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Implications for Students and Public Policy

William Zumeta and Nick Huntington-Klein

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The Council of Independent Colleges (CIC) is an association of 755 nonprofit independent colleges and universities and higher education affiliates and organizations that has worked since 1956 to support college and university leadership, advance institutional excellence, and enhance public understanding of private higher education's contributions to society. CIC is the major national organization that focuses on providing services to leaders of independent colleges and universities as well as conferences, seminars, and other programs that help institutions improve educational quality, administrative and financial performance, and institutional visibility. CIC conducts the largest annual conference of college and university presidents. CIC also provides support to state fundraising associations that organize programs and generate contributions for private colleges and universities. The Council is headquartered at One Dupont Circle in Washington, DC. For more information, visit *www.cic.edu.*
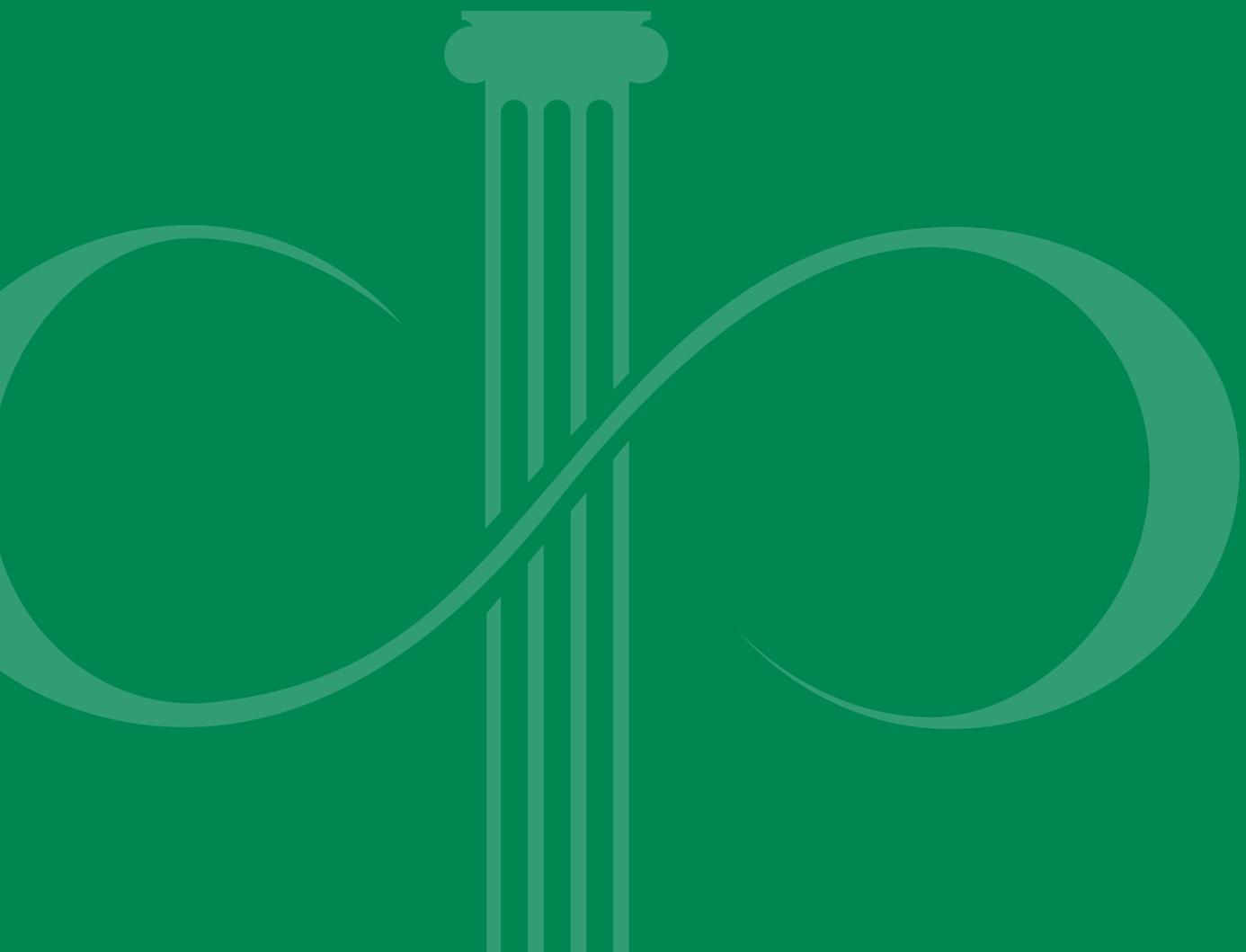
## About the Authors

William Zumeta is professor of public policy and higher education at the University of Washington in Seattle where he has taught since 1985. He holds a BA from Haverford College and a PhD in public policy from the University of California, Berkeley. He previously taught at UCLA as well as the University of British Columbia and Claremont Graduate University. Zumeta is a fellow of the TIAA-CREF Institute and previously served as senior fellow at the National Center for Public Policy and Higher Education (2005–2011). In 2009–2010, he was president of the Association for the Study of Higher Education. Zumeta's research touches on many aspects of public policy toward postsecondary education at all levels, and he has studied the private sector of academe extensively. His most recent book is *Financing American Higher Education in the Era of Globalization,* co-authored with Patrick Callan, David Breneman, and Joni Finney (Harvard Education Press 2012). In 2011, Zumeta co-edited with Daniel Levy a special issue of the *Journal of Comparative Policy Analysis* titled, "Private Higher Education and Public Policy: A Global Comparative View."

Nick Huntington-Klein recently received a PhD in economics at the University of Washington and joined the faculty at California State University, Fullerton. He holds a BA from Reed College. His research interests include choice in higher education, decision making under uncertainty and risk, and teacher labor markets. Huntington-Klein's work has been published in the *Economics of Education Review* and as policy briefs and working papers at the Center for Education Data and Research. One chapter, "Beliefs, Choice Structure, and Human Capital Investment," of his dissertation has been published in the *Journal of Economic Behavior & Organization.*

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# Preface

When the Council of Independent Colleges launched the Project on the Future of Independent Higher Education, the goal was to explore fresh approaches to aspects of independent higher education that would help reconcile the need for more cost-effective business models with the student-centered features of independent colleges that account for much of their success. The goal of the project is to engage CIC's member colleges and universities in a reconsideration of institutional missions, strategic plans, and financial models with enhanced information about possibilities that come from rigorous research.

A series of research initiatives is underway to support the work of the project's steering committee as it considers what to treat as high priority—indeed, to distinguish what is essential and what is negotiable—about the traditional liberal arts college model. What follows is the fourth report in the series. Using representative and empirical data, it explores the cost-effectiveness of private colleges and universities and their superior ability to graduate students on time with significantly less need to rely on state and federal subsidies than public institutions—while also educating high percentages of low-income and first-generation students.

This report is written by William Zumeta and Nick Huntington-Klein, distinguished scholars who are not based at a private college. Their reputations for rigorous research and absence of any appearance of conflict of interest will, we hope, show convincingly that private colleges and universities are less expensive to society as a whole, especially when the additional cost of the longer average time to degree at public institutions is considered. On the whole, a degree at a public institution is 6.4 times more costly to state taxpayers. Even with larger student loan amounts, the cost of a degree at private colleges and universities is, on average, a better value when completion rates are taken into account. The efficiency of degree production at these institutions—22 percentage points better than comparable public institutions in four-year graduation rates—should inform policymakers who wish to increase the college attainment rate in the United States.

**Richard Ekman**
*President*
*Council of Independent Colleges*

September 2015

# The Cost-Effectiveness of Undergraduate Education at Private Nondoctoral Colleges and Universities

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# Executive Summary

The diverse U.S. higher education sector includes more than 700 private nonprofit colleges and universities that focus primarily on baccalaureate education. These are commonly termed private non-doctoral (PND) colleges, and they enroll close to 1.6 million students across the country, granting nearly 150,000 degrees annually. In sheer numerical terms they represent a significant resource in support of the nation's current college completion agenda. Less well known is that these colleges "punch above their weight" by producing bachelor's degrees, including degrees in science, technology, engineering, and mathematics (STEM) and health fields, more effectively and at much lower taxpayer cost than comparable public institutions. At a time when more college degrees are needed but public resources are tightly constrained, this cost-effectiveness is worth policymakers' attention.

This study examines key aspects of the cost-effectiveness of PND colleges as providers of baccalaureate degrees and explores how states might feasibly make better use of these colleges to produce more degrees efficiently. The study looks at degree production and cost in the PND sector relative to other higher education sectors, focusing on the most comparable public institutions. PND colleges and universities have a 22 percentage point edge over comparable public institutions in four-year graduation rates and a nearly 12 point advantage in six-year graduation rates, and they hold a significant advantage for all subgroups. Moreover, PND colleges retain students initially interested in STEM and health to degrees in those majors at rates (41 percent) approaching twice the rates of public doctoral and nondoctoral institutions (24 and 23 percent, respectively).

The study compares costs of PND degrees to degrees from comparable public institutions from several perspectives: those of taxpayers, of students and families, and of society as a whole. Using federal Integrated Postsecondary Education Data System data spanning 2005–2012, the study shows that PND degrees are less

costly for society overall by an estimated 9 percent. This difference rises to nearly 30 percent when the additional social opportunity cost of the longer average time students spend in public institutions is taken into account. The advantage of PND degrees in terms of comparative costs to taxpayers is substantially greater since the public bears a larger share of the costs of education in public institutions. We estimate costs (over the period 2005–2012 and excluding capital costs) to state governments of each PND degree at $7,200 (mostly from state student aid grants), compared to $46,401 for a bachelor's degree from our matched sample of public colleges. The public sector degree is 6.4 times as costly to state taxpayers. Adding in costs to the federal government, which are very similar across sectors, the total average cost to taxpayers of a PND degree is $27,585, versus $67,126 for a public sector degree.

Students and their families do pay more in out-of-pocket costs and loans for bachelor's degrees from PND schools relative to comparable public institutions, as would be expected. We estimate that, on average, students and families pay $62,566 for a PND degree, after all aid grants are considered, versus $23,253 for a degree from a comparable public institution (with the latter figure averaged over state residents and out-of-state students). For the 28 percent of public sector students in the out-of-state category, the total estimated personal cost per degree is close to the PND cost, at $57,428. PND students borrow more for their undergraduate education, $25,506 on average compared to $20,619 for students at comparable public institutions, but they also are more likely to graduate and less likely to default on their loans (by 21 percent).

In order to explore the realistic possibilities for cost savings to states and direct benefit to individual citizens from redirecting some future students from public to PND colleges, we selected five states and simulated the effects of plausible increases ($1,000 and $2,000) in annual state student aid grants to aid-eligible students who choose a private college. Representing a range of contextual conditions, the five states are California,

Georgia, Kansas, Pennsylvania, and Virginia. All have long-standing student aid programs in place for which private college students are eligible.

We find that these modest grant increases could shift significant but not dramatically large numbers of students from public to private colleges. Such a shift could, in principle, save states on operating appropriations to public institutions and on student aid grants in states where these grants currently go primarily to public college students. The most expansive assumptions of student response to the grants yield estimates of students diverted to the private sector on the order of 1,000 per year and net annual state operating savings as large as $10–12 million (with considerable variation by state). There is the potential for additional savings through reduced capital expenditures in states that are likely to see increased demand; we estimate a one-time savings of $100–300 million in Georgia and Virginia and $20–60 million in Kansas. In states where the PND colleges have higher graduation rates than their public counterparts—as is the case nationally—the shift also should increase degree productivity modestly and could increase retention in STEM and health fields, although we lack state level data to estimate the latter.

These capital cost savings estimates, in addition to the evidence presented here about differences in graduation and STEM retention rates, might well make the idea of diverting some enrollment growth to private institutions particularly attractive to policy makers in states facing significant enrollment increases.

In sum, the findings of this study demonstrate that private nondoctoral colleges and universities are not only more efficient producers of baccalaureate degrees than their public counterparts, but they consume substantially fewer taxpayer resources in the process. As policy makers seek to make wise investments in higher education in the context of constrained resources, the PND sector merits particular consideration.

# Introduction

The United States is home to more than 700 private nonprofit colleges and universities that are focused primarily on baccalaureate-level undergraduate education. These are often termed private nondoctoral (PND) colleges and universities to distinguish them from private doctoral universities.

*The PND sector is quite adept at graduating students at high rates and in a timely fashion and at supporting students with interests in the high-priority fields of health and science, technology, engineering, and mathematics (STEM).*

The PND sector enrolls a total of nearly 1.6 million students and grants nearly 150,000 degrees annually. There are PND colleges in all 50 states (see Maps 1 and 2). The country needs this sector first, simply, because America needs to tap all of its higher education capacity to achieve the ambitious increases in college degree completion that the president and many state policy leaders seek in this knowledge-driven age (Zumeta, Breneman, Callan, and Finney 2012). Moreover, as this report shows, the PND sector is quite adept at graduating students at high rates and in a timely fashion and at supporting students with interests in the high-priority fields of health and science, technology, engineering, and mathematics (STEM). Thus the sector is an important national resource.

MAP 1

## Number of Private Nondoctoral Colleges by State (2005–2012)



**Number of PND Colleges by State**

- 0–25
- 26–50
- 51–75
- 76–100+

**Source:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.
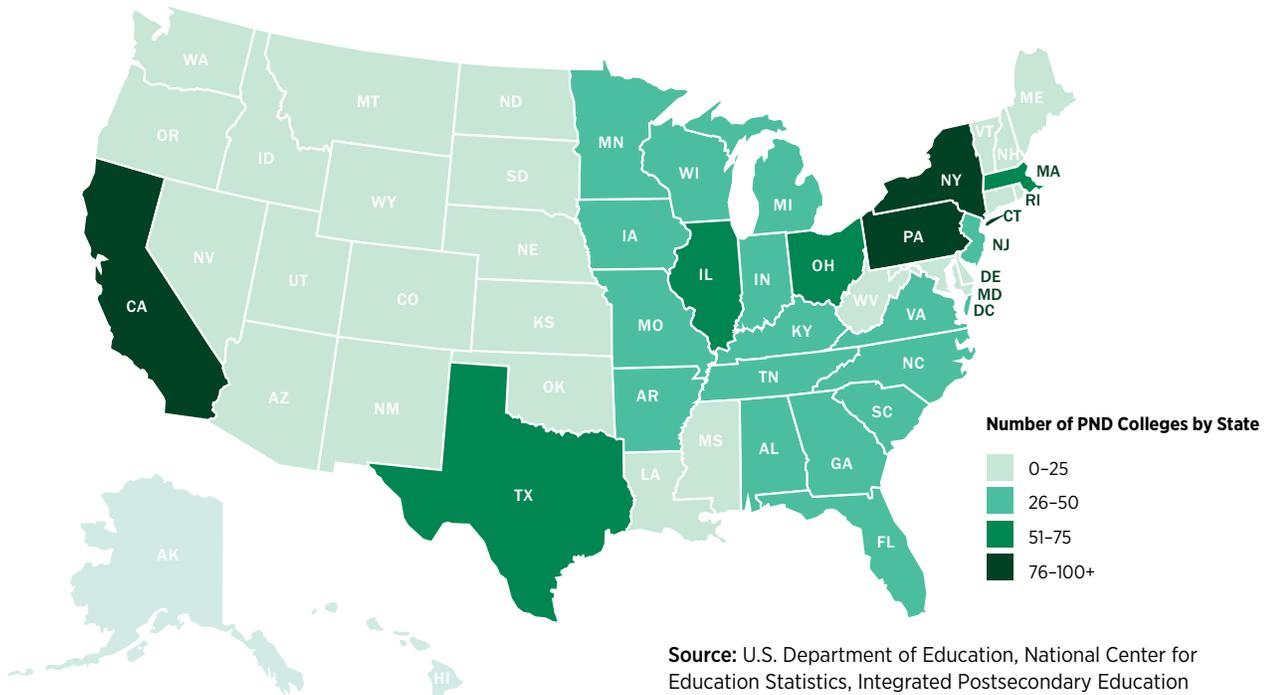
MAP 2

## Number of Private Nondoctoral Colleges per Capita by State (2005–2012)



**Colleges Per 1,000,000**

- 0 to 3 (9 states)
- 3 to 6 (24 states)
- 6 to 9 (9 states)
- 9 to 12 (7 states)
- 12+ (1 state and District of Columbia)

**Source:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.
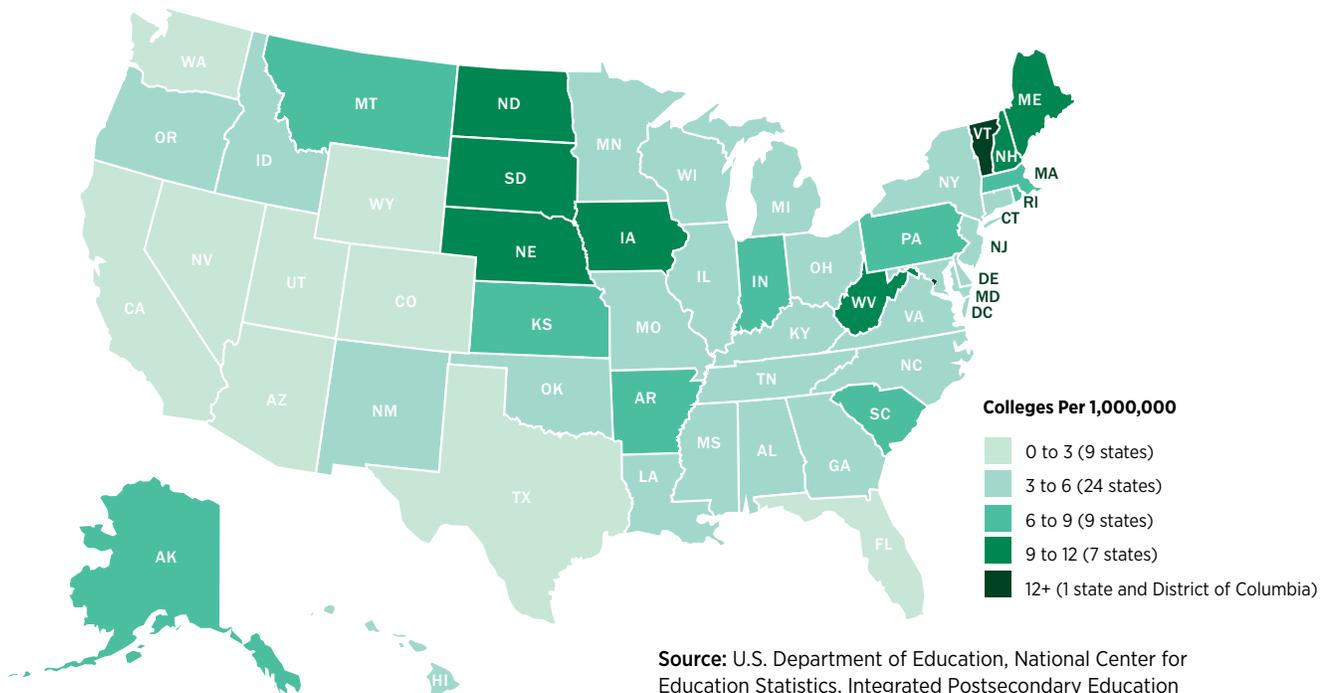
At the same time that the nation seeks to increase college degree output, many of the states—the governmental entities tasked in the U.S. federal system with overseeing and supporting higher education—face serious financial stress. In constant dollar terms, per-student state support to higher education has declined by 29 percent over the past 25 years with much of this decline occurring since 2008 (State Higher Education Executive Officers 2014, page 18). Looking ahead, experts on state finance generally characterize the states' financial situation as somewhat precarious given still-weak revenue growth, pent-up spending needs from multiple sectors, and limited capacity to build large reserves (Streepey 2014; Zumeta 2015). Thus, the nation's private nonprofit higher education sector has a continuing, important role to play as a substantial and high-quality provider of higher education opportunities and degrees. Beyond this, the sector could play an even larger role as a cost-effective provider of baccalaureate education—more cost-effective in particular than public systems for some financially strapped states. Private nonprofit higher education would be even more cost effective with additional help from state policies whose basic infrastructure is for the most part already in place.

This report is designed to examine key aspects of the cost-effectiveness of private nondoctoral colleges as providers of baccalaureate degrees and to explore how states could feasibly make better use of them to produce more degrees efficiently. The report has four main sections.

- First, the report compares the graduation efficiency of the PND sector relative to other higher education sectors, including a comparison group constructed from public institutions with comparable characteristics to the PND colleges. Next, the report compares the PND sector to other sectors in terms of the production of STEM and health degrees and success in retaining students who express initial interest in these fields. These two sections provide impressive evidence of the effectiveness of PND colleges.

- Next, the report focuses on comparisons of costs across sectors. The study compares PND colleges' costs primarily to the constructed public non-doctoral comparison set of institutions from the perspectives of *taxpayers* (costs to state and federal governments per degree granted); *students* and their families (considering grant aid from all sources, loans, and out-of-pocket costs—not just published tuition prices); and *society* as a whole (governments plus families and students). These comparisons are based on standard national data available through the federal government's Integrated Postsecondary Education Data System (IPEDS). The report uses the IPEDS sample for the years 2005–2012. The sample covers a recent set of years while avoiding changes in relevant variable definitions.

- The final major section of the report describes and presents results from preliminary policy simulations in five selected states. The simulations are designed to begin to assess the impact of policy steps that states might take to "nudge" some students toward private rather than public institutions. The five states—California, Georgia, Kansas, Pennsylvania, and Virginia—were selected in part because they have programs already in place for aiding state resident students in their private colleges. Also, these states represent a range of policy contexts, such as variation in pressure on public higher education sector capacity in relation to demand and demonstrated policy interest in increasing STEM and health degree production.

Before proceeding to the graduation efficiency comparisons, the report first explains the college comparison groups used in this study so that these comparisons can be fully understood.

## Comparison Groups

The report compares PND colleges to other institutions in two ways. First, the report categorizes all nonprofit colleges and universities contained in the IPEDS data set by their basic Carnegie Classification. The study limits the sample to institutions that primarily provide bachelors' or advanced degrees, and then identifies four groups:[1]

| Nondoctoral | Doctoral/Research |
| --- | --- |
| Private (PND) | Private (PD) |
| Public (PubND) | Public (PubD) |

The report presents many outcomes for all four of these categories and suggests that the most relevant comparison is between private nondoctoral and public nondoctoral (PubND) colleges. Institutions in both of these categories are, on average, less selective than doctoral counterparts and could be considered substitutes in many regards. Policymakers interested in increasing baccalaureate attainment will find that in many cases the relevant choice of a student on the margin of college attendance is between a PND college and a PubND college (or no college at all if, for example, there are not as many places available at state colleges as the number of eligible students who might want to enroll there). Figure 1 shows the distribution of PND colleges by selectivity and indicates that a large fraction admit more than two-thirds of their applicants.

**FIGURE 1**

**Percentage of Applicants Admitted at Private Nondoctoral Colleges (PND), 2005–2012**

DISTRIBUTION OF SELECTIVITY AMONG PND COLLEGES
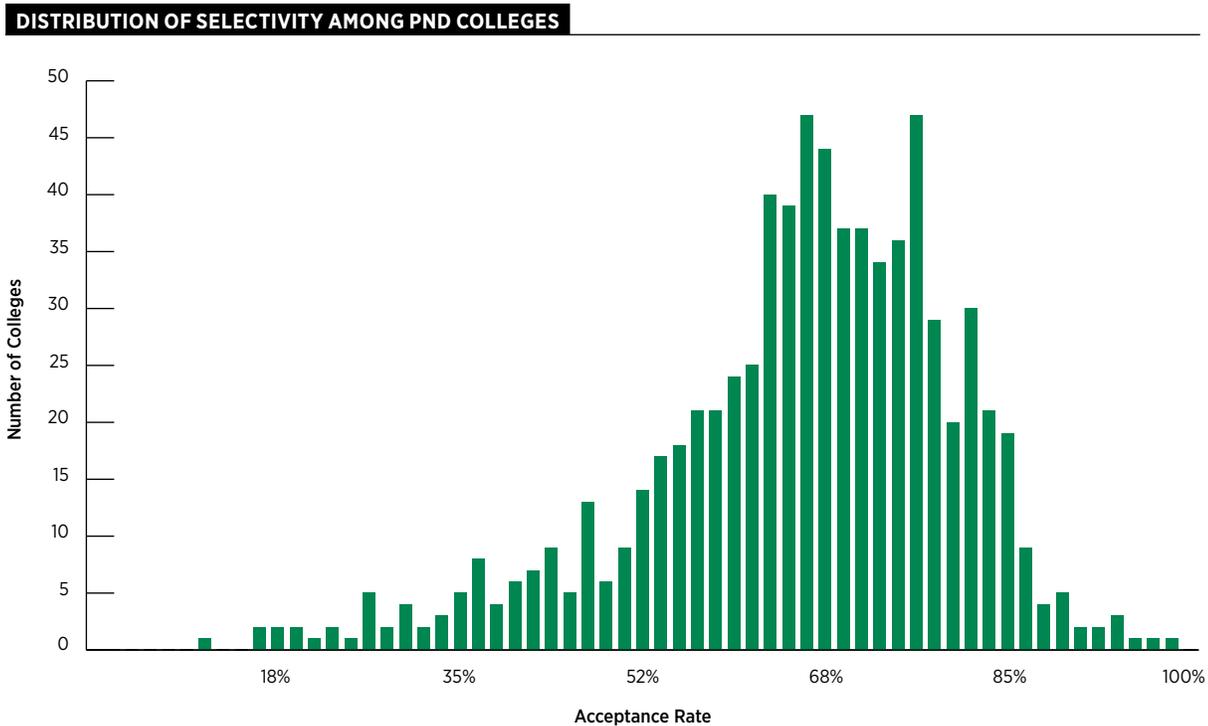


**Note:** Selectivity for each college is the average per year from 2005 to 2012.
**Source:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.

In order to produce more refined comparisons, we define an additional comparison group: the matched group. There is significant heterogeneity within each of the four institutional categories above. And although PND and PubND colleges are most comparable, significant differences in the qualities of these institutions and the students who attend them could influence outcomes in ways that would be misleading for generalizing the effects of hypothetical policies that could nudge additional students to PND colleges. The report addresses this limitation by creating a matched group of public institutions that is similar to the sample of PND colleges in terms of observable characteristics reported in IPEDS. Each characteristic is averaged for each college over all of the sample years (2005–2012) and then normalized to have a mean of zero and standard deviation of one across the sample as follows:

- Selectivity (undergraduate);

- Total number of undergraduate students enrolled;

- Proportion of undergraduates relative to total student population;

- Proportion of undergraduates receiving federal or state grant aid;

- Proportion of undergraduates receiving Pell grants;

- Proportion of undergraduates receiving federal loans;

- Proportion of undergraduate degrees produced that are in STEM or health fields; and

- Location.[2]

These characteristics were chosen so that PND colleges can be compared to public institutions with similar structures and that attract similar types of students. The Location characteristic, which measures the (logarithm of) distance in miles between two colleges, is included for the reason that two colleges that are nearby are likely drawing from a similar pool of students, perhaps in ways that cannot otherwise be captured.[3]

Our matched group is a sample of public nondoctoral and public doctoral institutions that are determined to match most closely the PND sample based on the above observable characteristics.[4] The PND colleges are each matched to the public institution that they most closely resemble.[5] The details of the matching procedure are described in Appendix A.

## HIGHLIGHTS: Introduction

- Government agencies that support higher education are stressed financially. With the help of state policies, the private nondoctoral sector could play an even larger role as a cost-effective provider of bachelor's degrees.

- For the purposes of this report, analysis is broken down by doctoral and nondoctoral public and private institutions, as well as a refined comparison group of public institutions that have been "matched" to private colleges.
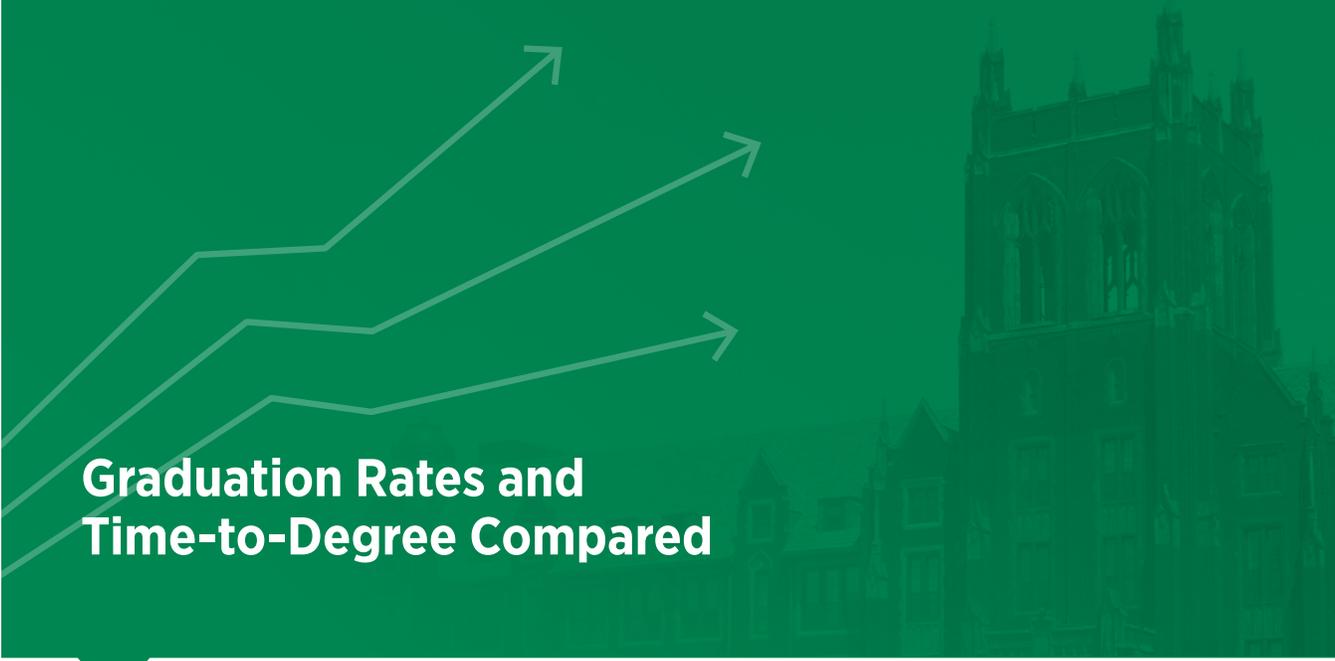
# Graduation Rates and Time-to-Degree Compared

This study presents baccalaureate graduation rates for the various categories of colleges at four and six years after the date of matriculation.[6] In each case the report uses the cohort of students who enrolled as full-time, first-time, degree-seeking undergraduate students in a given year, which is the standard approach. Cohorts matriculated six years before their results were reported, and so the cohorts analyzed are the entering classes of 1999–2006. The proportion of these students who received a bachelor's degree within the next four years makes up the four-year graduation rate; the proportion of these students who received a bachelor's degree within the next six years makes up the six-year graduation rate.

The report calculates graduation rates separately for each Carnegie Classification group (private doctoral, public doctoral, private nondoctoral, and public nondoctoral) and for the matched PND colleges and their comparison group of public institutions as described previously and in Appendix A. Figure 2 shows the overall results by sector. The report also splits the sample by gender (in Figure 3) and by the four largest race/ethnicity groups (in Figure 4) to see the patterns for these subgroups.

**FIGURE 2**

## Average Graduation Rates by Institutional Type (2005–2012)



**FIGURE 3**

## Average Graduation Rates by Institutional Type and Gender (2005–2012)

**MEN**



**WOMEN**



**Source:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.

- ● Private Nondoctoral (PND)
- ■ Public Nondoctoral (PubND)
- ▲ Private Doctoral (PD)
- ■ Public Doctoral (PubD)
- ▲ PND (Matched)
- ● PubND (Matched)
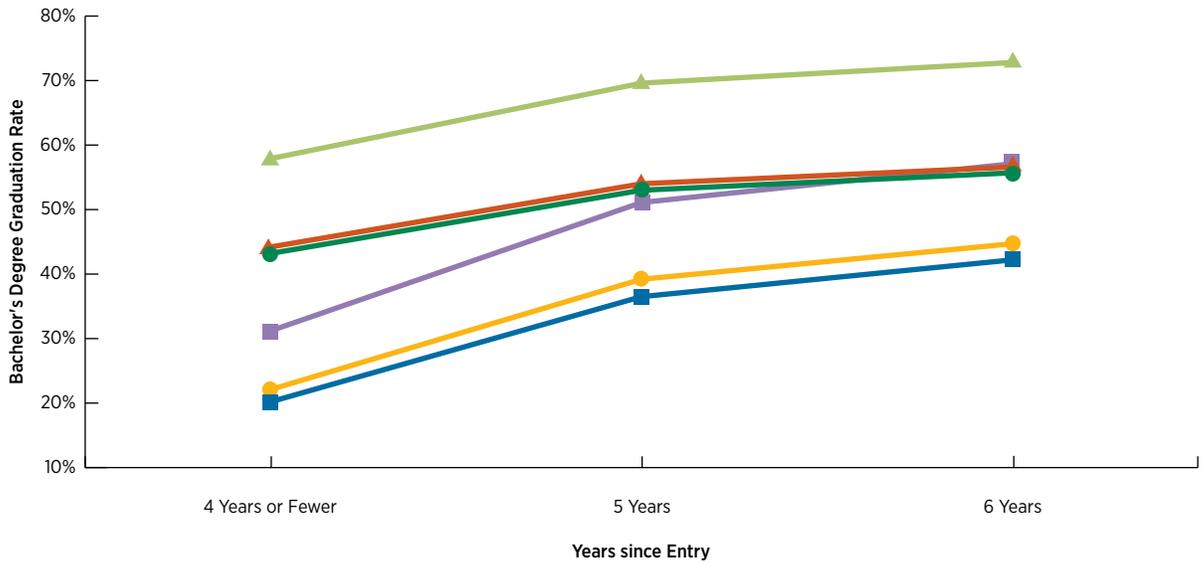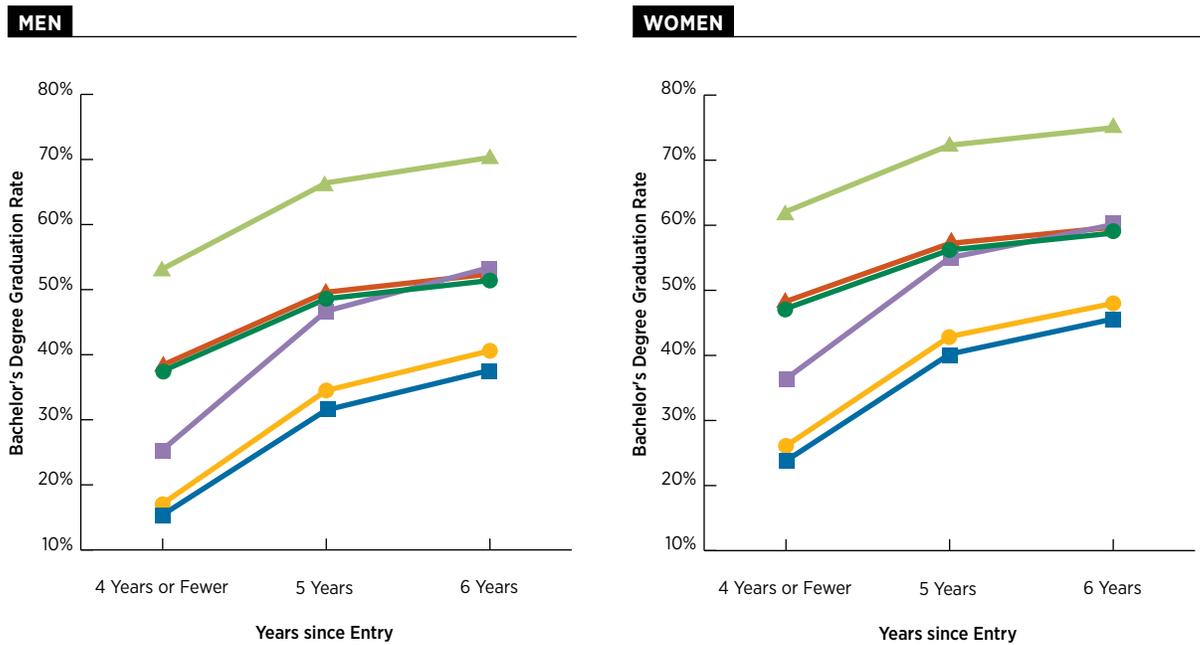
**FIGURE 4**

## Average Graduation Rates by Institutional Type and Race/Ethnicity (2005–2012)
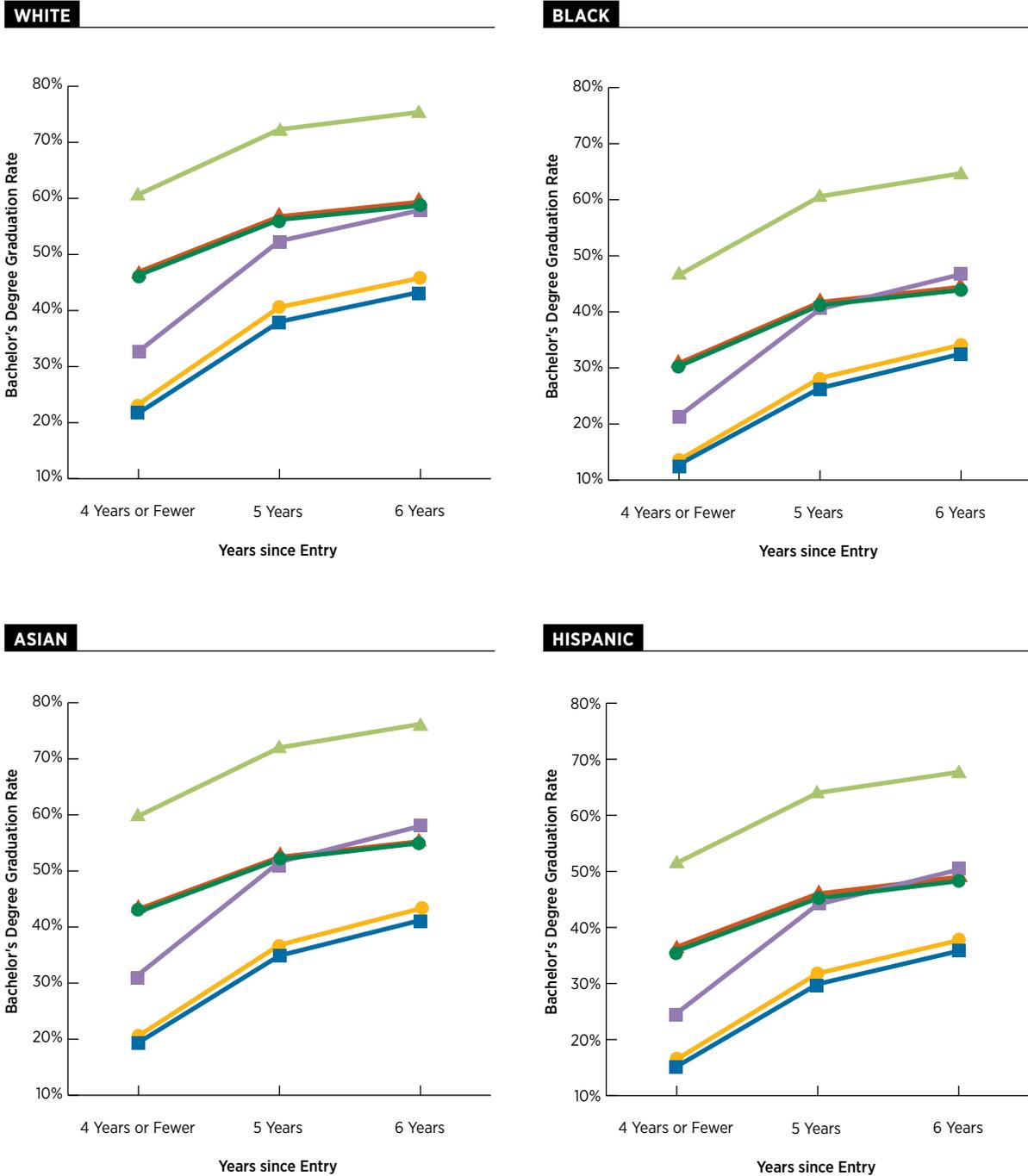


Source: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.

Legend:
- Private Nondoctoral (PND)
- Public Nondoctoral (PubND)
- Private Doctoral (PD)
- Public Doctoral (PubD)
- PND (Matched)
- PubND (Matched)

Indeed, in the main results and in each subgroup a consistent picture emerges. Private doctoral universities have by a large margin the highest graduation rates, followed by private nondoctoral colleges. PND colleges are similar to PubD universities in five- and six-year graduation rates, but PND colleges are much better at getting students to the bachelor's degree in four years, with *four-year graduation rates about 15 percentage points higher than public doctoral institutions*. Public nondoctoral institutions lag far behind in graduation rates. The public matched group (the set of public institutions chosen to have characteristics most similar to those of the matched PND colleges) outperforms the public nondoctoral institutions but still lags far behind its PND comparison group.

Figure 5 reports the differences in the four- and six-year graduation rates between the PND matched and public matched groups across all subsamples. The PND matched group has *four-year graduation rates about 20 percentage points above the matched comparison group of public institutions, and it has six-year rates about 10 percentage points above the comparison group*. These differences are largely consistent across demographic groups, although they are somewhat smaller for black students. All the differences shown are statistically significant at the .01 level.

Graduation rates take into account student attrition, though indirectly, and so are a broad indicator of institutional efficiency. The differences in time-to-bachelor's-degree between the matched PND and public

colleges also are large, and this has serious implications for the cost of education to students and families. The left-hand bars for each sector in Figure 6 show the average number of enrolled years of college among those who graduate with a bachelor's degree. At a college in the matched PND group, it takes on average 4.2 years for a graduate to earn a bachelor's degree. At the matched group of public institutions, it takes on average 4.6 years for a graduate to earn a degree. These figures emphasize another aspect of the relative efficiency of PND colleges compared with similar public institutions.[7]

This analysis does not take into account those students who never finish, however. Figure 6 remedies this by showing the average number of years of education provided per degree awarded in the right-hand bars for each sector. Thus, for example, if two students attended for four years each but only one graduated, then it takes on average eight years of college education to produce one degree in this scenario. Data on the number of years that dropouts attend college at these different types of institutions is unavailable. Lacking this information, the report assumes that non-completers attended one-and-a-half years of college since the average number of years of college attended among non-completers in general is about 1.5.[8] Using this method, the report finds statistically significant differences between enrolled years per degree at matched PND and public colleges.[9] For every degree produced at a matched PND college, 5.18 total years of education are utilized. For every degree at a matched public institution, nearly an additional year—6.10 years in total—is required.

If the costs of education per student-year were constant across college types, then these results would strongly imply an opportunity for social savings by sending more students to PND colleges instead of public institutions with similar characteristics. The costs of education per student-year, however, are not necessarily the same across institution types. The report examine these differences later.

*If the costs of education per student-year were constant across college types, then these results would strongly imply an opportunity for social savings by sending more students to PND colleges instead of public institutions with similar characteristics.*

**FIGURE 5**

**Differences in Average Graduation Rates between Matched Private Nondoctoral and Matched Public Colleges (Entering Classes 1999–2006)**

**FOUR-YEAR GRADUATION RATES**

| Group | PND (Matched) | Public (Matched) |
|---|---|---|
| All Students | 44.2% | 22.1% |
| Men | 38.4% | 17.1% |
| Women | 48.3% | 26.1% |
| White | 46.5% | 23.3% |
| Black | 30.4% | 13.6% |
| Asian | 43.0% | 20.6% |
| Hispanic | 36.5% | 16.5% |

**SIX-YEAR GRADUATION RATES**

| Group | PND (Matched) | Public (Matched) |
|---|---|---|
| All Students | 56.6% | 44.7% |
| Men | 52.4% | 40.6% |
| Women | 59.7% | 48.0% |
| White | 48.0% | 45.8% |
| Black | 44.0% | 34.1% |
| Asian | 55.1% | 43.3% |
| Hispanic | 49.0% | 37.7% |
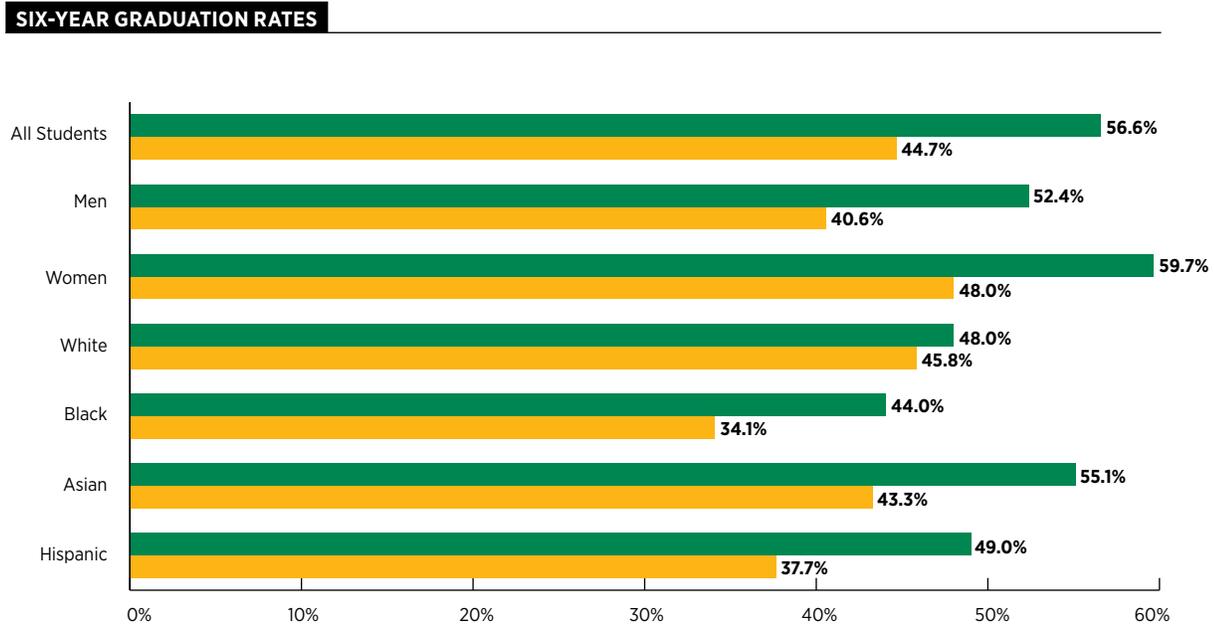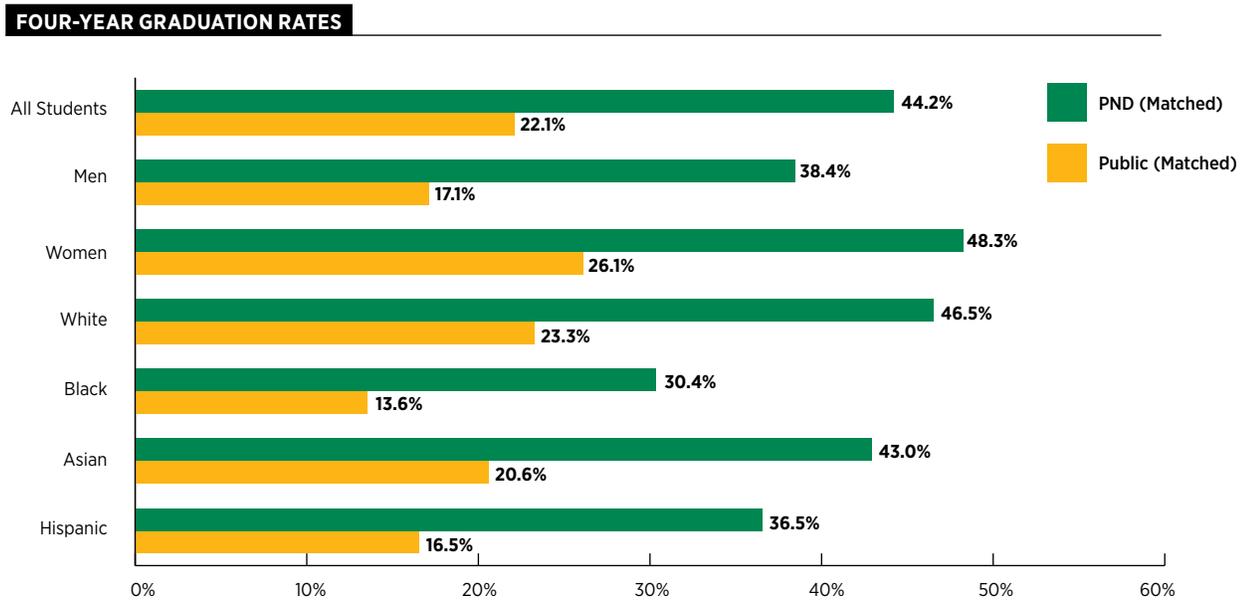
**Notes:** PND = private nondoctoral colleges. Observations are at the institution/year level. All differences between PND (matched) and Public (matched) are statistically significant at the .01 level.
**Source:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.

**FIGURE 6**

**Years of College per Degree among Graduates and All Students, 2005–2012**
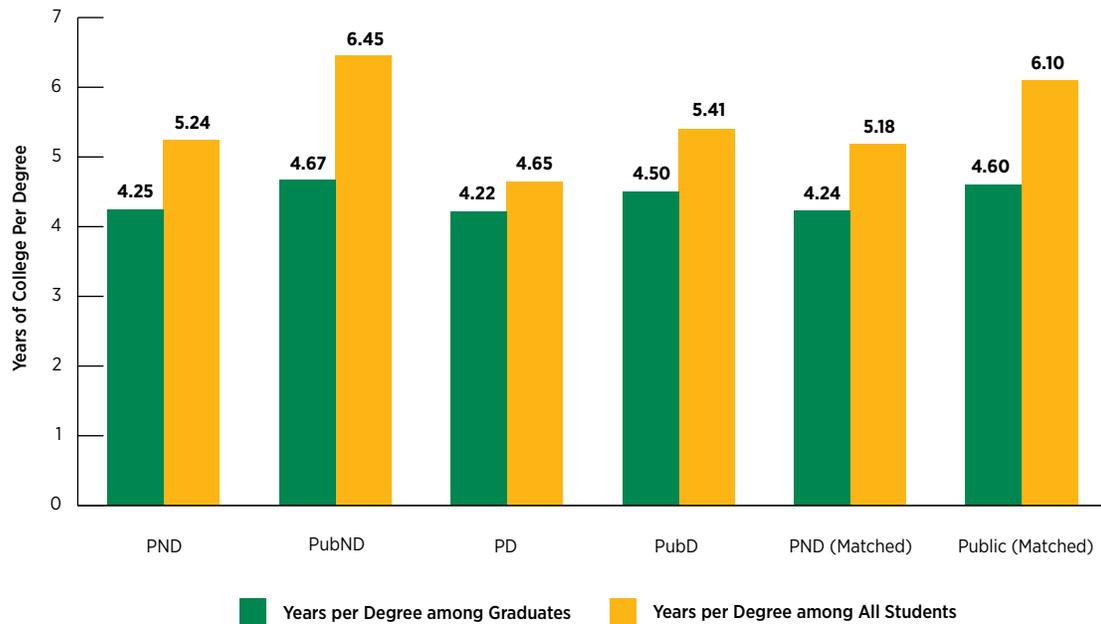


**Note:** PND = private nondoctoral; PubND = public nondoctoral; PD = private doctoral; PubD = public doctoral
**Source:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.

**HIGHLIGHTS:** Graduation Rates

• Private nondoctoral colleges and universities consistently outperform public sector institutions on four, five, and six-year graduation rates. The average four-year graduation rate at private nondoctoral institutions was 43 percent from 2005 to 2012, compared to 20 percent at public nondoctoral institutions.

• Private nondoctoral colleges and universities have four-year graduation rates that are 16 to 24 percentage points higher than those of a matched group of public institutions with similar characteristics, across men and women and all major ethnic groups.

• If the costs of education per student-year were constant across college types, then these results would strongly imply an opportunity for social savings by sending more students to PND colleges instead of public institutions with similar characteristics.

# STEM and Health Degree Production

States have a general policy goal of producing more college graduates, but there also is specific interest in increasing the number of graduates in STEM and health fields to meet labor market demands. This section compares degree production in STEM and health fields across college types.

Figure 7 shows the proportion of degrees produced that are classified as STEM,[10] health,[11] or neither. The proportion of degrees produced that are in health fields is a fairly consistent 6–8 percent across institutional types. The proportion of degrees that are in STEM fields varies. About 12.7 percent of the degrees produced at matched PND colleges are in STEM, compared with 16.4 percent of the degrees produced at the matched public institutions.

It should be noted, however, that much of this difference comes from the small number of doctoral universities in the matched public sample. Thirteen percent of baccalaureate degrees at public nondoctoral colleges are in STEM, similar to the 12.7 percent at PNDs. The first difference then may have something to do with the

motivations of entering students. Students interested in a major in science may be more likely to choose a research university.

This initial comparison does not consider the proportion of students who enter a college interested in a science major. One major barrier to the production of science degrees is that students often enter college with an interest in a STEM major but switch to something else (Stinebrickner and Stinebrickner 2014). Figure 8 shows results for the persistence of students in STEM and health programs by sector. This report examines students who declare their first major as STEM or health, or another field, and then indicates whether

*Private institutions are much better at ensuring that students who initially declare an interest in STEM or health as a major will complete such a degree.*

**FIGURE 7**

**Degree Production by Major and Institutional Type (2005–2012)**
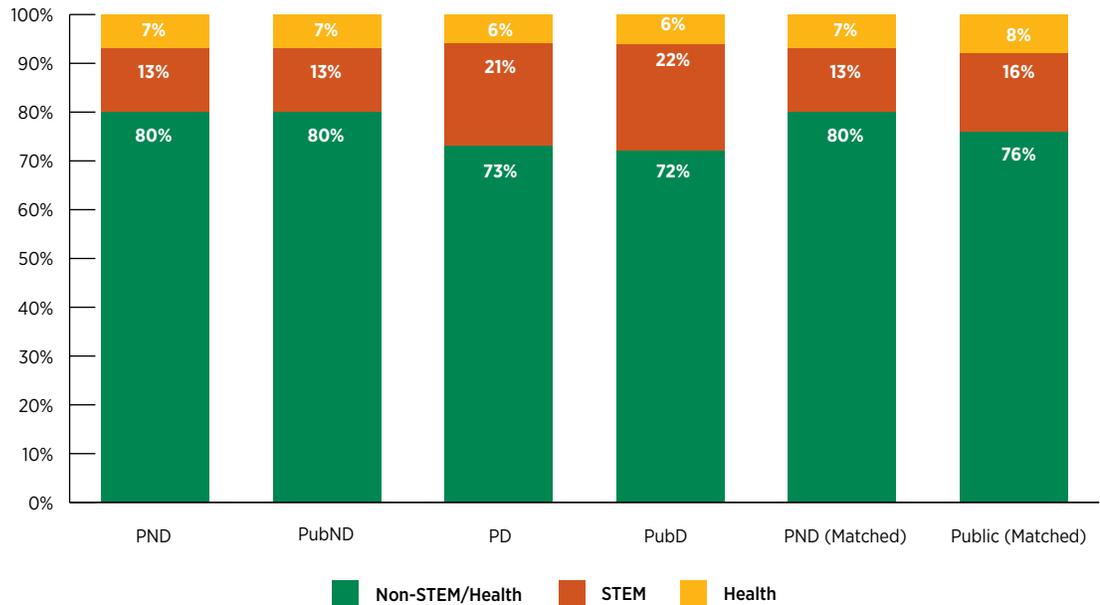


**Note:** PND = private nondoctoral; PubND = public nondoctoral; PD = private doctoral; PubD = public doctoral
**Source:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.

they graduate with a degree in STEM or health, or neither (either switching to another field or never completing a bachelor's degree). Since IPEDS does not record first declared major, the report instead uses the Beginning Postsecondary Students (BPS) federal survey sample, which tracks a nationally representative set of students from the 2003–2004 school year through 2009–2010 (U.S. Department of Education 2009). We do not have the constructed matched sample of PND and comparison public colleges for these data since BPS is student-based, not institution-based. Thus, we are restricted to the broader Carnegie-based sector comparisons.

Although our main results suggest that a similar proportion of degrees produced are in STEM and health at PND and public nondoctoral colleges, PND colleges

are much better at ensuring that students who start in STEM or health end up with a degree in those fields. Of all students at PND colleges who declared a first major in STEM or health fields during the 2003–2004 academic year, 40.7 percent ended up with a STEM or health bachelor's degree.[12] This figure is fairly close to that at private doctoral universities (45.9 percent) and is *much higher than the 23.4 percent and 23.8 percent, respectively, at public nondoctoral and public doctoral institutions*. Private institutions in general then are much better at ensuring that students who initially declare an interest in STEM or health as a major will complete such a degree. PND colleges look a lot like private doctoral universities and substantially outperform both types of public institutions in this regard, although PNDs attract somewhat fewer students interested in STEM as first-year students.

**FIGURE 8**

**Percentage of Students Who Graduated with Degrees in STEM and Health Majors by First Major and Institutional Type (2005–2012)**
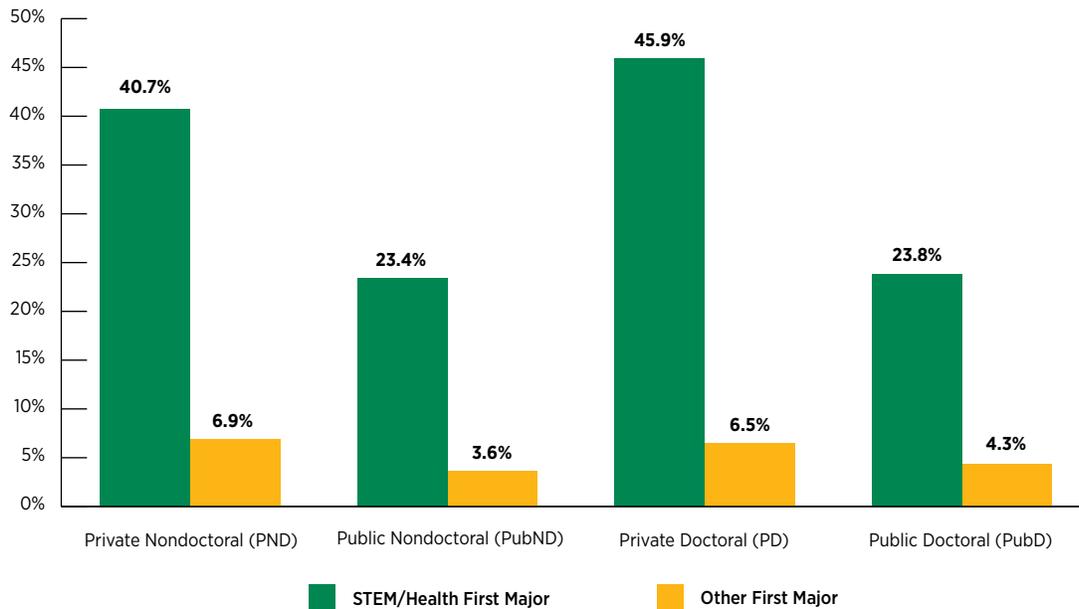


**Note:** This figure depicts the proportion of students who start in a STEM/health major (or something else) and end up earning a bachelor's degree in STEM or health fields. For example, 40.7 percent of PND students who indicated STEM or health interests as first-year students earned a degree in these fields, compared to 23.4 percent of the same initial group at public nondoctoral institutions. Also, 6.9 percent of students at PND schools who initially indicated another major ended up with a STEM or health degree compared to 3.6 percent of such students at public nondoctoral institutions.
**Source:** U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students (BPS) 2003–2004 cohort. Analysis by authors.

## HIGHLIGHTS: STEM and Health Degree Production

- Students in STEM and health-related majors at private nondoctoral institutions are a similar percentage of the student population (21 percent) as at public nondoctoral institutions (20 percent).

- Students whose first major was a STEM or health-related major were much more likely to graduate with that major (40.7 percent) at private nondoctoral institutions than at public nondoctoral institutions (23.4 percent).

- Private nondoctoral institutions also outperform public doctoral institutions at original STEM and health students' persistence to a degree (40.7 percent compared with 23.8 percent).

- For students whose initial major was in a field other than STEM or health, nearly twice as many at PND colleges (6.9 percent) as at public nondoctoral institutions (3.6 percent) ended up with a degree in one of these high-priority fields.

# Comparing the Costs of Education

The comparative performance of PND colleges must take into account differences in costs as well as differences in effectiveness. This section examines differences in sources of funding, tuition charges, and total costs by institutional types. The figures discussed in this section also are displayed in Table 1.

*PND colleges provide much larger per student amounts of institutionally funded aid … in effect lowering net charges for many students. Matched PND colleges provide an average of $10,256 in aid to their students versus $1,436 provided by the matched public institutions.*

The bar charts in Figure 9 display average tuition and average student loans, as well as state, federal, and institutional grants per full-time, first-year enrolled undergraduate, by sector. Private colleges, both doctoral and nondoctoral, being largely unsubsidized by state governments, charge substantially higher tuition than public institutions charge to state residents. The average published tuition across all years in the matched PND sample was $22,586, compared to $4,722 for in-state tuition across all years in the matched public sample. The differences are not nearly as large with respect to the 28 percent of students at matched public institutions who pay public out-of-state tuition, which averaged $12,504 over the sample years. Still, private colleges charge considerably higher "list prices" for education before financial aid to students is considered.

**TABLE 1**

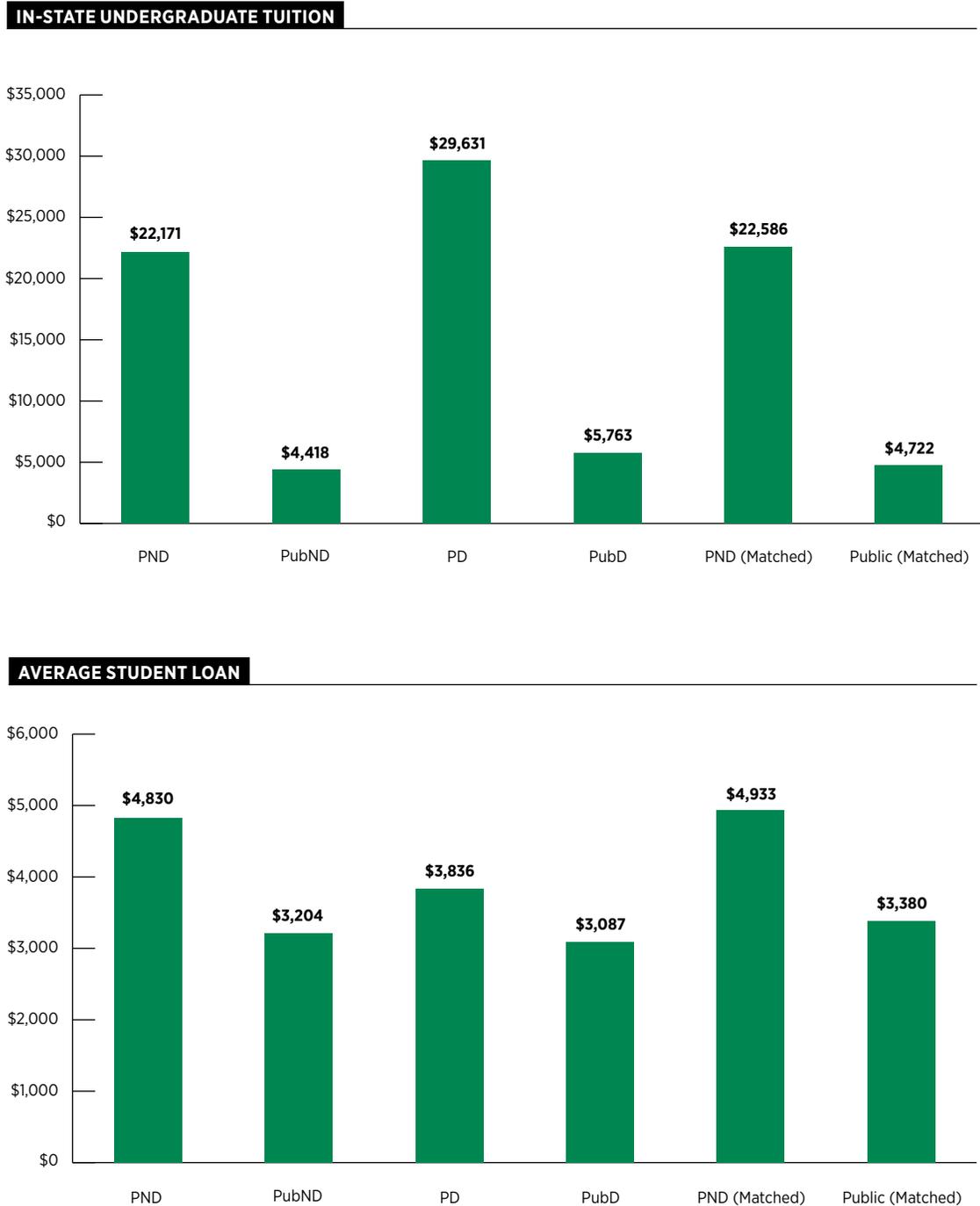## Costs of Education by Institutional Type (2005–2012)

| | Matched PND Sample Average | Matched Public Sample Average |
|---|---|---|
| Average published tuition—in state | $22,586 | $4,722 |
| Average published tuition—out of state | $22,586 | $12,504 |
| Average institutional aid (per year) | $10,256 | $1,436 |
| **Cost to Governments** | | |
| State grant aid per student per year | $1,350 | $1,190 |
| Federal grant aid per student per year | $3,812 | $3,267 |
| State appropriations per student per year | $43 | $6,550 |
| Federal appropriations per student per year | $131 | $40 |
| State grant aid per degree | $6,978 | $7,262 |
| State appropriations per degree | $221 | $39,139 |
| Total state spending per degree | $7,200 | $46,401 |
| Federal grant aid per degree | $19,711 | $19,928 |
| Federal appropriations per degree | $675 | $247 |
| Total federal spending per degree | $20,386 | $20,175 |
| Total government spending per degree | $27,585 | $67,126 |
| Three-year student loan default rate | 7.66% | 9.68% |
| **Cost to Students and Families** | | |
| First-year student loans | $4,933 | $3,380 |
| Total loan burden per degree | $25,506 | $20,619 |
| Total charge (sticker price) per degree—in state | $116,995 | $28,804 |
| Total charge after grants (net price) per degree—in state | $62,566 | $9,963 |
| Total charge (sticker price) per degree—out of state | $116,995 | $76,274 |
| Total charge after grants (net price) per degree—out of state | $62,566 | $57,428 |
| **Cost to Society** | | |
| Total cost per degree (no opportunity cost) | $63,231 | $68,963 |
| Total cost per degree (with opportunity cost of staying in college longer than normative four years)* | $89,231 | $115,631 |

*Opportunity cost does not count lost wages from the first four years of college; additional costs are from continuing to be in college after the first four years, as opposed to graduating after four years exactly.

**Source:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.

FIGURE 9

## Charges and Sources of Funding by Institutional Type for First-Year, Full-Time Students (2005–2012)

### IN-STATE UNDERGRADUATE TUITION



### AVERAGE STUDENT LOAN



**Note:** PND = private nondoctoral; PubND = public nondoctoral; PD = private doctoral; PubD = public doctoral
**Source:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.

**FIGURE 9 (continued)**

**Charges and Sources of Funding by Institutional Type for First-Year, Full-Time Students (2005–2012)**

**AVERAGE FEDERAL GRANT**



**AVERAGE STATE GRANT**



**Note:** PND = private nondoctoral; PubND = public nondoctoral; PD = private doctoral; PubD = public doctoral
**Source:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.

**FIGURE 9 (continued)**

**Charges and Sources of Funding by Institutional Type for First-Year, Full-Time Students (2005–2012)**
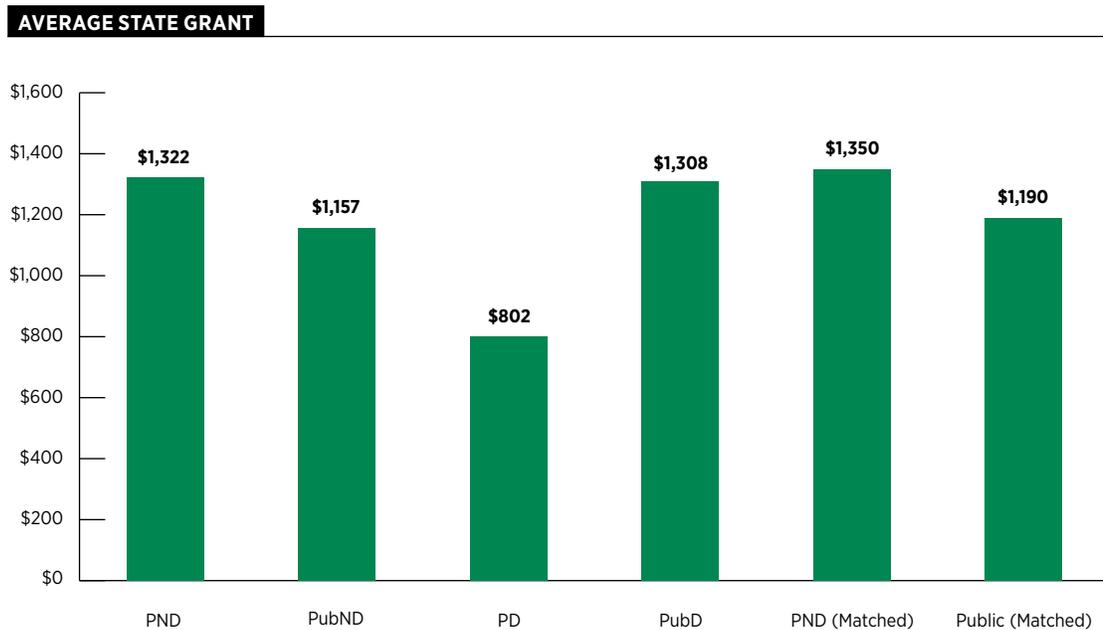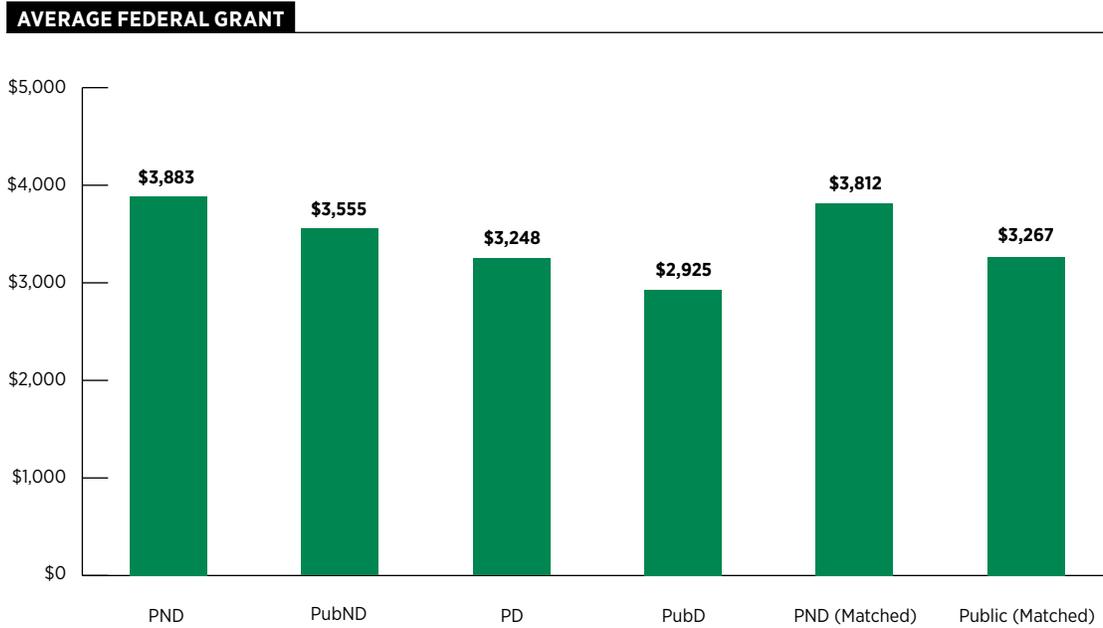
**AVERAGE INSTITUTIONAL GRANT**



**Note:** PND = private nondoctoral; PubND = public nondoctoral; PD = private doctoral; PubD = public doctoral
**Source:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.
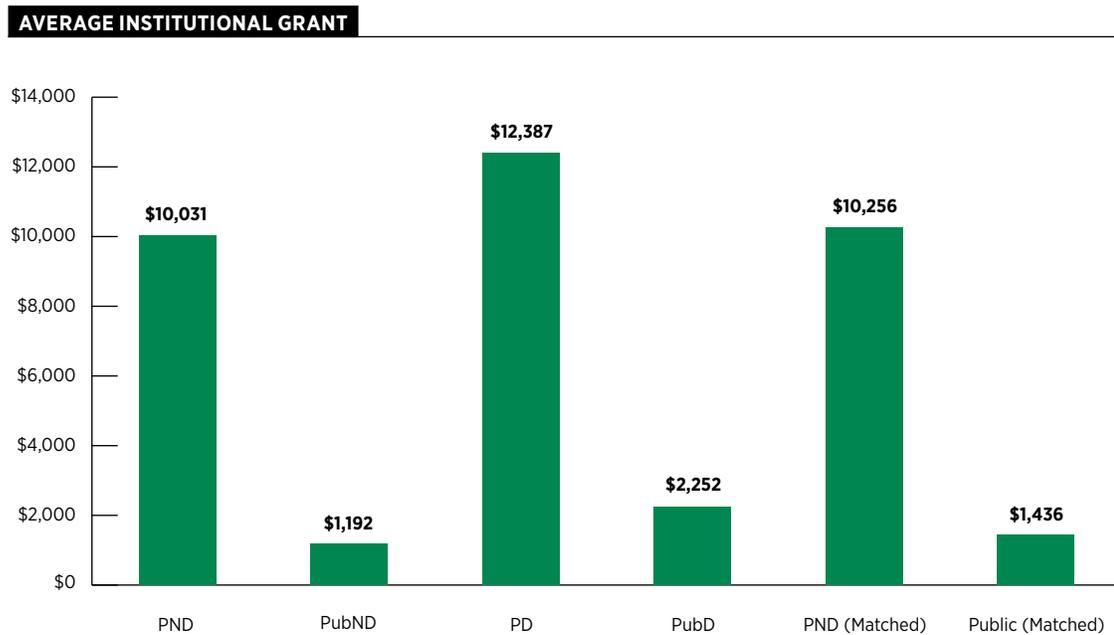
In order to mitigate this price difference, PND colleges provide much larger per student amounts of institutionally funded aid, as illustrated in Figure 9, in effect lowering net charges for many students. Matched PND colleges provide an average of $10,256 in aid to their students, versus $1,436 provided by the matched public institutions. Institutional aid covers a part of gross tuition costs, but such aid still leaves a considerable sum to be made up by the taxpayer, the student and family, and other sources in both the public and private sectors.

## Cost to Governments

Federal and state governments provide significant funding for colleges in the form of student aid grants (for example, federal Pell Grants or state Cal Grants in California) and direct governmental support. The latter, by covering a part of operational costs, allows public institutions to charge lower tuition. As shown in Figure 9, students at matched PND colleges receive a bit more grant aid from state governments ($1,350 vs. $1,190 per year on average) and the federal government ($3,812 vs. $3,267) than do students at the matched

public institutions.[13] These figures are averages across students who receive aid and those who do not. But these modest sector differences in government student aid received do not mean that PND education is more expensive for the government, as these figures do not take into account the substantial amounts of direct government appropriations to public institutions and do not adjust for the number of degrees produced per enrolled year.

This report calculates the average annual state and federal appropriations to matched PND and public colleges per enrolled undergraduate, using data reported in IPEDS.[14,15] On average, as would be expected, PND colleges receive far less than matched public institutions in appropriated funds per student from state governments ($43 vs. $6,550) but slightly more from the federal government, although neither group receives much support from this source ($131 vs. $40) (see Table 1).

To adjust these figures for differences in degree production by sector, we divide the sector averages for yearly student grant aid and appropriations by six-year graduation rates to give the average first-year expenditure per degree produced. We must use first-year expenditures for these calculations since these are the figures reported in IPEDS. Under the assumption that student aid amounts are constant across the student's college career,[16] we multiply annual aid figures by the average number of years of education per degree by sector (as in Figure 6 in the previous section) to give the average dollars spent in government student aid grants per degree awarded. We estimate (see Table 1) that each baccalaureate degree at a matched PND college costs the state government an average of $6,978 in grant aid plus $221 in appropriations, in comparison with $7,262 in grant aid and $39,139 in appropriations at a matched public institution. *In total then, states spend $7,200 per degree granted by a PND college compared with $46,401 per degree from a matched public institution. The public institution degree is about 6.4 times as costly to state taxpayers as the PND degree, on average.*

> *States spend $7,200 per degree granted by a PND college compared with $46,401 per degree from a matched public institution. The public institution degree is about 6.4 times as costly to state taxpayers as the PND degree, on average.*

Costs per degree to the federal government are very similar for matched PND colleges and their public counterparts. Federal student aid grants total $19,711 per PND degree versus $19,928 per degree at the matched public institutions (see Table 1). Federal appropriations per degree, while small, are slightly higher at PND colleges ($675 vs. $247). Summing these two sources leads to an average federal cost per PND degree of $20,386, compared to $20,175 for the matched public institutions. *Adding the state and federal figures together produces an average government cost per PND degree of $27,585 compared to $67,126 for a degree at a matched public institution.* Thus, the PND degree is considerably less than half as costly to taxpayers, overall.

An additional government expenditure in support of higher education is the outlay for student loans. As illustrated in Figure 9, students at PND colleges take out more in student loans than do students at comparable public institutions. Because loans are largely repaid to the government, however, these figures cannot simply be added on to other governmental costs. To calculate the cost to the government of a dollar in loans issued today, it is necessary to take into account administrative costs, the default rate, the interest rate, and the rate at which the government discounts its future income. According to the discounting method used by the federal government, student loans are actually profitable for the government, overall (Alsalam and Carrington 2013). As such, student loans can reasonably be considered as a cost only to families, not to government.

*In sum, PND colleges produce baccalau-
reate degrees at a substantially lower
average cost to government, especially
state government, than do similar
public institutions.*

Moreover, to assess whether loan default rates differ by sector, we merged data from the U.S. Department of Education on institutional (three-year) default rates over fiscal years 2009–2011 (U.S. Department of Education 2015) with IPEDS data. Matched PND colleges have a lower default rate (7.7 percent) compared with matched public colleges (9.7 percent) over these years, and this difference is statistically significant at the 1 percent level. Thus on average loans to PND students are less costly (i.e., more profitable) to the government than loans to public sector students. This is noteworthy given the fact that students at PND colleges tend to take on higher loan burdens, as will be addressed in the next section.

In sum, PND colleges produce baccalaureate degrees at a substantially lower average cost to government, especially state government, than do similar public institutions. This suggests the possibility for savings to taxpayers by encouraging more students on the margin to choose PND colleges rather than public institutions with similar characteristics. A policy that shifted students to PND colleges from matched public institutions could thus reduce costs to taxpayers, even if some increase in student aid grants or other financing mechanisms were necessary to incentivize students to switch. If a shift of

*The private nondoctoral college (PND)
degree is considerably less than half as
costly to taxpayers overall.*

students to PND colleges is a response to increasing undergraduate enrollment in a state, additional cost savings would be possible if such a policy also reduced capital outlays to increase capacity at public institutions. We illustrate how such policies might work in a few representative states later in this report.

## Cost to Students and Families

Students and their families pay a significant portion of the cost of attending college, either by paying tuition bills "out-of-pocket" or by taking on student loans to repay later. Students at PND colleges typically borrow more money than students at comparable public institutions. On average, according to IPEDS, first-year students in the matched PND sample take out $4,933 in loans as compared to $3,380 for first-year students in the matched public institution sample.

The heavier loan burden on students at PND colleges narrows and possibly reverses, though, when differences in completion rates are taken into account. The higher graduation rate at PND colleges means that students have a greater chance of getting a degree for the loans they take on. Indeed, higher graduation rates may well have something to do with PND colleges' lower student loan default rate despite higher average loan burdens per student, as reported in the previous section. The sector difference in default rates points to the importance of the interaction between loan burdens and graduation rates. Assuming that the annual amount borrowed is constant across the student's college career, the loan burden is nearly 25 percent higher per degree awarded in the matched PND college sample ($25,506) than in the matched public institution sample ($20,619). On the other hand, as described earlier, six-year graduation rates are about 12 percentage points higher at the matched PND colleges.

Families also pay for college through immediate payment of tuition bills. IPEDS does not have data on the direct tuition bills paid at matched PND and public colleges, but we can calculate the total amount paid by students, including both loans and direct cash

payments, after accounting for government and average institutional grant aid. Adding to the above average loan figures the amount of published tuition that is not covered by any grant, the total charge paid by families for a baccalaureate degree averages $62,566 at matched PND colleges (see Table 1). A similar figure for the matched public institutions is $9,963 for in-state students and $57,428 for out-of-state students.[17] Weighting the above total charges for public sector students by the proportion of their students who are in-state gives an overall total average private charge per degree at matched public institutions of $23,253, compared with the $62,566 figure at matched PND colleges. Thus, students and families pay substantially more for a degree from a PND college than one from a matched public institution, especially if the matched public institution is in their home state (or a state that holds a reciprocal tuition agreement with their home state).

Students at PND colleges pay on average more for their education than those at public institutions. Comparison of tuition bills at PND and similar public institutions is complicated because of data limitations. But it appears that there is a larger gap between published tuition and awarded grant aid at PND colleges than the gap between published tuition and awarded grant aid at public institutions whose sticker prices are subsidized by the state. Thus, the cost savings that PND colleges might offer to taxpayers must be considered in light of the higher private costs to students and families under current conditions. It should be noted, however, that these figures are averages. Assuming that some part of the difference in graduation rates between PND and matched public colleges is causally related to the educational environments of PND colleges, personal cost savings at matched public institutions come with increased risk of students leaving college without a degree and thus foregoing many of the labor market benefits associated with college.[18]

## Costs to Society

The particular source of funding for a college education (government vs. students and their families) has

*Personal cost savings at matched public institutions come with increased risk of students leaving college without a degree and thus foregoing many of the labor market benefits associated with college.*

important implications for the distributive aspects of higher education finance policy and education policy more generally. But the total costs of education regardless of source also are of interest for the purposes of general social welfare and the design of efficient public policy. This section combines the cost estimates from the previous two sections.

It is important to note that there are other costs of education that we have not yet accounted for, in particular the opportunity cost of spending additional time in college before earning a degree. Although we present primary estimates without opportunity costs because the measurement of opportunity costs is so rough, the opportunity cost can be approximated by comparing the annual earnings of a college graduate with a bachelor's degree against the annual earnings of a currently enrolled college student, and then multiplying by the number of additional years a degree takes to earn in a matched public institution compared with a PND college. Using data from the 2012 Current Population Survey Merged Outgoing Rotation Group (National Bureau of Economic Research 2015), mean annual earnings for current students are $11,920, and for college graduates aged 25 or younger with a bachelor's degree they are $34,143.[19] Factoring in the difference by sector in number of years per degree, this implies an additional cost of $19,112 per degree earned from a matched public institution.

Another cost we do not address in this comparison is capital cost, as IPEDS financial data are limited to operating costs.

**FIGURE 10**

## Societal Cost of a Degree by Matched Private and Public Colleges (2005–2012)
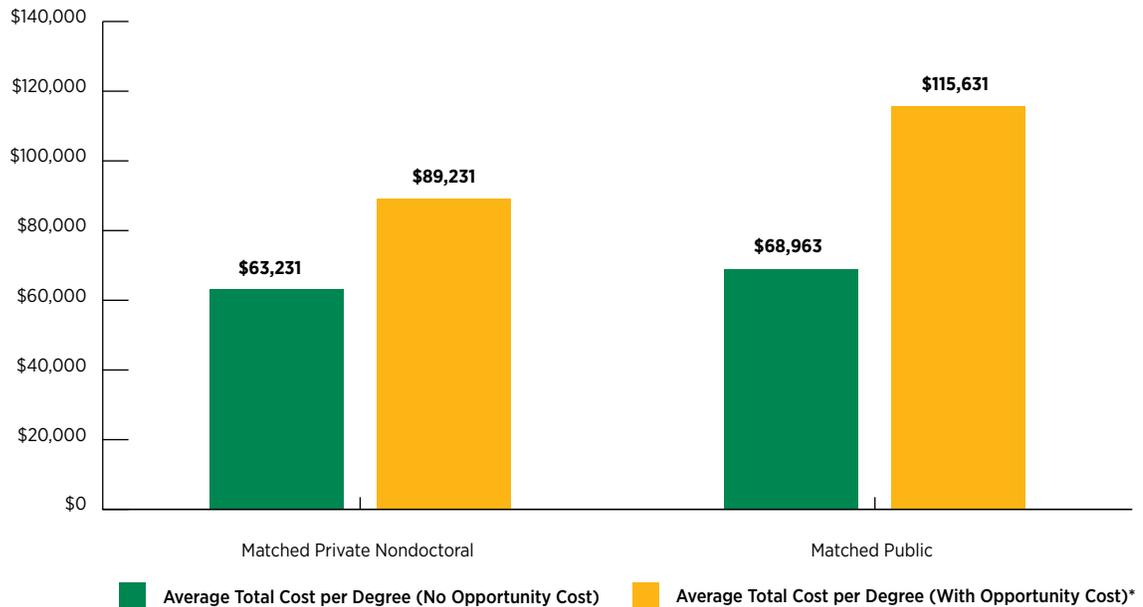


*Opportunity cost of staying in college longer than the normative four years does not count lost wages from the first four years of college; additional costs are from remaining in college after the first four years as opposed to graduating after four years exactly.
**Sources:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System; and National Bureau of Economic Research, 2012 Current Population Survey Merged Outgoing Rotation Group. Analysis by authors.

With these caveats, the calculation of costs to society is relatively straightforward. Since this bit of analysis does not pay attention to the different sources of funding that go toward paying tuition charges, we can simply take the total tuition charged and add to it governmental operating appropriations to institutions that do not go directly toward defraying tuition (i.e., we exclude student aid spending). These are the appropriations dollars calculated in the Costs to Government section (see Table 1).

Under the assumption that tuition is constant across all years of a student's college career, we calculate the cost to produce a single bachelor's degree at different institutional types. As noted in Figure 10, using the average number of years of education per degree produced, the societal cost of a degree (not including any opportunity costs) is $63,231 at a matched PND college, versus $68,963 at a matched public institution.[20] If the opportunity cost of the longer time that the average student spends in a public institution is included, the gap between the two sectors increases from $5,732 to $24,844 (as shown in Table 1, page 19). Thus, it appears that PND colleges are appreciably less costly to society overall per baccalaureate degree awarded.

## HIGHLIGHTS: Cost to Governments, Students and Families, and Society

- Private nondoctoral (PND) colleges provide institutional grants that mitigate the higher sticker price of these institutions compared with the matched set of public institutions. PND colleges provide an average of $10,256 per student in institutional grants versus $1,436 for public institutions.

- Each bachelor's degree at a matched private nondoctoral college costs the state government $6,978 in grant aid plus $221 in appropriations, in comparison with $7,262 in grant aid and $39,139 in appropriations at a matched public institution. The public degree is about 6.4 times as costly to state taxpayers as the PND degree on average.

- Private nondoctoral colleges have a lower loan default rate (7.7 percent) compared with their matched public institutions at 9.7 percent. Thus, on average, loans to PND students are less costly (more profitable) to the government than loans to public sector students.

- Private nondoctoral colleges produce bachelor's degrees at a substantially lower average cost to governments, especially state governments, suggesting the possibility for savings to taxpayers by encouraging more students on the margin to choose PND colleges rather than public institutions.

- When differences in completion rates are taken into consideration, the heavier loan burden on students at private nondoctoral institutions narrows and possibly reverses.

# State Policy Change Simulations

The state-level savings inherent in producing a bachelor's degree at a PND college as opposed to a matched public institution leads to the natural question of how states could take advantage of the sector differences. In this section we provide some preliminary simulations of the effects of a state-level policy that would increase student aid from state grants by either $1,000 or $2,000 per year for students who enroll specifically at PND colleges. In the simulations, grant aid is increased only for students who already receive state grant aid. Such an increase could be accomplished simply by increasing the cost-of-education allowance for tuition in the aid eligibility calculation, which is often now capped at a level approximating public university tuition in the state. In the case of states such as Georgia, which grant aid on the basis of students' academic performance rather than financial need, the amount of the grants made to eligible students who attend in-state private colleges could simply be increased by the proposed amounts ($1,000 or $2,000).

Such a policy, if it drew students to PND colleges from similar public institutions, should increase degree production, because PND colleges in general have substantially better degree completion and time-to-degree rates. Notably, our simulations necessarily assume that some portion of the difference in outcomes at PND and matched public colleges is causal, such that the average student who switches sectors achieves outcomes equal to the average student who previously chose the PND sector. This assumption will inevitably either understate or overstate the true effects of the policy, although the direction of the bias is not
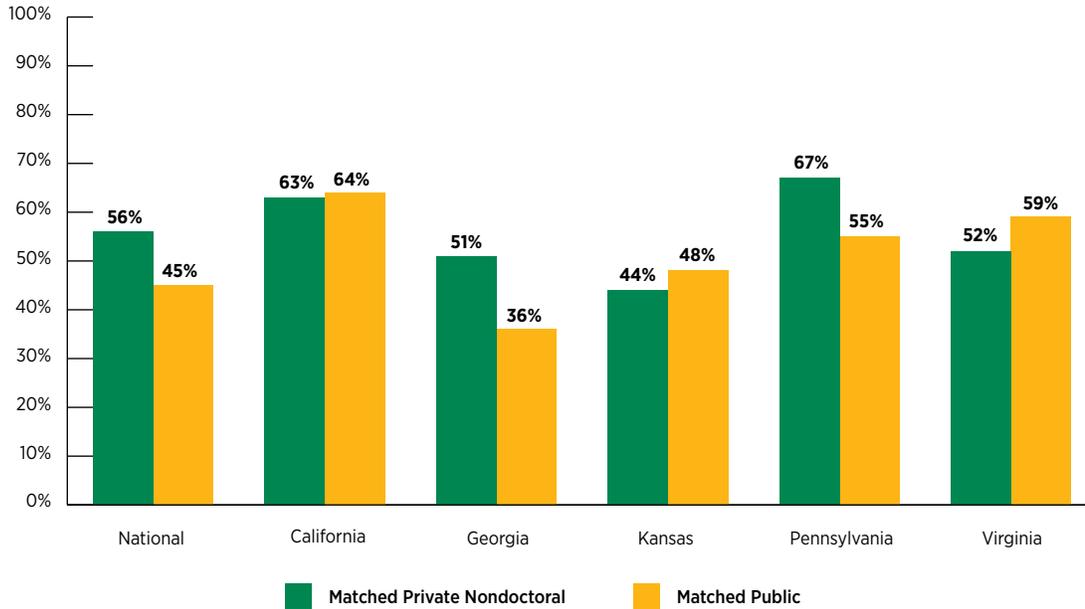
*An increase in state grant aid, if it drew students to PND colleges from similar public institutions, should increase degree production, because PND colleges in general have substantially better degree completion and time-to-degree rates.*

**FIGURE 11**

**National and State-Level Six-Year Graduation Rates by Matched Sector**



**Source:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.

clear. This is one reason why we refer to these simulation results as being rough estimates of the effects of the hypothetical $1,000 or $2,000 increase in grant aid. Figure 11 shows the six-year graduation rates for the matched PND colleges and their matched public counterparts for the U.S. as a whole and for the five states where we simulate student aid policy shifts.[21]

The policy also could have effects on state spending. In some cases students at PND colleges currently receive much less grant aid from the state than students at public institutions, so that grant spending would presumably drop for students who switched to PND colleges from matched public institutions even with the hypothesized grant increases. Moreover, students who switch sectors may decrease direct state appropriations to matched public institutions, which are typically calculated on a per student basis. We assume that for every student who leaves a matched public institution, the state saves one half of the prior level of appropriations per student.[22] In states anticipating strong growth in the number of high school graduates, which likely will require additional public institution enrollment capacity, we also take into account estimated capital cost savings from diverting some students to the private higher education sector.

We target five states for the simulations: California, Georgia, Kansas, Pennsylvania, and Virginia. These states either have projected growth in high school graduates according to estimates by the Western Interstate Commission for Higher Education (WICHE), and thus

presumably an increasing demand for higher education enrollment, or a demonstrated policy interest in promoting STEM education (Prescott and Bransberger 2012).

Changes in degree production, as well as net cost savings to the state, hinge on student responsiveness to a policy change that makes state student aid grants to eligible students attending private institutions more generous. As such, we need an estimate of how strongly aid-eligible students would react to a $1,000 or $2,000 increase in state grant funding associated with attendance at a private institution. Ideally we would be able to produce an estimate of student responsiveness tailored to each state. With available data, however, we can only generate a simple correlation between net price (published tuition minus all grant aid) and enrollment, rather than generating anything with a causal interpretation. Therefore we turn to empirical literature, which offers several estimates of the effects of increasing grant aid on enrollment.

Using enrollment at a large research university, van der Klaauw (2002) estimates an elasticity of demand with respect to aid of 0.8, which implies that a 10 percent increase in grant aid is associated with an 8 percent increase in enrollment. But studies that focus on price response at small private colleges, similar to those we are interested in, report net price elasticities in the range of -1.2 to -1.5 (Allen and Shen 1999; Buss, Parker, and Rivenburg 2004). We assume that increased aid affects students' choices by reducing the "net price" of college (tuition minus aid). A net price elasticity of -1.53 implies that a 10 percent reduction in net price will produce a 15.3 percent increase in enrollment of entering students. The estimate most relevant to our purposes is the elasticity of demand estimate of -1.53 with respect to net tuition (tuition minus aid) at a small private college (Allen and Shen 1999), as this estimate focuses on students' choice between colleges rather than the choice to attend college or not.

We simulate the effects of our hypothetical student aid grant increase using this -1.53 elasticity estimate.[23] For a robustness check, we also estimate the effects of our

hypothetical grant aid increase using a -1.0 estimate of elasticity with respect to net tuition. We use this alternate elasticity estimate to be closer to the estimates provided by Buss, Parker, and Rivenburg (2004) and van der Klaauw (2002). The alternate elasticity estimate also is used to account for the fact that, in addition to those attracted from public institutions, some of the students drawn to PND colleges by such a policy would not otherwise have attended college. Even if the true elasticity is larger than -1.0, the use of the true elasticity may overstate savings to the state from shifting funds away from public institutions, since some students would be coaxed by the policy into college (producing costs to the state) who otherwise would not have received grant funding at all because they would not have enrolled in any college.

## California

California is a state of interest because of its large size and prominence, the strains on its public finances and public baccalaureate education capacity, as well as its considerable number but relatively low proportion of PND colleges. (In California, about 11 percent of four-year college and university students are at PND colleges compared with about 21 percent across the entire country). Perhaps surprisingly, WICHE does not project significant growth in high school graduates in California over the coming decade (Prescott and Bransberger 2012).

Contrary to the national pattern, in California, state grant spending per aid recipient per degree[24] is higher at PND colleges than at matched public institutions: $39,012 compared with $29,389. This is largely due to the state's CalGrants program, which typically offers more grant aid to private college students than to students attending the state's public universities. The state, however, could still save substantial money on appropriations to public universities by shifting students to PND colleges, as we shall see.

We estimate that a $1,000 grant increase for students attending private institutions would incentivize 130

students per year to switch to the PND sector if the net price elasticity were -1.0, or 199 students if the elasticity were -1.53. The hypothesized $2,000 grant increase for private sector students would shift 252 or 386 students per year, depending on the price elasticity assumed. Accordingly, since aid awards in California are already larger at PND colleges, the aid increase would be accompanied by an increase in state spending on grant aid, from $2–$3 million per cohort with a $1,000 grant increase, or from $5–$7.7 million per cohort with a $2,000 increase, depending on elasticity. These figures assume that the grant can be targeted such that only "switching" students are paid for. This might be difficult to accomplish practically, as incoming students do not actually switch sectors. Rather, we are comparing to an estimate of how many would have enrolled in the different sectors in the absence of the policy change. If instead the grant were untargeted so that all aid-eligible state resident students attending private institutions benefited from the grant increase, the state cost figures would rise to $19–$20 million per entry cohort with a $1,000 grant increase or to $39–$42 million per cohort with a $2,000 increase.

So long as the increased aid spending can be targeted to those who switch sectors, the additional state spending is more than offset by the assumed decrease in operating appropriations to public institutions (i.e., half of the state appropriation per student who switches sectors). This comes to $3.2–$4.8 million in savings per cohort with a $1,000 aid grant increase, depending on elasticity, or $6.2–$9.5 million with a $2,000 grant. These savings would more than cancel out the additional state grant aid funding assuming the grant increases could be targeted to students who switch sectors only. If this is impractical and all aided students in the private sector receive the larger grants, state costs would substantially exceed the savings from those who switch sectors. Since there is no significant increase in high school graduates (and thus college students) expected in this state, we assume there are no savings on public sector expansion costs.

Unlike in most states, the graduation rate in California PND colleges is slightly lower than that at matched

*As long as the increase in state grant aid to private sector students could be effectively targeted on those who switch, Georgia could stand to save a considerable amount of annual operating funds by incentivizing students to shift to PND colleges, where they are more likely to graduate.*

public institutions, and so the grant increase policy is estimated to slightly *decrease* state degree production, but only on the order of about 15 degrees per cohort in any scenario.

## Georgia

Georgia is a state of interest because it has a rapidly increasing pool of high school students (more than 17 percent between 2014–2015 and 2024–2025, according to WICHE's projections) and thus could face capacity constraints at public institutions. Most PNDs in the state have slack capacity, and marginal additions of students would not put additional strains on infrastructure or campus support. Applying this percentage increase to recent public higher education enrollments in Georgia (from IPEDS) yields a projected increase in students of around 23,500 without even considering possible gains in older students.[25] In addition, with the Georgia HOPE scholarship, the state has had experience with tightening and loosening restrictions on grant aid that can be used at private colleges. HOPE grants to Georgia residents attending private colleges in the state are currently limited to $3,820 per year but have varied in the past. Unlike in California, state student aid grant spending per recipient per degree at PND colleges in Georgia ($15,219) is lower than that at matched public institutions ($21,367). In our IPEDS sample, annual appropriations to Georgia's public four-year colleges and universities average $5,985 per student.

Georgia, then, would seem to have room for significant savings with a PND-targeted change in aid funding. Georgia could save $0.3–0.6 million per cohort in targeted state grant aid with a $1,000 grant increase for private sector students, with 387–592 students shifting to PND colleges, depending on net price elasticity. If the increase could not be limited to students who switch sectors, however, the state would incur a net cost increase of about $2.3 million. A $2,000 grant increase for private sector grantees would cross the line into making matched public institutions cheaper in terms of grant aid per recipient per degree, and would cost the state $3.0–$4.7 million per cohort if the grants could be targeted to students who switch sectors (or $51–$52 million if the aid were not targeted only toward switchers). We estimate that 725–1,109 students would switch from public to private institutions in response to a $2,000 increase in the HOPE Scholarship for private college students. These students would be moving into environments with higher graduation rates, resulting in an estimated additional 50–78 bachelor's degrees per year with the $1,000 grant increase, or 96–146 more degrees with the $2,000 increase.

Shifting students from public to PND colleges offers an opportunity for appropriations savings to the state as well. These savings would be on the order of $6.0–$9.2 million per cohort with a $1,000 grant increase for private college students, or $11–$17 million with a $2,000 increase, depending on price elasticity. So long as the increase in state grant aid to private sector students could be effectively targeted to those who switch, Georgia could stand to save a considerable amount of annual operating funds by incentivizing students to shift to PND colleges, where they are more likely to graduate.

The substantial projected enrollment increase Georgia faces also suggests that moving more students into the private higher education sector could save public sector costs for capital expansion. It is difficult to know how the state's public higher education system, the University System of Georgia, might respond to needed growth given the changes at play in higher education

delivery systems and a general reluctance nearly everywhere to add costly capital facilities. The system could seek to stretch capacity at its existing campuses, intensify the use of existing primarily two-year campuses for baccalaureate instruction, and serve more students via online courses to conserve on capital expansion needs. Nonetheless, we have constructed some rough estimates of possible capital expansion costs in the case study states with projected growth, including Georgia. These estimates are based on consultations with national experts and pertinent recent studies.

We generalize using estimates from the recent Higher Education Space Standards Study, hereafter the HESSS (Paulien and Associates 2011). The HESSS uses a space needs model to project the additional square feet of building space required at different public institutions in Utah on a per-student basis. We take the average guideline of assignable square footage per student FTE for each type of building space over all nondoctoral colleges[26] and apply these estimates to public nondoctoral institutions in our three case study states expecting substantial growth: Georgia, Kansas, and Virginia. We multiply the square footage required per student by an estimated cost per square foot by building use type. Using information from several expert sources in the business of designing higher education facilities, we estimate the cost of building and utility improvements to be $550 per square foot for laboratory space, $300 per square foot for office space, and $375 per square foot for all other types of space. In total, this implies that the cost of adding buildings to accommodate an additional FTE student at a public nondoctoral institution is estimated at $81,775.[27] This figure is of course a rough estimate, especially when applied to states other than Utah.

According to IPEDS, there are on average 133,880 full-time undergraduates in Georgia's public institutions. In the absence of official enrollment projections, simply applying WICHE's high school graduate projections to the current enrollment figure, this is likely to increase by about 17.6 percent over the next ten years (2014–2015 to 2024–2025). As stated above, the $1,000

**TABLE 2**

**Estimated Savings on Publicly Funded Capital Costs with Grant Aid Increase**

| Grant | Elasticity | Kansas Capital Savings (millions) | Georgia Capital Savings (millions) | Virginia Capital Savings (millions) |
|---|---|---|---|---|
| $1,000 | Low (-1) | $21 | $102 | $108 |
|  | High (-1.53) | $33 | $156 | $166 |
| $2,000 | Low (-1) | $41 | $191 | $208 |
|  | High (-1.53) | $62 | $298 | $317 |

**Sources:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, and Higher Education Space Standards Study. Analysis by authors.

grant increase would encourage 387–592 students per cohort to shift to PND colleges, depending on elasticity. A $2,000 grant increase would encourage 725–1,109 students per cohort to shift. Each of these figures must then be multiplied by 6.45 to determine the effect on total FTE enrollments, based on the average years that an American public nondoctoral college student spends in college (from IPEDS). We then multiply the FTEs diverted to the private sector by the $81,775 per-student capital cost and divide the final figure by two to reflect the fact that the cost of adding a marginal student is likely well below the average capital cost per student, so that savings from building for fewer students would not likely be strictly proportional. Using these assumptions and figures, the (ongoing) $1,000 and $2,000 grant boosts have the capacity to save $102–$156 million and $191–$298 million in one-time public building costs, respectively, in Georgia. Table 2 depicts the estimated capital savings for Georgia and the two other case study states with projected enrollment growth.

As in California, in Kansas students at PND colleges receive appreciably more in-state grant aid than those at matched public institutions: $14,092 per recipient per degree vs. $7,446. A $1,000 grant increase for aid-eligible students attending private colleges in Kansas would then cost the state $0.9–$1.4 million in state grant aid per cohort if it could be targeted only to those who switched, or about $6.6–$7.1 million per cohort if not so targeted. A $2,000 increase policy would cost $2.6–$4.0 million per cohort if targeted only to switchers, and $14–$15 million if not so targeted. As in the other states, including a 50 percent savings in per-student appropriations to public institutions more than offsets the additional spending in the targeted scenario (but not if the grants cannot be targeted). The $1,000 grant increase would save $1.7–$2.5 million per cohort, and the $2,000 increase would save $3.1–$4.8 million if these increases could be targeted only to the students who shifted sectors.

## Kansas

We simulate the effects of policy in Kansas because it also is a growing state, with a projected 15.8 percent increase in high school graduates between 2014–2015 and 2024–2025, according to WICHE. In addition, Kansas has a stated policy interest in increasing the number of STEM degrees (public universities are rewarded for increases in the state's current performance-funding scheme).

*Kansas may be able to pursue more efficiently its goal of increasing STEM degree production by shifting students to PND colleges.*

These figures, however, do not take into account capacity constraints at public institutions. In the face of a rapidly increasing high school age population, current rates of appropriations per student may not fully capture future spending needs if new buildings must be built and land acquired to expand public campuses. We estimate savings from diverting some students to private colleges using the same methodology we applied to the Georgia case.

In the IPEDS data, there are in an average year of our sample 60,883 full-time undergraduates in public institutions in Kansas. Using WICHE's 2012 high school graduate projections as a basis for projecting growth in enrollment demand, this figure is likely to increase by 15.8 percent over the ten years from 2014–2015 through 2024–2025. As described above, the $1,000 and $2,000 grant increases for aided students attending private colleges would shift 80–124 and 153–234 students per cohort out of the public system, respectively, depending on the assumed elasticity of response. Following the same procedures described in the Georgia case, we find that implementation of the simulated increased grant levels then has the ability to save $21–$33 million (for the $1,000 grant increase) or $41–$62 million (for the $2,000 increase) in public sector building costs, respectively, depending on the response elasticity assumed (see Table 2).

In addition, Kansas may be able to pursue more efficiently its goal of increasing STEM degree production by shifting students to PND colleges. As in California (but unlike the country as a whole), graduation rates at Kansas PND colleges are slightly lower than those at matched public institutions, so overall degree

production would drop by 5–15 degrees per year out of the 80–234 additional students per year shifted to the PND colleges, depending on grant size and price elasticity response. But given the success of PND colleges at getting early STEM majors to graduate with a STEM degree, the additional spending may still be worthwhile.

Putting a precise figure on how shifting students to PND colleges could change the degree mix is difficult. As outlined in our prior analysis, PND colleges do not attract as many STEM and health students as those in the matched public institution group nationally, but those who do attend PND colleges are much more likely to persist in their field. If the hypothesized grant increase were capable of shifting students who are interested in STEM in the first place to the PND sector, then STEM attainment should rise. But as our elasticity estimates are not detailed enough to estimate how grant aid changes affect those with STEM and health interests, no firm figure can be put on the effects of the policy change on degree output in these fields.

## Pennsylvania

Pennsylvania does not expect increased numbers of high school graduates, according to WICHE, but it has a robust PND sector as well as an explicit policy goal of increasing STEM attainment that is rewarded in its current performance-funding scheme involving the Pennsylvania State System of Higher Education (public nondoctoral) institutions. In Pennsylvania, the state spends almost the same in grant aid per recipient per degree at PND colleges as at matched public institutions ($16,603 vs. $16,734). The small gap closes quickly with the addition of PND-specific funding, such that even the $1,000 grant increase ends up costing the state more in grant funding, on the order of $3.0–$4.6 million per cohort (assuming the increase can be targeted only to those whose sector decision it affects) to attract 600–918 additional students per year to PND colleges rather than to public options. With a $2,000 grant increase for students switching to private colleges, we estimate that 1,157–1,767 students would shift their enrollment to

*We estimate that by shifting a significant number of students from public to PND institutions, Pennsylvania would produce more college graduates.*

a PND institution at a cost to the state of $11.8–$18.0 million, assuming the grants can be precisely targeted. These additional costs, however, would be more than offset by assumed savings in appropriations to public institutions on the order of $6–$10 million per cohort with a $1,000 grant, or $13–$19 million with a $2,000 grant. Costs for an untargeted grant would be much higher, under the most expensive assumptions topping $100 million per year, which would swamp the savings from reduced appropriations to public institutions.

We estimate that by shifting a significant number of students from public to PND institutions, Pennsylvania would produce more college graduates. Depending on grant size and elasticity, we estimate that the effect would be between an additional 44 (with a $1,000 grant and an elasticity of -1.0) and 130 degrees per year (with a $2,000 grant and an elasticity of -1.53), because PND colleges in Pennsylvania have better completion rates and times. In addition, PND colleges could help Pennsylvania meet its STEM goals by keeping STEM students in their fields and on the path to graduation, although we are unable to provide an estimate of this effect for the reasons already outlined.

## Virginia

Virginia is a state of interest because it has an increasing high school age population and an already-vibrant private higher education sector into which some of this additional population could be directed. The state has long had a Tuition Assistance Grant program in place for resident students attending private nonprofit colleges in the state. Virginia also has a particularly large difference in state spending per student between public and private institutions, and thus there is the potential for significant savings by incentivizing shifts of students to PND colleges from matched public institutions.

State tuition aid grants are significantly lower per recipient per degree at PND colleges than at matched public institutions in Virginia ($14,225 vs. $27,863). Therefore the state would presumably be able to save

on grant aid overall by increasing such grant aid (for example, by raising grant amounts) to those who switch to PND colleges from matched public institutions by any amount up to the difference ($13,638 per degree). This is before taking into account savings in appropriations to public institutions.

We calculate that the hypothesized $1,000 grant increase would entice 410–627 students per year to switch from matched public institutions to PND colleges in Virginia, depending on whether the response elasticity is -1 or -1.53. Similarly, the $2,000 grant increase would lead to an estimated 786–1,202 sector switches. These switching students would allow for the savings in tuition grant aid described above. Adding in the assumed decrease in appropriations per student for public institutions (at 50 percent of the current per-student state appropriation), the $1,000 grant increase would allow for state savings of $7.5–$11.5 million per entry cohort, and the $2,000 increase would allow for savings of $14.3–$22.0 million per entry cohort, each depending on elasticity. Of course, these projections assume that the cost of the additional grant aid can be effectively targeted to sector switchers. If this targeting cannot be accomplished and the larger grants go to all private sector students, then the switch would produce a net additional cost to the state of about $34 million per entry cohort for the $1,000 grant boost, or $75 million for the $2,000 increase.

Since Virginia's college age population is increasing substantially, there may well be possibilities for savings on public sector capital expansion as well, similar to what could occur in Georgia and Kansas. IPEDS shows an average of 137,400 FTE undergraduates in Virginia's public institutions over our sample years, and WICHE projects that the state's high school graduates will increase by 12.7 percent over the next decade. Using the same methods described for the Georgia case above and the estimates just given for the number of Virginia students induced to shift by the hypothesized grant increases, we estimate the savings in public sector capital costs from the diversion of students to the private sector to be $108–$166 million for the $1,000

grant increase and $208–$317 million for the $2,000 increase (see Table 2). The ranges again reflect the different response elasticity assumptions.

The graduation rate at PND colleges in Virginia is, unlike the national pattern, somewhat lower than that at matched public institutions. Thus, the $1,000 grant increase would be predicted to lower the number of bachelor's degrees produced per cohort by about 100, and the $2,000 increase would lower the number of degrees by about 175 per cohort.

## Summary of Simulation Results

These policy simulations have several implications. First, for student aid grant increases targeted to students on the margin between choosing a PND and similar public institution to work, the increases only need to be modest in amount yet large enough to nudge a significant number of additional students into the PND sector. Grant increases in the range studied here—$1,000 to $2,000 more per student attending a private college in order to offset the higher tuition—would likely move significant (but not large) numbers of students across the sectors. We found that in two of our five target states PND students already received larger state aid grants on average than public sector students, so having more students shift sectors would not likely produce any state savings on typical aid grants. Benefits to the state also depend in important measure

upon cutting appropriations to public institutions if their enrollments fall (or rise less than expected), which might be difficult to accomplish politically. In cases where substantial enrollment growth is projected—for example, Georgia, Kansas, and Virginia among our case study states—the prospects for savings on public sector capital expansion could well make the idea of absorbing some of the demand in the private sector considerably more attractive. Using what we think are conservative assumptions about public capital cost savings from diverting significant numbers of students to the private sector, we estimate capital cost savings in Georgia and Virginia in the $100–$300 million range and in Kansas from $20–$60 million. The ranges reflect the size of the grant increases and the response elasticities that are assumed, plus assumptions about capacity constraints in the various states and generic assumptions about higher education construction costs.

Another component of benefits from inducing students to switch to private institutions arises from private sector colleges being able to produce degrees more efficiently. Although nationally PND colleges have a substantial edge in degree productivity over their public sector counterparts, in three of the five states examined the PND sector is not more productive of degrees than its public peers; therefore this potential benefit might not be realized. PND colleges also are better (nationally) in retaining students interested in STEM and health fields, but available data did not permit us to estimate this effect accurately at the state level.

Finally, it is clear that any policy designed to shift students across sectors to be cost effective must be able to target the financial incentives provided precisely to the students whose decisions are affected. If all aid-eligible students—not just those who are induced to switch—receive the benefits of the grant increase, the costs to the state quickly balloon to the point at which they swamp any likely benefits. Such targeting may be a challenge, for we cannot be sure precisely what decisions individual students will make—only that more

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students in general will choose the private sector if the net tuition price is significantly lowered. One way to approximate such targeting, it seems, would be to shift policy thinking out of the current student aid paradigm to consider simply rewarding private colleges for enrolling more state resident students than they did in a base year. The colleges might try to do that via more generous institutionally funded grants for resident students in hopes of recouping their costs and more from the state incentives provided were they successful. This is certainly a less straightforward approach, and thus not as easy to explain and justify.

## HIGHLIGHTS: State Policy Changes

- California is a state of interest because of its large size and prominence, the strains on its public finances and public baccalaureate education capacity, and its considerable number but relatively low proportion of PND colleges. An increase in aid spending targeted to those who "switch" from the public to private sector would be more than offset by the assumed decrease in operating appropriations to public institutions. This comes to $3.2–$4.8 million in savings per cohort with a $1,000 grant aid increase or $6.2–$9.5 million with a $2,000 grant.

- Georgia seems to have room for significant savings with a PND-targeted change in aid funding. Georgia could save an estimated $0.3–$0.6 million per cohort in targeted state grant aid with a $1,000 grant increase for private sector students, with 387–592 students shifting to PND colleges, depending on net price elasticity.

- Following the same procedures described in the Georgia case, implementation of the simulated increased grant levels has the ability to save Kansas $21–$33 million (for the $1,000 grant increase) or $41–$62 million (for the $2,000 increase) in public sector building costs, respectively, depending on the response elasticity assumed.

- By shifting a significant number of students from public to PND institutions, Pennsylvania could produce more college graduates. Depending on grant size and elasticity, the effect could be between an additional 44 (with a $1,000 grant and an elasticity of -1.0) and 130 degrees per year (with a $2,000 grant and an elasticity of -1.53), because PND colleges in Pennsylvania have better completion rates and times.

- Virginia is a state of interest because it has an increasing high school age population, a vibrant private higher education sector, and a long-standing Tuition Assistance Grant for resident students attending private colleges in the state. Adding in an assumed decrease in appropriations per student for public institutions, a $1,000 grant increase targeted at students who switch from the public to the private sector would allow for state savings of $7.5–$11.5 million per entry cohort and a $2,000 grant increase would allow for savings of $14.3–$22.0 million.

# Conclusion

In the research and analysis underlying this report, we have explored from several perspectives the relative costs and effectiveness of private nondoctoral colleges and universities and the public institutions most like them. The data demonstrate clearly that PND colleges as a group produce superior graduation rates and time to degree for graduates and that these significant advantages apply across student demographic categories. The PND colleges also do a superior job of retaining students who express an initial interest in STEM and health fields. These are important dimensions of institutional effectiveness.

On the costs side, PND colleges are shown to be far less costly to taxpayers, especially state taxpayers, per bachelor's degree produced than comparable public institutions, although they do cost students and families substantially more since state appropriations do not subsidize tuition rates at PND colleges. Although PND students pay more out of pocket and take on somewhat greater loan burdens, they complete bachelor's degrees at substantially higher rates and are less likely to default on their student loans than the generally comparable student bodies at matched public institutions. Overall, the full societal resource costs per degree—including both public and private costs—at PND institutions are somewhat less than those at comparable public institutions, especially so when the opportunity cost of additional student time spent in public colleges is factored in.

*The data demonstrate clearly that PND colleges as a group produce superior graduation rates and time to degree for graduates and that these significant advantages apply across student demographic categories. The PND colleges also do a superior job of retaining students who express an initial interest in STEM and health fields.*

To explore whether these cost-effectiveness advantages of PND colleges could be further exploited by plausible state policy "tweaks," we simulated the effects of modest increases in state student aid grants to aid-eligible private higher education students in five states that were chosen for their geographic variation and variation in policy-relevant contextual conditions. In all five states there are already existing student aid grant programs for which private nonprofit college students are eligible, therefore implementation would be straightforward. The results suggest that plausible shifts in policies could have significant but not dramatic impacts on enrollment allocations across sectors and could, under favorable conditions present in some states, significantly but modestly increase degree completion rates and, more speculatively, the output of

bachelor's degrees in high-priority STEM and health fields. For benefits to states to outweigh costs it would be necessary for policies to be designed so as to target quite precisely the students whose decisions would be affected, which presents a policy design challenge. States facing substantial growth in demand for higher education and public higher education capacity that is close to fully utilized are the most likely candidates for interest in such policy changes, because they could plausibly save substantial sums—in the hundreds of millions of dollars in the larger states—by reducing public sector capital expansion costs.

## HIGHLIGHTS: Conclusion

- On the costs side, PND colleges are shown to be far less costly to taxpayers, especially state taxpayers, per bachelor's degree produced than comparable public institutions. PND colleges do cost students and families substantially more, however, because state appropriations do not subsidize tuition rates at PND colleges. Although PND students pay more out of pocket and take on somewhat greater loan burdens, they complete bachelor's degrees at substantially higher rates and are less likely to default on their student loans than the generally comparable student bodies at matched public institutions.

- Overall, the full societal resource costs per degree—including both public and private costs—at PND institutions are somewhat less than those at comparable public institutions, especially so when the opportunity cost of additional student time spent in public colleges is factored in.

- The results of providing more state grants to students to incentivize attendance at a private non-doctoral college rather than a public institution suggest that plausible shifts in policies could have significant but not dramatic impacts on enrollment allocations across sectors. In addition, such changes could, under favorable conditions present in some states, significantly but modestly increase degree completion rates and, more speculatively, the output of bachelor's degrees in high-priority STEM and health fields.

1   These categorizations are made using the basic Carnegie Classification contained within IPEDS (U.S. Department of Education 2014), where "doctoral/research universities" are comprised of "Research Universities (high or very high research activity)" and "Doctoral/Research Universities" and "nondoctoral colleges" are comprised of "Baccalaureate Colleges—Arts & Sciences or Diverse Fields" and "Master's Colleges and Universities (smaller, medium, or large programs)."

2   Location is determined by the ZIP code of the college. The natural logarithm of the distance in miles between the centroid of the ZIP code of one college and the centroid of the ZIP code of another college is taken to be the distance between those two colleges. Two colleges in the same ZIP code are taken to be one mile apart.

3   Some private nondoctoral (PND) colleges are highly selective and have a more national footprint, and for these colleges location might not be relevant. But, as shown in Figure 1, these highly selective colleges, as defined by the proportion of applicants admitted, make up a very small part of the PND sample.

4   Private doctoral (PD) institutions are not included in the comparison group for PND colleges since the most relevant margin for policy action is the comparison between private and public nondoctoral colleges.

5   A few PND institutions did not have a close public sector match, so the Matched PND group differs slightly from the overall PND sector. See Appendix A and Appendix B for details.

6   We examined five-year graduation rates as well. We found these rates and the sector comparisons so similar to the six-year rates that they are not discussed here.

7   The difference between average time-to-degree at matched PND and public colleges is statistically significant at the .01 level.

8   In the 2012 National Bureau of Economic Research Merged Outgoing Rotation Group file for the Census Bureau's Current Population Survey, among respondents aged 25–35 with some college but no degree, the mean and median number of years of college education reported were both roughly 1.5.

9   This calculation may well understate the actual difference between colleges with high graduation rates (such as private doctoral and nondoctoral colleges) and those with lower rates if the large difference in four-year graduation rates reflects that students at low graduation rate colleges stay longer before dropping out. We do not assume that here.

10  STEM as defined by the U.S. Department of Homeland Security (2012) for the Student and Exchange Visitor Program.

11  Two-digit IPEDS Classification of Instructional Program (CIP) code 51.

12  The remaining nearly 60 percent of students who start in STEM or health either switch majors or drop out.

13  Note that for public institutions these average aid figures come out to more than their average tuition figures. The additional aid can assist with fees, books, housing, or other college-related expenses. It should be noted that these average aid figures include both in-state students and out-of-state students. The latter are about 28 percent of first-year students at public institutions overall—whose tuition is much higher.

14  We do not address an additional form of governmental aid: federal and state grants made directly to colleges, which are awarded less to PND colleges than to matched public institutions. These grants are often for research and other purposes that are not of interest here. Research and non-research grants cannot be separated in IPEDS data, so the report excludes the entire grants category.

15  Appropriations are defined broadly in IPEDS, as "amounts received by the institution through acts of [the federal/state] legislative body, except grants and contracts. Funds reported in this category are for meeting current operating expenses, not for specific projects or programs."

16  The assumption that charges are constant across years is somewhat problematic. It is likely that government spending may decrease over a student's college career since some out-of-state students may become legal residents and some student aid grants have limited time frames. Also, students who receive aid, being more needy on average, may be less likely to persist. Allowing average government spending to decrease over the student's career would improve the picture somewhat for matched public institutions since graduation takes longer at these colleges,

although implausibly large drops would be required to reverse the main results favoring the PND colleges presented above. Under the assumption that average grant aid expenditures per student drops 5 percent from its first-year maximum for each year the student has been in college, state grant aid plus appropriations per degree would be $10,954 for matched PND colleges and $53,682 for matched publics. Those numbers for federal grant aid plus appropriations are $30,983 for the PND colleges and $37,894 for the matched publics.

17  The figures for public institutions assume that grant aid, including federal aid, is apportioned equally to in-state and out-of-state students, so these numbers likely understate the total charge to in-state students and overstate the charge to out-of-state students.

18  More formally, students would make decisions on the basis of comparing the graduation rate-adjusted charges only if they were risk-neutral, since these are expected values. If students are risk-averse, they will be willing to tolerate a somewhat higher average cost-per-degree when they are more likely to attain the degree with its attendant benefits.

19  These figures are calculated using weekly earnings and assume that students work an equal number of weeks per year both in and out of college. This likely overestimates earnings in college, and so it is a conservative estimate of the additional opportunity cost of attending a matched public institution.

20  This figure averages in-state and out-of-state students for matched public institutions, weighting in-state and out-of-state tuition by the proportion of students who are in-state and out-of-state.

21  As Figure 11 shows, nationally, the PND colleges graduate students at a rate that is more than 11 percentage points higher than the matched public sample, so it is likely that in most states PND colleges perform better on this measure. Among our five case study states, though, only in Georgia and Pennsylvania do the PND colleges show an edge similar to the national one. In California, with a selective and generally high-quality public four-year sector, the six-year graduation rates are high and nearly equal across the sectors. In the other two case study states, Kansas and Virginia, the matched public sector institutions have modestly higher graduation rates than the PND institutions. Note, however, that in these last three states

the number of matched public institutions happens to be quite small (five or less), so the cross-sector comparisons at the state level are less meaningful. This is because, while our institutional matching procedure takes geographic proximity into account, it is only one of a number of factors, so that a state need not have a large number of public colleges represented in the national pool of public institutions matched to the PND colleges. See Appendix A for a complete description of our procedures for creating the matched sets of PND and public institutions.

22  This may be a conservative assumption. The savings in appropriations to public institutions might be larger, but we want to make a reasonable allowance for fixed costs that cannot readily be cut when enrollments are reduced modestly.

23  We calculate net price as the difference between all tuition, fees, and charges to students and the average grant aid for all students. Colleges with an average net price below $4,000 per year are dropped to avoid unrealistic simulated responses, since elasticity may change at very low prices. This approach prevents the change in net price from being above 50 percent.

24  Notably, we are using here (and in the rest of this section) *aid per recipient per degree,* as opposed to *aid per student per degree* as in the rest of our analyses, since the former allows us to simulate the effects of targeting the additional grant aid to those who already receive grant aid. We think that this is the most realistic policy scenario.

25  Note that this approach implies no change in public versus private sector shares of increased enrollments.

26  See Section 6 of the HESSS. These figures come from Weber State University, Utah Valley University, Southern Utah University, and Dixie State College.

27  Notably, this figure is in the "ballpark" of the cost per FTE enrollment seat estimated by architectural and other consultants to the University of Washington (2007) in a report to the governor on the cost of developing a new nondoctoral campus in a small city north of Seattle. Dividing the lower end of the estimated cost to develop this new campus (about $545 million exclusive of residences) by the planned capacity of 6,000 students yields a cost per student of about $90,000.

## APPENDIX A: Constructing the Matched Comparison Groups

For each PND college, *i,* and each non-PND college, *j,* we calculate the Mahalanobis distance (a standard measure of difference) between their sets of characteristics:

$$d_{ij} = ( X_i - X_j )' S_x^{-1} (X_i - X_j)$$

where $d_{ij}$ is the Mahalanobis distance, $X_i$ is a vector of the previously mentioned characteristics of college *i*, $X_j$ is a vector of the same characteristics (see page 8) for college *j*, and $S_x^{-1}$ is the inverse of the sample variance-covariance matrix of the characteristics in the X vectors.[i, ii] The Mahalanobis distance is a way of judging the overall "closeness" of two colleges considering several characteristics. Colleges with many similar characteristics are very close, while those where none of the characteristics are similar, or where several of the characteristics are very different, are not close.

For each PND college, *i,* we have the Mahalanobis distance (i.e. calculated difference across the characteristics) between college *i* and each public institution, *j.* We choose college *i*'s best match based on which public institution *j* is closest to it in Mahalanobis distance. So, for example, if the Mahalanobis distance between PND institution Trinity College and PubND institution West Texas A & M is 2, but the distance between Trinity College and PubND institution West Liberty University is 1, then West Liberty University is a closer match for Trinity College than is West Texas A & M. If every other public institution has a distance of more than 1 with Trinity College, then West Liberty University would be Trinity College's closest match and would be one of the matched institutions in the matched set. Having chosen each PND college's closest match, we end up with a set of matched public institutions that has similar characteristics as the set of matched PND institutions. There are 310 colleges in the non-PND (matched) public comparison group.[iii] Some of the public institutions in the non-PND (matched) group are the best match for more than one PND college. We allow non-PND public colleges to be matched more than once because this allows for an appropriately weighted comparison group with the best possible match for each PND college, and because the number of PND colleges is larger than the number of potential public comparison institutions. Table 1A shows that, among the 515 public institutions eligible to be matched, 205 are not matched at all to a PND college. Among those that are matched, 125 are matched once, 70 are matched twice, 53 are matched three times, and 62 are matched four or more times. The two most heavily matched public institutions, the University of West Georgia and Wright State University, are matched to ten and 16 PND colleges, respectively.[iv]

A modest number of PND colleges do not resemble any of the public institutions in terms of characteristics. If very dissimilar colleges were matched to each other, it could introduce bias in estimates (Althauser and Rubin 1970). We drop any college from this comparison approach if it does not have a match where the distance is less than .2 of a standard deviation of the Mahalanobis distance measure over all colleges (as suggested in Steiner and Cook 2013). About 5 percent of the sample, or 41 PND colleges, are dropped from the matched data set due to this restriction.[v] This means that we have a set, PND (Matched), of 706 PND colleges that found a close match, which we compare to the set of 310 matched public institutions that resemble the PND colleges closely overall.

TABLE 1A

**Number of Private Nondoctoral Matches per Public Institution**

|  | Total | No Matches | One Match | Two Matches | Three Matches | Four or More Matches |
|---|---|---|---|---|---|---|
| Number of Colleges | 515 | 205 | 125 | 70 | 53 | 62 |

## Appendix A Endnotes

i   The above equation with the $S_x^{-1}$ left out is the square of the Euclidian distance across all the characteristics, which is analogous to the distance between two points on a map. The correction ensures that highly correlated characteristics are not overrepresented in the distance calculation (Steiner and Cook 2013). For example, the proportion of students receiving loans and the proportion of students receiving Pell grants have a correlation of .5. The Euclidian distance using our list of characteristics would be heavily determined by financial aid. The Mahalanobis distance down-weights the redundant selectivity variables in order to give similar weight to financial aid and other factors.

ii   The location characteristic is measured only relatively between colleges, so it does not make sense to think of the correlation between location and the other characteristics. As such, sample variance-covariance $S_x$ is calculated for all other characteristics, and then an additional column and row is added for Location, which is equal to 1 on the diagonal and 0 elsewhere.

iii   The use of only the single best match per PND school, as opposed to averaging over the best X matches, where X>1, minimizes the bias of estimates of differences in outcomes, but these estimates are less efficient than those using more than one match. Efficiency is less of a concern due to the large sample we use so we choose to use a single matched institution for each PND school.

iv   These frequently matched institutions are similar to the PubND averages on our graduation outcome measures.

v   About half of these PND colleges are in Hawaii or Puerto Rico and do not have public alternatives with similar characteristics nearby. Of the other half, most are religious institutions with unusual characteristics that are difficult to match in the public sector. A list of the unmatched PND colleges is provided in Appendix B.

## Appendix B: Unmatched Private Nondoctoral Colleges

The full list of private nondoctoral colleges that were not matched to any public college in the matching algorithm follows:

- Alaska Pacific University (Alaska)
- Atlantic University College (Puerto Rico)
- Bayamon Central University (Puerto Rico)
- Brigham Young University-Hawaii (Hawaii)
- Caribbean University-Bayamon (Puerto Rico)
- Chaminade University of Honolulu (Hawaii)
- Dominican University of California (California)
- Hawaii Pacific University (Hawaii)
- Holy Names University (California)
- Inter American University of Puerto Rico-Aguadilla (Puerto Rico)
- Inter American University of Puerto Rico-Arecibo (Puerto Rico)
- Inter American University of Puerto Rico-Barranquitas (Puerto Rico)
- Inter American University of Puerto Rico-Fajardo (Puerto Rico)
- Inter American University of Puerto Rico-Guayama (Puerto Rico)
- Inter American University of Puerto Rico-Ponce (Puerto Rico)
- Inter American University of Puerto Rico-San German (Puerto Rico)
- Lynn University (Florida)
- Menlo College (California)
- Mills College (California)
- Monterey Institute of International Studies (California)
- Northwest Christian College (Oregon)
- Notre Dame de Namur University (California)
- Pontifical Catholic University of Puerto Rico-Arecibo (Puerto Rico)
- Pontifical Catholic University of Puerto Rico-Mayaguez (Puerto Rico)
- Saint John Fisher College (New York)
- Saint Mary's College of California (California)
- Samford University (Alabama)
- Simpson University (California)
- Universidad Adventista de las Antillas (Puerto Rico)
- Universidad Del Este (Puerto Rico)
- Universidad Metropolitana (Puerto Rico)
- Universidad of the Sacred Heart (Puerto Rico)

**Appendix C: Tables**

TABLE 1C

## Persistence of STEM and Health Majors by College Type, 2005–2012

**Private Nondoctoral**

| First Major | Field of Bachelor's Degree | |
| --- | --- | --- |
| | STEM/Health | Other/Dropout |
| STEM/Health | 0.407 | 0.593 |
| Other | 0.069 | 0.931 |

**Public Nondoctoral**

| First Major | Field of Bachelor's Degree | |
| --- | --- | --- |
| | STEM/Health | Other/Dropout |
| STEM/Health | 0.234 | 0.766 |
| Other | 0.036 | 0.964 |

**Public Doctoral**

| First Major | Field of Bachelor's Degree | |
| --- | --- | --- |
| | STEM/Health | Other/Dropout |
| STEM/Health | 0.238 | 0.762 |
| Other | 0.043 | 0.957 |

**Private Doctoral**

| First Major | Field of Bachelor's Degree | |
| --- | --- | --- |
| | STEM/Health | Other/Dropout |
| STEM/Health | 0.459 | 0.541 |
| Other | 0.065 | 0.935 |

**Note:** This table depicts the proportion of students who start in a STEM or health major (or something else, as depicted on the left) who end up earning a bachelor's degree in STEM or health (as depicted on the top). For example, 40.7 percent of private nondoctoral students who indicated STEM or health interests as first-year students earned a degree in those fields, compared to 23.4 percent of the same initial group at public nondoctoral institutions.

**Source:** U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students (BPS) 2003–2004 cohort. Analysis by authors.

TABLE 2C

## National and State-Level Six-Year Graduation Rates by Sector

| | Six-Year Graduation Rates at Matched PNDs (Number of PNDs) | Six-Year Graduation Rates at Matched Publics (Number of Matched Publics) |
| --- | --- | --- |
| National | .558 *(N = 729)* | .445 *(N = 310)* |
| California | .633 *(N = 31)* | .637 *(N = 4)* |
| Georgia | .507 *(N = 18)* | .361 *(N = 13)* |
| Kansas | .442 *(N = 16)* | .478 *(N = 5)* |
| Pennsylvania | .671 *(N = 58)* | .554 *(N = 12)* |
| Virginia | .524 *(N = 24)* | .590 *(N = 5)* |

**Note:** PND = private nondoctoral

**Source:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.

**TABLE 3C**

**Differences in Graduation Rates between Matched Private Nondoctoral and Matched Public Institutions (Entering Classes 1999–2006)**

|  | Four-Year Graduation Rates (Matched PND – Matched Public) | Six-Year Graduation Rates (Matched PND – Matched Public) |
|---|---|---|
| All Students | .221 | .119 |
|  | (.003) | (.003) |
| Men | .213 | .118 |
|  | (.003) | (.003) |
| Women | .221 | .117 |
|  | (.003) | (.003) |
| White | .232 | .131 |
|  | (.004) | (.004) |
| Black | .168 | .099 |
|  | (.005) | (.005) |
| Asian | .223 | .118 |
|  | (.006) | (.007) |
| Hispanic | .200 | .113 |
|  | (.005) | (.006) |

**Note:** Observations are at the institution/year level. Standard errors are in parentheses. All differences are statistically significant at the .01 level. For all students, the four- and six-year graduation rates at matched PND colleges are 44.2 percent and 56.6 percent, respectively. For matched public colleges these rates are 22.1 percent and 44.7 percent, respectively.

**Source:** U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. Analysis by authors.

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