

# Playing the Long Game: The impact of outcomes-based funding on bachelor’s degree attainment

Austin Slaughter, Kate Callahan, Dae Kim, Kasey Meehan, Lenny Wainstein, Lindsey Liu, Xiaochen Zhu

Research for Action | info@researchforaction.org | @Research4Action

## Research Questions

1. Do outcomes-based funding (OBF) formulas increase the production of Bachelor’s degrees at public, four-year universities?
2. How does the impact of OBF change over time?

## Background & Literature Review

- OBF is a state-level higher education funding policy that links a percentage of the base funding that an institution receives from the state government to that institution’s performance on a variety of metrics, such as credit completion and graduation. Typically, the policies place extra weight on low-income and/or at-risk students.
- OBF grew out of performance-based funding (PBF), which awards “bonuses” to institutions based on their performance.
- OBF has proliferated over the last nine years. In academic year 2008, only one state (Pennsylvania) had OBF in place. By 2015, 15 states did (see Figure 1).
- Prior research has lumped PBF and OBF together as one treatment and found little to no impact. Our qualitative research in Indiana and Tennessee, however, suggests that institutions respond much differently to OBF than they do to PBF.
- Only one previous study (Tandberg & Hillman, 2014) examined the impact of PBF/OBF over time. The research found that the policies began to have a positive impact after seven years of implementation.
- Two recent studies (e.g. Kelchen & Stedrak, 2016) have found that PBF/OBF results in “creaming,” the practice of serving fewer students who are less academically prepared.

| Figure 1. Timeline of OBF Implementation |      |      |      |      |      |      |      |      |      |
|--|------|------|------|------|------|------|------|------|------|
| State                                    | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Arkansas                                 |      |      |      |      |      |      |      |      |      |
| Illinois                                 |      |      |      |      |      |      |      |      |      |
| Indiana                                  |      |      |      |      |      |      |      |      |      |
| Louisiana                                |      |      |      |      |      |      |      |      |      |
| Maine                                    |      |      |      |      |      |      |      |      |      |
| Minnesota                                |      |      |      |      |      |      |      |      |      |
| Mississippi                              |      |      |      |      |      |      |      |      |      |
| Montana                                  |      |      |      |      |      |      |      |      |      |
| Nevada                                   |      |      |      |      |      |      |      |      |      |
| New Mexico                               |      |      |      |      |      |      |      |      |      |
| North Carolina                           |      |      |      |      |      |      |      |      |      |
| North Dakota                             |      |      |      |      |      |      |      |      |      |
| Ohio                                     |      |      |      |      |      |      |      |      |      |
| Pennsylvania*                            |      |      |      |      |      |      |      |      |      |
| Tennessee                                |      |      |      |      |      |      |      |      |      |

\*Pennsylvania not used in analysis because it has no variation in the treatment

This work was supported through grants from the Lumina Foundation. All analyses, findings, and conclusions are those of the authors.

## Data & Methodology

We utilize **longitudinal data** for public, four-year institutions of higher education from the Integrated Postsecondary Education Data System (IPEDS) for **academic years 2007 through 2015**. We drop institutions that are missing data on bachelor’s degrees, did not exist for the entirety of our dataset, or awarded more associate degrees than bachelor’s degrees in a year. There were outliers in terms of our outcome of interest that appear to be data errors. As such, we remove the bottom and top 2.5% of the distribution. Institutions in Pennsylvania and South Carolina are not used. Our analysis contains **438 unique institutions over 9 years**.

We utilize a quasi-experimental research design that yields a **difference-in-differences** estimate of the impact of OBF on bachelor’s degrees produced per 100 FTE enrollment. Our data contains both pre- and post-treatment data for both treated and comparison states. Our independent variable is a dummy indicating that the state had OBF in that year. We include year and institution fixed-effects, as well as multiple covariates. Our model is given by:

$$Y_{it} = \beta_0 + \beta_1 OBF_{it} + \sum_{k=1}^K \beta_{k+1} (X_k)_{it} + I_i + T_t + \varepsilon_{it}$$

where  $Y_{it}$  represents bachelor’s degrees per 100 FTE, OBF indicates that the institution was exposed to OBF in that year,  $I_i$  represents institution fixed effects,  $T_t$  represents time fixed effects, and  $X_k$  represents a vector of time-variant state and institution-level covariates.

To examine if the impact of OBF changed over time, we specified a second model with separate dummies that corresponded with the number of years that OBF had been implemented in the state. That model is given by:

$$Y_{it} = \beta_0 + \beta_1 Post\_OBF1_{it} \cdots + \beta_7 Post\_OBF7_{it} + \sum_{k=1}^K \beta_{k+7} (X_k)_{it} + I_i + T_t + \varepsilon_{it}$$

where Post-OBF1 takes a value of one in the first year of OBF, Post-OBF2 takes a value of one in the second year of OBF, and so on.

## Results

| Bachelor’s degrees / 100 FTE  | (1)                 | (2)                  | (3)                  | (4)                  |
|---|---------------------|----------------------|----------------------|----------------------|
| OBF   | 0.429**<br>(0.129)  | 0.390**<br>(0.130)   | 0.346**<br>(0.129)   | 0.328*<br>(0.129)    |
| Proportion Black  |                     | -0.144**<br>(0.0193) | -0.137**<br>(0.0192) | -0.137**<br>(0.0192) |
| Proportion Hispanic   |                     | -0.0398*<br>(0.0203) | -0.0219<br>(0.0204)  | -0.0189<br>(0.0205)  |
| Pell \$ per FTE (000s)  |                     | 0.833**<br>(0.115)   | 0.823**<br>(0.115)   | 0.781**<br>(0.116)   |
| Tuition + Fees (000s)   |                     |                      | 0.0201<br>(0.0485)   | -0.0232<br>(0.0500)  |
| Enrollment (000s)   |                     |                      | -0.188**<br>(0.0258) | -0.184**<br>(0.0258) |
| Unemployment Rate   |                     |                      |                      | 0.120**<br>(0.0439)  |
| GDP per capita  |                     |                      |                      | -0.0312<br>(0.0163)  |
| Constant  | 20.39**<br>(0.0820) | 21.74**<br>(0.304)   | 23.74**<br>(0.542)   | 25.12**<br>(1.130)   |
| Observations  | 3,942               | 3,942                | 3,942                | 3,942                |
| R-squared   | 0.840               | 0.845                | 0.847                | 0.848                |
| Standard errors in parentheses<br>** p<0.01, * p<0.05<br>Estimates for time fixed effects not shown |                     |                      |                      |                      |

## Results (cont.)

| Bachelor’s degrees/100 FTE   | (1)                | (2)                | (3)                | (4)                |
|--|--------------------|--------------------|--------------------|--------------------|
| Post-OBF Year 1  | 0.271<br>(0.178)   | 0.267<br>(0.176)   | 0.233<br>(0.176)   | 0.201<br>(0.175)   |
| Post-OBF Year 2  | 0.331<br>(0.185)   | 0.304<br>(0.184)   | 0.268<br>(0.183)   | 0.269<br>(0.182)   |
| Post-OBF Year 3  | 0.450<br>(0.239)   | 0.442<br>(0.236)   | 0.395<br>(0.235)   | 0.395<br>(0.234)   |
| Post-OBF Year 4  | 0.867**<br>(0.278) | 0.777**<br>(0.275) | 0.708**<br>(0.274) | 0.635*<br>(0.274)  |
| Post-OBF Year 5  | 0.933**<br>(0.298) | 0.785**<br>(0.298) | 0.697*<br>(0.296)  | 0.642*<br>(0.296)  |
| Post-OBF Year 6  | 1.443**<br>(0.404) | 1.319**<br>(0.403) | 1.313**<br>(0.401) | 1.400**<br>(0.401) |
| Post-OBF Year 7  | 2.232**<br>(0.551) | 2.099**<br>(0.546) | 2.019**<br>(0.543) | 2.120**<br>(0.544) |
| Observations   | 3,942              | 3,942              | 3,942              | 3,942              |
| R-squared  | 0.841              | 0.846              | 0.848              | 0.849              |
| Standard errors in parentheses<br>** p<0.01, * p<0.05<br>Estimates for time fixed effects and covariates not shown |                    |                    |                    |                    |

We find that:

- In the average post-OBF year, OBF increases the number of bachelor’s degrees per 100 FTE by .33. This is an effect size of .1 standard deviations, which is generally considered small.
- The effect of OBF increases over time. We find no significant impact of OBF in post years 1-3; however, a positive impact emerges in post years 4-7. The growth in the effect is consistent, with each year’s effect being larger than that of the previous year.
- The effect size is substantial in post years 4-7, ranging from .2 to .6 standard deviations.

## Conclusion and Next Steps

- Unlike the previous literature that has treated PBF (bonuses) and OBF (base appropriations) for postsecondary institutions as homogeneous treatments, we analyze OBF as a separate treatment and find a positive and substantial impact of the policy.
- These findings support Research for Action’s comprehensive mixed-methods studies of OBF in Indiana and Tennessee, which also found positive impacts of the policy on student outcomes in those states, utilizing statewide, student-level data.
- Our results also reinforce the findings of Tandberg & Hillman (2014), who found that the effects of PBF/OBF increase over time.

Research for Action will improve on these preliminary findings by:

- Utilizing a multiple baseline interrupted time series research design to take advantage of the staggered nature of OBF implementation.
- Conducting interviews with state higher education officials to better understand OBF implementation in their respective states.
- Specifying a model that analyzes if states that put more funding into their OBF formulas see larger impacts of the policy.
- Examining unintended consequences of OBF, recognizing that, although we find OBF to be effective, other studies have found concerning unintended consequences of the policy.