

What constitutes prudent spending from private college endowments? Evidence from underwater funds

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Drew M. Anderson

dmanderson5@wisc.edu

Postdoctoral Researcher, University of Wisconsin-Madison

L139C Education Building

1000 Bascom Mall

Madison, WI 53706

Abstract

This study examines how private colleges and universities choose to spend versus reinvest resources in endowment funds that have suffered investment losses. The analysis takes advantage of a public policy shift that revealed how colleges define prudent spending. Investment losses during the financial crisis of 2008 left many endowment gift funds below their original donated values, or “underwater.” Colleges in some states were legally required to cut spending from underwater funds. Other states had recently enacted the Uniform Prudent Management of Institutional Funds Act, which allows prudent spending from underwater funds. The Act loosened financial constraints, and affected colleges responded by spending 22 percent more from their endowments in the fiscal year following the financial crisis. Other colleges did not increase spending from unrestricted parts of their endowments to offset reduced spending from underwater funds.

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1. Introduction

Only a year ago, universities, with their \$400 billion in endowment money, faced a congressional inquiry because of widespread concern they needed to spend more of their savings on financial aid for students. Now, colleges are finding that state laws are not letting them spend enough, [after] taking a beating from the recession and the collapse in stock prices. . . . The growing movement [toward a new state law] is sparking a debate about the value of freeing up emergency cash versus the danger of further depleting key financial reserves, potentially shortchanging future generations (Hechinger & Levitz, 2009).

This study informs the debate that is central in the quote above, by measuring changes in private college endowment spending caused by a state law called the Uniform Prudent Management of Institutional Funds Act or UPMIFA.¹

In a five-year period of growth leading up to 2008, the average private college endowment gained 46 percent in real value from investment returns and new donations, net of spending. Spending roughly five percent of its total endowment value in each year, the average private college covered ten percent of its yearly expenses, though some covered well over half. Endowment spending typically supports scholarships and faculty salaries.

During the financial crisis of 2008 the average private college endowment lost 22 percent of its value, jeopardizing financial support for core educational functions (NACUBO-Commonfund, 2009). Many recent endowment gift funds were worth less than their original donated values, or “underwater.” In a few months, the proportion of endowment dollars in underwater funds increased from one percent to 31 percent (Bass, 2009). Expecting declines in revenue from tuition and other sources (Nelson & Goodman, 2009), each college had to choose how much to spend from smaller, and in many cases underwater, gift funds. In many states, the law prohibited spending from underwater funds, imposing large cuts to endowment revenue, which would be difficult to replace from other sources.

¹Say “up-MIFF-uh.”

UPMIFA allows for spending from underwater funds where prior law did not. Introduced in 2006, UPMIFA was enacted in all states by 2012.² Small differences in timing of enactment, combined with the prevalence of underwater funds after the financial crisis, led to large differences in spending constraints on otherwise similar colleges.

To assess the effect of changing spending constraints, I compare endowment spending across colleges. During this time, state laws vary within each college across years, and across colleges within each year. Therefore it is possible to identify the law's effect on spending while controlling for college and year fixed effects in a difference-in-differences approach. I fully interact an indicator for UPMIFA with dollars in underwater funds, a third difference that measures exposure to UPMIFA at the time of enactment, since the effect of the law should operate through underwater funds. From multiple data sources I construct a yearly panel over fiscal years 2005 to 2013 of 522 private, non-profit, endowed, four-year colleges and universities in the United States.

I find that colleges acting under the prudent person standard of UPMIFA spend from underwater funds at close to the same rate as they typically spend from other funds, relative to colleges under prior law being unable to spend from underwater funds. UPMIFA allows colleges to spend 6.12 cents more per dollar in underwater funds.

Increased spending under UPMIFA provides evidence that the prior law's constraints were binding. From the effect of legal constraints alone, these findings imply the average private college under prior law experienced a 22 percent decrease in endowment revenue in fiscal 2010, on top of a roughly 6 percent decrease in endowment revenue from absorbing the investment losses of fiscal 2009. Colleges do not appear to have increased spending from unrestricted parts of their endowment to offset these losses.

This study contributes to a growing empirical literature on endowment spending decisions. Most colleges use similar, simple formulas to plan spending (Brown & Tiu, 2015), but colleges systematically deviate from their plans, usually to spend less (Brown et al., 2014). Legal constraints on endowment spending have received little attention as an

²“All states” includes the District of Columbia, as well as Pennsylvania which adopted the key provisions of UPMIFA in 1998, but has not yet enacted the 2006 version of UPMIFA (Pennsylvania State Legislature, 1998).

explanation for these deviations, for two reasons. Nearly all states used the same uniform law for decades, and the law restricted spending only in extreme circumstances (Budak & Gary, 2010). UPMIFA represents a new and less restrictive endowment law that was introduced just before the extreme investment losses of the late 2000s recession.

A few other studies address UPMIFA, but do not test for its impact by comparing spending across groups of colleges. The calibrated model in Gilbert & Hrdlicka (2015) predicts that external constraints on endowment spending will lead to larger and more risky endowments. The study does not test this prediction using the loosening in constraints provided by the adoption of UPMIFA. Bass (2009) and Bass (2010) ask a set of colleges in early-enacting states how they will respond to UPMIFA. The majority of colleges plan to take advantage of the flexibility to spend from underwater funds under UPMIFA, but many also report spending from underwater funds under prior law, suggesting a muted effect of the change to UPMIFA. The present study provides information beyond these targeted surveys, with a larger panel including observations of actual spending by colleges under different laws.

Under UPMIFA, a college's management of underwater funds should be representative of its general approach to balancing the need for current revenue with the need to invest to ensure future revenue. By comparing legally imposed spending cuts to colleges' implementation of "Prudent Management" under UPMIFA, this study provides an empirical definition of prudent spending to support higher education through a financial crisis.³

The remainder of the study is divided into six sections. Section 2 provides additional background, which informs the empirical strategy laid out in Section 3. Section 4 describes the data used to implement the empirical strategy. Section 5 reports the main results, and Section 6 includes some supplementary results. Section 7 concludes with a discussion of the results.

³UPMIFA had a measurable impact on endowment spending, but I do not measure its indirect impact on endowment asset allocation or on other revenue sources such as tuition. Many empirical studies of endowments take spending rules as given and examine investment choices (Black, 1976; Thaler & Williamson, 1994; Lerner et al., 2008; Brown et al., 2010; Dimmock, 2012; Goetzmann & Oster, 2015). In contrast, Merton (1993), Hoxby (2015), and Gilbert & Hrdlicka (2015) lay out full models of both investment and spending, taking into account the college's other revenues and expenses.

2. Endowment spending and state laws

Endowment donors stipulate that the college invest their gifts and spend only the investment income, for a particular purpose like student financial aid or a faculty chair. Within these constraints, the college chooses how to invest gift funds together with other savings in its endowment, and how much to spend each year on particular students or faculty.⁴ On behalf of donors and taxpayers, state laws (as enforced by the state attorney general) guide the choices made by non-profit, tax-exempt college endowments. This section discusses how endowment spending works in practice, and how state laws affect this process.

The vast majority of colleges plan endowment spending using simple formulas that combine future expectations with recent history (Brown & Tiu, 2015). Under a moving-average rule, the most common formula, a college sets a constant “policy spending rate” near five percent. This rate corresponds to its long-term target for real rate of return on investments (NACUBO-Commonfund, 2014). The college multiplies that rate by a moving average of the total endowment value. Most often the moving average includes endowment values over the past three to five years at a yearly or quarterly frequency (Brown & Tiu, 2015).

Total spending during a fiscal year divided by total endowment value at the beginning of the fiscal year is called the “effective spending rate” or simply the spending rate. While the policy spending rate is constant, the effective spending rate moves counter to changes in endowment value coming from new donations, investment gains, or investment losses. These changes in value are incorporated slowly into spending levels.

Colleges often change the parameters of their spending formulas, and actual spending varies around planned spending (Brown & Tiu, 2015). This is not surprising, because in theory a simple spending rule is unlikely to solve the complicated intertemporal allocation problem each college faces (Hansmann, 1990; Hoxby, 2015). In practice, college spending appears to respond to the source of capital gains and to respond asymmetrically to gains and losses, which are not components of the typical spending rule (Woglom, 2003; Brown et al.,

⁴Endowment management decisions are made by a combination of a college or university’s governing board and investment committee (NACUBO-Commonfund, 2014). Throughout this study I refer to these entities together as the “college.”

2014). Still, the prevalence of the moving-average formula illustrates the importance of sustaining the value of the endowment while providing a steady and growing stream of payouts.

A college endowment is commonly discussed as a whole, but is actually made up of many separate donations and deposits. Endowed gifts each create a permanent fund. In addition to gift funds, sometimes called “true endowment” funds, around a third of endowment value is in quasi-endowment funds. These are assets kept in the endowment by a resolution of the college’s governing board. The college has only a reversible internal commitment, and no legal obligation, to permanently maintain the value of quasi-endowment funds.

Most of the time, the legal distinction between the endowment as a unit and the endowment as a collection of funds is not economically important. Investment and spending decisions are made at the level of the endowment, so that each fund experiences the same net percent growth. Purpose restrictions of individual gifts are not economically binding except in the rare case where investment income from a gift fund provides the last dollar a college spends on a particular purpose (Ehrenberg, 2009). Similarly, endowment contracts are not a binding reason for colleges to hold savings, since most colleges save additional unrestricted assets in quasi-endowment funds. This study therefore focuses on the choice of how much investment income to spend, rather than the choice of which, if any, endowment contracts to accept.⁵

Sometimes legal constraints on spending from individual gift funds bind and become economically important. Agreements with donors are made at the fund level, but rarely include explicit instructions for spending. State laws interpret donor intent, defining income intended to be spent versus principal intended to be saved. The definition has evolved over time and been codified in two versions of a uniform state law. Both versions were promulgated by the National Conference of Commissioners on Uniform State Laws (NCCUSL, now called the Uniform Law Commission or ULC), a non-partisan, national association of lawyers seeking to unify laws across state boundaries whenever appropriate.

Before 1972, the working definition of endowment income was limited to trust income,

⁵A series of studies including Tobin (1974), Hansmann (1990), Winston (1999), Weisbrod et al. (2008), and Hoxby (2015) discuss objectives that would lead colleges to accumulate endowment assets.

including interest, dividends, rents, and royalties from investments bought with the original gift principal (Budak & Gary, 2010). In 1972 the NCCUSL published the Uniform Management of Institutional Funds Act or UMIFA (NCCUSL, 1972). This predecessor to UPMIFA expanded the definition of endowment income by expressly allowing endowments to pursue and spend capital gains. To protect some concept of permanent principal, the law limited spending to capital gains above “historic dollar value.” The law defined historic dollar value as the original gift amount plus any subsequent donations to the fund, not adjusted for inflation. This created the concept of an underwater fund, worth less than its historic dollar value and therefore yielding no capital gains to spend. The law was enacted nearly universally.

Newer funds with little net nominal growth will fall below their historic dollar values after investment losses. Designating them as underwater, the old uniform law limits spending only from these newer funds even though they tend to have lost the same percent of their real value as older funds. Mainly to address this inconsistency, in 2006 the NCCUSL published UPMIFA (NCCUSL, 2006). UPMIFA ignores underwater funds *per se* and ensures the preservation of each endowment fund using a prudent person standard instead of a sharp, nominal, backward-looking spending limit.⁶

Since there is no clear consensus on endowment management objectives, it is not clear that prudent management of underwater funds implies spending from those funds.⁷

Just after the financial crisis of 2008 led to a large increase in underwater funds, 25 states had not yet enacted UPMIFA. Colleges in these states therefore saw a gap between what their normal spending policies would indicate for the following year’s spending and what

⁶UPMIFA applies to all existing funds, regardless of when they were created. Gilbert & Hrdlicka (2015) discuss the clause in many states’ enacted versions of UPMIFA that sets a sharp limit by establishing a rebuttable presumption of imprudence if a college spends more than seven percent of some measure of current endowment value. Under current practice however, this seven-percent ceiling will rarely be hit as colleges spend closer to five percent of current value. Unrelated to this analysis, UPMIFA updates the law regarding modification of the purpose of smaller and older gift funds.

⁷The law says “In making a determination to appropriate or accumulate, the institution shall act in good faith, with the care that an ordinarily prudent person in a like position would exercise under similar circumstances, and shall consider, if relevant, the following factors: (1) the duration and preservation of the endowment fund; (2) the purposes of the institution and the endowment fund; (3) general economic conditions; (4) the possible effect of inflation or deflation; (5) the expected total return from income and the appreciation of investments; (6) other resources of the institution; and (7) the investment policy of the institution” (NCCUSL, 2006).

prior law allowed. The gap varied across colleges by the amount in underwater funds, which ranged from very little of the endowment to over half of the endowment.

Colleges under prior law had a few options for filling the gap between planned spending and legally allowed spending, including seeking out donors to modify agreements, seeking legal release from agreements with unavailable donors, or limiting spending to trust income (Sare, 2009). Each of these options requires a fundamental change in either the spending or investment plan for each underwater fund. A college could also legally spend more from unrestricted quasi-endowment funds, which can never be underwater. Besides these options within the endowment, the college could seek other revenues or make budget cuts.

Colleges in UPMIFA states could, in addition to all these more difficult options, pursue their definition of prudent spending from underwater funds. The following section lays out a plan for measuring the impact of UPMIFA by comparing spending across colleges.

3. Empirical model

The key parameter to estimate is the difference in spending rates caused by UPMIFA. This could ideally be estimated by directly comparing spending rates from gift funds, particularly underwater funds, while only varying the applicable law. The following empirical model approximates this ideal comparison using the available data and the natural variation in timing of enactment of UPMIFA.

Survey data, which I detail in Section 4, do not include spending rates from individual gift funds or from types of funds. They do include aggregate endowment stocks by type of fund, such as the total value in the endowment, the value in underwater funds, and the value in quasi-endowment funds. The data include aggregate flows at the level of the endowment, such as spending and investment returns. Colleges are observed once per year. I use this information to infer spending rates by estimating the coefficients of the following panel

regression.

$$\begin{aligned}
Spend_{it} = & \sum_{j=0,1,2} \alpha_j Beg.value_{it-j} \\
& \theta UPMIFA_{it} + \zeta Underwater_{it} + \eta UPMIFA_{it} Underwater_{it} + \\
& \mathbf{X}_{it}' \boldsymbol{\beta} + \gamma_i + \delta_t + \varepsilon_{it}
\end{aligned} \tag{1}$$

This regression estimates average spending rate slopes α_0 , α_1 , α_2 , ζ , and η across many colleges i and fiscal years t . γ_i , δ_t , and θ allow for different spending intercepts by college, year, and law. ε_{it} is an idiosyncratic error term. I report results with and without \mathbf{X}_{it} , which includes investment returns broken into positive and negative components, as well as lagged expenses (these measures make up the endowment shocks in Brown et al. (2014)).

This regression mirrors the moving-average formula, where spending is a linear function of current and lagged endowment values. Therefore I expect the sum of the coefficients on lagged endowment values $\alpha_0 + \alpha_1 + \alpha_2$ to approximate the policy spending rate, around five cents per dollar. For colleges that do not using a moving-average formula, current and lagged endowment values and current value in underwater funds control in a simple and flexible way for a college's recent financial history.⁸

Dollars in underwater funds reduce the base available for spending, but only prior to UPMIFA. Therefore I expect the coefficient ζ to equal the negative of the effective spending rate, around negative five cents per dollar. The coefficient η on the interaction term represents how much of this reduction is offset under UPMIFA, and is the focus of this analysis.

η is a triple-difference parameter. θ captures the difference in differences in spending, for colleges in states enacting UPMIFA when underwater funds are zero, and η captures how that difference in differences varies by the amount in underwater funds at the time of enactment. If the effect of UPMIFA operates only through underwater funds, then $\theta \approx 0$ in the presence of the interaction term.

⁸This empirical model makes particular choices that can be relaxed in robustness checks. In Appendix A I allow for varying effects of UPMIFA in the post-enactment period, and use alternative measures of spending.

To interpret η as the causal impact of UPMIFA on spending from underwater, there must be parallel differences in differences in spending, absent the policy change, at all levels of underwater funds. This assumption fails if the effect of UPMIFA is heterogeneous and associated with the timing of enactment. In Section 4 I provide some evidence for similarity across colleges in states that enact UPMIFA at varying times, and for parallel trends in spending, but the parallel differences in differences assumption is not directly testable.

The assumption breaks down under policy endogeneity, or any sort of selection into enactment timing that is associated with potential differences in differences. Suppose after the drafting of UPMIFA, some colleges advocate more strongly for enactment because they are more inclined to take advantage of UPMIFAs added flexibility and spend more from underwater funds. If they succeed and their states enact UPMIFA earlier, then there are no longer parallel differences in differences across early- and late-enacting states.

This story seems unlikely for a few reasons. First, advocacy by colleges was not the main determinant of variation in enactment timing. Members of the drafting committee of UPMIFA emphasized that the law was typically disseminated to legislators by lawyers and national organizations, not by colleges (personal communication with Susan Gary and Sheldon Kurtz). State legislatures meet for different periods of the year, have different non-endowment-related priorities, and follow idiosyncratic conventions in setting the effective dates of new laws.⁹

Second, earlier enactments need not reflect variation in colleges' preferences for spending under UPMIFA. Earlier enactments could reflect the preferences of state legislatures for increased spending, which colleges could choose to ignore. The complexity of the issue was on display in Massachusetts, a state where lawmakers had previously criticized endowments for spending too little, but where UPMIFA was enacted relatively late (Hechinger, 2008). Small non-educational endowments advocated for UPMIFA, while one large private college endowment cited the negative impact of prior law on spending, yet had not advocated for UPMIFA (Hechinger & Levitz, 2009). Third, successful advocacy by colleges, if it occurred,

⁹For example, Oregon's enactment was moved along by a ULC member who filed it as an Oregon Law Commission bill rather than the more typical route of filing it as a State Bar Association bill, which given the timing of ULC's publication of UPMIFA would have required waiting until the next legislative session (personal communication with Susan Gary).

could be a function of their size and resources, rather than any differential preference for additional spending under UPMIFA.

Most states saw fit to enact UPMIFA before the financial crisis, when underwater funds were nearly zero, and all states enacted it at some point. Within such a short time span for all state legislatures to enact UPMIFA, small differences in timing of enactment could arise even without any differences in preferences across colleges or state legislatures.¹⁰

There may however be differences across colleges in the impact of UPMIFA that are not associated with the timing of enactment. In a supplemental analysis, I allow for heterogeneity in effects by observable characteristics of colleges that may lessen the impact of UPMIFA. I add terms to Equation (1) to measure heterogeneity in the effect along these dimensions.

$$\begin{aligned}
Spend_{it} = & \sum_{j=0,1,2} \omega_j Beg.value_{it-j} + \\
& \xi UPMIFA_{it} + \chi Underwater_{it} + \nu UPMIFA_{it} Underwater_{it} + \\
& \pi P_i UPMIFA_{it} + \phi P_i Underwater_{it} + \psi P_i UPMIFA_{it} Underwater_{it} + \\
& \mathbf{X}_{it}' \boldsymbol{\mu} + \iota_i + \tau_t + \epsilon_{it}
\end{aligned} \tag{2}$$

The additional terms interact the key underwater and legal terms with a time-invariant measure P_i . P_i can represent the percent of college i 's operating expenses covered by endowment spending. Colleges that rely more heavily on the endowment may make smaller cuts in spending under prior law. P_i can also be an indicator for the use of special appropriations from the endowment. Colleges sometimes draw special appropriations outside the normally reported spending rate. Since many colleges never do this, Brown & Tiu (2015) interpret colleges that do draw special appropriations as having more flexible control over

¹⁰The error term ϵ_{it} also contains omitted factors such as idiosyncratic opportunities for “intellectual venture capital investments” that compete for resources with market investments, making colleges want to spend resources rather than keep them in the endowment (Hoxby, 2015). There is no reason to believe these opportunities would arrive at differential rates that coincide with the enactment of UPMIFA and underwater funds. Many other omitted factors affect endowment management choices, including how a college’s close competitors manage their endowments (Goetzmann & Oster, 2015). These are also unlikely to be timed coincidentally with UPMIFA. If a college’s in-state competitors are affected by UPMIFA itself, which in turn affects the college, this can be thought of as a component of the reduced-form effect of UPMIFA being effective in the state.

spending. Most importantly, P_i can represent the percent of endowment dollars in quasi-endowment funds, which are not subject to the constraints imposed by state laws.

In this extended regression ξ , χ , and ν represent impacts for colleges with $P_i = 0$. π , ϕ , and ψ represent the differential impact for a unit increase in P_i . In all cases, I expect higher P_i to shrink the effect of underwater funds and therefore shrink the gap in spending across colleges under different laws. Then $\phi > 0$ and $\psi < 0$.

Estimating these regressions requires data on college endowments during a period when variation in underwater funds and legal changes allow for identification.

4. Data and descriptive statistics

This study focuses on private, non-profit, four-year colleges and universities. These are the colleges where endowments are the most important to the budget and where endowments commonly support a single college campus. More important, public colleges and universities receive state funding determined by the same central authority for many colleges in a state, often for multiple years at a time. If state budgets affect endowment spending, this increases the likelihood of confounded differences in differences in endowment spending across states and years.

Data come from the National Association of College and University Business Officers (NACUBO), the Commonfund Institute, and the Integrated Postsecondary Education Data System (IPEDS). The NACUBO-Commonfund Study of Endowments (NCSE) provides data on spending, investment returns, and asset valuations for each college's endowment each fiscal year.¹¹ IPEDS adds general college characteristics and finances. The NCSE began measuring underwater funds at the beginning of fiscal 2005, so the sample for this study begins then and extends through fiscal 2013, covering the final state enactment of UPMIFA. A total of 522 colleges have sufficient data to appear in the panel sample. The sample is skewed toward colleges with larger endowments and the resources to provide data.

¹¹UPMIFA also impacted charitable endowments outside of higher education. Endowments of churches, museums, and community organizations tend to be smaller than those of colleges (Fisman & Hubbard, 2003). Smaller endowments tend to be made of up newer funds, meaning they had higher concentrations of underwater funds after the financial crisis. Without a targeted survey like the NCSE, these organizations are harder to study.

Appendix B includes further details on the data sources and sample, and Appendix C includes detailed data definitions.

The average endowment in the panel sample is summarized in the first column of Table 1. The top three rows report averages over pre-financial-crisis fiscal years 2005 to 2008. The average college holds \$368.6 million in its endowment.¹² An average spending rate of 4.8 cents per dollar covers an average of 9.8 percent of the college’s operating expenses.¹³ The next three rows report post-financial-crisis observations. Including the rebound in stock prices late in fiscal 2009, average investment returns over fiscal 2009 were still well below zero, at -19.0 percent. This led to 17.4 percent of endowment value being in underwater funds by the end of fiscal 2009. The amount in quasi-endowment funds is first reported in 2009, so I include the post-crisis average here as a measure of quasi-endowment for each college. The average endowment is made up of 31.4 percent quasi-endowment. Finally, covering all years in the sample, 39.3 percent of colleges ever drew special appropriations.

Figure 1 shows the progression of investment, spending, and underwater funds over time, averaging over all colleges in the sample each fiscal year. As investment returns fluctuate, spending stays relatively smooth. Underwater funds increase with a lag after investment losses, and decrease with a lag after investment gains. While these aggregate trends are consistent with stated spending formulas, actual spending often varies around planned spending. Central to this study, legal constraints can be one reason for this variation.

Every state during 2005 to 2013 was subject to one of two rules on spending from underwater funds. Table 2 lists the effective date of the move to UPMIFA for all states. It also lists the lag between signing (when UPMIFA is passed by the legislature and signed or otherwise approved by the governor) and the effective date of the law.¹⁴

¹²All measures are in current dollars. The regression results are robust to estimating in constant 2013 dollars using the Higher Education Pricing Index for private colleges.

¹³A college’s operating expenses include direct costs to provide education, for example paying salaries, but do not include taxes or debt service.

¹⁴Only three states did not enact the old uniform law: Alaska, South Dakota, and Pennsylvania (Arnold & Porter, LLP, 2009; Budak & Gary, 2010). Alaska never enacted the old law, but no colleges from Alaska appear in the panel sample (Alaska State Legislature, 2010). South Dakota did not use the title of the old uniform law, but prohibited spending from funds below historic dollar value (South Dakota State Legislature, 2000). In this analysis I treat Pennsylvania and Florida as the earliest adopters of UPMIFA, because in 1998 and 2003 they enacted legislation ignoring historic dollar value and imposing a prudence standard for spending (Pennsylvania State Legislature, 1998; Florida State Legislature, 2003). Florida later enacted

A key decision for this analysis on yearly data is how to define $UPMIFA_{it}$ to accurately measure when the law impacts colleges. State laws apply at the time of appropriation for spending, a planning period that precedes actual expenditure (Budak & Gary, 2010). Rogers (2012) surveyed 23 private liberal arts colleges and found that they appropriate an amount to be spent from the endowment prior to the beginning of the fiscal year, and do not change that amount. This happens far enough in advance of the new fiscal year that some forecasting of investment returns and donations is required to know the beginning-of-year endowment value. In contrast, Brown et al. (2014) find that endowment spending at doctoral universities reacts to contemporaneous investment returns, particularly losses. Neither study directly addresses the process required to react to a new law.

The drafting committee of UPMIFA expected that there would be heterogeneity across colleges in reaction time (personal communication with Sheldon Kurtz). Large endowments would be most aware of legal developments, as they have greater resources devoted to managing the endowment and greater dependence on endowment revenue. But larger endowments also tend to be older and less exposed to underwater funds. Smaller endowments typically heard about the law through non-profit trade publications or their legal counsel, months after it was enacted in their state.¹⁵ In all cases, UPMIFA provides less guidance than prior law, and should initiate a rethinking of what prudent management means. Therefore it could require time incorporate UPMIFA into practice. However colleges may predict the law with certainty in cases where there is a long lag between the date of signing and the effective date.

Taking all of this into account, I define $UPMIFA_{it}$ to indicate that the law is effective on or before July 1 of year $t - 1$, the typical beginning of the fiscal year, and is signed into law at least three months prior.¹⁶ Given the heterogeneity across colleges, any setting will have some measurement error, which will attenuate estimated impacts of UPMIFA. In

UPMIFA. These two states are coded as always under UPMIFA in the regressions, and are grouped with the earliest enacting states in the tables and figures.

¹⁵For example, Quinn (2009) points out the immediate accounting implications of UPMIFA, but also says that changing spending in response would require action by the governing board.

¹⁶According to NCSE responses, 77 percent of college-year observations in the panel analysis sample begin the fiscal year on July 1, and 20 percent begin on June 1.

Appendix A I present results with an alternative definition that ignores the signing date.

States can be divided into enactment cohorts by their first year with UPMIFA effective under this definition. In the regression analysis, college fixed effects control for any level differences across cohorts. However it can be instructive to look for differences across cohorts that suggest enactment timing could be systematically associated with the potential effect of UPMIFA. For the following descriptive statistics, the 2008 cohort also includes earlier enactments and the 2012 cohort also includes later enactments.

In Table 1 there are some differences across cohorts. An F -test of equality in means across cohorts is rejected for spending rate and the percent in quasi-endowment. However there are no monotonic trends, and in a regression predicting cohort year, only percent in quasi-endowment is significant (with a positive relationship with cohort year, indicating colleges with more quasi-endowment funds were in later-enacting states). The lack of any significant variation across cohorts in either average investment rate of return or average percent in underwater funds suggests the financial crisis had a consistent impact on the average college in each cohort.

In the United States map in Figure 2, darker shades of gray mark later enacting states. The map shows that each cohort is geographically diverse. Again this shows differences across cohorts, but no clear systematic trends. Figure 3 reports the mean spending by year and enactment cohort in the panel sample. There is some evidence for parallel trends in the pre-UPMIFA period. Some of the noise in this figure comes from colleges entering and leaving the sample. The evidence for a difference in differences in spending caused by UPMIFA is not immediately evident from the figure. The regressions in the next section focus in on colleges and years where UPMIFA should have the an impact on spending through underwater funds.

5. Effects of UPMIFA and underwater funds

Overall I find that colleges cut spending from underwater funds when legally required to, but that UPMIFA allowed colleges to avoid these cuts. These conclusions are based on statistically significant estimates that are robust to adding covariates.

Regression results appear in Table 3. Standard errors in parentheses allow for arbitrary

correlation within each state to account for two features of this analysis. Legal changes happen at the state level, and serial correlation of error terms within a state is likely (Moulton, 1986; Bertrand et al., 2002).

The dependent variable of spending is measured in millions of dollars. Therefore the coefficient on the indicator term $UPMIFA_{it}$ represents the million-dollar change in spending level when the indicator is on. Continuous independent variables are measured in hundreds of millions of dollars so that their coefficients represent the cent change in spending, in response to a one dollar increase in the independent variable. This is analogous to a spending rate in percentage points.

Summing the coefficient estimates on the endowment values suggests that colleges spend an average of 6.37 cents per dollar of a moving average, higher than what colleges report for policy spending rates. This is conditional on college and year fixed effects, which take out level differences in spending. Similar sums appear in all of the regressions reported.

The coefficient estimate on underwater funds implies a 4.71 cent decrease in spending for each dollar in underwater funds, nearly equal to the estimated moving-average spending rate. This is consistent with colleges complying with the old uniform law and not spending from underwater funds.

UPMIFA causes these cuts to be offset completely by a 6.07 cent per dollar increase in spending from underwater funds. The coefficient on underwater funds and the coefficient on underwater funds interacted with UPMIFA sum to 1.4, but I cannot reject that this sum is zero. Therefore colleges under UPMIFA spend no more or less in years with underwater funds. UPMIFA takes away the legal importance of underwater funds relative to prior law, and this is borne out in spending behavior. As expected, the difference-in-differences term in this regression is small and not statistically significant.

The covariates leave the main results intact. The coefficients on the covariates suggest higher spending following investment fluctuations, even after conditioning on endowment value. Lagged expenses do not appear to have a consistent relationship with endowment spending.

In the specification with covariates, the estimated increase in spending from underwater funds under UPMIFA is 6.12 cents per dollar. This is 28 percent larger than the average

effective spending rate in the sample. Therefore when underwater funds made up 17.4 percent of the endowment as they did at the beginning of fiscal 2010, UPMIFA allowed for 22 percent more spending (128 percent times 17.4 percent).

Taking account of the effects of the financial crisis on endowment spending in fiscal 2010, the effect of underwater funds combined with late enactment of UPMIFA were larger for the average college than the direct effect of investment losses. For a typical college that plans spending using a three-year moving-average rule, the 19.0 percent drop in asset values in fiscal 2009 would lead to a 6.3 percent drop in spending in fiscal 2010, smaller than the 22 percent gap imposed by UPMIFA.

Several robustness checks are presented in Appendix A. The results are generally robust to alternative definitions of the $UPMIFA_{it}$ variable. The main results also hold when spending is measured in terms of deviations from planned spending, as calculated from reported spending formulas. The main results are robust to several methods of weighted least squares estimation to deal with heteroskedasticity.

The main results do not hold when spending and underwater funds are normalized by a measure of endowment size, and investment returns are normalized by lagged operating expenses. Here the estimated impacts of underwater funds and UPMIFA are much smaller and the effect of UPMIFA is not statistically significant. One reason for this change is that the normalizations potentially reduce the influence of large endowments. The smaller impacts of laws regarding underwater funds are consistent with smaller endowments having lower levels of resources to adjust spending and lower levels of monitoring for compliance. Unfortunately the process of implementing UPMIFA and prior law, and the level of monitoring for compliance, are not observable. The following section explores differences in impacts of UPMIFA along some observable measures.

6. Heterogeneous effects of UPMIFA and underwater funds

Increased spending from underwater funds under UPMIFA means that prior law was a binding constraint. In this section I explore characteristics that would lower the shadow price of that constraint, to see if colleges with those characteristics reacted differently to UPMIFA.

As discussed in Section 2, some colleges have access to other sources of spending within

the endowment such as special appropriations and spending from quasi-endowment funds, to offset the legally required cuts in spending from underwater funds. Colleges that rely more heavily on their endowments to cover operating expenses may also be more likely to find offsetting sources of endowment revenue.

Table 4 shows the results from estimating Equation (2). The definitions and means of the P_i variables are reported in Table 1. Percent of operating expenses covered by endowment spending and the use of special appropriations have a correlation of 0.21 across colleges. Percent in quasi-endowment funds has a correlation of -0.12 with percent operating of expenses covered and a correlation of -0.14 with special appropriations. While percent of operating expenses covered is positively correlated with endowment size at 0.19, the others are not substantially correlated with endowment size in the panel sample.

Colleges that cover more of their expenses with endowment spending make significantly smaller cuts to spending from underwater funds ($\phi = 0.78$), but this does not significantly differ based on UPMIFA ($\psi = -0.59$). Colleges that draw special appropriations are also estimated to make smaller cuts to spending from underwater funds, which is offset by UPMIFA, but neither estimate is significant ($\phi = 4.00$ and $\psi = -3.77$).¹⁷

There is no evidence of a lessened impact of UPMIFA by percent in quasi-endowment funds. The sign on ψ is positive, suggesting colleges with more quasi-endowment funds are actually more affected by differences in state laws. However ψ is small and not significantly different from zero. In all three of these specifications, for the college at the sample average $P - i$ there is still a significant increase in spending from underwater funds caused by UPMIFA.

Spending down quasi-endowments is a clearly legal way to avoid reduced overall spending under prior law, yet colleges do not appear to do so. Colleges that have more quasi-endowment value may be more inclined to save generally. They treat unrestricted assets as permanent funds by placing them in their endowments, and they appear to continue to preserve the value of quasi-endowment funds at the expense of lost endowment revenue.

Keeping unrestricted funds saved in the endowment even when other revenues are down

¹⁷Appendix A contains an additional test for heterogeneous effects across colleges using different spending formulas. There is not strong evidence of differential effects of UPMIFA based on spending formulas.

is consistent with building the endowment for its own sake, or endowment hoarding (Hansmann, 1990; Brown et al., 2014). Keeping unrestricted funds in the endowment could also be consistent with the model in Hoxby (2015) where colleges accumulate endowment funds and expend them based on the flow of profitable opportunities to invest in intellectual capital, if market investments were seen to have relatively high growth potential after the financial crisis.

7. Discussion and conclusion

UPMIFA afforded colleges greater flexibility and responsibility to choose how to fulfill donor intent. Private colleges used this flexibility to draw 22 percent more endowment revenue in the year following the financial crisis. For the average college, 22 percent of endowment spending translates to roughly 2 percent of the yearly budget. Spending gaps across states soon closed as proportions in underwater funds decreased and all states enacted UPMIFA.

The most likely reason that prior law was binding is that UPMIFA, like the prior uniform law when it was introduced, represented an overdue update. The gradual development of prudent management in practice was captured in an abrupt change in law.

This episode provided an opportunity to learn how colleges manage resources under constraints. Colleges that had placed larger amounts in quasi-endowment funds were no less likely, and perhaps even more likely, to feel the effect of legal constraints. This suggests colleges view quasi-endowment funds as permanent funds themselves, not as sources of insurance against unavailability of other endowment income. This is part of the empirical definition of prudent management of endowment funds.

While endowment decisions reveal part of how colleges manage resources, this study does not address how other revenues and expenses react to changes in endowment revenue. During the brief period when legal variation and underwater funds coincided, many other changes were occurring, making it empirically difficult to trace the redistribution of a few percentage points of the larger budget.

Brown et al. (2014) show how doctoral university operations were affected by shocks to endowment revenue in the 1990s and early 2000s. Universities tended to cut support staff

and tenure-system faculty after investment losses, without increasing them after investment gains. Brown et al. (2015) show that colleges and universities also tend to receive more donations after investment losses. An important avenue for future research is to show the effects of colleges' financial and hiring inputs on student achievement outcomes.

Policymakers and the public who are concerned about these outcomes often disagree with how private colleges manage endowment funds. Typically these observers call for increased spending to help lower the price or increase the quality of education for today's students, without providing a normative model of how endowments and other resources should be allocated across all students. UPMIFA removed one barrier to increased spending, the zero percent ceiling on spending rates from underwater funds. Other proposals have called for a five percent floor on effective spending rates from all endowment funds (Wolf, 2011). Such proposals would move away from the prudent person standard of UPMIFA and prior state laws, would be unlikely to solve a college's complicated intertemporal allocation problem, and could prevent colleges from upholding donor agreements to maintain permanent funds.

Without calling for minimum payouts, researchers have also normatively questioned how endowments are managed (Hansmann, 1990). Aggregate empirical results have shown several cases of lower spending than expected, including Woglom (2003), Brown et al. (2014), and the normalized specification in this paper which finds no evidence of increased spending under UPMIFA. Since UPMIFA provides few clear standards, it may be difficult to identify and prevent individual cases of imprudently low spending.

All state legislatures now agree on the definition of prudent management of endowments. But at a crucial moment, the old definition limited spending more than did colleges' notions of prudence, and briefly prevented colleges in late-enacting states from providing for scholarships, salaries, and other expenses supported by endowments.

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Appendices

A. Robustness checks

This appendix reports robustness checks related to the timing of UPMIFA and its effects, to spending formulas, and to endowment size.

Estimating Equation (1) yields the average impact of UPMIFA in the period after enactment. However, the effects could vary over time. For example, spending could grow over time as more colleges implement new spending policies under UPMIFA. Alternatively, increased spending could be localized to the first year after enactment, if colleges decide it is prudent to temporarily spend more from underwater funds to compensate for foregone spending in years under prior law. I estimate how the effects are distributed over the years after UPMIFA's enactment in an event study, expanding the $UPMIFA_{it}$ term from Equation (1) into multiple terms $UPMIFA_{it}^k$. For $k = 1, 2, 3, 4+$, $UPMIFA_{it}^k$ is an indicator that year t is the k th year UPMIFA has been in effect in the state of college i . These terms are also interacted with underwater funds in year t . Table 5 shows the results of estimating this specification. There are positive and significant impacts of UPMIFA in all years after enactment. Overall there does not appear to be a trend in impacts. The coefficients on the interaction terms are not statistically significantly different from each other.

Section 4 discusses the definition of the $UPMIFA_{it}$ indicator, which is equal to 1 in fiscal year t if UPMIFA is effective by the beginning of the fiscal year, and was signed into law at least three months prior. Table 6 reports the results of estimating the event study using an alternative definition that removes the condition on the signing date. The effect of UPMIFA on spending from underwater funds is smaller on average, and is nearly zero in the first year. This suggests that colleges in late-signing states may not react to the law in the first year it is effective, when it is signed into law too late to affect budgeting for the fiscal year.

I argue that since spending formulas change often and need not be followed, the most important outcome is a direct measure of actual spending. However UPMIFA's impacts may manifest differently across colleges that use different spending formulas. Colleges that consistently report using a moving-average formula represent 55 percent of colleges in the sample. They tend to be smaller than non-users in size, but have pre-crisis effective spending rates that are nearly identical to non-users. Table 7 reports the results of estimating Equation (1) when dividing the sample into moving-average users and others. The conclusions in both groups are similar to the main conclusions in Section 5. However the reduction in spending from underwater funds under prior law is significantly stronger among the group with less consistent use of the moving-average formula. This is consistent with moving-average users being more likely to follow their formulas even in the presence of underwater funds.

Where there is enough information I use lagged endowment values and reported spending formulas to calculate the planned spending implied by moving-average formulas. In doing so I ignore the potential effects of underwater funds. Similar to Brown et al. (2014), I can calculate the difference between actual spending and an estimate of planned spending. The median observable deviation is zero dollars, and half of all deviations are between -0.5 percent and 0.5 percent of beginning endowment value. Table 7 reports estimates of the main regression specification, centering the outcome measure around planned spending, similar to Table 5 of Brown et al. (2014). The key coefficients have the same signs and

similar magnitudes to the main results in Table 3. This supports the main finding that underwater funds caused reductions in spending, but only under prior law.

All regression analyses so far have measured endowment stocks and flows in terms of dollars. Equation (1) then reflects the way that spending is commonly chosen in practice, by applying constant policy spending rates to current and lagged endowment values. The regression averages across colleges with varying spending rates, and recovers the difference in spending rates from underwater funds between UPMIFA and prior law. Another way to estimate the equation is to look for UPMIFA's impact on spending rates directly. This approach divides spending and underwater funds by the current endowment value, instead of including current and lagged values in the regression. A more appropriately scaled set of covariates includes investment returns divided by the prior year's operating expenses, to create the endowment shock variables defined by Brown et al. (2014).

Table 8 shows the results of estimating Equation (1) with scaled measures. The interpretation of coefficients is not as clear as with dollar measures, but coefficients should be of the same signs and similar magnitudes. For example, a coefficient of -4.8 on the fraction of endowment value in underwater funds would imply that if all funds were underwater, then the spending rate would be reduced by 4.8 percentage points (to zero for an average college). The estimated coefficient of -0.8 to -0.6 on the fraction underwater is about 15 percent as large as expected. The estimated coefficient on the interaction term with UPMIFA is smaller still, and not statistically significant.

The main analysis includes controls for endowment size, but normalizing dollar measures further reduces the influence of large endowments. The distribution of endowment size is highly skewed, with the largest endowments over 100 times larger than the median endowment. The distribution of dollars spent in the main results is not skewed, after the regression conditions out current and lagged endowment values, college fixed effects, year fixed effects, and covariates. However there are both positive and negative outliers driven by large endowment values. The distribution of spending rates has much tighter bounds and few outliers.

The much smaller estimates in the normalized regression are therefore consistent with the largest endowments driving the estimated effect of UPMIFA. When estimating the regression in various subsamples by endowment size, the coefficients do not have a clear monotonic pattern, but are generally larger among large endowments. This could be explained by larger endowments having more resources to shift spending in compliance with prior law, or more monitoring that would enforce compliance with prior law.

Normalizing dollar measures makes the specification more comparable to that of Brown et al. (2014). In Brown et al. (2014), both positive and negative endowment shocks lead to decreases in spending rates, among doctoral universities before 2008. In Table 8, the coefficients suggest the opposite, among private colleges and universities during the period of this study.

Brown et al. (2014) show that endowment shocks predict spending rates under a range of assumptions about a college's treatment of underwater funds before UPMIFA. In the second column of Table 8 the effects of underwater funds, UPMIFA, and endowment shocks can be directly compared. The effect of underwater funds under prior law has the highest point estimate, but the differences in magnitudes are not statistically significant. This suggests that underwater funds are at least as important an explanation for decreased spending as

endowment shocks in this sample.

B. Data sources and sample selection

Under a restricted-use data agreement, NACUBO and Commonfund provided college-identified data from their yearly surveys of endowments. These surveys include the NACUBO Endowment Study and the Commonfund Benchmarks Study series of Educational Endowment Reports. In fiscal 2009 these series combined to form the NACUBO-Commonfund Study of Endowments (NCSE). For brevity I refer to all of these surveys as the “NCSE.” For more information on data collection and definitions, see NACUBO-Commonfund (2014).

IPEDS is publicly available. Reporting to IPEDS is mandatory for any college with students that receive federal financial aid, and IPEDS therefore achieves a larger sample coverage than the endowment surveys.

Using data from IPEDS, Table 9 compares the panel sample used in this study, to the population of endowments at private, non-profit, four-year colleges and universities in the United States. Relative to the population, the sample is skewed toward larger endowments both at the mean and median. The sample covers 39.1 percent of colleges in the population, but 671.3 percent of the endowment dollar value in the population. The endowment-to-expense ratio in the sample is higher, at 2.23 versus 1.69. The panel contains a much smaller proportion of colleges in the “Other” Carnegie classification, which includes medical colleges, engineering schools, and theological seminaries. The remaining colleges are distributed in similar proportions across Baccalaureate, Masters, and Doctoral institutions.

Missing yearly data within colleges in the sample do not appear to bias results. Similar conclusions can be drawn from estimating Equation (1) with a balanced sample (results not shown). There is no evidence that a college-year observation appearing the sample is associated with UPMIFA, conditional on endowment values and college and year fixed effects.

C. Selected variable definitions

Endowment value includes permanent funds including cash, securities, and property, whose income finances operations. This includes **true endowment funds** perpetually bound by gift instruments, as well as quasi-endowment funds and term endowment funds. **Quasi-endowment funds** function as endowment by the vote of the governing board. **Term endowment funds** function as true endowment funds for a period of time, after which they can be spent or remain in the endowment as quasi-endowment funds. This study does not distinguish between term endowment funds and true endowment funds, nor between expired term endowment funds and other quasi-endowment funds.

About 80 percent of colleges reporting to the NCSE in any given year employ a **moving-average spending formula**. Dollars spent $Spend_{it}$ is a linear function of current and lagged endowment values. If the college uses a yearly frequency for n years and a constant policy spending rate s , then the function is $Spend_{it} = s \frac{1}{n} \sum_{j=0,1,\dots,n-1} Beg.value_{it-j}$.

An **underwater fund** is a donated gift fund whose current value is below its historic dollar value (HDV), the nominal value at donation. The total value in these funds constitutes $Underwater_{it} = \sum_{f \in Endmt.it} Beg.value_{ft} \mathbf{1}\{Beg.value_{ft} < HDV_f\}$, for all gift funds

f in the endowment of college i at the beginning of fiscal year t , where $\mathbf{1}\{\cdot\}$ is an indicator function equal to 1 if the inequality is true and 0 otherwise.

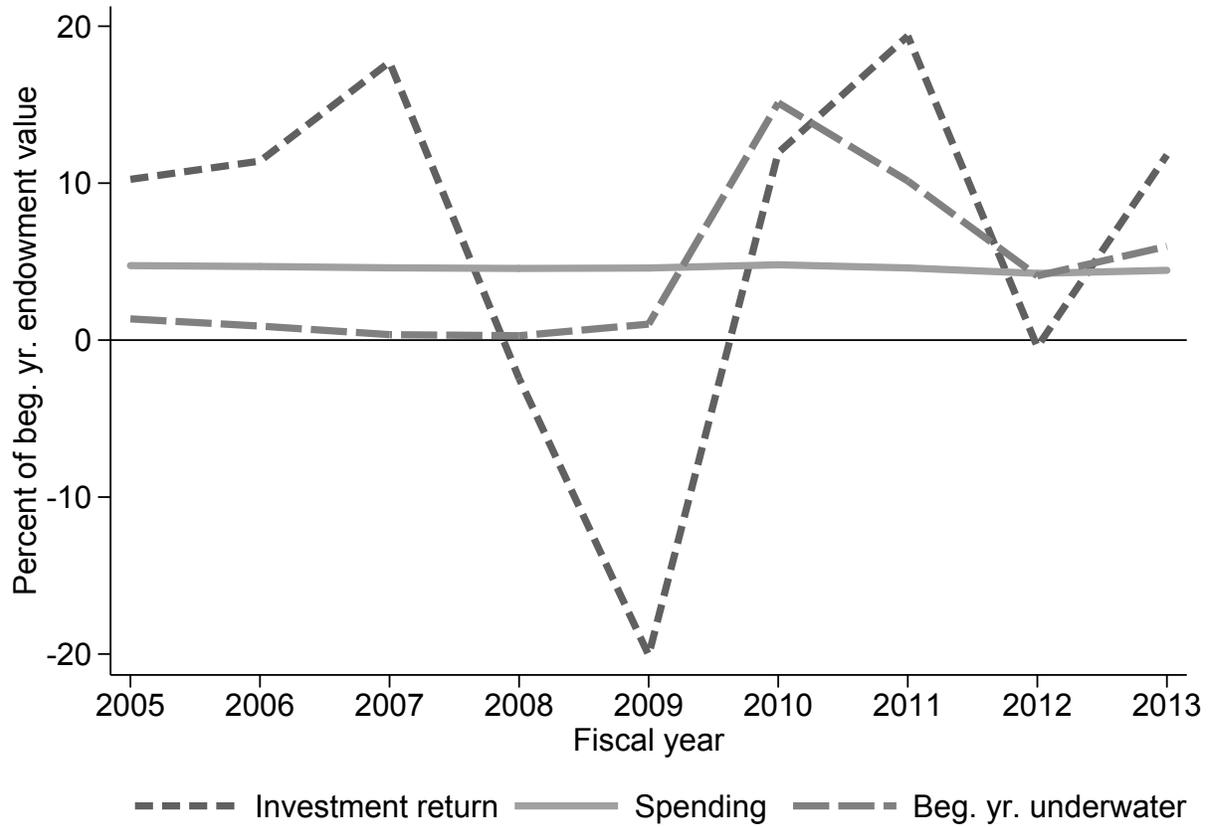
Investment returns are net of management and administrative costs. Investment returns during fiscal year t can be broken into a positive component $Return_t^+ = \max\{0, Return_t\}$ and a negative component $Return_t^- = \min\{0, Return_t\}$.

Operating expenses include direct costs to provide education, for example paying salaries, but do not include taxes or debt service.

Special appropriations are defined by each college. Some colleges may spend an unusually large amount, but simply report it in their effective spending rate without designating it a special appropriation.

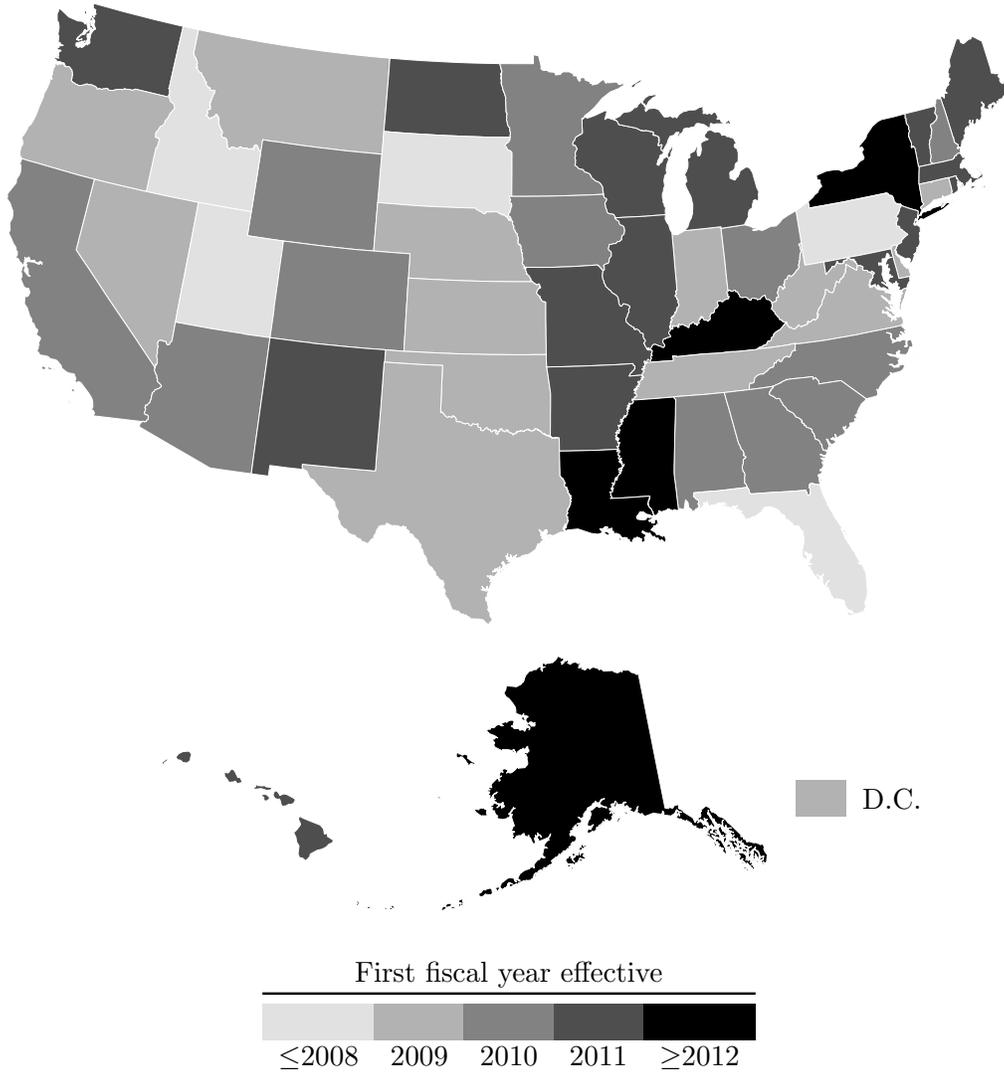
Figures and tables

Figure 1: Trends in mean endowment rates, 2005–2013



Source: NCSE.

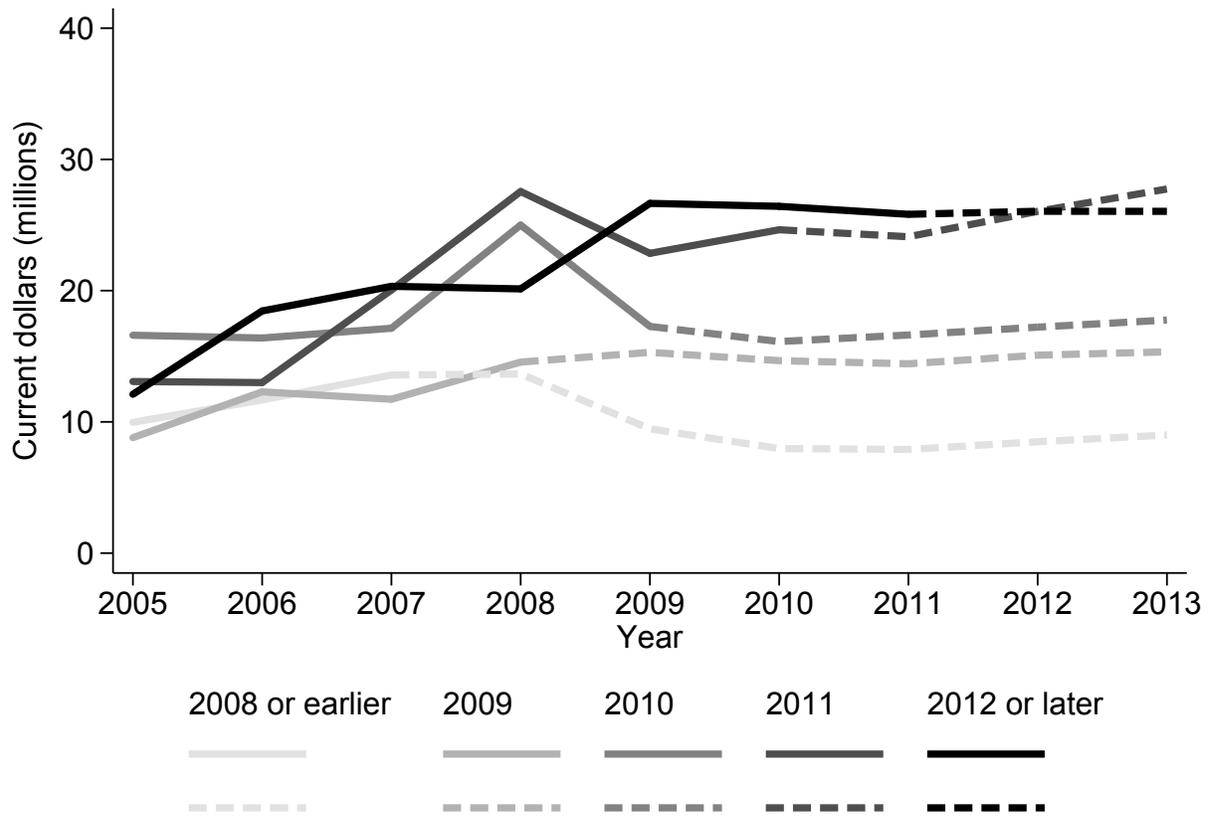
Figure 2: Map of UPMIFA enactments by state



Source: state laws.

Enactment cohorts are defined by the first fiscal year UPMIFA was effective in their state in time to affect spending plans. The 2008 cohort also includes earlier enactments, and the 2012 cohort also includes later enactments.

Figure 3: Trends in spending levels by enactment cohort, 2005–2013



Source: NCSE.
Dotted lines represent fiscal years under UPMIFA.

Table 1: Mean values for UPMIFA enactment cohorts

(shades correspond to Figures 2 and 3)		≤2008	2009	2010	2011	≥2012
Enactment cohort	All					
Number of colleges	522	65	106	142	146	63
<i>Pre-financial-crisis, 2005–2008 average</i>						
Endowment (\$M beginning of year)	368.6	226.8	242.3	367.7	478.7	393.9
Effective spending rate (% of endowment) ***	4.8	4.3	5.4	4.7	4.5	5.1
Operating expenses covered (% of expenses)	9.8	7.9	11.8	9.3	8.9	11.3
<i>Post-financial-crisis (% of endowment)</i>						
Investmt. return fiscal 2009	−19.0	−18.9	−18.2	−18.9	−19.5	−19.2
Underwater end fiscal 2009	17.4	15.9	18.1	18.2	15.4	20.4
Quasi-endowment, 2009–2013 average ***	31.4	36.2	25.5	25.3	37.0	35.3
<i>Over entire sample</i>						
Ever used special appropriations (% of colleges) *	39.3	27.7	45.3	41.8	34.2	47.6

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$ for F -test of equality across cohorts.

Source: NCSE.

Enactment cohorts are defined by the first fiscal year UPMIFA was effective in their state in time to affect spending plans. The 2008 cohort also includes earlier enactments, and the 2012 cohort also includes later enactments.

Table 2: Effective dates of UPMIFA, and lag in days between signing into law and effective date

State	Year	Month	Day	Lag	State	Year	Month	Day	Lag
Alabama	2009	Jan	1	245	Montana	2007	Oct	1	151
Alaska†	2010	Sep	8	61	Nebraska	2007	Sep	1	150
Arizona	2008	Sep	26	165	Nevada†	2007	Oct	1	140
Arkansas	2009	Jul	30	154	New Hampshire	2008	Jul	1	41
California	2009	Jan	1	93	New Jersey	2009	Jun	10	0
Colorado	2008	Sep	1	133	New Mexico	2009	Jul	1	85
Connecticut	2007	Oct	1	188	New York	2010	Sep	17	0
Delaware†	2007	Jul	31	13	North Carolina	2009	Mar	19	0
Florida	2003	Jul	1	0	North Dakota	2009	Apr	21	0
Georgia	2008	Jul	1	56	Ohio	2009	Jun	1	146
Hawaii	2009	Jul	1	12	Oklahoma	2007	Nov	1	181
Idaho	2007	Jul	1	97	Oregon	2008	Jan	1	193
Illinois	2009	Jun	30	0	Pennsylvania	1998	Dec	21	0
Indiana	2007	Jul	1	51	Rhode Island	2009	Jun	30	0
Iowa	2008	Jul	1	81	South Carolina	2008	Jul	1	20
Kansas	2008	Jul	1	96	South Dakota	2007	Jul	1	121
Kentucky	2010	Jul	15	112	Tennessee	2007	Jul	1	44
Louisiana	2010	Jul	1	22	Texas	2007	Sep	1	78
Maine	2009	Jul	1	12	Utah†	2007	Apr	30	54
Maryland	2009	Apr	14	0	Vermont	2009	May	5	0
Massachusetts	2009	Jun	30	-2	Virginia	2008	Jul	1	120
Michigan	2009	Sep	10	0	Washington	2009	May	11	0
Minnesota	2008	Aug	1	113	West Virginia	2008	Jun	3	68
Mississippi	2012	Jul	1	76	Wisconsin	2009	Aug	4	15
Missouri	2009	Aug	28	49	Wyoming†	2009	Jul	1	111
D.C.	2008	Jan	23	65					

† No colleges from the state appear in the panel sample.

Source: State legislative records.

“Lag” is the number of days after the bill becomes law, before it becomes effective. A negative lag indicates a retroactive effective date. The dates for Florida and Pennsylvania refer to the first appearance of a law with similar provisions to UPMIFA. In Florida, UPMIFA itself was later enacted.

Table 3: Effects of UPMIFA and underwater funds on endowment spending

Dependent variable: endowment spending (\$M)				
Parameter	Coeff.	(SE)	Coeff.	(SE)
Beginning-of-year endowment value (\$100M)				
Current year	2.59***	(0.65)	3.44***	(1.03)
Lagged one year	1.73***	(0.28)	1.59	(1.21)
Lagged two years	2.05***	(0.32)	1.38***	(0.28)
UPMIFA	-0.38	(0.51)	-0.32	(0.43)
Underwater (\$100M)	-4.71***	(1.60)	-5.11***	(1.75)
UPMIFA * underwater	6.07***	(2.12)	6.12***	(2.13)
Investment returns (\$100M)				
Current year, positive	2.28**	(1.02)		
Current year, negative	-1.69**	(0.70)		
Lagged one year, positive	1.88	(1.41)		
Lagged one year, negative	-2.66**	(1.17)		
Total expenses (\$100M)				
Lagged one year	2.13	(1.58)		
Lagged two years	-0.84	(2.35)		
College and year fixed effects	Included		Included	

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Sources: NCSE and IPEDS. Fiscal years 2005–2013. 2,739 college-year observations across 522 colleges. Standard errors in parentheses are clustered at the state level. Current dollars. Coefficients represent spending rates in cents per dollar, or in the case of the UPMIFA indicator, represent spending changes in millions of dollars.

Table 4: Heterogeneous effects

Dependent variable: endowment spending (\$M)						
Parameter	Coeff.	(SE)	Coeff.	(SE)	Coeff.	(SE)
Beginning-of-year endowment (\$100M)						
Current year	3.41***	(1.07)	3.41***	(1.04)	3.33***	(1.11)
Lagged one year	1.62	(1.23)	1.66*	(1.22)	1.88	(1.18)
Lagged two years	1.40***	(0.28)	1.37***	(0.29)	1.48***	(0.24)
UPMIFA	-0.74*	(0.40)	-0.58	(0.46)	-0.68	(0.68)
Underwater (\$100M)	-15.23***	(3.88)	-7.76**	(3.43)	-4.32*	(2.55)
UPMIFA * underwater	14.21***	(4.26)	-9.15**	(3.63)	-0.94	(3.25)
Investment returns (\$100M)						
Current year, positive	2.22*	(1.10)	2.34**	(1.03)	1.75	(1.08)
Current year, negative	-1.69**	(0.76)	-1.70**	(0.70)	-1.26*	(0.91)
Lagged one year, positive	1.92	(1.43)	1.99	(1.42)	1.76	(1.42)
Lagged one year, negative	-2.46**	(1.20)	-2.69**	(1.17)	-0.48	(1.13)
Total endowment(\$100M)						
Lagged one year	2.09	(1.65)	2.16	(1.51)	1.78	(1.67)
Lagged two years	-0.74	(2.31)	-0.87	(2.29)	-0.90	(2.25)
Operating expenses covered (%) *						
UPMIFA	0.04	(0.02)				
Underwater	0.78***	(0.27)				
UPMIFA * underwater	-0.59	(0.44)				
Ever used special appropriations *						
UPMIFA			0.58	(0.50)		
Underwater			4.53	(4.35)		
UPMIFA * underwater			-5.66	(4.42)		
Quasi-endowment (%) *						
UPMIFA					-0.02	(0.01)
Underwater					0.02	(0.11)
UPMIFA * underwater					0.19	(0.14)
College and year fixed effects						
	Included		Included		Included	
Number of colleges	342		521		467	
Number of college-year observations	1,914		2,378		2,225	

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Sources: NCSE and IPEDS. Fiscal years 2005–2013. Samples differ across columns because of missing data.

Standard errors in parentheses are clustered at the state level. Current dollars. Uninteracted coefficients represent spending rates in cents per dollar, or in the case of the UPMIFA indicator, represent spending changes in millions of dollars. Percent operating expenses covered by endowment is averaged over pre-financial crisis fiscal years 2005–2008. Percent in quasi-endowment is averaged over post-financial crisis fiscal years 2009–2013. “Ever used spec. approp.” is an indicator for ever drawing positive special appropriations during any fiscal year 2005–2013.

Table 5: Event study defining UPMIFA relative to first year effective

Dependent variable: endowment spending (\$M)		
Parameter	Coeff.	(SE)
Beginning-of-year endowment (\$100M)		
Current year	3.40***	(1.08)
Lagged one year	1.62	(1.25)
Lagged two years	1.39***	(0.29)
UPMIFA (1st yr)	-0.45	(0.45)
UPMIFA (2nd yr)	-1.45**	(0.62)
UPMIFA (3rd yr)	-1.25*	(0.69)
UPMIFA (4th yr+)	-1.51	(0.91)
Underwater (\$100M)		
UPMIFA (1st yr) * underwater	5.27**	(2.35)
UPMIFA (2nd yr) * underwater	9.50***	(3.37)
UPMIFA (3rd yr) * underwater	6.44***	(2.05)
UPMIFA (4th yr+) * underwater	6.76***	(2.25)
Investment returns (\$100M)		
Current year, positive	2.26**	(1.02)
Current year, negative	-1.70**	(0.71)
Lagged one year, positive	1.86	(1.43)
Lagged one year, negative	-2.61**	(1.19)
Total expenses (\$100M)		
Lagged one year	2.10	(1.46)
Lagged two years	-0.95	(2.19)
College and year fixed effects	Included	

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Sources: NCSE and IPEDS. Fiscal years 2005–2013. 2,739 college-year observations across 522 colleges. Standard errors in parentheses are clustered at the state level. Current dollars. Coefficients represent spending rates in cents per dollar, or in the case of the UPMIFA indicator, represent spending changes in millions of dollars.

Table 6: Event study with alternative definition of UPMIFA

Dependent variable: endowment spending (\$M)		
Parameter	Coeff.	(SE)
Beginning-of-year endowment (\$100M)		
Current year	3.40***	(1.04)
Lagged one year	1.63	(1.22)
Lagged two years	1.37***	(0.31)
UPMIFA (1st yr)	-0.37	(0.47)
UPMIFA (2nd yr)	-0.29	(0.55)
UPMIFA (3rd yr)	-0.38	(0.47)
UPMIFA (4th yr+)	-0.26	(0.49)
Underwater (\$100M)		
UPMIFA (1st yr) * underwater	-0.32	(2.21)
UPMIFA (2nd yr) * underwater	4.85**	(2.06)
UPMIFA (3rd yr) * underwater	5.24	(3.43)
UPMIFA (4th yr+) * underwater	5.06**	(1.88)
Investment returns (\$100M)		
Current year, positive	2.27**	(1.05)
Current year, negative	-1.69**	(0.72)
Lagged one year, positive	1.91	(1.41)
Lagged one year, negative	-2.61**	(1.17)
Total expenses (\$100M)		
Lagged one year	2.10	(1.50)
Lagged two years	-0.86	(2.21)
College and year fixed effects	Included	

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Sources: NCSE and IPEDS. Fiscal years 2005–2013. 2,739 college-year observations across 522 colleges. Standard errors in parentheses are clustered at the state level. Current dollars. Coefficients represent spending rates in cents per dollar, or in the case of the UPMIFA indicator, represent spending changes in millions of dollars. This definition of UPMIFA ignores signing date.

Table 7: Robustness checks related to spending formulas

Dependent variable: endowment spending (\$M)						
Parameter	MA user		Non-user		Dev. from planned	
	Coeff.	(SE)	Coeff.	(SE)	Coeff.	(SE)
Beginning-of-year endowment (\$100M)						
Current year	2.84**	(1.09)	3.38**	(1.44)	2.78***	(0.32)
Lagged one year	2.68*	(1.42)	1.44	(1.68)	-0.61	(0.84)
Lagged two years	1.87***	(0.41)	1.06***	(0.38)	-0.10	(0.19)
UPMIFA	-0.49	(0.37)	0.13	(0.66)	-0.67**	(0.31)
Underwater (\$100M)	-0.93	(1.87)	-6.31**	(2.86)	-5.13**	(2.36)
UPMIFA * underwater	3.58***	(1.30)	6.18**	(2.92)	4.95**	(2.24)
Investment returns (\$100M)						
Current year, positive	-0.19	(1.40)	3.05***	(1.11)	2.20**	(1.07)
Current year, negative	-0.95	(1.07)	-1.30	(0.96)	0.72	(0.97)
Lagged one year, positive	0.51	(1.81)	2.16	(2.25)	-0.97	(0.88)
Lagged one year, negative	1.46	(1.97)	-3.12**	(1.24)	0.87	(0.97)
Total expenses (\$100M)						
Lagged one year	-2.49	(3.40)	1.23	(1.28)	4.71	(3.06)
Lagged two years	0.62	(3.39)	1.12	(2.49)	-5.12*	(2.67)
College and year fixed effects	Included		Included		Included	
Number of colleges	287		235		439	
Number of college-year observations	1,320		1,059		1,731	

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Sources: NCSE and IPEDS. Fiscal years 2005–2013.

Standard errors in parentheses are clustered at the state level. “MA user” indicates a college that always uses a moving-average formula, and “Non-user” is the complement. In the third column, “Dev. from planned” is the dependent variable, the difference in dollars between actual spending and planned spending calculated from the NCSE.

Table 8: Robustness checks related to spending rates

Dependent variable: spending rate (% of endowment value)				
Parameter	Coeff.	(SE)	Coeff.	(SE)
UPMIFA	-0.07	(0.15)	-0.07	(0.15)
Underwater (fraction of value)	-0.80**	(0.33)	-0.61*	(0.35)
UPMIFA * underwater	0.30	(0.50)	0.21	(0.50)
Endowment shocks				
Current year, positive			-0.13*	(0.09)
Current year, negative			-0.42***	(0.12)
Lagged one year, positive			0.34**	(0.14)
Lagged one year, negative			-0.08	(0.12)
College and year FE	Included		Included	

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Sources: NCSE and IPEDS. Fiscal years 2005–2013. 2,739 college-year observations across 522 colleges. Standard errors in parentheses are clustered at the state level. Endowment shocks are investment dollar flows as a fraction of lagged college expenses.

Table 9: Panel sample compared to population of private college endowments

Sample	IPEDS population	Ever in panel sample
Number of colleges	1,336	522
As % of IPEDS colleges	100	39.1
As % of IPEDS dollar value	100	61.3
Mean endowment (\$M)	207.8	327.5
Median endowment (\$M)	20.5	73.9
Mean endowment/expense ratio	1.69	2.23
Bacc./Masters/Doctoral/Other (%)	36/8/26/30	41/14/34/11

Source: IPEDS.

Measures are averages within college over fiscal years 2005–2008.