RESEARCH REPORT

Choice Deserts

How Geography Limits the Potential Impact of Earnings Data on Higher Education

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Executive Summary

Policymakers from both parties agree that prospective students need access to better information on quality when deciding whether and where to attend college and what degree program to pursue. The Obama administration and several states have led the way, publishing information on typical earnings for those who attend a given college or pursue a given program of study. Such efforts rest on the premise that more and better information will improve consumers' ability to make informed choices.

But little empirical evidence exists on the potential effects of providing this kind of information, and the effects of this strategy could fall short of expectations. Students may not pay attention to the information if it is not presented in a compelling and useful format, information may not be available for colleges or programs they're interested in, or there may not be a sufficient number of accessible programs to compare. Further, students who cannot relocate to attend college may not be able to use comparative earnings information to decide among colleges.

In this report, we examine detailed administrative data from Virginia to assess the potential of labor market outcomes measured at the program (major) level, such as the average earnings of business majors at a given college, to help prospective students decide among different programs of study. We focus on Virginia because it is the only state that is generating earnings data by major for all public and private nonprofit colleges in the state.

We find that data on the average earnings of graduates have the potential to add value to other available metrics. Some institutions report similar core metrics, such as graduation rates, but vary substantially in the average earnings of their graduates within a given program. Consequently, earnings data make it possible to better approximate the likely return on investment from attending a particular program at a particular school.

But we also find that for large numbers of students, program-level data are unlikely to be helpful when deciding where to go to college to pursue a given course of study. Nearly two thirds of Virginia students live in an "education desert," where no programs are accessible, or in a "choice desert," where there is only a single program or the data are insufficient to make comparisons. Only a minority of students (36 percent) can use earnings data to compare a given program of study at multiple colleges that vary meaningfully in their labor market outcomes.

The potential utility of earnings information for deciding among colleges is especially limited for students whose higher education choices are constrained by geography or their level of academic

preparation. For example, among students only eligible for an open-access program, only 4 percent have a true, information-based choice between at least two programs within 25 miles of their home.

Our analysis, which is based on data from a single state, is not without limitations. Earnings data may be useful for purposes other than comparing institutions, such as deciding among majors within an institution. We focus on high school seniors (though about half of students attend college later in life) and our analysis does not consider the role of online learning in overcoming geographic barriers.

Our findings make clear that "build it and they will come" is unlikely to be a successful approach when it comes to publishing earnings data as a means of improving the market for higher education. Instead, policymakers and researchers need to consider strategies that account for the limitations of this approach. Specifically, we recommend the following:

- The federal government should continue to refine its measurement of earnings and other labor market outcomes and increase the granularity of published data to include individual programs of study. While those efforts are underway or stalled by politics, it should work with states to augment their ability to track current and former students who cross state lines.
- The market model for higher education needs to be rethought for the many students who face significant geographic or academic constraints. High-quality information on labor market outcomes could well play a leading role in a new, innovative regulatory regime. For example, these outcomes could be part of required disclosures to new students or tied to institutional eligibility for financial aid.
- Policymakers should pay particularly close attention to geographic variation in the availability of different programs of study, particularly those that are connected to local industries. For example, states could undertake policy efforts aimed at creating or expanding needed programs in underserved areas. Such efforts could aim to decrease both the number of students without access to any program (those in education deserts) and the number of those only able to consider a single program (those in choice deserts).

Policymakers should not abandon their efforts to enable prospective students, policymakers, and the public to assess colleges and universities based on data on student outcomes rather than reputation and vague impressions from campus tours. But our findings suggest that this approach's potential to improve the market for higher education likely lies in the other efforts it makes possible and not in the inherent usefulness of publishing earnings data.

Choice Deserts

The market for higher education is suboptimal. One reason for this is a lack of information for consumers about quality and price. Until recently, prospective students could learn little about the employment outcomes of students at different colleges. And students only learn the price that they will pay at each institution after applying for admission, being accepted, and receiving a financial aid offer. As a result, institutions too often compete on factors such as the attractiveness of buildings and grounds and the average SAT scores of the freshman class, which all can drive up costs, rather than on net price and quality.

Bipartisan policy efforts at the state and federal levels have tried to remedy this problem by providing more information to guide the decisions of prospective college students and their families. In 2015, Republican Senator Marco Rubio and Democratic Senators Ron Wyden and Mark Warner introduced the Student Right to Know Before You Go Act, which would make more information on graduation rates, borrowing, and labor market outcomes available to prospective students.[1] Underpinning these efforts is an expectation that more information will make the higher education market function better.

Congress has yet to act on this issue, but new measures of the average earnings of former college students have proliferated nonetheless. In late 2015, the Obama administration augmented its College Scorecard by adding earnings information for most colleges in the country. A White House press announcement for the new Scorecard earnings data claimed that "the new way of assessing college choices, with the help of technology and open data, makes it possible for anyone—a student, a school, a policymaker, or a researcher—to decide what factors to evaluate."[2] Ben Miller from the Center on American Progress lauded the College Scorecard as showcasing "the power of unlocking even a small portion of the data capabilities held by the federal government" (Miller 2016).

States are also embarking on a parallel strategy by creating state-level websites, often through partnerships with organizations such as College Measures. States currently have the advantage of being able to report labor market outcomes at the program (major) level for their public institutions (e.g., business majors at a particular university) but generally cannot follow workers across state lines or produce similar measures for private colleges. The creators of these state-led measures have hailed them as "a consumer-oriented effort that provides students, parents and policymakers with information to help them make choices when it comes to higher education."[3]

The logic behind these policy efforts is compelling, but there are also several reasons why their impacts may fall short of expectations. Students may not pay attention to the information available, it may not be available for programs they're interested in, it may not add much to information already available, or there may not be a sufficient number of accessible programs to compare. In particular, students who are geographically constrained (i.e., cannot relocate to attend college) or academically constrained (i.e., do not have the credentials to get into a selective school) may not be able to make use of comparative earnings information when deciding whether and where to go to college.

In this report, we examine data from Virginia to assess the potential of information on labor market outcomes, measured at the program level (e.g., the average earnings of engineers from Virginia Tech), to decide among different institutions. We focus on Virginia because it is currently the only state generating earnings data by major for all public and private nonprofit colleges in the state (only for-profit colleges are excluded).

We find that program-level earnings data add meaningful information to existing metrics. Earnings data are not perfectly correlated with current metrics, such as graduation rates, and they meaningfully change estimates of the return on investment (ROI) of particular programs. Put another way, many institutions have similar graduation rates but substantial variation in the earnings of their graduates.

But we also estimate that nearly two-thirds of students cannot make use of earnings information to decide among institutions. These students cannot meaningfully use earnings information for this purpose because they do not have access to multiple institutions offering a given program of study for which earnings information are available and where ROI varies meaningfully. In other words, they live in "choice deserts." This is especially true for students whose higher education choices are constrained by geography or their level of academic preparation.

Earnings Measurement Challenges

Calculating the average earnings of former students or graduates by institution or program of study is far from straightforward. Some data providers, such as PayScale, use the self-reported earnings of self-selected groups of former students who visit a particular website. Earnings measures that rely on administrative data collected by state and federal governments are not self-reported, but they have their own limitations.

The earnings data included in the federal government's College Scorecard report the average earnings of former financial aid recipients—whether they graduated or not—10 years after enrollment. The earnings data are drawn from Internal Revenue Service records that capture former students regardless of where they live and are thus comprehensive, but average earnings in the Scorecard exclude former students who did not have any earnings. However, students who did not receive a federal grant or loan are not included, and students are included in an institution's average even if they spent little time there before dropping out or transferring (Whitehurst and Chingos 2015).

Federal data are not reported by program of study within each institution, but several states, including Arkansas, Colorado, Florida, Tennessee, Texas, and Virginia, have produced such data from their own records.[4] These state databases usually include only public institutions (although Virginia also includes private nonprofit schools) and are based on wage records from unemployment insurance systems, which do not capture individuals who leave the state or work for the federal government. State-reported earnings data tend to include only graduates, thereby excluding former students who did not earn a degree.

Every data provider has to make decisions that affect how average earnings are measured. The Virginia earnings data that we used for this study are only reported for programs with at least 10 graduates that appear in the wage data with earnings of at least $13,195 a year (corresponding to 52 weeks of employment at 35 hours a week at $7.25 an hour). Consequently, part-time workers and those who do not appear at all in the earnings data are excluded from the reported average earnings.

The primary earnings measure used in this study is the average earnings of graduates, by program of study, 18 months after graduation. The average earnings data we use are averaged across students who graduated between 2005 and 2010.[5] We use this metric to estimate lifetime earnings based on earnings growth assumptions that are detailed in appendix A. To facilitate comparisons across similar (but not identical) programs at different institutions, we collapse the 756 distinct programs for which earnings information are available into 46 categories, separating associate's and bachelor's degree programs (table B.3).

Differences in data sources, which former students are included, and how earnings are calculated mean that comparisons can only be made within a given dataset. Moreover, the use of different groups of students (e.g., graduates rather than any student who enrolled) makes the interpretation of these data all the more difficult. Additionally, potentially important data issues exist, such as the exclusion from early-career wage records of students who go on to higher education or who work for organizations that the system is unable to track (Schneider, Massa, and Vivari 2012).

Perhaps the most important limitation of the Virginia earnings data is that published program-level earnings data exclude students who enrolled and did not complete (i.e., did not get a degree in a given field). This limitation means that students must incorporate the likelihood of completion into their assessment of the value of a given program (Council of Economic Advisers 2015).

Do Earnings Data Add Value?

Earnings data are only likely to be useful to students deciding where to attend college if those data add information to existing measures, such as graduation rates, time to degree, net price, and selectivity. Put differently, if earnings data by major were perfectly correlated with existing measures, we would not expect that the release of the earnings data would help consumers decide among the same program offered at different institutions.[6]

We address this question in two ways. First, we examine whether average earnings varies among colleges with similar graduation rates. Second, we perform a more sophisticated ROI calculation that allows us to examine whether program-specific earnings data change ROI estimates that already account for graduation rates, time to degree, and net price.

Graduation Rates

In Virginia, graduation rates are measured at the college level, whereas earnings are measured at the program level. This means we have to look separately by program to see how average earnings are correlated with graduation rates, acknowledging that the earnings data are based on graduates from a particular program, whereas graduation rates are based on all matriculating first-time, full-time freshmen at the institution. The populations are different, but the analysis is still relevant to a potential student comparing these metrics across institutions.

On average across all programs, graduation rates are positively associated with higher average wages for bachelor's degree programs (figure 1). The average correlation coefficient is 0.35, but it ranges across programs from 0.01 to 0.75. For associate's degree programs, however, the correlation with institutional graduation rates tends to be negative, with an average correlation of -0.28, ranging from about -0.05 to -0.60. These correlations may be negative in part because graduates of two-year programs who immediately enroll in four-year programs will tend to have lower earnings because they

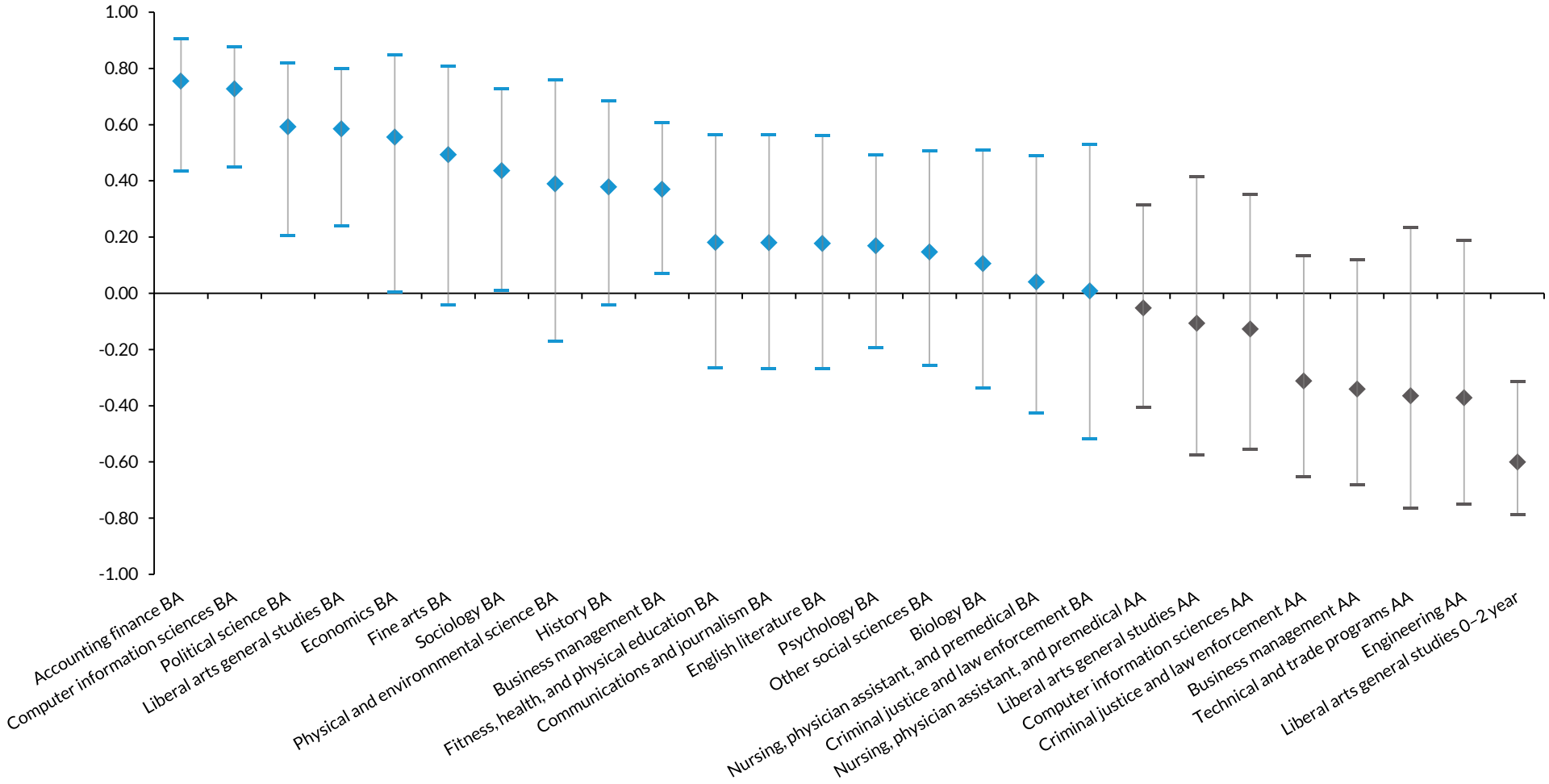
are enrolled in school. Consequently, two-year institutions with more graduates who transfer soon after leaving will have lower average earnings.

All of these correlations are imprecisely estimated because of the small number of institutions in a single state like Virginia (the number of schools included in our estimates in figure 1 ranges from 10 for associate's degrees in technical trade programs to 31 for bachelor's degrees in business management programs), but the pattern is clear: earnings data vary meaningfully even after accounting for graduation rates, and the pattern varies across programs (especially for associate's versus bachelor's degree programs).

This result is illustrated by data on business management bachelor's degree programs (where the correlation is near the median for all bachelor's-degree programs). Many examples exist of programs with similar graduation rates that vary by more than $10,000 in starting salary (figure 2).

FIGURE 1

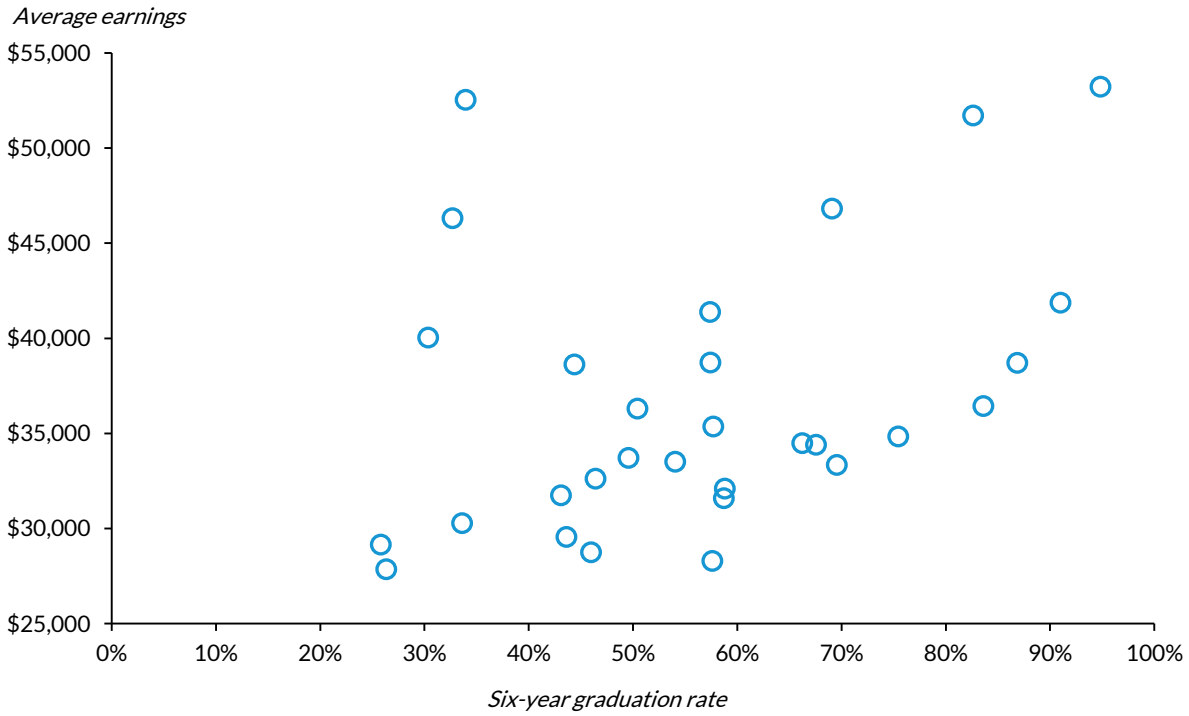
Correlation of Average Wage with Institutional Graduation Rate



Source: Urban Institute analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.
Note: Estimates are provided with a 90 percent confidence interval.

FIGURE 2

Six-Year Graduation Rate of Institution versus Average Wage of Business Management Bachelor's Degrees



Source: Urban Institute analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.
Note: r=0.37.

Why do we obtain such different results for associate's degree programs than for bachelor's degree programs? Previous work hypothesizes that an increase in educational standards (typically in the form of a lower graduation rate) can act as a signal to employers, leading to higher wages for those who graduate (Betts 1998). We observe this possibility for programs that grant two-year degrees, but we observe the opposite for programs that grant bachelor's degrees. In this case, it is possible that the signal for employers is driven by the correlation between the selectivity of an institution and its graduation rate (highly selective institutions tend to have high graduation rates; Hamrick, Schuh, and Shelley 2004).

Return on Investment with and without Wage Data

Our comparison of earnings data and graduation rates is informative but simplistic. A prospective student seeking to use earnings information to calculate the likely return on his or her educational

investments needs to filter earnings data through a framework that incorporates the likelihood of graduating, the cost of tuition and fees (after grants and scholarships), and the lost wages from attending college instead of working.[7]

We combine measures of these constructs into an ROI framework that estimates over 40 years the expected financial return of attending a particular program of study. We detail the methodology in appendix A, but the basic idea is that for each program, we calculate lifetime earnings based on average starting salaries adjusted for the institution's graduation rate. We then subtract the average net price of a degree for students from middle-income families (those with family incomes between $48,000 and $75,000) and the lost wages from going to college instead of working full time.

An important limitation of this framework is that it does not address living costs during periods of college enrollment, which vary by geography and by whether the student can commute from home to school or needs to live on his or her own. Consequently, a student from an area with a low cost of living likely faces higher living costs by attending an institution far from home in a more expensive area rather than commuting to the local college. We do not have data on students' potential living arrangements, so we cannot include this aspect of college costs in our ROI calculation, but we note it as an important subject for future research.

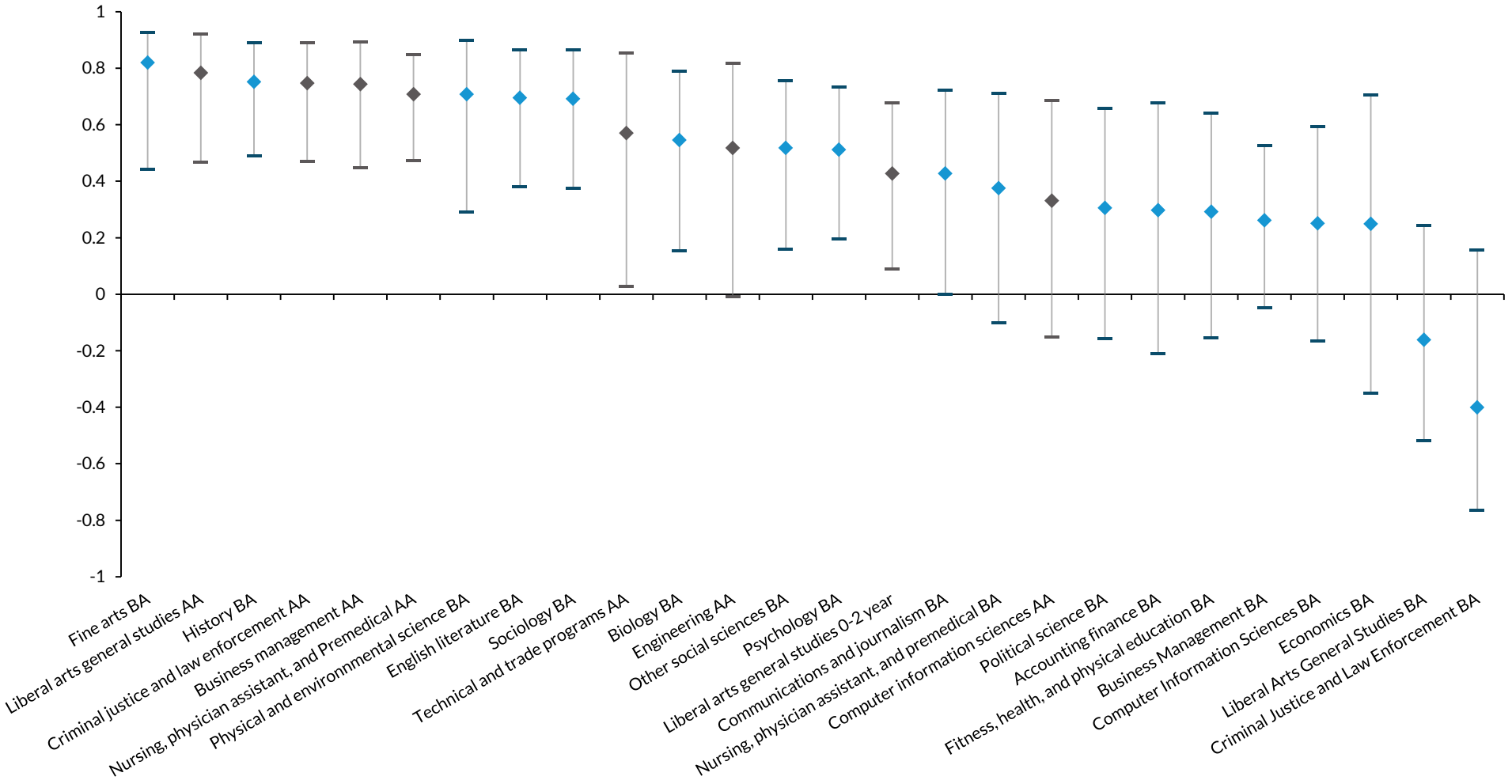
We use our ROI framework to test of the value of wage data compared with other institutional data by running the ROI calculation with a constant wage (for bachelor's degrees, the average wage of a college graduate in the state of Virginia; for associate's degrees, the average wages of an individual with some college education or an associate's degree) and comparing the result to the ROI calculation incorporating the program-level wage data.

A high correlation between ROI with program-specific earnings data and without it would indicate that either wages do not differ substantially across institutions for a given program (i.e., most of the variation is already reflected in graduation rates, time to degree, net price, etc.), or that wages across institutions for a given program differ substantially but do so in a way that is related to other ROI measures.

We find a positive correlation between the ROI measure with and without differentiated program wages for 24 of the 26 programs for which we have data (figure 3). The correlation tends to be stronger, on average, for programs culminating in associate's degrees (r=0.67) than for programs that culminate in bachelor's degrees (r=0.36).[8]

FIGURE 3

Correlation between ROI Calculations with and without Wage Data

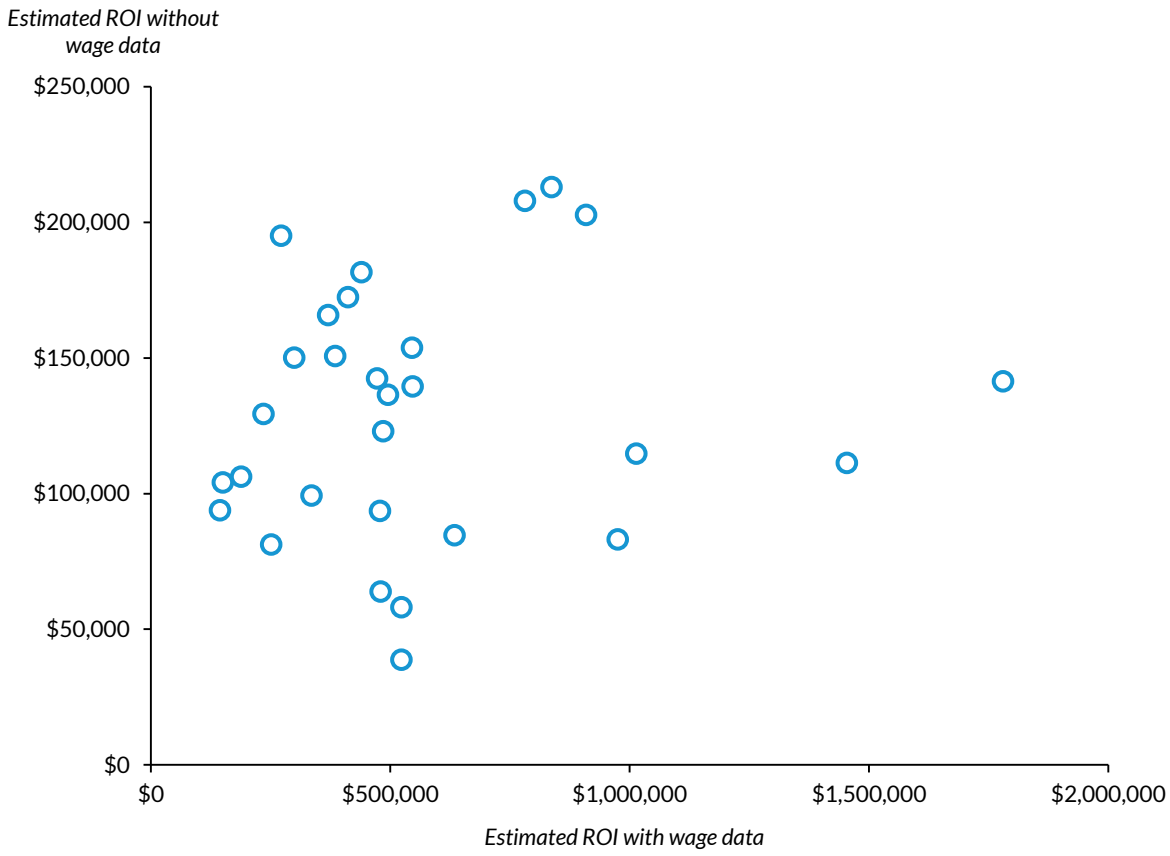


Source: Urban Institute analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.
Note: Estimates are provided with a 90 percent confidence interval.

For example, business management bachelor's degree programs with similar ROI estimates based on nonwage measures vary significantly—and sometimes widely—in ROI once wages are included in the calculation (figure 4).

FIGURE 4

ROI with Wage Data versus ROI without Wage Data of Business Management Bachelor's Degrees



Source: Urban Institute analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.
Note: ROI = return on investment. r = 0.26.

Our analysis indicates that the wage data may be more useful for those considering a bachelor's degree in a given program. This may be because of the greater variation in selectivity across four-year programs. A graduate with a degree in computer science from the University of Virginia may earn more than a graduate in the same field from Norfolk State, even if the other ROI indicators, such as graduation rate and net price, are similar. The selectivity of the college can act as a signal for employers, and employers may pay a premium for students from a given institution. We find evidence in support of this hypothesis: selectivity (defined as the school's average SAT/ACT score) is positively correlated with

average wage (r=0.38) and overall ROI (r=0.53) for bachelor's degree programs (averaged across program groups).[9]

The analyses above establish that earnings data add meaningful information to existing measures that potential students can use to assess their likely ROI in higher education. But is this information actually useful to most students as they select among institutions offering a given program? That is the question to which we now turn.

Choice Deserts

College decisionmaking is shaped not only by institutional or program factors but also by a given college's selectivity and distance from the student's home. Nationally, students at public two-year institutions attend a school that is, on average, 31 miles from home (8 miles at the median), and students at public four-year institutions are an average of 82 miles away (18 miles at the median; Hillman and Weichmann 2016). A 2015 survey of incoming freshman attending four-year colleges showed that 46 percent of students at public institutions and 31 percent of students at private colleges reported enrolling at schools within 50 miles of their permanent home (Eagan et al. 2015).

Students who want or need to attend college close to home may find themselves with few or no options depending on where they live relative to postsecondary institutions. Nicholas Hillman from the University of Wisconsin–Madison estimates that many Americans live in such "education deserts" (Hillman, forthcoming). Earnings data are unlikely to help these individuals decide among colleges because they have no options. But is the number of people for whom earnings data are unhelpful even larger because some live not in education deserts but in "choice deserts," where earnings data are (a) not available, (b) only available for a single option, or (c) do not suggest much difference between the available options?

We address this question by merging the program-level earnings data and ROI calculations described above with student-level data on high school seniors from the Virginia Longitudinal Data System. In this part of our analysis, we account for the fact that although many high school students may live near an institution that offers a program they're interested in, the options available to those students are limited by their academic histories and abilities. A student that did not take the ACT/SAT, for example, could not get into most four-year schools, where scores are mandatory for admission. Likewise, a student with a low SAT score is unlikely to get into a selective institution, such as the College of William and Mary.

To better understand what programs are actually available as options to students, we group students into three categories by eligibility for a given set of programs, and further by the distance of that program from their high school:

- Open-access eligible: We assume that a student who does not take the ACT/SAT would only be eligible for open-access institutions (defined as institutions that do not require the ACT/ SAT, almost all of which are community colleges). In Virginia, participation in the ACT/SAT is not compulsory. In 2013, 67 percent of public school graduates took either or both of the tests.[10]
- Less-selective eligible: Students that took the SAT (or ACT) and scored less than 1500 out of 2400 on the SAT (or the equivalent on the ACT) are assumed to be eligible for less-selective four-year institutions, which are institutions where the combined SAT (math and critical reading) for enrolled students in the 25th percentile was less than 1000 (roughly equivalent to a 1500 overall).
- More-selective eligible: Students that scored at least 1500 out of 2400 on the SAT (or the equivalent on the ACT) are assumed to be potentially eligible for all four-year institutions, both selective and nonselective, in Virginia. This group is roughly half of public-school ACT/SAT takers.

Table 1 shows the college attendance patterns of each of these categories of students using data on all Virginia public school graduates from the classes of 2011 and 2012. Of students who had no recorded ACT or SAT test scores (those in the "open-access eligible" pool) and attended a higher education institution in state, 75 percent attended within 25 miles of their graduating high school.[11] For those in the "less-selective eligible" pool, 57 percent of those who attended a Virginia institution remained within 50 miles of home. For students from the "more-selective eligible" pool, 35 percent of those who attended a Virginia institution attended within 50 miles, and 78 percent of these students attended school in state.

These Virginia-specific findings align with the national studies we discuss above, showing that college choice tends to be constrained by academic background and geography.

Our methodology also divides Virginia public and private, nonprofit institutions into three categories as shown in table 2.

TABLE 1

College Attendance Patterns of Virginia Classes of 2011 and 2012

	Open-Access Eligible		Less-Selective Eligible		More-Selective Eligible	
	All students	In-state students	All students	In-state students	All students	In-state students
No higher education recorded	82%	NA	49%	NA	31%	NA
Non-Virginia school (includes online)	5%	NA	9%	NA	15%	NA
Within 25 miles of high school, in-state	10%	75%	20%	46%	14%	26%
Within 25–50 miles of high school, in-state	1%	9%	4%	10%	5%	8%
Within 50–75 miles of high school, in-state	0%	3%	4%	9%	6%	11%
Within 75–100 miles of high school, in-state	1%	5%	5%	11%	13%	25%
More than 100 miles from high school, in-state	1%	8%	10%	24%	16%	29%

Source: Urban Institute analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.
Note: NA = not applicable.

TABLE 2

Virginia Public and Private, Nonprofit Colleges and Universities

Open access (No SAT/ACT required)	Nonselective (25th percentile SAT<1000)	Selective (25th percentile SAT≥1000)
Averett University-Non-Traditional Programs	Averett University	Christopher Newport University
Blue Ridge Community College	Bluefield College	College of William and Mary
Bryant & Stratton College-Richmond	Bridgewater College	George Mason University
Bryant & Stratton College-Virginia Beach	Eastern Mennonite University	Hampden-Sydney College
Central Virginia Community College	Emory & Henry College	James Madison University
Dabney S Lancaster Community College	Ferrum College	University of Mary Washington
Danville Community College	Hampton University	University of Richmond
Eastern Shore Community College	Hollins University	University of Virginia-Main Campus
Germanna Community College	Jefferson College of Health Sciences	Virginia Commonwealth University
J Sargeant Reynolds Community College	Liberty University	Virginia Military Institute
John Tyler Community College	Longwood University	Virginia Polytechnic Institute and State University
Lord Fairfax Community College	Lynchburg College	Washington and Lee University
Mountain Empire Community College	Mary Baldwin College	
New River Community College	Marymount University	
Northern Virginia Community College	Norfolk State University	

Open access (No SAT/ACT required)	Nonselective (25th percentile SAT<1000)	Selective (25th percentile SAT≥1000)
Patrick Henry Community College	Old Dominion University	
Paul D Camp Community College	Randolph College	
Piedmont Virginia Community College	Randolph-Macon College	
Rappahannock Community College	Regent University	
Southside Virginia Community College	Richard Bland College of the College of William & Mary	
Southwest Virginia Community College	Shenandoah University	
Thomas Nelson Community College	Southern Virginia University	
Tidewater Community College	Sweet Briar College	
Virginia Highlands Community College	University of Virginia's College at Wise	
Virginia University of Lynchburg	Virginia State University	
Virginia Western Community College	Virginia Union University	
Wytheville Community College	Virginia Wesleyan College	

Source: Urban Institute analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.

Within the three groups of students—those eligible for two-year programs, those eligible for nonselective four-year colleges, and those eligible for all four-year colleges—we calculate, for each field of study, the number of relevant programs that lie within 25 and 50 miles from their graduating high school.[12] By program, we classify each student into one of five categories:

1. **No program:** these students have no programs in their selectivity grouping within the specified distance from their high school.
2. **At least one program, but no earnings data:** these students have access to one or more programs in their selectivity grouping within the specified distance, but earnings data on graduates are not available for any of these programs.
3. **Earnings information for one program:** these students have access to one or more programs in their selectivity grouping within the specified distance, but earnings data are available for just one program, which prevents comparison with other schools.
4. **Earnings information for more than one program, with an ROI difference of less than $50,000:** these students have access to two or more programs in their selectivity grouping within the specified distance, and earnings data are available for at least two programs. However, the range in ROI between the highest- and lowest-ROI programs, over 40 years of working, is less than $50,000 in present-day dollars. These students thus have some ability to compare institutions, but the range of ROI is not large (for comparison, the standard deviation of ROIs, averaged across all programs, is about $187,000).

5. **Earnings information for more than one program, with an ROI difference of more than $50,000:** these students have access to two or more programs in their selectivity grouping within the specified distance, and earnings data are available for at least two programs. The estimated ROI for these programs, over 40 years of working, is greater than $50,000 in present-day dollars. These students are able to compare institutions that vary substantially in terms of their ROI.

The students in the first category, those with access to no programs, can be said to be in an "education desert" for a given field of study. We describe those in the second through fourth categories as being in "choice deserts": they have access to one or more programs, but they either have no basis for making comparisons in terms of ROI or the differences in ROI are not large. The students in the final category are those for whom earnings data are most likely to be helpful when choosing among institutions to pursue a particular program of study.

We run this analysis for each program-degree combination, calculating how many eligible students had a given program offering within 25 and 50 miles. For example, 38 Virginia institutions offer a business management bachelor's degree. Table 3 shows that, among students who took the ACT/SAT and scored below 1500 overall (out of 2400), 29 percent had access to a "true" earnings-based choice—that is, at least two business management bachelor's degree programs were offered within 25 miles of their home where the difference in expected ROI was greater than $50,000 over a lifetime.

Expanding the distance that students are able and willing to travel (or move) to attend college changes these numbers significantly. Increasing the distance from 25 to 50 miles increases the share of students in the "less-selective eligible" pool who have access to a true choice from 29 to 75 percent. For students with higher ACT/SAT scores (at least 1500), 63 percent have access to a true choice within 25 miles, and 97 percent have access to a true choice within 50 miles.

Not all program offerings feature the same scope of available earnings information as is available to students looking at business management programs. For example, although Virginia has 35 math bachelor's degree programs, just 7 programs have earnings information. Consequently, no students in the "less-selective eligible" pool had a true choice within either a 25- or 50-mile radius, and just 8 to 26 percent of more-selective eligible students had a true choice based on earnings difference, depending on their willingness to travel 25 or 50 miles from home (table 4).

TABLE 3

Usefulness of Earnings-Based ROI Data for Comparing Business Management Bachelor's Degree Programs

Percentage of students…	Category	Less-selective eligible	More-selective eligible
Within 25 miles			
Without a program	Education desert	21%	1%
With program(s), but no earnings information	Choice desert	1%	0%
With earnings information for 1 program	Choice desert	40%	23%
With earnings for >1 program, with ROI difference<$50,000	Choice desert	10%	13%
With earnings for >1 program, with ROI difference≥$50,000	True informed choice	29%	63%
Within 50 miles			
Without a program	Education desert	4%	0%
With program(s), but no earnings information	Choice desert	0%	0%
With earnings information for 1 program	Choice desert	20%	2%
With earnings for >1 program, with ROI difference<$50,000	Choice desert	0%	1%
With earnings for >1 program, with ROI difference≥$50,000	True informed choice	75%	97%

Source: Urban Institute analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.
Note: ROI = return on investment.

TABLE 4

Usefulness of Earnings-Based ROI Data for Comparing Mathematics Bachelor's Degree Programs

Percentage of students…	Category	Less-selective eligible	More-selective eligible
Within 25 miles			
Without a program	Education desert	21%	4%
With program(s), but no earnings information	Choice desert	55%	53%
With earnings information for 1 program	Choice desert	24%	34%
With earnings for >1 program, with ROI difference<$50,000	Choice desert	0%	0%
With earnings for >1 program, with ROI difference≥$50,000	True informed choice	0%	8%
Within 50 miles			
Without a program	Education desert	1%	1%
With program(s), but no earnings information	Choice desert	63%	11%
With earnings information for 1 program	Choice desert	37%	56%
With earnings for >1 program, with ROI difference<$50,000	Choice desert	0%	7%
With earnings for >1 program, with ROI difference≥$50,000	True informed choice	0%	26%

Source: Urban Institute analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.
Note: ROI = return on investment.

The Availability of True Informed Choice

We take a broader look by averaging the results for all programs in Virginia, with each weighted by its popularity among Virginia students. We measure the popularity of a program as the share of Virginia students who graduated from high school in 2011 or 2012 and declared an interest in a given field when they took the PSAT, usually in 10th grade (we discuss this measure in more detail in appendix A).

Table 5 shows overall estimates of the availability of programs (education desert, choice desert, and true choice) for students, broken out by students eligible for open-access two year programs, students eligible for less-selective four year programs, and students eligible for more-selective four year programs (table B.1 includes the three separate choice desert categories).

TABLE 5

Usefulness of Earnings-Based ROI Data for Comparing Institutions, All Programs

	Without a program (education desert)	Without meaningful earnings information (choice desert)	With meaningful earnings information (true informed choice)
Open-access eligible—AA degrees (79,197 students)			
Within 25 miles	35%	61%	4%
Within 50 miles	22%	52%	27%
Whole state	0%	33%	67%
Less-selective eligible—BA degrees (49,594 students)			
Within 25 miles	44%	39%	17%
Within 50 miles	22%	49%	28%
Whole state	0%	23%	77%
More-selective eligible—BA degrees (50,167 students)			
Within 25 miles	22%	50%	28%
Within 50 miles	12%	38%	50%
Whole state	0%	5%	95%
Open-access eligible (25 miles), less-selective (50 miles), more-selective (whole state)			
Weighted average	21%	42%	36%

Source: Urban Institute analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.

Previous evidence has shown that community college students are the most likely to stay close to home, and table 1 shows that 75 percent of Virginia students who did not take the SAT/ACT attend college within 25 miles of their high school. Yet few of these students have the opportunity to make an informed decision based on earnings information. Four percent of students eligible for two-year schools

would have the opportunity to make a meaningful choice between two or more institutions offering the same program within 25 miles, and roughly a quarter have a meaningful choice within 50 miles. In other words, most students who did not take the SAT/ACT live in an education or choice desert.

Students tend to move farther from home for four-year programs than for two-year programs. Still, more than half of Virginia graduates with less competitive ACT/SAT scores attending four-year public institutions are less than 50 miles from their permanent home (table 1). Among students with less-competitive ACT/SAT scores comparing institutions within 50 miles of their high school, just 28 percent have the information to make a meaningful decision between two or more institutions offering the same program.

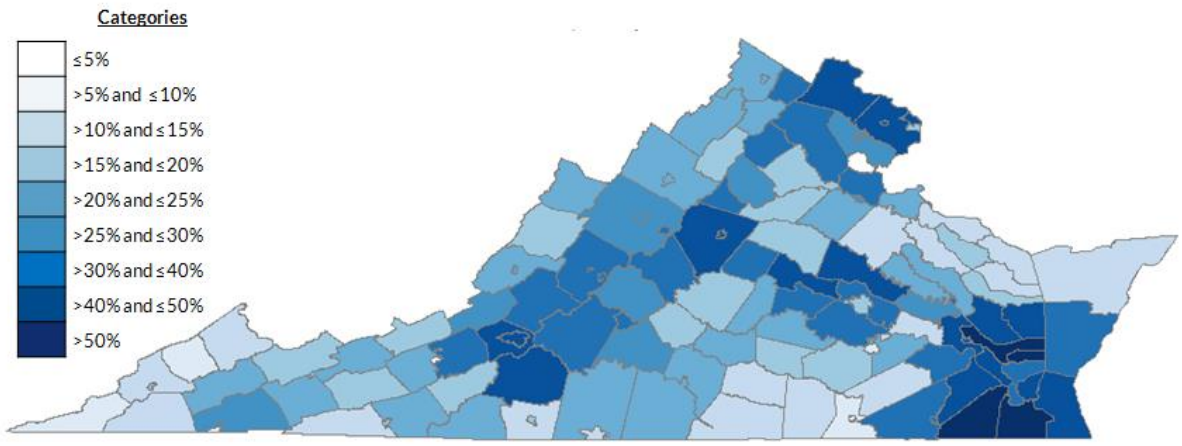
The group most likely to benefit from earnings information comprises students who have earned competitive ACT/SAT scores, providing the opportunity to potentially consider any four-year program within Virginia. Among this group, we estimate that about half have a meaningful choice between institutions offering the same program within 50 miles. If these academically competitive students were willing to travel anywhere in Virginia, the share that could use earnings data to meaningfully distinguish among programs would rise to 95 percent.

Overall, earnings information is potentially useful for 36 percent of students, under the fairly conservative assumptions that students eligible for open-access schools look within 25 miles of home, students eligible for less-selective schools look within 50 miles, and students eligible for more-selective schools are willing to travel anywhere in the state. The other 64 percent of students have access to no programs, programs without earnings information, or programs where that information is unlikely to be helpful.

Table B.1 shows that overall, among students in choice deserts, most live near one or more programs without earnings information available (often just a single program) or near a single program that has earnings information (but no other programs to which it can be compared). Only a small percentage of students are classified as living in choice deserts because the variation in lifetime ROI among the available choices is less than $50,000.

FIGURE 5

Overall Percentage of Students with True Earnings-Based Choice, by School Division



Source: Urban Institute analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.

Figure 5 shows that the school districts with the largest percentage of students with "true" program-level choice based on their academic background tend to cluster near cities in Virginia. In many districts near the District of Columbia, including Richmond, Lynchburg, and Charlottesville, more than 40 percent of graduating seniors are estimated to have a true choice. In more rural areas, such as the west and south-central part of the state, less than 15 percent of graduating seniors have a true choice based on desired program and earnings. These differences are driven by both the location of colleges and the unequal distribution of more-selective eligible students across Virginia (see figures B.1 through B.3).

Conclusions

The explosion in the availability of earnings data in recent years reflects policymakers' hopes that this information will help prospective students make better-informed decisions among institutions that offer a given academic program. Our analyses of student- and program-level data from Virginia suggest that for many students, this information is unlikely to be helpful when deciding where to go to college to pursue a given program of study.

The students for whom earnings data are potentially most useful are those with the credentials needed to gain admission to selective colleges. This is partly because of how the earnings data are

constructed: students at selective institutions are more likely to graduate, and such institutions are likely to produce large enough earnings cohorts to create earnings data. These are also the students most likely to travel farther to attend college.

One possible implication is that the release of earnings information may exacerbate stratification by ability and socioeconomic status in higher education, with those most able to take advantage of high-return educational investments now in a stronger position to identify them. This notion is supported by a recent College Board study finding that the release of earnings data as part of the new College Scorecard in 2015 led to increases in student interest in schools with higher earnings, but only for well-resourced students and high schools (Hurwitz and Smith 2016).

However, our findings are subject to several potentially important limitations. First, earnings data may be useful for purposes other than distinguishing among institutions. For example, a student might use earnings data to help select a major after enrolling at a particular institution. Many students enter college unsure of their academic plans, so earnings data provided at the right time could inform decisions about what field of study to pursue.

Second, our analyses only examine data on high school seniors, when about half of undergraduate students are considered financially independent of their parents, usually because they are age 24 or older (Radwin et al. 2013). These students may well use earnings information for purposes other than deciding among institutions offering a given program. For example, prospective students who are geographically constrained by work and family obligations may use earnings information to help them decide whether to pursue a particular program at their local college (as opposed to not enrolling at all).

Third, the results of our analysis are based on data from a single state (Virginia), and may not be broadly applicable to the nation as a whole. Small states with a higher population density might have a higher proportion of students who are able to make use of program-level earnings for college decision-making. But larger, more sparsely populated states might in turn have a smaller portion of students who have true informed choice at the program level.

Finally, our analysis does not consider the role of online learning in overcoming geographic barriers. Through the lens used in this study, earnings data will be more useful for comparing online programs to the extent that they are calculated for online students only and vary meaningfully across multiple programs. However, many online programs market to national audiences from various states and thus would not appear in the same state-level databases, rendering meaningful comparisons impossible with currently available data.

With these limitations in mind, our findings indicate that the hype around newly available earnings data in higher education should give way to careful consideration of how this information can be embedded in related policy efforts designed to maximize its impact. The data presented here make clear that "build it and they will come" is unlikely to be a successful strategy in this context. In that spirit, we offer several recommendations for future policy and research efforts in this area.

First, efforts by both public and private entities are needed to determine how best to deliver this kind of information to potential students and their families. Our analysis identified students for whom earnings-based information is potentially useful for comparing programs, but it is not informative as to how many of these students would actually make use of such information. Presumably that would depend on how and when the information is presented to them. An elegant user interface that makes the data easy to access and understand will likely be a lot more useful than a clunky website where data are either hard to find or overwhelming in their complexity.

Efforts along these lines could help relax geographic constraints by helping prospective students identify educational opportunities that are higher quality but farther away. For example, one study showed that when parents of school-age children were provided information that included the six-year graduation rates of two similar in-state colleges, they were more likely to prefer the college with the higher graduation rate, even though it was, on average, 40 miles further from home (Kelly and Schneider 2011).

We suspect that ROI-type information may be most salient in combination with other indicators that help prospective students match their abilities and interests to higher education options. The private sector has a clear role to play in competing to create tools that make the best use of data. At the same time, it should be the responsibility of the government, ideally at the federal level, to publish the necessary data by drawing on administrative records already in its possession. Making data easily accessible to third parties is important, such as through an application program interface (API), a feature of the current College Scorecard.

Second, the limitations of existing data sources should continue to be addressed in order to maximize the potential usefulness of the information made public by the government. A Brookings Institution report identified several potential improvements to the data underlying the College Scorecard, including the publication of earnings data for individual programs based on all students, accounting carefully for the fact that many students do not graduate (Whitehurst and Chingos 2015).

State leadership in this area is to be commended, but it is not a long-term solution given the limitations of state databases and the growth in online options that are not constrained by state

borders. At the same time, there are political obstacles to the creation of a federal data system up to the task of producing the necessary information. While such obstacles remain in place, Congress could authorize or the executive branch could encourage voluntary partnerships through which states share data with the goal of tracking college students across borders.

Finally, the fact that many students are geographically constrained in their educational options strongly suggests the need to rethink a model of higher education that leans too heavily on markets. Information can surely still play a role in areas where choice is limited by geography, such as by enabling consumers to compare hard data with institutions' marketing claims about their students' future success. But well-designed regulation may also be necessary to maximize ROI for students and taxpayers, especially given that college students are often spending taxpayer-funded grants and loans.

High-quality information on labor market outcomes could well play a leading role in a new, innovative regulatory regime. For example, institutions' eligibility for access to financial aid programs could be tied to data on how their former students fare in the labor market rather than to coarse, indirect measures such as loan default or repayment rates. Such a regulatory approach might also require institutions to disclose information on labor market outcomes to students before they take out loans, ideally in a format that would help students make more-informed decisions.

Our analysis suggests that policymakers should pay particularly close attention to geographic variation in the availability of different programs of study, especially those that are connected to local industries. For example, states could undertake policy efforts aimed at creating or expanding needed programs in underserved areas. Such efforts could aim both to decrease the number of students without access to any program (education deserts) and those only able to consider a single program (choice deserts).

Policymakers should not abandon their efforts to enable prospective students, policymakers, and the public to assess colleges and universities based on data on student outcomes rather than reputation and vague impressions from campus tours. But our findings suggest that this approach's potential to improve the market for higher education likely lies in the other efforts it makes possible and not in the inherent usefulness of publishing earnings data.

Appendix A. Data and Methodology

Data

For this study, we use deidentified student-level data from the Virginia Longitudinal Data System (VLDS) for the classes of graduating seniors from Virginia public schools in 2011 and 2012. This dataset includes demographic data, such as gender, race, and disadvantaged status, as well as data on academic performance, such as PSAT, SAT, and ACT scores. Further, the dataset includes information on where these students graduated high school and where they enrolled in college.

We use this individual-level VLDS data to divide students into the three eligibility categories (open-access eligible, less-selective eligible, and more-selective eligible) based on SAT availability and score (or equivalent ACT score if SAT score was unavailable), as described above. We also use individual-level data to weight program availability by student preference, which students select when they take the PSAT.

The State Council of Higher Education for Virginia (SCHEV) consolidates data from the VLDS and other sources to provide summative statistics on higher education in the state. We use SCHEV data obtain estimates on initial earnings (18 months after completion) by institution and degree program. In addition, we use SCHEV data on graduates by program in 2014–15 to provide an alternative weight for program availability.

The Virginia SCHEV data provide earnings information for 756 distinct programs, available across 62 of the state's 73 public and private nonprofit colleges and universities (these Virginia institutions offer 2,754 programs overall). More than 70 percent of first-time, full-time undergraduates in Virginia enrolled in one of these programs in 2009.

We group programs into general categories based on program classification and degree type (associate's degree [both bachelor's credit and occupational or technical credit] and bachelor's degree). Despite creating 46 distinct categories of programs, 205 programs with earnings data still had at least one duplicate within a given institution at the category-degree level (55 programs had a duplicate similar program, 16 had two similar, 5 programs had three similar, 3 programs had four similar, and 2 programs had five similar). For example, George Mason offers a bachelor's degree in accounting and a bachelor's degree in general finance, both of which are classified as an accounting/finance bachelor's

degree. At Virginia Polytechnic Institute, bachelor's degrees of agricultural economics, animal sciences, agronomy and crop science, and horticultural science are classified as agriculture bachelor's degrees.

The average difference between maximum and minimum mean earnings in these "duplicate" majors is roughly $6,100, and the median difference is roughly $4,600. In cases where an institution has more than one program with earnings data that falls into the classification-degree category, we take the mean of earnings (and other program-level data, as needed), weighted by total graduates, to calculate a single ROI metric for each program-institution combination.

Measuring Program Popularity

Ideally, we would have consistent statewide data on the program students want to pursue when they enroll in a postsecondary institution. In place of such data, our preferred proxy is based on survey data. Students are asked to declare their first postsecondary program interest when they take the PSAT, typically in 10th grade. In our sample of 2011 and 2012 high school graduates, approximately 64 percent took the PSAT, and 51 percent of the overall sample declared a program interest. This is our preferred measure because it is the best proxy we have for the fields in which students were interested when they were deciding where to go to college.

Student interest, as expressed on the PSAT, varies across programs. For example, 5 percent of students expressed interest in business management programs, whereas only 1 percent expressed interest in pursuing a degree in math. Weighting choice according to this metric allows us to better account for student preference before exposure to higher education (compared with computing a simple unweighted average across all programs). However, this PSAT metric is also likely biased by an oversampling of students who are eligible for four-year schools (and we use the same breakdown of interests when weighting results for associate's and bachelor's degree programs).

As a robustness check, we use as an alternative measure the number of graduates that the programs produced in a given year, separately for associate and bachelor's degree programs. For example, business management bachelor's degrees constituted roughly 11 percent of bachelor's degrees awarded to Virginia students in the 2014–15 school year, whereas math bachelor's degrees accounted for 1 percent. This method allows us to generate an overall number based on the areas that students actually obtain degrees in. However, the use of graduates from these programs may also bias our estimate. It is conceivable, for example, that a larger proportion of Virginia graduates enrolled in

four-year institutions with an interest in majoring in math but that some of these students shifted to other programs over time.

Table B.4 shows the distribution of program interest using both measures: the PSAT survey and numbers of graduates. The two measures diverge significantly: the correlation is only 0.09 for associate's degree programs and 0.49 for bachelor's degree programs). For example, 11 percent of PSAT takers expressed in interest in engineering, but degrees in this field were earned by only 4 and 6 percent of associate's and bachelor's degree graduates, respectively.

We obtain similar overall findings if we use the alternative measure of program interest based on numbers of graduates. Table B.2 shows that the overall share of students with a true informed choice is 39 percent using the alternative measure compared with 36 percent using the preferred measure. In general, the estimated share of students able to make an informed choice is higher using the alternative measure, which is what we would expect given that programs with more graduates more likely to have earnings information available (because programs with small numbers of graduates are excluded from the publicly reported earnings data).

Measuring ROI

We calculate an ROI for each institution-major in our dataset that takes into account the following:

- The probability that a student will graduate and earn a full-time salary. We assume that nongraduates receive incomes typical of individuals with some college but no degree in the metropolitan/micropolitan statistical area where the school is located (Winters and Xu 2013). We assume that part-time workers earn the maximum of this group ($13,195).
- Salary growth over 40 years, projected from earnings measured 18 months after graduation by assuming a linear increase (dependent on level of degree, associate's or bachelor's) over the first 15 years after graduation, and assuming constant earnings over the remaining 25 years (this is in line with our Current Population Survey estimates of earnings trajectories for bachelor's and associate's degree holders, and with VLDS data; Greenstone and Looney 2011).
- The costs of enrolling in college, including the average net price of a degree for middle-income students (annual net price multiplied by average time to degree) and the opportunity cost of enrolling (average earnings of high school graduates multiplied by average time to degree; Winters and Xu 2013).

Specifically, to account for the risk of dropping out without a degree or working part time, we calculated an expected earnings measure that accounts for the percentage of individuals who appear to be working part time (measured as those with annual earnings less than minimum wage at 35 hours a week, or $13,195), and the percentage of individuals who drop out.

For two-year degree programs, the formula we use is:

$$\text{Expected Earnings} = \left([\text{Program Average Earnings} \times \frac{\%\ \text{FT Wages}}{\%\ \text{FT Wages} + \%\ \text{PT Wages}}] + [13{,}195 \times \frac{\%\ \text{PT Wages}}{\%\ \text{FT Wages} + \%\ \text{PT Wages}}]\right) \times \text{Grad Rate} + (\textit{Median High School Wage} \times [1\text{-Grad Rate}]),$$

where *Median High School Wage* is the median earnings of workers with a high school diploma in the institution's micropolitan statistical area (whenever available) or county, 2012 five-year American Community Survey estimate (2012 dollars), decreased to reflect entry-level earnings (reduced 37.5 percent, the inverse of the 1.6 growth metric we apply later) .

For four-year degree programs, the formula is:

$$\text{Expected Earnings} = \left([\text{Program Average Earnings} \times \frac{\%\ \text{FT Wages}}{\%\ \text{FT Wages} + \%\ \text{PT Wages}}] + ([13{,}195 \times \frac{\%\ \text{PT Wages}}{\%\ \text{FT Wages} + \%\ \text{PT Wages}}])\right) \times \text{Grad Rate} + (\textit{Median Some College Wage} \times [1\text{-Grad Rate}]),$$

where *Median Some College Wage* is the median earnings of workers with some college education or an associate's degree in the institution's micropolitan statistical area or county, 2012 five-year American Community Survey estimate (2012 dollars), decreased to reflect entry-level earnings.

Data from previous VLDS cohorts indicate that an associate's degree graduate earning the median wage will see his or her wages increase by about 60 percent over 15 years, after accounting for inflation; a bachelor's degree graduate earning the median wage will see his or her wages increase by about 80 percent (SCHEV 2014).

To account for the increase in wages over time, we take the expected earnings value and increase it linearly so that earnings in year 15 equals the expected earnings multiplied by 1.6 (two-year degree) or 1.8 (four-year degree). After year 15, we assume that the expected earnings are fairly flat, save for increases caused by inflation. We assume that individuals work for 40 years before leaving the labor force.

Finally, we calculate ROI by subtracting from this estimate of lifetime earnings the net price of a degree for the average student (the annual net price for dependent students from families with incomes between $48,000 and $70,000, multiplied by average time to degree at the institution) and the earnings lost because of school enrollment (time to degree multiplied by the median earnings of high school graduates with no college experience in the county where the institution is located). An example of this ROI calculation is in table B.5.

Appendix B. Data Tables

TABLE B.1

Program and Earnings Availability, Weighted by PSAT Selection

	Without a program (education desert)	With program(s), but no earnings information (choice desert)	With earnings information for 1 program (choice desert)	With earnings for > 1 program, with ROI difference < $50,000 (choice desert)	With earnings for > 1 program, with ROI difference ≥ $50,000 (true informed choice)
Open-access eligible—AA (79,197)					
Within 25 miles	35%	22%	32%	6%	4%
Within 50 miles	22%	20%	25%	7%	27%
Whole state	0%	9%	18%	6%	67%
Less-selective eligible—BA (49,594)					
Within 25 miles	44%	16%	22%	2%	17%
Within 50 miles	22%	21%	25%	3%	28%
Whole state	0%	9%	11%	4%	77%
More-selective eligible—BA (50,167)					
Within 25 miles	22%	10%	38%	2%	28%
Within 50 miles	12%	8%	29%	2%	50%
Whole state	0%	3%	2%	0%	95%
Open-access eligible (25 miles), less-selective (50 miles), more-selective (whole state)					
Weighted average	21%	17%	22%	4%	36%

Source: Authors' analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.
Note: AA = associate's degrees; BA = bachelor's degrees; ROI = return on investment.

TABLE B.2

Program and Earnings Availability, Weighted by Program Graduates in 2014–15 School Year

	Without a program (education desert)	With program(s), but no earnings information (choice desert)	With earnings information for 1 program (choice desert)	With earnings for > 1 program, with ROI difference < $50,000 (choice desert)	With earnings for > 1 program, with ROI difference ≥ $50,000 (true informed choice)
Open-access eligible—AA (79,197)					
Within 25 miles	19%	23%	45%	10%	4%
Within 50 miles	8%	17%	22%	17%	35%
Whole state	0%	1%	18%	2%	80%
Less-selective eligible—BA (49,594)					
Within 25 miles	33%	19%	25%	3%	20%
Within 50 miles	11%	21%	25%	4%	37%
Whole state	0%	5%	4%	1%	90%
More-selective eligible—BA (50,167)					
Within 25 miles	12%	10%	38%	2%	37%
Within 50 miles	4%	6%	22%	1%	66%
Whole state	0%	0%	1%	0%	98%
Open-access eligible (25 miles), less-selective (50 miles), more-selective (whole state)					
Weighted average	11%	16%	27%	6%	39%

Source: Authors' analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.
Note: AA = associate's degrees; BA = bachelor's degrees; ROI = return on investment.

TABLE B.3

Program Categories

	Associate's Degree		Bachelor's Degree	
	Institutions offering at least one program	Institutions with earnings available	Institutions offering at least one program	Institutions with earnings available
Accounting finance	21	2	22	13
African-American and black studies			5	2
Agriculture	7	4	3	1
Anthropology			11	6
Architecture	2	2	3	2
Biology	9	2	38	16
Business management	33	15	38	30
Business operations support	19	8		
Chemistry			32	5
Classic languages			10	1
Communications and journalism	5	3	30	16
Computer information sciences	22	14	34	18
Criminal justice and law enforcement	23	16	19	11
Dance			7	1
Dental assistant hygienist	5	4	2	2
Design	2	0	8	3
Drama and theatre arts	6	1	33	3
Economics			24	10
Electrician and electronics programs	12	3		
Emergency medical technician	14	4	1	0
Engineering	21	11	13	9
English literature			38	16
Fine arts	2	1	28	11
Fitness, health, and physical education			25	16
Foreign languages	4	0	29	6
Healthcare administration	2	0	6	3
Healthcare technicians	16	8	11	4
Healthcare therapy	9	6	5	2
History	1	0	38	17
Industrial technology and metallurgy	22	4	1	0
Legal assistant paralegal	13	3	4	2
Liberal arts general studies	32	12	35	19
Marketing and merchandising	1		12	8
Math			35	7
Music			30	5
Nursing, physician assistant, and pre-medical	25	23	19	14
Other social sciences	7	1	34	19
Philosophy and religion	1	0	33	3
Physical and environmental science	1	1	24	11
Physics			23	2
Political science	1		32	15
Psychology	4	1	36	23
Public policy and administration	2	1	10	4
Sociology			30	16
Teaching	14	8	19	10
Technical and trade programs	17	10	2	0

Source: Authors' analysis of State Council of Higher Education for Virginia data.

TABLE B.4

Program Preferences

	Percentage of 2014–15 school year AA graduates	Percentage of 2014–15 school year BA graduates	Percentage of PSAT selections from high school class of 2011–12
Accounting finance	1.2%	3.8%	1.3%
African-American and black studies		0.2%	0.5%
Agriculture	0.3%	0.5%	1.4%
Anthropology		0.4%	0.1%
Architecture	0.2%	0.4%	2.5%
Biology	5.5%	6.4%	6.0%
Business management	12.3%	10.7%	5.0%
Business operations support	1.4%		1.8%
Chemistry		1.1%	0.3%
Classic languages		0.1%	0.1%
Communications and journalism	0.0%	4.6%	2.9%
Computer information sciences	4.8%	3.0%	2.4%
Criminal justice and law enforcement	3.0%	4.0%	4.8%
Dance		0.1%	0.7%
Dental assistant hygienist	0.5%	0.1%	1.1%
Design	0.8%	0.9%	3.4%
Drama and theatre arts	0.7%	1.2%	1.7%
Economics		3.7%	0.1%
Electrician and electronics programs	0.3%		1.0%
Emergency medical technician	0.8%	0.0%	0.0%
Engineering	3.6%	6.0%	10.9%
English literature		2.6%	1.5%
Fine arts	0.1%	1.6%	1.1%
Fitness, health, and physical education		4.4%	2.3%
Foreign languages	0.0%	0.9%	0.9%
Healthcare administration	0.0%	1.4%	3.2%
Healthcare technicians	1.8%	0.6%	1.3%
Healthcare therapy	2.5%	1.0%	0.9%
History	0.0%	2.5%	1.8%
Industrial technology and metallurgy	0.2%		0.1%
Legal assistant paralegal	1.0%	0.4%	3.4%
Liberal arts general studies	34.6%	6.4%	0.9%
Marketing and Merchandising	0.0%	1.5%	1.4%
Math		1.3%	1.1%
Music		0.9%	3.5%
Nursing, physician assistant, and pre-Medical	6.5%	4.5%	11.3%
Other social sciences	9.7%	2.5%	1.1%
Philosophy and religion	1.1%	2.9%	0.2%
Physical and environmental science	1.1%	1.2%	1.7%
Physics		0.5%	0.3%
Political science	0.0%	2.5%	0.6%
Psychology	1.1%	8.7%	5.3%
Public policy and administration		0.3%	0.1%
Sociology		1.5%	0.2%
Teaching	1.8%	1.9%	5.0%
Technical and trade programs	2.9%	0.3%	3.0%

Source: Survey responses from Virginia students who took the PSAT and analysis of VLDS data.
Note: AA= associate's degree; BA = bachelor's degree.

TABLE B.5

Wage Calculation Example

Mean initial income at 18 months	$50,000
Graduates now FT workers	50%
Graduates now PT workers	25%
Graduates with no information reported	25%
Institution graduation rate	50%
Degree type	BA
Average time to degree (TTD)	4.5
Average degree cost (net cost x TTD)	$45,000
MSA HS median earnings[a]	$25,000
MSA some college median earnings[a]	$35,000

Notes: FT = full-time; HS = high school; PT = part-time; MSA = micropolitan statistical area.

[a] If not available, county-level is substituted.

TABLE B.6

Wage Calculation Example Continued

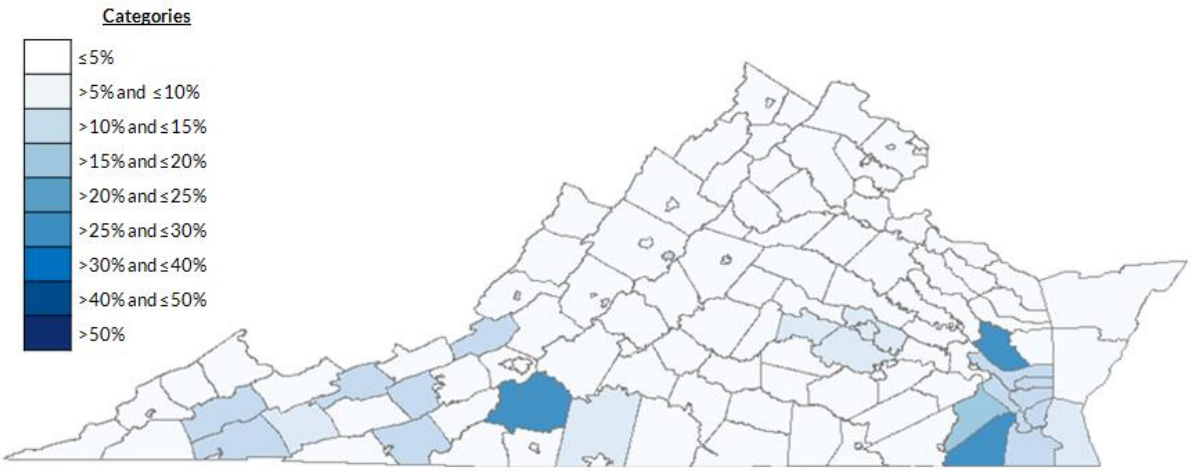
1.	**Estimate expected income at 18 months, discount for probability of working part time (max $13,195) and probability of not graduating**	
	Expected income =	(Initial income x % FT + $13,195 x % PT) x graduation rate + MSA some college median earnings/1.6 x (1 - graduation rate)
	Expected income =	($50000 x (0.50/(0.50 + 0.25) + $13,195 & x (0.25/(0.5 + 0.25) x 0.50+$35000/1.6 x (1-0.50)
	Expected income =	$29,291
2.	**Estimate a linear growth of income over first 15 years, ending at x1.8 for four-year degrees, x1.6 for two-year degrees**	
	Earnings in first 15 years =	Expected income x (growth/2) x 15 years[a]
	Earnings in first 15 years =	$29291 x 1.4 x 15 years
	Earnings in first 15 years =	$615,114
3.	**Estimate overall earnings, with income growth of 1% each year over past 25 years**	
	Earnings over 40 years =	Earnings in first 15 years + ([expected income x 1.8] x 25)
	Earnings over 40 years =	$615114 + $29291 x 1.8 x 25
	Earnings over 40 years =	$2,119,101
4.	**Estimate ROI, minus degree cost and forgone earnings (both in school and after)**	
	ROI total =	Earnings over 40 years - degree cost - (time to degree x HS median earnings/1.6) - 40 x MSA HS median earnings
	ROI total =	$2119101 - $45000- (4.5 x [$25000/1.6]) - 40 x $25000
	ROI total =	$1,003,789

Note: FT = full-time; HS = high school; PT = part-time; MSA = micropolitan statistical area; ROI = return on investment.

[a] This is equivalent to the sum of linear series.

FIGURE B.1

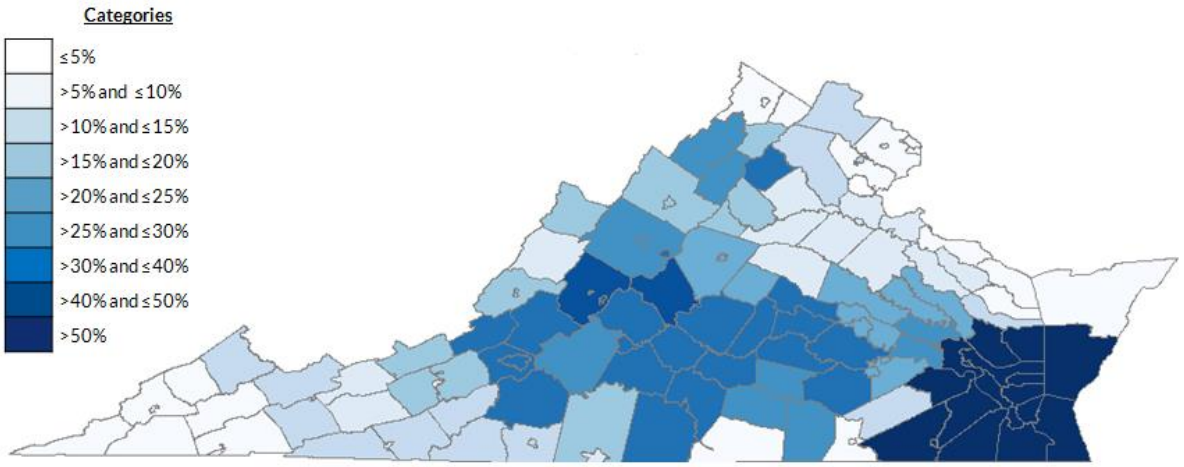
Percentage of Students with True Choice Given Academic Eligibility for Open-Access Eligible Students, by School Division



Source: Urban Institute analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.

FIGURE B.2

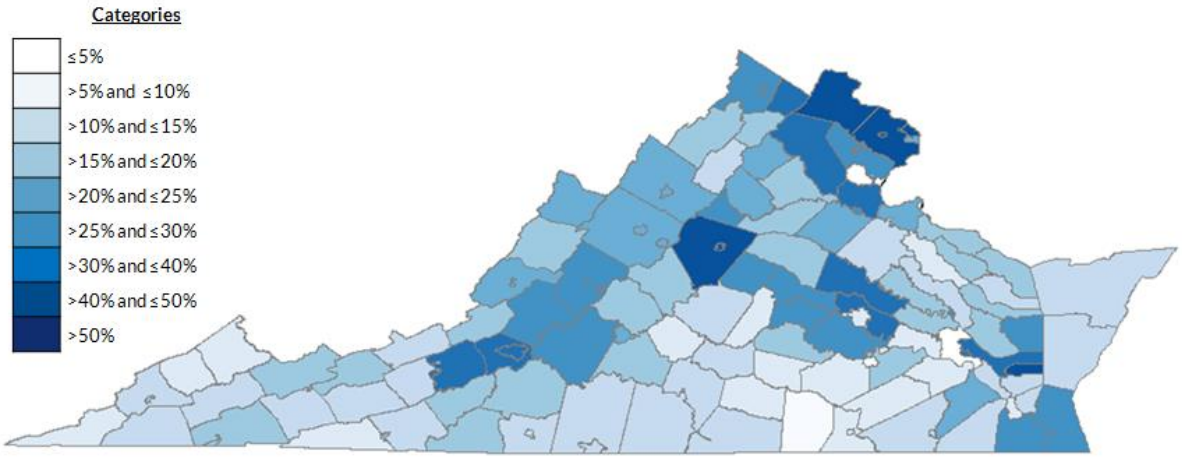
Percentage of Students with True Choice Given Academic Eligibility for Less-Selective Eligible Students, by School Division



Source: Urban Institute analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.

FIGURE B.3

Percentage of Students Eligible for More Selective Institutions, by School Division



Source: Urban Institute analysis of State Council of Higher Education for Virginia and Virginia Longitudinal Data System data.

Notes

1. Office of US Senator Ron Wyden, "Wyden, Rubio, Warner Introduce 'The Student Right to Know before You Go Act,'" press release, March 5, 2015, http://www.wyden.senate.gov/news/press-releases/wyden-rubio-warner-introduce-the-student-right-to-know-before-you-go-act.
2. White House Office of the Press Secretary, "Fact Sheet: Empowering Students to Choose the College That Is Right for Them," press release, September 12, 2015, https://www.whitehouse.gov/the-press-office/2015/09/12/fact-sheet-empowering-students-choose-college-right-them.
3. College Measures, "Data Offers Insights into the Earning Power of College Graduates in Arkansas," press release, August 23, 2012, http://collegemeasures.org/category/Press-Releases.aspx.
4. "Economics Success Metrics Program," College Measures, accessed September 26, 2016, http://www.collegemeasures.org/esm/?aspxerrorpath=/default.aspx. The exception to this statement is that the federal government reports earnings by program of study for the subset of programs covered by gainful employment regulations.
5. For some programs, earnings data is not available for the 2005–2010 period. In these cases, we pull data from the previous two periods, if available (2004–09 and 2003–08).
6. The release of earnings data could still affect institutional choice if, for example, consumers take earnings data more seriously than existing measures or if earnings data receive more prominent public attention.
7. We do not factor into the ROI calculation decisions about how to finance higher education (e.g., savings, loans, and working while in college).
8. Because of the way that the Virginia wage data are constructed, we include the program-level likelihood of being a full-time or part-time employee in the ROI calculation. Because this likelihood is positively correlated with the wage (r=0.39) and typically unavailable to graduates, we also exclude the part-time or full-time program data when calculating the ROI without program-wage data.
9. These correlations would likely be weakened by controlling for other student characteristics, such as socioeconomic status and academic preparation, measured at the individual level.
10. Office of Virginia Governor Bob McDonnell, "Virginia SAT Scores Rise as Nation's Fall," press release, September 26, 2013, http://www.doe.virginia.gov/news/news_releases/2013/sep26_gov.shtml.
11. This distance, and all other distances in the paper, are measured in great-circle ("as the crow flies") distances.
12. We use distance from the student's graduating high school as the metric to estimate the proximity of a given institution because we do not have home addresses. We use the great-circle distance ("as the crow flies"), so the driving distance is generally a bit farther. Our approach excludes institutions in neighboring states that are within 25 or 50 miles of the student's high school, which accurately describes the potential usefulness of earnings measures produced by a single state. Program-level data produced by the federal government would likely be of greater use to students who live near state borders, but these data are not yet available.

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