

## College Choice: Informing Students' Trade-Offs Between Institutional Price and College Completion

Matea Pender  
Senior Policy Research Analyst

Michael Hurwitz  
Associate Policy Research Scientist

Jonathan Smith  
Associate Policy Research Scientist

Jessica Howell  
Executive Director of Policy Research

### Summary Notes

- When students choose among postsecondary institutions, they potentially face a trade-off between the net price of attendance and the likelihood of completing a college degree. The magnitude of the trade-off varies by individual student attributes, such as family income and academic measures, and institutional characteristics, such as sector and academic profile.
- Clear information about the relationships between net price and degree completion can help students and families weigh these factors in conjunction with their personal preferences, education goals, and financial resources.
- An overemphasis on price in the college planning and choice process may cause students and families to overlook other important factors that they would be wise to consider.

Empirical research on the returns to postsecondary education provides a near universal consensus that college confers numerous advantages for both individuals and society. Not only do individuals with a college degree earn more money than their peers with only a high school degree, they lead healthier lifestyles, experience greater job satisfaction, and engage in more civic activity (Baum, Ma, & Payea, 2010).

Although arguments in opposition to higher education are rare, there is currently a lively debate as to whether higher education is a good investment for everyone, particularly for academically modest, lower-income students who would, in many instances, take out loans to finance their postsecondary endeavors. There are concerns that many of these students will not be able to recoup the money they spend on higher education. Sensationalized anecdotes of jobless college graduates saddled with staggering indebtedness provide an inaccurate depiction of the typical college graduate's job prospects and debt loads.<sup>1</sup> Such depictions fuel a growing movement that questions whether the benefits of higher education outweigh costs

1. See Martin and Lehren (2012) and a rebuttal by Dynarski and Turner (2012).

for all students. In light of price increases at U.S. postsecondary institutions, these concerns are not without merit.

### **Facts About Sticker Price and Net Price**

Over the past decade, published tuition and fees faced by the typical student increased by nearly 30 percent in inflation-adjusted dollars at private nonprofit four-year institutions. The corresponding increase was greater than 70 percent at public four-year institutions. These increases are not a blip in the college pricing trend; they were preceded by two decades of steadily rising prices. In fact, between the 1981-82 and 2011-12 academic years, tuition and fees increased by 268 percent beyond inflation at the nation's public four-year institutions and 181 percent beyond inflation at private nonprofit four-year institutions (Baum & Ma, 2011).

Because institutional "sticker prices" are featured prominently in major sources of college information, such as guidebooks and websites, it is tempting to latch on to these numbers and assume that they represent what the typical student pays. This assumption is unfounded. A conservative estimate is that only one-third of full-time college students pay the full sticker price (Scott-Clayton, 2011). Between 2000-01 and 2010-11, grant aid from all sources more than doubled, increasing from \$47.9 billion to \$107.2 billion (Baum & Payea, 2011).<sup>2</sup> As a result of this increase in grant aid, the "net price" that students actually pay for tuition and fees, after accounting for grant aid from all sources as well as tax credits and deductions, has remained relatively flat

2. Both of these estimates are in 2010 dollars.

over the past decade at private nonprofit four-year institutions and has increased by about \$1,150 at public four-year institutions (Baum & Ma, 2011).

Students and parents alike overestimate the cost of college tuition, and parents from relatively low-income backgrounds are more prone to estimate these costs inaccurately (Horn, Chen, & Chapman, 2003; Grodsky & Jones, 2004). This tendency to overestimate college tuition is compounded by a lack of awareness and understanding about financial aid and the steps required (e.g., FAFSA completion) to receive it (Kantrowitz, 2009). These factors may create a scenario in which sticker prices play a prohibitive role in the college choice process for families whose net price may, in fact, be manageable.

College "sticker prices" for tuition and fees may play a prohibitive role in the college choice process for families whose net price may, in fact, be manageable.

### **The Price/Completion Trade-Off**

The analyses conducted in this brief show that college price and degree completion rates are positively correlated. If students opt to go to college but have concerns about affordability or the return on their financial investment, they may gravitate toward less expensive (by sticker or net price) institutions. Students who choose what they perceive as a more affordable college may find themselves enrolled at an institution with lower rates of degree completion compared to their other, more expensive college options. In this

case, making the college choice based on frugality may not prove to be the best investment in the long run.

We present data on the trade-offs between annual net price and college completion rates for the high school graduating class of 2004. These analyses are intended to illustrate the magnitude of the trade-off associated with choosing between colleges that differ in terms of net price and completion rates, thereby enabling students and families to think critically about college options in light of long-term outcomes.

### Data

Three data sources underlie the analyses described in this brief. Institutional net price data are from the *2003-04 National Postsecondary Student Aid Study (NPSAS:04)*. Student degree completion data for the high school class of 2004 are collected by the College Board in conjunction with the National Student Clearinghouse (NSC). Attributes of enrolled students at all U.S. colleges and universities in 2004 are from the *Integrated Postsecondary Education Data System (IPEDS)*.

### National Postsecondary Student Aid Study

The *NPSAS:04* sample contains 5,111 undergraduate students, ages 17 to 20, who graduated from high school in 2003 and were enrolled full time during the 2003-04 academic year at public or private nonprofit four-year institutions.<sup>3</sup> The *NPSAS* contains a wealth of student demographic variables, including gender, race/ethnicity, and family

3. *NPSAS* provides the most reliable estimates for what students in the 2004 high school cohort would be paying, despite the one-year lag between *NPSAS* and the College Board 2004 cohort.

income as well as academic characteristics such as SAT® or ACT scores. Also included in *NPSAS* are the published tuition and fees for each student's institution of choice, along with the grant aid from all sources that each student received. In this study, the student's net price of college is calculated as the difference between the college's tuition plus fees and the grant aid received from all sources.<sup>4</sup>

### NPSAS:04 Sample Snapshot

Number of students: 5,111

Number of colleges: 429 (193 public, 236 private)

Average student SAT: 1089

Average annual net price: \$5,357

Percent low-income students (< \$48,800): 24%

### College Board and National Student Clearinghouse

The National Student Clearinghouse (NSC) collects data from 3,300 participating colleges and universities, which represent 96 percent of enrolled students across the country. The NSC tracks individual students through their postsecondary education career. Participating institutions provide the NSC with student-level data on enrollment by semester, graduation date, degree earned, and duration of studies. These NSC student-level data are merged with College Board records of all students who took the SAT and graduated from high school in the spring of 2004.<sup>5</sup> Many of the student-level demographic characteristics

4. This net price is likely a slight overestimate of the true net price as a result of missing data on tax credits and deductions.

5. The sample is restricted to students who enroll in college within six months of completing high school. However, the data do not differentiate between students who are enrolled in college full time versus part time.

available in *NPSAS* are also collected by the College Board, which allows us to identify similar students who appear in both data sets.

### College Board 2004 Sample Snapshot

Number of students: 362,595

Number of colleges: 930 (388 public, 542 private)

Average student SAT: 1080

Four-year completion rate: 42%

Six-year completion rate: 62%

Percent low-income students (< \$48,800): 25%

### *Integrated Postsecondary Education Data System*

The *IPEDS* data provide institution-level information on the average SAT scores of students entering college in 2004-05.<sup>6</sup> For purposes of this research, colleges and universities are grouped into categories based on the average SAT scores of enrolled students. Linking *IPEDS* data to *NPSAS:04* and College Board 2004 data yield the two data sets that are used to analyze net price and degree completion, respectively.<sup>7</sup>

Table 1 shows the number of colleges and students analyzed in each data set, disaggregated by institutional sector and the average SAT scores of enrolled students.

*NPSAS* data, which contain detailed financial aid information, are used to predict the net price that students in the

6. If a college reports only ACT scores, the SAT/ACT concordance is used to convert institution-level ACT scores into SAT scores. See <http://professionals.collegeboard.com/profdownload/act-sat-concordance-tables.pdf>.

7. Several postsecondary institutions provided only partial lists of graduating students. These institutions were identified through graduation rate verification in *IPEDS*, and then were excluded.

College Board data set would likely face at a wide variety of postsecondary institutions. Because of the larger numbers of both students and institutions represented in the College Board data, all subsequent analyses of the trade-off between net price and college completion are conducted using College Board 2004 data. Summary statistics for these two data sets are provided in the Technical Appendix.

### Predicting Net Price

In order to analyze the trade-off between net price and the likelihood of degree completion, we link information about net price in *NPSAS* to information about college completion in the College Board data.

Several variables (parental income, gender, race/ethnicity) are evaluated using statistical techniques to quantify the relationship of net price to these variables, by institutional sector and average SAT category (as depicted in Table 1). The results of this multivariate regression are then applied to the College Board data set to predict the net price each student would likely face, depending on institutional sector and SAT category.<sup>8</sup>

Table 2 presents the net price that the typical student in the College Board 2004 data set would be predicted to pay, broken down by average SAT category and institutional sector. Using average SAT scores of enrolled students as an indicator of institutional selectivity, a clear relationship between estimated net price and average score category appears in the full sample. Schools with higher average SAT scores tend to

8. For more information, please consult the Technical Appendix.

**Table 1:** Number of Students and Four-Year Institutions Within Each Average SAT Category, by Data Source and Sector

| Overall Sample        | NPSAS:04      |               | College Board 2004 |               |
|-----------------------|---------------|---------------|--------------------|---------------|
| Average SAT Category* | # of colleges | # of students | # of colleges      | # of students |
| <1000                 | 103           | 835           | 233                | 56,399        |
| 1000–1099             | 140           | 1,757         | 324                | 116,350       |
| 1100–1199             | 108           | 1,462         | 216                | 102,957       |
| 1200–1299             | 44            | 622           | 94                 | 57,189        |
| ≥1300                 | 34            | 435           | 63                 | 29,700        |
| Total                 | 429           | 5,111         | 930                | 362,595       |

| Private Nonprofit     | NPSAS:04      |               | College Board 2004 |               |
|-----------------------|---------------|---------------|--------------------|---------------|
| Average SAT Category* | # of colleges | # of students | # of colleges      | # of students |
| <1000                 | 46            | 342           | 104                | 10,504        |
| 1000–1099             | 63            | 607           | 170                | 26,482        |
| 1100–1199             | 66            | 619           | 144                | 34,212        |
| 1200–1299             | 30            | 396           | 65                 | 19,473        |
| ≥1300                 | 31            | 400           | 59                 | 24,509        |
| Total                 | 236           | 2,364         | 542                | 115,180       |

| Public                | NPSAS:04      |               | College Board 2004 |               |
|-----------------------|---------------|---------------|--------------------|---------------|
| Average SAT Category* | # of colleges | # of students | # of colleges      | # of students |
| <1000                 | 57            | 439           | 129                | 45,895        |
| 1000–1099             | 77            | 1,150         | 154                | 89,868        |
| 1100–1199             | 42            | 843           | 72                 | 68,745        |
| ≥1200                 | 17            | 261           | 33                 | 42,907        |
| Total                 | 193           | 2,693         | 388                | 247,415       |

\* SAT scores reflect the sum of the critical reading and math sections of the SAT.

Note: Data on public institutions are collapsed into four (rather than five) Average SAT Categories due to the small number of public institutions with average scores above 1300.

**Table 2:** Estimated Average Net Price for the Typical Student in the College Board 2004 Sample

| Average SAT Category* | Full Sample | Private Nonprofit Four-Year | Public Four-Year |
|-----------------------|-------------|-----------------------------|------------------|
| <1000                 | \$3,851     | \$8,106                     | \$2,361          |
| 1000–1099             | \$4,585     | \$10,087                    | \$3,139          |
| 1100–1199             | \$5,563     | \$9,966                     | \$3,708          |
| 1200–1299†            | \$8,227     | \$14,864                    | \$2,096          |
| ≥1300                 | \$18,659    | \$20,589                    | —                |

\* SAT scores reflect the sum of the critical reading and math sections of the SAT.

† For public institutions, the top Average SAT Category is ≥1200.

Note: Dollar figures have been converted from 2004 to 2012 dollars.

There is a strong positive relationship between college selectivity and the net price paid by the typical student at private nonprofit four-year institutions, and no such relationship at public four-year colleges.

### Quantifying the Price/Completion Trade-Off

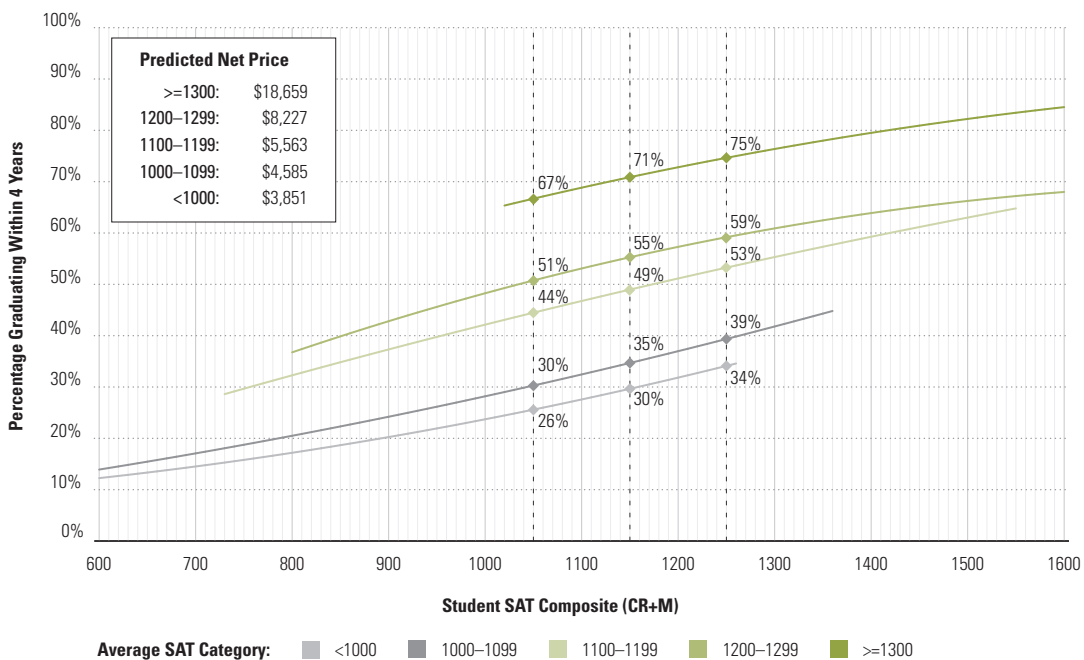
Modeling net price and college completion simultaneously allows for equating differences in annual net price to differences in the probability that a unique student will obtain a bachelor's degree from his or her initial institution within four or six years.<sup>9</sup>

have higher net prices, ranging from \$3,851 per year among institutions with average SAT scores below 1000 to \$18,659 among institutions with average SAT scores equal to or exceeding 1300. This relationship in the full sample is driven almost entirely by private nonprofit four-year institutions. In contrast, no clear relationship emerges between estimated net price and institutional selectivity in the public sector.

Figures 1 and 2 present the four- and six-year college completion rates, respectively, for the typical student who began college in the fall of 2004. Note that the SAT score values along the horizontal axes in both figures represent the scale for individual student scores on the critical reading and mathematics sections of the SAT. The legend and the upward

9. All graduation rates in this brief represent bachelor's completion rates at the institution at which a student began.

**Figure 1:** Four-Year Completion Rates by Individual Student SAT Score and College Selectivity



Note: Dashed lines represent example students with SAT scores of 1050, 1150, or 1250 and the estimated likelihood of degree completion for sampled students with the typical demographic characteristics in Appendix Table 1, by institutional selectivity.



sloping lines within the figures depict the average SAT score categories of colleges and universities examined in Tables 1 and 2, and they represent institutional selectivity as measured by average SAT scores of enrolled students.

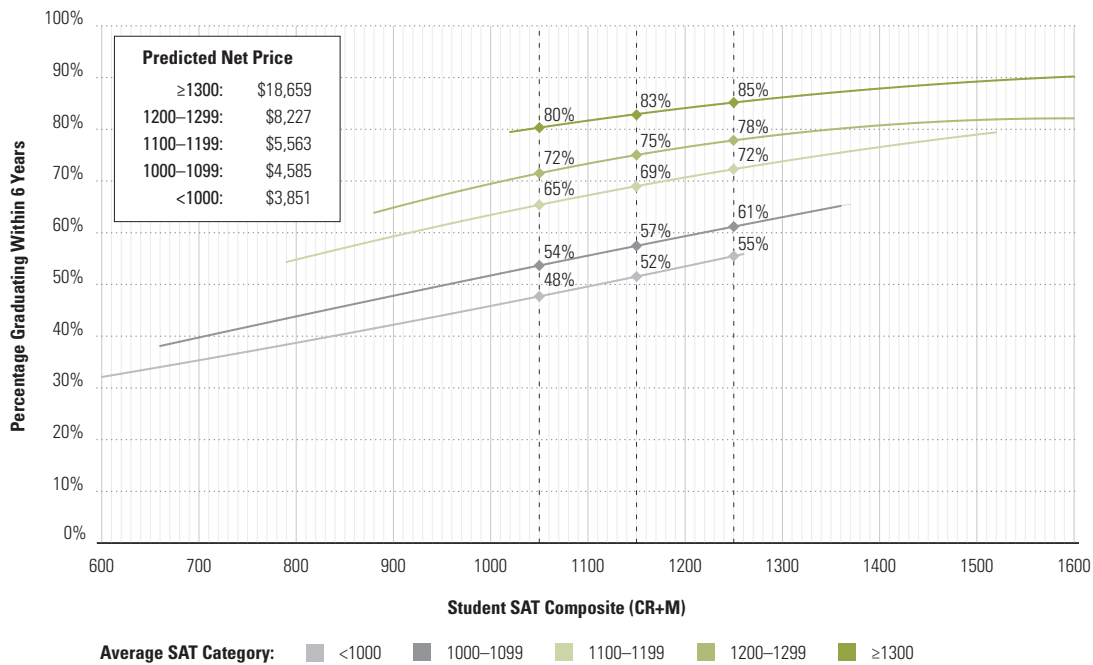
Both Figures 1 and 2 clearly show that, for any student with a particular SAT score, the probability of bachelor's degree completion increases with college selectivity. In all average SAT categories, students with lower SAT scores tend to have lower completion probabilities than their peers with higher SAT scores. This is an expected finding if one assumes that the SAT score is a reasonable measure of academic readiness for college.<sup>10</sup>

10. See results of validity studies in Patterson and Mattern (2009) and Mattern and Patterson (2012).

For example, a student who scores 1150 on the SAT (the middle dashed line in Figure 1) and attends a four-year institution where the average student scores below 1000 on the SAT is predicted to have a 30 percent chance of completing a degree at that institution within four years.<sup>11</sup> If that same student enrolled at an institution where the typical SAT score was equal to or exceeded 1300, the student would have a 71 percent chance of degree completion in

11. According to the College Board (2011), the average score on the SAT among students in the 2004 college-bound senior cohort was 1024. The hypothetical student with an SAT score of 1150 was chosen for demonstration purposes only, and the basic conclusions drawn for this hypothetical student would be nearly identical for a student with an SAT score of 1024.

**Figure 2:** Six-Year Completion Rates by Individual Student SAT Score and College Selectivity



Note: Dashed lines represent example students with SAT scores of 1050, 1150, or 1250 and the estimated likelihood of degree completion for sampled students with the typical demographic characteristics in Appendix Table 1, by institutional selectivity.

four years.<sup>12</sup> The same pattern is depicted for a hypothetical student with a score of 1050 — where the likelihood of degree completion in four years ranges from 26 to 67 percent depending on the selectivity of the college choice — or a hypothetical student with a score of 1250, where the four-year completion probability range is 34 to 75 percent.

The average student would experience an increase in the probability of degree completion by moving to an institution with a higher average SAT score. The increase in completion probability is substantially bigger for some moves than others.

Although both Figures 1 and 2 relay the important message that attending a more selective postsecondary institution is correlated with a higher probability of degree completion, the boost associated with moving from one category of institution to another is not equal across categories.

For example, the four-year completion rates are largest when transitioning from a 1200–1299 SAT category school to a 1300+ SAT category school (Figure 1). By contrast, the six-year completion rate differential is largest between the 1000–1099 SAT category and the 1100–1199 SAT category (Figure 2). The analysis of four-year completion rates (Figure 1) would predict that a student with a score of 1150 who moves from a 1000–1099 SAT category college to a 1100–1199 SAT

college would experience a 14 percentage point increase in completion probability (i.e., from 35 percent to 49 percent), compared to a 6 percentage point increase if moving from an 1100–1199 SAT category college to a 1200–1299 SAT college (i.e., from 49 percent to 55 percent).

Gaps in completion rates between average SAT categories are generally smaller when measured at six years rather than four years. This is particularly true when comparing schools in the top two average SAT categories. Conditional on the student's SAT score, four-year completion probabilities are nearly 16 percentage points higher in the 1300+ SAT category than in the 1200–1299 SAT category, but this gap is only about 8 percentage points when predicting six-year completion rates. Bachelor's degree attainment rates vary for the typical student attending schools in these two categories, as does the time-to-completion.

Even if there are only modest differences in the probability of degree completion between different categories of institutions, time-to-degree can still vary dramatically, which is an important consideration in a student's college choice.

As shown previously (Table 2), more selective colleges, on average, are associated with higher net prices. By adding average net price information to Figures 1 and 2, the net price/completion trade-off associated with choosing colleges in different average SAT categories can be better evaluated. Showing the net price changes in conjunction with changes in bachelor's completion rates, we illustrate

12. Some students attending schools in the lower-selectivity categories may not have been admitted to schools in higher selectivity categories. We do not have access to admission decisions and cannot determine the scope of this phenomenon.



that the magnitude of the trade-offs differs depending on the choice being made. For example, choosing an 1100–1199 institution over a 1000–1099 institution is associated with the largest gain in six-year bachelor's completion rates as well as a relatively small predicted increase in annual net price of \$978 (\$4,585 to \$5,563 for the first year).

### **Differences in the Net Price/Completion Trade-Off by Sector**

A clear relationship exists between selectivity and net price among the private nonprofit four-year institutions — one that is noticeably absent among the four-year public institutions (Table 2). Explaining the differences in these two relationships is beyond the scope of this brief, and examining the trade-offs in the context of public four-year institutions is more complex than the comparable analyses for private nonprofit four-year institutions. Undergirding these analyses is the assumption that it is possible to estimate changes in the typical student's net tuition and fees as he moves across the college selectivity categories. This assumption is valid for the private nonprofit four-year institutions where advertised tuition and fees are generally independent of a student's home state. Such an assumption does not hold for the public four-year institutions. The typical student's expected net tuition and fees within college selectivity categories depend not only on the sticker prices of his in-state institutions but on the availability of in-state public postsecondary institutions in the various

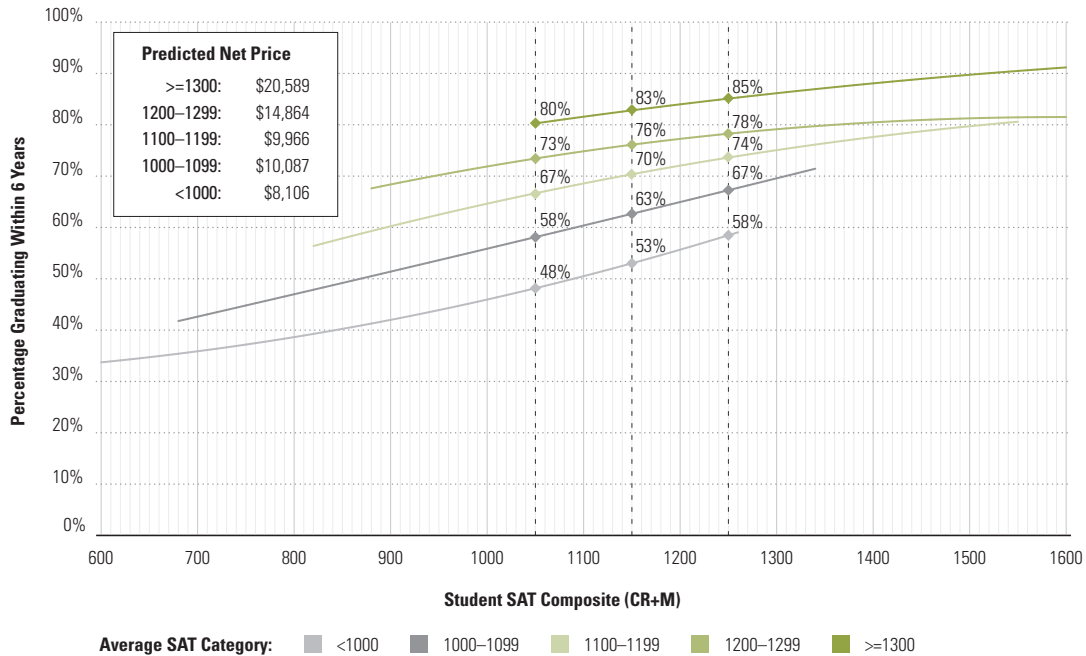
average SAT categories.<sup>13</sup> Nineteen states have public four-year institutions in all four average SAT categories in Table 1. An additional 17 have public four-year institutions in the first three average SAT categories. In essence, a Nebraska student looking to choose a 1200+ SAT public four-year institution would find that no such postsecondary option exists in-state. That student would thus incur a much larger bump in net prices than is indicated by the estimates in Table 2. We include public four-year institutions in our trade-off analyses below because they do reveal clearly the completion rate advantages of attending more selective public institutions. We also caution that such analyses are generally applicable to students hailing from states with public four-year institutions in each of the average SAT categories.

In Figures 3 and 4, the net price/completion trade-offs are segmented by institutional sector (private and public, respectively). The first notable finding is that the six-year completion rates for each of the institutional selectivity categories are slightly lower in the four-year public sector compared to the four-year private nonprofit sector across the range of student SAT scores. For the typical student with an SAT score of 1150, the six-year graduation rate predicted at an institution with average SAT scores in the 1100–1199 range is 68 percent at a public four-year institution and 70 percent at a private nonprofit four-year institution.

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13. Reciprocity agreements across state boundaries for in-state resident tuition at public colleges and universities also complicate the analyses substantially.

**Figure 3:** Six-Year Completion Rate by Student SAT and College Selectivity, Private Nonprofit Four-Year Institutions



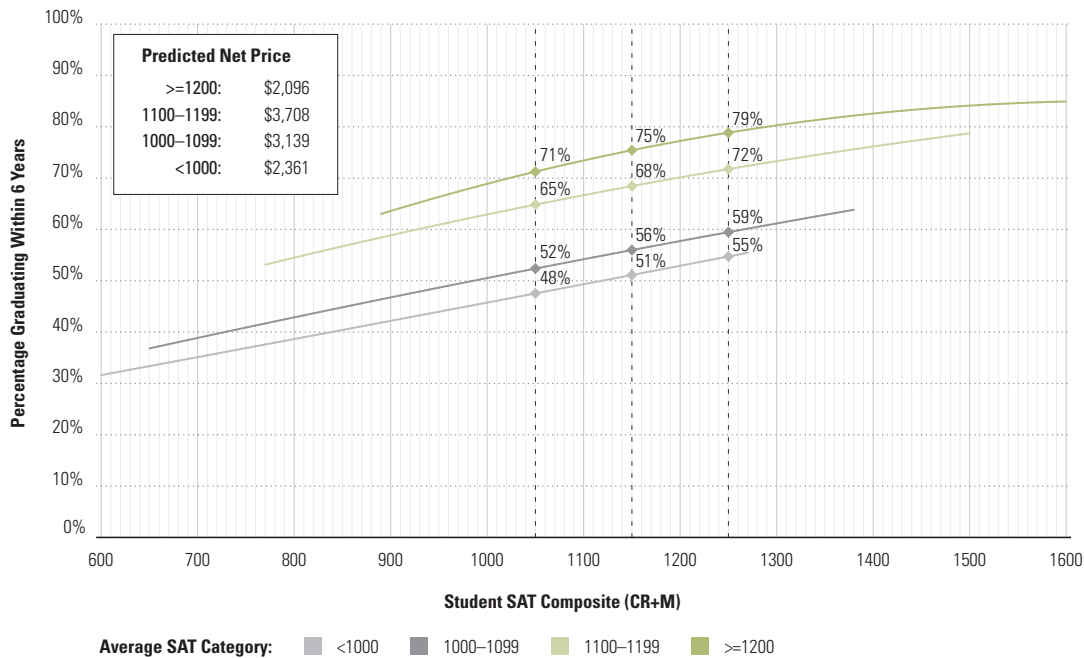
Note: Vertical dashed lines represent example students with SAT scores of 1050, 1150, or 1250, and the intersecting percentages estimate the likelihood of degree completion in six years, depending on institutional selectivity.

Net price differences by selectivity category are more pronounced for private nonprofit compared to public institutions, with an expected net price of \$20,589 in the most selective private institutions compared to \$8,106 for the least selective category of these institutions. Among private institutions, the typical student would experience a 10 percentage point bump in six-year completion probabilities by selecting a 1000-1099 SAT institution over one in which the typical student scores less than 1000. A slightly smaller increase (7 to 9 percentage points) in completion probabilities would be achieved by selecting an 1100-1199 SAT institution over a 1000-1099 SAT institution. Although these boosts in completion rates are comparable, the differences in first-year net prices vary

somewhat. The net price difference between the 1000-1099 SAT private sector colleges and those where the typical student scores less than 1000 is approximately \$1,981 (\$8,106 to \$10,087), while the difference between the 1100-1199 SAT and the 1000-1099 SAT categories in the private sector is close to zero.

Compared to private nonprofit institutions, selecting a 1100-1199 SAT public four-year institution over a 1000-1099 SAT public four-year institution is accompanied by a much larger jump in six-year completion rates. At the public four-year institutions this increase in completion rates is larger than the corresponding increase from selecting an institution where the typical student scores less than 1000 over one at

**Figure 4:** Six-Year Completion Rate by Student SAT and College Selectivity, Public Four-Year Institutions



Note: Vertical dashed lines represent example students with SAT scores of 1050, 1150, or 1250, and the intersecting percentages estimate the likelihood of degree completion in six years, depending on institutional selectivity.

which the typical student scores between 1000–1099. The former choice is associated with a boost of about 13 percentage points, while the latter is associated with a 4 to 5 percentage point increase in completion probability. The expected annual net price increase from choosing an 1100–1199 public four-year institution over a 1000–1099 institution (\$569) is similar to that incurred from choosing a 1000–1099 institution over one in which the typical student scores less than 1000 on the SAT (\$778). Choosing a public college in the most selective category over one in the second most selective category is associated with the dual benefit of a decrease in net price (\$3,708 to \$2,096) and an increase in six-year completion rates of approximately 7 percentage points.

### Differences in Net Price/Completion Trade-Off by Family Income

On average, low-income students (defined in these analyses as having current annual family incomes of less than \$48,800), have lower six-year completion rates than those with family incomes greater than \$122,000.<sup>14</sup> For example, as shown in Table 3, a low-income student with an SAT score of 1150 has a predicted 65 percent probability of completing a degree from an 1100–1199 SAT category institution within six years. If that same student were from a high-income family, the estimated six-year completion probability would be

14. These dollar amounts, and all subsequent dollar amounts, have been converted from 2004 dollars to 2012 dollars. In *NPSAS*, the low-income threshold was set at \$40,000 (2004 dollars) and the high-income threshold was set at 100,000 (2004 dollars).

**Table 3:** Estimated Average Net Price and Completion Probabilities by Income, College Board 2004 Data (Public and Private Nonprofit Four-Year Institutions)

| Average SAT Category | Low-Income        |                               |                               | High-Income       |                               |                               |
|----------------------|-------------------|-------------------------------|-------------------------------|-------------------|-------------------------------|-------------------------------|
|                      | Average Net Price | 4-Year Completion Probability | 6-Year Completion Probability | Average Net Price | 4-Year Completion Probability | 6-Year Completion Probability |
| <1000                | -\$587            | 27%                           | 48%                           | \$6,632           | 29%                           | 52%                           |
| 1000–1099            | -\$1,053          | 31%                           | 54%                           | \$7,834           | 36%                           | 59%                           |
| 1100–1199            | \$131             | 44%                           | 65%                           | \$9,636           | 52%                           | 72%                           |
| 1200–1299            | \$48              | 49%                           | 72%                           | \$14,322          | 60%                           | 78%                           |
| ≥1300                | \$7,017           | 67%                           | 81%                           | \$26,237          | 74%                           | 85%                           |

Note: See Technical Appendix for more details about methodology. All prices are adjusted from 2004 to 2012 dollars using the Bureau of Labor Statistics' Consumer Price Index for the typical urban consumer. Four- and six-year completion probabilities are estimated for the typical sampled student with an SAT score of 1150. The analysis controls for race/ethnicity and gender.

72 percent. Although the completion rates of low-income students are slightly lower than those of high-income students in every average SAT category, the completion probability *gains* associated with moving to higher average SAT institutions are fairly similar for low- and high-income students. Unlike low-income students, high-income students experience steadily increasing annual net price values as colleges become more selective.

### Visualizing the Net Price/Completion Trade-Off

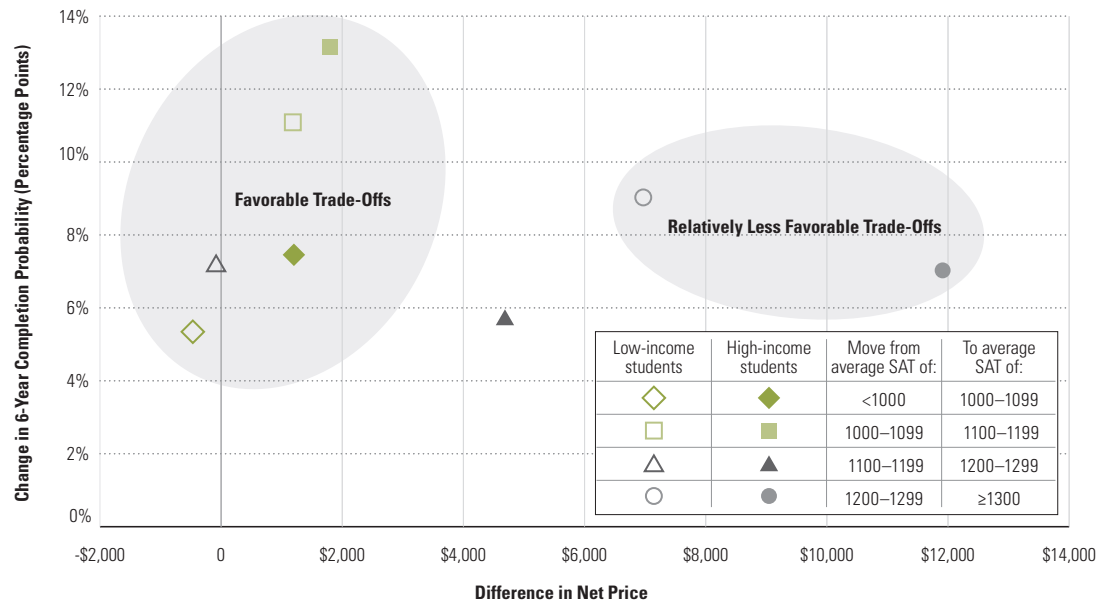
Figure 5 depicts the trade-offs associated with selecting colleges in different average SAT categories. It shows changes in predicted six-year completion probabilities graphed against the predicted changes in net price associated with choosing between average SAT categories.<sup>15</sup> Students and families may be interested in the “sweet spot” in the upper left quadrant of Figure 5, where the biggest gain in the probability

of degree completion combines with the smallest increases in net price — favorable trade-offs. Conversely, the upper right quadrant displays relatively less favorable trade-offs, in which a sizeable gain in completion probability is accompanied by a large increase in net price. The trade-offs predicted for low-income and high-income students are depicted by unshaded and shaded symbols, respectively, in Figure 5. For both low-income and high-income students, transitioning from a 1200–1299 school to a 1300+ school appears to represent a relatively less favorable trade-off (identified by circle symbols in Figure 5). Through the narrowly focused lens of the net price/completion cost-benefit analysis, selecting a 1300+ institution over

*Favorable trade-offs* involve large predicted increases in completion probability and small predicted increases (or decreases) in net price.

*Relatively less favorable trade-offs* involve small predicted increases (or decreases) in completion probability and large predicted increases in net price.

15. The magnitude of trade-offs differs little by student SAT score because, as previous figures show, the increases in graduation probability from moving across selectivity tiers are similar across the range of SAT scores into which most students fall.

**Figure 5:** Net Price/Completion Trade-Off Summary by Family Income

Note: The price/completion trade-offs depicted in this figure are for a student with an SAT score of 1150. The basic results are very stable for a wide range of individual student SAT scores.

a 1200–1299 institution may appear unwise on its surface, yet there are other factors at play to be considered: the students' personal preferences and sense of fit as well as the recent research addressing the earnings advantages of attending more selective colleges (Hoxby, 1998; Dale & Krueger, 2002; Dale & Krueger, 2011).

We have classified the transitions represented in Figure 5 as either favorable or relatively less favorable trade-offs. In some instances, movement up the selectivity ladder does not represent a trade-off at all. The low-income student choosing a 1000–1099 institution over a <1000 institution (represented by the unshaded diamond) experiences a dual benefit: he enjoys a higher probability of completion as well as a slight reduction in net price.

Compared to their high-income peers, students from low-income families are sometimes predicted to face a more appealing net price/completion trade-off associated with moving to a college with a higher average SAT score.

In general, the trade-offs experienced by high-income students mirror those of their low-income counterparts, although no choice confers a dual benefit to the high-income students. One exception to this similarity in trade-offs between low- and high-income students appears when choosing between an 1100–1199 institution and a 1200–1299 institution (represented by the triangles). Whereas the low-income student, on average, experiences a 7 percentage point increase in degree completion probability with zero difference in net price, the high-income

student experiences a 6 percentage point increase in completion probability and an accompanying net price increase of about \$4,700 annually.

### **Causality Versus Correlation in Trade-Off Estimates**

To predict college completion probabilities, we account for the fact that students attending more selective institutions tend to differ from those attending less selective institutions in terms of gender, race, and income. These traits are also associated with students' probabilities of completion, so accounting for these differences is an important measure to ensure that the trade-offs presented in this brief are not driven extensively by differences in the types of students who attend colleges in the various college selectivity categories. Yet, there are many other differences in student-level characteristics between college selectivity categories that we are unable to account for in the analyses (e.g., parental education, state residency). Much like the trade-off between net price and completion, these analyses also involved a trade-off between complexity in the predictive model and ease of presentation. Although the analyses presented in this brief are not causal in nature, they are intended to inform students, parents, counselors, and other mentors that such trade-offs exist.<sup>16</sup>

### **Implications and Recommendations**

The key message in this brief is that focusing on college price may mask other important factors that students and families would be wise to consider in the college planning and decision processes. In some cases, a lack of awareness of important trade-offs may adversely affect a student's postsecondary success.

An accurate framing of this discussion necessitates the use of tentative language. Phrases like "may adversely affect" are used intentionally because the analyses hold for the typical student. Certainly, however, some students would not experience a lower probability of completion from selecting a less expensive, less selective institution, while other students may benefit from such a choice. An insurmountable challenge related to this analysis is that it is not possible to identify into which of these categories an individual student would fall. In addition, college enrollment choices are personal decisions that should not be guided only by net price and completion probability considerations. Therefore, this analysis is intended to be informative rather than prescriptive. The analysis is intended to demonstrate that it is important for students and their families to be aware of and consider a variety of factors, including a potential net price/college completion trade-off.

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16. In particular, the predicted increases in completion probabilities are biased upward to the extent that the control variables do not capture unobservable factors that drive both the selectivity of the college chosen and the probability of completion (e.g., student motivation).



*Recommendation 1: Additional Research***Recommendation 1**

Additional quantitative and qualitative research on the impact of net price calculators on student decision making.

If a student avoids applying to particular colleges that are perceived as prohibitively expensive, his/her eventual choice set is limited in ways that may reduce the probability of degree completion. Until recently, students had few means of obtaining an accurate estimate of net price of attendance or financial aid eligibility at a wide variety of colleges and universities. The passage of the Higher Education Opportunity Act of 2008 (HEOA) improved this situation by mandating that all institutions receiving Title IV federal aid offer online net price calculators beginning in October 2011. This increased transparency around the net price of attendance for a student with a very specific financial profile should inform an important part of the trade-off story outlined in this brief. Yet, net price calculators are relatively new, and their role in influencing college application and enrollment behaviors is still unknown. We recommend additional quantitative and qualitative research on the impact of net price calculators on student decision making, with particular attention to how information on predicted net price interacts with information on the likelihood of completing a degree.

*Recommendation 2: Refine Reporting Requirements***Recommendation 2**

Refine institutional reporting requirements so that students have better access to institution-specific completion rate data for students like themselves.

With the passage of the HEOA, postsecondary institutions participating in federal Title IV financial aid programs are also required to supplement their traditionally reported overall degree completion rates with rates that are disaggregated by race, gender, and the student's status as a federal loan or grant recipient. The availability of this information means students now have the ability to roughly estimate the trade-offs outlined in this brief — at the application stage or earlier — by using net price calculator tools and, at the point of admission, actual aid awards. Through the HEOA passage, great strides have been made to place these trade-off calculations within a student's reach. A slight refinement of the HEOA requirements would empower the student with an even more sophisticated understanding of the net price/completion rate trade-offs. Because academic credentials are such strong predictors of completion rates, we encourage colleges to disaggregate completion rates and average time-to-degree by the SAT/ACT scores of their incoming students, and to feature these data prominently alongside the net price calculator tools. The strong relationship between a student's family income and college completion rates also suggests that the newly enforced legislation aimed at highlighting differences

in completion rates by socioeconomic status could be augmented with completion rates disaggregated along finer family income measures. Access to the income of a student's family upon college entry, perhaps through survey or financial aid application data, would allow these institutions to disaggregate completion rates by family income — a metric that is potentially more meaningful than federal grant/loan recipient status.

*Recommendation 3: Provide Information About Engaging in a Good College Choice Process*

### **Recommendation 3**

Convey clear message that, particularly for lower-income students, the additional cost of attending more selective colleges may be much smaller than the benefits of attending such colleges.

A flurry of recent research on the topic of “undermatching” (defined as selecting a college where the student's academic credentials substantially exceed that of the typical enrollee) identifies potentially serious ramifications of undermatching for student outcomes. The literature provides evidence that undermatching is associated with a reduced probability of completion and a longer time-to-degree (Horn & Carroll, 2006; Bowen et al., 2009; Cohodes & Goodman, 2012). Smith et al. (2012) document that, among the 2004 high school cohort, 41 percent of all students and 50 percent of lower-SES students undermatched in the college selection process. While there are many reasons that students make a particular college choice, doing so in the absence of information about

long-term outcomes may create unnecessary hardships. Reducing the incidence of uninformed college choice, particularly among underresourced students, requires a concerted effort to drive home the message that the additional net price of attending a more selective college may be much smaller than the benefits of attending such colleges. We recommend that influential high school staff/faculty reach out to students most susceptible to engaging in suboptimal college choice processes — particularly low-income students who are likely to gain the most from attending more selective colleges — and convey the importance of understanding the range of factors to consider rather than focusing exclusively on college price in the college choice process.

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### Technical Appendix

Within institutional selectivity categories, the net price varies markedly by student income, and the degree completion probability depends heavily on student academic potential and other student-level characteristics such as gender and race/ethnicity. The combinations of covariate pairings are so numerous that,

for illustrative purposes, we instead focus on the net price/completion probability trade-off experienced by the typical sampled student. Mean values for all student-level characteristics in the College Board data, shown below, are substituted into regression models to express the typical student's trade-off.

**Appendix Table 1:** Student Characteristics by Average SAT Category in *NPSAS:04* and College Board 2004 Data

| NPSAS:04 Data      | Overall | Average SAT Category |           |           |           |       |
|--------------------|---------|----------------------|-----------|-----------|-----------|-------|
|                    |         | <1000                | 1000–1099 | 1100–1199 | 1200–1299 | ≥1300 |
| White              | 74.8%   | 60.0%                | 80.8%     | 77.7%     | 73.2%     | 73.0% |
| Black              | 7.7%    | 18.5%                | 6.1%      | 4.7%      | 4.0%      | 4.9%  |
| Hispanic           | 6.6%    | 11.4%                | 5.1%      | 5.4%      | 6.8%      | 6.4%  |
| Asian              | 6.3%    | 5.3%                 | 3.7%      | 7.9%      | 10.4%     | 10.6% |
| Other              | 4.6%    | 4.7%                 | 4.3%      | 4.3%      | 5.6%      | 5.1%  |
| Male               | 45.9%   | 44.0%                | 47.7%     | 44.8%     | 41.6%     | 53.4% |
| <b>Income:</b>     |         |                      |           |           |           |       |
| <\$48,800          | 24.2%   | 36.7%                | 25.2%     | 18.6%     | 19.2%     | 15.1% |
| \$48,800–\$85,399  | 26.4%   | 27.3%                | 29.6%     | 25.4%     | 20.9%     | 18.9% |
| \$85,400–\$122,000 | 21.0%   | 20.2%                | 20.8%     | 23.7%     | 18.2%     | 19.6% |
| >\$122,000         | 28.4%   | 15.7%                | 24.4%     | 32.4%     | 41.7%     | 46.4% |

| College Board      | Overall | Average SAT Category |           |           |           |       |
|--------------------|---------|----------------------|-----------|-----------|-----------|-------|
|                    |         | <1000                | 1000–1099 | 1100–1199 | 1200–1299 | ≥1300 |
| White              | 68.4%   | 48.8%                | 69.4%     | 76.7%     | 70.7%     | 68.8% |
| Black              | 11.6%   | 29.9%                | 11.5%     | 5.9%      | 6.5%      | 6.9%  |
| Hispanic           | 8.6%    | 13.0%                | 8.4%      | 7.6%      | 7.4%      | 6.7%  |
| Asian              | 7.5%    | 4.5%                 | 6.7%      | 6.2%      | 11.5%     | 13.2% |
| Other              | 3.8%    | 3.9%                 | 4.0%      | 3.5%      | 3.8%      | 4.4%  |
| Male               | 44.7%   | 40.2%                | 42.8%     | 45.6%     | 49.1%     | 49.3% |
| <b>Income:</b>     |         |                      |           |           |           |       |
| <\$48,800          | 25.3%   | 42.2%                | 28.3%     | 20.0%     | 18.3%     | 13.4% |
| \$48,800–\$85,399  | 25.9%   | 28.9%                | 29.1%     | 25.4%     | 21.6%     | 17.5% |
| \$85,400–\$122,000 | 22.8%   | 18.2%                | 23.4%     | 24.7%     | 23.9%     | 20.3% |
| >\$122,000         | 26.0%   | 10.7%                | 19.2%     | 30.0%     | 36.2%     | 48.8% |

### *Predicting Net Price with Multivariate Regression*

To obtain the net price for the typical student in each college selectivity category, student net price from *NPSAS:04* is regressed on covariates that include gender, a set of indicator variables for race/ethnicity, and a set of four indicator variables representing income quartiles. In order to predict net price for individuals in the College Board 2004 cohort, prototypical values for each of the variables (from the College Board sample) are multiplied by the parameter estimates from this first regression.<sup>17</sup> For the College Board 2004 cohort, these prototypical values are as follows:

- Male = 0.45
- Race/ethnicity variables:
  - Black = 0.12
  - Hispanic = 0.09
  - Asian = 0.08
  - Other = 0.04
- Income variables:
  - Income < \$48,800 = 0.25
  - Income from \$48,800–\$85,400 = 0.26
  - Income from \$85,400–\$122,000 = 0.23
  - Income > \$122,000 = 0.26

The four- and six-year completion probability curves in Figures 1 and 2 are created by regressing the binary outcome, bachelor's degree attainment from the institution at which the student began, on the same set of covariates as well as an additional covariate — student SAT score. The same prototypical values used to estimate the typical student's net price are also used to generate the completion

probability curves. For Figures 3 and 4, the regression models are estimated separately for public and private institutions.

Low-income students are designated as those from families earning less than \$48,800 (2012 dollars) per year. In analyses where students are disaggregated by income, we select only the low-income students who completed the FAFSA (86 percent) because of concerns regarding the accuracy of income data for students falling into the “low-income” category. The prototypical covariate values for low-income students (Income < \$48,800 = 1.00) are:

- Male = 0.37
- Race/ethnicity variables:
  - Black = 0.24
  - Hispanic = 0.17
  - Asian = 0.12
  - Other = 0.05

The prototypical values for high-income students (Income > \$122,000 = 1.00) are:

- Male = 0.51
- Race/ethnicity variables:
  - Black = 0.04
  - Hispanic = 0.04
  - Asian = 0.06
  - Other = 0.03

17. Regression parameters and prototypical covariate values are estimated using the recommended sampling weights (see section 6.2 of the *NPSAS:04* Methodology Report).



### **About the Authors**

Matea Pender is a senior policy research analyst in the College Board Advocacy & Policy Center. She holds a doctorate in public policy and conducts research on college access and retention. She can be reached at [mpender@collegeboard.org](mailto:mpender@collegeboard.org).

Michael Hurwitz is an associate policy research scientist in the College Board Advocacy & Policy Center. He holds a doctorate in quantitative policy analysis and conducts research on college admissions and financial aid. He can be reached at [mhurwitz@collegeboard.org](mailto:mhurwitz@collegeboard.org).

Jonathan Smith is an associate policy research scientist in the College Board Advocacy & Policy Center. He holds a doctorate in economics and conducts research on student-college match and degree completion. He can be reached at [jsmith@collegeboard.org](mailto:jsmith@collegeboard.org).

Jessica Howell is executive director of policy research in the College Board Advocacy & Policy Center. She holds a doctorate in economics and conducts research on access and success throughout the education pipeline. She can be reached at [jhowell@collegeboard.org](mailto:jhowell@collegeboard.org).

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