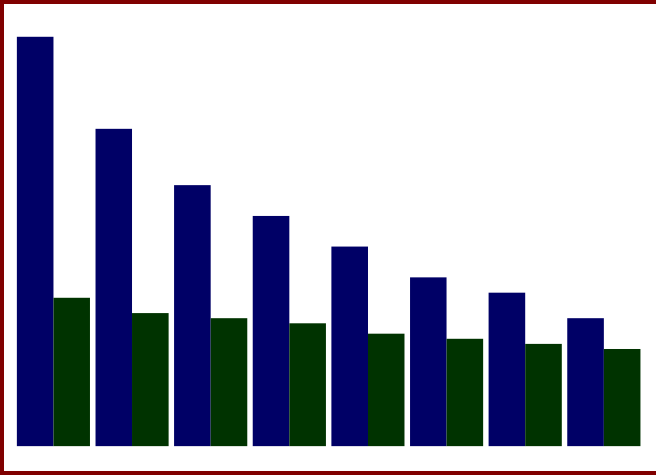
# MEASURE TWICE

## THE IMPACT ON GRADUATION RATES OF SERVING PELL GRANT RECIPIENTS



**A POLICY BULLETIN FOR HEA REAUTHORIZATION**

**JULY 2013**

**ADVISORY COMMITTEE ON STUDENT FINANCIAL ASSISTANCE**

**WASHINGTON DC**

**ADVISING CONGRESS AND**
**THE SECRETARY OF EDUCATION**
**FOR OVER 25 YEARS**

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# EXECUTIVE SUMMARY

There is growing interest in leveraging Title IV student aid to improve college completion. Advocates have proposed linking funding in the Pell and Campus-Based Programs to measures of college performance. However, to do so in an equitable and efficient manner, raw measures of college output, such as rates of graduation and academic progress, must be adjusted to reflect differences in factors that determine those rates – inputs such as college mission, student characteristics, and other constraints. Failing to account for inputs when measuring and evaluating college performance unfairly penalizes colleges that are efficiently serving large numbers of low-income students, particularly colleges doing so with limited resources.

To demonstrate the impact that serving low-income students can have on raw measures of college performance, this bulletin explores the relationship between 6-year graduation rate and three inputs: the percentage of first-time students who are Pell recipients, average test score of the student body, and level of endowment per student. The analysis finds that these three inputs are powerful determinants of 6-year graduation rates at nonprofit 4-year public and private colleges.

**Empirical Findings**

- As the percentage of a college's students who are Pell recipients (serving Pell recipients) rises, 6-year graduation rate declines from **80%** to **25%**, and average test score declines from **29** to **19**. **(Figure 1)**
- Serving Pell recipients and average test score, combined, account for **76%** of the observed variation in 6-year graduation rates of 4-year public and private colleges. **(Table 1)**
- As endowment per student falls, serving Pell recipients lowers average 6-year graduation rate from **67%** to **28%** and from **85%** to **33%** at public and private colleges, respectively. **(Tables 2-A and B)**
- Serving very high percentages of Pell recipients, with very low endowment per student, reduces average 6-year graduation rate to **23%** at public colleges and **19%** at private colleges. **(Table 2-C)**

The more a 4-year college defines its mission as serving low-income students, and the more modest its endowment per student, the more its 6-year graduation rate will deviate from a valid and reliable assessment of its relative performance.

To illustrate the importance of adjusting raw 6-year graduation rate for these effects, the analysis uses one particular model and dataset to calculate an estimate of value added for ten selected colleges. Reordering the colleges by this estimate reverses their ranking by raw 6-year graduation rate, with those serving Pell recipients perceived as *most effective*. **(Table 3)**

However, estimates of value added can vary considerably, depending on the statistical model and dataset used to generate the estimates. Most important, no model will explain all of the variation in 6-year graduation rates and no dataset will contain observations on all of the important student characteristics or resource constraints that determine those rates.

These findings have major implications for student aid policy, including reauthorization of the Higher Education Act (HEA).

**Policy Implications**

- Using raw output measures, such as rates of graduation or student academic progress, in the awarding or allocation of Title IV student aid will harm low-income students and the colleges that serve them.
- To prevent such harm, output measures must be adjusted to adequately reflect differences in inputs, in particular, college mission, student characteristics, resources, and factors beyond colleges' control.
- Because estimates of value added are vulnerable to both modeling and data limitations, such measures should not be used to support high-stakes decisions in either the Pell or Campus-Based Programs.
- The best approach to improve graduation rates is to use well-designed case studies to identify policies and practices shown to be effective at peer colleges and incentivize colleges to implement them.

In race-to-the-top competitions for *additional* funds, colleges should be required to compete only against peers with highly comparable inputs. These inputs include the percentage of students who are Pell recipients, average test score, endowment per student, and other factors shown to have a statistically significant relationship to the output measure in question.

The empirical findings and policy implications above are not meant to imply that 4-year colleges serving a large number of Pell recipients should not be evaluated or that graduation rates cannot or should not be improved. All colleges must meet minimum standards of performance, implement policies and practices shown to be effective in improving graduation rates at peer colleges, and provide adequate consumer protections, including accurate information for students and parents.

# THE IMPACT ON GRADUATION RATES OF SERVING PELL GRANT RECIPIENTS

Graduation rates are highly imperfect indicators of college performance. In their raw, unadjusted form, the rates can fail to measure quality and content of curriculum, level of student preparedness or employability, or the extent and value of student learning. In addition,

**Limitations of Graduation Rates**

- Those rates which are readily available include only first-time, full-time, degree-seeking students and fail to account adequately for transfer students or part-time students.
- Because of their restricted time frame, rates can exclude long-term degree and certificate attainment and fail to reflect current college performance.
- Finally, using the rates to award and distribute program funding can create perverse incentives to limit enrollment of at-risk students or lower standards of graduation.

For more information on graduation rate as a measure of college performance, see American Association of State Colleges and Universities (2002), Bailey and Xu (2012), Gold and Albert (2006), Kelchen and Harris (2012), and McGuire (2012).

However, in spite of these weaknesses, advocates have called for using graduation rates in the awarding and distribution of Title IV student aid. For example, to improve college completion, proposals have called for adjusting the level of Pell awards or reallocating some portion of Campus-Based Funding among colleges on the basis of graduation rates. However, thus far, no proposal has shown if and how the rates must be adjusted to avoid harm to colleges serving low-income students.

## Issues and Questions

Because the issue of using graduation rates in the awarding and distribution of need-based grant aid may be considered in the upcoming HEA reauthorization, it is essential to examine the determinants of those rates, how they must be adjusted to fairly and accurately indicate relative college performance, and what impact those adjustments are likely to have on perceptions of college effectiveness and distribution of Title IV funds.

This bulletin addresses the following specific issues and questions.

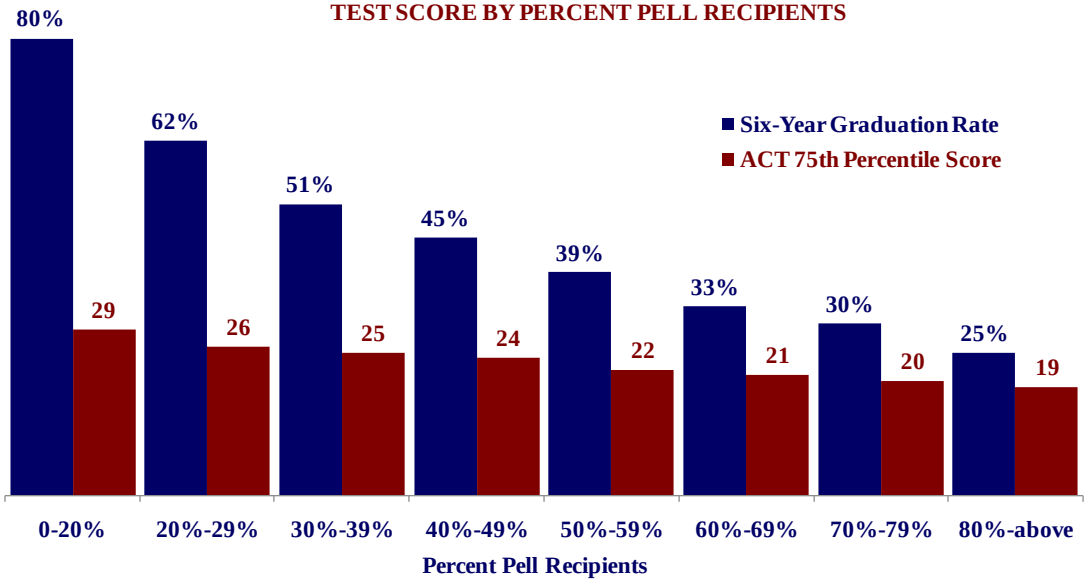
**Issues and Questions**

- **Overall Impact of Serving Pell Grant Recipients.** To what extent does a 4-year college's graduation rate depend upon the number of Pell recipients it serves? For example, to what extent does the percent of first-time students who are Pell recipients determine test score and 6-year graduation rate?
- **Factors Determining 6-Year Graduation Rates.** Which factors explain the 6-year graduation rate of 4-year colleges in a multivariate analysis? Which factors appear to be most important, and how much variation do they explain? Which factors appear to be relatively unimportant?
- **Impact of Percent Pell Recipients by Endowment per Student.** To what extent does the relationship between percent of first-time students who are Pell recipients, test score, and 6-year graduation rate vary by endowment per student at public and private 4-year colleges?
- **Colleges with Most Pell Recipients and Least Resources.** Among 4-year colleges with the *lowest* endowment per student and *highest* percentage of Pell recipients, what is the relationship between test score and 6-year graduation rate? To what extent does test score reduce the 6-year graduation rate?
- **Actual Rates Minus Predicted Rates = Value Added.** If a multivariate statistical model is used to predict the 6-year graduation rate of each college, and the predicted rate is subtracted from the actual rate to yield value added, to what extent are perceptions of college performance and ranking altered?

These issues and questions are addressed using data from the Integrated Postsecondary Education Data System (IPEDS), cross-tabular analyses, and a step-up regression model aimed at identifying the determinants of 6-year graduation rates.

**Percent of Students Who Are Pell Recipients Is a Strong Determinant of Average Test Score and 6-Year Graduation Rate**

**FIGURE 1: SIX-YEAR GRADUATION RATE AND TEST SCORE BY PERCENT PELL RECIPIENTS**




## OVERALL IMPACT OF SERVING PELL GRANT RECIPIENTS

Using IPEDS data from 2010, **Figure 1** shows the inverse relationship between the percentage of first-time students who are Pell recipients, average test score, and 6-year graduation rate at nonprofit 4-year public and private colleges.

- On the far left, 4-year colleges with **up to 20%** Pell recipients have an average 6-year graduation rate of **80%** and an average test score of **29**.
- On the far right, 4-year colleges with **80% or more** Pell recipients have an average 6-year graduation rate of **25%** and an average test score of **19**.

The more a 4-year college serves Pell recipients, the lower its 6-year graduation rate and the more difficult it is to improve that rate.

**TABLE 1: DETERMINANTS OF 6-YEAR GRADUATION RATES AT 4-YEAR COLLEGES**

| Inputs | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 |
|---|---|---|---|---|---|---|---|---|
| Percent Pell Recipients | -0.774*** | 0.145*** | -0.162*** | -0.178*** | -0.205*** | -0.203*** | -0.227*** | -0.225*** |
| ACT 75th Percentile Composite | | 4.171*** | 3.682*** | 3.097*** | 2.900*** | 2.927*** | 2.751*** | 2.745*** |
| Percent Part-Time | | | -0.263*** | -0.249*** | -0.231*** | -0.230*** | -0.240*** | -0.241*** |
| 4-Year College Endowment (ln) | | | | 1.507*** | 1.586*** | 1.223*** | 1.330*** | 1.336*** |
| 4-Year College Control | | | | | 3.003*** | 4.472*** | 5.294*** | 5.289*** |
| Full-Time Enrollment | | | | | | 0.021*** | 0.021*** | 0.023*** |
| Expenditures Per Student | | | | | | | 0.003 | 0.003 |
| Percent Minority | | | | | | | | -0.003 |
| $R^2$ | 0.551 | 0.761 | 0.791 | 0.798 | 0.804 | 0.806 | 0.808 | 0.808 |
| Adjusted $R^2$ | 0.551 | 0.761 | 0.790 | 0.797 | 0.803 | 0.805 | 0.807 | 0.807 |
| Observations | 1,334 | 1,334 | 1,331 | 1,277 | 1,277 | 1,277 | 1,231 | 1,231 |

**Source: Calculated from 2010 data in the Integrated Postsecondary Education Data System (IPEDS).**
***p* < 0:05. ****p* < 0:01. *****p* < 0:001**

## FACTORS DETERMINING 6-YEAR GRADUATION RATES

**Percent of Students Who Are Pell Recipients and Test Score Account for Over 76% of the Variation in 6-Year Graduation Rates**

The results of a step-up regression of 6-year graduation rate on various inputs are shown in **Table 1**.

- As might be expected from **Figure 1**, the percent of students who are Pell recipients explains over half of the variance in 6-year graduation rate: (R-Squared = **0.551**).
- When test score is added, over **75%** of the variation is explained: (R-Squared = **0.761**).
- Adding the variables of percent part-time, endowment, control (public/private), and full-time enrollment increases R-Squared modestly by 0.045 to **0.806**.

Expenditures per student and percent minority are not statistically significant.

**TABLE 2-A: IMPACT ON GRADUATION RATES OF SERVING PELL RECIPIENTS**
**By Endowment Per Student**
**4-Year Public Colleges**

| Percent of Students Who Are Pell Recipients | Endowment Per Student (FTE) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Highest Quartile ($M$ = $34,000) | | Third Quartile ($M$ = $6,000) | | Second Quartile ($M$ = $3,000) | | Lowest Quartile ($M$ = $1,000) | |
| | Average 6-Yr. Rate | Test Score | Average 6-Yr. Rate | Test Score | Average 6-Yr. Rate | Test Score | Average 6-Yr. Rate | Test Score |
| Under 30% | 67% | 28 | 61% | 26 | 60% | 26 | 54% | 24 |
| 30% to 39% | 51% | 26 | 49% | 25 | 44% | 24 | 43% | 23 |
| 40% to 49% | 47% | 24 | 37% | 23 | 36% | 22 | 41% | 21 |
| 50% and over | 31% | 21 | 30% | 20 | 29% | 20 | 28% | 20 |

**The Impact of Serving Pell Recipients on 6-Year Graduation Rate Intensifies as Endowment per Student Declines at Public Colleges**

**Source: Calculated from 2010 data in the Integrated Postsecondary Education Data System (IPEDS).**

## IMPACT OF PERCENT PELL RECIPIENTS BY ENDOWMENT PER STUDENT: 4-YEAR PUBLIC COLLEGES

**Table 2-A** shows the impact of serving Pell recipients on average 6-year graduation rate and average test score of 4-year public colleges, by endowment per student in quartiles.

- For colleges in the highest quartile of endowment per student, as the percent of students who are Pell recipients rises, average 6-year graduation rate falls from **67%** to **31%** and average test score falls from **28** to **21**.
- For those in the lowest quartile, 6-year graduation rate falls from **54%** to **28%** and average test score falls from **24** to **20**.

Overall, as the percent of students who are Pell recipients rises and endowment per student falls, average 6-year graduation rate falls from **67%** to **28%** and average test score falls from **28** to **20**.

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**TABLE 2-B: IMPACT ON GRADUATION RATES OF SERVING PELL RECIPIENTS**
**By Endowment Per Student**
**4-Year Private Colleges**

| Percent of Students Who Are Pell Recipients* | Endowment Per Student (FTE) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Highest Quartile ($M$ = $269,000) | | Third Quartile ($M$ = $35,000) | | Second Quartile ($M$ = $16,000) | | Lowest Quartile ($M$ = $5,000) | |
| | Average 6-Yr. Rate | Test Score | Average 6-Yr. Rate | Test Score | Average 6-Yr. Rate | Test Score | Average 6-Yr. Rate | Test Score |
| Under 20% | 85% | 31 | 77% | 28 | 68% | 27 | 58% | 26 |
| 20% to 34% | 70% | 28 | 64% | 27 | 58% | 26 | 52% | 25 |
| 35% to 49% | 58% | 26 | 51% | 25 | 50% | 24 | 48% | 23 |
| 50% and over | 44% | 23 | 41% | 22 | 38% | 21 | 33% | 20 |

**The Impact of Serving Pell Recipients on 6-Year Graduation Rate Intensifies as Endowment per Student Declines at Private Colleges**

**Source: Calculated from 2010 data in the Integrated Postsecondary Education Data System (IPEDS).**
***Note: Ranges differ slightly from those used for public colleges above.**

## IMPACT OF PERCENT PELL RECIPIENTS BY ENDOWMENT PER STUDENT: 4-YEAR PRIVATE COLLEGES

**Table 2-B** shows the impact of serving Pell recipients on average 6-year graduation rate and average test score of 4-year private colleges, by endowment per student in quartiles.

- For colleges in the highest quartile of endowment per student, as the percent of students who are Pell recipients rises, average 6-year graduation rate falls from **85%** to **44%** and average test score falls from **31** to **23**.
- For those in the lowest quartile, 6-year graduation rate falls from **58%** to **33%** and average test score falls from **26** to **20**.

Overall, as the percent of students who are Pell recipients rises and endowment per student falls, average 6-year graduation rate falls from **85%** to **33%** and average test score falls from **31** to **20**.

**At Colleges with Highest Percentage of Pell Recipients and Lowest Endowment Per Student, Test Score Drives Graduation Rate to Lowest Levels**

**TABLE 2-C: IMPACT ON GRADUATION RATES OF SERVING PELL RECIPIENTS**

**4-Year Colleges with Highest Percentage of Pell Recipients and Lowest Endowment Per Student**

| 4-Year College Control | Average 6-Year Graduation Rate if Test Score Is: | | | |
|---|---|---|---|---|
| | 23 and above | 21-22 | 19-20 | 18 and below |
| Public | 34% | 32% | 27% | 23% |
| Private | 44% | 39% | 30% | 19% |

**Source: Calculated from 2010 data in the Integrated Postsecondary Education Data System (IPEDS).**

## COLLEGES WITH MOST PELL RECIPIENTS AND LEAST RESOURCES

**Table 2-C** shows the relationship between average test score and average 6-year graduation rate at 4-year public and private colleges with ***lowest*** endowment per student and ***highest*** percentage of students who are Pell recipients – 50% and over.

- At 4-year public colleges with the ***lowest*** endowment per student and ***highest*** percentage of students who are Pell recipients, as test score decreases from **23 and above** to **18 and below**, average 6-year graduation rate falls from **34%** to **23%**.
- At 4-year private colleges with the ***lowest*** endowment per student and ***highest*** percentage of students who are Pell recipients, as test score decreases from **23 and above** to **18 and below**, average 6-year graduation rate falls from **44%** to **19%**.

The more a 4-year college – public or private – defines its mission as serving Pell Grant recipients, and the lower its endowment per student, the lower its 6-year graduation rate can be driven by declining average test score.

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**TABLE 3: ADJUSTING 6-YEAR GRADUATION RATES FOR INPUTS**

**Selected 4-Year Colleges**

| College | Actual 6-Year Rate | Inputs | | | | | | Predicted 6-Year Rate | Value Added |
|---|---|---|---|---|---|---|---|---|---|
| | | % Pell Recipients | Test Score | % Part-Time | Control | Endowment (ln) | % Minority | | |
| A | 87 | 6 | 35 | 0 | Private | 21 | 8 | *99* | -12 |
| B | 70 | 11 | 31 | 23 | Private | 21 | 9 | *81* | -11 |
| C | 68 | 20 | 29 | 6 | Public | 21 | 7 | *75* | -7 |
| D | 61 | 23 | 26 | 10 | Public | 20 | 19 | *63* | -2 |
| E | 60 | 34 | 27 | 15 | Private | 17 | 5 | *61* | -1 |
| F | 58 | 39 | 25 | 12 | Public | 17 | 30 | *52* | +6 |
| G | 56 | 41 | 24 | 12 | Public | 15 | 23 | *45* | +11 |
| H | 49 | 47 | 20 | 21 | Private | 13 | 16 | *32* | +17 |
| I | 42 | 72 | 20 | 37 | Public | 17 | 95 | *23* | +19 |
| J | 41 | 76 | 19 | 13 | Public | 14 | 94 | *21* | +20 |

**Source: Calculated from 2010 data in the Integrated Postsecondary Education Data System (IPEDS).**

## ACTUAL RATES MINUS PREDICTED RATES = VALUE ADDED

**Table 3** uses IPEDS data and the regression equation in **Table 1** to illustrate how adjusting actual 6-year graduation rate for inputs yields a predicted 6-year rate, measure of value added, and new ranking. Note that actual 6-year rate (second column) minus the predicted rate (second-last column) equals value added (last column).

- Ordering the ten colleges by value added, rather than by actual 6-year graduation rate, completely reverses their ranking.
- Colleges serving high proportions of Pell Grant recipients show the highest value added and ranking after adjustment.

**Table 3** is an *illustration* using *one model* and *one data set*. Alternative models and data will yield different results. Also, these ten colleges have been selected to show the *potential* impact of adjusting outputs for inputs. Not all colleges serving large numbers of Pell recipients have positive value added, nor do all colleges serving few Pell recipients have negative value added.

Regardless of the model used, redistributing program funds on the basis of value added will shift funds *away from* colleges with high 6-year graduation rates (but negative value added) *toward* colleges with low 6-year graduation rates (but positive value added). Accordingly, redistributing need-based grant aid on the basis of value added could have unexpected and unpopular consequences.

## POLICY IMPLICATIONS AND LIMITATIONS

These finding have major implications for student aid policy, including HEA reauthorization.

**Policy Implications**

- Using raw output measures, such as rates of graduation or student academic progress, in the awarding or allocation of Title IV student aid will harm low-income students and the colleges that serve them.
- To prevent such harm, output measures must be adjusted to adequately reflect differences in inputs, in particular, college mission, student characteristics, resources, and factors beyond colleges' control.
- Because estimates of value added are vulnerable to both modeling and data limitations, such measures should not be used to support high-stakes decisions in either the Pell or Campus-Based Programs.
- The best approach to improve graduation rates at 4-year public and private colleges is to use well-designed case studies to identify policies and practices shown to be effective at peer colleges and incentivize colleges to implement them.

In race-to-the-top competitions for *additional* funds, colleges should be required to compete only against peers with highly comparable inputs. These inputs include the percentage of students who are Pell recipients, average test score, endowment per student, and other factors shown to have a statistically significant relationship to the output measure in question.

### Limitations

The approach, model, and data used in this analysis are not meant to be definitive but, rather, illustrative of the need to adjust 4-year college outputs, such as graduation rates and measures of academic progress, for inputs. In general, techniques that adjust output for inputs, create measures of value added, and define peer groups within which to compare colleges are only as valid and reliable as the data used to do so. Regardless of the model used, differences in performance among colleges that appear to be similar might be attributable to differences in *unobserved* student characteristics or resource constraints. These differences cannot be identified centrally by multivariate analysis.

To ensure that adjusted outputs, estimates of value added, and definitions of peer group are sufficiently precise for use in the awarding and allocation of Title IV student aid, far more research is needed.

**Five Areas for Further Research**

- Regression models used to determine inputs and adjust outputs must be improved.
- Measures of college outcomes and inputs must be better defined and measured.
- Alternative definitions of value added must be explored and evaluated.
- Changes in the level of input-adjusted output, *by college*, must be developed.
- Data required to more accurately measure outputs and inputs must be collected.

The Advisory Committee encourages and welcomes further analysis of the impact of serving Pell Grant recipients on college graduation rates.

The empirical findings and policy implications in this bulletin are not meant to imply that 4-year colleges serving a large number of Pell recipients should not be evaluated or that graduation rates cannot or should not be improved. All colleges must meet minimum standards of performance, implement policies and practices shown to be effective in improving graduation rates at peer colleges, and provide adequate consumer protections, including accurate information to students and parents.

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