regression with these dummy variables in this paper, and we also estimate the random effects regressions, regressions on group means, OLS regressions, and tobit regressions for different institutional categories to understand our results more clearly, but we do not report

those results here. (Our results do not change fundamentally, in a qualitative sense, under these other specifications.)

Results

We present, in Figure 2, survey-weighted mean values for total costs, EFC, grants outside of institutional grants (federal, state, and private), and pre-institutional need by level and control. We report results for full-year, part-year, and part-time students together. These results illustrate that total cost, and not EFC, is the major driver of need: total cost exhibits much greater variation across institutional classifications than EFC does, and mean EFC for out-of-state students at

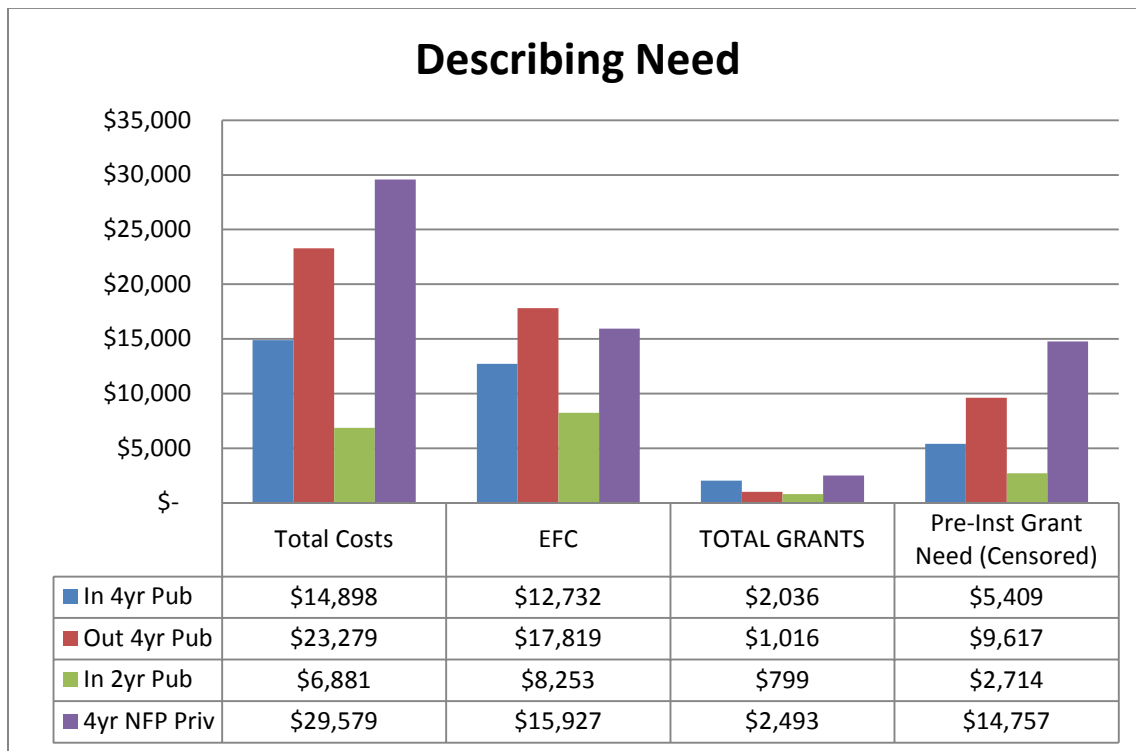


Figure 2: Means for all students by level and control

public four-year institutions is higher than mean EFC for students at private institutions. Mean values for need match mean values for total costs insofar as mean costs for private institutions

exceed mean costs for out-of-state students at public four-year institutions and far exceed mean costs at public two-year institutions.

Figure 3 illustrates distributions of pre-institutional need by percentiles for full-time, full-year in-state and out-of-state students at public four-year institutions, in-state students at public two-year institutions, and students at private four-year institutions. (These are represented by Carnegie classifications or *carn08* values of 9, 10, 1, and 11, respectively, in Figure 3.) Students at private institutions and out-of-state public institutions have far more need than students who attend in-state two-year and four-year public institutions. About half of students at in-state public institutions have pre-institutional need under \$5,000.

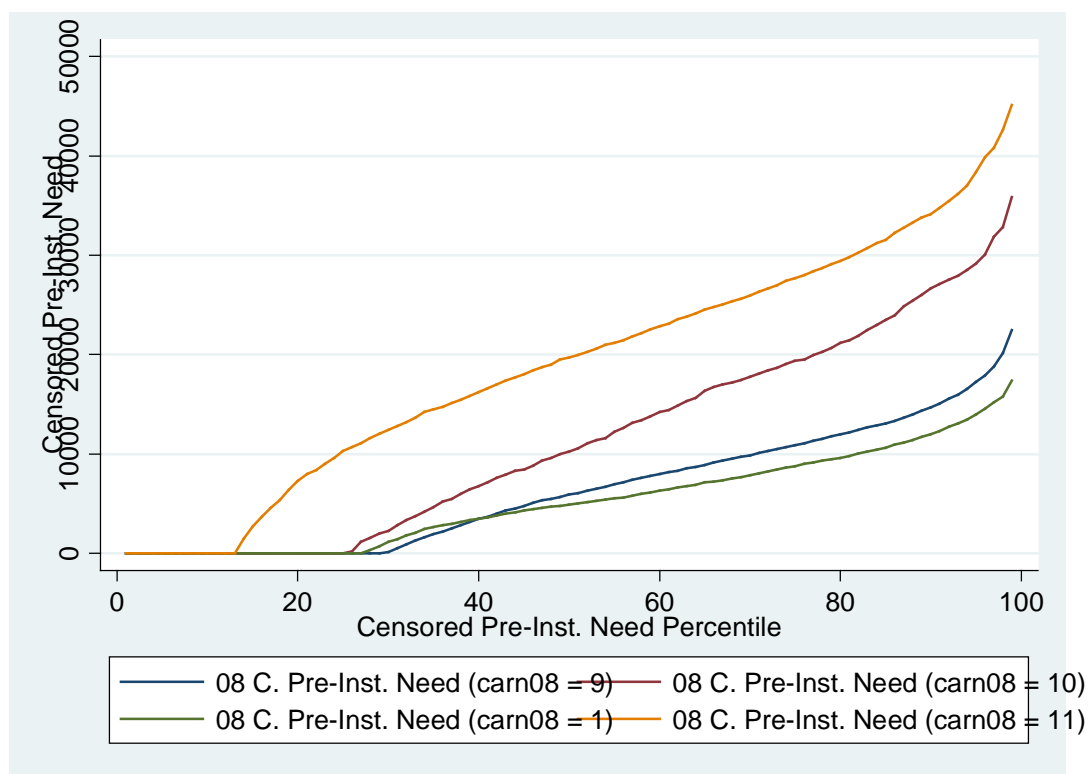


Figure 3: Censored pre-institutional need by institution type

Figure 4 illustrates mean values of pre- and post-institutional need, with the corresponding mean values for institutional grants. Public two-year institutions award very little grant aid to students, and public four-year institutions award more grant aid to high-paying out-of-state students than to their own residents. Private institutions award the most institutional grants on average, by far. Financial need remains after institutional grant at each institution type; mean post-institutional grant need of \$4,889 for in-state students at public four-year institutions, \$8,693 for out-of-state students at public four-year institutions, \$2,659 for students at public two-year institutions, and \$10,054 for students at private institutions must be addressed using family resources, loans, work-study, and other means.

We report on our alternative constructions of need-based and non-need-based institutional grants in Figure 5. Mean values of need-based aid in excess of demonstrated

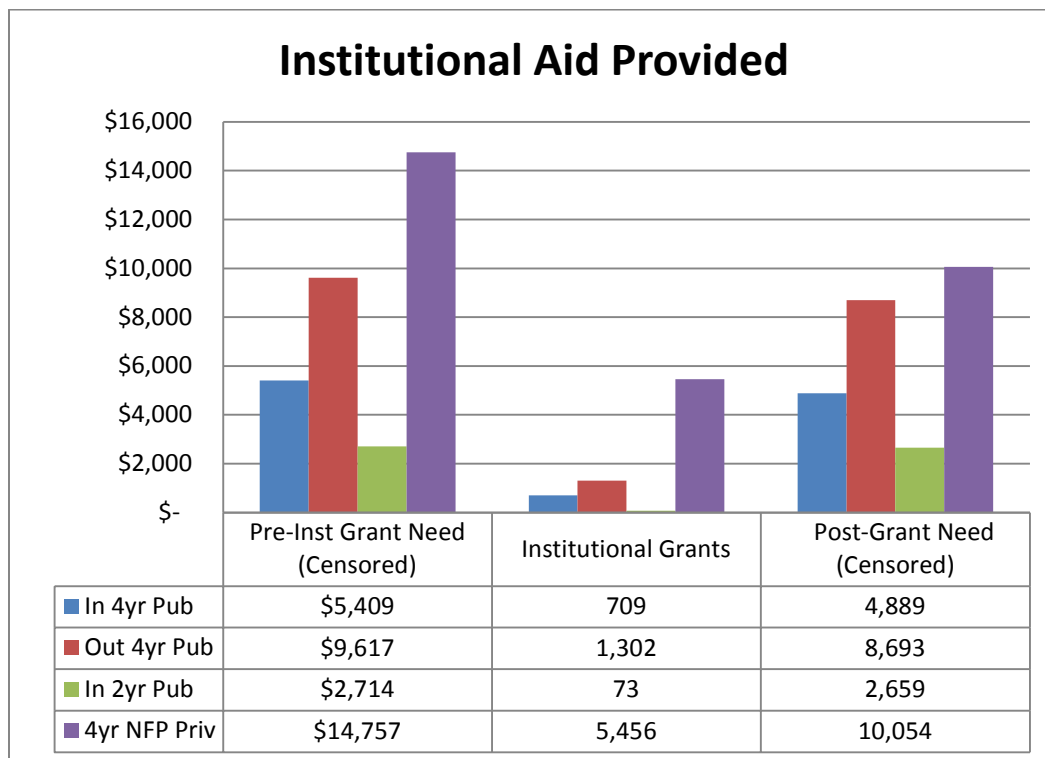


Figure 4: Mean need and institutional grants by institution type

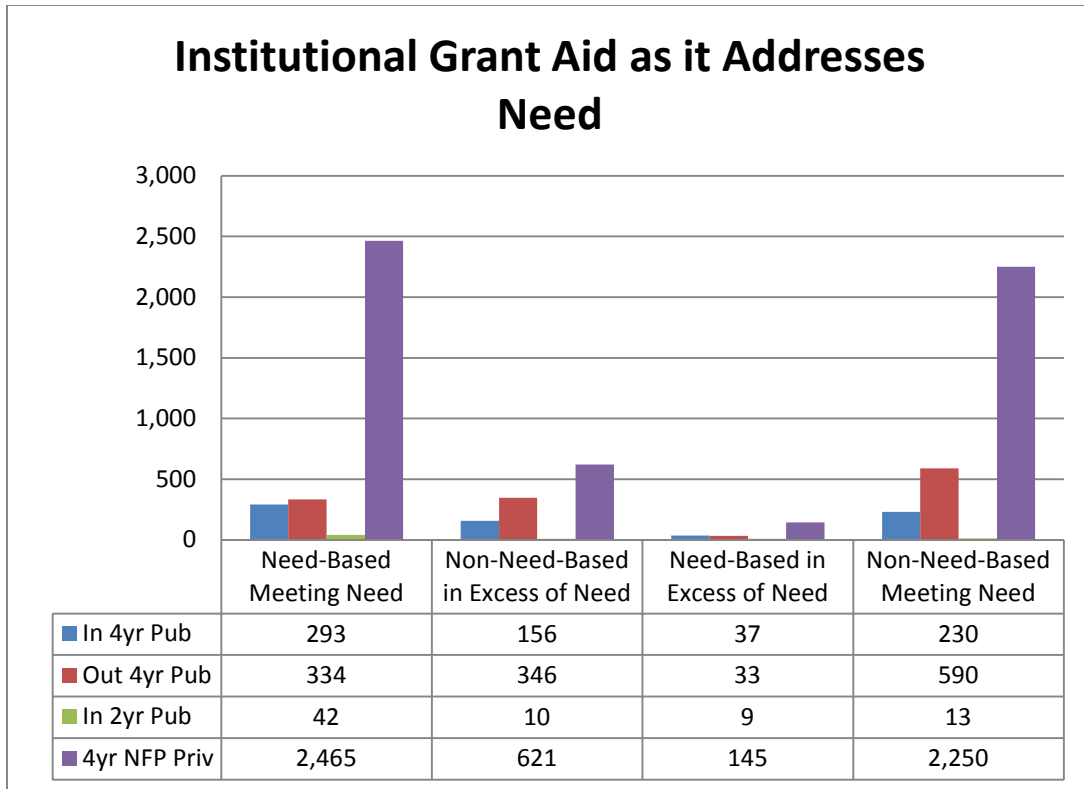


Figure 5: Alternative constructions for need- and non-need-based grants

financial need are very small, and mean values of non-need-based aid meeting demonstrated need are larger, especially at private institutions. Many of these have values of zero for some students; we report the percentage of nonzero cases and the mean values for nonzero cases of *need_need*, *non_non*, *need_non*, and *non_need* across level and control in Table 2.

	Need-Based Meeting Need	Non-Need-Based in Excess of Need	Need-Based in Excess of Need	Non-Need-Based Meeting Need
In 4-Year Public	13% (\$2,446)	5% (\$3,128)	2% (\$2,266)	9% (\$2,850)
Out 4-Year Public	8% (\$4,228)	6% (\$5,356)	1% (\$2,584)	13% (\$5,304)
In 2-Year Public	8% (\$563)	1% (\$1,075)	2% (\$545)	1% (\$959)
4-Year Private	35% (\$7,539)	10% (\$6,573)	3% (\$4,966)	33% (\$7,327)

Table 2: Percentage of nonzero cases and means for nonzero cases for aid classifications

Figure 6 displays pre-institutional grant need by percentile for all students with associated institutional grants on the same figure. Aid rises as need rises, but this result may appear because high-cost institutions award more aid on average (the between effect). We supplement the analysis in Figure 6 with our set of regressions to elicit differences across student characteristics, and we report these in Table 3. Specifically, regressing institutional grants on pre-institutional need with institutional fixed effects and dummy variables for full-time, full-year independent status, part-time independent status, and part-time dependent status reveals that independent students and part-time students lose out in institutional grant-awarding patterns even after accounting for differences in demonstrated need. Overall, for every \$1 increase in demonstrated need, institutional grants increase by about \$0.18 on average. This change is

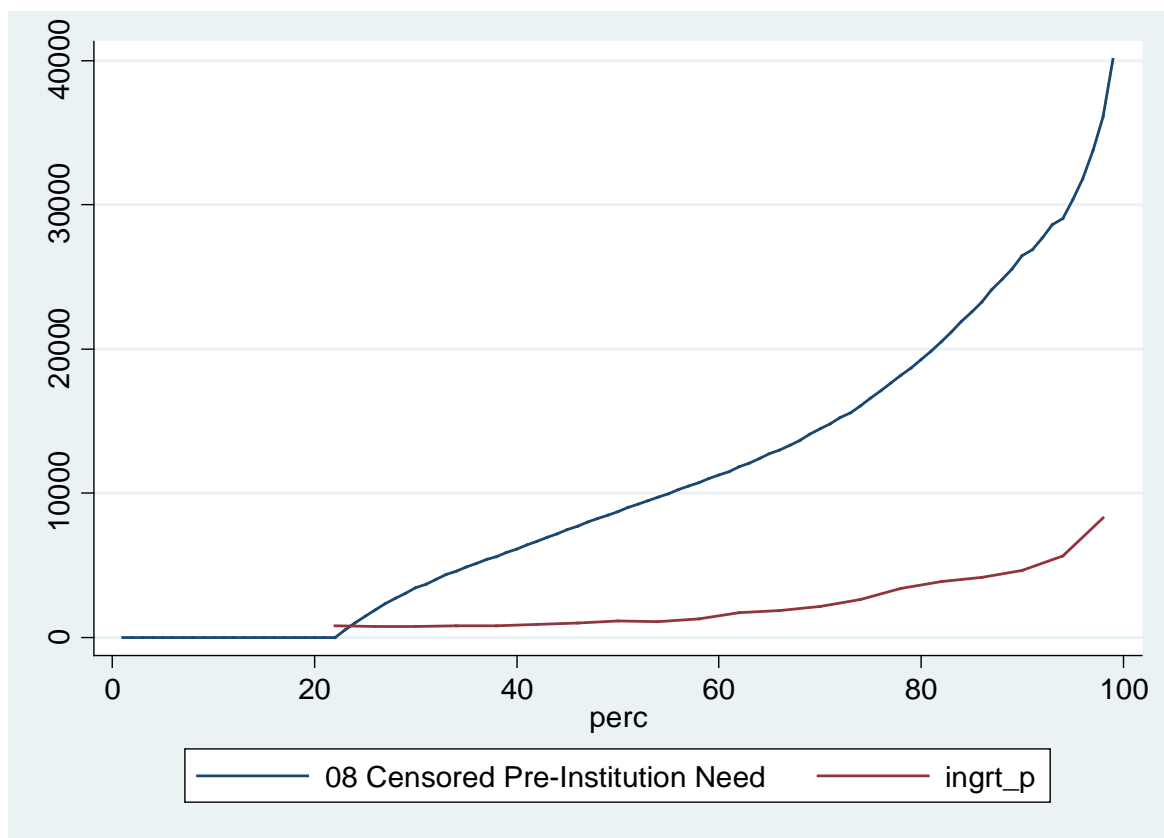


Figure 6: Censored pre-institutional need and associated institutional grants

	All	In 4-Year Public	Out 4-Year Public	4-Year Private
Need	0.18	0.12	0.13	0.24
Dep. PT	-347	-208	-335	-1,248
Ind. FT	-1,400	-547	-1,643	-3,657
Ind. PT	-758	-443	-1,279	-3,405
Observations	10,480,005	3,254,636	349,763	1,794,419

Table 3: Regression results with dummy variables for income and attendance pattern

greater at private institutions than at public institutions. (Coefficient estimates are smaller than the random effects estimates and larger than the tobit marginal effects estimates for grant amounts greater than zero, which we do not report here.)

Conclusion

In summary, we can draw several conclusions from what we report. Institutional grants do not make a large difference with respect to unmet financial need or patterns of unmet financial need across institutional types. Private institutions' grants reduce where it is largest initially, but these institutions' students' unmet need still exceeds students' unmet need at other kinds of institutions. Institutional grants exceed demonstrated financial need only in a small percentage of cases across institutions, so merit-based or non-need-based institutional grants generally meet some kind of demonstrated financial need, though they may not meet the need of the students with the greatest need. Independent status and part-time status reduce students' likelihood of receiving institutional grants and the sizes of the grants they should expect.

Going forward, we will incorporate updated NPSAS institutional grant data to refine our results. We will also include data on selectivity and institutional wealth to understand how these

factors affect institutions in their ability to award grants to students. We may employ multivariate regression to go beyond the basic relationship between grants and need, and we may rely on nonparametric regression to characterize our distributions without making strong assumptions about the shapes of the distributions. Finally, we will work to understand differences in high- and low-ability-to-pay students by standardizing pre-institutional need across institutions.

References

- Advisory Committee on Student Financial Assistance. (2006). *Mortgaging our future: How financial barriers to college undercut America's global competitiveness*. Washington, D.C.: U.S. Department of Education.
- Bresciani, M. J., & Carson, L. (2002). A study of undergraduate persistence by unmet need and percentage of gift aid. *NASPA Journal*, 40(1), 104-123.
- College Board. (2009). *Trends in Student Aid, 2009*. Washington, D.C.: Author.
- Davis, J. S. (2003). *Unintended consequences of tuition discounting*. Indianapolis, IN: New Agenda Series, Lumina Foundation for Education.
- Fitzgerald, B. K., & Delaney, J. A. (2002). Educational opportunity in America. In D. E. Heller (Ed.), *Condition of access: Higher education for lower income students* (pp. 3-24). Westport, CT: Praeger Publishers (ACE/Praeger Series on Higher Education).
- Heller, D. E. (2006). *Merit aid and college access*. Madison: Wisconsin Center for the Advancement of Postsecondary Education, U. of Wisconsin.
- Leslie, L. L., & Brinkman, P. T. (1988). *The economic value of higher education*. New York: American Council on Education/Macmillan Publishing.

- Long, B. T., & Riley, E. (2007). Financial aid: A broken bridge to college access? *Harvard Educational Review*, 77(1), 39-63.
- McPherson, M. S., & Schapiro, M. O. (1996). Are we keeping college affordable? Student aid, access, and choice in American higher education (No. DP-34). Williamstown, MA: Williams Project on the Economics of Higher Education.
- . (1998). The student aid game: Meeting need and rewarding talent in American higher education. Princeton, NJ: Princeton University Press.
- . (2002). Changing patterns of institutional aid: Impact on access and education policy. In D. E. Heller (Ed.), *Condition of access: Higher education for lower income students* (pp. 73-94). Westport, CT: Praeger Publishers (ACE/Praeger Series on Higher Education).
- Mundel, D. S. (2008). What do we know about the impact of grants to college students? In S. Baum, M. McPherson & P. Steele (Eds.), *The effectiveness of student aid policies: What the research tells us* (pp. 9-38). New York: The College Board.
- National Association of College and University Business Officers. (2010). 2009 tuition discounting study report. Washington, DC: Author.
- Perna, L. (2006). Understanding the relationship between information about college prices and financial aid and students' college-related behaviors. *American Behavioral Scientist*, 49(12), 1620-1635.
- Redd, K. E. (2000). Discounting toward disaster: Tuition discounting, college finances, and enrollments of low-income undergraduates. Indianapolis, IN: USA Group Foundation.