



## Measuring value-added in higher education: Possibilities and limitations in the use of administrative data<sup>☆</sup>



Jesse M. Cunha<sup>a,\*</sup>, Trey Miller<sup>b</sup>

<sup>a</sup>Naval Postgraduate School, Graduate School of Business and Public Policy, 555 Dyer Road, Ingersoll Hall, Monterey, CA 93943, United States

<sup>b</sup>RAND Corporation, 1776 Main Street, Santa Monica, CA 90401, United States

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### ABSTRACT

This paper develops a general methodology for measuring the value added of institutions of higher education using commonly available administrative data. Our approach recognizes the data limitations and selection problems inherent in higher education, and highlights the challenges these issues pose for education policy. Combining information from different administrative sources in the state of Texas, we follow the universe of Texas college applicants from the time of application (pre-enrollment) through public college and into the labor market. In specifications that do not control for selection, we find large, significant differences across colleges in terms of persistence, graduation, and earnings; however, these differences decrease substantially when we control for selection. In light of the growing interest in using value-added measures in higher education for both funding and incentivizing purposes, our methodology offers unique evidence and lessons for policy makers.

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\* Corresponding author. Tel.: +1 650 492 0381.

E-mail addresses: [jcunha@nps.edu](mailto:jcunha@nps.edu), [jessecunha@gmail.com](mailto:jessejuncunha@gmail.com) (J.M. Cunha), [tmiller@rand.org](mailto:tmiller@rand.org) (T. Miller).

“Student achievement, which is inextricably connected to institutional success, must be measured by institutions on a ‘value-added’ basis that takes into account students’ academic baseline when assessing their results. This information should be made available to students, and reported publicly in aggregate form to provide consumers and policymakers an accessible, understandable way to measure the relative effectiveness of different colleges and universities.”

Quote from “A Test of Leadership,” the 2006 Report of the U.S. Department of Education (the Spellings Commission) on Higher Education

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## 1. Introduction

Recent years have seen mounting pressure on colleges and universities to measure and disseminate the value that they are adding to their students (see, e.g., [Harnisch, 2011](#)). This outcomes-based culture recognizes foremost the need for measures of value added that capture the causal influence of institutions on their students, which must take into account the fact that students enter college with different academic backgrounds ([Spellings, 2006](#)). Many government agencies – of both states in the U.S. and other countries – are using or are considering using quantitative measures of institutional performance to incentivize achievement and target funding ([Dougherty, Natow, & Vega, 2012](#); [Jongbloed & Vossensteyn, 2001](#)). For example, in the U.S., the state of Tennessee is currently using a performance-based funding formula in higher education, and the state of Texas is considering using one ([Wright, Fox, Murray, Carruthers, & Thrall, 2012](#)); in the United Kingdom, there is continual interest in using quantitative performance indicators for public colleges and universities for funding purposes ([Johnes, 2012](#)). However, there is a lack of research that can guide policymakers towards an optimal policy.

In this paper, we discuss the unique challenges of measuring value added in higher education and explore the possibilities and limitations of using commonly available student-level administrative data as the basis for such measures. It proves useful to contrast the higher education environment with that of primary and secondary education, a sector which is broadly characterized by the use of yearly standardized test scores as the basis of value-added measures. While there is evidence that such test-based value-added measures can indeed capture differential performance of institutions and teachers ([Kain & Staiger, 2008](#); [Klein, Kuh, Chun, Hamilton, & Shavelson, 2005](#)), several differences render the wholesale importation of the K–12 model to higher education impractical.

First, year-on-year standardized tests are not generally administered in higher education.<sup>1</sup> In their stead, we must consider other quantitative outcomes of the higher education process that are available in administrative databases. Three such outcomes of interest are persistence rates, graduation rates, and post-college earnings.

Second, these available non-test outcomes are either only observed once (persistence or graduation) or only observed post-enrollment (earnings). As such, we cannot use a within-individual differencing estimator – an estimator which can be extremely useful in order to isolate the influence of specific factors in the education

process, such as teachers and schools, separately from pre-existing student ability.<sup>2</sup>

Third, students deliberately and systematically select into colleges.<sup>3</sup> Combined with the lack of pre-enrollment outcome measures, this selection problem makes it difficult to attribute student outcomes to the effect of the college attended separately from the effect of pre-existing characteristics such as motivation and natural ability.

Fourth, college students intentionally specialize their instruction, and institutions emphasize discipline-specific knowledge (i.e., major specific knowledge). Such specialization calls for outcome measures that are comparable across students with a wide range of learned abilities. In this respect, standardized tests of general skills may not be the optimal outcome measure.

Reflecting the unique context of higher education and the availability of data, we propose a simple methodology that provides estimates of the relative value added of individual institutions: a student-level regression that explains the variation in the outcome of interest through (i) observable differences in pre-enrollment student characteristics, (ii) unobserved differences in students' preferences for schools and schools' preferences for students, captured by a student's application and acceptance profile, and (iii) fixed effects for the college at which a student is enrolled. This model yields average differences in conditional outcomes across colleges, or relative value-added measures; and these measures can be considered causal value-added estimates to the extent that pre-enrollment student characteristics and application/acceptance profiles control for differential selection into colleges.

We implement this methodology using rich administrative records from the state of Texas, developing value-added estimates for the state's 30 traditional four-year public colleges. Texas has one of the most-developed K–20 data systems in the nation and thus provides an ideal setting to demonstrate the incremental benefits of using various student-level data sources to correct for selection, while at the same time demonstrating the potential bias that can result by not correcting for selection.

Our analysis shows that there are large mean differences in outcomes across public colleges prior to controlling for pre-existing student characteristics. For example, the unconditional mean difference in earnings between Texas A&M University and Texas Southern University – the institutions with the highest and lowest unconditional earnings, respectively – is 78 log points. Perhaps not surprisingly, our analysis confirms that value-added measures change considerably upon controlling for pre-enrollment student characteristics. Continuing the example, controlling for the largest set of student characteristics

<sup>1</sup> Some standardized tests in higher-education do exist, for example the Collegiate Learning Assessment (CLA) test of general knowledge or the GRE Subject Tests of major specific knowledge; however, they are not our knowledge administered regularly to all students in an administrative unit (e.g., a state or country).

<sup>2</sup> Certain populations do have labor market experience prior to college enrollment, facilitating student fixed-effect models in labor market earnings. For example, [Cellini and Chaudhary \(2012\)](#) study the returns to private, two-year colleges, and [Arcidiacono, Cooley, and Hussey \(2008\)](#) study the returns to MBA programs.

<sup>3</sup> Sorting undoubtedly occurs in the primary and secondary setting as well ([Tiebout, 1956](#)); presumably, however, to a much smaller degree.

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