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In the Right Ballpark? Assessing the Accuracy of Net Price Calculators

IHELG Monograph

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In the right ballpark? Assessing the accuracy of net price calculators¹

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Abstract

Large differences often exist between a college or university's sticker price and the net price of attendance after accounting for financial aid. Net price calculators (NPCs) were designed to help students more accurately estimate their actual costs to attend a given college. We assess the accuracy of information provided by selected institutions through their net price calculators. Specifically, we compare NPC estimates of financial aid to actual financial aid packages for a sample of low-income, first-year college students at seven postsecondary institutions which all utilize the federal template NPC. We find that NPC estimates of grant aid do correlate highly with actual grant aid, on average, but that the variation of individual financial aid packages among socioeconomically similar students can be substantial. We suggest two improvements to the federal NPC template. First, whereas NPCs sometimes present cost information that is several years old, it must be kept up to date. Second, NPC estimates should include information on the potential range of actual grant aid received, particularly aid provided by the institutions themselves, where we observe variation in aid to be the largest. Our findings have implications for federal policy related to NPCs.

¹ We are grateful to the National College Access Network for supporting this project and facilitating our connection to the several NCAN-member organizations which graciously provided data for this study. We additionally thank those organizations which provided student-level data for this study. We do not mention these organizations by name in order to protect the identities of the students and postsecondary institutions for which they provided data. We especially thank Diane Cheng and Alexandra Chewing for insightful feedback. All views and any errors are our own.

Working paper: Assessing the accuracy of net price calculators

In the right ballpark? Assessing the accuracy of net price calculators

1. Introduction

Issues of college cost and affordability have been the focus of popular and policy attention over the last many years and for good reason. Unprecedented increases in tuition rates coupled with a stagnant economy lead many families to question the value of a college education. This is despite evidence that a college graduate can expect to earn over \$800,000 more in lifetime earnings than a high school graduate *after* fully repaying loans (Daly & Bengali, 2014). Even against historic tuition increases, such figures indicate that a college education remains a sound investment.

Recognizing this value, the US government provides billions of dollars in student financial aid annually, such that the majority of college students do not pay the full cost of attendance, or the sticker price, of their postsecondary institution. In 2011, the federal government provided \$146 billion in student financial aid (Aud et al, 2013), allowing 57 percent of undergraduates to receive federal student aid, with 42 percent receiving federal grant aid and 36 percent taking out Direct Subsidized Loans (Radwin et al, 2013).

However, the availability of federal aid is dwarfed in media coverage by rising tuition rates. As sticker prices increase, families may perceive postsecondary education to be inaccessible. Families are especially vulnerable to misjudging college affordability if they lack a clear understanding of the differences between the sticker price of an institution and the actual expenses that they would incur to attend, given the financial aid for which their students would qualify. Indeed, research identifies several financial aid-related barriers to postsecondary enrollment and success, including a lack of information about financial aid (Bettinger et al, 2012; Hoxby & Avery 2012; Hoxby & Turner 2013); discrepancies between actual versus perceived

college affordability (ACSFA 2005); and the complexity of the financial aid process itself (ACSFA 2005).

In light of such evidence, a 2008 amendment to the Higher Education Act (HEA) of 1965 called for the development of college Net Price Calculators (NPCs) as a tool to combat misunderstandings and increase transparency about college cost and financing. The legislation stipulates that every postsecondary institution receiving federal financial assistance include an NPC on its website by October of 2011. NPCs are intended to provide students and families with customized, institution-specific estimates of cost of attendance and grant aid. Together, these figures allow for an estimated net price after accounting for grant-based financial aid.

While NPCs hold great promise for improving information about college costs, their recent introduction leaves open questions about the quality of information that they provide. A critical first-order question relates to the accuracy of their estimates of grant aid and college costs. Indeed, to be useful in guiding students to make informed decisions about college options, they need to provide reasonably accurate information about net costs. One area of concern is that institutions' NPCs may not reflect the most recent tuition and fees information available. For example, in the summer leading up to the 2014-2015 academic year, several institutions included in this study were still presenting 2009-2010 tuition and net price information as the basis for their calculations. From 2009 to 2014, the average net tuition and fees paid by in-state students at public four-year colleges and universities increased nearly 50 percent from about \$2,030 to about \$3,030 (in 2014 dollars; The College Board 2014). Given this substantial increase, information that is five-years-old may differ substantially from current cost and aid information. In response to these and other concerns, Representative Elijah Cummings of Maryland and Senator Al Franken of Minnesota introduced bipartisan legislation in the House and Senate to make

technical improvements to NPCs, although the bills did not make it out of committee during the 113th session of Congress.² In this study, we examine the extent to which NPCs provide accurate estimates of grant-based financial aid when compared to actual grant aid awarded in students' financial aid packages.

Data for this investigation come from several partnering organizations which largely provide direct support to students in the process of college consideration, application, and transition. We limited our analysis to include only data for low-income students applying to postsecondary institutions that use the federal NPC template. We gathered data on would-be first-time college students' financial aid award packages and compared these figures to NPC estimates of students' financial aid. Our analysis focuses on the differentials between actual and estimated grant aid from federal, state, local and institutional sources.

To preview our results, we find that among students with an expected family contribution of zero, NPC estimates are identical within each respective institution, and on average, NPC grant aid estimates were very close to actual grant aid awarded. Nevertheless, actual levels of grant aid awarded can differ from the NPC estimate by several thousand dollars. We find that the greatest share of this difference is in the form of institution-specific grant aid, while federal and state grant aid is more predictable. In short, NPCs may help families with a ballpark estimate of their likely postsecondary expenses, but for many low-income families, the ballpark remains large, owing primarily to variation in grant aid provided by institutions themselves. Because our study is based on a relatively small sample of convenience, our findings may be limited from being broadly generalizable. Nevertheless, we provide a proof of concept regarding the accuracy

² H.R. 3694 and S. 2281, respectively. H.R. 3694 is cosponsored by Representatives Hinojosa (D-TX15), Issa (R-CA49), and Miller (D-CA11). S. 2281 is cosponsored by Senators Grassley (R-IA) and Kaine (D-VA).

of NPCs as well as a strategy for assessing the accuracy of other institutions' calculators. Such a strategy may be a valuable tool for future assessment, regulation and improvement of NPCs.

We structure the paper as follows: in section 2, we review the relevant literature on college cost and on the impact of college-related information on student outcomes. We then discuss the legislative development of NPCs and a review of their early implementation. In section 3, we outline our methodological approach to assessing the accuracy of NPC estimates and describe our data sources and sample. In section 4, we present our key findings. Finally, in section 5, we discuss the implications of our research for policy and future research.

2. Literature review

Research has documented several financial-aid related barriers to postsecondary enrollment and success. Two types of barriers are especially relevant to the development of NPCs. First, students, particularly those from low-income backgrounds, commonly lack an accurate understanding of higher education costs (ACSFA 2005). For example, when surveyed, they overestimate current tuition and fee levels and underestimate financial aid dollars available through grant and loan programs (Ikenberry and Hartle 1998; Horn, Chen, and Chapman 2003; Avery and Kane 2004). Popular media coverage regarding the rising cost of college fuels common misperceptions about the affordability of postsecondary education (ACSFA 2005; Horn, Chen, and Chapman 2003). Grodsky and Jones (2007) argue that inequalities in knowledge about college costs contribute to the persistence of gaps in postsecondary attainment. The authors find that parents from disadvantaged backgrounds are less able to even attempt to estimate college costs, and when they do, they are more likely to overestimate the costs than their middle-class counterparts. Bettinger and colleagues (2012) find that families overestimate the

cost of college by 300 percent, and Dunn and Oreopoulos (2013) report that high school students are more likely to aspire to postsecondary education after receiving information about the costs and benefits of college.

Second, many students and families lack information about financial aid and the associated application process. Of course, students must know about the availability of financial aid in order to apply for it. Too often, however, students and their families lack such awareness. For example, a 2002 Harris Poll revealed that large shares of parents and young adults lacked an understanding that grant funds were available to assist in the financing of postsecondary education. Further, low-income families were even less likely than others to have such knowledge (Sallie May Fund 2003, as cited by Bettinger et al. 2012). Even among top-performing students, those from low-income backgrounds often lack sufficient information about financial aid (Radford 2013), and often do not apply to top colleges and universities, even when these would be their best financial choices, given the generous financial aid that such schools provide (Hoxby and Avery 2012; Hoxby and Turner 2013).

Given these barriers, a question is whether providing students and families with better information about college costs would serve to improve postsecondary decisions and outcomes for students. Two studies provide early evidence in response to this question. In North Carolina, the College Board (2012) collaborated in the development of a “College Is Affordable” brochure that was distributed to lower-income families with middle school students in North Carolina and aimed to educate families about college net price. Treatment and comparison families were then surveyed regarding their knowledge of postsecondary financing. Families receiving the brochure were more likely to report knowing the cost of attending college in North Carolina; agreeing that

most students pay less than colleges' list prices; and agreeing that students from low-income families could attend college at low to no cost.

Hoxby and Turner (2013) provide evidence on a much more comprehensive campaign – Expanding College Opportunity, Comprehensive (ECO-C) – focused on providing high-achieving, low-income students semi-customized information about the college application process and colleges' net costs as well as no-paperwork application fee waivers. The intervention led to increases in the rates with which students applied and were accepted to high quality colleges and universities but did not lead to increases in college enrollment overall. The intervention did not impact freshman year grades, implying that students were able to be equally competitive academically, even at higher quality postsecondary institutions.

A key point made by Hoxby and Avery (2012) is that for high-achieving students from low-income backgrounds, attending a higher-tier postsecondary institution would represent a better choice academically as well as financially, owing to the generosity of the need-based financial aid that these institutions provide to their students compared to the less-selective colleges and universities that these students more typically attend. Indeed, for these same students, Hoxby and Turner (2013) identify having a clear understanding of a college or university's net price as instrumental in selecting a better-matched school. These studies suggest that high-achieving, low-income students and their families stand to benefit from improved access to college-related information on college financing in addition to other aspects of the college-going process. However, open questions remain about how net price information, and NPCs in particular, may impact the broader swath of students from low-income backgrounds who are not necessarily as high-achieving.

History and Legislation

Federal legislation called for the development of NPCs in the 2008 Higher Education Opportunity Act, the reauthorization of the Higher Education Act of 1965. One goal of the original act was to “provide financial assistance for students in postsecondary and higher education” (HEA 1965). Specifically, Title IV of the Act focused on student financial assistance and established the framework for need-based financial aid at colleges and universities. Building on this foundation, the 2008 reauthorization called for postsecondary institutions to increase transparency in college pricing (HEOA 2008). In conjunction with the 2008 reauthorization, the US Department of Education established the College Affordability and Transparency Center,³ where prospective college students can compare institutions by full cost reports (including tuition, housing costs, and fees), average net prices after accounting for aid, and other features, such as whether an institution is private or public, for-profit or not-for-profit, and a two or four-year program. NPCs are featured prominently on the site.

NPCs, as established by the HEOA, are designed to “help current and prospective students, families, and other consumers estimate the individual net price of an institution of higher education for a student” (2008). Prior to the introduction of NPCs, early, individualized estimates of financial aid were not available for many students, and students were not likely to receive financial aid award letter until after making important decisions about where to apply. The legislation mandated that by October 29, 2011, all postsecondary institutions benefiting from Title IV student aid programs were required to post a Net Price Calculator on their web sites. NPCs use student households’ financial and other information to estimate the total grant aid that a student would receive to attend a given institution and deduct that figure from the institution’s

³See <http://collegecost.ed.gov/catc/> for more information.

full cost of attendance in order to estimate the student's net price of attendance. Cost of attendance includes not only tuition and fees, but also room and board and estimates for the costs associated with books, supplies and transportation.

NPC Varieties and Challenges

While the US Department of Education has developed a free calculator template,⁴ there is no stipulation mandating institutions to use any particular NPC, provided that minimum required elements are included.⁵ As a result, though the federal template is used by just over half of postsecondary institutions (according to usage assessment performed by College Abacus), a number of alternative calculators exist that rely on an expanded set of questions and data elements.⁶ For reference, in Appendix A, we detail the data elements included in the federal template calculator as well as two additional NPCs, one created by Student Aid Services and the other by The College Board. These latter two are examples of NPCs created by third-party vendors, although additional vendors exist. Alternatively, institutions may design and implement their own NPCs. A comparison of the data elements included in Appendix A reveals variation in the extent of input information required by institutions using different NPC templates. Regarding the federal template calculator, it is important to note that it was designed with the goal of simplicity so that it could be utilized by a variety of institutions, including those that lacked the resources to invest in the development or purchase of a more complex NPC.

⁴ For more information on the federal NPC template, see <http://nces.ed.gov/ipeds/netpricecalculator/>

⁵ Input elements must include those that allow for an estimate of the student's Expected Family Contribution (EFC). These elements include household income, number in family, and student dependency status. Output elements must include estimates of: total cost of attendance; tuition and fees; room and board; books and supplies; other expenses; total grant aid; and net price. Additional output requirements include the percent of the first-time, full-time student cohort receiving grant aid and caveats or disclaimers associated with the estimates provided.

⁶ See, for example, the NPC created by The College Board at <http://netpricecalculator.collegeboard.org/>; and the NPC created by Student Aid Services at <http://studentaidservices.com/index.php/products-and-solutions/net-price-calculators-personal-affordability-planners>.

Comparing across the different types of NPCs reveals important potential trade-offs. A calculator that relies on only a few pieces of information, as does the federal template, might be more likely to be utilized, given that students and families are more likely to be able to provide the information required and less likely to be fatigued by the process of answering a long battery of detailed financial questions. Nevertheless, there are potential drawbacks to the simplicity of the federal template. For example, the federal template NPC does not require measures of students' academic achievement (such as GPA or SAT / ACT scores) and therefore cannot generate estimates that reflect variation in aid related to factors such as eligibility for merit-based scholarship; this is both relevant and important for those institutions that award merit-based grant aid. Additionally, by only considering a narrow set of student characteristics, the federal template generates a simple approximation of expected family contribution upon which grant aid estimates are based. Other NPCs may base grant aid estimates on more fine-grained measures of family income and asset information.

By contrast, alternative, more sophisticated calculators may require students to provide detailed information such as parents' untaxed Social Security benefits, home equity, and trust equity. In these cases, an applicant may be discouraged by the high search cost and abandon the process of obtaining a net price estimate. Because colleges and universities utilize different data elements to obtain net price estimates, resulting estimates may vary in their accuracy.

An early review of NPCs conducted by The Institute for College Access and Success (TICAS) reports that though universities have widely incorporated the NPC tools into their websites, significant improvements can be made in terms of the ease with which students and families can find, use, and compare net price estimates (Cheng 2012). For example, based on a sample of 50 institutions (including both two-year and four-year institutions and public, private

and for-profit institutions), the authors report that NPCs are not visually prominent in nearly one-quarter of the schools sampled. Some schools had given their calculators different names, such as “Education Cost Calculator” and “Tuition Calculator,” and nearly a third provided links that would not help students find their NPCs, such as broken links or links to the college’s home page. Second, as discussed above, NPCs varied in terms of their ease of use with required question sets ranging from eight to more than 70. Next, though some NPCs were easy to understand and yielded comparable results, many others did not. Lack of comparability, in some instances, related to the fact that net price estimates were based on tuition figures that were outdated by one or several years. In our study (for which data were gathered during the lead-up to the 2014-15 school year), some institutions were still using total cost information from the 2009-10 school year. Given rising college costs, these outdated figures can be misleading. Adding to the confusion, some calculators included estimates of net costs after subtracting out student work study and loans (as opposed to grant aid only), again resulting in misleading perceptions about the true cost of attending a given institution.

The TICAS report provides several suggestions for improving NPCs and their usage. It does not, however, investigate the accuracy of NPCs. To our knowledge, no studies exist on NPC accuracy. As improvement efforts advance and calculators evolve, it is important to quantitatively measure the effects of these changes. One fundamental measurement of NPC effectiveness is the accuracy of the information that the calculators provide. In this study, we assess the accuracy of information provided by the federal template NPC. A focus on the federal template is important, given that it is the most widely used and arguably the most straightforward of the most widely used NPCs, requiring only basic information like household size and income.

Our analyses are guided by two key research questions: first, to what extent do NPCs provide accurate estimates of net college costs? Second, where discrepancies between estimated and actual grant aid awarded exist, are these discrepancies more prevalent in certain sources of funding? Answers to these questions will shed light on whether and how NPCs should be improved to provide students and families with the best possible information about college cost.

3. Research design

The focus of our investigation is a comparison between estimates of financial aid generated by NPCs and the corresponding financial aid packages that students actually received from the colleges and universities to which they are admitted. To construct these comparisons, we gathered data from several non-profit organizations that work to support students – predominantly those from low-income households or who would be a first-generation college-goer – to apply, enroll and succeed in college.

Specifically, we collaborated with the National College Access Network (NCAN) to recruit NCAN partner organizations for this investigation. In total, 18 NCAN member organizations from across the US signaled interest in participating. Of these 18 organizations, we filtered out those that either did not store the needed data elements or did not work with substantial numbers of students applying to institutions that use the federal NPC template. Ultimately, we identified four partner organizations that were able to provide the student-level data necessary for this investigation. From each organization, we gathered individual-level records of student and household information required by the federal NPC template. Second, we gathered records of students' specific financial aid packages (i.e., their financial aid award letters).

NPC estimates

To populate the federal template NPC, institutions report grant and scholarship information corresponding to different EFC ranges.⁷ Specifically, institutions document the median amount of both need- and non-need-based grant and scholarship aid from federal, state, or local governments, or the institution itself awarded to full-time, first-time students in each EFC range. To obtain a simplified approximation of student EFC, the federal NPC template requires the following data elements: student's age, on- or off-campus living arrangement, in or out of state residency, marital status, dependent status, number of people living in the household, number of people from household in college, and net household income after taxes. Of these data elements, variations in student's on- or off-campus living arrangement and state residency may correspond with different grant aid estimates within the same EFC range. For example, at some institutions, a student with an EFC of zero and is living on campus may receive more grant aid than a student with an EFC of zero and is living off campus. Every partnering organization included in our study kept records of EFC, and all students associated with a particular institution was an in-state resident. Only one partnering organization did not maintain records of students' on- or off-campus living arrangement. Nevertheless, the organization confirmed that the great majority of sampled students (and students served by their organization historically) would be living on campus upon successful transition to college. Together, the data available allow for an accurate appraisal of NPC grant aid estimates for the students in our sample.⁸

⁷ EFC ranges (in USD) include: 0; 1-1,000; 1,001-2500; 2,501-5,000; 5,001-7,500; 7,501-10,000; 10,001-12,500; 12,501-15,000; 15,001-20,000; 20,001-30,000; 30,001-40,000; unknown.

⁸ We nevertheless assessed the potential sensitivity of our results to student living arrangement where this information was not available. NPC estimates were somewhat sensitive to student living arrangements at the institution for which we did not have this information. Nevertheless, our main conclusions are robust to the uncertainty due to not having information on these students' planned living arrangement.

We utilized the relevant online NPCs to obtain net price estimates for the institution(s) to which each student had been admitted. In addition to an inclusive cost estimate, NPCs provide an estimate of total grant aid. The estimated total grant aid is subtracted from the estimated total cost of attendance to reach the estimated net price. Finally, we recorded the academic years on which the net price estimate calculations were based.

Student financial aid award information

The second major source of data was student-level financial aid award information. Whereas NPCs present estimates of grant aid, financial aid award letters provide actual grant aid figures. We collected data on would-be first-time college students' financial aid award packages, as reported in the financial aid award letters from the institutions to which they had been admitted. This information includes federal, state, and institution-specific grant, loan, work study, and scholarship awards. Because the federal template NPC focuses on grant aid and does not estimate loan or work study aid, we focus our analysis on a comparison of grant aid awards and estimates.

Analytic sample

In our analyses, we focus particularly on students with an expected family contribution (EFC) to the cost of college of zero. This analytic decision is motivated by the idea that low-income students may be particularly sensitive to information on college cost. Therefore, from a policy standpoint, we should have an interest in focusing on accuracy of cost information for this subset of students, in particular; thus, all results pertain to students with an EFC of zero. In total, the partnering organizations provided the needed individual-level data for 455 students with zero

EFCs to the cost of college. These 455 students are from 11 unique institution-school year cohorts from seven different four-year institutions in four states. Six of the institutions are public and one is private. A recognized limitation of this investigation is that our sample is one of convenience and our findings may therefore suffer from a lack of generalizability. Nevertheless, our results provide an important proof of concept regarding the study of accuracy in NPC estimates.

Grant aid differentials

Having obtained an institution-specific estimated and actual grant aid amount for each student, we then calculated student-institution-level grant aid differentials. These differentials are a simple difference between the amount of grant aid predicted for the student by the NPC and the amount of grant aid offered in the financial aid award letter. The grant aid differential is positive when the actual grant aid is greater than the estimate and negative when less than the estimate. We also calculated percentage differentials by dividing the actual grant aid by the NPC estimated grant aid and scaling by 100.

Positive grant aid differentials are potentially benign as they indicate students who received more generous financial aid than the NPC would suggest. Underestimated grant aid may, however, deter a student from applying to an institution presumed to be unaffordable. A negative grant aid differential may mean that some families could have mistakenly assessed their abilities to finance their student's schooling at a particular institution.

4. Results

We first examine the accuracy of NPC-estimated grant aid in comparison to students' actual grant aid awards. In Table 1, we present results on this comparison for students organized by

institution and cohort.⁹ Within institution-cohort groupings, sample sizes range from 6 to 46. We do not identify the postsecondary institutions included here, as our focus is on the NPC as a tool rather than on the specific institutions for which we are able to obtain data. We ordered institutions from largest to smallest in terms of NPC-estimated grant aid.

Within institution-cohort groupings, each student in our analytic sample was a full-time, first-time student. For these students, because NPC-estimated grant aid corresponds with EFC within institution-cohort groupings, there was no variation in NPC-estimated grant aid, which we report for each institution-cohort grouping of students in column 3 of Table 1. Estimated grant aid ranged from \$7,990 at Institution H, a public, non-competitive institution in the Midwest to \$24,267 at Institution A, a private, highly competitive institution in the South. As would be expected, there is substantial variation in total grant aid across institutions, owing to the variation in total cost of attendance.

In examining actual grant aid amounts (Table 1, column 4), average grant aid ranged from \$8,507 at Institution F, a public, non-competitive institution in the Midwest to \$23,847 at Institution A. We observe a strong relationship between the average level of grant aid and its corresponding estimate. In fact, the estimate and institution-cohort average that we calculate are almost perfectly correlated ($r = .96$).

In column 5, we present the simple difference between the NPC estimated level of grant aid and the average actual level of grant aid for students in the sample. These differences range from a low of \$39 to a high of nearly \$2500. One conclusion that is tempting to draw here is that institutions range in the accuracy of their NPCs. Of course, a limitation of our sample is that it is a sample of convenience. The students in our sample are not necessarily representative of all

⁹ Three institutions are represented by two different partnering organizations with student data from different graduating classes.

low-income students admitted to the institutions examined here. Further, we are not able to observe important details such as whether students completed the financial aid application process in a timely manner. Therefore, we caution against drawing this conclusion about the average accuracy of these NPCs.

What is worth noting, however, is the wide variation that exists in actual grant aid within each institution-cohort group of students, even among students that are homogenous in terms of socioeconomic status, as measured by expected family contribution to the cost of college. We report the range of the grant aid differential in brackets in column 5 of Table 1. At Institution C1, for example, grant aid ranged from nearly \$6,000 *less* than the NPC estimated grant aid to almost \$7,000 in excess. At Institution A, where the average and estimated grant aid differed by only a few hundred dollars, we observe a similar spread in actual aid across students. Of the institutions included in our examination, more than half had grant aid award ranges of more than \$4,000. In the final column of Table 1, we offer a second metric for comparison – actual aid as a percentage of the NPC estimate. For some institutions, there was a tight correspondence between actual and estimated aid for all students examined (e.g., institutions D2 and F). At the most extreme, actual aid ranged from 53% to 156% of the NPC estimate within a single institution. Yet, even at this most extreme end of variability, in no cases do grant aid differentials exceed the range between net price and sticker price. In other words, even at their most inaccurate points, NPC estimates still present a more accurate picture of college expense than do sticker prices.

In Table 2, we further disaggregate grant aid into federal, state, and institutional sources to better understand the sizeable variations in grant aid awarded to students who are socioeconomically similar. For each aid source, we report the average and standard deviation of award amount as well as the corresponding minimum and maximum. Federal aid includes Pell

and Federal Supplemental Educational Opportunity grants; state aid includes statewide need- and merit-based awards; and institutional grants are those awarded by the particular colleges and universities in our sample. On financial aid award letters, institutional grants typically are designated as residence life, presidents', or deans' scholarships. The results in Table 2 indicate generally consistent and predictable grant funding at the federal and state levels. In contrast, we observe substantially greater variability in grant funding at the institutional level. Finally, in Figure 1, we illustrate the strong, positive relationship between the generosity of institutional grant aid, on average, and the variation in institutional grant aid across students in our sample. This figure reveals that the level of institutional aid that a student in our sample might expect is less certain for those institutions that have more generous aid, on average.

5. Discussion

The goal of this investigation is to assess the extent to which net price calculators provide accurate information to students about the likely costs that they will face to attend a given institution. To assess accuracy, we gathered data on students across seven different institutions in the US that utilize the federal template NPC. We focus entirely on students from low-income backgrounds with an expected family contribution of zero to the cost of college. Even within this sample of students with similar socioeconomic circumstances, we observe surprising variation in the level of grant aid actually awarded to students and, therefore, in the out-of-pocket expense that students would face to attend the same institution. The non-representative nature of our sample limits conclusions about the accuracy of NPC estimates, on average. Our results nevertheless provide a proof of concept that even among students with similar socioeconomic profiles, NPC estimates can differ substantially from actual financial aid, in some cases

overstating and in other cases understating the level of grant aid that a student would eventually be awarded from a particular institution.

What are the sources of the discrepancy? Grant funding from state and federal sources are relatively consistent. At the federal level, for example, such consistency is not surprising, given that all of these students would qualify for the means-tested Pell grant. Instead, much of the variability in grant aid received by students within the same institution is due to variability in grant aid awarded by the institution itself.

Based on the financial aid award letters that we examined, many of the institution-specific grants that students received were awarded on the basis of merit, academic or otherwise, and were awarded to students based on strict criteria, such as SAT and/or GPA thresholds. Other sources of funding were need-based but distributed on a first-come, first-served basis, such that later applicants may have missed out on funding. This type of variation in institutional grant aid is not unexpected, given that many colleges and universities utilize merit-based institutional grants to attract strong students to their campuses. Nevertheless, such sources of funding can clearly contribute to substantial differences between estimated and actual levels of grant funding.

In addition, while we are limited in our ability to investigate this point, given that we have data from only seven unique postsecondary institutions in our sample, another potential source of discrepancy in the information provided by NPCs is the reliance of some institutions' NPCs on stale data. With the costs of postsecondary education changing on an annual basis, the information provided by NPCs should be expected to keep pace.

Despite the inaccuracies that we have detected, it is important to state emphatically that we do not intend for our results to serve as an indictment of the federal template NPC. Rather, we hope that these results will help to guide further improvement to tools that provide

information to students and families on the true costs of college attendance. Importantly, the families who may benefit most from the use of an NPC tool may be those whose access is via a gatekeeper such as a counselor or other college advising practitioner. Improved accuracy may increase the likelihood of practitioners sanctioning the use of NPCs and, better information on accuracy may help these practitioners improve in their ability to inform the expectations of the students with whom they work.

A benefit of the federal template NPC is that users are required to provide a minimal amount of household and other information in order to obtain an estimate of college cost. This is an important feature of the federal template, as NPCs that require many additional data elements not typically at students' or even parents' finger tips run the risk of not being used due to complexity. Nevertheless, for net price calculators to be useful in helping students understand the true costs of attending a particular postsecondary institution, it is imperative that they provide a reasonably accurate picture of cost.

To work towards this goal, we offer two key recommendations informed by our examination. First, we recommend that the information on median aid that NPCs currently provide be accompanied by information on variability, and potentially, on sources of that variability. Particularly in the case of institutional aid, net price calculators could include information on the types of institutional aid awarded to some students as well as on the procedures and priority deadlines for financial aid application.

Second, institutions should be required to update the data underlying their NPCs on a regular basis and particularly when they increase their tuition levels and other costs of attendance or make modifications to their available institutional grants. Work in the behavioral economics literature suggests that even small changes in cost can impact students' decision making

regarding postsecondary education (e.g., Pallais, 2009, Castleman & Page, 2014). If students' college application decisions are based on outdated, inaccurate information, they may be less willing or able to follow through when it comes time to pay the tuition bill. The US Department of Education advises but does not currently require colleges to update their calculators on an annual basis. The Net Price Calculator Improvement Act, introduced by Senators Al Franken and Chuck Grassley, goes further by including the stipulation that calculators be populated with data from not earlier than two academic years prior to the most recent academic year.

To conclude, NPCs were designed to help students and families more easily reach an estimate of the actual costs to attend college and to understand sources of financial aid that are available. By accounting for likely grant aid based largely on the student's household income, the federal template NPC can provide a quick and simple estimate of net college cost. As a tool for estimation, net price calculators are undoubtedly a move in the right direction. The NPCs that we examined through this study rely on a minimal level of information and provide families with a ballpark estimate of college costs that is much closer than the 300 percent overestimate reported by Bettinger and colleagues (2012). Nevertheless, our findings here indicate that for those lowest income students this ballpark may remain large and call for potentially simple augmentations to the federal NPC to further improve the information that it can provide for students and families in order to understand the true costs of college.

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Tables and Figures

Table 1. Summary statistics of grant aid and NPC estimates

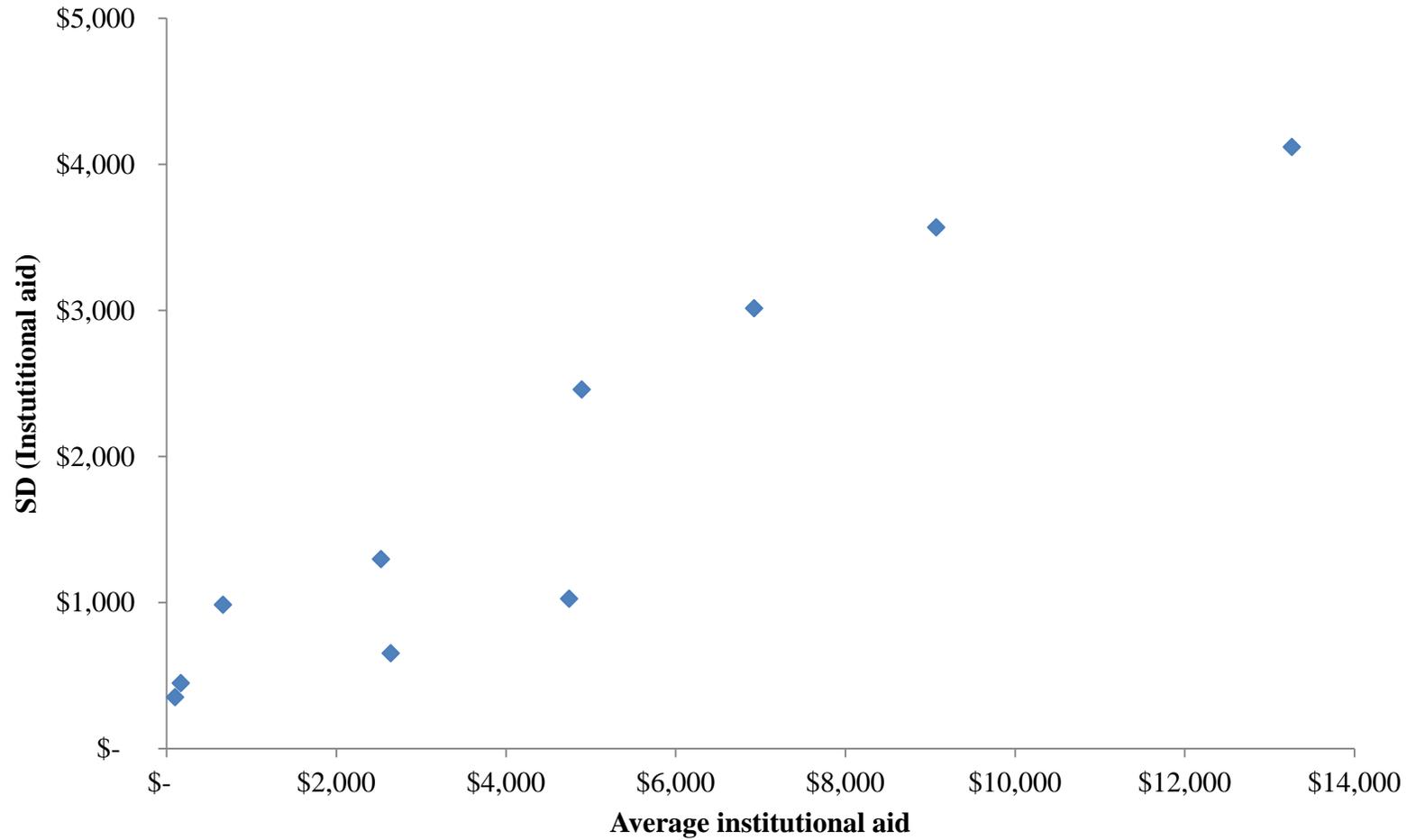
Institution -cohort	NPC data year	N	NPC Estimated Grant Aid	Actual Grant Aid (SD)	Grant Aid Differential Mean [min, max]	Actual Aid as Percentage of NPC Estimate (min, max)
A	2012- 2013	6	\$24267	\$23847 (3778)	-\$420 [-5926, 5608]	98% [76, 123]
B1	2013- 2014	41	\$15940	\$14132 (2986)	-\$1808 [-3900, 5784]	89% [64, 125]
B2	2013- 2014	20	\$15940	\$16404 (3569)	\$464 [-2630, 9214]	103% [84, 158]
C1	2009- 2010	35	\$12500	\$11458 (2687)	-\$1042 [-5905, 6973]	92% [53, 156]
C2	2009- 2010	34	\$12500	\$11571 (1026)	-\$929 [-4970, -670]	93% [60, 95]
D1	2009- 2010	31	\$11750	\$9295 (614)	-\$2455 [-5205, -1355]	79% [56, 88]
D2	2009- 2010	46	\$11750	\$9443 (203)	-\$2307 [-2350, -1350]	80% [80, 89]
E	2012- 2013	30	\$9170	\$9131 (1226)	-\$39 [-3475, 1383]	100% [62, 115]
F	2012- 2013	11	\$8393	\$8507 (407)	\$114 [-333, 467]	101% [96, 105]
G	2012- 2013	19	\$8289	\$8685 (346)	\$396 [-347, 1403]	105% [96, 117]
H	2012- 2013	27	\$7990	\$9152 (972)	\$1162 [-68, 3432]	114% [99, 143]

Notes: Column 4 provides the NPC grant aid estimate for students in each institution-cohort group. There was no variation in these estimates. Column 5 presents the average level of grant aid and associated standard deviation within each group. Column 6 presents the average grant aid differential and associated range, and column 7 presents the average and associated range of actual aid as a percentage of the NPC estimate.

Table 2. Grant aid by source

Institution-cohort	N	Federal Aid		State Aid		Institution Aid	
		Mean (SD)	[Min, Max]	Mean (SD)	[Min, Max]	Mean (SD)	[Min, Max]
A	6	\$6022 (900)	[4480, 6730]	\$4560 (651)	[3250, 4876]	\$13265 (4119)	[7000, 18270]
B1	41	\$6035 (62)	[5645, 6045]	\$1171 (187)	[0, 1200]	\$6926 (3015)	[4795, 14479]
B2	20	\$6130 (0)	[6130, 6130]	\$1200 (0)	[1200, 1200]	\$9074 (3569)	[5980, 17824]
C1	35	\$5758 (516)	[2795, 5846]	\$803 (276)	[0, 900]	\$4897 (2458)	[1800, 12728]
C2	34	\$5924 (34)	[5730, 5930]	\$900 (0)	[900, 900]	\$4747 (1027)	[700, 5000]
D1	31	\$5818 (250)	[4695, 6545]	\$832 (217)	[0, 900]	\$2644 (654)	[0, 4300]
D2	46	\$5927 (22)	[5780, 5930]	\$3413 (361)	[1470, 4440]	\$103 (352)	[0, 2000]
E	30	\$5640 (1352)	[795, 6154]	\$960 (569)	[0, 2400]	\$2531 (1297)	[0, 7510]
F	11	\$6166 (418)	[5730, 6530]	\$2341 (32)	[2330, 2436]	\$0 (0)	--
G	19	\$6283 (339)	[5730, 6480]	\$2231 (38)	[2212, 2302]	\$171 (449)	[0, 1750]
H	27	\$6293 (372)	[5730, 6530]	\$2192 (0)	[2192, 2192]	\$667 (985)	[0, 3500]

Figure 1. Scatterplot of standard deviation of institutional aid by average level of institutional aid by institution-cohort group



In the right ballpark? Assessing the accuracy of net price calculators

Appendix A.

Table A1. Data elements included in selected Net Price Calculator Templates

Data element	Federal Template	College Board	Student Aid Services
<i>Input information</i>			
Agree to terms	X		X
Plan to apply for aid	X		
Age	X	X	X
State residency	X	X	X
Student marital status	X	X	X
Student dependents	X	X	X
Household size	X	X	X
Number of household in college	X		X
Household income after taxes	X		
First name		X	
Current grade		X	X
On/off campus living		X	X
Status at institution (just looking, requested info, applied, admitted)		X	
Orphan or ward of court		X	X
Citizenship		X	X
Ethnicity		X	
High school GPA		X	X
High school class rank		X	
Combined reading and math SAT score		X	X
Composite ACT score		X	X
National Merit Aid finalist		X	
Anticipated major		X	
Legacy at institution (parent or step-parent alumni association member)		X	
Intention of parents to apply for federal education loans		X	
Gender		X	
First year or transfer student		X	
AGI (only if filed 1040EZ or 1040A)			
Student name		X	X
Student address			X
Student email			X
Student phone			X
In armed forces			X
Veteran of armed forces			X
Child of active veteran service member			X
At age 13, was student ward of court or were parents deceased			X
Form completer relation to student			X
Anticipated year of HS graduation (notice of estimates for future graduation dates)			X
Parent or guardian employed at institution			X

In the right ballpark? Assessing the accuracy of net price calculators

Data element	Federal Template	College Board	Student Aid Services
SAT reading			X
SAT math			X
ACT composite		X	X
Participation in Governors Honors Academy			X
Valedictorian			X
Mother's income		X	X
Father's income		X	X
Additional income		X	X
Amount of other taxable income		X	X
Amount of income losses		X	X
Amount of untaxed income		X	X
Total value of parent's assets		X	X
Parent marital status		X	X
Age of older parent		X	X
Parents' state of residence		X	
Federal income tax form filed by parents for most recent tax year (1040, 1040A, 1040EZ, other, did not file, not sure)			
Number of siblings		X	
Age of siblings		X	
Wages, salaries, and tips (parents)		X	
Parent 1 income		X	X
Parent 2 income		X	X
Total interest and dividend income (parents)		X	X
Business income or losses (parents)		X	X
Other taxable income or losses (parents)		X	X
Parents' total income adjustments (parents)		X	X
Amount reported in education tax credits (parents)		X	
Amount received in tax credits and benefits (parents)		X	
Amount contributed to non-taxable retirement plans and/or received in untaxed income and benefits (parents)		X	
Amount claimed in itemized deductions (parents)		X	
Number of exemptions claimed (parents)		X	
Current amount in cash, savings, and checking (parents)		X	X
Current value of investments, not including retirement (parents)		X	X
Amount owed on investments (parents)		X	
Business ownership (parents)		X	
Farm ownership (parents)		X	
Real estate other than home, business, or farm (parents)		X	
Earnings from work (student)		X	X
Interest and dividend income (student)		X	X
Untaxed income and benefits (student)		X	X
Amount in cash, savings, checking, and investments, not including retirement (student)		X	X
Business or farm ownership (student)		X	
Equity in real estate other than home, business, or farm (student)		X	
Value of trusts of which student is beneficiary		X	

In the right ballpark? Assessing the accuracy of net price calculators

Data element	Federal Template	College Board	Student Aid Services
Parent home ownership		X	
Value of home		X	
Amount owed on home		X	
Purchase price of home		X	
Year of home purchase		X	
Total elementary, jr high, and high school tuition parents paid or expect to pay for all dependents		X	
Option to save data for future comparisons		X	
<i>Output information</i>			
Estimated tuition and fees	X	X	X
Estimated room and board charges	X	X	X
Estimated cost of books and supplies	X	X	X
Estimated “other expenses”	X		X
Estimated personal expenses		X	
Estimated transportation expense		X	
Estimated total cost of attendance	X	X	X
Estimated total grant aid	X	X	X
Estimated federal Pell grant aid		X	
Estimated federal grant		X	
Estimated institutional grant		X	
Estimated student loan		X	
Estimated student work-study		X	
Estimated total self help		X	
Year of data	X		X
Expected family contribution		X	
Expected parent contribution		X	
Expected student contribution		X	
Estimated remaining cost		X	
Student resources worksheet		X	
Student next steps guide		X	
Clarification of grants and loans	X		
Percentage of students receiving grant/scholarship aid	X		X
Estimated state grant		X	X
Institutional merit scholarship		X	X
SEOG (listed under “self help”)		X	
Estimated eligibility for other aid programs			X
Estimated Stafford subsidized loan amount			X
Estimated Stafford unsubsidized loan amount			X
Estimated PLUS loan amount			X