

Dynamic capabilities and governance: An empirical investigation of financial performance of the higher education sector

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Abstract

Research Summary: We postulate that resource allocation decisions consistent with dynamic capabilities can improve financial performance, but that governance moderates the relationship between resource allocation flexibility and financial performance. Using more than a decade of data on US public universities, we find that flexibility has much more impact when matched by lower levels of governance that allow greater expenditure autonomy for university executives and administrators.

Managerial Summary: Organizations are increasingly subject to conflicting demands imposed by their institutional environments. Given the importance of governance arrangements, we apply strategic management concepts to public universities and investigate the effect of external governance arrangements on university performance. We show that universities that reallocate resources more regularly are more likely to run larger budget surpluses. This is far more likely to be true at universities where external governance arrangements allow greater executive discretion.

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KEY WORDS

dynamic capabilities, higher education industry, resource allocation

1 | INTRODUCTION

The importance of resource allocation has been well recognized in the strategic management literature (Ansoff, 1965; Chandler, 1962; Rumelt, Schendel, & Teece, 1991). In organizational contexts, the attractiveness and relative priority of expenditure categories rarely are static. Some categories become less important, and new opportunities and problems may arise and require timely investment. Without adjustments, the initial resource allocation across expenditure categories can become suboptimal, resulting in poor performance. Reallocating resources requires flexibility to respond as necessary to opportunities and challenges in the environment. This reprioritization of expenditures over time (“asset orchestration”) is consistent with the dynamic capabilities framework (Eisenhardt & Martin, 2000; Helfat & Raubitschek, 2018; Teece, 2007), but goes beyond the framework.

Key asset orchestration activities include the search/selection of investments and the configuration/deployment of those investments, such as coordinating cospecialized assets and their reconfiguration (Helfat et al., 2007). Much of this research has dealt with modes of resource reconfiguration, including resource redeployment, knowledge sourcing and grafting, resource recombination, business reconfiguration, corporate restructuring, business unit reorganization, patching, structural reconfiguration, and strategic assembly (Karim & Capron, 2016, p. 3). Empirical findings show that asset orchestration through a variety of modes of resource reconfiguration plays an important role in firm performance. For instance, resource-bundling actions in law firms, such as mixing senior partners with less-experienced lawyers, affected performance positively (Kor & Leblebici, 2005). Sirmon, Gove, and Hitt (2008) also found a positive effect of synchronous bundling and deployment decisions on performance. More generally, reconfiguration of resources can help firms gain and sustain competitive advantage (Capron, Dussauge, & Mitchell, 1998; Helfat et al., 2007; Karim, 2006).

Although existing studies stress the role of resource configuration, relatively less attention has been paid to another important dimension of reconfiguration—the ability to reallocate resources flexibly across the firm over time—with notable exceptions (e.g., Arrfelt, Wiseman, McNamara, & Hult, 2015; Helfat & Martian, 2019; Lovallo, Brown, Teece, & Bardolet, 2020). The managerial abilities to “make well-timed investments” and to combine and deploy those investments effectively often are perceived as asset orchestration capabilities (Helfat et al., 2007; Teece, 2009). Most studies in this area implicitly assume that all firms have the capability to redeploy resources to the right place at the right time. However, firms differ in their ability to move resources across the organization (Helfat & Martian, 2019). Various idiosyncratic factors, such as managerial search behaviors (Busenbark, Semadeni, Arrfelt, & Withers, 2022) and CEO ideology (Gupta, Briscoe, & Hambrick, 2018), can influence the resource allocation process, and thus empirical studies find mixed results about the effect of the process on firm performance (Burgelman, 1994). The divergent empirical findings also hint at the heterogeneity in a firm’s capability to reallocate resources.

Reallocation isn’t required at all times; but there also is surprisingly little research on specific conditions under which resource allocation flexibility influences performance. Moreover, studies of resource allocation traditionally focus on companies in the private sector (e.g., Asgari, Singh, & Mitchell, 2016; Busenbark et al., 2022; Natarajan, Mahmood, & Mitchell, 2019;

Vidal & Mitchell, 2015). As a consequence, little is known about performance implications for not-for-profit or public colleges and universities subject to nonmarket environments¹ such as state and federal regulation.² Using the example of, and by examining, public universities, we argue that the context of hybrid environments can inform and be informed by research on resource allocation in competitive market environments.

Organizations competing in the higher education sector must take into account a wide range of stakeholders with different interests. Compared with corporations, public universities generally are more subject to influence from nonmarket forces. Social, political, and legal demands and obligations impact the organization's environment (Dorobantu et al., 2017). The leadership of public universities often faces significant counter-pressure from stakeholder groups that are likely to hamper organizational efforts to reallocate resources to improve long-run performance (e.g., DiMaggio & Powell, 1983).

We also argue (and demonstrate) that research on not-for-profit organizations can result in findings relevant to private for-profit firms. For-profit private-sector firms face growing regulatory burdens, and regulated contexts span many industries (e.g., telecommunications, motor vehicles, healthcare, and pharmaceuticals) (Dutt & Mitchell, 2020). The incipient shift from maximizing shareholder value to stakeholder capitalism and the increased demands of investors to measure performance on a range of environmental, social, and governance dimensions have narrowed some distinctions between public universities and for-profit corporations.

Our study examines a boundary condition and performance consequences of resource allocation flexibility in a sample of public universities. With extensive longitudinal data spanning the last two decades, this study analyzes (a) the influence of resource allocation flexibility on a university's financial performance and (b) the effect of external governance arrangements on the relationship between resource allocation flexibility and the financial performance of a university. We aim to determine the conditions under which universities perform better financially. We show that universities that reallocate resources more regularly are more likely to run larger budget surpluses. However, this is far more likely to be true at universities where external governance arrangements allow greater executive discretion.

The article is structured as follows: Section 2 discusses research questions relating to a link among flexibility in resource allocation, performance, and governance. Section 3 describes the data and methods employed in the empirical analysis. Section 4 presents results. In Section 5, we offer conclusions.

2 | FLEXIBILITY IN RESOURCE ALLOCATION, GOVERNANCE, AND PERFORMANCE

2.1 | Flexibility in resource allocation

Good financial performance results from not only garnering more resources but also deploying them wisely (Maritan & Lee, 2017). This requires assiduous reallocation of financial and other

¹This term is used in Dorobantu, Kaul, and Zelner (2017) and includes local communities, regulators, nongovernmental organizations, and activists. More specifically, universities are subject to hybrid public/private environments. By hybrid environment, we mean a mix of market and governmentally and endowment-funded activities, where competition for funds and talent is highly competitive, but the regulatory and institutional environment is such that market forces are present but mediated in a significant manner.

²That said, Kattel and Mazzucato (2018) recently began applying dynamic capabilities to the public sector.

resources toward more critical priorities. The redeployment of resources within the firm to related businesses can improve performance (Anand & Singh, 1997) through intertemporal economies of scope (Helfat & Eisenhardt, 2004). Reallocation involves managers adjusting investments across the organization in response to changing conditions, combining existing and new assets in value creating ways, and deploying those bundles to enhance performance. Organizations that demonstrate greater flexibility in resource allocation can respond more quickly to changing conditions and can launch new initiatives. Some firms reconfigure resources with parties both inside and outside the firm, plural sourcing (i.e., having both internal and external suppliers) to provide greater process flexibility in allocating resources (Chondrakis & Sako, 2020). By having both internal and external suppliers, the firm can switch between them, especially in times of greater technological change and uncertainty. The dynamic capabilities framework suggests that reallocation, a pillar of dynamic capabilities, should have a positive impact on a firm's performance (Teece, 2007; Teece, Pisano, & Shuen, 1997).

This is not to say that reallocation cannot have a negative effect on an institution. Ineffective reallocation can occur if the capital allocation process is distorted by internal power struggles, such as when there is great divergence in the strength of the divisions and when a CEO has low-powered incentives (Scharfstein & Stein, 2000). A high level of reallocation can disrupt the firm's operations (e.g., loss or reassessments of key employees) (Lovallo et al., 2020). A higher level of investment in any particular business unit or activity might mean an overall higher degree of risk for the firm, possibly leading to inferior performance (Sirmon & Hitt, 2009). Resource/expenditure reallocation flexibility has benefits but also can be chaotic and disruptive to the day-to-day functioning of an organization/institution. Accordingly, resource reallocation that is too frequent may impair performance (Winter, 2003). Too much change can undermine efficiency, effectiveness, continuity, and identity (Weick, 1982).

Although potential pitfalls exist in high levels of reallocation, too much flexibility in resource allocation is not often a concern for universities. Many higher education leaders, such as Dr. James J. Duderstadt, a former president of the University of Michigan, have noted publicly that too many resource allocation decisions have become overly mechanistic (Duderstadt, 2000). The National Association of College and University Business Officers (NACUBO) also has expressed concern about the lack of flexibility within internal allocation processes (Carnaghi, 2021). The existence of shared governance combined with high academic autonomy may make it difficult for universities to change quickly and/or on a large scale. Academic units commonly are allocated what they were given the year before, plus a small increase for inflation (Denneen & Dretler, 2012). Many colleges and universities budget incrementally, so the percentage increase would be the same for all departments and programs. This may be easy politically, but it is unlikely to make good economic sense when the environment is undergoing structural change.

Many public colleges and universities in the US face daunting challenges, including severe state budget cuts (Murakami, 2020). Given the changing nonmarket environment, many universities are taking adaptive approaches (Dorobantu et al., 2017),³ through which universities generally accept the institutional environment as given and use internal processes and capabilities to create and appropriate value within existing institutions (Camp, 2021).⁴ For example, to

³Dorobantu et al. (2017) introduced a typology of nonmarket strategies taken by firms to adapt or influence their institutional environments.

⁴Public nonprofit colleges historically have shied away from lobbying. Only 37% of private and public nonprofit colleges spent time lobbying, but many weren't consistent across 11 years (2004–2014) (Camp, 2021).

TABLE 1 Budget redesign rationales at selected universities, 2010–2014

University	Reasons for budget redesigns	Implementation date
University of Virginia	<ul style="list-style-type: none"> • Increase the self-reliance of schools and other major units • Support the development and pursuit of academic priorities defined by deans and faculty by matching up authority with responsibility 	2014
Miami University (Ohio)	<ul style="list-style-type: none"> • Improve the allocation of resources • Identify sources of new revenue 	2013
Cornell University	<ul style="list-style-type: none"> • Distribute revenues and address costs in ways that are consistent, coherent, and transparent across colleges and units • To allow the university to think and make decisions collectively 	2013
Ohio University	<ul style="list-style-type: none"> • Position academic units to rationally compete for resources; discuss the appropriate balance between academic and nonacademic resource allocation • Encourage decisions based on current and future needs rather than past assumptions 	July 2012
University of California, Davis	<ul style="list-style-type: none"> • Advance the university's vision (align funding to institutional priorities) • Provide assurance of reasonable reserves, oversight, and potential direct benefit for those units willing to engage in responsible risk-taking 	2012
University of Washington	<ul style="list-style-type: none"> • Enabling reallocation of resources when necessary • Implement policies that serve the best interests of the university 	2011
University of Florida	<ul style="list-style-type: none"> • Promote innovative and entrepreneurial activities that are financially viable • Achieve success through decentralized decision making 	July 2010
University of Oregon	<ul style="list-style-type: none"> • Reward good decision makers • Associate revenues directly to revenue creating activity 	July 2010

Source: Laws (2014, pp. 12–13).

ensure financial sustainability, many universities are experimenting with changes to their business models, trimming costs wherever possible and tapping new revenue streams, from intellectual property to professional master's programs to renting campus facilities to a broader set of constituencies, among other sources (Lapovsky, 2018; Mintz, 2019). In many countries, universities that often have regarded themselves as world class now find that sustaining their reputations in the competitive market requires considerable flexibility, innovation, and entrepreneurialism (Clark, 1998; Gumpert & Sporn, 1999).

Universities and colleges are heterogeneous, with varying missions, traditions, opportunities, and internal management structures (Williams, 1992). Resource-allocation practices differ by university (see Table 1). For example, some universities respond to student preferences and market signals (e.g., putting more resources into a course that attracts large numbers of students). Others operate based on a system that allows each unit to keep resources it generates

and levies a “tax” on a unit’s expenditure, which produces a pool of resources for central operation (Duderstadt, 2000). Others can modify allocations and levels of financial resources in the case of unexpected needs, opportunities, and threats.

The more “entrepreneurial” universities exhibit the ability to maneuver quickly to respond to opportunities and threats (Davies, 1985). University investment income may fall short due to unexpected market conditions. A sudden change in the flow of full-tuition international students, for example, may require adjusting expenses for certain courses. Reallocation also can take other forms, such as starting new degree programs and dropping existing ones.

A recent University of Wisconsin–Stevens Point (UWSP) announcement illustrates a university-wide shift in resource allocation between expense categories. In March 2018, UWSP, facing a large deficit due to declining enrollment, announced a plan to cut 13 programs, including English and History, while adding or expanding 16 others in areas with high-demand career paths (Flaherty, 2018). Of course, this type of change must be effective and part of a coherent long-run strategy. And while tenured faculty do not come and go often, universities can maintain student–teacher ratios in the face of shifts in the popularity of particular fields by employing adjunct professors and other faculty on shorter-term contracts.⁵

Universities can move some resource types among departments and colleges within a university, and between teaching and research within departments. Armstrong (2014) places this in a business-model context and notes how flexibility in resource allocation cuts across the multiple models that coexist within most universities. In particular, tuition and other funds received for teaching services can be used to “discreetly cross subsidize” research activities (Armstrong, 2014, p. 10).

To take an extreme example, Liberty University, a private nonprofit in Virginia, was one of few universities to receive a credit upgrade in recent years, with Moody’s citing as a strength its flexible staffing with no tenured faculty members outside of the law school (Logue, 2014). Universities that exhibit resource allocation flexibility also may be more able to raise additional funds. A university might, for example, reallocate funds in order to co-invest in a new laboratory or research institute that has attracted money from a company or foundation.

Flexibility is a way to avoid undue financial risk. By not allocating all anticipated resources to committed expenses, universities can avoid incurring the risk that resources will be insufficient to meet commitments (Goldstein, 2005, p. 1). This leads us to our first research question: Is a university’s resource allocation flexibility positively related to the university’s financial performance?

2.2 | Governance

Financial decisions by public universities can be shaped by governmental institutions and the governance they impose (e.g., Tandberg, 2010; Weerts & Ronca, 2006). “Governance” already is recognized as a major factor in institutional and organizational performance (Fiszbein & Ringold, 2012). Agency theory continues to play a major role in discussions about corporate governance. Dalton et al. (2007, p. 42) state “the notions of agency theory and corporate

⁵Class size may be inversely related to quality, but the tradeoff differs greatly by field (Courant & Turner, 2017). For example, in fields such as humanities, good pedagogy requires substantial writing with careful evaluation on the part of the instructor, but more quantitative fields can be taught without close interaction between the student and the instructor.

governance are essentially equivalent.” The literature focuses on the relationship between “owners” and “managers.” The implicit assumption is that the agent (the manager) has incentives that differ from the principal (the owner); and that multilevel governance and possibly even state regulation can reduce those distortions (Amihud & Lev, 1999; Goranova, Alessandri, Brandes, & Dharwadkar, 2007; Morck, Shleifer, & Vishny, 1990). Much less attention is focused on how rules and controls, if overbroad and too wooden, can constrain managers in ways that reduce rather than improve organizational performance (Van Essen, Engelen, & Carney, 2013).⁶

Conducive governance arrangements allow organizations to “pivot” decisively when the situation demands it (Helfat et al., 2007). Put differently, conducive governance can facilitate dynamic capabilities; rigid and poor-designed governance may get in the way. The corporate governance literature suggests that boards can be a critical source of advice (Zahra & Filatotchev, 2004; Zhang, Baden-Fuller, & Pool, 2011), are involved in strategy (Garg & Eisenhardt, 2017), play an important role in various decisions such as changing personnel, and thus can positively shape the decisions of the top management teams (Bjornali, Knockaert, & Erikson, 2016; Knockaert, Bjornali, & Erikson, 2015; Zahra, Filatotchev, & Wright, 2009).

However, there is also a more dismal view of public boards: that boards’ lack of expertise and heavy-handed controls leave little scope or time for strategic management activities. Board sizes and structures sometimes can stifle board communication (Boivie, Bednar, Aguilera, & Andrus, 2016; Westphal & Zajac, 2013). Some researchers in corporate governance have noted challenges faced by outside directors in making meaningful contributions to corporate strategy (e.g., Westphal & Zajac, 1997). Outside directors may have an inadequate understanding of the issues facing any one firm; they often serve on boards at multiple companies, and their attention is reduced by those appointments more than it is enhanced.

Among governance mechanisms documented in the university governance literature, state governing boards receive particular attention (Tandberg, 2016). Many policymakers view a statewide governing board as one means to hold universities accountable. Such a governance structure provides greater control over university missions, policies, and budgets, and an opportunity for assessing university performance (McGuinness, 1997). The governance processes at the state and institutional levels determine the degree of decision autonomy that universities enjoy (Salmi, 2007, p. 337).

Many universities encounter obstacles at the board level when they endeavor to reallocate diminishing resources.⁷ Knott and Payne (2003) showed that public universities in general performed worse than their more autonomous private counterparts. Former University of Wisconsin–Madison Chancellor Carolyn A. Martin said: “It’s hard to be more responsible or more responsive if we spend all our time trying to comprehend and then follow 25 steps to get approval for one purchase... The risk to the mission is greater if we don’t have flexibility we need than if we do” (quoted in Lewin, 2011). For example, the relaxation of state procedural regulation over St. Mary’s College of Maryland led to saving \$2.3 million on a \$4.7 million capital construction project (Dill, 2001). Similarly, Arnold, Underwood, and Kempner (1996)

⁶One exception is Van Essen et al. (2013).

⁷Clark Kerr, the first chancellor of the University of California (UC), Berkeley and the twelfth president of the UC system, said, “Well, I worked very closely with the Academic Senate committees, but I worked in areas which weren’t filled by the administrative bureaucracy, which reported to Sproul Hall (UC Berkeley’s administration building). The public relations officer on the Berkeley campus reported to Sproul Hall; the dean of the graduate division reported there; the dean of students reported there; you know, just everybody. I had no control over the budget. I had no control over faculty appointments. Anything ... So I moved into areas which were vacant really” (Kerr, 1976).

examined the impacts of the implementation of the 1995 Higher Education Administrative Efficiency Act in the Oregon state higher education system. They found that the delegation of the university system of control over decisions such as its personnel system, purchasing and contract administration, travel and printing activities, and facilities management led to savings of over \$12 million per biennium (Dill, 2001). A NACUBO survey of US universities revealed that the main areas for reform were management of all institutional funds, ability to purchase and contract independent of preaudits by the state, authority to set and retain fees (including tuition), authority over personnel classifications and benefits, and ability to manage facilities and construction projects (Dill, 2001). That does not mean a reduction in ethical standards and/or discounting and debasing of educational values or the reduction in accountability for overall performance. It does mean allowing the resource allocation the flexibility necessary to embrace new opportunities. In many ways, it's simply the flexibility to follow the precepts of good (strategic) management, especially in times of deep uncertainty and rapid change.

Both economists and management scholars agree that highly centralized management generally is less effective, especially in the context of rapidly changing environments and in knowledge-based industries where the context differs in different business units. Those closest to the "market" and to the issues are likely to be best informed about which directions to take, which changes to make, and how to do so in a timely manner (Drucker, 1985). In short, too much prescriptive regulation can hurt the performance of otherwise well-governed organizations. For instance, Burkart, Gromb, and Panunzi (1997) find that high levels of shareholder monitoring and intervention undermine managerial initiatives, such as searching for new investment projects, and reduce managerial incentives to exert effort, leading to lowered returns and company valuation.

Giving the university more autonomy allows it to open new revenue opportunities, thereby reducing its vulnerability to inadequate state funding. Too much regulatory and board-level prescription can diminish the campus leadership team's ability to respond to changes in the competitive environment and distract it from building positive points of difference. The varied needs of students and society can be matched by different providers so that, over time, a greater heterogeneity in offerings will emerge to meet the differing needs of economies and societies (UNESCO, 1995; World Bank, 1994). In fact, some public universities, such as the University of Oregon and Portland State University, have established a local institutional governing board, which may give them more autonomy and allow them to tap into greater philanthropy (Wang, 2013).⁸ Altbach and Salmi (2011) found that research universities with complete autonomy manage their resources with more flexibility as they respond more quickly and better to changes in the global market for education. In examining European universities, Aghion, Dewatripont, Hoxby, Mas-Colell, and Sapir (2008) found that those with more autonomy in areas such as hiring and wage-setting were higher performing (p. 5).

In the US, governance mechanisms for higher education differ by state. Each state has some sort of governance structure for higher education but differs in the type of structure

⁸In 2013, the Oregon legislature passed SB 270, requiring local governing boards for the state's three largest institutions. However, Robert Berdahl, a former interim president of the University of Oregon (UO), said many public universities have their own boards, and adopting one at UO would not be a step toward privatization or withdrawal from the university system (Graves, 2012).

employed and the power given to the governing body (Tandberg, 2016).⁹ Variations in governance structures, such as legislative term limits, and traditions and political culture shape each state's policymaking environment (AASCU, 2013). Universities may differ in their ability to set tuition and fees, regulate the mix of in- and out-of-state students, and manage investment.¹⁰ These considerations bring us to a second research question: Does governance moderate the positive relationship between resource allocation flexibility and financial performance across states? We empirically examine these two research questions in the next section.

3 | METHODS

3.1 | Data

Our sample consists of all public universities in the US since the adoption of Governmental Accounting Standards Board (GASB) statements 34 and 35 in 1999. The sample is derived from the Integrated Postsecondary Education Data System (IPEDS) data published by the National Center for Education Statistics (NCES).¹¹ This extensive data set consists of time-series, cross-sectional data that spans the period from 2002 to 2017 for 2,171 public universities (30,662 observations).¹² To be included, a university had to: (a) be a public university; (b) have total net assets exceeding \$1 million between 2002 and 2017; and (c) demonstrate a variation in resource allocation. The \$1 million cutoff helped ensure universities had adequate size to have resource allocation processes in place (Kuemmerle, 2005).¹³ Also, there is little publicly available data on smaller universities. Including smaller universities would have resulted in a significant amount of missing data and a potentially less-representative sample of the population studied. Our resulting sample is representative of midsize and large universities that have enough resources to shift among identifiable expenditure categories.

Our study used data for public universities for two reasons. First, public universities are the most important in terms of reach. About 74% of college students in the United States attend public schools, which have a total budget of more than \$355 billion (NCES, 2016).

⁹The variability in governance by state affords us the opportunity for an empirical study that can measure explanatory factors.

¹⁰In 2005, the Virginia legislature passed the Restructured Higher Education Financial and Administrative Operations Act, which increased the autonomy of the state's public universities and colleges while decreasing state funding (Schneider, 2010). Before the act was introduced, the state had influence over internal resource allocations for categories such as capital outlays, leases, information technology, procurement, human resources, finances, and accounting, limiting what management could do (Schneider, 2010). Other states, such as Oregon, Colorado, and Texas, have made marginal moves toward restructuring their higher education systems.

¹¹See IPEDS, "Use the Data," at: <http://nces.ed.gov/ipeds/datacenter/Default.aspx>

¹²Note that the average number of universities in our 16-year sample is 1,916 in any given year (calculated as 30,662 divided by 16), which is smaller than the total number of 2,171. This is because the number of universities was not constant during our sample period, and the 2,171 number includes all universities that ever appeared in the sample. This difference can be explained using the following hypothetical example: if there were 16 universities in 2002 and 0 universities in any subsequent year, the average number of universities over the entire 16-year period would be 1 (calculated as 16 observations divided by 16 years). However, the total number of unique universities that ever appeared in the sample would be 16.

¹³Kuemmerle (2005) suggested that small organizations may not have well-established resource allocation procedures in place.

Statista, 2016). Second, public and private universities report financial statements in different formats, making it difficult to compare them.¹⁴

Financial data include revenues, endowments, and expenses. Data on institutional characteristics, such as the average SAT score and the highest degree that a university offers, were obtained from the dataset entitled “Educational offerings, organization, admissions, services, and athletic associations.” We will describe the properties of our sample in more detail after introducing the variables and the model estimated in this study.

3.2 | Variables

3.2.1 | Resource allocation flexibility

To measure the level of reallocation of financial capital across the university's segments in a given year, we use the deviation of expense ratio (DER). Modified from Lovallo et al. (2020), we use the university's own capital allocation in the previous year as a benchmark. The DER is defined as the change in the expense ratio across segments from 1 year to the next. The absolute value of the weighted sum of changes in expenses was scaled by net assets for different segments of a university in each year. We then weighted these changes by the university's expenditures (as of the end of previous year) within each respective segment. The DER captures the rigidity/flexibility of the expenditure allocation process: universities that commit to a benchmark of maintaining stable allocations over time have low DER, and universities that actively reallocate capital across their business units have high DER. The equation is:

$$\text{Deviation of expense ratio (DER)} = \sum_{I \in U} w_{i,t-1} \left| \frac{E_{i,t}}{NA_t} - \frac{E_{i,t-1}}{NA_{t-1}} \right| \quad (1)$$

where E is the expense of segment i in university U in year t ; NA is total net assets of university U in year t ; and w is the expense share of each segment in university U in year $t - 1$.

In the available IPEDS dataset, expenses are grouped into broad segments: instruction, research, public service, academic support, student services, institutional support, operation and maintenance of plant, scholarships, auxiliary enterprises (e.g., college stores), hospitals, and independent operations (e.g., federally funded labs).

3.2.2 | Governance

The measure for governance used is taken from the classification of higher education structures developed by Knott and Payne (2004). Building on the classification scheme of higher education governance systems from the State Postsecondary Education Structures Sourcebook (1991, 1994, 1997), Knott and Payne (2004) developed a more detailed classification by taking into account additional aspects of governance, such as whether the state-level board has a high, medium, or low level of regulation. The variable takes the values of one, two, or three for the states with low, medium, and high levels of regulation, respectively.

¹⁴The GASB governs the reporting of financial data for public universities and colleges, while the Financial Accounting Standards Board (FASB) governs private universities and colleges' financial statements.

State-consolidated governing boards always have regulatory authority over both program approval and budget, while state coordinating boards may have this kind of regulatory authority (Knott & Payne, 2004, p. 18). The authority of some coordinating boards is less centralized and weak, which allows universities to have far more autonomy (McLendon, Heller, & Young, 2005). Planning agencies have no regulatory authority (Knott & Payne, 2004, p. 18). Following Knott and Payne (2004), we categorize a high level of governance if the state-level board is either a consolidated governing board or a coordinating board that has regulatory authority over both budget and program approval.

The high level of governance structure refers to consolidated governing boards and regulatory coordinating boards that have direct control over the institutional operations and fiscal affairs of universities. A coordinating board with a medium level of regulation has regulatory authority over either budget or program approval, but not both. A coordinating board with a low level of regulation has no regulatory authority or is a planning agency (Knott & Payne, 2004, p. 18).

In our sample, there are 239, 328, and 1,136 universities with low, medium, and high levels of regulation, respectively (1,703 in total). To improve the validity of the category, we assessed it with references reporting recent changes to postsecondary governance (e.g., Smith & Fulton, 2013). There have been some changes in some states, but the recent changes do not appear to require a change in the original category. For example, California (original category: the most minimally regulated state) became more minimally regulated by disbanding the state postsecondary coordinating body in 2011 (Equation (1)).

3.2.3 | University financial performance

Our dependent variable is financial performance. Financial performance is one of many dimensions by which a university can be assessed; but it is foundational to the long-term survival of a university. Without sound financial management, universities can find themselves unable to maintain their facilities, uphold quality standards, and fulfill their missions effectively. For example, the Covid pandemic caused a deficit for many colleges that had to introduce measures such as hiring freezes and early retirements, employee furloughs, and reductions in programs. For instance, the University of South Florida announced that its college of education would become a graduate school only, eliminating undergraduate education degrees to help close a \$6.8 million budget gap. The University of Akron invoked a clause to supersede tenure rules and laid off 97 unionized faculty members due to a deficit caused by the coronavirus (Hubler, 2020).

We define financial performance as a university's capacity to conduct its current and intended programs successfully (Prager & Sealy, 2002, p. 16). This captures whether a university is living within its means. We measure this as the net operating revenues ratio.¹⁵ A positive

¹⁵Revenues include tuition and fees, after deducting discounts and allowances; federal operating grants and contracts; federal nonoperating grants; state operating grants and contracts; state nonoperating grants; local/private operating grants and contracts; local nonoperating grants; sales and services of auxiliary enterprises; sales and services of hospitals; independent operations; gifts, including contributions from affiliated organizations; other sources—operating; and other non-operating revenues. Expenses include salaries and wages, employee fringe benefits, and all other expenses for instruction, research, public service, academic support, student services, institutional support, operation and maintenance of plant, auxiliary enterprises, hospital services, independent operations, interest, and depreciation. IPEDS does not break out expenses into operating and nonoperating expenses after (and including) 2009.

value means an annual surplus, and a negative value indicates an annual deficit. Bond ratings agencies such as Moody's and Fitch, and the US Department of Education, use this measure when evaluating universities in the US (Fischer, Gordon, Greenlee, & Keating, 2004).

$$\text{Net operating revenues ratio} = \frac{\text{Operating income (loss)} + \text{Net nonoperating revenues}}{\text{Operating revenues} + \text{Nonoperating revenues}} \quad (2)$$

Source: KPMG (2002).

Generally speaking, the larger the surplus, the stronger the university's financial performance, and a negative ratio indicates a loss for the year. Universities, such as universities in Mississippi and the University of Maine,¹⁶ often target a 2%–4% surplus over an extended time period. Although a small short-term deficit might be acceptable if it's aligned with an institutional goal, a large, structural long-term deficit is a sign of financial instability and poor overall fiscal health. For example, a small amount of short-term deficit might be a positive outcome if it's due to a significant capital expansion for a program consistent with a university's strategic plan. An operating surplus resulting from cuts in spending for a strategically important initiative could be viewed as negative (Equation (2)) (Institute for Higher Education Policy, 2011).

3.2.4 | Control variables

We controlled for a number of university characteristics expected to precede and possibly influence the effects of reallocation of financial capital across the university's segments on the financial performance measure.

Previous studies have found that university size, wealth, and selectivity exert significant influences on university outcomes such as productivity (e.g., Pascarella & Terenzini, 1991; Volkwein, 1986). Therefore, we control for average SAT score, the highest degree that the university offers (bachelor's, master's, or PhD), and university size (proxied by the logarithms of the university's revenue and endowment).¹⁷ We also control for return on endowment (ratio of current-year investment income to endowment at the end of the previous year), because the university's financial performance might reflect the skills of investment managers at universities in generating investment returns (Lerner, Schoar, & Wang, 2008).

Further, universities' resource environments can vary, which might affect their capability to be flexible in resource allocation. For example, resource allocation flexibility may depend on funding structure (e.g., appropriations, grants). Therefore, we control for the ratio of operating grants to total revenue.¹⁸

Finally, we control for diverse features of the environment specific to time, state, and even at the level of university by using fixed effects for each year and each university. Fixed effects account for both macroeconomic developments (which affect all universities over time) and systemic cross-sectional differences across universities (which depend on their location, policies, priorities of the state with respect to higher education, and many other factors constant over

¹⁶Mississippi Institutions of Higher Learning (2013) and University of Maine at Machias (2019).

¹⁷An alternative measure of university size is the number of students. However, because of a large number of missing observations in the "number of students" variable, we have not included this measure in our regression analysis.

¹⁸Revenue from operating grants is defined as operating grants from federal, state, and local governments and from private entities. Total revenue is the sum of operating and nonoperating revenues.

time). Such controls are important because of potential effects of a business cycle on university funding (e.g., the financial crisis of 2008–2009), as well as variation in the environment across states and at the university level within the same state.¹⁹ For example, if the financial performance of a university depends on its quality, its focus, or the stability of funding that it receives from the state, such dependences would be controlled for through university fixed effects.

3.3 | Analysis

We used linear regressions to model a university's financial performance (dependent variable), conditional on several covariates described above. To test the effectiveness of resource allocation flexibility in different levels of governance, we included an interaction term for DER and governance. Our preferred empirical specification is shown below²⁰:

$$\left(\frac{\text{Income}}{\text{Revenue}} \right)_{i,t} = \alpha_i + \gamma_t + \beta_0 * \text{DER}_{i,t}^{\text{IV}} * \text{Gov Low}_{i,t} + \beta_1 * \text{DER}_{i,t}^{\text{IV}} * \text{Gov Med}_{i,t} \\ + \beta_2 * \text{DER}_{i,t}^{\text{IV}} * \text{Gov High}_{i,t} + \sum_{j=3}^{N-1} \beta_j * x_{j,t-1} + \epsilon_{i,t} \quad (3)$$

[Correction made on 28 November 2022 after first online publication: Equation 3 has been corrected in this version.]

where α_i and γ_t are university and time fixed effects, respectively; and $\text{DER}_{i,t}^{\text{IV}}$ is our measure of expenditure flexibility. $\text{Gov Low}_{i,t}$, $\text{Gov Med}_{i,t}$, and $\text{Gov High}_{i,t}$ are dummy variables that take the value of 1 for low, medium, and high levels of regulation, respectively, and 0 otherwise. $x_{j,t-1}$ represent the control variables, which include one-year lags of the natural logarithms of revenue and endowment, operating grant to revenue ratio, investment income to endowment ratio, average SAT score, and dummy variables for non-zero endowment, availability of SAT score, and whether the university grants bachelor's, master's, and PhD degrees. N refers to the number of covariates in the model.²¹

Our dependent variable may affect allocation of resources in the same year, resulting in a causal relationship that runs from our dependent variable to DER. This reverse causality problem could result in a bias in β_1 . To address this issue, we use lagged DER as an instrumental variable for contemporaneous DER. Lagged DER is highly correlated with contemporaneous DER.²² Further, lagged DER is exogenous to contemporaneous financial performance, because

¹⁹Note that once we introduce fixed effects for universities, fixed effects for states become redundant, as they are simply linear combinations of the fixed effects of universities located in those states. University fixed effects account for differences in financial performance at a more granular level (i.e., the university level) and thus explain a larger portion of the variation in the data. Governance dummies cannot be included as stand-alone variables in the regression, for the same reason. However, they can be included as interactions with DER.

²⁰We have not included a lagged dependent variable in our preferred specification because, as Nickell (1981) pointed out, including a lagged dependent variable in a fixed effects model may lead to biased estimates. When a lagged dependent variable is included in the regression, the results remain qualitatively the same.

²¹Note that for each observation, only one of the three governance dummies is equal to 1. Further, we don't need to drop one of the dummies to prevent perfect multicollinearity, because DER does not enter the regression without interactions with the governance dummies.

²²The correlation coefficient is .45. A linear regression of DER on lagged DER produces a coefficient of .44 (*p*-value: .000).

TABLE 2 Summary statistics

	Number of values	Number of zero values	Number of missing obs.	Min	Max	Mean	Std. dev.
[1] Year	30,662	0	0	2002	2017	2,009,76	4,48
[2] Unique ID for each Institution (entity)	30,662	0	0	100,654	490,805	208,688	89,673
[3] Income to revenue ratio	30,612	221	50	-1	1	0.002	0.186
[4] Deviation of expense ratio (DER)	18,970	9	11,692	0	0.498	0.038	0.061
[5] Total operating and non-operating revenues	30,639	46	23	0	8,793,177,000	139,303,525	396,519,572
[6] Non-operating revenues	30,639	479	23	0	7,546,017,438	55,923,026	124,336,357
[7] Operating revenues	30,662	153	0	0	6,882,808,000	83,727,793	304,983,312
[8] Federal operating grant	30,661	5,594	1	0	1,092,972,834	14,047,435	55,555,336
[9] State operating grant	30,660	6,601	2	0	324,813,059	3,635,047	9,913,198
[10] Local operating grant	30,661	11,047	1	0	797,697,000	4,972,353	25,897,988
[11] SAT available dummy	30,662	25,766	0	0	1	0.160	0.366
[12] Average SAT (0 if not available)	30,662	25,766	0	0	686.67	82.58	190.86
[13] Grants bachelor degree	30,662	20,006	0	0	1	0.348	0.476
[14] Grants master's degree	30,662	21,704	0	0	1	0.292	0.455
[15] Grants PhD	30,662	25,257	0	0	1	0.176	0.381
[16] Endowment assets dummy	30,662	12,668	0	0	1	0.587	0.492
[17] Endowment	30,662	12,668	0	0	25,445,315,326	50,427,981	464,922,838
[18] Ratio of investment income to endowment	30,253	13,216	409	-0.976	4,997	0.121	0.415
[19] Total expenses deductions—current year total	30,661	36	1	0	7,724,609,000	139,363,087	393,406,997
[20] Ratio of instruction expenses to total net assets	23,416	427	7,246	0	51.705	0.514	1.127

TABLE 2 (Continued)

	Number of values	Number of zero values	Number of missing obs.	Min	Max	Mean	Std. dev.
[21] Ratio of research expenses to total net assets	23,649	14,341	7,013	0	8,536	0.030	0.162
[22] Ratio of public service expenses to total net assets	23,504	6,997	7,158	0	5,535	0.032	0.113
[23] Ratio of academic support expenses to total net assets	23,397	659	7,265	0	9,194	0.101	0.197
[24] Ratio of student services' expenses to total net assets	23,412	516	7,250	0	12,065	0.115	0.266
[25] Ratio of operation and maintenance of plant expenses to total net assets	23,425	3,033	7,237	0	13,409	0.110	0.280
[26] Ratio of auxiliary enterprises' expenses to total net assets	23,450	3,395	7,212	0	5,112	0.083	0.185
[27] Ratio of hospital services' expenses to total net assets	23,820	23,273	6,842	0	15,850	0.013	0.177
[28] Ratio of independent operations' expenses to total net assets	23,822	23,495	6,840	0	4,271	0.001	0.035
[29] Ratio of other expenses and deductions to total net assets	23,405	12,444	7,237	0	12,808	0.035	0.223
[30] Total net assets	23,829	0	6,833	1,006,006	30,287,060,628	193,310,150	850,786,259
[31] Investment income	30,662	4,745	0	-2,504,830,986	7,500,021,282	3,886,740	76,564,049
[32] Governance	29,934	0	728	1	3	2.49	0.75
[33] Operating grant to revenue ratio	30,587	3,859	75	0.000	1,000	0.139	0.146

Note: Data were restricted to public institutions (GASB 34/35) from 2002 to 2017. Negative values of all variables except the income to revenue ratio, total net assets and investment income were treated as missing values.

[3] Income to revenue ratio is defined as the sum of net operating and non-operating income, divided by the sum of operating and non-operating revenues. When income to revenue ratios was lower than -1 (e.g., when there was a loss and revenues were close to zero), the value of -1 was assigned.

[4] The deviation of expense ratio (DER) was calculated using the expense categories in [20] through [29]. Each of the above expenses was divided by the total net assets. When total net assets

were less than or equal to \$1 million or missing, each of the expenses was assigned a missing value. Then, a deviation for each expense was calculated as the absolute value of the difference of the current and previous year expense, divided by the respective total net assets. The DER was calculated as the average of the above deviations, weighted by the respective previous year expenses. Values of DER greater than or equal to 0.5 (50%) were considered outliers and assigned a missing value.

[16] Takes the value of 1 when the value of endowment assets is greater than zero, and zero otherwise.

[17], [20–29] Missing values were replaced with zeros for endowment assets and for total expenses in instruction, research, public service, academic support, student services, operation and maintenance of plant, auxiliary enterprises, sales and services of hospitals, independent operations, and other expenses.

[18] When the ratio of investment income to endowment was lower than –1 or greater than 5, missing values were assigned.

[20–30] For the purposes of scaling by the total net assets, total net assets of less than or equal to \$1 million were considered missing. Values corresponding to the percentage change from the previous year above the 99th percentile of the distribution of the percentage change in each respective ratio were considered outliers and treated as missing. The ratios were calculated using the sums of wages and salary expenses, employee fringe benefits, and all other expenses, for each respective ratio, as defined by IPEDS.

[32] State governance structure is defined as in Jack H. Knott and A. Abigail Payne, "The Impact of State Governance Structures on Management and Performance of Public Organizations: A Study of Higher Education Institutions," *Journal of Policy Analysis and Management*, Volume 23, Issue 1, pages 13–30, Winter 2004. State governance structure takes the values of 1, 2, and 3,

which correspond to low, medium, and high level of regulation, respectively.

[33] Operating grant to revenue ratio is defined as the ratio of the sum of federal, state, and local operating grants to total operating and non-operating revenues.

Source: Integrated postsecondary education data system.

changes in the income-to-revenue ratio in the current year cannot affect resource allocation in the previous year.

We estimate (Equation (3)) using two-stage least squares. Superscript IV in $DER_{i,t}^{IV}$ means that we use an instrument to estimate the effect of contemporaneous DER on financial performance. In all the specifications that we estimated, we reject the possibility that lagged DER is a weak instrument.

4 | RESULTS

Table 2 reports summary statistics of the variables used in our analysis. Our sample covers a period from 2002 to 2017 and includes 30,662 total records.²³

The size of the final sample included in the analysis was reduced substantially largely due to missing data on net assets and various expense categories. Another reason for the reduction is the inclusion of two lags. The first lag is introduced in the calculation of DER in (Equation (1)). The second lag is introduced in the model when we instrument for DER using lagged DER.

Table A1²⁴ shows the number of observations that are lost due to each of those reasons. Column [a] shows that the total number of observations is 30,662. Column [b] demonstrates that as a result of missing observations on net assets, which are used in the calculation of DER, the total number of observations declines to 23,829. Universities that have no data on assets have substantially lower annual revenues (\$81 million on average) than universities with asset data (\$156 million on average). Hence, as mentioned above, the universities that were dropped in our sample don't cause a concern, in that they are not our target population in the first place. Our resulting sample is representative of midsize and large universities (i.e., our target population) that are large enough to shift resources among expenditure categories.

Missing data on expenses further reduce the sample to 21,517 observations, as shown in column [c]. The introduction of lagged expenses in the formula for calculating DER reduces the total number of observations to 19,361 (column [d]). DER can be calculated for 18,870 observations (column [e]). Finally, the introduction of lagged DER decreases our sample to 15,708 observations (column [f]).

Table 3 shows our main results. We use lagged DER and control variables to avoid reverse causality (i.e., the potential effect of financial performance on contemporaneous DER). Next, we examine the effect of contemporaneous DER and its interaction with the level of governance on financial performance. We address the reverse causality issue using an instrumental variable (IV) approach.

Table 3, column [a] shows that the effect of lagged DER on financial performance is 0.053 (*p*-value: .000). The coefficient of 0.053 implies that an increase of one standard deviation in DER (which is equal to 0.061) would generate an increase in financial performance of a university by 0.32% points.²⁵ This increase is twice as large as the average increase in financial performance of a university, which between 2002 and 2017 is only 0.16%.

Table 3, column [b] reports the effect of contemporaneous DER on financial performance. We use the instrumental variable approach to test whether contemporaneous DER positively affects

²³All the analyses were performed in R. The packages include lfe (for fixed effects regressions), ivreg (for the instrumental variable regressions), and stargazer and pastecs (for outputting the results).

²⁴See online Appendix A1.

²⁵Calculated as $0.061 \times 0.053 \times 100$.

TABLE 3 Regression analysis of the effect of the universities' deviation of expense ratio (DER) on income to revenue ratio, as a function of governance, 2002–2017

	[a]	[b]	[c]	[d]
[1] Lagged DER	0.053 (0.014)			
[2] Lagged DER × governance: low		0.19 (0.029)		
[3] Lagged DER × governance: medium			-0.016 (0.029)	
[4] Lagged DER × governance: high			0.038 (0.018)	
[5] DER (IV)		0.51 (0.11)		
[6] DER × governance: low (IV)				1.2 (0.19)
[7] DER × governance: medium (IV)				-0.1 (0.2)
[8] DER × governance: high (IV)				0.43 (0.2)
[9] Lagged log(revenue)	0.007 (0.003)	0.037 (0.005)	0.007 (0.003)	0.035 (0.005)
[10] Lagged SAT available dummy	0.008 (0.021)	0.016 (0.02)	0.007 (0.021)	0.022 (0.021)
[11] Lagged average SAT (if available)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
[12] Lagged grants bachelor degree	0.002 (0.006)	-0.002 (0.006)	0.000 (0.006)	-0.008 (0.006)
[13] Lagged grants master's degree	-0.028 (0.01)	-0.031 (0.01)	-0.021 (0.01)	-0.022 (0.01)
[14] Lagged grants PhD	-0.007 (0.005)	-0.009 (0.005)	-0.007 (0.005)	-0.008 (0.005)
[15] Lagged endowment assets dummy	0.017 (0.016)	0.017 (0.015)	0.015 (0.016)	0.018 (0.016)
[16] Lagged log(endowment)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
[17] Lagged investment income/endowment	0.002 (0.002)	0.005 (0.002)	0.002 (0.002)	0.005 (0.002)

TABLE 3 (Continued)

	[a]	[b]	[c]	[d]
[18] Observations	17,317	15,421	16,989	15,174
[19] R^2	0.51	0.49	0.51	0.47
[20] Adjusted R^2	0.45	0.43	0.45	0.40
[21] Weak instruments	Not applicable	<i>p</i> -value < .000	Not applicable	<i>p</i> -value < .000

Note: Fixed effects for institutions and years were included. Standard errors in parentheses.

Source: Integrated postsecondary education data system.

financial performance. As discussed above, we use lagged DER as an instrument for the contemporaneous DER. Table 3 shows that we reject the possibility that lagged DER is a weak instrument.²⁶

We estimate our IV model using two-stage least squares. The effect of contemporaneous DER on financial performance is substantially larger than the effect of lagged DER on financial performance. Indeed, while the coefficient of lagged DER is 0.053 (*p*-value: .000), as reported in Table 3, column [a], the coefficient of contemporaneous DER (estimated using the IV approach) is 0.51, about 10 times larger. This estimate implies that an increase of one standard deviation in DER would increase financial performance by 3.1% points, which supports our hypothesis that reallocation of financial capital across a university's segments drives financial performance.

Our results also suggest that the level of governance moderates the relationship between resource allocation flexibility and financial performance, which addresses our second question. Table 3, column [c] shows that when the level of governance is low, the effect of lagged DER is 0.19 (*p*-value: .000), larger than the effect of medium (coefficient: −.016, *p*-value: .709) or high (coefficient: .038, *p*-value: .017) levels of governance.²⁷

Table 3, column [d] shows the effect of contemporaneous DER on financial performance (using the IV approach) when the level of governance moderates the relationship between DER and financial performance. The effect of contemporaneous DER is, again, stronger than that of lagged DER. After using lagged DER as an instrument for contemporaneous DER, the estimated coefficient of DER in the presence of a low governance level is 1.20 (*p*-value: .000), economically the largest among all the specifications discussed above.²⁸

This coefficient implies that an increase of one standard deviation in DER would generate an increase in financial performance of an average university by 7.35% points.²⁹ This increase is substantial compared to the average financial performance of a university between 2002 and 2017 of only 0.16%. In absolute terms over the period we studied, that would have added \$10.02 million to the average university's income.³⁰ The effect is not insignificant given that a public university spends about \$5 million for scholarships (31% of students received a

²⁶The *p*-values reported in Tables 3 and 4 are calculated by testing the hypothesis that the coefficient on the instrument is 0 in the first-stage regression of TSLS. These *p*-values are included in the output of the ivreg function of the AER package in R (Stock & Watson, 2007).

²⁷The impacts of medium and high levels of governance are similar to each other (*p*-value: .12 when testing the hypothesis that their coefficients are the same).

²⁸As in column [c] of Table 3, the impacts of medium and high levels of governance are similar to each other (*p*-value: .07 when testing the hypothesis that their coefficients are the same).

²⁹Calculated as $0.061 \times 1.20 \times 100$.

³⁰Calculated as $(0.061 \times 1.20 - 0.0016) \times 139,303,525$, which is the increase in an average university's financial performance times average revenue, as reported in Table 2.

TABLE 4 Regression analysis of the effect of the universities' deviation of expense ratio (DER) on income to revenue ratio, as a function of governance and operating grants, 2002–2017

	[a]	[b]	[c]	[d]
[1] DER (IV)	0.51 (0.11)		0.2 (0.16)	
[2] DER × governance: low (IV)		1.2 (0.19)		0.41 (0.21)
[3] DER × governance: medium (IV)		-0.1 (0.2)		-0.39 (0.34)
[4] DER × governance: high (IV)		0.43 (0.2)		0.12 (0.42)
[5] Lagged DER × lagged operating grant to revenue ratio			0.25 (0.092)	
[6] Lagged DER × governance: low × lagged operating grant to revenue ratio				0.98 (0.2)
[7] Lagged DER × governance: medium × lagged operating grant to revenue ratio				0.32 (0.25)
[8] Lagged DER × governance: high × lagged operating grant to revenue ratio				0.21 (0.18)
[9] Lagged operating grant to revenue ratio	-0.007 (0.012)	-0.011 (0.012)	-0.021 (0.013)	-0.024 (0.015)
[10] Lagged log(revenue)	0.037 (0.005)	0.035 (0.005)	0.039 (0.004)	0.039 (0.005)
[11] Lagged SAT available dummy	0.014 (0.02)	0.021 (0.021)	0.006 (0.02)	0.009 (0.02)
[12] Lagged average SAT (if available)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
[13] Lagged grants bachelor degree	-0.002 (0.006)	-0.007 (0.006)	-0.003 (0.006)	-0.008 (0.006)
[14] Lagged grants master's degree	-0.03 (0.01)	-0.022 (0.01)	-0.028 (0.009)	-0.021 (0.01)
[15] Lagged grants PhD	-0.009 (0.005)	-0.008 (0.005)	-0.008 (0.005)	-0.006 (0.005)
[16] Lagged endowment assets dummy	0.016	0.017	0.017	0.019

TABLE 4 (Continued)

	[a]	[b]	[c]	[d]
	(0.016)	(0.016)	(0.015)	(0.015)
[17] Lagged log(endowment)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
[18] Lagged investment income/ endowment	0.005 (0.002)	0.005 (0.002)	0.004 (0.002)	0.004 (0.002)
[19] Observations	15,414	15,167	15,414	15,167
[20] R^2	0.470	0.450	0.510	0.500
[21] Adjusted R^2	0.410	0.380	0.450	0.440
[22] Weak instruments	<i>p</i> -value < .000			

Note: Fixed effects for institutions and years were included. Standard errors in parentheses.

Source: Integrated postsecondary education data system.

scholarship, and the average scholarship is about \$2,800 per year) (Scholarship America, 2020; Wood, 2021).

Similarly, the interaction of DER with governance in Table 3, column [d] indicates a clear weakening of resource allocation flexibility on financial performance when there is a high level of governance.

4.1 | Robustness checks

Table 4 shows the results of robustness checks that we conducted. We focus on the effect of contemporaneous resource allocation flexibility on financial performance, because we established that this effect of contemporaneous DER on financial performance is substantially stronger than the effect of lagged DER. All the specifications in Table 4 are estimated using an instrumental variable approach.

First, we control for the ratio of revenue from operating grants to total revenue (“operating grant to revenue ratio”), as resource allocation flexibility may depend on the source of a university’s funding. If operating grant-to-revenue ratio reflects resource allocation flexibility better than DER, then it will be positive and have a low *p*-value, while DER will become less important in explaining the variation in financial performance. Columns [a] and [b] of Table 4 show the results of regressions that are analogous to those in columns [b] and [d] of Table 3, except we include lagged operating grant to revenue ratio as another control. The results remain similar to those reported in columns [b] and [d] of Table 3.

Second, we address potential noise in the DER measure. DER may contain a substantial amount of noise. For example, many budget cuts at public universities are ad hoc and often take the form of a top-down instruction to reduce budgets by a given number. To the extent all budgets are reduced by fiat given from the board of regents, this would result in a high level of DER, yet would not necessarily reflect managerial discretion in resource allocation.

It is not clear *ex ante* whether such budget cuts would improve or worsen financial performance. Indeed, while a decline in expenses implies an increase in surplus, expenses under such

circumstances are likely to be cut when revenues also are low. Hence, if budget cuts introduce rather random noise into DER (independent of financial performance), the coefficient on DER will be biased downward.³¹ This means that, if such noise could be eliminated, our results would be even stronger than those that we obtained.

To address this concern, we included interaction terms among operating grant to revenue ratio, DER, and levels of governance in the regression. We observed that expenses of universities whose financing comes largely from operating grants are less likely to be affected by budget cuts (Meyer & Zhou, 2017). Hence, we expect that DER at universities with a larger proportion of revenue coming from operating grants would be less subject to noise than at universities where funding comes mostly from appropriations.

Columns [c] and [d] in Table 4 indeed suggest that DER at universities with a larger portion of revenues coming from operating grants has a stronger effect on financial performance in the presence of low governance level. This implies that in the absence of budget cuts, the estimated effect of DER on financial performance likely would be even stronger when the governance level is low.

In addition to our discussion in the previous section on the magnitude (i.e., the economic significance) of the effect of resource allocation flexibility on financial performance, the economic significance of our results can be demonstrated further by counting the number of universities with a budget deficit in any particular year. A budget deficit would become a surplus if a university's DER increased by one standard deviation. Between 2003 and 2017, DER could be calculated for 1,264 universities on average, of which 51.4% had a budget surplus (see Table A2). Increasing the income of each university by \$10.02 million (equivalent to an increase of one standard deviation in DER) would make 42.6% of universities switch from deficit to surplus. As a result, the total number of universities with surplus would increase from 51.4% to 94.0%.

5 | DISCUSSION AND SUMMARY

The results of this study suggest that, in general, universities with greater flexibility in annual spending across major budget categories perform better; and that this is assisted by low regulation/governance, since universities can redeploy resources more easily. Our findings complement the work of Lovallo et al. (2020), who emphasize the role of executive management latitude or discretion in resource allocation. Both public and private organizations must avoid ossification and create a fluid internal market for resources; it is important that resources do not become imprisoned without executive review within particular departments or other units.

It also is noteworthy that our finding does not show that resource allocation flexibility cannot have a negative effect on public college or university. Winter (2003, p. 993) notes that “attempting too much change... can impose additional costs when the frequent disruption of the underlying capability outweighs the competitive value of the novelty achieved.” Too much change also can undermine a sense of continuity and identity (Weick, 1982). While our results suggest that public universities should be given more flexibility to manage the resources they have, there might be tradeoffs. More allocation for one task necessarily diverts resources from other tasks, at least in the short term. A shift from teaching to public-private research projects, for example, might improve finances but conflict with the goals for which the university was

³¹This may be considered as attenuation bias. See Greene (1993), p. 281.

created (Knott & Payne, 2003). We believe a fruitful path for future work lies in identifying the potential impact of resource allocation flexibility on various kinds of university activity (e.g., teaching, research, technology transfer).

As noted, researchers from different disciplines have identified particular factors that might influence resource allocation decisions, such as increased managerial ownership (Scharfstein & Stein, 2000), agency problems (Aktas, Andreou, Karasamani, & Philip, 2019), managerial search behavior (Busenbark et al., 2022), and information asymmetry (Bergh, Ketchen, Orlandi, Heugens, & Boyd, 2019) (for a review, see Helfat & Martian, 2019). Although a growing body of research has recognized the importance of flexibility, the findings of this study suggest that local nonmarket mechanisms (Ahuja & Yavaram, 2011; Dorobantu et al., 2017) can affect the scope of managerial choice and optimal allocation of underlying resources, ultimately reducing organizational performance. We focus on formal institutions, especially external governance arrangements, and argue that the rules of the game are not always the same for all universities and that they lead to heterogeneous strategic responses at the university level. The findings are consistent with a sociocognitive perspective in the corporate governance literature (including venture capital literature) suggesting that the nature of external ties is important to a firm's strategic decision making (e.g., Carpenter & Westphal, 2001; Lerner, 1995). Our findings also warn that the push toward legislating strong governance requires a more careful assessment.

The actual workings of governance are likely to be much more complex than we explore in this study, involving interactions with myriad other internal and external governance mechanisms, such as institutional-level boards of trustees and system-level boards. Future research should examine more carefully the interactions across different governance mechanisms.

At the heart of this article is a strong hint of the power of dynamic capabilities—and especially the managerial freedom wisely exercised to reallocate resources (i.e., to shift internal and external resources effectively and efficiently within the organization), which Teece et al. (1997), Teece (2007), and Helfat et al. (2007) suggest are a key source of competitive advantage to business enterprises. This study suggests the importance of governance to resource allocation flexibility. However, if entrepreneurial proclivities are not embedded within the leadership team, greater freedom to reallocate resources will not guarantee that it will happen in a mission-enhancing manner.

Our findings also are a contribution to the dynamic capabilities literature. Most studies to date have focused on technological change and the management of business enterprise as the context (Fainshmidt, Pezeshkan, Lance Frazier, Nair, & Markowski, 2016). Governance is largely ignored. Our main result is not simply that resource allocation flexibility (undergirding dynamic capabilities) likely assists university (financial) performance.³² We tie this flexibility to the governance regime. Governance arrangements that are too tight (i.e., too prescriptive) can reduce the performance of universities by making it difficult to allow necessary flexibility. As Rick Levin, president of Yale (1993–2013), noted, “improving the efficiency of capital allocation can slow the rate at which costs increase.”³³ It also can ensure that financial resources are directed to the areas of highest potential and future benefits.³⁴

³²It also provides empirical support for the argument that financial restructuring is not a universal panacea (Schilke, 2014, p. 198).

³³The authors' interview with Levin on November 9, 2021.

³⁴Our study does not permit a direct examination of how resource allocation flexibility is linked to dynamic capabilities, but this limitation is shared by most empirical research in the microfoundation of dynamic capabilities literature (Easterby-Smith, Lyles, & Peteraf, 2009).

The literature on higher education has a reasonably strong research tradition in economics and political science but rarely draws on strategic management concepts. For example, scholars in law and economics are interested in questions like how governance structures impact institutional characteristics (McCubbins, Noll, & Weingast, 1987; Moe, 1990) and how the composition of a principal impacts the output of an agent (Nicholson-Crotty & Meier, 2003). Bringing a strategic management perspective³⁵ to the study of universities calls attention to several important questions, such as: (a) How do universities develop and sustain advantages relative to other universities via better management and governance? (b) How can public university leaders convince oversight institutions to loosen the reins?; and (c) How can campus leadership develop and promulgate a strategic vision that unites stakeholders?

While our results imply that governance that is too heavy-handed can limit the effectiveness of a university's dynamic capabilities, public university managers must be willing and able to avail themselves of as much flexibility as their governance system allows. Dynamic capabilities are organizational capabilities, which means they must be nurtured and maintained campus-wide for when they are needed. In practical terms, this entails laying groundwork such as establishing processes for continuous scanning for signals from talent markets, legislatures, students, donors, and other stakeholders; implementing decentralized decision making with appropriate accountability; and instilling organizational norms and incentives for employees at all levels to be more innovative and to embrace change. In a dynamically capable organization, information and knowledge and financial resources can flow easily to where they will be most useful. A university must be able to not only conduct research and teaching, but also learn how to manage itself well. In the age of international competition for resources and talent, "organized anarchies" (Cohen, March, & Olsen, 1972) are no longer an acceptable model for college and university management.

We hope that by bringing elements of the dynamic capabilities framework to bear on some management and policy issues in higher education, we will stimulate robust discussion about priorities and decision styles required for campus leadership today. Top leadership teams with dynamic capabilities challenge programmatic and research leaders to embrace new research and teaching opportunities of higher quality, greater potential, and greater importance, scientifically, humanistically, commercially, or otherwise, while at the same time trimming or abandoning low-quality, moribund activities and units. Although cost cutting sometimes is needed, by itself it is not the handmaiden of greatness. Putting available resources to the greatest opportunities and needs matters more.

Serious discussions of strategic management issues in education management are long overdue; their absence is surprising given that most strategic management scholars have appointments in universities and colleges. Researchers now can access new and rich data. The opportunity to transform the higher education sector is high, and the need considerable. This paper not only suggests avenues for more research; it also provides a pathway for immediate review and action by governments, campus leadership itself, and external funding sources.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

³⁵Our strategic management perspective is in turn informed by a law and economics perspective flowing from the examination of agency theory.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Heaton, S., Teece, D., & Agronin, E. (2023). Dynamic capabilities and governance: An empirical investigation of financial performance of the higher education sector. *Strategic Management Journal*, 44(2), 520–548. <https://doi.org/10.1002/smj.3444>