

DEVELOPING INPUT-ADJUSTED METRICS OF COMMUNITY COLLEGE PERFORMANCE

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INTRODUCTION

This paper will explore the possible strategies for developing input-adjusted metrics for community college performance. There is growing interest in measuring college performance. Until the last 20 years or so, researchers and policymakers have focused on college access and enrollment. Colleges were paid on the basis of enrollments or credits. Certainly, most college faculty and administrators wanted their students to succeed, but funding systems gave colleges incentives to accumulate credits, not to assure completion of credentials or attainment of student goals. This focus on enrollments rather than outcomes was particularly strong in community colleges. They were seen as institutions that provided access to college for almost anyone.

Starting in the late 1970s, states began to take tentative steps toward developing reimbursement or regulatory systems that would reward or at least highlight improved outcomes for college students. In 1992, the U.S. Congress passed the Student Right to Know and Campus Security Act. This required all colleges, as a condition for their students to be eligible to receive federal financial aid, to report the Student Right to Know (SRK) graduation rate to the National Center for Education Statistics for inclusion in the publicly available Integrated Postsecondary Education Data System (IPEDS). These data only became available in the late 1990s, and for the first time there was a consistent outcome measure for most colleges in the country. As the name implies, the sponsors of this legislation saw this as a consumer information measure to allow students to make a better choice among colleges.

Meanwhile, states had been experimenting with outcome-based funding systems. A flurry of activity in the late 1990s was followed by a period during which some of these existing systems lapsed or were funded only sporadically. But the past five years has seen a dramatic growth of efforts to measure and encourage improved outcomes, including a resurgence of interest in state outcome-based funding systems and discussion of reforms of the SKR graduation rates.

How can higher education systems provide incentives for colleges to improve student outcomes, either through publicizing individual college outcomes or by developing funding systems that provide financial rewards for improved student outcomes for the institution? First, appropriate outcomes and measures of those outcomes need to be established. Community colleges have several missions. Which ones, if any, should be emphasized or given greater priority? Second, outcome measures need to be adjusted for differences in entering-student characteristics. Otherwise, colleges that enroll students with weaker skills or with other barriers to success will appear to be less effective. Assuming that educators and policymakers want to encourage success in college for these types of students, taking account of entering-student characteristics can reward colleges, or at least not penalize them, for serving more difficult-to-serve students.

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The large majority of efforts to analyze input-adjusted college performance have been about four-year colleges.¹ This paper will focus on these issues as they relate to community colleges. I highlight two factors that cause particular problems for community colleges. The first involves accounting for different college outcomes. Community colleges occupy an unusual place among institutions of higher education, and that complicates the analysis of student outcomes. Some of the issues involve data limitations, but others involve differences or disagreements about institutional objectives. The second area that is particularly difficult for community colleges is the measurement of relevant student characteristics, particularly student goals, and relevant institutional characteristics.

The sophisticated measurement of community college outcomes and appropriate input adjustments are at an early stage of development. Data quality and availability, outcome measures, variable definitions, and empirical methods have advanced to the point that we can develop performance metrics that are superior to simple comparisons of graduation rates. Nevertheless, a good deal of work remains to be done, and research and development needs to proceed along with implementation.

In the next section, I will first discuss community college outcome measures or metrics. The following section discusses issues and problems related to adjusting metrics for differences in community college student characteristics. Subsequent sections include a discussion of methodologies for making comparisons and a description of some of the ranking and outcome metric systems that already exist or are being developed. I end with overall conclusions and some suggestions for a research agenda to improve the input-adjusted measurement of community college outcomes.

COMMUNITY COLLEGE OUTCOMES

Higher education is an industry engaged in the joint production of diverse products. Universities are highly complex institutions that produce education, knowledge and other services. Although community colleges do not put much emphasis on faculty research and do not have hospitals, they also have multiple missions, particularly for education of undergraduates. And while most people would agree that the fundamental goal of undergraduate education at a four-year college is to get students to a bachelor's degree, undergraduate objectives at community colleges are more diverse, including completion of certificates of varying lengths, completion of associate degrees and transfer to a four-year college. Many community college faculty and administrators also argue that teaching skills that do not necessarily lead to a degree—for students who either take regular courses and stop short of a degree or certificate, or pursue noncredit programs—is also a fundamental mission of community colleges and a prime method through which they serve their local economy and community. How should these multiple outcomes be incorporated into measures of institutional performance?

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Currently for the country as a whole, the only consistent outcome measure for community colleges is the Student Right to Know (SRK) graduation rate, which is available from the Integrated Postsecondary Education Data System (IPEDS). IPEDS is a comprehensive data set maintained by the National Center for Education Statistics (NCES). In order for students at a particular college to be eligible for federal financial aid, the college must send IPEDS data, including the SRK graduation rate. The Student Right to Know and Campus Security Act of 1992 created the SRK rate. It measures the percentage of an entering cohort of first-time, full-time, degree- or certificate-seeking students who finish in 150 and 200 percent of the time a full time student normally would take. For a two-year associate degree, 150 percent equals three years and 200 percent equals four years.ⁱⁱ

Critics of the measure cite several problems. Since the rate includes only full-time students, it does not include the more than 60 percent of community college students who attend part time. There is a great deal of ambiguity about the concept of “degree-seeking.” Students who transfer successfully to a four-year college without completing an associate degree are considered non-completers, even those who eventually earn a bachelor’s degree. The measure combines certificates and associate degrees in a way that distorts the overall outcome measure. The graduation rate fails to recognize important community college missions to provide noncredit instruction or to teach specific skills that may not lead to degrees.ⁱⁱⁱ I will discuss each of these issues and consider how these weaknesses could be addressed to effect improved and more comprehensive outcome measures for community colleges.

Associate degrees:

Associate degrees are the central and most common award given by community colleges. They generally require 60 credits (based on a semester system) and are awarded in both liberal arts and sciences and occupational areas. The cohort graduation rate (the percentage of an entering cohort that graduates within a given time period) is a reasonable measure of completion, but it does require longitudinal tracking. Although the concept is simple, the cohort is often not well defined. In community colleges, it is often not clear who should be considered “degree-seeking.” I will return to this later. One possibility is to count the number of associate degrees or use a cross-section measure such as degrees or awards per full-time equivalent (FTE). This is a measure used in some accountability systems. These measures can be easily computed each year, but they can rise or fall as enrollments (including students who transfer in or return after a period away from college) change, even if nothing else changes. Cohort graduation rates are a more accurate reflection of a college’s ability to get an entering student to completion. This does not provide information, though, on the success of students who transfer in after starting college elsewhere. Community colleges have many such students.

Transfer:

Many students enter community college with the intention of transferring to a four-year institution and completing a bachelor’s degree. The current SRK graduation rate does not include transfer as a positive

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outcome: Students who transfer to a four-year college (or any other college) without completing an associate degree or certificate are counted as non-completers. The NCES does ask colleges to report the number of students who did not complete a degree or certificate but did transfer; however, these data are not reliable.^{iv}

Data for the 2004/2009 Beginning Postsecondary Students Longitudinal Study (BPS) suggested that graduation rates are much higher when the tracking period is lengthened and students are tracked across institutions. While the national SRK graduation rate for two-year colleges is less than 25 percent, when students were tracked across institutions for six years, 35 percent of an entering cohort had earned a certificate or associate or bachelor's degree. An additional 6.7 percent had transferred to a four-year institution and were still enrolled, and 12.9 percent were still enrolled at a less-than-four-year institution.^v This contrast with the traditional SRK graduation rate is even more striking because that graduation rate is only for students who start full time, but the BPS data include part-timers. The Department of Education's Committee on Measures of Student Success (CMSS)^{vi} is considering changes in the SRK reporting that would improve transfer information.

Statewide data systems can fundamentally improve measures of transfer. But even states that have good systems rarely track students who enroll in private institutions and those who move out of state. National Student Clearinghouse data can supplement state data (and could even be used in states that lack a data system), and some colleges are reporting completion information to the Clearinghouse (in addition to enrollments).^{vii}

Certificates versus associate degrees:

In addition to associate degrees, community colleges also confer certificates. These are awards that usually take less than two years and in some cases less than one year. In 2009, community colleges awarded about 510,000 associate degrees and 365,000 certificates; 218,000 (about 60 percent) of these required less than one year of study.^{viii} The SRK graduation rate combines data on associate degrees and certificates. Colleges are expected to track certificate students for 150 percent (or 200 percent) of the normal time it would take to complete the certificate. Students who complete certificates within the tracking period are counted as graduates.^{ix} But in most cases, certificates and associate degrees are fundamentally different awards. Certificates take much less time to complete and are often focused on specific occupational credentials. In many cases they consist of integrated programs rather than an accumulation of courses. The students attracted to an occupational certificate program and those attracted to a community college transfer program, and in many cases those attracted to occupational associate degrees, undoubtedly differ in their goals and orientation toward college. Probably as a result of these differences, certificate programs have much higher completion rates. For example, in 2008, 38 of the 50 community colleges with the highest graduation rates did not confer a single associate degree—all credentials were certificates.^x Likewise, multivariate studies on graduation rates in community colleges have consistently found that colleges with a greater emphasis on certificate programs, such as technical colleges, are associated with higher graduation

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rates.^{xi} Clearly, combining associate degrees and certificates distorts graduation rates as measures of performance. Finally, the costs of the two types of credentials will differ, so combining or averaging them will probably lead to distortions. Unfortunately, colleges do not report enrollments by degree type, which would allow the calculation of separate rates for associate degrees and certificates. Later I will discuss identifying enrollments by degree type.

Program differences:

Outcomes also differ significantly by program. For example, using data from a sample of 15 colleges in four states and using a measure of program enrollment based on course-taking patterns, we found that fewer than 20 percent of the students concentrating in liberal arts and sciences (LAS) had earned a degree or certificate from the college of initial enrollment within five years, compared with 40 percent of students in career and technical education (CTE) programs. CTE programs look much more successful. But if transferring to a four-year institution and obtaining a degree from another institution are also considered positive outcomes, then just over 40 percent of both LAS and CTE concentrators had “positive” outcomes. We also found significant variation in performance among occupational areas. Almost 60 percent of allied health concentrators completed a degree or certificate at the college of initial enrollment within five years, compared with between 35 and 40 percent of business/marketing or CIS concentrators.^{xii} Thus, institutional performance is in effect a weighted average of program performance; two colleges can have very different institutional graduation rates simply because they have different mixes of programs.

Although it is important to understand the contribution that program mix can make to institutional outcome measures, it should be remembered that program mix is also a policy that colleges may want to consider changing to improve student outcomes. This is particularly true for employment-related outcome measures. If graduates of a program cannot get jobs, then the college might consider shrinking or eliminating the program.

Noncredit enrollments:

Noncredit instruction is an important function at many community colleges. Indeed, in some colleges noncredit students outnumber credit students, although these are head-count rather than credit-weighted numbers.^{xiii} In many cases, the community college’s primary means to serve the specific needs of local businesses is through customized training or noncredit courses (or course offerings). A significant share of funds from the American Recovery and Reinvestment Act that flowed to community colleges was spent on noncredit programs, primarily because such programs do not need state approval or accreditation and so can be created and implemented quickly. Given the importance of noncredit to the community college mission, it might make sense to include data on noncredit students and outcomes in performance metrics, but problems with the data and definition of these programs make that difficult. First, the prevalence of noncredit programs in states depends on whether the state will reimburse colleges for noncredit instruction. Not surprisingly, in states that reimburse colleges for credit and noncredit instruction on an equal basis,

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there tend to be many more noncredit offerings. This complicates comparisons of outcomes across states. Second, noncredit enrollments or completions are not available from IPEDS, although NCES is working on plans to collect these data. Some state data sets include data on some noncredit enrollments, but these have not been used much in research. Finally, costs of noncredit instruction are often included in the instructional cost data, therefore distorting analyses using IPEDS that attempt to take account of costs.

Credits and intermediate outcomes:

While measures of college completion are the most common performance metrics, community college representatives argue that many students attend without intending to complete a degree and that, whatever their intentions, students benefit from completing credits even if they do not complete their degree or certificate. These are reasonable arguments (I will return to the issue of student intentions below), but research has suggested that students are more likely to be successful if they are enrolled in coherent programs rather than taking more or less unconnected or random courses.^{xiv} Therefore, if an accountability system includes intermediate measures, it would make sense to reward colleges for credits in a defined program rather than an accumulation of random credits. Accountability systems that include intermediate variables have made some improvements over simply counting credits by rewarding “momentum points” or credit thresholds. This is based on the idea that there is an empirical discontinuity at these thresholds after which the probability of completion rises.^{xv}

Additionally, there is the problem of “excess” credits. Students who earn associate degrees usually accumulate many more than the presumed minimum of 60 credits. Based on a sample of 29 states, Complete College America reported that students who earned associate degrees earned on average 79 credits.^{xvi} Our data from one large state found that 25 percent of all students who earned associate degrees had at least 73 credits. It is possible that some of these credits were transferable or that they might have been prerequisites for entry into limited programs (nursing is the best example), but they also could be unnecessary credits or courses taken because of poor advising or student confusion.

Meeting student goals:

To what extent should or can student goals be considered when setting performance standards? Many students enroll in credit courses without necessarily planning to complete a degree. For example, they may want to learn a limited set of skills that can be picked up in a small number of courses. Some of those non-degree-seeking students may matriculate in a program as a condition for financial aid eligibility. The current SRK graduation rate is supposed to be based on “degree-seeking” students, suggesting that colleges should not be held accountable for completions of students whose goals are more limited.

How can student goals be incorporated into performance metrics? Information collected by institutions on student intentions is notoriously inaccurate. Colleges submitting data to the National Center for Education Statistics for IPEDS are asked to include “degree-seeking” students, but the primary means of judging that is

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through full-time status: A student attending full time is assumed to be degree-seeking. But about two-thirds of community college students attend part time. Other alternatives have been suggested—enrollment for six credits plus enrollment in a college-level English or math course or completion of 12 (or 15 or 18) credits within the first year (or two years). The CMSS recommended classifying students based on criteria including receipt of federal financial aid or enrollment in one or more of a particular set of courses.^{xvii} The availability of individual student-level data allows other possibilities for inferring educational objectives, and these should be explored, but the main problem with this approach is that it uses descriptions of in-college behavior as a proxy for entering-college characteristics. College practice, such as poor advising or a disorganized schedule, may influence student behavior. Using course-taking patterns as a control or a way of classifying entering objectives may therefore disguise poor performance or obscure superior performance.

Although classifying student goals is difficult, the developers of systems of outcome metrics also need to consider the extent to which those goals should be taken into account. As open-door, low-income and primarily local institutions, community colleges probably attract a disproportionate share of students without clear goals. Thus one of the functions of a college may be to help students form and solidify goals, especially for first-generation college students or other students who do not come from families or high schools that provide resources and support to help students develop plans for the future. This suggests that adjusting outcome measures based on student goals should be done cautiously.

Costs:

Systems of accountability and outcome metrics have not given much emphasis to costs. This is an important omission since we want to design systems that provide incentives for efficient use of resources. The Delta Cost Project has extracted cost data from IPEDS back to 1987, adjusted for changes in reporting requirements. Their data show that the cost (“educated and related expenditures”) per associate degree in 2009 was about \$70,000, while the cost for a B.A. at a public research university was just over \$60,000. If certificates are included, then the cost per “completion” drops to about \$45,000.^{xviii} These comparisons would change if some weight were given to credits, but given the extreme differences between community colleges and research universities, it is not clear how to interpret this comparison. Comparisons among community colleges would make more sense.

This is a large area that requires much more discussion than is possible in this paper. Belfield^{xix} presents a detailed discussion of the use of cost in performance metrics. He concludes that the best measure at this point is the cost per completion (with associate degrees and certificates weighted by the credits required to complete them), although his goal is to compare community college performance, so this measure would not serve as an appropriate basis of comparison between Berkeley and Cabrillo Community College, for example. Since his goal is to measure cost per outcome for public community colleges, he includes only the public subsidies (not fees or tuition) in his measure of cost.

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Program quality:

Completion or other indications of progression are the most common outcome measures. The most obvious criticism of a reliance on progression and completion is that it gives an incentive for lowering standards. So-called “degree mills” hand out credentials with minimal demands. In order to address this problem, developers of systems of accountability have looked to two sources of information to take account of quality: measures of student learning and employment outcomes. Policymakers, accreditors and researchers are all working to develop better measures of learning and employment. Accreditors in particular are requiring colleges to develop measures of student learning outcomes (SLOs) as conditions of accreditation. Various instruments such as the Collegiate Learning Assessment (CLA) have been developed to measure general skills, and there are many assessments or certifications in specific occupational areas.^{xx} But so far none of these offer a consistent measure that could be used to compare a large number of institutions. Finding a consistent measure of learning for community colleges is particularly difficult. While it might be plausible to argue that the general skills measured by the CLA and similar tests should be learned by all students in four-year colleges, given the much shorter length of some community college credentials and the specific occupational focus of some, measuring these skills for all credit community college students would make less sense. At least samples would have to be restricted to students in associate degree programs and particularly transfer-oriented programs.

Similarly, there are interesting developments in measures of employment outcomes. Most relevant is the U.S. Department of Education’s Gainful Employment regulation that will require for-profits and community colleges to provide identifiers of graduates from specific programs.^{xxi} Social Security data will then be used to measure earnings of those graduates. But this reporting will be limited to programs at for-profit institutions and to certificate programs in community colleges. This will provide very interesting information for a limited sample of community college students. Furthermore, other information on the characteristics of those programs will not be easily available, and since the data will be only for graduates, we will not be able to take account of completion rates. If only a few highly persistent students succeed in graduating, and those students get good jobs, then this measure will look good even when students who start the program have a very low probability of getting those high-paying positions.^{xxii}

ADJUSTING FOR INPUT VARIATION

One goal of input adjustments for institutional performance is to account for differences in entering-student characteristics. Open-enrollment colleges enrolling low-income, first-generation (in college) students with weak academic skills may have profound positive effects on their students yet still have what appear to be low completion rates. Selective colleges populated by well-off students do not have to do much with their students to enjoy strong performance metrics. Comparing the raw graduation rates (or almost any outcome measure) for these two types of colleges makes little sense. Even among open-enrollment institutions such

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as community colleges, entering-student characteristics could vary, thus distorting performance measures such as graduation rates. In a sample of 14 colleges from four states, the percentage of entering students referred to developmental education ranged from 8 percent to more than 90 percent.

But community colleges lack consistent measures or proxies of entering-student academic achievement or socioeconomic status. Analyses of four-year colleges can use SAT or ACT scores of entering students to measure academic achievement, and for those colleges the incidence of financial aid is a reasonable proxy for SES. Most community college students do not have SAT or ACT scores. Studies limited to community college students with such scores must rely on a sample that is not representative. The CMSS recommended that colleges report to IPEDS the number of students in a cohort referred to developmental education.^{xxiii} This will begin to provide a measure of entering-student skills.

In some states, data systems can help solve these problems. Statewide entry assessment tests can provide a common measure of academic preparation. Data on entering students' GPAs, when available, can also provide information on student academic skills. If student addresses are available in these systems, then local Census data can provide a useful proxy for SES. In places where data on individual students can be used, geocoding student home addresses and using Census data for small geographic areas is one increasingly used approach.^{xxiv} When K-12 data are linked to college data, then free-lunch eligibility is another possible proxy for student income levels.

Nontraditional status—delayed postsecondary enrollment, part-time attendance, interrupted attendance and full-time work—also influences a student's probability of graduating, so some or all of these are usually included. Other characteristics of nontraditional students, such as nonresidential status, financial independence, having dependents, being a single parent and not possessing a high school diploma, also influence the probability of completion. Previous literature has also identified a series of other student composition characteristics that are related to institutional graduation rates, including gender, race, ethnicity and immigrant status. Some of these characteristics are available now from IPEDS. Longitudinal data would allow a more precise measure of part-time status, program interruptions and age at entry. When financial aid data are also linked, the information on financial independence and financial aid receipt can also be used.

I have cautioned against excluding undecided students from calculations of outcome measures, but providing a college education to a completely undecided student with potentially weak commitment to college, and with little knowledge of what is expected in college, is very different from educating a well-informed student with clear goals. So, if possible, it would make sense to take account of the prevalence of undecided or poorly directed students when considering outcome measures. And since students often live at home, do not have to apply many months before enrollment and can enroll in a small number of courses often with low tuition, students can start community college with minimal commitment and without any clear objective or goal. Colleges should be given incentives, through adjusted outcome metrics, to help these

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students form and strengthen their goals and plans, yet consistent data are not available to identify this crucial student characteristic. This is another area in which the analysis of course-taking patterns may offer some insight.

Institutional characteristics:

Performance metrics and college ranking systems often control for institutional characteristics such as size, urbanicity and religious affiliation. The Education Trust system for comparing four-year colleges takes account of the sector, admissions selectivity, Carnegie classification, status as a commuter campus and other factors.^{xxv} In an analysis of community college graduation, Bailey et al. controlled for urbanicity, whether the college was historically black, enrollment size, whether it was a technical college, and other institutional characteristics.^{xxvi}

Which institutional characteristics should be included depends on the purpose of the research or outcome measurement systems. If the aim of a study is to understand how to improve student outcomes by identifying key factors associated with graduation rates, then it makes sense to include a comprehensive set of variables, including ones that are not under the control of colleges and others that are. In this type of study, analysts are interested in the coefficients of these variables.

However, if the goal of a study is to compare or assess institutional performance, then some variables should be included while the effects of some variables should be left in the residual. For example, if a college uses a particular pedagogic strategy or curricular strategy, it would not make sense to adjust outcomes for that since a pedagogic strategy may lead to better outcomes. Controlling for a successful practice will reduce the residual and lower a college's ranking even though it has found a successful strategy. But note that this is exactly the type of practice that we would like to include if the purpose is to explain variation in outcomes.

Educational expenditures or costs are an important determinant of outcomes. As Kelchen and Harris argue,^{xxvii} the expenditures or costs included in a ranking system also depend on the target audience. Parents are concerned with the cost of a unit of outcomes to them—tuition minus institutional financial aid. This calculation will give a ranking different from one aimed at state policymakers, who may be interested in the cost to the state and therefore would not want to count tuition.^{xxviii} Less parochial policymakers might want to take into account the total expenditures per unit of outcomes. Kelchen and Harris show that rankings are different for models using tuition minus institutional aid and those using total expenditures.^{xxix} While total expenditures should be taken into account, the distribution of expenditures among functions in the college should clearly be left for the residual, since this is a fundamental variable that colleges can use to improve outcomes with a given level of resources.

Although taking account of fixed institutional characteristics is a common practice, many apparently fixed characteristics can be changed. Institutions can grow or shrink or create quasi-independent campuses;

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colleges (even community colleges) add dorms, open branch campuses (thereby changing their urbanicity) and change their mix of programs. Community colleges have added bachelor's degree programs (and in some cases essentially transformed themselves into four-year colleges).

In general, characteristics that are under the control of the college (or perhaps policymakers), should not be included in the analysis unless policymakers want to, in effect, protect a particular characteristic.

METHODOLOGIES FOR MAKING COMPARISONS

How should performance be evaluated, or what comparisons should be made to put the performance of a particular college in appropriate context? A variety of approaches are used to make these comparisons. The papers for this conference, and much of the research and analysis of this type, use multivariate statistical methods to derive comparative performance metrics while controlling for input characteristics. But there are several approaches even to this, and the choice of the methodology depends on the available data and the types of variables that are to be taken into consideration.

If only aggregate data are available, then the most accessible methodology is the regression approach that relates institutional characteristics, including average characteristics of students, to outcomes such as a graduation rate. Then the expected outcome, based on the characteristics included in the analysis, can be compared with actual outcomes to develop a metric or ranking. The highest-performing colleges are those that have actual graduation rates above the expected rate. This approach has been used for four-year colleges^{xxx} but infrequently for community colleges.^{xxxi} The regression-based graduation rate analysis is easy to implement, is well understood and allows the analyst to judge performance among dissimilar colleges. This analysis can be carried out on almost all colleges in the country using data available from IPEDS. This is the approach used in the paper by Kelchen and Harris written for this conference,^{xxxii} although they include only four-year colleges.

If unit record data are available, then analysis of the probability of achieving a particular outcome controlling for individual characteristics can be carried out. The analysis also can include an institutional dummy variable, and the coefficient on that dummy will be the outcome metric. The colleges with higher coefficients for that variable contribute more to the positive student outcomes than other colleges after taking account of the characteristics of students. This is the methodology used by Wright and his coauthors and by Cunha and Miller for their papers for this conference.^{xxxiii} This has some advantages over the approach using aggregate data. First, it preserves that information contained in the variation in individual characteristics within an institution (aggregate measures such as the average SAT score or average score on an assessment test lose that information). Second, it leads to much more flexibility in the construction of outcome and control variables since the analyst is not limited to variables available from IPEDS.

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There are disadvantages to the use of individual unit record data to compute metrics. First, these analyses are limited to single states and, even more, to states with good unit record systems and states with enough community colleges to generate a meaningful sample. But the limitation to a state-by-state analysis may not be a serious problem for community colleges. Community college systems vary significantly among states, which calls into question the validity of cross-state comparisons. Also, accountability or performance funding systems will be used at the state, not the national, level. A second problem is that the methodology using a dummy variable for each institution prevents the use of other institution-level variables—for example, if the analyst wants to include institution size, location or labor market characteristics as control variables.

Hierarchical linear modeling (HLM) may offer an approach that allows an analysis that yields an institutional performance metric, but that can include both individual data (thus preserving within institution variability), and institution-level variables such as institution size or average assessment scores of entrants. HLM generates institution-level coefficients, so the outcome metric in this case would be the difference between the actual outcome and the expected outcome. This methodology also requires an adequate number of colleges to generate a usable sample size, so state level analyses will be difficult for states with few community colleges.^{xxxiv} As far as I know, HLM has never been used to analyze community college outcomes.

The methodologies that I have described so far are most appropriate when comparing institutions with similar input characteristics. Estimating the relationship between the academic characteristics and graduation rates is less reliable when the institutions in the analysis have little overlap in the distribution of entering student academic skills—highly selective and open admissions colleges, for example. This suggests that analyses should be limited to roughly similar institutions.

One possibility would be to identify key institutional characteristics—such as urbanicity, the assessment scores of incoming students, or institution size—and restrict comparisons to colleges that are similar based on those characteristics.^{xxxv} This is easy to do if the analyst focuses on a very small number of variables (comparing a college to all urban colleges or all urban colleges with enrollments over 10,000), but it becomes more complicated when several variables are used. If the method requires close similarity on several variables, then the number of potential comparison colleges will be quickly reduced. Focusing on a small number of variables will leave a great deal of heterogeneity among potential comparison colleges.^{xxxvi}

College Results Online,^{xxxvii} a service of The Education Trust, has developed a methodology for using several variables to calculate a comparison score for any two four-year colleges in its database. A college can choose the one, 10, 20 or any number of colleges with the highest comparison scores. Colleges can then directly compare their graduation rates with those of similar colleges.

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The comparison college approach does not generate outcome metrics. It limits the comparison institutions, after which the actual outcome measure—such as the graduation rate—can be compared directly. Using a matching technique, such as propensity score matching, is an alternative approach that would eliminate significantly different colleges from the analysis, but it would still generate a performance metric based on the difference between the actual and expected outcomes for each college.

In developing performance accountability systems, some states have chosen to limit their comparisons to year-to-year changes in outcomes for individual colleges. This is the approach used in the Washington State performance funding system—the Student Achievement Initiative.^{xxxviii} The justification is that even with multivariate techniques, it is difficult to take account of all of the differences between colleges, so that cross-section comparisons will always be distorted. This also rewards colleges for improvement, even if their baseline outcomes are low, although it probably will penalize colleges that start out performing at a relatively high level, since it may be more difficult for those colleges to improve. And focusing on changes over time may give colleges an incentive to be more selective, so even in this case, the analyst should take account of student characteristics.

EXISTING AND EMERGING SYSTEMS FOR MEASURING AND COMPARING STUDENT OUTCOMES

Over the past decade, the growing interest in accountability has led to many systems of performance metrics for community colleges. Perhaps the most elaborate is the Voluntary Framework for Accountability (VFA), sponsored by the American Association of Community Colleges and the College Board.^{xxxix} The National Governors Association has produced another set of measures for its Complete to Compete initiative.^{xl} The organization, Complete College America (CCA), has also developed a similar set of outcomes as part of its college completion initiative. Thirty-three states have agreed to try to achieve these goals. In addition, the U.S. Department of Education has convened a group, the Committee on Measures of Student Success (CMSS), to make recommendations to the secretary of education to revise the outcome measures reported in IPEDS.^{xli}

There are some differences among these systems, but in general they ask colleges to report degree and certificate completions and transfers. They also include some intermediate measures, such as retention, course completions, attainment of credit thresholds and completion of developmental education. These systems recognize the importance of promoting quality through measures of learning or employment outcomes but do not propose specific measures, although in some cases colleges are expected to disclose whatever information they have on available learning or employment outcomes—for example, learning outcomes that they may provide to accreditors or employment outcomes provided to the Department of Education for the Gainful Employment regulation. These systems do not try to adjust for input characteristics,

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but in some cases they ask that colleges disaggregate outcome metrics by race and ethnicity, gender or financial aid status. Costs are not included in any of these measures.

Several states have or are developing performance-funding systems.^{xliii} There is a long and unstable history of state performance funding. Schemes have come and gone, encouraged or discouraged by fiscal and political conditions. Given the number and diversity of the programs, it is difficult to generalize, but most use some combination of completion and intermediate variables. Some use counts of degrees rather than rates, and for the most part sophisticated input adjustments are not used. Some states distribute funds based on comparisons among colleges, while others focus on improvements over time. In general, systems do not use input adjustments, although in some cases systems include rewards for serving low-income or other harder-to-serve groups. This is a fast-changing field, and several systems are being developed and reformed. It is unlikely that they have had much influence, however, both because of the instability and because the funding share that is “at risk” has generally been very low, calling into question the potential strength of any incentive. More than through the direct effect of the incentives, these policies may have been influential by calling attention to the apparent low level of performance at many colleges.^{xliiii} Dougherty and Reddy also argue that these schemes have promoted greater use of data in institutional planning and changes in academic and student services designed to promote greater student success.^{xliv}

RECOMMENDATIONS

In this section I will make a series of recommendations about the development of performance metrics for community colleges. Overall, the field has made a great deal of progress in developing strategies to measure community college outcomes. Useful metrics can be developed, but we need to continue to improve the data and methodologies for measuring institutional outcomes, so recommendations are directed to the federal government, states or foundations interested in developing metrics, and researchers working on improving data and methodologies.

The Student Right to Know (SRK) graduation rate reported in IPEDS has the advantage of being a more or less consistent measure for all Title IV-eligible community colleges in the country. But the rate is at best an incomplete measure of community college performance. The outcome measures reported to IPEDS can be significantly improved through the steps listed below.

1) Revise the student outcomes reporting requirements for IPEDS to broaden the cohort, improve measures of transfer, develop more consistent sample definitions and refine completion measures.

Some of the deficiencies of the SRK graduation rate can be addressed. A more comprehensive measure would include completion of an associate degree or a certificate or, for those who did not complete, transfer after some minimum number of credits earned at the college of initial enrollment. In the past, some colleges

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have not been able to report reliable transfer data, but the department should place a greater emphasis on this and provide technical assistance. In states with good data systems, transfers within the public state system can be easily measured and reported by the colleges, but measuring transfers is still more difficult for students who move out of state or go to private colleges. The National Student Clearinghouse data offer a potential solution to the problem of tracking transfer students. Colleges should also report outcomes for part-time students, students who are referred to at least one developmental education course (a crude measure of entering academic ability) and students on financial aid (also a crude measure of socioeconomic status). NCES should also develop a measure of “degree-seeking,” so that all colleges use the same concept to establish their entering “cohort.” The Department of Education’s Committee on Measures of Student Success has made suggestions (approved on November 29, 2011) along these lines for improvements in community college student outcomes reporting for IPEDS.^{xlv}

Although the use of IPEDS allows research at the national or multistate level, the analysis is limited to outcome and input variables available from NCES. Possible IPEDS reforms will increase their variables and allow more complete analyses of outcomes. Nevertheless, many of the issues raised in this paper can be addressed only with longitudinal student unit record data. I have emphasized that the most appropriate outcome measures and control variables depend on the audience and purpose of the measure. Students and parents, legislators, taxpayers, accreditors and researchers may all have different goals and want different measures. A unit record system would allow for the flexibility to adjust measures and control variables for different purposes. And aggregating data to calculate average characteristics for institutions loses potentially important information relating to the distribution of characteristics within colleges.

The creation of a federal-level unit record system for college students was prohibited by the last reauthorization of the Higher Education Act. This prohibition should definitely be revisited. While the creation of such a national database will be costly, the development and rapid growth of the National Clearinghouse database suggests that it is possible.

But at this time, state unit record systems, supplemented with National Clearinghouse data, offer the best options for comprehensive input-adjusted outcome measures. IPEDS data can still be used for some institutional variables and particularly for cost. Reliance on state-level data is less of a disadvantage for community colleges than for four-year colleges for several reasons. First, community college students are less mobile. For the most part, students go to the nearest community college,^{xlvi} so comparing colleges at the national level is less important. Also, community colleges are regulated and funded at the state level, so for many purposes, such as performance funding systems, state-level analysis is the most appropriate. For many states, state systems also allow an analysis of course-taking patterns through the use of student transcripts. This is the type of analysis that could not be done with clearinghouse data or even a national student unit record system.

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2) Differentiate between academic and occupational associate degrees, and between short- (less than one year) and long-term certificates.

Ideally, associate degrees and certificates should be treated separately. Analysts should also pay more attention to program differences, particularly differences between liberal arts (or transfer) and occupational programs, but differences within occupational programs are also important. Degrees and certificates are very different awards, and combining them in an overall degree/certificate completion rate is misleading. Most data sets identify certificate and degree completions by program and major, but they do not record enrollments in particular programs or degree types. As a result, even with unit record data, analysts cannot calculate program or degree-level completion rates. Transcript data can be used to identify program and degree-type enrollments at a much earlier period in a student's college career. If transcripts are not available, then the share of awards accounted for by certificates and potential information on the distribution of awards by program should be taken into account. Perhaps colleges with very high percentages of certificates (particularly 100 percent) should be analyzed separately.

3) Differentiate between students who transfer with and without a degree, and between those who transfer to a four-year college and to another community college.

Incomplete measurement of transfer is one of the greatest weaknesses in the current SRK graduation rate. Longitudinal data sets supplemented with National Clearinghouse data allow a more accurate accounting of student transfer. Students who transfer without a degree should not be counted as non-completers. If analysts or policymakers want a single outcome measure, one possibility is a measure that includes all degree and certificate completers and those who transfer to a four-year college without a degree. But two problems need to be kept in mind. First, in order to be counted as a successful transfer, students should be required to earn a minimum number of credits at the sending community college. Second, although college faculty and administrators argue that they have met their responsibility to the student if that student successfully transfers to a four-year college, a student who transfers may still never earn a degree. As a result, in any performance metric, I would weigh non-degree transfers less than completion, perhaps based on the credits earned at the community college. Community colleges should also track the progress of their students once they have transferred. I would not advocate including this information in a performance metric, primarily because of data and methodological problems, but in the long run some measure of post-transfer success should be taken into account. Transfer to another community college should be considered the same as retaining a student.

4) Take account of differences in program offerings in comparing institutional performance.

Even within institutions, graduation rates for different programs vary dramatically. Thus two college graduation rates can differ significantly simply because they have different distributions of programs. One problem with taking this into account, though, is that institutions generally do not have comprehensive data for program enrollments—data are most accurate for program completions, not enrollments. Moreover, program choice is an institutional policy that itself could be improved. Thus at this point, better measures of

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program enrollment should be developed and variations in program offerings should be considered in the interpretation of differences in performance metrics. We are not ready to include program distributions in comprehensive performance metrics.

5) Develop more information on noncredit instruction, but do not include it in institutional performance metrics—or at least develop separate metrics for noncredit.

Noncredit instruction is an important activity in community colleges, but it is a secondary function. In many cases, noncredit programs are funded by fees, by contracts with employers or by special categorical funding, rather than by public resources based on taxes. Moreover, noncredit offerings range from programs that last a few hours to months-long courses or sequences of courses that lead to certifications with labor market value. Categorization of these variables and programs to allow common performance measures would be difficult. Data on noncredit is scarce and the data that do exist are rarely used. States should begin to strengthen and use these data. Particularly when data can be linked to employment data, outcome metrics for some noncredit programs can be developed.

6) In outcome metrics, include intermediate outcomes such as credit thresholds or completion of developmental education, but give them less weight than completions and favor intermediate metrics that indicate progress through a coherent program.

Current systems of outcome metrics, such as the Voluntary Framework of Accountability and the National Governors Association's *Complete to Compete* metrics, emphasize intermediate measures such as credit accumulation or achievement of credit thresholds, completion of developmental education, or retention. On the one hand, research has shown that there are economic benefits to accumulating credits even without completing an award. But accumulation of credits is not unambiguously good. Many community college students who complete degrees do so after having accumulated many more than the 60 credits generally required for an associate degree. One reason that students end up with excess credits is that they may take a series of unconnected courses that do not lead toward a degree. As a result, some of their courses in effect do not count toward completion of an award. To be sure, many students arrive in community colleges without clear goals, and what looks like random course-taking may be a productive search for a subject or a major that is of interest to the student. Nevertheless, one function of the community college is to help students find a direction and a goal and get them established in a program that leads to that goal. From this perspective, a course-taking pattern short of a degree that represents coherent progress should be rewarded more than one that is made up of disconnected or excess courses. Perhaps courses should be counted if they meet a requirement for a degree or certificate (other than electives). Completion of developmental education could be counted as an intermediate outcome if the student enters a college-level program.

Measuring the coherence and productiveness of a student's course-taking pattern is difficult, and no common methodology has been developed to do that. Jenkins categorizes students who have taken and passed three courses in specific fields as having "entered a program."^{xlvi} But that work represents the first step in developing a better understanding of student pathways. Although analyzing student patterns will require

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work on the part of colleges, it is the type of information that colleges should have about their students—that is, they should know whether a student is on a clear path or floundering around.

7) Where possible, include measures of quality in outcome metrics, but we need better measures and methodologies for taking account of indicators of quality such as learning and employment outcomes.

Basing judgments about performance on progression measures alone runs the risk of providing incentives for lowering quality and standards. The two potential measures of quality that have received the most attention are employment and learning outcomes.

7a) In some well-defined occupational areas, employment measures can be incorporated into performance metrics.

It makes sense to look at employment outcomes for students in programs explicitly designed to prepare students for jobs immediately after completion: focused occupational certificates and some occupational associate degrees. In current practice, these types of programs report on employment and earnings of graduates, and this information is often based on graduate surveys, which tend to have very low response rates and are, as a result, unreliable. Approaches that link information on graduates to employment outcomes—either in the UI system or, even better, through Social Security data, as the Gainful Employment regulations do—can provide interesting information. But such measures should either take account of the graduation rate or analyze outcomes for students enrolled in programs (perhaps after some threshold number of credits), not just the graduates. The interpretation of employment outcomes for students who transfer to other institutions is more complicated, since those other institutions also influence the employment outcomes. Perhaps institutional effects could be weighted by the time spent in each college, but in any case, more work needs to be done on this before it can be reliably incorporated into common performance metrics.

7b) Measures of learning outcomes available now are not adequate for use in an institutional outcome metric, but this is an evolving field that needs further development.

No overall assessment of learning outcomes is available that is appropriate to measure institution-wide performance. Broad measures such as the Collegiate Learning Assessment have not achieved even moderate usage in community colleges. In some cases, occupational certifications can and do serve as a benchmark for program quality. Some accreditors require colleges to describe their procedures and plans for assessing learning outcomes. A self-study procedure of this type using a consistent system makes sense for states that are trying to develop performance accountability systems. Such a procedure could be designed to support the development of more refined measures.

8) Control outcome metrics for academic skills and socioeconomic background as well as other demographic variables such as race, ethnicity, gender and part-time status.

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There is no common measure of entering academic ability, such as the SAT, for community college students. Alternatives include referral to developmental education, assessment scores (especially useful in states with common assessments) and high school GPA, for recent high school graduates.

Socioeconomic status (SES) is another important determinant of college outcomes for students. Financial aid receipt is the most available variable, but it is a relatively weak measure of SES for community college students, since many attend part time and are not eligible for aid. If unit record data that include addresses are available, then a proxy for SES can be constructed using Census data or data from the American Community Survey.

9) Work toward better methodologies to take account of student intentions and goals.

Student intentions and objectives are a fundamental determinant of student outcomes. This involves whether they actually have goals and, if so, what those goals are and how set the students are in them. Probably one of the most important reasons why certificate programs and technical colleges have higher graduation rates is that students enter those programs with clearer goals. Individual data with transcripts will also allow a much more comprehensive analysis of student programs and possibly intentions. Transcripts and other detailed information from students could help categorize students by intention. This is not a straightforward practice, since institutional policy can influence student course-taking patterns and one goal of colleges may be to help students develop and shape their goals. The course-taking patterns of students in a college that does a better job of helping them set goals may look more coherent than those patterns in other colleges. Nevertheless, there is a tremendous amount of information in detailed data on student behavior. Some colleges or states collect self-reported information on student goals. This information is not considered reliable, and students' goals change over the course of their college careers. At least research should be conducted to relate reported goals to student course-taking patterns. Bahr has used transcript data from California's community colleges to categorize colleges based on dominant course-taking patterns of their students.^{xlviii} This type of research needs to be continued.

10) Include the costs of producing outcomes in performance metrics

I do not have the space in this paper for a comprehensive approach to incorporating costs into outcome metrics for community colleges. That topic deserves another paper. Especially in the current resource-constrained environment, metrics should be designed to provide incentives to encourage improved student outcomes at the lowest cost without sacrificing quality.

11) Control sparingly for institutional characteristics.

Controlling for institutional variables in measuring the performance of community colleges should be done with a conscious understanding of the goals of the measure and of the relevant audiences. The appropriate institutional controls for ranking and assessment systems will be different for different audiences. Parents and students (and different types of students), state legislators, state-level agency personnel, college

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presidents, accreditors and researchers looking for efficiency or the best use of society's resources may want different information and assessment systems. Researchers trying to understand what characteristics and practices promote successful outcomes will want to include characteristics and policies that are and are not under institutional control.

But for the purposes of accountability or performance funding, policies or practices that are under the control of the college should not be included in the analysis. In developing performance metrics, states may have special goals. For example, they may want to site colleges in particular locations, say in rural areas. Urbanicity is a characteristic that seems out of the control of a college, so it would be reasonable to take that into account, but colleges can change their urbanicity by opening up branch campuses—many colleges have multiple sites. Metrics that include employment outcomes might include local labor market characteristics. In some cases, there are good arguments for including institutional characteristics, but these should be evaluated carefully before they are included in performance metrics.

12) Base the methodology used to develop outcome metrics on the goals of the metric and the available data.

Any system of metrics that includes colleges from more than one state or colleges in states without developed state data systems will have to be based on IPEDS data. The most flexible methodology in this case is the regression approach that calculates metrics based on the relationship between actual outcomes and expected outcomes based on controls for aggregate individual and institutional variables. The analyst can restrict the sample to avoid comparing fundamentally different colleges, although this is less of a problem for community colleges, especially within one state, than for four-year colleges. Two community colleges are much less likely to be as different as, say, Columbia and St. John's, two private colleges in New York City.

The same approach can be used within state metrics systems: for example, for the purpose of developing funding accountability systems, as long as the state has enough community colleges to provide an adequate sample. This strategy would be easy to implement since the data are available from IPEDS.

In states with enough colleges and well-developed state data systems, metrics can be computed using longitudinal unit record data. This is much more flexible than an aggregate analysis using IPEDS data, and it has some statistical advantages. There are alternative methodologies for this strategy depending on whether the metric will control for institutional variables. But this strategy is much more difficult to carry out and to understand than the analysis based on IPEDS data, and it is worth comparing rankings or relative results using the two methodologies to determine whether the differences are worth the extra effort and resources and the reduction in transparency.

Finally, given the many problems with controlling for differences among colleges, there is an argument to be made for also focusing attention on changes in colleges from year to year—for example, as the Washington State Student Achievement Initiative does. Focusing on an institution's progress greatly restricts, although certainly does not eliminate, the unmeasured variables that could change over time that might influence college performance. In making these comparisons, it would also be important to make sure that there have not been significant changes in student characteristics that might account for changes in institutional performance.

CONCLUSION

Researchers and educators have made a great deal of progress in adjusting outcome measures for differences in inputs, but more can be accomplished. Improvements in IPEDS; the growing availability and quality of longitudinal data sets that link K-12, community college, four-year college and employment data at the state level; agreements to connect these data across state lines; and the growth of the National Student Clearinghouse database will enable more comprehensive and sophisticated performance measures. In addition to improvements in data availability, refinements in methodologies and coordinated use of qualitative methodologies to further explain quantitative outcomes can contribute both to improved understanding of what can be done to improve outcomes and to more meaningful accountability and performance funding systems.

The discussion in this paper has suggested that, at least for community colleges, choosing the most appropriate outcome measure may be more difficult than taking account of student characteristics. Community colleges are, for the most part, open-access institutions, so the student characteristics do not vary as much from college to college as they do for four-year institutions. On the other hand, the mix of degree types, the role of transfers, and the varied and ambiguous student goals make it difficult to develop a consistent outcome measure. Any system of metrics will need to include a variety of outcome measures.

Although available input-adjusted metrics are an improvement over comparisons of simple graduation rates, our capability to measure and compare outcomes could still be improved. Rankings change with different methodologies, different outcomes and different control variables. Since reasonable arguments can be made for many of these differences, reasonable arguments can also be made for the different rankings. Small or even moderate differences, especially in the middle of the distribution where many colleges are bunched together, probably are not stable and do not represent substantively different performance—these differences probably are not statistically significant, either. Large differences have more meaning, and we can begin to have more confidence in substantive measures if colleges appear near the top or bottom on different metric systems.

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Throughout this paper, including the recommendations, I have made suggestions for research that could advance this agenda. Research on course-taking patterns would be particularly useful. Another fruitful avenue of investigation includes projects that compare ranking systems. And certainly where resources are available, a comprehensive research program should include qualitative research to develop a better understanding of what might account for differences in rankings in different systems.

Many states are working to develop community college funding systems designed to provide incentives for colleges to work to improve student outcomes. I have suggested some guidelines for those systems. While data and methods are still being developed, it would make sense for states to allocate some funding based on performance metrics—enough funding for colleges to take risk seriously—while they continue to monitor the effects of those metrics and in general continue to search for the most appropriate outcomes metrics for community colleges.

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ⁱ Thomas Bailey and Di Xu, *Input-Adjusted Graduation Rates and College Accountability: What Is Known from Twenty Years of Research?* (New York: Columbia University, Teachers College, Community College Research Center, 2011).

ⁱⁱ "Information on completion of graduation rates," Code of Federal Regulations - Title 34: Education, accessed November 22, 2011, <http://cfr.vlex.com/vid/668-45-completion-graduation-rates-19762539>.

ⁱⁱⁱ For a discussion of the problems of the SRK graduation rate see "Draft Report," Committee on Measures of Student Success, accessed November 22, 2011, <http://www2.ed.gov/about/bdscomm/list/cmss-committee-report-11-15-11.pdf>.

^{iv} Allan Joseph Medwick, *Transfer-Out Reporting on the IPEDS Graduation Rate Survey: A First Look at Trends and Methods* (Tallahassee: Association for Institutional Research and U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2009).

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^{vi} Committee on Measures of Student Success, “Draft Report.”

^{vii} “What’s In the Clearinghouse Database?,” National Student Clearinghouse, accessed November 22, 2011, <http://www.studentclearinghouse.org/gls/how.htm>.

^{viii} Calculated using the Integrated Postsecondary Education Data System (IPEDS).

^{ix} According to the IPEDS instructions, colleges should track certificate students for 150 percent of the normal time it would take to complete a certificate—13 ½ months for a nine-month certificate. We suspect that colleges simply use the three-year tracking period for all credentials, therefore biasing graduation rates in favor of certificates.

^x Thomas Bailey, “Can Community Colleges Achieve Ambitious Graduation Goals” (paper presented at the American Enterprise Institute conference, Washington, DC, February 15, 2011).

^{xi} e.g., Mariana Alfonso et al., “The Educational Outcomes of Occupational Sub-Baccalaureate Students: Evidence from the 1990s,” in *Economics of Education Review* 24(2) (2005); Thomas Bailey et al., “Is Student Right-To-Know All You Should Know? An Analysis of Community College Graduation Rates,” in *Research in Higher Education* 47(5) (2006); Judith Scott-Clayton and Madeline J. Weiss, *Institutional Variation in Credential Completion: Evidence from Washington State Community and Technical Colleges* (CCRC Working Paper No. 33) (New York: Columbia University, Teachers College, Community College Research Center, 2011).

^{xii} The recent gainful employment regulation promulgated by the U.S. Department of Education recognizes the sharp difference among programs since it requires colleges (for-profits for the most part) to report loan repayment rates and earnings of graduates by program, although the regulation still is based on graduates, not program enrollments.

^{xiii} Michelle Van Noy and James Jacobs, “The Outlook for Noncredit Workforce Education,” *New Directions for Community Colleges* (2009): 87–94, accessed October 25, 2011, doi: 10.1002/cc.369.

^{xiv} Judith Scott-Clayton, *The Shapeless River: Does a Lack of Structure Inhibit Students' Progress at Community Colleges?* (CCRC Working Paper No. 25, Assessment of Evidence Series) (New York: Columbia University, Teachers College, Community College Research Center, 2011).

^{xv} See Nancy Shulock and Davis Jenkins, *Performance Incentives to Improve Community College Completion: Learning from Washington State's Student Achievement Initiative* (A State Policy Brief) (New York: Columbia University, Teachers College, Community College Research Center, 2011), for a discussion of intermediate measures in the Washington State performance funding system that awards “momentum points.”

^{xvi} “2011 National Report,” Complete College America, accessed October 24, 2011, http://www.completecollege.org/docs/Time_Is_the_Energy_Summary.pdf.

^{xvii} Committee on Measures of Student Success, “Draft Report.”

^{xviii} Donna M Desrochers and Jane V. Wellman, *Trends in College Spending 1999-2009: Where Does the Money Come From? Where Does It Go? What Does It Buy?* (Washington: Delta Cost Project, 2011), Figure 19.

^{xix} Clive Belfield, “Measuring Efficiency at the Community College Level,” (unpublished manuscript, July 8, 2011), PDF file.

^{xx} Collegiate Learning Assessment, accessed October 25, 2011, <http://www.collegiatelearningassessment.org>.

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^{xxi} “Gainful Employment Regulations,” U.S. Department of Education, accessed October 25, 2011, <http://www.ed.gov/news/press-releases/gainful-employment-regulations>.

^{xxii} Given the practical barriers to developing consistent and comparable learning and employment measures, I focus the discussion in this paper on completion and progression measures. Bailey and Xu, *Input-Adjusted*, deals with these issues in more detail.

^{xxiii} Committee on Measures of Student Success, “Draft Report.”

^{xxiv} Peter M. Crosta et al., *Using Census Data to Classify Community College Students by Socioeconomic Status and Community Characteristics*. (CCRC Research Tools, No.1) (New York: Columbia University, Teachers College, Community College Research Center, 2006).

^{xxv} “About the Data, Table 1.” College Results Online, accessed October 25, 2011, <http://www.collegeresults.org/aboutthedata.aspx>.

^{xxvi} Thomas Bailey et al., “Student Right-To-Know.”

^{xxvii} Robert Kelchen and Doug Harris, “Pulling Rank: The Potential of Value-Added to Address the Failures of U.S. News and Other Popular College Ranking” (unpublished manuscript, January 26, 2011), PDF file.

^{xxviii} Belfield, “Measuring.”

^{xxix} The outcome variable is the SRK six-year graduation rate. The method first regresses the graduation rate on 10 variables, including student and institutional characteristics. The coefficients are used to derive weights based on which characteristics are most closely related to graduation rates—the median SAT or ACT score is four times more important than the next most important variable (public or private). These weights add up to 1,000. If a comparison college is identical with respect to a variable to the college under consideration, then the comparison college is given the full value of the weight. As the values for the variables diverge, the college is given some percentage of the weight. Two colleges identical on all 10 variables have a comparison score of 1,000. They also make some other adjustments or filters for costs and other factors.

^{xxx} Marc Scott et al., “Relative Success? Determinants of College Graduation Rates in Public and Private Colleges in the U.S.,” *Research in Higher Education* 47(3) (2006): 249–279; Kelchen and Harris, “Pulling.” See Bailey and Xu, *Input-Adjusted*, for a review.

^{xxxi} Bailey, et al. “Student Right to Know;” Davis Jenkins, *What Community College Management Practices Are Effective in Promoting Student Success? A Study of High- And Low-Impact Institutions* (New York: Columbia University, Teachers College, Community College Research Center, 2006).

^{xxxii} Kelchen and Harris, “Pulling.”

^{xxxiii} David L. Wright et al., *College Participation, Persistence, Graduation, and Labor Market Outcomes: An Input-Adjusted Framework for Assessing the Effectiveness of Tennessee’s Higher Education Institutions* (Nashville: Tennessee Higher Education Commission, 2011); Jesse M. Cunha and Darwin W. Miller, “Measuring Value-Added in Higher Education” (Paper presented at the Association for Public Policy Analysis & Management, Washington, District of Columbia, November 4, 2011).

^{xxxiv} Ita Kreft and Jan De Leeuw, *Introducing Multilevel Modeling* (London: SAGE Publications Ltd., 1998).

^{xxxv} Lana Muraskin and John Lee, *Raising the Graduation Rates of Low-Income College Students* (Washington: Pell Institute for the Study of Opportunity in Higher Education, 2004).

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^{xxxvi} Juan Carlos Calcagno et al., “Community College Student Success: What Institutional Characteristics Make a Difference?” in *Economics of Education Review*, 27(6).

^{xxxvii} “About the Data, Table 1,” College Results Online, accessed October 25, 2011, <http://www.collegeresults.org/aboutthedata.aspx>.

^{xxxviii} Shullock and Jenkins, *Performance*.

^{xxxix} “Proposed Student Progress and Outcomes Measures,” American Association of Community Colleges Voluntary Framework of Accountability, accessed October 24, 2011, <http://www.aacc.nche.edu/Resources/aaccprograms/vfa/Pages/ProposedProgressOutcome.aspx>.

^{xl} Ryan Reyna, *Complete to Compete: Common College Completion Metrics* (Washington: National Governors Association, 2010), accessed October 24, 2011, <http://www.nga.org/files/live/sites/NGA/files/pdf/1007COMMONCOLLEGEMETRICS.PDF>.

^{xli} Committee on Measures of Student Success, accessed October 24, 2011, www2.ed.gov/about/bdscomm/list/acmss.html.

^{xlii} Kevin J. Dougherty and Esther Hong, “Performance Accountability as Imperfect Panacea: The Community College Experience,” in *Defending the Community College Equity Agenda*, ed. Thomas Bailey and Vanessa Smith Morest (Baltimore: Johns Hopkins Press, 2006); Kevin J. Dougherty et al., *Performance Accountability Systems for Community Colleges: Lessons for the Voluntary Framework of Accountability for Community Colleges* (New York: Columbia University, Teachers College, Community College Research Center, 2009); Thomas L. Harnisch, *Performance-Based Funding: A Re-Emerging Strategy in Public Higher Education Financing* (Higher Education Policy Brief) (Washington: American Association of State Colleges and Universities, 2011); Kevin J. Dougherty and Vikash Reddy, *The Impacts of State Performance Systems on Higher Education Institutions: Research Literature Review and Policy Recommendations* (CCRC Working Paper) (New York: Columbia University, Teachers College, Community College Research Center, forthcoming).

^{xliii} Davis Jenkins et al., *Formative Evaluation of Student Achievement Initiative “Learning Year”* (New York: Columbia University, Teachers College, Community College Research Center, 2009), accessed October 24, 2011, <http://ccrc.tc.columbia.edu/Publication.asp?uid=655>.

^{xliv} Doherty and Reddy, *Impacts*.

^{xlv} The committee proposed the establishment of a Technical Review Panel to set a consistent definition for “degree-seeking,” to determine the appropriate length of time to track students in determining a graduation rate, especially for part-time students, and to set a minimum number of credits taken at a community college before a transfer from that college would be considered a positive outcome.

^{xlvi} Kevin Stange, *Ability Sorting and the Importance of College Quality to Student Achievement: Evidence from Community Colleges* (Ann Arbor: University of Michigan, Ford School of Public Policy, 2010).

^{xlvii} Davis Jenkins, *Get with the Program: Accelerating Community College Students' Entry into and Completion of Programs of Study* (CCRC Working Paper No. 32) (New York: Columbia University, Teachers College, Community College Research Center, 2011).

^{xlviii} Peter R. Bahr, *Classifying Community Colleges Based on Students' Patterns of Usage* (Ann Arbor: University of Michigan, Center for the Study of Higher and Postsecondary Education, 2011).

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