



The Impact of Outcomes-Based Funding on Bachelor's Degree Production: Evidence from a multiple baseline interrupted time series analysis

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INTRODUCTION

- Performance funding for institutions of higher education has evolved from early performance funding to outcomes-based funding (OBF) over the past two decades. Instead of providing bonus funding to institution that meet the performance goal, OBF links an institution's base funding to the completion of goals.
- States convey legitimacy to institutions through *substantive* and *symbolic* resources (Naughton 2004), and OBF is believed to have more perceived legitimacy through both resources than early performance funding.
- As of 2015, 24 states had some form of performance funding for public 4-year institutions. Of these, 16 states had implemented OBF (NCSL 2015).
- Researchers agree that OBF provides more financial incentives for institutions to improve their performance (Rutherford & Rabovsky, 2014), but only a limited number of studies examined the effectiveness of OBF when it is separated from early performance funding.

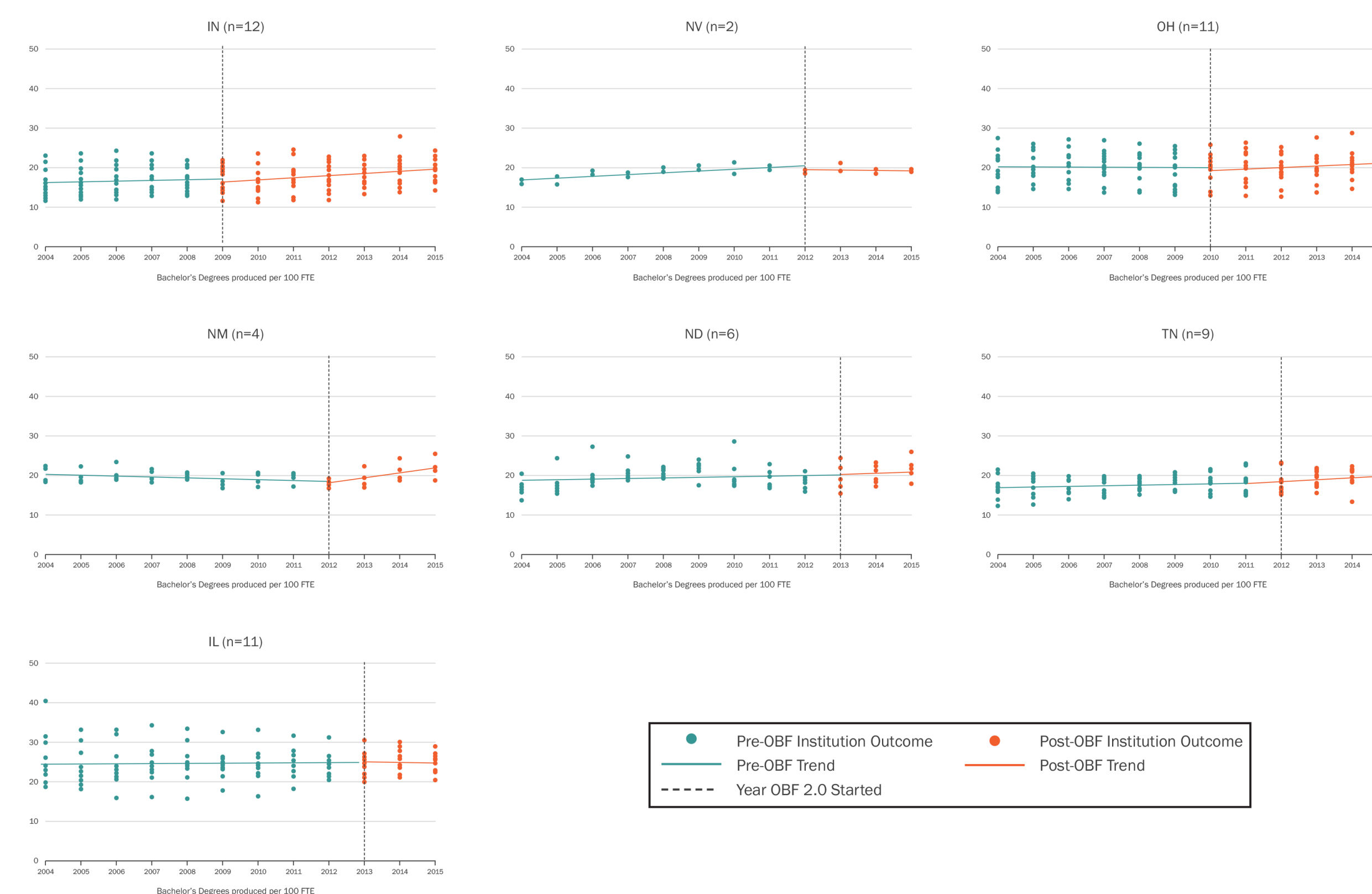
OBJECTIVE

- Our study attempts to narrow the research gap by examining empirical evidence of the impact of OBF on bachelor's degree production using a sample of 55 institutions in 7 states that implemented the policy in or before fiscal year 2012-13.

DATA & RESEARCH DESIGN

- We identified OBF states using published reports, literature, state legislature documents, and budgetary data. We also conducted interviews with state or postsecondary officials.
- We addressed discrepancies in OBF timelines by prioritizing verified sources, e.g. state legislative documents or interviews with state higher education officials.
- Our institution-level panel dataset included 55 institutions from 2003-04 to 2014-15. Integrated Postsecondary Education Data System (IPEDS) provides data for our outcome measure bachelor's degrees per 100 FTE and other institution-level covariates, including enrollment, tuition and fees, expenditures, and student demographics. We addressed the parent-child reporting issue identified in IPEDS data by creating institution-level aggregates. The state-level economic data is collected from the Bureau of Economic Analysis.
- This study utilizes a multiple baseline interrupted time-series (MBITS) research design to estimate the impact of OBF on bachelor's degree production. We used a multi-level estimation approach to model pooled time-series data nested within institutions, which accounts for trends in the bachelor's degree production that existed before the implementation of OBF.

Figure 1 Bachelor's degrees awarded per 100 FTE before and after OBF implementation



METHOD

- The Level 1 model nests a total of 12 years of time-periods (i) within 55 institutions (j) and attempts to determine effects of OBF within institutions using a linear growth model. The Level 1 equation is specified as:

$$Y_{ij} = \beta_{0j} + \beta_{1j}(T_{ij} - C_j) + \beta_{2j}X_{ij} + \beta_{3j}X_{ij}(T_{ij} - C_j) + \sum_{k=1}^K \delta_{j,k} (Z_{ij,k} - \bar{Z}_{j,k}) + e_{ij}$$

which includes a continuous time variable, T_{ij} , a binary variable indicating pre- and post-intervention periods, X_{ij} , an interaction term of the X_{ij} and T_{ij} , and a set of covariates, $Z_{ij,k}$. Since OBF policies were implemented at different times in different states, time (T_{ij}) is centered at the last baseline year (C_j).

- At the institutional level (Level 2), we examine the association between institution-level and state-level covariates and the baseline intercept β_{0j} ; average degree production across all institutions in pre-OBF years and slope β_{1j} ; change in average degree production over time prior to OBF; and estimated changes in the intercept and slope with OBF in place (β_{2j} and β_{3j}). The Level 2 covariates (grand mean centered) include the means of all Level 1 covariates $\bar{Z}_{j,k}$ and the state-level GDP (\bar{G}_j).

$$\beta_{qj} = \pi_{q0} + \sum_{k=1}^K \theta_{qk} (\bar{Z}_{j,k} - \bar{\bar{Z}}_k) + \omega_q (\bar{G}_j - \bar{\bar{G}}) + \gamma_q$$

where $q=0, 1, 2, \text{ or } 3$ corresponding to Level 1 coefficients $\beta_{0j}, \beta_{1j}, \beta_{2j}, \text{ or } \beta_{3j}$.

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FINDINGS

- We found there was no statistically significant change in the intercept (or baseline level) of bachelor's degree per 100 FTE after the implementation of OBF.
- The implementation of OBF policies, on average, posts a net gain in bachelor's degree production.
- The number of bachelor's degree per 100 FTE will increase by 0.264 per year. The implementation of OBF shows a positive effect on the increasing trend of bachelor's degree production for institutions with a 1.3% increase in degree production per year.
- The enrollment of underserved minority students and the total enrollment were negatively associated with bachelor's degree production, while the Pell grant showed a positive association.
- The baseline intercept of bachelor's degree production (β_{0j}) was greater at institutions with higher tuition and institutions in states with higher GDP, but the estimated impact of OBF policies was not related to any of the observed institutional characteristics or the state GDP per capita.

IMPLICATIONS

- This study makes a unique contribution to the literature by 1) limiting our analysis to states with OBF policies for three or more years to examine a long-term effect; 2) taking advantage of more recent IPEDS data; and 3) utilizing a MBITS research design that is not commonly used in previous literature.
- The MBITS approach has its limitation: 1) it assumes both baseline and post-OBF growth trends are linear; 2) the staggered nature of OBF implementation across states poses the threats of history; 3) and the lack of a comparison group might contain bias with unobserved changes in the population over time.
- More research is needed to identify specific policy components and implementation strategies that are effective in improving bachelor's degree production and to understand how institutions respond to OBF policies and what roles they play in mediating policy implementation.

REFERENCES

- National Conference of State Legislatures (NCSL). 2016. "Performance-Based Funding for Higher Education." Retrieved January 4, 2016.
- Naughton, Blake A. "The Efficacy of State Higher Education Accountability Programs." (PhD's dissertation, Stanford University, 2004).
- Rutherford, Amanda, and Thomas Rabovsky. "Evaluating Impacts of Performance Funding Policies on Student Outcomes in Higher Education." *The ANNALS of the American Academy of Political and Social Science* 655, no. 1 (September 2014): 185-208.