

IMPLEMENTATION AND IMPACT OF OUTCOMES-BASED FUNDING IN INDIANA

Prepared by *Research for Action* • July 2017

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About Research for Action

Research for Action (RFA) is a Philadelphia-based nonprofit organization. We seek to use research as the basis for the improvement of educational opportunities and outcomes for traditionally underserved students. Our work is designed to: strengthen public schools and postsecondary institutions; provide research-based recommendations to policymakers, practitioners, and the public at the local, state, and national levels; and enrich the civic and community dialogue about public education. For more information, please visit our website at www.researchforaction.org.

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Outcomes-Based Funding in Indiana: Implementation and Results

Executive Summary • July 2017

Introduction

Outcomes-based funding (OBF) is a term used to define state and system-level higher education funding policies that link public higher education dollars to key student outcomes such as credit completion, retention and graduation (Snyder, 2016). Outcomes-based funding models have evolved from traditional approaches to public higher education funding that include base-plus funding, enrollment-based funding, and early versions of performance-centered funding (Hearn, 2015). Within the past decade, OBF policies have become increasingly prevalent, and now exist in some form in about 30 states (Harnisch, 2011).

Since 2014, Research for Action (RFA) has conducted comprehensive, mixed methods research on the development, implementation and effects of robust OBF policies in three states: Indiana, Tennessee, and Ohio. This brief highlights the most policy-relevant findings of our work in Indiana to date.

Policy Overview

Indiana adopted its first OBF metric in 2003 with the goal of utilizing bonus dollars to incentivize research universities to obtain more federal research dollars. In 2007, the state began transitioning to a formula focused on base funding (OBF), fully adopting Indiana's OBF model in 2009.

As can be seen in Table i, the current formula rewards both two-year and four-year institutions for increases in a wide array of outcomes, and provides additional funding when Pell students achieve outcomes. In FY 2015, 6% of state appropriations to public postsecondary institutions in Indiana was determined via the state's OBF formula. As of FY 2016 that percent dipped to 4%, although the state increased appropriations based on the OBF formula to 6.5% in FY 2017.

Table i. Indiana’s FY 2013 through 2015 OBF Formula

OBF PERFORMANCE METRICS/WEIGHTS	INDIANA	
	Community Colleges	Public Universities
Degree/Certificate Completion	•	•
College Credit Accumulation	•	•
High Impact Degree Completion ^a		•
On-Time Graduation	•	•
Remedial and Developmental Success	•	
Institutionally Defined Metric	•	•
Premiums: Low Income Students	•	•
% of State Funding Based on Outcomes	6% - 4%	

^a Indiana’s OBF formula rewards four research institutions for students who declare or complete a degree in a high-impact field. This designation contains a range of majors including but not limited to STEM majors.

Note: the 2009 through 2012 iteration of the formula did not contain the following metrics: high impact degree completion, remedial and developmental success, and the institutionally defined metric.

OBF Impact on Student Outcomes in Indiana’s Public Universities

From 2014-2016, RFA worked closely with state officials in Indiana to obtain, verify, and analyze data from the Statewide Longitudinal Data System (SLDS) to both track trends in enrollment and determine the impact of the state’s OBF policy on student outcomes over time.¹ Enrollment in Indiana’s public universities has not varied dramatically since OBF implementation in 2009. Yet notably, the populations of Pell and underrepresented minority (URM) students have been increasing in terms of both overall enrollment and percentage of total enrollment during the same time period.

Analyses of policy impact were conducted using Indiana’s Statewide Longitudinal Data System for all students in public universities², as well as for historically underserved student groups targeted in OBF policies: Pell grant recipients and underrepresented minorities. We also conducted separate analyses for part-time and full-time student samples. The analyses have been member-checked with state officials to ensure that our results are both comprehensive and accurate.

For each outcome indicator and student sample, we asked two questions:

- Is there evidence that OBF is having a significant impact, either positive or negative?
- Is the effect of OBF changing (increasing/decreasing) over years of OBF implementation?³

¹ Results were produced by utilizing interrupted time series analysis, a quasi-experimental research design that measures the degree to which an outcome deviates from its historical trend following the implementation of a policy. Additionally, we controlled for student characteristics such as gender, race, socioeconomic status, and choice of major, further isolating the effect of OBF on student outcomes from differences in these covariates. See Appendix B for detailed technical notes on research design, sample, analytical model, and a full set of regression estimates for the student outcomes analyses.

² Robust analyses of the impact of OBF 2.0 in Indiana’s 2-year sector were not possible. Upon careful inspection, it was discovered that two-year sector data in Indiana’s SLDS did not meet the quality and consistency standards necessary for our analytic model. As a result, and in partnership with Indiana’s Commission for Higher Education, we decided to exclude the 2-year sector from our analyses.

³ For our second question, we could only capture data on an increasing or decreasing trend if there were at least two cohorts. In the case of Indiana’s part-time students, analysis is only available for one cohort of students.

Results are summarized in Table ii below.

Table ii. Summary of Key Findings: Impact of OBF on Formula-Related Student Outcomes for Most Recent Post-OBF Cohort and Trends across All Post-OBF Cohorts (2009 through 2011)

	UNIVERSITY					
	FULL-TIME			PART-TIME		
	ALL	PELL	URM	ALL	PELL	URM
Degree	+	∅▲	∅	∅	∅	∅
Declaring a High-Impact Major	+▲	∅▲	∅▲	∅	∅	∅
Degree in a High-Impact Major	+▲	∅▲	∅	∅	∅	∅

Note: analyses were conducted on a four-year timeline for full-time students and a six-year timeline for part-time students

+ = statistically significant, positive impact for most recent cohort

-- = statistically significant, negative impact for most recent cohort

∅ = no statistically significant impact on most recent cohort

▲ = trending positive

▼ = trending negative

Specific notable findings include:

- **Four-year, full-time students fare well under Indiana’s OBF policy.** Specifically we document positive effects for the full-time student sample as a whole on all three measurable outcomes: bachelor’s degree completion, declaration of a high-impact major, and graduation with a high impact major. In addition, the impacts of OBF on declaration of a high-impact major and graduation with a high impact major have been growing stronger over time.
- **OBF in Indiana has no measurable impact on either Pell, underrepresented minorities or part-time students enrolled in the four-year sector.** While their numbers are increasing overall and as a percentage of the total population, these students are faring about the same as they would be expected to if OBF were not in place.
 - However, OBF effects for full-time university students who are Pell recipients, while not statistically significant, are growing more positive with time for all three outcomes.
 - OBF effects over time for underrepresented minority students are not as consistent.
 - We document no significant impact or trends on any OBF outcomes for part-time university students.

Because we found positive impacts for the policy on the overall full-time student population but not on underserved students, we conducted additional analyses⁴ to determine whether there was evidence of a growing achievement gap under OBF. We did not find statistically significant differences in OBF effects between the underserved and more advantaged student populations and therefore, did not find evidence of a widening achievement gap. Yet it will be important to continue to examine the effects of OBF on equity gaps in future research.

The Policy Environment: Factors Affecting Institutional Response

RFA conducted intensive case studies of four public Indiana postsecondary institutions: its two-year public institution, plus two comprehensive universities and one research university. Across all four, there is ample evidence that institutional policies and practices changed in ways designed to increase student success. Yet

⁴ See Appendix E

response was not monolithic, nor did it begin when OBF was enacted in 2009. Rather, for many institutions the policy served as an accelerant to already-existing efforts to improve student outcomes. And institutional response varied by factors such as mission, capacity, and leadership.

We identified three important contextual factors that influenced institutional response to the policy:

- **A statewide student completion agenda provided fertile soil for OBF adoption and implementation.** This agenda included: a strategic plan titled Reaching Higher, Achieving More; a 15 to Finish campaign; limiting bachelor’s degree programs to 120 credit hours; and shifting state scholarship requirements to passing 30 credits a year.
- **While Indiana’s higher education governing board provides centralized oversight of OBF, the lack of deep legislative or executive branch involvement does not communicate broad-based buy-in.** Indiana’s OBF policy is not set in statute; rather, it is driven by the state’s Commission for Higher Education (CHE). The General Assembly routinely adopts the Commission’s recommendations for the metrics and weights, and in doing so signals support of CHE’s authority as the driver of the formula. The General Assembly does not, however, routinely accept the recommendations of the CHE in regards to overall budget levels and percent of funding subject to OBF.
- **Cuts in higher education funding have created a particularly high-stakes implementation environment.** As has been the case in many states, Indiana’s OBF formula has been implemented during a time of decreasing state funding and declining enrollments.

Changes in Institutional Policy and Practice

We compared strategic plans developed both before and after the implementation of OBF and found that student outcomes aligned to the OBF formula received significantly more emphasis in the wake of OBF policy adoption in 2009. Changes were most marked in the two-year institution and the research university. Not surprisingly, interviews and document review reveal that institutions are investing in efforts designed to increase student success, as summarized in Table iii.

Table iii. Institutional Policies or Programs Intentionally Aligned with Degree Completions and Persistence

Focus Area	INSTITUTIONAL POLICIES AND PROGRAMS	INDIANA			
		2 YR	4 YR (Comp)	4 YR (Comp)	4 YR (Research)
Academic Affairs	Decrease time needed for degree	•			•
	Align curriculum to post-graduation goals	•			•
	Increase access to degrees		•		
	Increase access to courses	•	•	•	
	Increase use of data analysis			•	•
	Change faculty roles and staffing		•		
	Improving developmental education	•	•	•	•
Student Services	Change advising and counseling methods	•	•	•	•
	Improve communications between students and admin		•		•
	Improve student support programs	•		•	•
	Increase student services capacity	•			•

Admissions, Recruitment and Other Institution Responses	Change financial aid policies			•	•
	Change administrative staffing related to performance tracking		•		
	Change Responsibility-Centered Management practices	•			•

Remaining Challenges

Indiana’s OBF policy is having concrete, measurable effects on both institutional practices and policies, and on outcomes for full-time university students. Yet outcomes for part-time students, and for Pell and underrepresented minority students, have not been significantly affected; and institutional response has varied as well. What challenges remain? Our analysis identifies a range of factors that may have erected barriers to fully achieving the intended effects of OBF. As such, they bear continued scrutiny and consideration.

A. The Formula Design and Refinement Process

The absence of a formal and transparent process to obtain institutional input during the development of the formula impeded buy-in. As noted previously, Indiana’s Commission for Higher Education (CHE) is frequently referenced as a key driver in formula design and implementation. While it has consulted with some institutions during the development and refinement of the formula, CHE’s process is not perceived to be either thorough or transparent by all of Indiana’s postsecondary institutions. Institutions described how discussions with CHE about the formula occurred during private meetings, rather than in an open or inclusive environment.

Indiana’s formula has changed frequently since 2009. As a result, institutions find it difficult to strategically align policies and practices with the formula. In spite of the reported positive intent of changes to the formula, the lack of formula stability was largely viewed as a negative by institutions, making it more difficult to achieve targeted outcomes.

B. Formula Elements

Specific elements of Indiana’s OBF formula were also identified as problematic by some institutions.

Indiana’s use of six years of performance data to calculate annual awards is designed to reduce volatility, but does not recognize recent shifts by institutions to improve student success. This method of calculating performance was designed to “allow for any abrupt spike or drop in data to be measured against other more customary years” and prevent “a major shift of funding to one institution because of an anomaly in the data.” However, institutional leaders report that using data from such a long period does not allow funding based on the formula to reflect recent initiatives by institutions that may improve student success.

Institutions report that the formula does not adequately recognize or account for variation in institutional missions, students served and programs offered. Unlike states such as Ohio, which developed separate formulas for each sector that are explicitly designed to recognize mission differentiation, Indiana developed a single formula, and has revised it repeatedly in attempts to embed mission-specific metrics.

Some formula metrics are restricted to specific institutions in ways that make little sense to institutions not included. For example, only the main campuses of research universities are eligible for

the high impact degree completion metric included in the formula, which rewards degree completion in STEM or other designated “high-impact” fields. However, non-Research I institutions also reward STEM degrees, as does Indiana’s community college, Ivy Tech.

The level and process of OBF funding has created a competitive dynamic across institutions. Without fully funding the formula through “new” state dollars, investment in outcomes is subsidized by institutions, at times disproportionately decreasing funding to institutions that are more reliant on state funding. This arrangement creates a significant sense of unfairness, since institutional leaders report that they believe they are funding other institutions at their own expense.



Implementation and Impact of Outcomes-Based Funding in Indiana

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Setting the Stage

I. Introduction

Outcomes-based funding (OBF) is a term used to describe state- and system-level higher education funding policies that link public dollars to key student outcomes such as credit completion, retention and graduation. These models are a significant shift away from traditional approaches to funding public higher education based on enrollment or previous levels of funding. Within the past decade, OBF policies have become increasingly prevalent and are now present in a majority of states. When taken together, these policies determine how hundreds of millions of dollars are distributed to public colleges and universities across the country.

Yet OBF is not consistent across states. Policy formation and implementation varies significantly across states, as do specific elements of each policy. For this reason, generalizations are not particularly helpful to policymakers. To provide more practical analysis to guide state policymakers who are considering adopting or refining OBF, Research for Action (RFA) conducted a comprehensive, mixed methods research study on the development, implementation, and effects of OBF in three states: Indiana, Tennessee, and Ohio. This brief highlights the most policy-relevant findings of our work in Indiana.

A. Trends in Public Higher Education Funding

States have taken multiple approaches to funding public higher education institutions over the decades. Prior to the 1990s, state funding to public higher education was primarily allocated through base-plus or enrollment-based funding formulas. Under base-plus models, institutions were awarded a “base” each year, derived from conversations between policymakers and institutional leaders on the costs needed to continue operating. As student enrollment boomed in the 1950s, states shifted their models to allocate funding based on the number of students being served. However, as noted by Hearn (2015), neither model can be considered strategic. These models tend to rely on historic assumptions, cost, and enrollment figures and largely ignore institutional mission.

From 1979 through the 1990s, many states began adopting early performance funding models. Early performance funding provided a bonus for performance in addition to base appropriations. The bonus provided an incentive for institutions to improve student performance on key outcomes, such as increased graduation rates or job placement rates, although funding was still primarily driven through historic enrollment or base-plus models.

Recently, performance funding through bonus appropriations has evolved into OBF models. OBF differs from early performance in both design and implementation (Snyder, 2015). First, under OBF, funding for performance is allocated as part of an institution's base funding (Dougherty, 2015). Secondly, Snyder notes that OBF policies are more explicitly aligned to a state's higher education attainment goals and student success priorities. Lastly, OBF models provide a more comprehensive mechanism to hold higher education institutions accountable for their performance.

While most states now tie at least some portion of postsecondary support to student outcomes, it would be a mistake to categorize OBF as a coherent or consistent policy intervention. Rather, the term encompasses a wide array of formulas and designs, as noted in a recent typology developed by HCM Strategists (Snyder, 2016). States vary in terms of whether the funding for performance is allocated through a bonus (early performance funding model) or within an institution's base funding through an OBF model. Additionally, states vary in whether an OBF model affects all postsecondary institutions or sectors; and by the percentage of funding affected by the policy. Even among states that have enacted the most robust policies to date, the percentage of state dollars affected varies from roughly 6% in Indiana to 100% in Ohio.

Also notable is the fact that OBF policies have been implemented in states whose governance structures, funding apparatus, student demographics, and political environments vary enormously. It comes as little surprise, then, that the development and implementation of OBF policy is considerably different as well. The degree of institutional involvement in policy development; the pace of change; the stability of the formula; and the type and effectiveness of communication about the formula—all these factors have a significant effect on policy development, enactment, and implementation.

The complexity extends even further. There is a world of difference between adoption of formal policy at the state or system level, and policy implementation at an institution. It takes time for institutions to adjust to such a high-stakes change in funding; and institutional response is affected by a wide range of factors, including mission, capacity, resources, leadership, and student demographics.

B. Research Examining Outcomes-Based Funding Policies: Past and Present

OBF models have received much scrutiny and study in recent years. Our study enters a robust conversation in the academic literature regarding the efficacy and impacts of OBF policies.

i. Past Research on OBF Implementation

In a series of published reports and recently released volumes, a research team led by Dougherty examines OBF policies across Indiana, Tennessee, and Ohio utilizing interviews with state officials, state-level policymakers, and institution administrators and faculty across 18 institutions. Dougherty summarizes that OBF models “are influencing higher education institutions, through financial incentives, awareness of state priorities, and awareness of institutional performance” (Dougherty et al, 2016). In addition, he states that “performance funding clearly spurred institutions to change their institutional policies and programs in order to improve student outcomes” (Natow, Pheatt, Dougherty, Jones, Lahr & Reddy, 2014). Dougherty also argues that institutional response to OBF depends upon factors such as size, type of institution,

capacity, and quality of leaders (Dougherty et al, 2014; Dougherty et al, 2016). He identifies the potential for unintended impacts of OBF policies, such as admission restrictions and weakening academic standards. However, as much of his work occurred prior to full implementation of OBF policies, Dougherty recognizes that these unintended impacts were forecasts of what may occur, not what has actually occurred.

Additional qualitative efforts include an ethnographic case study of community colleges and universities in Tennessee funded by the Ford Foundation (Ness, Deupree & Gandara, 2016). Pulling from interviews with over 100 campus and system actors, the authors found “robust campus-level completion activity” following the implementation of OBF. Findings also highlight potential challenges of OBF models, such as increased campus competition and insufficient premiums for at-risk students.

ii. Past Research on the Impact of OBF

To date, published quantitative studies examining the impact of OBF on student outcomes have relied exclusively on institution-level, aggregate data, mostly sourced through the Integrated Postsecondary Education Data System (IPEDS), to examine the impact of OBF on institutional completion rates, student enrollment, and institutional selectivity in a variety of states that have adopted or implemented OBF (e.g., Hillman, Fryar, Tandberg & Crespín-Trujillo, 2015; Hillman, Tandberg & Fryar, 2015; Hillman, Tandberg & Gross, 2014; Rutherford & Rabovsky, 2014; Tandberg & Hillman, 2014; Tandberg, Hillman & Barakat, 2014; Kelchen & Stedrak, 2016; Umbricht, Fernandez, & Ortagus, 2015). Results of these IPEDS studies are mixed. Below we summarize early and more recent results.

Early examinations of OBF impact. Most early examinations of OBF reveal no effects of the policies on student outcomes (e.g., Hillman et al., 2014; Dougherty et al., 2014; Hillman et al., 2015; Tandberg & Hillman, 2014; Tandberg, Hillman & Barakat, 2014). However, these studies focus on less robust OBF models (Tandberg, Hillman & Gross, 2014) and in several cases utilize data collected prior to full implementation of the policy. In doing so, they search for effects in student cohorts that had little to no exposure to the policy (Shin & Milton, 2004; Tandberg, Hillman, & Barakat, 2014) or immediately following OBF implementation (Rutherford & Rabovsky, 2014; Tandberg, Hillman & Barakat, 2015). This approach can be particularly problematic because many states adopted hold-harmless policies, which delayed the full impact of the policy for several years. Thus, the lack of significant findings in early examinations of OBF could be due to weaknesses in the policies themselves or because analyses were conducted using data collected prior to full implementation of the policy.

More recent examinations of OBF impact. More recent studies of OBF utilizing IPEDS data correct for some of the shortcomings of earlier studies and reveal some positive impacts of OBF on student outcomes. These include an increase in associate degrees conferred and short-term certificates in the two-year sector (Tandberg, Hillman, & Barakat, 2015; Hillman, Tandberg, & Fryar, 2015), as well as increases in bachelor’s degrees and degrees per 100 full-time equivalent (FTE) students (Hillman, Fryar, Tandberg, & Crespín-Trujillo, 2015; Slaughter et al, 2017). Yet while these studies are based on data collected post-OBF implementation, there are still not enough years of post-OBF data available for many states in the IPEDS database to support a definitive analysis of the policy’s impact on institutional outcomes.

In addition, a few researchers have begun to examine whether there is any evidence that OBF is having the “unintended impacts” that Dougherty (2014) forecasted, such as increases in selectivity and limiting access to historically underserved student populations. Results of these analyses suggest that institutional selectivity may have increased in Indiana under OBF (Umbricht, Fernandez, & Ortagus, 2015; Rutherford & Rabovsky, 2014) and that there has been a decline in Pell enrollments under OBF (Kelchen & Stedrak, 2016).

Due to the limitations of IPEDS and the relatively recent implementation of the most robust OBF models, many questions remain about the effectiveness of various OBF policies, how these policies influence changes in institution behaviors, and whether these changes in behaviors impact student outcomes. Institutions are the intended targets of OBF policies; however, the formulas award dollars based on improved student outcomes. Thus, research is needed that examines whether and how the outcomes of students have improved under OBF when controlling for key student factors like age, gender, race/ethnicity, and socioeconomic status.

C. A Different Kind of Research on Outcomes-Based Funding

The sheer variation and complexity of OBF policies beg for a more nuanced, comprehensive policy-relevant analysis as states consider either adopting or refining these policies. To that end, and with the support of the Bill and Melinda Gates Foundation and the Lumina Foundation, RFA has conducted a detailed, mixed-methods study of OBF implementation and outcomes in three states: Indiana, Ohio, and Tennessee.

This report presents our findings on Indiana and is designed to provide the specificity and utility state policymakers need as they consider specific elements or approaches to OBF policy development or refinement. It draws from extensive, state-specific qualitative and quantitative data, as outlined below.

i. Quantitative Data: Tracking Student Outcomes Using Statewide Longitudinal Data Systems

RFA worked closely with the Indiana Commission for Higher Education to obtain data from its State Longitudinal Data System (SLDS) to examine the effects of OBF on key student metrics included in Indiana's funding formula. SLDS are important analytical tools that provide the opportunity to conduct far more nuanced analyses of student outcomes in individual states over time than is possible using IPEDS. First, SLDS assign each student an individual identifier and allow for analyses of institutional outcomes at the student level that can control for key student characteristics (e.g., race/ethnicity, Pell recipient status, and enrollment status). Moreover, SLDS include a wide range of indicators included in OBF formulas that are not available in IPEDS, such as credit accumulation, major, and certificate attainment. Finally, because these datasets are more up-to-date than IPEDS, which has a two-year lag, SLDS analyses can provide more real-time results for informing policy change and providing feedback to states on formula effectiveness.

ii. Qualitative Data: Examining Policy Formation, Implementation and Institutional Response Using Interviews and Extensive Document Review

Our examination of OBF policy implementation in Indiana builds upon Dougherty's efforts by examining whether there is concrete evidence of institutional change several years after robust models of OBF have been implemented (Dougherty et al, 2016). We pay particular attention to state contextual factors influencing policy adoption and implementation, documenting and understanding how institutions are responding to OBF, investigating potential unintended impacts of the funding formula following implementation, and further examining the challenges Dougherty highlights to help states in their thinking and design of OBF policies.

Qualitative data was collected across two levels—states and institutions.

State policy analysis. Comprehensive analyses of Indiana's OBF policy and formula were conducted using documents drawn from state- and system-level websites. We identified state websites and downloaded relevant documents, including legislation, descriptions of policy, meeting minutes, power point presentations, and state- and system-level strategic plans (both pre- and post-OBF). Analyses of state policy

were refined and deepened via repeated interviews with three state policymakers between February 2015 and July 2016.

Institutional case studies. We conducted in-depth analyses of institutional response to OBF using case studies of four public institutions: one research university, two comprehensive universities, and the state's multi-campus community college. We conducted interviews, either face-to-face or over the phone, with 34 administrators and faculty. Importantly, we triangulated our analysis of institutions by also collecting and analyzing strategic plans developed both prior to and after OBF implementation in 2009, institution planning documents, and reports on student success initiatives from each institution.

II. Why Indiana? An Overview of the State's Outcomes-Based Funding Policy and Conditions Affecting Implementation

We chose to study Indiana because it has over ten years of experience with OBF. Indiana was highlighted by HCM Strategists as a state exemplar of OBF in 2015 for its focus on completion as a primary metric in alignment with state goals, prioritization of at-risk students, and differentiation between community colleges and universities (Snyder, 2015). In addition, Indiana has been examined in prior research (HCM Strategists, 2011; Natow et al, 2014) allowing our work to advance efforts in understanding the development and implementation of OBF in Indiana, as well as its effects on student outcomes.

A. Indiana's Outcomes-Based Funding Formula: An Overview

In 2007, Indiana adopted an early performance funding model, fully transitioning to an OBF model in 2009 (Dougherty et al, 2016). Indiana's current OBF model rewards funding to public community colleges and universities based on a defined set of metrics. In FY 2015, the state awarded 6% of postsecondary appropriations based on OBF; in FY 2016 the percent dipped to 4%, although the percent will increase back to 6.5% in FY 2017. Compared to other states, such as Ohio and Tennessee, the percentage of base funding affected by Indiana's OBF formula is modest.

Indiana's OBF formula for the most recent biennium (2015-2017) includes seven outcomes, four of which apply to all institutions: degree completion, at-risk student degree completion, on-time graduation, and an institutionally-defined metric. Three outcome metrics attempt to address the different missions of community colleges and universities: high-impact degree completions, student persistence, and remediation success. Where high-impact degree completions are awarded exclusively to research institutions, remediation success is only awarded to community colleges. In addition, while student persistence is awarded across both sectors, it is defined differently across institution types. Community colleges are awarded when students complete 15, 30, and 45 credit hours and comprehensive or non-research universities are awarded when students complete 30 and 60 credit hours. Research universities are not awarded for student persistence. An overview of Indiana's current funding formula is outlined in Table 1.

Table 1. Indiana’s Outcomes-Based Funding Formula for FY 2015-17

METRICS		FOUR-YEAR INSTITUTIONS		COMMUNITY COLLEGES
		RESEARCH UNIVERSITIES	COMPREHENSIVE UNIVERSITIES/ NON-RESEARCH	
Completion	Overall Degree Completion	•	•	•
	Degree Completions of At-Risk Students ⁵	•	•	•
	High Impact Degree Completions ⁶	•		
	On-Time Graduation ⁷	•	•	•
Progression	Student Persistence		•	•
	Remediation Success ⁸			•
Productivity	Institutionally Defined Metric	•	•	•

In allocating funding, each outcome metric included in Indiana’s OBF formula is assigned a dollar amount for one “unit”—or achieved outcome—as shown in Table 2. The amount of funding designated to each metric reflects the state’s priorities and relative importance of each outcome. For instance, on-time completion of a bachelor’s degree receives the largest dollar award per unit (\$23,000) and completion of 15 credit hours receives the smallest (\$300).

⁵ At Risk Degree Completion Metrics include 1 Year Certificate, Associate, Bachelor’s Degrees only for those students eligible for Pell Grant upon graduation; applies to state residents only

⁶ High-Impact Degree Completion Metrics include Bachelor’s, Master’s and Doctoral Degrees for specific degree types granted in STEM fields; applies to state residents only. Research institutions include Indiana University-Bloomington, Indiana University-Purdue University Indianapolis, Purdue University-West Lafayette and Ball State University.

⁷ On-time completion is awarded based on increases in rate. If on-time completion increases, the metric is funded. The metric is not funded if on-time completion decreases.

⁸ In the 2013-15 biennium CHE did not include remediation due to decreasing trends in success rates. As with on-time completion, the metric is funded based on increases in rate. If remediation success decreases, the metric is not funded.

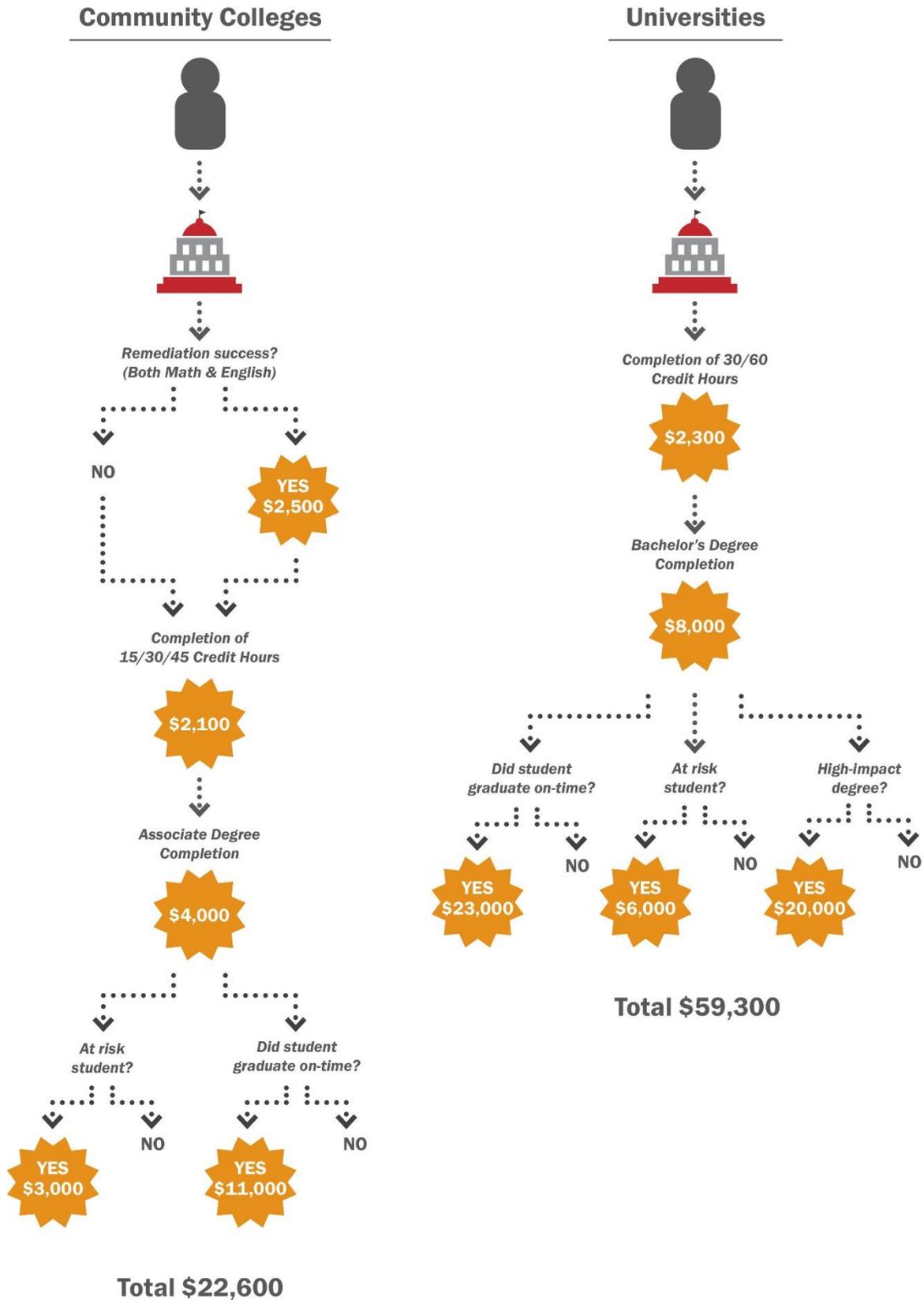
Table 2. OBF FY 2015-17 Unit Value for Completion and Progression Metrics

METRIC		PER UNIT VALUE	ADDITIONAL AWARDS FOR:		
			AT-RISK STUDENTS	HIGH-IMPACT DEGREES	ON-TIME COMPLETION
Degree Completion	1 Year Certificate	\$2,000	\$1,500		
	Associate	\$4,000	\$3,000		\$11,000
	Bachelor's	\$8,000	\$6,000	\$20,000	\$23,000
	Master's	\$4,000		\$14,000	
	Doctoral	\$2,000		\$7,000	
Progression	15 Credit Hours	\$300 (2 YR-only)			
	30 Credit Hours	\$600 (2 YR) \$800 (4 YR)			
	45 Credit Hours	\$1,200 (2 YR-only)			
	60 Credit Hours	\$1,500 (4 YR-only)			
	Remediation Success - Math/English	\$1,300 (Math or English) \$2,500 (Both)			

B. Tracing Indiana’s Outcomes-Based Funding Dollars

The price per unit in Indiana’s OBF formula is applied to reflect each institution’s performance. Figure 1 provides an illustration of how institutions in both sectors may be awarded for student success. The total sum “earned” by each institution is then adjusted based on the percent of state operating appropriations being allocated through the funding formula.

Figure 1. FY 2015-17 Potential Award by Sector per Metric



C. The Indiana Context: State-Level Factors Affecting the Development and Implementation of Outcomes-Based Funding

No state implements policy in a vacuum; Indiana's OBF is no different in this regard. Our analysis of qualitative data identified three important factors that have influenced the state's OBF policy formation and implementation: the existence of a statewide completion agenda, the presence of a centralized, state-level driver, and funding cuts to higher education as the formula has been implemented.

A comprehensive, statewide commitment to a student attainment agenda provided fertile soil for the adoption and implementation of OBF.

In Indiana, OBF was implemented under the mantle of a statewide completion agenda to increase college attainment in the state. Preceding adoption of the full OBF policy, Indiana's Commission for Higher Education released its strategic plan, *Reaching Higher*, in 2008. This plan "signaled a significant shift in focus"—to completion over enrollment.⁹ In 2012, Indiana built upon its strategic plan with *Reaching Higher, Achieving More* which introduced Indiana's "Big Goal" of ensuring that 60% of the state's residents attain a postsecondary credential by 2025. Today, Indiana's third strategic plan, *Reaching Higher, Delivering Value* documents the state's commitment to increasing college completion, promoting productivity, and ensuring academic quality.

The Commission has also partnered with Complete College America to develop initiatives such as "15 to Finish," which encourages students to take at least 15 credit hours each semester to help ensure on-time graduation. In addition, the Indiana Legislature has mandated changes that align with OBF, such as limiting bachelor's degree programs 120 credit hours and providing financial incentives for Hoosiers with college credits to complete their degrees. Moreover, the state's 21st Century Scholars Program now requires students to take 30 credits a year to maintain their scholarship, encouraging more students to complete on time. Appendix A illustrates the multitude of completion-focused state initiatives implemented prior to or concurrently with OBF.

State and institutional-level leaders described the interconnection between Indiana's broad-based college completion agenda and OBF. As one state policymaker noted, "Every entity is talking about on-time completion and the number of completers. They know that no matter what, most of the money is going to go toward those two things."

While Indiana's higher education coordinating board provides centralized oversight of OBF, the lack of deep legislative or executive branch involvement does not communicate broad-based buy-in.

Indiana's OBF policy is not set in statute. Rather, it is a provision included in the biennial state budget, subject to renewal each budget cycle. Higher education related budget recommendations are made by the Commission for Higher Education, the state's higher education coordinating body, to the General Assembly every biennium. This approach has both advantages and drawbacks.

The Commission makes recommendations regarding the metrics, weights, and budget amount to the General Assembly. The General Assembly routinely adopts the commission's recommendations for the metrics and weights, and in doing so signals support for the Commission's authority as the driver of the formula.

⁹ Indiana Commission for Higher Education, *Indiana's strategic plans*. Retrieved from: <http://www.in.gov/che/3142.htm>

The General Assembly does not, however, routinely accept the budgetary recommendations of the Commission. As a result, OBF implementation is driven jointly by the two entities, with lawmakers determining the share of state funding to be allocated and the Commission determining how best to allocate those funds, through the funding formula.

They [the General Assembly] have not changed the metrics in any biennia; they are following the Commission's recommendation. They [the General Assembly] will change the percent of funding. Therefore, the policy is directly driven by the Commission, but ultimately they [the General Assembly] decide the funding level. – Indiana Policymaker

Yet the fact that the formula itself is neither set in statute nor attracts much engagement from the governor and the General Assembly leads to a perception of formula vulnerability among institutional leaders. Institutional administrators explained the implications of this situation:

There was no executive order by the governor. There has been no joint resolution done by the General Assembly saying that this is important. – Community College, Indiana Higher Education Administrator

And I've found as I look at states and talk to states, states may have goals but in Indiana, you'll find the goal is CHE's. That goal... has never been endorsed by the state legislature, never been endorsed by the governor. – Community College, Indiana Higher Education Administrator

Cuts in higher education funding have created a particularly high-stakes implementation environment.

As has been the case in many states, Indiana's OBF has been implemented during a time of decreasing state funding and declining enrollments. These conditions create a more high-stakes policy environment than one might predict otherwise, given that the formula affects less than 10% of base appropriations.

Between 2008 and 2015, Indiana saw an 8% drop in state appropriations to higher education.¹⁰ Currently, educational appropriations per full-time equivalent in Indiana are \$1,824 below the national average.¹¹ As a result of declining state support, institutions are increasingly relying on tuition revenue, which grew 11% per FTE during the same time period.¹² But, even with this increase, total revenue to higher education per full-time equivalent in Indiana is \$1,069 lower than the national average.¹³

Institutional respondents frequently noted that the overall lower level of state appropriations presented challenges for their institutions, impacting their perceptions of OBF and ability to respond to it.

We have had declining support from the state. So, every year, you go through the same conversation: Less support. Watch your dollars. Reallocation. Elimination of resources. It's just been a constant practice that we've had to go through. – Comprehensive University, Indiana Higher Education Administrator

Yet this same administrator also noted how decreased funding acts as a crucible in which institutional policies are honed, and resources reallocated, to more directly affect student outcomes emphasized in the OBF formula:

¹⁰ State Higher Education Executive Officers (SHEEO). (2015). *SHEF: FY 2015*. Retrieved from: http://sheeo.org/sites/default/files/project-files/SHEEO_FY15_Report_051816.pdf

¹¹ Ibid. dollars adjusted by Cost of Living Adjustment and Enrollment Index

¹² Ibid.

¹³ Ibid. dollars adjusted by Cost of Living Adjustment and Enrollment Index

At the same time...we've tried to take some of the resources that we've seen through the enrollment growth and to invest those in strategic areas; a lot of that has been in student success. We've invested in a lot of different activities all around supporting student success...and almost all that's been through internal reallocation. – Comprehensive University, Indiana Higher Education Administrator

In sum, the environment was ripe for the adoption of OBF in Indiana, as the state's higher education institutions had already begun aligning to student success goals. A lack of clear and explicit buy-in to the formula by the executive and legislative branches of government is of concern to institutional administrators, as are significant fiscal constraints. Yet when taken together, the context and conditions under which OBF was implemented in Indiana creates incentives for institutions to focus available resources on outcomes targeted in the formula.

How Students Fare Under Outcomes-Based Funding in Indiana

III. Tracking Changes in Student Enrollment and Outcomes Using SLDS

We utilize Indiana's Statewide Longitudinal Data System (SLDS) to examine student-level changes in the rates of the three OBF formula-specific outcomes that we can track in this database: bachelor's degree completions, high-impact major declarations, and degree completions in high-impact fields for cohorts of students who entered pre- and post-OBF adoption. In addition, we consider how the impact of the policy varies for full-time and part-time students, as well as for traditionally underserved student populations including underrepresented minorities and low-income students.

Indiana's SLDS data allows for a more nuanced analysis of the effects of OBF than has previously been possible utilizing IPEDS. Specifically, SLDS makes it possible to:

1. Customize analyses to Indiana by tracking changes across specific interim and long-term outcomes included in the state's funding formula;
2. Track OBF effects on student-level outcomes while controlling for key student characteristics;
3. Analyze the unique impact of OBF on traditionally underserved students; and
4. Identify trends in OBF impact on specific outcomes over time.

The level of specificity that longitudinal student-level data provides makes a unique and significant contribution to our understanding of the effects of OBF on student outcomes. However, it is also important to note that every database and research methodology have weaknesses as well as strengths. Our use of statewide longitudinal databases is no exception. We utilize the most robust methodology possible with such data—a quasi-experimental technique called Interrupted Time Series Analysis—to determine whether students exposed to OBF have better (or worse) outcomes than we would have predicted if OBF had not been implemented. Yet because the time series analyses are conducted using the treatment group only, we cannot completely rule out the possibility that the results could be influenced to some degree by contemporaneous policy changes or unobserved changes in the population.

In addition, this report includes university analyses only. Analyses of the impact of OBF in Indiana's community colleges was not possible. Data from Indiana's SLDS covering the two-year sector was

inconsistent across the years needed for our analysis. In partnership with the Commission, we decided that data from Indiana's two-year sector could not support rigorous analyses.

Lastly, while Indiana's OBF policy rewards universities for a range of outcomes, missing or incomplete data from the state's SLDS enabled us to track only three outcomes related to Indiana's funding formula: bachelor's degree completion, declaring a high-impact major, and attaining a degree in a high-impact field. For more information about our methodology and our data, please see Appendix B.

Results for the three student outcomes relevant to Indiana's OBF policy are provided below. In addition, because increasing equity is an explicit goal of Indiana's formula (i.e., the funding formula provides an award for degrees completed by Pell students) we conducted analyses to estimate the effects of OBF on Pell recipients and underrepresented minority students. We provide both descriptive achievement trends and results from our quasi-experimental analyses examining changes in student outcomes over time to examine the degree to which Indiana's OBF policy impacted the completion of bachelor's degrees, declaring high-impact majors, and completion of a degree in a high-impact field.

First, a few important notes about our data and analyses:

- We examine changes in outcomes across cohorts. We defined a student's cohort as the academic year in which the student enrolled. For example, students who entered in the 2004-05 academic year are referred to as the 2005 cohort. We consider the 2005 through 2008 cohorts pre-OBF as enrollment occurred prior to 2009, the year OBF was implemented in Indiana. Post-OBF cohorts include students who enrolled following implementation of OBF in Indiana—the 2009, 2010, and 2011 cohorts.
- Our analytic sample is restricted to first-time students who registered in a bachelor's degree program at some point within their first four years of higher education. We examined outcomes for both full-time and part-time students. Furthermore, student cohorts enrolling in the 2012 academic year or later were excluded as they would not have been expected to graduate by the end of 2014. As this analysis presents the probability of attaining a bachelor's degree within four years (or six years for part-time students), data are not yet available to track graduation rates of later cohorts.
- The trends in enrollment of the analytic sample used for the analyses of student outcomes are captured in each table estimating the effect of OBF on that outcome and are broadly similar to those of the overall student population. For more information, see Appendix B.
- Our OBF impact analyses account for key student demographics such as race/ethnicity, gender, age, Pell recipient status, and choice of major. In this way, we isolate the effect of OBF by ensuring that changes in the probability of whether students will achieve key outcomes are absent the influence of any of these factors.
- We also control for the underlying time trend in the probability of achieving key student outcomes prior to the implementation of OBF, furthering isolating the effect of OBF.
- Lastly, for each outcome, we provide four sets of OBF impact analyses:
 - Trends in the full-time student population;
 - Trends in the part-time student population;
 - Trends for Pell students to determine whether there are differences in how at-risk students fare; and
 - Trends for underrepresented minority students.

Technical details about these analyses can be found in Appendix B.

In the sections to follow, we first track how student enrollment has changed over time, using several years of data both before and after OBF implementation. Next, we present descriptive achievement trends for the three formula-related student outcomes (bachelor's degree completions, high-impact major declarations, and degree completions in high-impact fields) for all student cohorts between 2005 and 2011. Finally, we present findings from our quasi-experimental analyses of OBF's impact on each of the three formula-related outcomes for all four student populations.

IV. Student Enrollment Trends

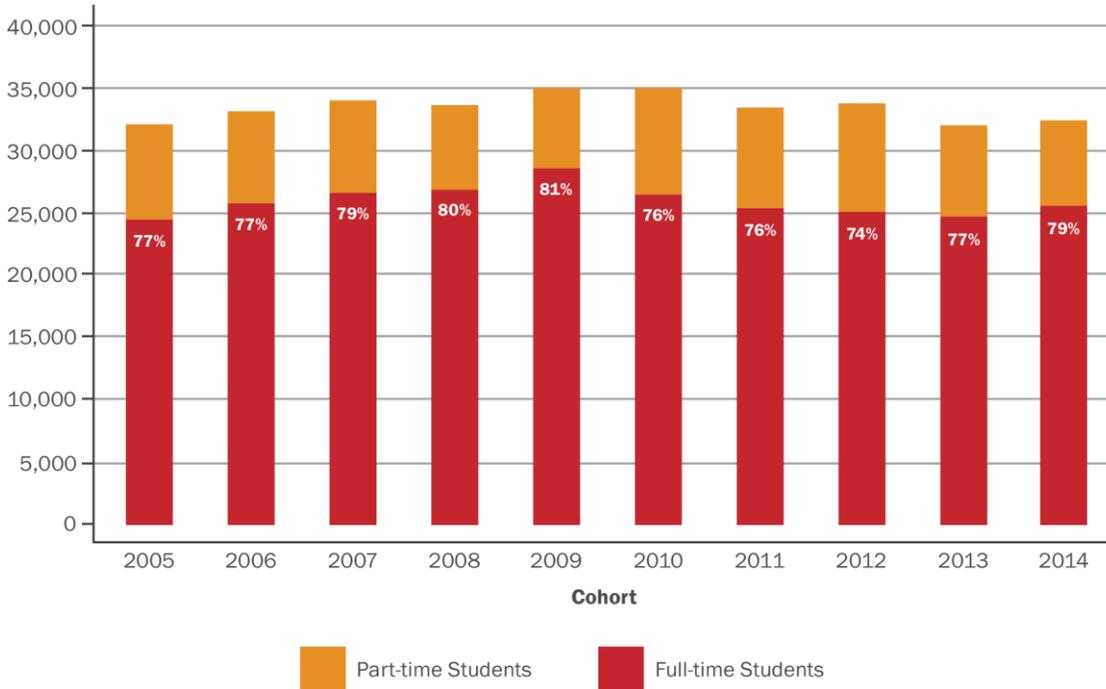
The stated, long-term goal of OBF in Indiana is to increase the number of students who attain high-quality degrees and credentials. In addition, there is a particular emphasis on increasing degree attainment among economically disadvantaged students, which is reflected in the weights applied in the formula for Pell students. For these reasons, it's important to track whether, and to what degree, enrollment trends have changed since the implementation of OBF.

From Indiana's SLDS, we obtained population data for all university and community college students from academic years 2005 through 2014, providing us with four years of pre-OBF implementation and six years of post-OBF implementation data. Here, we examine enrollment trends from 2005 through 2014, tracking changes in both the number and the percentage of full-time and part-time students, as well as students receiving Pell Grants and underrepresented minority students who have enrolled in Indiana's public universities during these years.

A. Overall Enrollment Trends of First-Time Undergraduate Students at Indiana's Public Universities

Figure 2 displays cohort enrollment trends from academic years 2005 through 2014.

Figure 2. Undergraduate Enrollment of First-Time Students in Indiana’s Public Four-Year Institutions Pre- and Post-OBF, 2005 through 2014



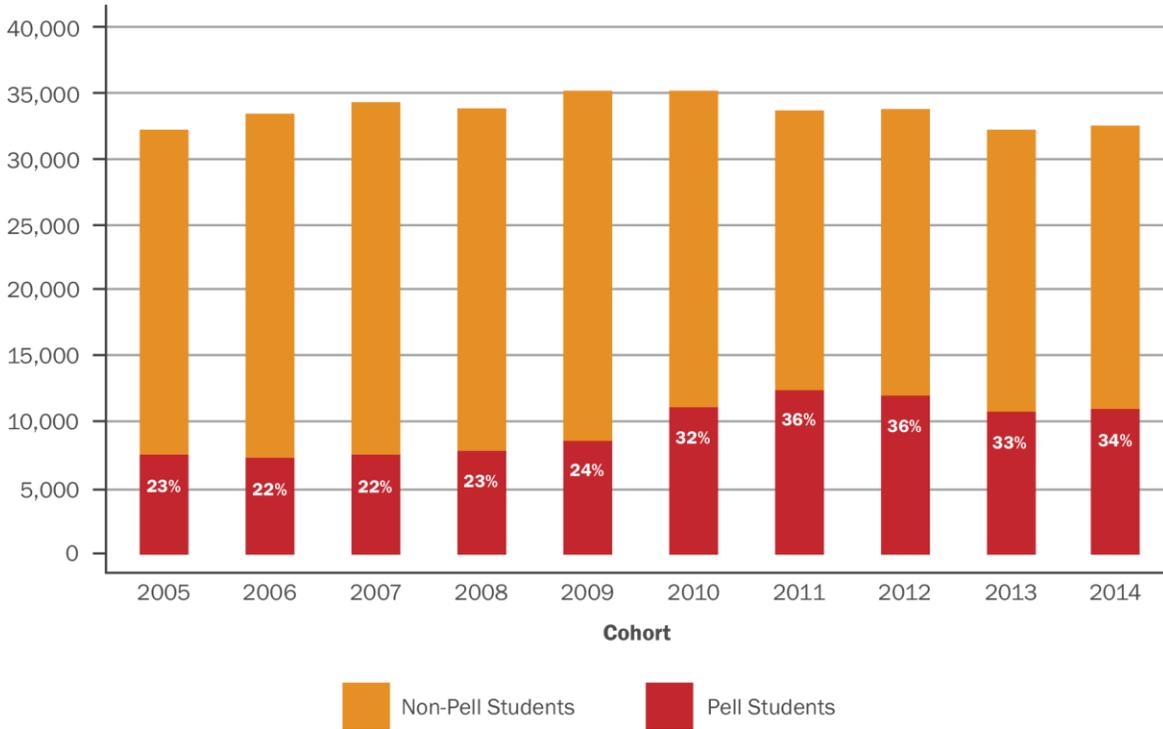
Key findings:

- About 78% of first time students enrolled as full-time students their starting year, whereas the other 22% were enrolled as part-time.
- The proportion of full-time and part-time students did not change significantly over the 10 years of data examined.
- The numbers of full-time and part-time students also did not vary substantially over the 10 years of data examined. While numbers did rise to some degree during the first and second years of OBF implementation, they dropped subsequently to pre-OBF levels.

B. Enrollment Trends of Pell Recipients at Indiana’s Public Universities

Figure 3 displays enrollment trends of first-time, undergraduate students who received Pell grants upon entering an Indiana public university.

Figure 3. Trends in Undergraduate Enrollment of First-Time Students Receiving a Pell Grant during their First Year in Indiana’s Public Four-Year Institutions in Year Pre- and Post OBF Implementation, 2005 through 2014



Key findings:

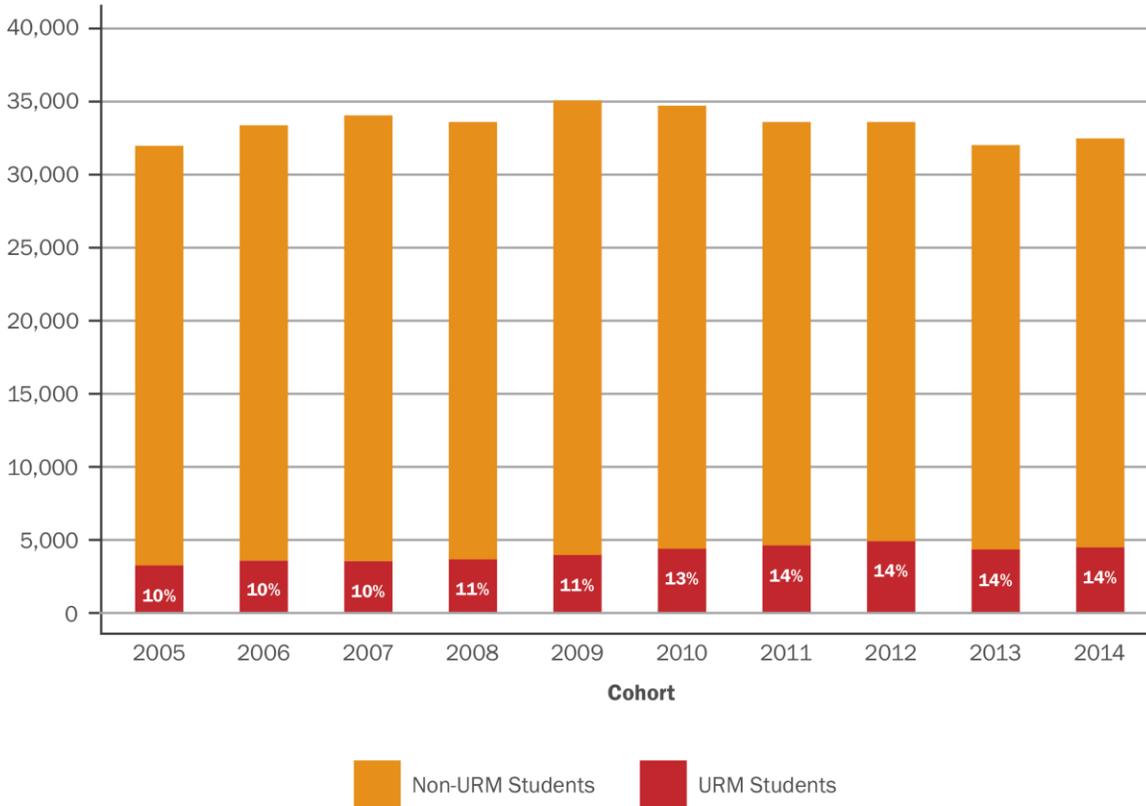
- Number of Pell Students. In contrast to the relatively steady levels of undergraduate enrollment pre- and post OBF, the overall number of students receiving a Pell grant during their first year is markedly higher beginning in 2010, the year following OBF implementation in Indiana. The total number of Pell students enrolled in the years prior to OBF was relatively steady, ranging from 7,207 to 7,728 across the four years with the highest number of Pell students enrolled in 2008. Post-OBF, the numbers increased to an average of 10,866 Pell students each year, with the largest peak in Pell enrollment occurring in 2011.
- Percentage of Pell Students. The percentage of first-time, undergraduate students receiving Pell their starting year also increased significantly by nearly 10% between 2009 and 2010.
- It is worth noting that changes in the Pell program through investments as part of the American Recovery and Reinvestment Act of 2009, coupled with the Great Recession between 2007 and 2009, may have influenced the increased number and proportion of Pell students in Indiana.¹⁴

C. Enrollment Trends of Underrepresented Minority Students at Indiana’s Public Universities

We also examined enrollment trends for underrepresented minority students. Figure 4 displays enrollment trends of first-time, undergraduate students who are black or Hispanic.

¹⁴ MsCann, C. (n.d.) Pell Grants. Retrieved from <http://www.edcentral.org/edcyclopedia/federal-pell-grant-program/>

Figure 4. Trends in Undergraduate Enrollment of First-Time Underrepresented Minority Students in Indiana’s Public Four-Year Institutions in Year Pre- and Post OBF Implementation, 2005 through 2014



Key findings:

- Both the number and percentage of underrepresented minority students increased in the years following the implementation of OBF in Indiana in 2009.

V. Changes in Student Outcomes

A. Trends in Three Key Outcomes for Indiana’s Universities

In this section, we present descriptive data tracking changes in the years pre- and post-OBF implementation in terms of both total number and percentage for:

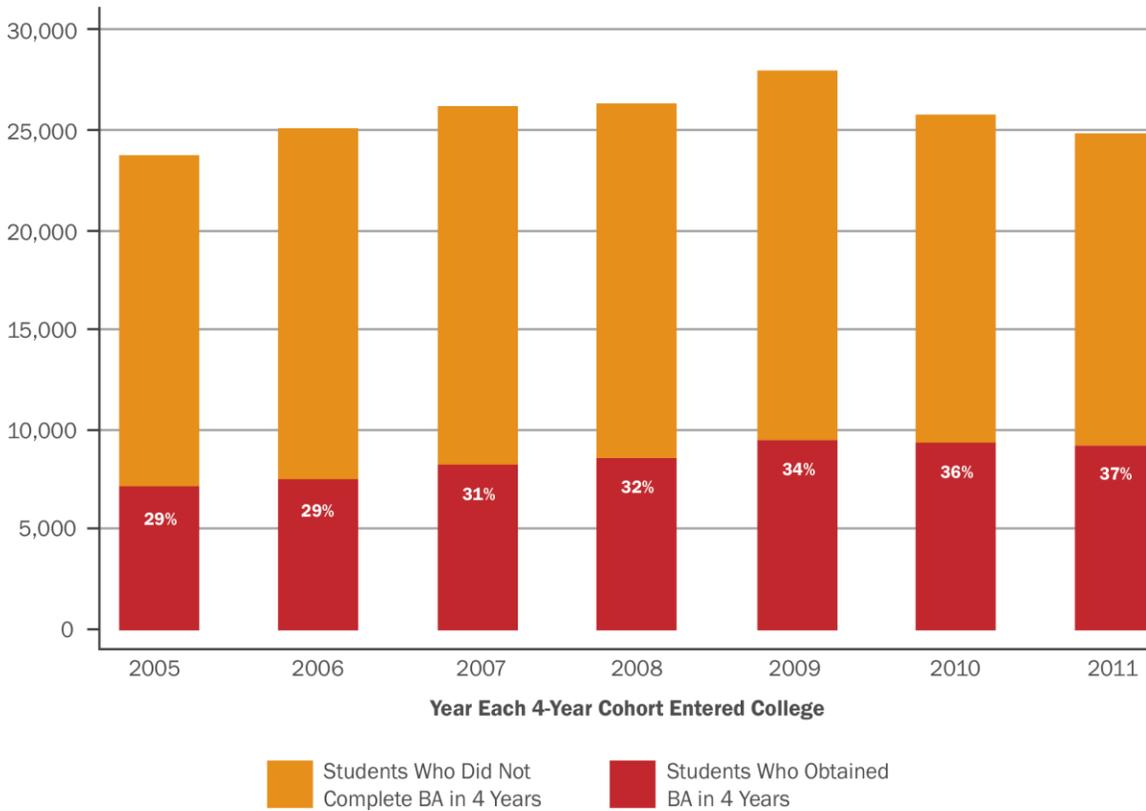
1. First-time, full-time students who complete a bachelor’s degree within four years (all public four-year institutions);
2. First time, full-time students who declare a major in a high-impact field¹⁵ (designated research institutions only); and
3. First-time, full-time students who complete a bachelor’s degree in a high-impact field within four years (designated research institutions only).

¹⁵ We track Declaration of a Major in a High Impact Field as an indicator of progress towards High Impact Degree Completion.

i. Attaining a Bachelor's Degree

Figure 5 displays overall changes in both the total number and the percentage of students who attain a bachelor's degree within four years pre- and post-implementation of OBF.

Figure 5. Number and Percentage of First-Time, Full-Time Bachelor's Degree Seekers Receiving a Bachelor's Degree within Four Years in Years Pre- and Post- Outcomes-Based Funding Implementation, 2005 through 2011



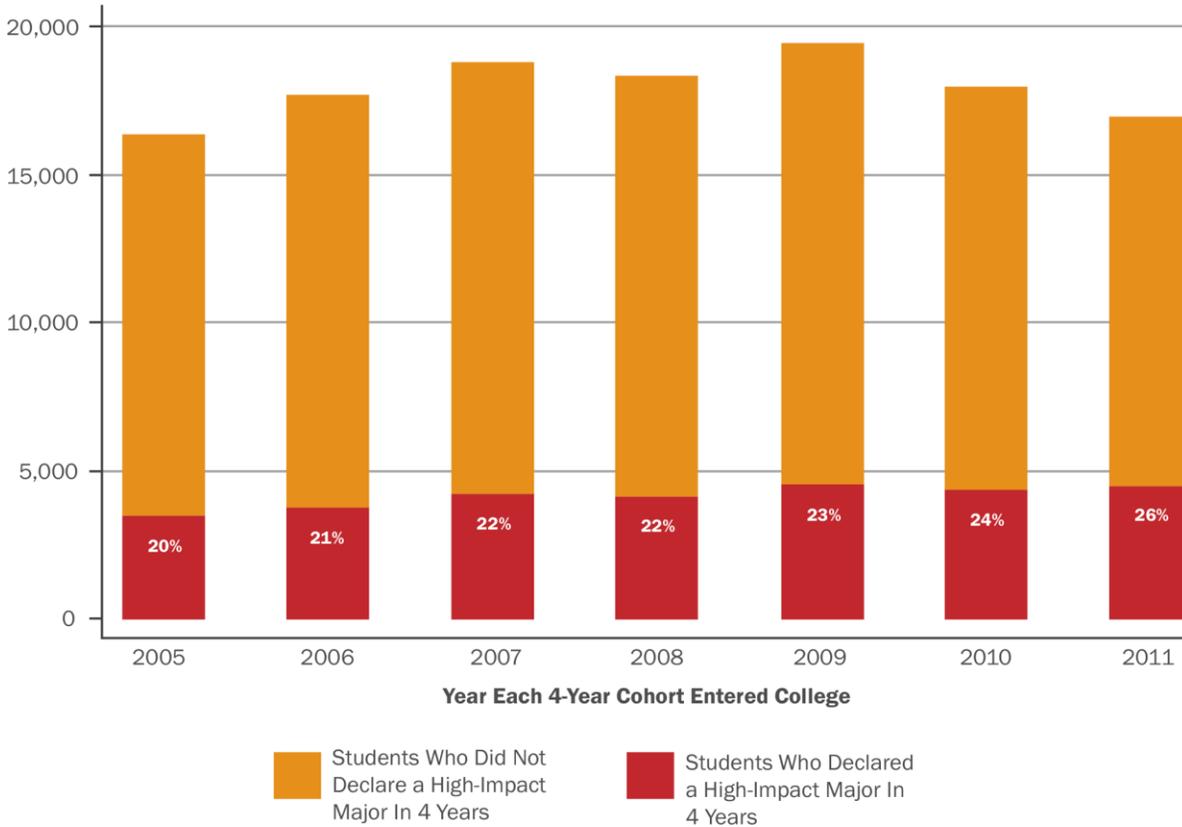
ii. Declaring a High-Impact Major and Attaining a Bachelor's Degree in a High-Impact Field

Indiana's OBF formula rewards four of the state's research institutions¹⁶ for completing students in a degree in a high-impact field—an area that includes a range of majors including but not limited to STEM majors. We examine whether there has been a change in the first step towards this goal--declaring high-impact majors--as well as a change in completing a degree in a high-impact major as a result of OBF.

Figure 6 shows the overall changes in both the total number and the percentage of students enrolled at a research institution who declared a high-impact major within four years pre- and post-implementation of OBF.

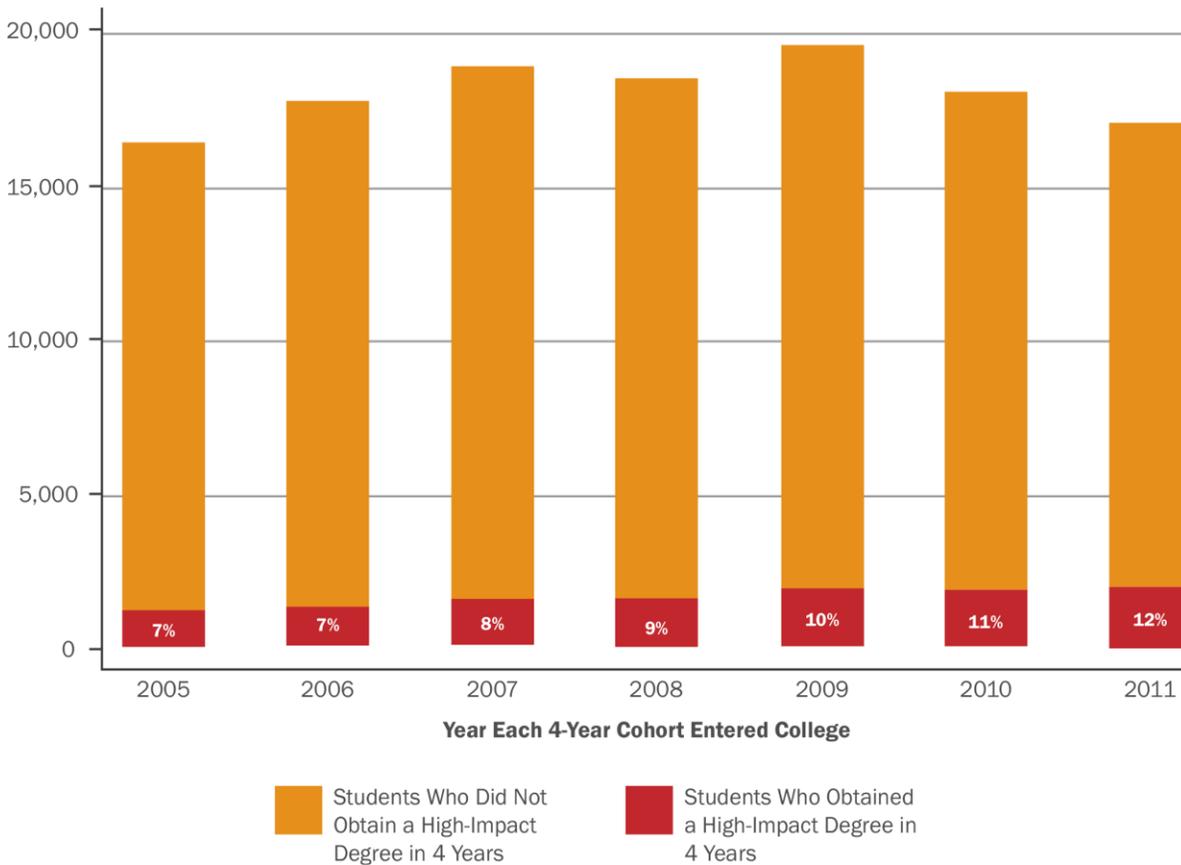
¹⁶ Research institutions awarded for degrees in high-impact majors include Indiana University-Bloomington, Purdue University-Main Campus, Ball State University, and Indiana University-Purdue University-Indianapolis.

Figure 6. On-Time, Full-Time Bachelor’s Degree Seekers in Research Institutions Declaring a High-Impact Major within Four Years in Years Pre- and Post- Outcomes-Based Funding Implementation, 2005 through 2011



As noted, Indiana’s OBF formula rewards research institutions when students *graduate* with a major in a high-impact field. Figure 7 shows how the total number and percentage of students attaining a bachelor’s degree in a high-impact field within four years from a research institution changed pre- and post-OBF implementation.

Figure 7. Number and Percentage of First-Time, Full-Time Bachelor’s Degree Seekers in Research Institutions Attaining a High-Impact Degree within Four Years in Years Pre- and Post- Outcomes-Based Funding Implementation, 2005 through 2011



Summary findings:

- Overall, both the number and percentage of first-time, full-time students attaining a bachelor’s degree on-time in Indiana have increased steadily from the 2005 cohort through the 2011 cohort.
- The percent of bachelor’s degree seekers graduating on-time increased by around 8 percentage points between the 2005 (29%) and 2011 (37%) cohorts.
- Among students enrolled in research institutions, the number and percent of students declaring a high-impact major increased, from 20% in the 2005 cohort to 26% in the 2011 cohort. Completions of degrees in high-impact fields within four years also increased from 7% enrolled in the 2005 cohort to 12% of students in the 2011 cohort.

VI. Estimating the Effect of Outcomes-Based Funding on Three Key Outcomes for Indiana’s Public Universities

Using a quasi-experimental method called Interrupted Time Series Analysis, RFA also examined how Indiana’s OBF policy impacted three key outcomes related to Indiana’s outcomes-based funding formula: on-time bachelor’s degree completion; declaring a high-impact major; and on-time bachelor’s degree completion in a high-impact field. Further, we examined how OBF impacted targeted student populations – Pell recipients and underrepresented minorities. Since all outcomes variables are binary, these analyses

were conducted using logit regression models that accounted for differences in various student-level characteristics including gender, race/ethnicity, age (i.e. adult student or not), and academic major.

A. Overview: Summary of the Impact of Outcomes-Based Funding and Trends over Time on Three Key Student Outcomes

Below we summarize the results of our analyses of the impact of OBF on bachelor’s degree completion, declaring a high-impact major, and attaining a bachelor’s degree in a high-impact field. For each of these outcomes, we examined whether OBF had a statistically significant impact, and whether the impact of OBF is increasing consistently over time as the policy becomes fully implemented. In this way we also determine whether change has been trending towards higher significance—either positive or negative—over time. Table 3 summarizes our key findings.

Table 3. Summary of Key Findings: Significant Impact of OBF on Formula-Related Student Outcomes for Most Recent Post-OBF Cohort and Trends across All Post-OBF Cohorts (2009 through 2011)

	UNIVERSITY					
	FULL-TIME			PART-TIME		
	ALL	PELL	URM	ALL	PELL	URM
Degree	+	∅▲	∅	No significant findings.		
Declaring a High-Impact Major	+▲	∅▲	∅▲	Trend analysis not possible due to single cohort.		
Degree in a High-Impact Major	+▲	∅▲	∅			

+ = statistically significant, positive impact; 95% confidence or above
 - = statistically significant, negative impact; 95% confidence or above
 ∅ = no statistically significant impact
 ▲ = trending positive
 ▼ = trending negative

Table 3 illustrates evidence of impact of Indiana’s OBF policy and suggests impact is getting stronger over time for *full-time* university students. Specific notable findings include:

- **Four-year, full-time students fare well under Indiana’s OBF policy.** Specifically we document positive effects for the population as a whole (i.e. “all” students) on all three measurable outcomes: bachelor’s degree completion, declaration of a high-impact major, and graduation with a high impact major. In addition, the impacts of OBF on declaration of a high-impact major and graduation with a high impact major have been growing stronger over time.
- **OBF in Indiana has no measurable impact on either Pell, underrepresented minorities or part-time students enrolled in the four-year sector.** While their numbers are increasing overall and as a percentage of the total population, these students are faring about the same as they were expected to fare given the pre-OBF trend.
 - However, the OBF impact on full-time university students who are Pell recipients, while not statistically significant, is growing more positive with time.
 - OBF impact trends over time for underrepresented minority students are not as consistent.
 - We document no impact or trends for part-time students.

Because we found positive impacts for the policy on the overall student population but not on underserved students, we conducted additional analyses to determine whether there was evidence of a growing achievement gap under OBF. Specifically, we examined whether the OBF effects for students who were *not* Pell recipients and students who were *not* underrepresented minority students were significantly different

than the OBF effects for Pell and underrepresented minority students. We did not find statistically significant differences in the OBF effects between the underserved and more advantaged student populations and therefore, did not find evidence of a widening achievement gap. Yet it will be important to continue to track the effects of OBF on Indiana’s equity gap.

In the following sections (B through D), we provide more detailed results from the interrupted time series analyses of OBF impact summarized in Table 3. Separate analyses were conducted for each of the three outcomes for full-time and part-time students.

Each of the tables below present the following:

- N. The total analytical sample of first-time, full-time, degree-seeking undergraduate students.
- Pre-OBF Trend. The probability of achieving the outcome for an average student, estimated from pre-OBF data.
- Post-OBF Trend. The probability of achieving the outcome for an average student, estimated from post-OBF data.
- OBF Impact: Probability. The increased probability of achieving the outcome as a result of OBF (deviation from the pre-OBF trend).
- OBF Impact: Student Count. The estimated number of additional students who achieved the outcome as a result of OBF.

B. Estimating the Effect of Outcomes-Based Funding on Three Key Outcomes for Full-Time Students Enrolled in Indiana’s Public Universities

i. Attaining a Bachelor’s Degree

Table 4 presents the effect of OBF on graduating on-time with a bachelor’s degree for full-time students, shown graphically in Figure 8.

Table 4. Estimating the Effect of Outcomes-Based Funding on Bachelor’s Degree Completion within Four Years for First-Time, Full-Time University Students, 2005 through 2011

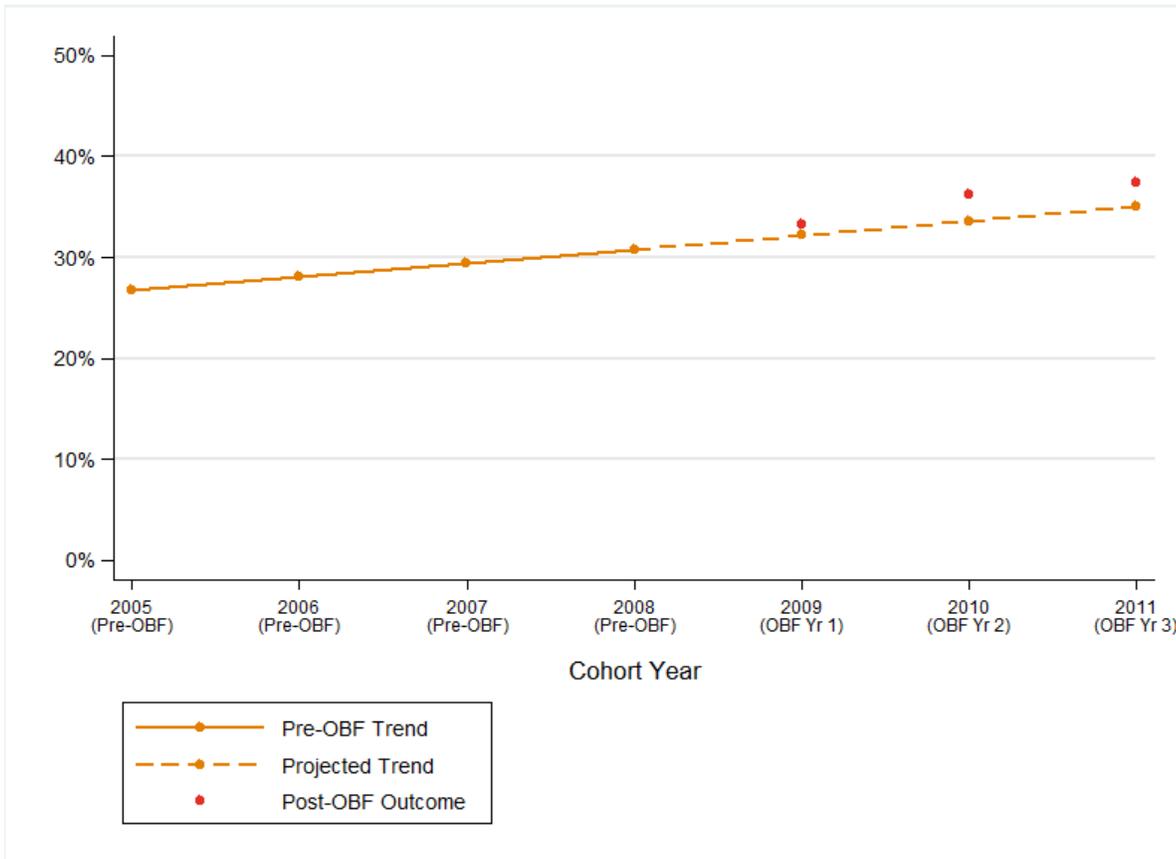
	PRE-OBF COHORT				POST-OBF COHORT		
	2005	2006	2007	2008	2009	2010	2011
N	23,695	25,065	26,084	26,297	27,856	25,752	24,757
Pre-OBF Trend	26.7	28.0	29.4	30.8	32.2	33.6	35.1
Post-OBF Trend					33.2	36.2	37.4
OBF Impact: Probability					1.1*	2.6***	2.3**
OBF Impact: Student Count					293*	678***	576**

OBF effects reported in the table are estimated after controlling for Pell, race/ethnicity, gender, age (i.e., adult or not), and major.

Reported probabilities (in percent) were estimated by fixing the covariates at their mean values.

* p<.05; **p<.01; ***p<.001

Figure 8. Estimating the Effect of Outcomes-Based Funding on Bachelor’s Degree Completion within Four Years for First-Time, Full-Time University Students, 2005 through 2011



ii. Declaring a High-Impact Major and Attaining a Bachelor’s Degree in a High-Impact Field

Table 5 presents the effect of OBF on declaring a high-impact major for full-time students at a research institution, shown graphically in Figure 9.

Table 5. Estimating the Effect of Outcomes-Based Funding on Declaring a High-Impact Major at a Research Institution within Four Years for First-Time, Full-Time Students, 2005 through 2011

	PRE-OBF COHORT				POST-OBF COHORT		
	2005	2006	2007	2008	2009	2010	2011
N	16,300	17,697	18,757	18,359	19,445	17,905	16,949
Pre-OBF Trend	18.8	19.3	19.8	20.4	20.9	21.5	22.1
Post-OBF Trend					21.4	22.4	24.2
OBF Impact: Probability					θ	θ	2.1**
OBF Impact: Student Count					θ	θ	359**

OBF effects reported in the table are estimated after controlling for Pell, race/ethnicity, gender, and age (i.e., adult or not).

Reported probabilities (in percent) were estimated by fixing the covariates at their mean values.

* p<.05; **p<.01; ***p<.001

θ Not statistically significant

Figure 9. Estimating the Effect of Outcomes-Based Funding on Declaring a High-Impact Major at a Research Institution within Four Years for First-Time, Full-Time University Students, 2005 through 2011

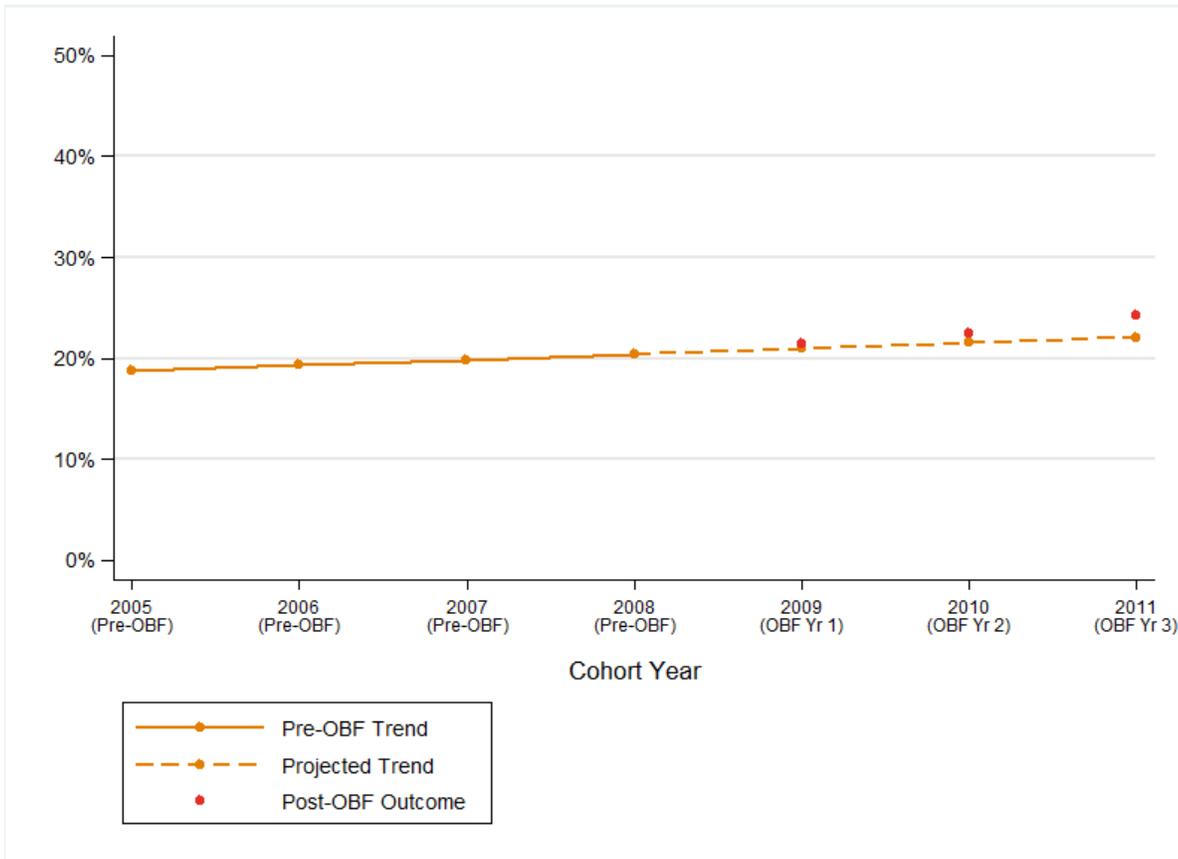


Table 6 presents the effect of OBF on attaining a bachelor’s degree in a high-impact major within four years for full-time students at a research institution, shown graphically in Figure 10.

Table 6. Estimating the Effect of Outcomes-Based Funding on Attaining a Degree in a High-Impact Major at a Research Institution within Four Years for First-Time, Full-Time University Students, 2005 through 2011

	PRE-OBF COHORTS				POST-OBF COHORTS		
	2005	2006	2007	2008	2009	2010	2011
N	16,300	17,697	18,757	18,359	19,445	17,905	16,949
Pre-OBF Trend	6.2	6.7	7.3	7.9	8.5	9.2	10.0
Post-OBF Trend					9.2	10.0	11.1
OBF Impact: Probability					θ	θ	1.2*
OBF Impact: Student Count					θ	θ	197*

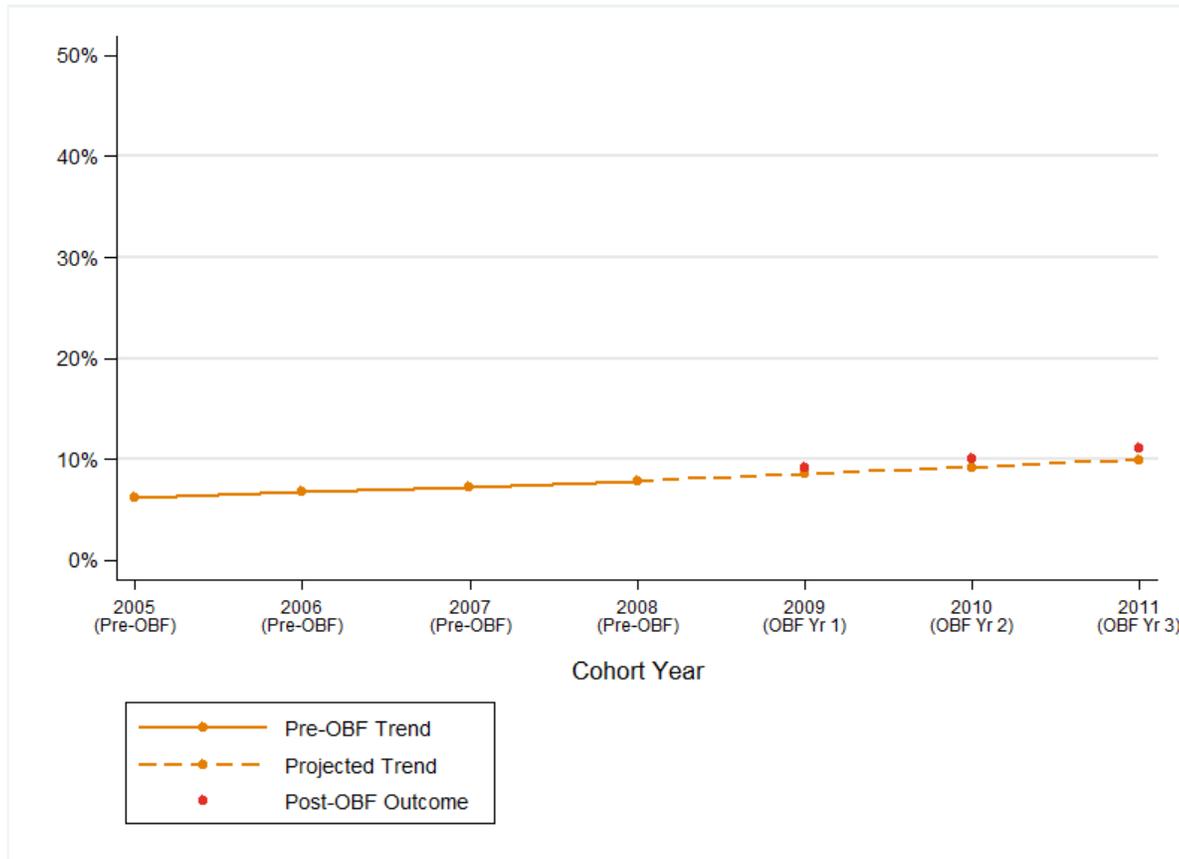
OBF effects reported in the table are estimated after controlling for Pell, race/ethnicity, gender, and age (i.e., adult or not).

Reported probabilities (in percent) were estimated by fixing the covariates at their mean values.

* p<.05; **p<.01; ***p<.001

θ Not statistically significant

Figure 10. Estimating the Effect of Outcomes-Based Funding on Attaining a Degree in a High-Impact Major at a Research Institution within Four Years for First-Time, Full-Time Students, 2005 through 2011



Summary findings:

- OBF in Indiana had a positive impact on on-time bachelor’s degree completions for first-time, full-time university students.
- The probability of graduating on-time for the average full-time university student increased by 2.3 percentage points for the 2011 cohort as a result of OBF implementation. This increase equates to 576 additional full-time students in that cohort graduating on-time as a result of Indiana’s OBF policy.
- OBF had a positive impact on the likelihood that students would both declare a high-impact major and attain a degree in a high-impact field within four years. However, this was true only for the most recent cohort (i.e., students who first enrolled in research institutions in 2010-11).
- For the 2011 full-time cohort, the estimated effect of OBF on students declaring high-impact majors was equivalent to 359 additional full-time students declaring a high-impact major.
- The estimated impact of OBF on the 2011 cohort was 197 additional full-time students completing high-impact degrees within four years. There was no evidence for an OBF effect on high-impact majors or degrees for the first two post-OBF cohorts.

C. Estimating the Effect of Outcomes-Based Funding on Three Key Outcomes for Part-Time Students Enrolled in Indiana’s Public Universities

We also examined the effect of OBF on outcomes for part-time students in Indiana’s four-year sector. For this population, there is only one post-OBF year (2009) because we expand the length of time to graduate to six years rather than four. Table 7 displays the results of our analyses for part-time students.

Table 7. Estimating the Effect of OBF on Bachelor’s Degree Attainment, Declaring High-Impact Major, and High-Impact Degree Attainment within Six Years for First-Time, Part-Time University Students, 2005 through 2009

	PRE-OBF COHORTS				POST-OBF COHORT
	2005	2006	2007	2008	2009
Bachelor’s Degree					
<i>N</i>	6,365	6,484	6,282	5,989	5,729
Pre-OBF Trend	9.7	10.3	10.9	11.5	12.1
Post-OBF Trend					13.0
OBF Impact: Probability					θ
OBF Impact: Student Count					θ
High-Impact Major^a					
<i>N</i>	2,252	2,222	2,127	1,819	2,040
Pre-OBF Trend	13.7	15.3	17.0	19.0	21.1
Post-OBF Trend					18.8
OBF Impact: Probability					θ
OBF Impact: Student Count					θ
High-Impact Degree^a					
<i>N</i>	2,252	2,222	2,127	1,819	2,040
Pre-OBF Trend	1.9	2.4	3.1	3.9	4.8
Post-OBF Trend					4.2
OBF Impact: Probability					θ
OBF Impact: Student Count					θ

OBF effects reported in the table are estimated after controlling for Pell, race/ethnicity, gender, and age (i.e., adult or not). Major indicators are also included in the BA degree completion model.

Reported probabilities (in percent) were estimated by fixing all the covariates at their mean values.

* p<.05; **p<.01; ***p<.001

θ Not statistically significant

^a Effect of OBF on student outcomes estimated only for students at research institutions

Summary findings:

- OBF had no statistically significant impact on the probability of attaining a bachelor’s degree within six years, declaring a high-impact major within six years, or attaining a high-impact bachelor’s degree within six years for part-time students in Indiana’s four-year sector.

D. Estimating the Effect of Outcomes-Based Funding on Three Key Outcomes for Pell and Underrepresented Minority Students Enrolled in Indiana’s Public Universities

OBF could have an unintended negative effect if institutions focused efforts on students who enter college with a greater likelihood of achieving the outcomes in the formula. To discourage institutions from doing this, some states have included metrics to target certain populations such as Pell students, underrepresented minorities, adults, and veterans. In Indiana, the OBF formula awards institutions for degrees completed by Pell students. In our analyses of Indiana’s OBF policy, we consider the impact of OBF on the outcomes of both Pell students and underrepresented minority students.

i. Pell Recipients

Tables 8 and 9 provide results from analyses examining whether OBF had an effect on either full- or part-time Pell students enrolled in public universities.

Table 8. Estimating the Effect of Outcomes-Based Funding on Bachelor’s Degree Completions, Declaring a High-Impact Major, and Completing a Degree in a High-Impact Field within Four Years for First-Time, Full-Time University Students Who Are Pell Recipients, 2005 through 2011

	PRE-OBF COHORTS				POST-OBF COHORTS		
	2005	2006	2007	2008	2009	2010	2011
Bachelor’s Degree							
<i>N</i>	6,778	6,959	7,676	8,493	9,676	10,037	9,929
Pre-OBF Trend	18.0	19.0	19.9	20.9	21.9	23.0	24.1
Post-OBF Trend					22.4	24.8	26.1
OBF Impact: Probability					θ	θ	θ
OBF Impact: Student Count					θ	θ	θ
High-Impact Major^a							
<i>N</i>	3,965	4,332	4,802	5,110	5,830	5,999	5,798
Pre-OBF Trend	17.3	17.9	18.7	19.4	20.1	20.9	21.7
Post-OBF Trend					19.4	21.0	23.2
OBF Impact: Probability					θ	θ	θ
OBF Impact: Student Count					θ	θ	θ
High-Impact Degree^a							
<i>N</i>	3,965	4,332	4,802	5,110	5,830	5,999	5,798
Pre-OBF Trend	4.3	4.7	5.1	5.6	6.1	6.6	7.2
Post-OBF Trend					6.3	7.0	8.7
OBF Impact: Probability					θ	θ	θ
OBF Impact: Student Count					θ	θ	θ

OBF effects reported in the table are estimated after controlling for Pell, race/ethnicity, gender, and age (i.e., adult or not). Major indicators are also included in the BA degree completion model.

Reported probabilities (in percent) were estimated by fixing the covariates at their mean values.

* p<.05; **p<.01; ***p<.001

θ Not statistically significant

^a Effect of OBF on student outcomes estimated only for students at research institutions

Table 9. Estimating the Effect of OBF on Bachelor’s Degree Attainment, Declaring High-Impact Major, and High-Impact Degree Attainment within Six Years for First-Time, Part-Time University Students Who Are Pell Recipients, 2005 through 2009

	PRE-OBF COHORTS				POST-OBF COHORT
	2005	2006	2007	2008	2009
Bachelor’s Degree					
<i>N</i>	2,325	2,464	2,424	2,463	2,613
Pre-OBF Trend	9.1	9.5	9.8	10.2	10.6
Post-OBF Trend					12.5
OBF Impact: Probability					θ
OBF Impact: Student Count					θ
High-Impact Major^a					
<i>N</i>	721	770	722	645	736
Pre-OBF Trend	13.6	14.8	16.2	17.6	19.1
Post-OBF Trend					17.5
OBF Impact: Probability					θ
OBF Impact: Student Count					θ
High-Impact Degree^a					
<i>N</i>	721	770	722	645	736
Pre-OBF Trend	1.6	1.9	2.3	2.8	3.4
Post-OBF Trend					3.9
OBF Impact: Probability					θ
OBF Impact: Student Count					θ

OBF effects reported in the table are estimated after controlling for Pell, race/ethnicity, gender, and age (i.e., adult or not). Major indicators are also included in the BA degree completion model.

Reported probabilities (in percent) were estimated by fixing the covariates at their mean values.

* p<.05; **p<.01; ***p<.001

θ Not statistically significant

^a Effect of OBF on student outcomes estimated only for students at research institutions

Summary findings:

- OBF had no statistically significant impact on the probability of attaining a bachelor’s degree, declaring a high-impact major, or attaining a high-impact degree within four years for full-time, Pell students enrolled in public universities.
- OBF similarly had no statistically significant impact on the probability of achieving any of the three outcomes within six years for part-time, Pell students enrolled in public universities.

ii. Underrepresented Minority Students

While there are no metrics in Indiana’s OBF formula that are tailored specifically to underrepresented minorities, we conducted analyses to examine the impact of the policy on these students as well. Tables 10 and 11 present results from our analysis of the relationship between OBF and each of the three outcomes for full-time and part-time underrepresented minority (black or Hispanic) students.

Table 10. Estimating the Effect of Outcomes-Based Funding on Bachelor's Degree Completions, Declaring a High-Impact Major, and Completing a Degree in a High-Impact Field within Four Years for First-Time, Full-Time University Students Who Are Underrepresented Minorities, 2005 through 2011

	PRE-OBF COHORTS				POST-OBF COHORTS		
	2005	2006	2007	2008	2009	2010	2011
Bachelor's Degree							
<i>N</i>	2,083	2,153	2,254	2,391	2,643	2,615	2,768
Pre-OBF Trend	12.1	12.9	13.7	14.6	15.5	16.4	17.4
Post-OBF Trend					15.2	19.7	19.6
OBF Impact: Probability					θ	3.2*	θ
OBF Impact: Student Count					θ	85*	θ
High-Impact Major^a							
<i>N</i>	1,270	1,342	1,394	1,416	1,451	1,444	1,524
Pre-OBF Trend	15.2	16.0	16.9	17.9	18.9	19.9	20.9
Post-OBF Trend					16.6	18.7	20.3
OBF Impact: Probability					θ	θ	θ
OBF Impact: Student Count					θ	θ	θ
High-Impact Degree^a							
<i>N</i>	1,270	1,342	1,394	1,416	1,451	1,444	1,524
Pre-OBF Trend	2.1	2.5	3.0	3.5	4.2	5.0	6.0
Post-OBF Trend					3.3	5.9	6.4
OBF Impact: Probability					θ	θ	θ
OBF Impact: Student Count					θ	θ	θ

OBF effects reported in the table are estimated after controlling for Pell, race/ethnicity, gender, and age (i.e., adult or not). Major indicators are also included in the BA degree completion model.

Reported probabilities (in percent) were estimated by fixing the covariates at their mean values.

* p<.05; **p<.01; ***p<.001

θ Not statistically significant

^aEffect of OBF on student outcomes estimated only for students at research institutions

Table 11. Estimating the Effect of OBF on Bachelor’s Degree Attainment, Declaring High-Impact Major, and High-Impact Degree Attainment within Six Years for First-Time, Part-Time University Students Who Are Underrepresented Minorities, 2005 through 2009

	PRE-OBF COHORTS				POST-OBF COHORT
	2005	2006	2007	2008	2009
Bachelor’s Degree					
<i>N</i>	910	1,052	1,023	1,102	980
Pre-OBF Trend	6.4	6.8	7.2	7.6	8.0
Post-OBF Trend					7.7
OBF Impact: Probability					0
OBF Impact: Student Count					0
High-Impact Major^a					
<i>N</i>	268	315	262	243	226
Pre-OBF Trend	14.8	16.3	18.1	19.9	21.9
Post-OBF Trend					15.2
OBF Impact: Probability					0
OBF Impact: Student Count					0
High-Impact Degree^a					
<i>N</i>	268	315	262	243	226
Pre-OBF Trend	1.3	1.8	2.4	3.2	4.3
Post-OBF Trend					4.6
OBF Impact: Probability					0
OBF Impact: Student Count					0

OBF effects reported in the table are estimated after controlling for Pell, race/ethnicity, gender, and age (i.e., adult or not). Major indicators are also included in the BA degree completion model.

Reported probabilities (in percent) were estimated by fixing the covariates at their mean values.

* p<.05; **p<.01; ***p<.001

0 Not statistically significant

^a Effect of OBF on student outcomes estimated only for students at research institutions

Summary findings:

- For full-time, underrepresented minority students enrolled in public universities, we only detect one statistically significant finding: the probability of attaining a bachelor’s degree within four years increased by 3.2 percentage points for the 2010 cohort as a result of OBF.
- There was no statistically significant OBF impact in the probability of achieving any of the three outcomes within six years for part-time, underrepresented minority students enrolled in public universities.

iii. Exploring Equity in Student Outcomes under OBF

It is possible that in the wake of a positive impact observed for all students, the lack of an OBF impact on both Pell students and underrepresented minority students could indicate a widening achievement gap between traditionally underserved students and more advantaged students. To determine if this occurred, we conducted further analyses to test whether the OBF effects for students who were *not* Pell recipients and students who were *not* underrepresented minority students were significantly different than the OBF effects for Pell and underrepresented minority students.

We did not find statistically significant differences in OBF effects between Pell and underrepresented minority students and more advantaged student populations.¹⁷ In addition, we document promising trends for Pell students, as changes to outcomes following OBF have been positive, despite not reaching statistical significance at the 95% confidence level. However, in order to rule out the possibility of a widening achievement gap, further analyses that compare performance outcomes for underserved student populations in Indiana to similar populations in a non-OBF state during the same time period are needed.

VII. Are the Positive Effects of Outcomes-Based Funding Widespread across Institutions?

As Indiana’s OBF policy is intended to affect all public universities, it was important to examine whether the positive effects detailed above were due to only a few institutions, or were spread across many. Figure 11 and Table 12 provide trends in bachelor’s degree completions across Indiana’s 14 public four-year institutions, which include five research universities, seven branch campuses, and two comprehensive universities.

Figure 11. Trends in the Four-Year Bachelor’s Attainment Rate at Four-Year Universities in Indiana



¹⁷ Details of these analyses are provided in Appendix E.

Table 12. Estimating the Effect of Outcomes-Based Funding on Bachelor’s Degree Completions within Four Years, by Institution and Institution Type¹⁸

UNIVERSITY	TYPE	POST-OBF COHORTS			
		N	2009	2010	2011
Indiana University-Bloomington	Research	44,761	0	0	-5.4***
Purdue University	Research	43,032	3.7***	4.2***	5.4***
Ball State	Research	23,421	3.0**	6.0***	12.1***
IUPUI	Research	14,190	0	0	0
Indiana State University	Research	10,368	-3.5**	0	0
University of Southern Indiana	Comprehensive	11,687	0	5.7***	4.9**
IUPUIFW	Comprehensive	8,535	2.9***	7.3***	9.3***
Purdue University-Calumet	Regional Campus	5,805	0	0	0
Indiana University-Southeast	Regional Campus	4,271	0	0	0
Indiana University-South Bend	Regional Campus	4,013	0	0	0
Indiana University-North Central	Regional Campus	3,342	0	0	0
Indiana University-Northwest	Regional Campus	2,792	0	5.5**	0
Indiana University-Kokomo	Regional Campus	1,750	0	0	0
Indiana University- East	Regional Campus	1,505	0	0	0

OBF effects reported in the table are estimated after controlling for Pell, race/ethnicity, gender, age (i.e., adult or not), and major. Reported probabilities (in percent) were estimated by fixing the covariates at their mean values.

* p<.05; **p<.01; ***p<.001

0 Not statistically significant

Summary findings:

The overall effects of OBF are not a result of changes concentrated in just one or two institutions in Indiana. Effects vary across institutions. Specifically:

- OBF had a consistent and statistically significant positive impact on on-time bachelor’s degree completion at four separate institutions.
- OBF had a significantly negative impact on the graduation rate at the state’s largest research university.
- OBF had limited to no effect on the graduation rate at Indiana’s regional campuses. Notably, this fact was acknowledged by university administrators, who have reported increased attention on these campuses as a result.

¹⁸ Research universities include Indiana University-Bloomington, Purdue-Main Campus, Ball State, IUPUI, and Indiana State University. Comprehensive universities include IUPUIFW and University of Southern Indiana. The regionals are campuses of Purdue and Indiana University. The classifications used here are defined by the 2015 Carnegie Classification. The list of research universities based on the Carnegie classification is different than the list of research universities being awarded for degrees in high-impact fields which was defined by the Indiana Commission for Higher Education.

Institutional Response to OBF in Indiana: Successes, Challenges and Concluding Thoughts

VIII. Changes in Institutional Policy and Practice Following the Implementation of Outcomes-Based Funding in Indiana

Indiana's OBF policy is, by some measures, not considered as potent as others because less than 10% of base funding is allocated by institutional performance against outcomes (Snyder, 2016). Yet our analysis of student-level longitudinal data presented above shows clearly that the probability that full-time students will achieve a range of outcomes increased in the wake of the policy.

Our examination of institutional-level response to OBF points to several factors that are contributing to these changes. A clearer focus on student success in the years preceding OBF had already begun to be reflected in changes to institutional policies and practices. Many of these changes accelerated in the wake of the new policy. While the institutional changes that occurred cannot be attributed wholly to OBF policy, there is little doubt that they contributed to the improvements in student outcomes that are documented above.

As can be seen in Figure 11 and Table 12 above, students' post-OBF outcomes vary across Indiana's colleges and universities. Indeed, our institution-level case studies purposefully included a sample of four colleges and universities that varied by sector, mission, size, and student demographics so that we could examine how such differences affected their response to the policy.

We made every effort to "triangulate" a wide array of evidence to examine whether, to what degree, and why institutions adjusted their policies and practices in the wake of OBF. Below, we use interviews with nearly three dozen high level administrators; institutional strategic plans; and evidence of change in policies and practices to identify high-level results.

We organize these results by their degree of direct connection to clear changes in institutional policy and practice designed to improve student success. We begin with the opinions and perceptions of institutional actors. Next, we examine how formal strategic plans have changed and/or reflect the goals of OBF. And finally, we document the degree to which specific policies and practices are aligned to OBF goals following the implementation of the policy in Indiana.

A. Administrator and Faculty Perceptions

Key finding: Institutional administrators noted a culture of student success that supports or aligns with OBF funding policies, particularly progression and completion goals. Institutional administrators across campuses were consistent in reporting that their focus was on student success, stating, for example, that, "at the center of almost every decision that we make on this campus, is student success" and "the No. 1 objective is to increase student success."

In addition, institutions are well-versed about how OBF policies support goals of student success. Administrators from a range of institutions, including a selective flagship university, its regional non-selective campuses, two public comprehensive universities, and the state's multi-campus community college system agree that institutional goals are largely aligned with formula outcomes.

Yet a disconnect between OBF's intended purpose and its implementation was noted by several institutional stakeholders. They described how important contextual factors, including state politics and competition among institutions, could damage the policy's effectiveness. One provost at a less selective comprehensive university put it this way:

If you start in an equitable position, and you have the same type of students, then maybe it makes sense. But we have such a different population... We get some real sharp students and some needy ones. Our first-time, full-time students are just so different from the first-time, full-time students at other places. Our students are largely regional and many are older. And eventually we're going to hit a ceiling where we can't get better. So I think we're going to lose long-term on it. I'm not a fan. But I do think the intention is good.

B. Strategic Plans

The consistency with which college and university administrators reported institutional change aligned to OBF policy is significant. However, our analysis went deeper to identify more concrete evidence of institutional response to OBF. To that end, we examined strategic plans and planning documents for all four institutions that were included in our Indiana case study.

Our analysis focused on two questions. First, to what degree were strategic plans in place prior to OBF reflective of student success goals, such as retention and graduation? And second, to what degree did strategic plans shift in the wake of OBF towards alignment of OBF outcomes?

To answer these questions, we obtained current and historic strategic plans and related documents from all four of our study institutions. Strategic plans developed prior to OBF implementation (i.e. before the 2008-2009 academic year) were considered pre-OBF. We then obtained each institution's most recent strategic plan, put in place after the implementation of OBF.

The selected strategic plans were then coded to identify where and if OBF goals are mentioned in an institution's strategic plan. Levels of alignment were then determined based on the language in the document.¹⁹ Table 13 summarizes the results of our analysis.

¹⁹ A scale of 5 indicates that improving the metric in question was mentioned as the number one priority or goal of the institution. This would mean that degree completions, course completions and/or at-risk student success was listed as the first goal in the strategic plan.

A scale of 4 indicates that improving the metric in question was mentioned as one of several top priorities for the institution. This was usually the case for institutions who had no clear prioritization of goals in their strategic plans or where the language suggests that the order of the goals does not indicate their importance to the institution's mission.

A scale of 3 indicates that improving the metric in question is mentioned in the strategic plan, but is not the focus of any goal in particular. This was the case when degree completions, course completions, or at-risk student success rates were mentioned as one of several measures for other goals ("indirect priority") or as a secondary or tertiary priority to other goals.

A scale of 2 indicates that the metric is mentioned in the strategic plan but there is no goal seeking to improve them. This was the case when strategic plans mentioned a metric as important, but did not attach it to any particular goal or strategy.

A scale of 1 indicates that the metric is not mentioned at all in the strategic plan. Even if the institutional goals contribute to these metrics, there was no indication that the institution was measuring or factoring these metrics into their decision-making.

Table 13. Formula Metrics and Strategic Plan Alignment Pre- and Post- Outcomes-Based Funding (Average Scale Components)

KEY										
	= Not Aligned		= 2		= 3		= 4		= Highly Aligned	
	DEGREE COMPLETIONS		PROGRESSIONS (COURSE COMPLETIONS)		AT-RISK STUDENT SUCCESS		TOTAL CHANGE			
	PRE	POST	PRE	POST	PRE	POST				
Community College	4	5	3	5	2	4	+5			
Comprehensive University	3	5	5	5	4	3	+1			
	4	4	4	4	4	3	-1			
Research University	4	5	3	4	2	3	+3			

Strategic plans were aligned to varying degrees with student success goals prior to OBF, but most are more consistently aligned in the wake of outcomes-based funding implementation.

The strategic plans in place in 2015 at all four Indiana case study institutions reflect a relatively high degree of alignment with OBF goals of persistence (i.e., course completions), degree completions, and a focus on the success of at-risk students .

Strategic plans of the community college and research university reflected the most change.

A comparison of pre/post OBF strategic plans within each institution reveals different patterns of change.

As shown in Table 13, the strategic plans of the research university and the community college became markedly more aligned with OBF following implementation of the policy. This occurred via re-prioritization of existing institutional priorities. While the strategic plans of these institutions included student success and completion as goals prior to OBF, current strategic plans highlight student success as the first objective of each institution. Enrollment or workforce development, which were listed as primary goals prior to OBF, are still present but appear lower on the list of institutional objectives.

In contrast, the pre-OBF strategic plans of the two comprehensive universities were already highly aligned to OBF goals, with an emphasis on degree completions, progression, and at-risk students present in strategic planning documents prior to and following implementation. We see relatively little change in the wake of policy implementation.

C. Alignment of Policy and Practice to Outcomes-Based Funding

To what degree did changes in strategic plans filter down to concrete policy and practice? Generally speaking, the capacity to respond effectively to a major policy such as OBF varies significantly across institutions. Factors such as size, resources, and leadership in particular can determine how quickly and effectively a college or university adjusts to a new policy. And, it’s important to note that institutions varied in the degree to which their practices aligned to OBF goals prior to the policy’s implementation. This is consistent with our analysis of strategic plans.

Interviews across four Indiana institutions, as well as examination of a range of institutional documents, revealed both similarities and differences in institutional response.

Institutions have added or revised administrative positions to focus on Indiana’s OBF policy and to track institutional data aligned to formula metrics.

All four of the institutions in our study reported an increased emphasis on tracking student performance outcomes aligned with the formula metrics. For example, an administrator at the two-year institution mentioned that staff across the college now “work with performance metrics.” In addition, an institutional administrator reported frequent discussions with the president’s council on how the institution is responding to formula metrics and how it can better generate data to articulate success. Similarly, at one university there has been campus-wide communication about which performance metrics the campus will focus on, and how the institution has been rewarded, or not, for those metrics. The introduction of “assessment days” or seasonal “addresses” where all departments come together to discuss how best to improve student success across performance metrics was also noted across multiple institutions.

Institutions are investing in student success initiatives.

We examined a broad range of institutional documents to determine the degree to which concrete policies and practices aligned to OBF were in place. Table 14 presents the many initiatives and programs institutions in Indiana are implementing in response to, or in alignment with, OBF policies. Spanning across academic affairs and student services, as well as admissions and financial policies, there is strong evidence that all institutions in our sample are investing in student success. Reforms range from revising math pathways and adding co-requisite courses, to hiring student advisors, and increasing support to first-year students.

Table 14. Institutional Policies or Programs Intentionally Aligned with Degree Completions and Persistence

Focus Area	INSTITUTIONAL POLICIES AND PROGRAMS	INDIANA			
		2 YR	4 YR (Comp)	4 YR (Comp)	4 YR (Research)
Academic Affairs	Decrease time needed for degree	•			•
	Align curriculum to post-graduation goals	•			•
	Increase access to degrees		•		
	Increase access to courses	•	•	•	
	Increase use of data analysis			•	•
	Change faculty roles and staffing		•		
	Improving developmental education	•	•	•	•
Student Services	Change advising and counseling methods	•	•	•	•
	Improve communications between students and admin		•		•
	Improve student support programs	•		•	•
	Increase student services capacity	•			•
Admissions, Recruitment and Other Institution Responses	Change financial aid policies			•	•
	Change administrative staffing related to performance tracking		•		
	Change Responsibility-Centered Management practices	•			•

Key findings:

- Policies and practices aligned to OBF were heavily concentrated in academic affairs and student services at the community college. In contrast, admissions and recruitment policies were not an area of focus for increasing student success in this sector.
- Of the universities we examined, the research university reports a wider array of policies aligned to student success than do the comprehensive universities.
- All institutions reported developmental education and student advising policies and practices aligned with OBF goals.
- Only one institution reported that faculty roles are directly aligned to student success goals.

Notably, institutions did not begin aligning their policies and practices to completion goals at the onset of OBF implementation. Many reported movement in this direction prior to OBF in response to a postsecondary policy environment that had already been shifting towards an emphasis on student completion. As one administrator from a university noted:

We were on this path before the performance-funding formulas even emerged. We had done two retention task forces before they rolled out with performance funding formulas. We were...zeroing in on the Math Department in terms of remediation practices. – Comprehensive University, Indiana
Higher Education Administrator

Yet all indicated that OBF served as an accelerant of sorts, speeding up and concentrating efforts to ensure that barriers to key student outcomes—particularly degree or certificate completion—were removed. As one administrator noted:

We created the advising centers [which] is yet another iteration of things we've been doing for many years. We added the [student success] course to help the students learn a little bit about the institution to give them tips and techniques to make them more successful. – Comprehensive University, Indiana
Higher Education Administrator

Further, both university and community college administrators reported that substantial investments that have been made to promote student success. For example, an administrator noted allocating \$4.8 million toward direct activities to enhance student success.

We can definitely see the commitments, the investments; even in cases where programs might not have ramped up, we're seeing campuses set aside money to fund those programs – Research University, Indiana
Higher Education Administrator

IX. Remaining Challenges

This report provides ample evidence that following the implementation of OBF, Indiana's postsecondary institutions are redoubling efforts to address student success and are adjusting policies and practices to align with Indiana's OBF formula. Concurrently, the probability that students will achieve outcomes included in the formula has been steadily improving. Yet this progress is neither consistent nor uniform to date.

What challenges remain? Our comprehensive analysis of institutional response to Indiana's OBF policy identifies a range of factors—including how the state has developed and refined the policy, as well as

particular elements of the policy itself—that may have erected barriers to achieving the intended effects of OBF. Below, we identify the most salient of these factors.

C. Formula Design and Refinement Process

The absence of a formal and transparent process to obtain institutional input during the development of the formula impeded buy-in.

As noted previously, CHE is frequently referenced as a key driver in formula design and implementation. While it has consulted with some institutions during the development and refinement of the formula, CHE's process is not perceived to be either thorough or transparent by all of Indiana's postsecondary institutions. Institutions described how discussions with CHE about the formula occurred during private meetings, rather than in an open or inclusive environment. One institutional leader noted:

In my recollection, there's never been a meeting where the presidents got together with the commission or the commission staff and discussed performance funding. There have been some private meetings, but never any kind of a meeting where everybody gets together and talks about it. – Comprehensive University, Indiana Higher Education Administrator

The level of input and influence that institutions do have seems to come from negotiations and lobbying efforts with the CHE or General Assembly around specific elements of the formula. Analysis of interview data shows considerable variation in how institutional leaders describe their level of input into the formula.

I sat in on the meeting as well, and [Indiana CHE Commissioner] asked for feedback on the performance funding formula. And some relatively minor changes were made as a result of that process. But I do give her credit for going through that effort. So we've had limited input, but we've been listened to on various points. – Research University, Indiana Higher Education Administrator

We don't feel as though we've been that involved in the formula. You know, basically, the Commission for Higher Education did the largest structuring of them. – Comprehensive University, Indiana Higher Education Administrator

I was part of several meetings early on... about moving toward performance-based funding, and it wasn't a process. Decisions were made...but it really wasn't a discussion. – Comprehensive University, Indiana Higher Education Administrator

You really didn't have a commission out there trying to propose something that everybody has bought-into...we're seeing that ripple effect of unintended consequences. – Community College, Indiana Higher Education Administrator

Some elements of Indiana's formula has changed frequently since 2009. As a result, institutions find it difficult to strategically align policies and practices with the formula.

Formula stability, or a formula that is "sustained for two or more consecutive fiscal years" is recognized as an indicator of a robust OBF policy as the lack of stability in the formula makes it challenging for institutions to focus on a set of metrics over time (Snyder, 2016).

Notably, Indiana's focus on degree completion, on-time graduation, and at-risk degree completion have remained constant since 2009. Yet early efforts to incentivize transfer have been removed, as have rewards

for research support, credit completion, dual credit and early college. And in the most recent biennium, high-impact degree completion, student persistence, and remediation success were added to the formula.

Table 15 displays formula metrics over the past three biennia.

Table 15. Indiana Performance Funding Formula Metrics from FY2010 through FY2015

FUNDING FORMULA METRICS	FY2010-11	FY2012-13	FY2014-15
Research Support		•	
Transfer Incentive	•		
Overall Degree Completion	•	•	•
On-Time Graduation Rate	•	•	•
At-Risk Student Degree Completion	•	•	•
Workforce Development (Non-Credit Instruction)	•		
Successful Completion of Credit Hours (SCCH)	•	•	
Dual Credit SCCH		•	
Early College SCCH		•	
High Impact Degree Completion			•
Student Persistence Metric			•
Remediation Success Metric			•
Institutionally Defined Metric			•

Interviews with high-level state policymakers indicate a clear rationale for these changes that centered on streamlining the formula, providing metrics that recognized mission-specific goals, and reducing the likelihood of unintended consequences. Some examples of changes to the 2011 and 2013 formulas are as follows:

- Indiana decided to remove the Transfer Incentive due to “the improved work by CHE, the state and institutions with regard to transfer of credit hours and articulation agreements” and the Workforce Development Incentive because of growth in the two-year system.
- Research Support was added to recognize the importance of that part of a university’s mission at institutions such as Indiana University, and as recognition that research universities were not eligible for funding based on persistence.²⁰ Research Support was eventually replaced in the 2014-15 funding formula with awards for degrees in high-impact fields, allocated specifically to Indiana’s four research universities.

²⁰ Indiana Performance Funding White Paper (2013).

- Successful Completion of Credit Hours was replaced with a measure of persistence for achieving specific credit hour milestones. While only research institutions were credited for high-impact degrees, only non-research institutions and the community colleges received awards for student persistence. These formula revisions attempt to recognize the differing missions between research and non-research institutions.

In spite of the reported positive intent of these kinds of changes, the lack of formula stability was largely viewed as a negative by institutions, because it was difficult to strategically align institutional practice and policy to achieve targeted outcomes. One institutional administrator from a comprehensive university described how the unstable formula made it difficult to respond:

The first several biennia that we were doing [performance funding], we didn't know what our metrics were supposed to be. We were told one thing, and then it changed, and that makes it very difficult for an institution to focus its limited resources on meeting the state's goals when they are ever-changing. They've pretty much, for now, nailed down the metrics...but again, the weighting of it, the allocation of resources to an individual metric are changing.

D. Formula Elements

Specific elements of Indiana's OBF formula were also identified as problematic by some institutions.

Indiana's use of six years of performance data to calculate annual awards is designed to reduce volatility, but does not recognize recent shifts by institutions to improve student success.

For the 2014-15 biennium, the state calculated change over a three year period rolling average (e.g. the average number of degree completions each year from 2009-11 compared to the average number of degree completions from 2006-08 based on comparison with all other comparable institutions). If performance did not improve on that metric, performance was counted as zero.²¹ This method of calculating performance was designed to "allow for any abrupt spike or drop in data to be measured against other more customary years" and prevent "a major shift of funding in to one institution because of an anomaly in the data."²²

However, institutional leaders report that using data from such a long period does not allow funding based on the formula to reflect recent initiatives by institutions that may improve student success. The problem is more pronounced when considering that Indiana's formula is primarily focused on degree completion instead of course completion, requiring a minimum of two to four years to see results. One administrator explained that, "because of the lag in data...our next biennium's budget is already baked...there's nothing we could do over the course of the next two years to budge any number of consequence in the funding formula."

Indiana does not distribute OBF dollars directly to community college regional campuses, distributing them instead to Ivy Tech's central administration.

As noted above, Indiana is unusual in that its entire two-year public sector consists of a single institution—Ivy Tech—comprised of multiple campuses spread across the state. This structure provides for a high level of centralization, which can be beneficial in many ways. However, the state distributes OBF dollars directly

²¹ CCRC Working Paper No. 78, retrieved from: <http://ccrc.tc.columbia.edu/publications/unintended-impacts-performance-funding.html>

²² Indiana Performance Funding White Paper (2013).

to Ivy Tech's central office, which then determines how to carve up the dollars among its campuses. While the dollars may be distributed on the basis of the formula, they are not required to be. This arrangement has the potential to remove the financial incentive for Ivy Tech's campuses to improve student outcomes. As a result, this aspect of the policy may be impeding the effectiveness of the formula.

Institutions report that the formula does not adequately recognize or account for variation in institutional missions, students served and programs offered.

Senior administrators and faculty at each of the four institutions included in our study expressed concerns about a perceived lack in the formula's sector specificity. The most prominent are described below.

The formula was not designed to recognize broad differences in sector mission or student populations.

Unlike states such as Ohio, which developed separate formulas for each sector that are explicitly designed to recognize mission differentiation, Indiana developed a single formula, and has revised it repeatedly in attempts to embed mission-specific metrics.

Administrators from a non-selective comprehensive university and the community college explained that the formula does not adequately recognize their efforts in making progress with students along the way:

The big ticket elements are graduation, so if we...take in students with a weaker academic background and then work to remediate them, that doesn't count for us for years. And of course not all those students are going to make it, so the student we get the rewards for, it might pay for the cost of helping that student, but the three who didn't make it, or didn't graduate within the six-year [data] window - we're getting nothing extra for them. – Comprehensive University, Indiana Higher Education Administrator

With the on-time graduation rate, [some of] the four-year schools do better than the community college because they have a traditional population that goes to college and is expected to graduate in four years. That's not the population that community colleges enroll, so that's a huge barrier right off the bat. – Community College, Indiana Higher Education Administrator

Some formula metrics are restricted to specific institutions in ways that make little sense to institutions not included.

For example, only the main campuses of research universities are eligible for the high impact degree completion metric included in the formula, which rewards degree completion in STEM or other designated "high-impact" fields. However, non-Research I universities also reward STEM degrees, as does Ivy Tech. Yet they are not rewarded for them under the formula—a fact that was widely viewed as inequitable:

For the Commission or the state to say, "your [STEM degrees] don't qualify," basically, they're telling us, "yours aren't worth anything." ...If the state's going to fund STEM degrees in some institutions, they should fund them in all institutions. – Comprehensive University, Indiana Higher Education Administrator

The level and process of OBF has created a competitive dynamic across institutions.

The level and stability of funding for Indiana's OBF formula is widely viewed as problematic by institutional administrators. According to HCM (Snyder, 2016), the most robust of OBF policies have "recurring dollars [for] base funding." Yet state appropriations toward the formula has been limited in Indiana. Without fully funding the formula through additional state dollars, investment in outcomes is subsidized by institutions, at times disproportionately decreasing funding to institutions that are more reliant on state funding.

The 2014-15 biennium provides a case in point. The OBF funding budget was based on 3.8% in "new money" in the state budget and 2.2% in funds withheld from institutional appropriations and put into a funding pool.²³ For FY 2016, the overall percentage of state appropriations based on performance will be 4%, with 2.3% in new money and 1.7% from institutional contributions to the funding pool. Institutions can earn these contributions back, but this is not guaranteed. Rather, dollars from the pool may be allocated to other institutions, which creates a competitive dynamic across institutions.

This arrangement creates a significant sense of unfairness, since institutional leaders report that they believe they are funding other institutions at their own expense. Institutional administrators explained that:

Limited new state funds and continued reliance primarily on institutional contributions to fund the performance funding pool will result in continued disinvestment by the state in Indiana's higher education institutions. – Research University, Indiana Higher Education Administrator

I don't think that the [state]...understands how detrimental the situation can be when the institutions are required to put back their resources to potentially go to a different institution because of the way that the metrics are weighted...or the way that dollars have been assigned to each metric. Metrics have never been fully funded. – Comprehensive University, Indiana Higher Education Administrator

Institutional competition does not allow for predictive budget modeling.

In requiring institutions to compete for the same pot of money, funding is based on relative, rather than absolute, performance. As a result, increases in OBF outcomes do not necessarily result in increases in OBF dollars for individual institutions, because others may have out-performed them. According to administrators in our study institutions, this allocation process discourages planning and new investments that will have recurring costs, such as hiring of new faculty or creating new programs that might contribute to improved student success. The following quotations illustrate the nature of these concerns.

The rewards actually are not that high, largely because there's not lots of new funding and because of the element of being compared to other institutions. So even if you do moderately well, you're probably just going to reduce the amount of money you might have lost as opposed to gaining money. – Research University, Indiana Higher Education Administrator

If [a large] percent of your operating comes from state appropriation...[and] if in one budget biennium, you are granted recognition for your good work under the performance-funding formulas, [but] in the next biennium, part of that is taken away again, and you have to keep re-earning it back over and over again...basically, that's...slow strangulation. – Comprehensive University, Indiana Higher Education Administrator

²³ CCRC Working Paper Number 74, retrieved from: <http://ccrc.tc.columbia.edu/media/k2/attachments/implementing-performance-funding-three-leading-states.pdf>

X. Conclusion

OBF has become an increasingly common policy tool for states interested in improving the educational attainment of their residents. As of 2016, over 30 states have either adopted, or plan to adopt, some form of OBF. Tying hundreds of millions of dollars to a range of concrete attainment goals, OBF policies are perceived as both ambitious and risky.

As a result, state policymakers have a pressing need to understand whether, how, for whom, and under what conditions OBF policies can lead to concrete, measurable completion and equity goals. This type of analysis allows policymakers to assess the suitability of OBF in their own particular state contexts; assists them in adopting policy design and implementation processes that will most likely lead to success; and provides insight into how already-existing OBF policies might be refined to address unintended consequences or provide support to institutions without the capacity to achieve key outcomes.

This case study of Indiana takes a first step in addressing these information needs by using a broad range of data and evidence to track changes in target outcomes, and to identify state and institutional-level factors that contribute to or hinder them.

Indiana implemented its OBF formula in 2009 against a backdrop of a decade-long attainment agenda, coupled with declining investments in public higher education. While the specific percentage of base funding affected by the formula varies year by year, it has never risen above 7%--a relatively modest percentage when compared to more robust policies in states such as Tennessee and Colorado. And the formula is broadly considered too blunt an instrument to recognize and reward sector- or mission-specific goals.

The process by which Indiana developed, implemented, and has refined its OBF policy was not top-down; leaders from both community colleges and universities were consulted. But involvement was neither universal nor consistent, and members of both sectors report frustration at the formula's lack of nuance and frequently changing metrics.

Yet despite these limitations and challenges, **Indiana's OBF policy had an impact on key student outcomes as shown through consistent, significant increases in the likelihood of achieving outcomes targeted by the formula.**

There is no doubt that Indiana has not yet met its student success goals. And because of flaws in data from the community college system, we cannot know whether, or to what degree, the policy is associated with changes in outcomes among community college students. For the four-year sector, the likelihood that full-time students will graduate from college on time and that they will elect and graduate with a major in a high-impact field has increased with each passing year of OBF in Indiana.

Our examination of how Indiana developed and implemented this policy—and how institutions have responded to it--details why this might be so. Postsecondary stakeholders across the state point to a policy environment ripe for the adoption of OBF, with a broad range of completion-focused initiatives already in place as OBF was implemented. **Colleges and universities made additional adjustments, as strategic plans were revised to prioritize outcomes targeted in the formula, and institutional policies and practices were refined to more fully align to the achievement of these goals.**

We've also identified a set of challenges that may be impeding further progress. At the institution-level, a broad range of **faculty and administrators reported buy-in to OBF goals and an emphasis on student success, although the degree to which they approved of specific elements of each policy varied by**

mission and capacity. Secondly, a high level of competition for scarce resources is perceived as counter-productive and demoralizing to many. Frequent changes in the formula further complicate institutional efforts to strategically align with key outcomes. When taken together, these critiques and shortcomings may threaten the long-term viability of the formula, and reduce the probability that all postsecondary actors engage in collaborative efforts to ensure that OBF works for all students, and all institutions.

Large-scale debates about the overall efficacy of OBF will no doubt continue, and the question of whether long-term effects are evident is centrally important. Newer IPEDS analyses that utilize more recent data and account for limitations in some previous research have begun pointing to an affirmative answer to that question. Yet despite broadly similar goals, OBF policies vary widely by state—so much so that it is of limited utility to policymakers to generalize about the effectiveness of these policies as a whole. In order for states to make effective decisions about OBF—whether to adopt, how to build the most effective formula, how to create a level playing field and strong buy-in, what to expect in the way of interim and longer-term outcomes--more nuanced analyses of individual states such as those provided in this brief provide critically important context-based analysis.

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Appendix A. Concurrent Policies in Indiana during Implementation of Outcomes-Based Funding

Table 1A. Concurrent Policies in Indiana during Implementation of Outcomes-Based Funding

POLICY	YEAR	SUMMARY
Dual Enrollment ²⁴	2007	Indiana legislation created Concurrent Enrollment Partnership (CEP), defined as, “credit hours earned when a high school student is taking a college-level course for both high school and college credit.
Innovation Grant Award ²⁵	2011	Statewide focus on increasing college completion rates in Indiana. Indiana’s efforts will be supported by a \$1 million innovation grant award from Complete College America, nonprofit focused on boosting college completion. Award presented to for Ivy Tech Community College.
Reaching Higher & Achieving More ²⁶	2012	CHE adopts <i>Reaching Higher and Achieving More</i> , statewide plan for higher education focusing on college completion, degree productivity, and educational attainment.
Transfer Single Articulation Pathways (TSAP) ²⁷	2012	TSAPs are competency-based tracks designed to promote seamless transfer from community college to university degree program. In 2012 the Indiana legislature enacted Senate Enrolled Act 182, stating that each educational institution, in collaboration with CHE will create a single articulation pathway (TSAP) for each programmatic area to be implemented by 2015.
Statewide Transfer General Education Core (STGEC) ²⁸	2012	STGEC is a framework of general education competencies and learning outcomes outlined and agreed upon by academic representatives of the Indiana state public institutions of higher education. These represent commonalities among the general education programs at the institutions and campuses. The STGEC framework maximizes the transferability of a general education “package” from one state institution (or campus) to another. In 2012 the Indiana legislature enacted Senate Enrolled Act 182, thereby establishing the requirements for a Statewide Transfer General Education Core of at least 30 credit hours.
Dual Credit ²⁹	2013	In Indiana, ‘dual credit’ is the term given to courses in which high school students have the opportunity to earn both high school and college credits in the same course. Dual credit is an additional Postsecondary Enrollment Opportunity, which also includes concurrent enrollment courses, and early college programs.

²⁴ Retrieved from: <http://www.doe.in.gov/sites/default/files/ccr/dual-credit-enrollment.pdf>

²⁵ Retrieved from: http://www.in.gov/portal/news_events/71905.htm

²⁶ Retrieved from: http://www.in.gov/che/files/2012_RHAM_4_26_12.pdf

²⁷ Retrieved from: http://www.in.gov/che/files/TSAP_BW_Binder_Final.pdf

²⁸ Retrieved from: [http://www.in.gov/che/files/STGEC_Guidance_13May22\(1\).pdf](http://www.in.gov/che/files/STGEC_Guidance_13May22(1).pdf)

²⁹ Retrieved from: <http://www.doe.in.gov/sites/default/files/ccr/dual-credit-july15-2015.pdf>

Guided Pathway for Student Success ³⁰	2013	State- and institution-level practices for guided pathways that fall into two broad categories: 1) strategies for accelerating completion and 2) strategies for preventing unnecessary credit accumulation.
Degree Mapping ³¹	2013	A requirement that public colleges provide degree maps to all new full-time students.
Student Financial Aid Reform ³²³³	2013	Reforms to financial aid that seek to increase college completion, galvanizing students to complete the credits needed in order to graduate within their allotted four years of state financial support.
Revisions to 21 st Century Scholars and Frank O'Bannon Grants ³⁴	2013	Grants for 21st Century Scholars stipulate that students must complete at least 30 credits each academic year in order to receive the full scholarship award. The full award covers 100% of tuition and mandatory fees at Indiana public colleges. Frank O'Bannon recipients must abide by credit completion requirements each academic year to renew for maximum award.
Promotion of Banded Tuition Reform ³⁵	2015	CHE has encouraged IHEs to move from charging tuition per credit-hour tuition to a structure that charges one fee for course loads beyond 12 credits.
Return and Complete ³⁶	2015	Established by the Indiana General Assembly, the Return and Complete project aims to encourage adult “stop out” students to complete a degree or credential by 2020.
You Can. Go Back. ³⁷	2015	Statewide campaign that aims to help the 750,000+ Hoosier adults with some college experience finish what they started. Funded by \$7.5 million in state grants, CHE is reaching out to Hoosiers directly and connecting them with Indiana colleges that are committed to eliminating barriers for returning adults.

³⁰ Retrieved from: [http://www.in.gov/che/files/Public_Agenda_ICHE_Guided_Pathways_Research_REVMar2014\(1\).pdf](http://www.in.gov/che/files/Public_Agenda_ICHE_Guided_Pathways_Research_REVMar2014(1).pdf)

³¹ Retrieved from: https://secure.in.gov/che/files/Degree_Map_Guidance_for_Indiana_Public_Colleges_and_Universities.pdf

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³⁵ Retrieved from: http://www.in.gov/che/files/2015_Indiana_Financial_Aid_Reform_13015_Pages.pdf

³⁶ Retrieved from: http://www.in.gov/che/files/Institutional_Guidance_for_Return_and_Complete_8.1.2015.pdf

³⁷ Retrieved from: <http://www.learnmoreindiana.org/adult-learners/>

Appendix B. Technical Appendix: Indiana SLDS Student Level Analysis

Introduction

Over the course of nearly two years, Research for Action (RFA) worked closely with Indiana's Commission for Higher Education to obtain, clean, and analyze Indiana's Statewide Longitudinal Data System (SLDS). During this iterative process, RFA worked to ensure the dataset was as accurate and complete as possible. We shared early results of our analyses with Indiana to ensure that we avoided any inadvertent errors in assumptions, coding, or analysis. This process, while time-consuming, allowed us to produce analyses that are accurate and complete. It is important to note that this process revealed a set of very serious limitations in Indiana's community college data, including a significant amount of missing data across multiple cohorts. As a result, we came to a mutual agreement with Indiana that analyses of community college data would be inappropriate at this time. Our university analyses utilize data on 334,207 first-time, undergraduate students during a ten-year period from 2005 to 2014. We examined descriptive trends across enrollment for first-time students including full-time and part-time status, and degree and non-degree seeking enrollment, proportion of Pell grant recipients, as well as trends in course completion milestones. We also conducted multivariate logit regression analyses focusing on bachelor's degree completion and high-impact degree completion and declaration.

The following outlines our methodological approach using SLDS.

Research Questions

1. Has the implementation of OBF impacted student outcomes, such as graduating on-time (within four years), declaring high-impact majors, and attaining high-impact degrees³⁸?
2. How has the OBF impact on each student outcome changed over years of OBF implementation?
3. Has the implementation of OBF benefited underserved students (i.e., Pell recipients and underrepresented minority students)?

Data

Working closely with the Indiana's Commission, we obtained the Indiana SLDS data of all public university and community college students from the 2005 to 2014 academic years, providing us four years of pre-OBF implementation and six years of post-OBF implementation data. For our study, we used a subset of these data consisting of incoming first-time college students entering each academic year.

Study Samples

The full student-level sample of Indiana's four-year sector public universities includes a total of 334,207 first-time, undergraduate students during a 10 year period from the 2005 to 2014 academic years. This student population includes undergraduate students seeking bachelor's degrees (93.1%),

³⁸ Indiana CHE provided RFA a list of degrees that classify as "high-impact" under Indiana's OBF model. This performance metric only applies to Research I institutions and so the sample for this analysis was restricted to students enrolled at Research I institutions.

associate degrees (4.7%), certificates (0.3%), and students labeled as “unclassified undergraduate” (2.0%).

As shown in Table 1B below, about 78% of these first time students registered as full-time during their starting year, whereas the other 22% were registered part-time.

Table 1B. Undergraduate Enrollment of First-Time Students in Indiana’s Public Four-Year Colleges and Universities, 2005 through 2014.

STARTING YEAR	FIRST-TIME, FULL-TIME		FIRST-TIME, PART-TIME		TOTAL	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
2005	24,468	76.6%	7,483	23.4%	31,951	100.0%
2006	25,804	77.4%	7,518	22.6%	33,322	100.0%
2007	26,738	78.6%	7,265	21.4%	34,003	100.0%
2008	26,823	79.8%	6,785	20.2%	33,608	100.0%
2009	28,474	81.3%	6,567	18.7%	35,041	100.0%
2010	26,481	76.0%	8,374	24.0%	34,855	100.0%
2011	25,419	75.9%	8,054	24.1%	33,473	100.0%
2012	24,819	74.1%	8,694	25.9%	33,513	100.0%
2013	24,659	76.9%	7,400	23.1%	32,059	100.0%
2014	25,506	78.8%	6,876	21.2%	32,382	100.0%
Total	259,191	77.6%	75,016	22.4%	334,207	100.0%

This full sample was used mainly for descriptive analyses that explored trends in first-time, undergraduate enrollment for full-time and part-time registration; underrepresented minority student enrollment; and the number of Pell Grant recipients in their starting year between the 2005 and 2014 academic years.

We also conducted multivariate logit regression analyses to examine the impact of OBF on bachelor’s degree attainment, declaring a high-impact major, and high-impact degree attainment, controlling for various student-level characteristics including gender, race/ethnicity, age (i.e. adult student or not), and academic major. Since full-time and part-time students require a different timeframe to attain these outcomes, the four-year sector student sample was divided into two samples: full-time and part-time samples.

Full-Time Student Sample: The full-time student sample was restricted to the first-time, full time students who declared they were seeking a bachelor’s degree during their first four years. Since these full-time students are expected to attain bachelor’s degrees (including bachelor’s degrees in high-impact majors) within the four-year timeframe, student cohorts from academic year 2012 or later years were excluded from the sample. Students in these later cohorts were not expected to graduate by the end of academic year 2014, which was the most recent year in our SLDS data set. The shaded column of Table 2 below reports numbers for our full-time analytical sample (first-time, full-time, BA/BS degree seeking students) by their starting year (i.e., 2005 refers to the cohort of full-time students enrolling for the first time in academic year 2004-2005).

Table 2B. Full-Time Student Sample for the Four-Year Sector Analyses, 2005 through 2011.

STARTING YEAR	BA/BS DEGREE SEEKER		NON-BA/BS DEGREE SEEKER		TOTAL FIRST-TIME, FULL-TIME	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
2005	23,695	96.8%	773	3.2%	24,468	100.0%
2006	25,065	97.1%	739	2.9%	25,804	100.0%
2007	26,084	97.6%	654	2.4%	26,738	100.0%
2008	26,297	98.0%	526	2.0%	26,823	100.0%
2009	27,856	97.8%	618	2.2%	28,474	100.0%
2010	25,752	97.3%	729	2.8%	26,481	100.0%
2011	24,757	97.4%	662	2.6%	25,419	100.0%
Total	179,506	97.4%	4,701	2.6%	184,207	100.0%

Key student characteristics for students included in the full-time student sample are presented in Table 3B.

Table 3B. Characteristics of Full-Time Student Sample for the Four-Year Sector Analyses, 2005 through 2011.

	2005	2006	2007	2008	2009	2010	2011
Pell Recipient	29%	28%	29%	32%	35%	39%	40%
Female	52%	52%	52%	53%	53%	52%	53%
African-American	6%	6%	6%	6%	6%	7%	7%
Hispanic	3%	3%	3%	3%	3%	4%	4%
Asian	3%	3%	3%	3%	3%	3%	3%
White	86%	86%	85%	85%	83%	82%	81%
Other Race	2%	3%	3%	3%	3%	4%	5%
Adult	4%	4%	4%	3%	3%	4%	4%
Professional Major	47%	48%	48%	48%	47%	48%	49%
STEM Major	13%	13%	14%	14%	15%	15%	16%
Liberal Arts Major	39%	39%	38%	38%	38%	36%	35%

- In general, averages of most student-level covariates remained similar across different first time, full-time student cohorts between 2005 and 2011, except for proportions of Pell and white students.
 - The percentage of first-time, full-time undergraduate students receiving Pell their first four years increased significantly by over 11 percentage points during this period.
 - The percentage of white students decreased by 5 percentage points during this period.

Part-Time Student Sample: Similar to the full-time student sample, the part-time student sample was also restricted to first-time, part-time students who declared they were seeking a bachelor's degree at any time during their first four years. Table 4B below reports numbers for the part-time analytical sample by their starting year. Since part-time students are not expected to graduate within four years, we use a six-year timeframe for such students. As such, student cohorts from 2010 or later academic years were excluded from the sample.

Table 4B. Part-Time Student Sample for the Four-Year Sector Analyses, 2005 through 2009.

STARTING YEAR	BA/BS DEGREE SEEKER		NON-BA/BS DEGREE SEEKER		TOTAL FIRST-TIME, PART-TIME	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
2005	6,365	85.1%	1,118	14.9%	7,483	100.0%
2006	6,484	86.3%	1,034	13.8%	7,518	100.0%
2007	6,282	86.5%	983	13.5%	7,265	100.0%
2008	5,989	88.3%	796	11.7%	6,785	100.0%
2009	5,729	87.2%	838	12.8%	6,567	100.0%
Total	30,849	86.6%	4,769	13.4%	35,618	100.0%

Key student characteristics for students included in the part-time student sample are presented in Table 5B.

Table 5B. Characteristics of Part-Time Student Sample for the 4-Year Sector Analyses, 2005 through 2009.

	2005	2006	2007	2008	2009
Pell Recipient	34%	35%	36%	39%	43%
Female	54%	53%	53%	52%	52%
African-American	10%	12%	11%	13%	12%
Hispanic	4%	4%	5%	5%	5%
Asian	2%	2%	2%	1%	1%
White	80%	79%	77%	76%	76%
Other Race	4%	3%	5%	4%	5%
Adult	33%	31%	30%	26%	32%
Professional Major	39%	39%	38%	38%	40%
STEM Major	10%	10%	10%	10%	11%
Liberal Arts Major	51%	51%	51%	52%	49%

- Similar to the full-time student sample, averages of most student-level covariates remained unchanged over time, but:
 - The percentage of students receiving the Pell grant increased by nine percentage points between 2005 and 2009
 - The percentage of students who are white decreased by four percentage points during this period

Outcome Measures

Our Indiana 4-year sector analysis examined the effects of OBF on the probability of students attaining bachelor's degrees, declaring a high-impact major, and attaining a bachelor's degree in a high-impact major. For the full-time student analyses, we estimated the effect of OBF on attaining each outcome within four years. For the part-time student population, we expanded the length of time to attain a bachelor's degree, to declare a high impact major, and to attain a bachelor's degree in a high-impact major to six years. Table 6B summarizes the studied outcome measures.

Table 6B. Outcome Measures

Full-Time Student Outcomes	Part-Time Student Outcomes
<ul style="list-style-type: none"> • Bachelor's degree completion within four years • Declare a high-impact major within four years • Bachelor's degree completion in a high-impact major within four years 	<ul style="list-style-type: none"> • Bachelor's degree completion within six years • Declare a high-impact major within six years • Bachelor's degree completion in a high-impact major within six years

Analytical Model

Using the repeated cross-sectional data of the incoming four-year college student cohorts, we conducted an interrupted time series analysis to estimate the effect of the OBF implemented in 2009 on each of the student outcome measures listed above. We conducted separate analyses for the full-time and part-time student samples.

Analytical Model for the Full-Time Student Sample: Since all student-level outcome measures are binary variables (1=completed; 0=not completed), a logit regression model was used to estimate the effect of OBF on an outcome measure. For example, the logit of the probability of attaining a BA degree within four years for a full-time student i in year t can be written as follows:

$$\text{logit}(\pi_{it}) = \beta_0 + \beta_1 \text{Time}_{it} + \beta_2 \text{POST1_OBF}_{it} + \beta_3 \text{POST2_OBF}_{it} + \beta_4 \text{POST3_OBF}_{it} + \sum_{k=1}^K \beta_{k+4} X_{kit} + \varepsilon_{it},$$

where:

π_{it} = probability of achieving a given binary outcome, $\Pr(Y_{it} = 1)$, given the values of all explanatory variables. And, $\text{logit}(\pi_{it}) = \log\left(\frac{\pi_{it}}{1-\pi_{it}}\right)$.

Y_{it} = Indicator of bachelor's degree attainment for student i at year t (e.g., 1 if a full-time student completed a BA degree and 0 otherwise.)

Time_t = A continuous variable indicating year t from the start of the observation period (academic year 2005)

POST1_OBF_{it} , POST2_OBF_{it} & POST3_OBF_{it}
= Dummy variables indicating 1st, 2nd, and 3rd year after the implementation of OBF, respectively

X_{kit} = A vector of student-level covariates including gender, Pell grant recipient in the first four years, race/ethnicity, age, and major.

ε_{it} = Random errors

In this logit regression model, β_1 estimates the slope of the baseline trend in the log odds of achieving student outcome Y before OBF. And, β_2 , β_3 , and β_4 estimate deviations from the pre-OBF baseline trend (i.e., OBF impacts) that occurred in Years 1, 2, and 3 after the implementation of OBF, respectively. Note that this model estimates the impact of OBF as the change in the log odds of achieving the outcome in a given post-OBF year, which is not easily-interpretable for a lay audience. Thus, we reported all OBF impacts in terms of predicted probabilities (in percent) that were converted from log odds at the mean values of all covariates.

In addition to estimating the impact of OBF for the overall full-time sample, we also examined whether the estimated OBF effect varies across two specific student populations: economically disadvantaged student groups, as defined by Pell recipient status within the first four years, and underrepresented minority (black and Hispanic) students. We conducted these subgroup analyses by segmenting the above regression equation between Pell and non-Pell groups or between underrepresented race/ethnic minority (URM) and non-URM groups. In these analyses, the differential impact of OBF was evaluated between two student subgroups by examining the significance of interaction terms between a student subgroup dummy (e.g., a dummy indicator for Pell and non-Pell students) and the three post-OBF dummies.

Analytical Model for the Part-Time Student Sample: The part-time student analysis used the same logit regression as the one used for the full-time student analysis. However, the part-time logit regression model only included one post-OBF term because the part-time analysis used data on the 2005 through 2009 cohorts. Cohorts from 2010 or later years were excluded from the analyses because part-time students in these later cohorts were not expected to graduate by the end of 2014, which is the most recent year in our SLDS data set. Again, we estimated segmented regression models to examine differential effects of OBF between Pell and non-Pell students or between URM and non-URM students.

A full set of parameter estimates for the full-time sample are reported in Table 7B, and estimates for the part-time sample are reported in Table 8B.

Model Limitations

An interrupted time series analysis with no control group is susceptible to threats to internal validity caused by history. For example, there may have been another program related to college completion implemented in Indiana at the same time as OBF, which could lead us to overestimate the positive effects of OBF.

Our analysis is also susceptible to omitted variable bias. For example, our logit regression model does not control for institutional level covariates because we could not assign all students in each cohort to a single institution. Many students moved from their starting institution to another within the Indiana's public university system over time.

A key component of an interrupted time series analysis is having an accurate pre-OBF trend line. To this end, a longer pre-OBF period is always desired. Due to data constraints, however, we must base our pre-OBF trend line on only four pre-OBF periods (cohorts 2005 through 2008). As such, there is the possibility that our pre-OBF trend line does not provide a valid counterfactual.

Data Limitations

Because of missing or incomplete data for credit accumulation and student-level indicators of academic success prior to starting at a university, such as SAT scores or high school GPA, these factors were neither analyzed nor included in models as covariates. As for other covariates and outcome success rates, we rigorously examined descriptive statistics by cohort to identify any possible issues and compared the results with other sources, such as IPEDS/Delta Cost aggregates and results obtained from state websites and contacts.

Table 7B. Parameter Estimates of Logit Regression Model, Full-Time Student Sample

VARIABLES	(1) Graduated with Bachelor's Degree within 4 Years	(2) Majored in STEM within 4 Years	(3) Graduate d with STEM Bachelor' s Degree within 4 Years
Time Trend	0.066*** (0.006)	0.034*** (0.009)	0.085*** (0.013)
Post OBF 2.0 Year 1	0.048* (0.021)	0.029 (0.029)	0.080 (0.041)
Post OBF 2.0 Year 2	0.116*** (0.026)	0.054 (0.036)	0.092 (0.052)
Post OBF 2.0 Year 3	0.101** (0.032)	0.119** (0.043)	0.124* (0.063)
Female Indicator	0.426*** (0.011)	- 1.122*** (0.015)	-0.638*** (0.021)
Adult Indicator (at least 22 in entry year)	-0.163*** (0.035)	- 0.532*** (0.058)	-0.205* (0.085)
Race: Dummy for Hispanic	-0.542*** (0.032)	0.056 (0.042)	-0.179** (0.065)
Race: Dummy for Black	-0.988*** (0.029)	- 0.312*** (0.037)	-1.225*** (0.083)
Race: Dummy for Asian	0.162*** (0.029)	0.666*** (0.031)	0.563*** (0.041)
Race: Dummy for Other Race	-0.398*** (0.031)	0.167*** (0.039)	-0.042 (0.057)
Professional Major Indicator	-0.182*** (0.015)	---	---
Liberal Arts and Sciences Major Indicator	-0.406*** (0.016)	---	---
Vocational Major Indicator	0.019 (0.117)	---	---
Missing Indicator for Female	-0.643 (0.447)	-0.636 (0.499)	-0.283 (0.743)
Pell Recipient in First Four Years	-0.674*** (0.012)	-0.017 (0.016)	-0.320*** (0.024)
Constant	-0.744*** (0.022)	- 0.929*** (0.025)	-2.333*** (0.038)

Number of Observations	179,506	125,412	125,412
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Notes: i) Standard errors in parentheses

ii) * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

iii) Indicators for major areas are not included in models (2) and (3) because these models examine the effect of OBF on attaining a BA degree in STEM or majoring in STEM.

Table 8B. Parameter Estimates of Logit Regression Model, Part-Time Student Sample

VARIABLES	Graduated with Bachelor's Degree within 6 Years	Majored in STEM within 6 Years	Graduated with STEM Bachelor's Degree within 6 Years
Time Trend	0.060*** (0.018)	0.131*** (0.027)	0.241*** (0.056)
Post OBF 2.0 Year 1	0.086 (0.063)	-0.142 (0.092)	-0.146 (0.176)
Female Indicator	0.077* (0.037)	-1.237*** (0.057)	-1.195*** (0.123)
Adult Indicator (at least 22 in entry year)	-0.155*** (0.043)	-0.179** (0.066)	-0.159 (0.134)
Race: Dummy for Hispanic	-0.300** (0.091)	0.052 (0.147)	0.203 (0.282)
Race: Dummy for Black	-0.663*** (0.073)	-0.059 (0.094)	-0.344 (0.223)
Race: Dummy for Asian	0.874*** (0.103)	0.641*** (0.127)	1.174*** (0.190)
Race: Dummy for Other Race	0.063 (0.085)	0.419*** (0.117)	0.749*** (0.198)
Professional Major Indicator	-0.066 (0.058)	---	---
Liberal Arts and Sciences Major Indicator	-0.563*** (0.059)	---	---
Vocational Major Indicator	0.795* (0.398)	---	---
Pell Recipient in First Four Years	-0.055 (0.038)	0.015 (0.057)	-0.066 (0.115)
Constant	-1.882*** (0.073)	-1.364*** (0.079)	-3.577*** (0.173)
Observations	30,849	10,460	10,460

Notes: i) Standard errors in parentheses

ii) * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

iii) Indicators for major areas are not included in models (2) and (3) because these models examine the effect of OBF on attaining a BA degree in STEM or majoring in STEM.

Appendix C. Case Study Institutions: Characteristics and Outcomes-Based Funding Formula Results

Table 1C. FY 2014 Institutional Characteristics by Qualitative Sample

INSTITUTIONS	CLASSIFICATION	UNDERGRADUATE ENROLLMENT	% FULL-TIME STUDENTS ³⁹	% PELL RECIPIENT ⁴⁰
University of Southern Indiana	Comprehensive	9,436	60%	32%
Indiana State University	Comprehensive	10,973	71%	44%
Ivy Tech Community College	Community College	110,128	16%	54%
Indiana University	Research	93,358	62%	34%

Table 2C. FY 2014 Allotment Recommendation from Performance Funding Formula⁴¹ by Qualitative Sample

INSTITUTIONS	FUNDS SET ASIDE FOR OBF POOL (6%)	TOTAL OBF FUNDING	DIFFERENCE IN SET ASIDE AND OBF AWARD	% OF OBF FUNDING
University of Southern Indiana	\$882,409	\$2,919,770	\$2,037,361	4.4%
Indiana State University	\$1,488,311	\$1,146,059	(\$342,252)	1.7%
Ivy Tech Community College	\$4,101,195	\$17,997,944	\$13,896,749	27.0%
Indiana University	\$7,635,470	\$20,447,066	\$12,811,596	30.7%

³⁹ Full-time numbers calculated from Indiana's SLDS and defined as having attempted 24 or more credits during Academic Year 2014.

⁴⁰ Pell recipient numbers calculated from Indiana's SLDS and defined as having received a Pell grant during Academic Year 2014.

⁴¹ Data cited from 2013-2015 Metric Allocation and Allotment Recommendation for the Performance Funding Formula, February 2013. Print.

Appendix D. Glossary Table for Institutional Policies or Programs Intentionally Aligned with Degree Completions and Persistence

Focus Area	INSTITUTIONAL POLICIES AND PROGRAMS	INDIANA			
		2 YR	4 YR (Comp)	4 YR (Comp)	4 YR (Research)
Academic Affairs	Decrease time needed for degree <i>Fewer credits to degree, AP credits, prior learning assessments, degree pathways, revisions to major selection</i>	•			•
	Align curriculum to post-graduation goals <i>Mandated experiential/service learning</i>	•			•
	Increase access to degrees <i>Milestone credentialing, creation of new credentials</i>		•		
	Increase access to courses <i>Increasing online course, changes in course scheduling, summer semester expansion</i>	•	•	•	
	Increase use of data analysis <i>Software programs for students, data analysis on completion and progression for faculty/administrators, increase IR capacity</i>			•	•
	Change faculty roles and staffing <i>Faculty to advising, addition of new positions, budget adjustments</i>		•		
	Improving developmental education <i>Limit dev-ed; Implement co-requisite model</i>	•	•	•	•
Student Services	Change advising and counseling methods <i>Intrusive advising, testing of new counseling strategies</i>	•	•	•	•
	Improve communications between students and admin <i>Early alert systems, degree audit/curriculum mapping, one-stop student services</i>		•		•
	Improve student support programs <i>Student orientation and first-year programs, tutoring and supplemental instruction, career exposure programs</i>	•		•	•
	Increase student services capacity <i>Increases in student services staffing or changes in roles, increase in funding/budget</i>	•			•
Admissions, Recruitment and Other Institution Responses	Change financial aid policies <i>Tuition guarantee, financial aid incentives to take full course loads</i>			•	•
	Change administrative staffing related to performance tracking <i>Shifting or addition of performance-related administrative roles</i>		•		
	Change Responsibility-Centered Management practices <i>Strategic planning initiatives, responsibility-based management</i>	•			•
TOTAL		8	7	6	10

Appendix E. Deeper Dive into Quantitative Findings

A. Are our positive findings for Bachelor’s degree attainment being driven by an increase in institutional selectivity?

A critique of OBF policies is that institutions will begin to only accept higher-performing students as a means of improving student outcomes. Such a scenario would be concerning for policymakers, as the goals of OBF and state public higher education systems is to support the success of all students, not just the ones who graduate from high school well-prepared.

Many have expressed concerns that increased selectivity, or “creaming,” is an unintended consequence of OBF policies. Theoretically, this concern is justified. If institutions are funded based on student outcomes and better-prepared students are more likely to achieve positive outcomes, then there is an incentive to take students who are better-prepared.

There is some research to support the concerns over increased selectivity. Umbricht (2015) found that OBF led to lower admissions rates and higher ACT test scores in Indiana, and Kelchen (2016) found that OBF led to public institutions receiving less Pell Grant funding, which may be indicative that fewer low-income students were enrolling.

Due to issues with the quality of ACT score data in Indiana’s SLDS, we were unable to control for students’ ACT scores. Thus, if ACT scores increased over the period of study, we may overestimate the positive impact of OBF on student outcomes. Using data from the Integrated Postsecondary Education Data System (IPEDS), we conducted an interrupted time series analysis and found that the 75th percentile ACT score deviated from its pre-OBF trend by between a tenth and a half of a point following the implementation of OBF in Indiana. As such, it is worthwhile for us to investigate how much of our results can be explained by this increase in ACT scores.

Combining the IPEDS and SLDS data, we conducted a regression with institution and year fixed effects and found that a cohort’s graduation rate increased by .56 percentage points when its 75th percentile ACT score increases by one point. Using that figure, we can estimate how much of our OBF effect can be explained by increased selectivity.

Table 1E. Estimating the Positive Effects of OBF That Remain After Accounting for Creaming

	2009	2010	2011
Increase in ACT Score post-OBF	0.154	0.238	0.554
Relationship between ACT score and grad rate	0.00558	.00558	.00558
Increase in grad rate as a result of increase in ACT score	0.09%	0.13%	0.31%
Estimated OBF effect	1.10%	2.60%	2.30%
Remaining OBF effect	1.01%	2.47%	1.99%

In 2009, increased selectivity was likely responsible for a .09 percentage point increase in the graduation rate; in 2010, it was responsible for a .13 percentage point increase; and, in 2011, it was responsible for a .31 percentage point increase in the graduation rate. Given that our estimated effects of OBF in Indiana are significantly larger than those figures, we find that increased selectivity most likely does not explain away our finding that OBF had a positive impact on the probability of attaining a Bachelor’s degree within four years.

B. What effect did the “partial dosage” cohorts have on our results?

Partial dosage refers to individuals who received less than the full portion of “treatment” in an experiment. In this context, it refers to students who entered Indiana’s higher education system before OBF was implemented, but continued their studies after it had been implemented.

We hypothesize that the presence of students who received partial dosage would cause us to *underestimate* the impact of OBF. If OBF has a positive impact on students’ outcomes, then students who received partial dosage will be more likely to graduate than students who received no dosage. Thus, comparing full dosage cohorts to partial dosage cohorts (as we do) likely results in an underestimation of the impact of OBF.

We can test our theory by switching the 2008 cohort from being considered “pre-treatment” in our analysis to being considered “post-treatment.” If our theory is correct, we would expect the positive effects of OBF for the 2009, 2010, and 2011 cohorts to become larger.

Table 2E. The Effect of OBF When 2008 Is Considered a Pre-treatment Cohort as Compared to When It Is Considered a Post-treatment Cohort

	2008 as pre-	2008 as post-
2008 Cohort		0.00896 (0.0251)
2009 Cohort	0.0479** (0.0212)	0.0570* (0.0333)
2010 Cohort	0.116*** (0.0263)	0.128*** (0.0426)
2011 Cohort	0.101*** (0.0318)	0.115** (0.0521)

Coefficients are from a logit regression.

The results above show that, when we switch 2008 from being a pre-treatment cohort to being a post-treatment cohort, the effects that we estimate for the 2009, 2010, and 2011 cohort become slightly larger. As it is only one cohort, it is difficult to infer much (and we cannot repeat this strategy for the 2007 cohort because it would give us too few pre-treatment cohorts), but this finding does align with our pre-existing theory that the presence of partial dosage cohorts causes us to underestimate the effects of OBF.

C. Could shifts in covariate trends have affected our results?

An abrupt shift in a covariate trend following the treatment can pose issues for an interrupted time series analysis that does not have a control group. Statistical control is not perfect and it can be difficult to disentangle the effect of the treatment from an abrupt, contemporaneous shift in a covariate trend.

Using an interrupted time series analysis, we found that many of our covariates did indeed significantly deviate from their pre-OBF trend lines after OBF was implemented. It is important, however, to understand *how* such a deviation would affect our results. For example, the proportion of students who are adults increased following OBF, but being an adult has a negative relationship with the likelihood of graduating, thus any error resulting from this shift would make our results *more negative*. Six of the other seven covariates that shifted following OBF produce a similar effect – if they did affect our results, the direction of that effect was negative.

Table 3E. The Effect that Shifts in Covariates Following OBF May Have Had on Our Results

Covariate	Change following OBF	Relationship with grad rate	Effect on results
Adult	+	-	-
Pell	+	-	-
Hispanic	+	-	-
Black	+	-	-
Asian	-	+	-
Professional Major	+	-	-
Liberal Arts Major	-	-	+

Being a liberal arts major is the lone covariate that could have possibly produced positive bias in our results. The likelihood of being a liberal arts major only decreased by 2.2 percentage points following OBF and the relationship between being a liberal arts major and the graduation rate is weaker than the majority of our covariates, thus it is difficult to imagine that any positive bias resulting from this covariate would outweigh the negative bias from the other covariates. To be clear: if abrupt shifts in covariate trends did affect our results, it likely caused our positive results to be *smaller* than they otherwise would have been.

D. How reliable is our pre-OBF trend line?

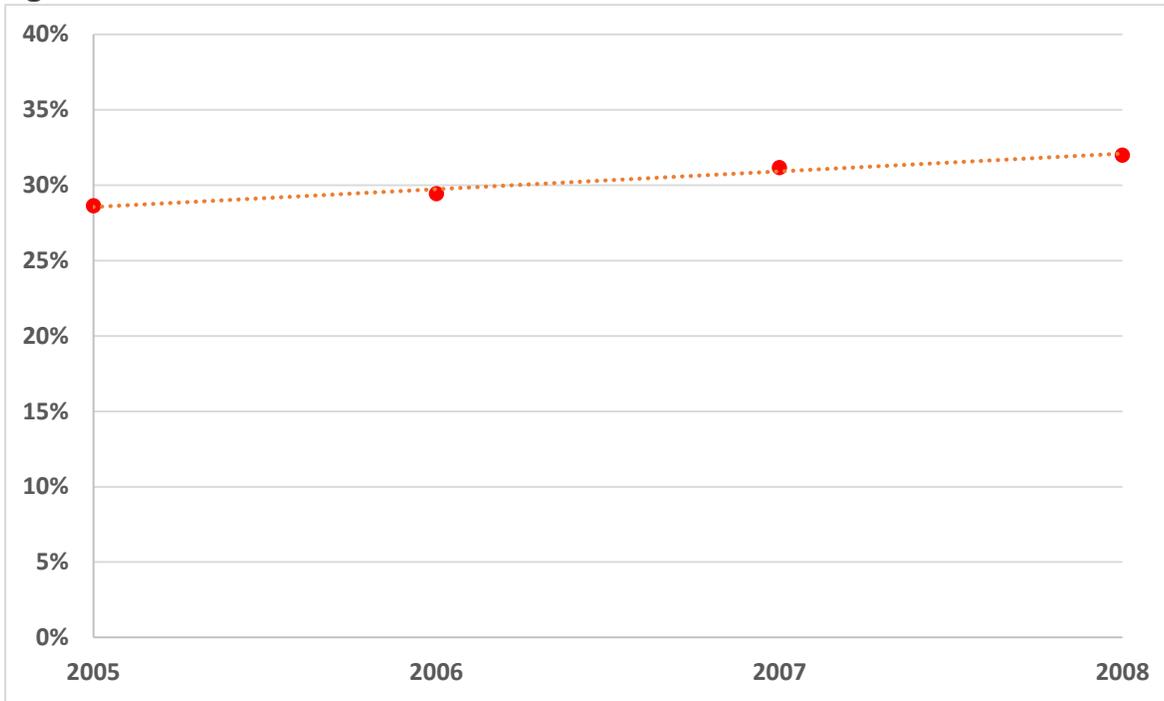
Estimating a reliable pre-OBF time trend is integral to properly implementing an interrupted time series analysis. Our estimates of Indiana’s OBF policy’s impact are entirely dependent upon the pre-OBF trend line accurately revealing an underlying time trend that would have continued in absence of the implementation of OBF. If, for example, one of our pre-OBF years is a large outlier, our estimation of the pre-OBF trend may be unreliable.

In Table 4E, we show the observed graduation rate for each of the pre-OBF cohorts, which are the numbers upon which our trend line is based. For each cohort, there is a consistent annual increase between .7 and 1.7 percentage points. In Figure 2E, we show our observed graduation rate with a linear best fit line and see that the graduation rates only slightly deviate from the best fit line. As such, we believe that our pre-OBF trend line accurately reflects a positive trend in graduation rates in Indiana prior to the implementation of OBF.

Table 4E. The Effect that Shifts in Covariates Following OBF May Have Had on Our Results

	Graduation Rate
2005	28.64
2006	29.45
2007	31.17
2008	32.01

Figure 1E. Observed Graduation Rates for the Pre-OBF Cohorts with a Linear Best Fit Line



Did OBF Widen the Attainment Gap?

In multiple cases, we find statistically significant results for our overall population, but not for underserved populations, i.e. Pell recipients or black and Hispanic students. As such, one might be concerned that OBF in Indiana has exacerbated gaps in educational attainment by improving student outcomes for more advantaged students, while having little impact on disadvantaged students.

We rigorously tested whether or not differences in OBF effects between subgroups were statistically significant with a fully interacted interrupted time series model, specified by:

$$\text{logit}(\pi_{it}) = \beta_0 + \beta_1 \text{Time}_{it} + \beta_2 \text{POST1_OBF}_{it} + \beta_3 \text{POST2_OBF}_{it} + \beta_4 \text{POST3_OBF}_{it} + \sum_{k=1}^K \beta_{k+4} X_{kit} + \beta_1 \text{Time}_{it} * \text{Pell}_{it} + \beta_2 (\text{POST1_OBF} * \text{Pell})_{it} + \beta_3 (\text{POST2_OBF} * \text{Pell})_{it} + \beta_4 (\text{POST3_OBF} * \text{Pell})_{it} + \sum_{k=1}^K \beta_{k+4} (X * \text{Pell})_{kit} + \varepsilon_{it},$$

where:

π_{it} = probability of achieving a given binary outcome, $\Pr(Y_{it} = 1)$, given the values of all explanatory variables. And, $\text{logit}(\pi_{it}) = \log\left(\frac{\pi_{it}}{1-\pi_{it}}\right)$.

Y_{it} = One of the binary outcome measures listed above for student i in year t (e.g., 1 if a full-time student completed a BA degree within four years and 0 otherwise.)

Time_{it} = A continuous variable indicating year t from the start of the observation period (year 2006)

$\text{POST1_OBF}_{it}, \text{POST2_OBF}_{it} \& \text{POST3_OBF}_{it}$

= Dummy variables indicating 1st, 2nd, and 3rd year after the implementation of OBF, respectively

X_{kit} = A vector of student-level covariates including gender, Pell grant recipient in their first two years, race/ethnicity, age, gender, ACT score, and major.

$Time * Pell_t$ = An interaction between Pell recipient status and a continuous variable indicating year t from the start of the observation period (year 2006)

$POST1_OBF * Pell_{it}$, $POST2_OBF * Pell_{it}$ & $POST3_OBF * Pell_{it}$

= Interactions between Pell recipient status and dummy variables indicating 1st, 2nd, and 3rd year after the implementation of OBF, respectively

$X * Pell_{kit}$ = A vector of interactions between Pell recipient status and student-level covariates including gender, Pell grant recipient in their first two years, race/ethnicity, age, gender, ACT score, and major.

ε_{it} = Random errors

The same model specified above was also conducted with underrepresented minority (black and Hispanic) students in place of Pell students. Students who identified as multiple races or were of an unknown race were not included in that model.

Across all of our outcomes and years, we find no instances in which attainment gaps grew as a result of OBF. More research into the issue of equity in OBF will, however, be necessary to provide a definitive answer on the issue.