

Free to Spend? Institutional Autonomy and Expenditures on Executive Compensation, Faculty Salaries, and Research Activities

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Abstract

System governing boards fulfill roles as both regulators and protectors for their multiple constituent campuses. While centralized control provides many benefits to institutional members, such advantages are also accompanied by limitations upon campuses to pursue expanded missions, fully compete, and spend according to individual rather than collective priorities. In this study, I leverage a natural experiment where one state “freed” six public universities by removing the oversight of a centralized board. Given a novel opportunity to assess how institutions respond to a new intra-state market characterized by deregulation and increased competition for students, faculty, and other scarce resources, I first focus on changes in three institutional expenditure areas closely tied to entrepreneurship, competition, and prestige-seeking: executive compensation, faculty salaries, and spending on research activities. After constructing a novel dataset with administrative records on compensation and public data on expenditures, I employ complementary difference-in-differences and synthetic control approaches which yield robust evidence suggesting that newly independent universities increased the salary of their president/chancellor by approximately 6.2% (or \$19,000), increased the average full professor salary by 2.2% (nearly \$2,000), and increased research expenditures by an average of 12% (or \$2 million). These findings not only advance the nascent literature on how state governance structures influence institutional behaviors but also provide useful evidence for policymakers considering the intended (and potentially unintended) consequences of similar governance reorganizations.

Keywords: governance; institutional spending; executive compensation; faculty salaries; research expenditures; difference-in-differences; synthetic control

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Higher education governing boards play an important role in the state postsecondary education policy arena. As envisioned, these “buffer” organizations work “in the middle” to balance public interests and state goals with the increasingly diverse and evolving priorities of their multiple institutional constituents (McGuiness, 1997, p. 17). In this way, multi-campus systems fulfill dualistic roles as both institutional regulators and institutional protectors. As the former, system governing boards not only hold administrative oversight over their colleges and universities—including through employing presidents/chancellors, approving academic programs and appointments, and allocating resources among institutions—but, as the latter, they also serve as “political intermediaries” between policy actors and their institutions, as well as inter-system referees between institutions themselves, shielding or partially deflecting constituent members from these external and internal pressures (Knott & Payne, 2004; Morgan et al., 2020, p. 3). For institutions, membership in such a system may carry many benefits. As “super-coalitions of sub-coalitions,” systems draw collective power and resources from their many component parts (Birnbaum, 1988, p. 132). This centralization may provide many benefits, including when seeking additional state or federal support or commanding influence over state policy agenda-setting, but these advantages may also be accompanied by realities that limit the pursuits of individual institutions (Geiger, 2004; Kezar, 2006).

In tandem with their duty to advance state goals, promote the public agenda, and act as stewards for their member institutions, system governing boards are also charged with the collective success and preservation of the systems themselves (Berdahl, 1971; Rippner, 2015). That is, accomplishing collective goals sometimes means prioritizing the pursuits of one campus

over another or putting the needs of the system before the wants of individual institutions (Knott & Payne, 2004). This collective approach may also include work to inhibit inter-system competition among members, and, at times, leveraging a centralized capacity to cross-subsidize member campuses by redistributing resources from one institution to another or from institutions to the central administration (Richardson et al., 1998). In direct ways, governing boards “regulate and hold universities accountable” through various mechanisms, including by setting tuition and fee rates and approving campus budgets (McGuinness, 1997, p. 12). Beyond these administrative functions, however, Berdahl (1985) argued that the creation of state governing boards was to broadly “protect diversity” by regulating academic drift among institutions (p. 303), suggesting these boards also act as regulators of mission creep to preserve institutional diversity (Morphew & Huisman, 2002). These limits have also been characterized as “mitigating forces against some institutions being able to completely...mimic others,” thus not only regulating institutional aspirations but also constraining the potentially entrepreneurial mechanisms by which they can pursue their priorities (O’Meara, 2007, p. 169). Similarly, regarding inter-system competition, Tandberg (2013) noted that state higher education governing boards may themselves “condition the impacts or effects one actor has on the other,” offering that “were it not for the existence of the boundary-spanning organization or actor, the influence the interacting entities have on each other might be quite different,” suggesting that systems may also help lessen the negative impacts that some members may have on others by directly and indirectly reducing competition for, among others, faculty, students, and other scarce resources (pp. 509-510). This could include providing protection from executive or faculty poaching, duplication of academic programs, monopolization of the state agenda, and more through direct public policymaking, private internal negotiation, and other centralized activities (Tandberg, 2013).

As regulators and protectors, system governing boards exercise broad authority to achieve their goals; from maintaining the stratification of institutions within their purview and overseeing individual budgetary decisions, to mediating external political influence and working to ensure institutions do not harm one another or the larger system itself. So, what happens to institutions when the oversight of a system governing board is removed? That is, what happens when multiple campuses from one system are “freed,” independent to pursue altered missions, fully compete, and spend according to individual rather than collective priorities? In this study, I explore these questions using a natural experiment where Tennessee decoupled six public universities from a centralized governing board, granting them autonomy under new and independent governing boards. Specifically, I ask whether this decentralization and rise of a new higher education market organization impacted institutional expenditures in three areas prior works have closely tied to institutional entrepreneurship, competition, and prestige-seeking: executive compensation, faculty salaries, and spending on research activities (Hunt et al., 2019; Marginson, 2004; O’Meara, 2007; Sam & van der Sijde, 2014; Volkwein & Sweitzer, 2006).

Understanding these impacts and answering these questions are important for many reasons. To my knowledge, this is the first study to directly consider the effect of increased institutional autonomy on expenditures and one of few to study the effects of a large-scale reorganization of one state’s higher education sector on institutional spending. In this context, I seek to contribute to extant knowledge on the entrepreneurial, competitive, and prestige-seeking behaviors of institutions and to provide useful evidence for policymakers considering the intended (and potentially unintended) consequences of similar governance reorganizations. How institutions use their resources matters for students and states. These decisions can promote or inhibit student success (Gansemer-Topf & Schuh, 2006; Pike et al., 2006), fuel competition

within the market (e.g., for faculty and students; Brewer et al., 2009; Ehrenberg, 2003), increase academic and economic stratification within the higher education sector (O’Meara, 2007; Taylor, 2016), and promote inefficiency (e.g., academic program duplication; Dill, 2001). Furthermore, if such a decentralization increased executive compensation, for example, policymakers may not find this to be a prudent use of scarce public resources. Fully exploring these outcomes is necessary to consider the impact of the “protection” and “regulation” functions of system governing boards on individual institutions. While the reorganization of higher education is not new to states (see McGuinness, 2016 for a review), most changes have been piecemeal over time, with few states ever successfully making substantial changes to the complete administration and governance of their system(s) (Bastedo, 2012; McLendon, 2003).¹ Thus, this complete removal of a centralized governing board presents a unique opportunity to contribute to extant research in these areas and provide actionable information for policymakers.

To accomplish these aims, I begin by providing an overview of the policy landscape and natural experiment I use to assess the effect that greater institutional autonomy has on these expenditures. I then discuss and draw from public administration and institutional theories to frame this study as I consider changes in institutions’ governance structures, motivators in an altered competitive marketplace, and the availability of new mechanisms to pursue altered missions, fully compete, and spend according to individual rather than collective priorities. Next, I review existing literature on state governance reforms and these entrepreneurial, competitive, and prestige-seeking expenditure areas (i.e., executive compensation, faculty salaries, and research) with a focus on institutions’ motivations to alter spending in these areas and the

¹ Recent concessions by states, in part due to declining appropriations, include California’s abolishment its coordinating body, the California Postsecondary Education Commission, and Texas’ deregulation of tuition-and-fee authority (Texas Higher Education Coordinating Board, 2010; Warren, 2019).

mechanisms by which such deregulation allows them to do so. What follows includes a description of the data and complementary empirical strategies I employ and my results, including a series of associated robustness checks. I conclude with a discussion of the findings and implications of this research for future work and public policy.

Tennessee and the FOCUS Act

In 2016, Tennessee made a substantial change to its postsecondary sector by decoupling six universities from the Tennessee Board of Regents (TBR) through the Focus on College and University Success (FOCUS) Act.² At the time, TBR was one of the largest systems of higher education in the nation, governing 46 institutions that served nearly 200,000 students in fall 2015 (Tennessee Higher Education Commission [THEC], 2016a). Describing the rationale for the governance change, the statewide coordinating board noted:

“The Act provides greater autonomy for universities in pursuit of innovation and differentiation, while allowing [TBR] to sharpen its attention on technical and community college success. At the core of FOCUS is a belief that increasing the number of Tennesseans with a postsecondary credential demands increased agility on the part of the six TBR universities, with an understanding that this nimbler approach must be deployed within the broader context of the State’s higher education policy agenda” (THEC, 2016b, p. 1).

To provide this greater autonomy, the FOCUS Act removed six public universities from TBR and granted them independence under six new and separate governing boards. The FOCUS Act was passed and signed into law during the state’s 2016 legislative session, with the Act taking effect July 1, 2016. While the six universities assumed independence on July 1, 2016, granting

² The universities include Austin Peay State University, East Tennessee State University, Middle Tennessee State University, Tennessee State University, Tennessee Technological University, and the University of Memphis.

first autonomy for the 2016-17 academic/fiscal year, their new governing boards were not installed until the following year's legislative session.³ Each board held its inaugural meeting beginning in March 2017. Though the FOCUS Act's hallmark change was a fundamental shift in the state's postsecondary governance structure, the Act also included other changes, including increasing the regulatory authority of the statewide coordinating board (i.e., THEC) in matters concerning academics, finance, and data, though THEC gained no governing power over any of the state's public systems or institutions, nor direct oversight of institutional expenditures.⁴

At its core, the FOCUS Act removed oversight of TBR over the six universities and invested this power in six new boards with singular foci on their respective institution. Among these full administrative powers, the FOCUS Act specifically entrusted the new Boards of Trustees to assume the management and governance of each state university, including to “select and employ chief executive officers, confirm [the] appointment of administrative personnel, prescribe curricula, approve operating budgets and set fiscal policies, establish policies and regulations, and assume general responsibility for operation” (TBR, 2016). Each of these duties was previously carried out by TBR, including the selection, evaluation, and compensation of each campus' president/chancellor; approval of academic programs and the conferral of tenure; administration and review of each campus' operating budget; and the management of campus' mission, differentiation, and relations with other system campuses. Upon enactment of the FOCUS Act, institutions began to embody this new freedom.

³ Tennessee has a part-time legislature.

⁴ While THEC remained the statewide coordinating board, THEC has no authority over institutional decisions or expenditures. The regulatory role of the Commission centers mainly around academic program approval, setting tuition and fee rate boundaries, ensuring institutional participation in the statewide longitudinal data system, authorizing for-profit institution activity, and overseeing many need- and merit-based financial aid programs.

As one salient example of expanded pursuits, the University of Memphis changed its mission statement during the seating of its new board in 2017 to include: “The University of Memphis is a comprehensive metropolitan research university classified by the Carnegie Foundation as Doctoral: Higher Research, *but with the goal of reaching Carnegie Very High Research status* [emphasis added]” (THEC, 2017, p. 7). In the following year, the university also announced it would alter its expenditures by overturning a TBR policy that limited compensation for part-time instructors. In doing so, the campus noted “one of the first moves by the University of Memphis when we left the TBR system was to boost adjunct pay” (Cook, 2018). In that same year, the regional comprehensive Austin Peay State University (classified as Master's Colleges & Universities by the Carnegie Classification of Institutions of Higher Education [Carnegie]) announced it would establish its first doctoral program, entering the competitive doctoral arena with the rest of its five FOCUS peers (The Leaf Chronicle, 2017). Finally, in 2020, *The Chronicle of Higher Education* identified the presidents of East Tennessee State University and the University of Memphis as “movers and shakers,” making the second and third largest jumps, respectively, up the rankings of public university leaders’ pay (Bauman & Elias, 2020). While certain activities of the former system are observable limiters on these behaviors (e.g., the TBR policy referenced by the University of Memphis that limited faculty pay), these immediate changes across many campus domains suggest there were other centralized activities that constrained the FOCUS institutions. It is highly plausible that the advent of an independent governing board provided opportunities for institutions to pursue these individualized missions, alter expenditures, and engage in entrepreneurial ventures in new and intensified ways.

Given this “greater autonomy” for the six public universities and the Act’s intended focus on their “pursuit of innovation and differentiation... [with] increased agility” (THEC, 2016b, p.

1), I hypothesize that the removal of centralized oversight from TBR and the installment of individual and independent governing boards provided an opportune environment for the six universities to alter their entrepreneurial, competitive, and prestige-seeking expenditures to higher levels (and via mechanisms) than were previously possible under centralized control. This is not only exhibited by the above actions of the campuses, but, at a fundamental level, these six universities are no longer members of one postsecondary system, a reality meaning that they must not only increasingly compete in intra- and inter-state markets for faculty, students, and other scarce resources but must also do so under two new realities: They no longer benefit from the protection of a system that concentrates power and shields them from external pressures, but they also no longer have many of the corresponding regulations limiting their entrepreneurial, competitive, prestige-seeking, and other efforts.

To leverage this governance change as an opportunity to understand how increased institutional autonomy affects institutional behaviors, I frame the current study in public administration and institutional theories considering the mechanisms and motivations by which institutions might alter their behavior in light of a new governance structure.

Conceptual Perspectives

In the context of the current study, it is important to acknowledge that this change in governance means many things for the six institutions and the higher education market in the state. Metaphorically, while the “game” remains the same, the players, the coaches, the referee, and the rules have changed. First, these six universities were once part of one team (i.e., TBR) that is now broken into six separate players. Second, the organization of the state higher education sector changed. Each university is now governed by a new board, meaning each answers to a new authority which is also uniquely focused on their success, rather than the

success of any system. Third, TBR's oversight and role as a buffer between institutions has been eliminated. While the statewide coordinating agency remains present, THEC holds no governing power and has a limited ability to "condition the impacts or effects one [university] has on the other" (Tandberg, 2013, p. 509). Finally, while each board and university is still expected to advance state goals and promote the public agenda, each board's focused oversight of one institution rather than many means the "innovation and differentiation" each institution pursues, the "autonomy" by which they pursue it, and the "agility" or "nimbleness" mechanisms by which they do so can vary from those previously controlled by TBR (THEC, 2016b, p. 1). These realities characterize a new higher education market in Tennessee which may not only *allow* the six universities to alter their entrepreneurial, competitive, and prestige-seeking expenditures to higher levels and via altered mechanisms than before but may also *encourage* such behaviors given a greater need to compete in an increasingly complex intra-state market. To consider these changing players and changing contexts, I draw from principal-agent theory and notions of academic capitalism, entrepreneurialism, and revenue theory of costs to help frame the current study and describe how the removal of centralized control—and the regulation and protection it provided—may incite changes in institutional behavior.

Principal-agent theory concerns itself with the roles and relationship between two parties, a leader (the "principal") and a follower (the "agent"), wherein the principal contracts the agent to perform duties on the principal's behalf (Jensen & Meckling, 1976; Moe, 1984). This framework has been widely applied to the field of higher education to consider issues of governance and policy (see Yallem et al., 2018 for a systematic review). Given that both public and private institutions of higher education are relatively autonomous, and the fact that public principals (e.g., the state or large boards) often have multiple agents, prior work has

contextualized the role of the principal as exercising a variety of “oversight” or “monitoring” roles for a “semi-autonomous” agent (Lane, 2007, p. 622). In the current context, principal-agent theory is useful given the fact that each institution (i.e., agent) is now directed by new boards (i.e., principal), and that the focus of these new principals (i.e., on one institution) varies from that of the previous one (i.e., TBR’s focus on the system at large). Given these changes, the agent should not only be freer to pursue an altered mission and fully compete—including the ability to alter spending in areas that support entrepreneurialism, competition, and the maximization of prestige or other resources—but should also have greater flexibility of tools with which to do so. This is particularly likely given the fact that agreements between principals and agents rest upon a belief that action of the agent will improve the status of the principal relative to others (Alchian & Demsetz, 1972; Lane & Kivisto, 2008). In this light, independent boards with foci on singular institutions are likely to permit or encourage institutional behaviors which benefit the institution’s pursuits and are unlikely to exercise Tandberg’s (2013) conditioning behaviors to mitigate their effects on others, unlike that of a centralized board. Indeed, prior studies have shown that a simple change in the principal alone has been enough to incite changes in agents’ behaviors (Kwiek, 2021; Lane & Kivisto, 2008; Liefner, 2003). For these reasons, I hypothesize that the six universities will spend differently under decentralized versus centralized control.

Given that the six universities now operate in a heightened competitive market absent any system-level referee (i.e., the presence of new, autonomous agents similarly seeking students, faculty, prestige, state appropriations, and other scarce resources in ways that are unconditioned by a system governing board), the notions of academic capitalism, entrepreneurialism, and revenue theory of costs are also important to consider. Academic capitalism and entrepreneurialism posit that institutions have necessarily adopted broad market-like behaviors in

their pursuit of power, prestige, and resources (Slaughter & Leslie, 1997; Slaughter & Rhoades, 2004), while Bowen's (1980) revenue theory of costs suggests organizations will maximize revenues to the fullest extent possible to fund infinitely evolving operations (Archibald & Feldman, 2008; Cheslock et al., 2016; Kimball, 2014). In this context, faced with greater competition and equipped with greater autonomy, the six FOCUS universities are thus likely to engage in the new market in a different manner than they previously did as they employ "nimbleness" with heightened "agility" (THEC, 2016b, p. 1). Fundamentally, given institutions' tendencies to seek new resources for endless pursuits, and systems' operations to regulate, limit academic drift, and condition behavior one has on another, the removal of TBR was also the removal of a barrier to set and pursue such endless goals—and the removal of an external body to define the ways in which those goals could be pursued. In all, the six universities and their boards now not only operate as separate autonomous agents, heightening their need to compete (and the severity of a failure to do), but they may now also pursue expanded aims through innovative and entrepreneurial efforts. Indeed, it could be expected that a market characterized by heightened competition and complexity alone would lead institutions to increasingly adopt such market-like behaviors that advance their competitive advantage and to focus expenditures on areas that support this pursuit. Discussing this likelihood, Eckel (2008) argued that, "when faced with choices of where to invest scarce time and resources, institutions may yield to those priorities that will position them well in the competitive arena" (p. 184). For these reasons, I hypothesize that the six universities will not only spend differently under decentralized versus centralized control, but that these altered expenditures will be focused in areas that can provide a competitive advantage, including ones that may have been previously limited or conditioned by a centralized authority.

In this study, I ask whether this decentralization and altered market impacted institutional expenditures. While many actions may improve institutions' position within the higher education market, governing boards and campus administrators have the most immediate control over expenditures, which ultimately hold the potential to impact short- and long-term institutional outcomes (Ryan, 2004; Webber & Ehrenberg, 2010). Prior works have consistently identified three areas of expenditures commonly associated with institutional entrepreneurship, competition, and prestige-seeking: executive compensation, faculty salaries, and spending on research activities. As discussed above, these are also areas that have been directly identified or exhibited by the FOCUS universities as areas constrained by a centralized system. In what follows, I introduce prior work on the antecedents to state higher education governance reforms, review the extant literature on these expenditure areas, and discuss how the FOCUS Act enables and motivates institutions to increase expenditures in pursuit of a heightened competitive advantage and resource acquisition.

Literature Review

As noted, many states have made piecemeal changes to their higher education governing structures, but few have made large-scale reorganizations via a single act in recent history (McGuinness, 2016). While this study leverages a unique opportunity to estimate impacts of one such large change, it is founded upon a rich body of work that considers the antecedents to these reforms. McLendon et al. (2007) reviewed many of these studies and conducted an analysis examining determinants of 22 governance reforms enacted from 1985-2000. The authors found that unified legislative control and larger shares of Republicans were strongly predictive of organizational changes, and Tandberg and Anderson (2012) reinforced these findings by suggesting that governance changes are driven by “economic pressures [and] efforts to reinvent

government,” including state responses to “growth in the size, complexity, and cost of higher education” (p. 565). Indeed, a host of work has identified politics and political maneuvering as an impetus for many higher education governance reorganizations (MacTaggart, 1996; McLendon, 2003; McLendon & Ness, 2003), and, beyond these political forces, Sponsler (2010) noted that states broadly also adopt policies given “learning, competition, coercion, and socialization” (p. 47). In Tennessee’s context, the 2016 state legislature had a Republican supermajority (85% of the senate and 74% of the house), and Republican Bill Haslam was still in his second term as governor (Council of State Governments, 2016), suggesting that the political environment was primed for a governance reform. Similarly, the state cited a need for campuses to pursue “innovation and differentiation” with “increased agility” and “nimbleness” in service of the “State’s higher education policy agenda” (THEC, 2016b, p. 1). These terms pull from much of the “new public management” and “quasi-public corporation” language used in prior reforms to dually suggest that such a change can (1) increase the public benefit of institutions while also (2) leveraging many private-sector efficiencies or practices (McLendon et al., 2007, p. 648). In all, such a reform to Tennessee’s higher education governance structure could have been expected, particularly given the suite of policies introduced by the same governor and legislature (e.g., Drive to 55, Tennessee Promise). However, while such reforms can appear rational or efficient, existing work finds generally null impacts of them on state higher education performance (Conner & Rabovsky, 2011; Volkwein, 1986; Volkwein & Tandberg, 2008), and others find such reorganizations may in fact leave states with increased costs given requirements to carry out and sustain such reforms in practice (Heller, 2003).

As the FOCUS universities embark under a new governance structure that increases autonomy and removes the inter-campus “buffer” previously fulfilled by TBR, competition for

faculty, students, and other scarce resources (including state appropriations) is likely to increase. Thus, institutions are likely to accentuate their focus on increasing power, resources, and prestige in ways that are objectively and subjectively associated with the accumulation of these commodities (Dill, 2001; Eckel, 2008). Prior studies have considered many “striving behaviors” of institutions (O’Meara, 2007, p. 122), including how institutions’ strategic priorities to maximize prestige, acquire additional resources, and improve their competitive advantage can traverse all areas of campus life, such as within academic programs (Maguad, 2018; Morpew, 2000), student recruitment and engagement (Bock et al., 2014; Szekeres, 2010; Zilvinskis & Rocconi, 2018), faculty hiring and evaluation (Gardner & Veliz, 2014; Johnson, 2017), institutional identity (Miller, 2019; Rusch & Wilbur, 2007), tuition and fee pricing (Allen & Shen, 1999), campus facilities (Griffith, 1994; McClure, 2019), and more. A key strand of this prior work has also considered institutions’ administrative expenditures or resource allocation (e.g., McClure & Titus, 2018; Morpew & Baker, 2004; Santos, 2007), and three areas of expenditures that have been commonly associated with institutional entrepreneurship, competition, and prestige-seeking include executive compensation, faculty salaries, and spending on research activities (Hunt et al., 2019; Marginson, 2004; O’Meara, 2007; Sam & van der Sijde, 2014; Volkwein & Sweitzer, 2006).

While no work to date has documented the impacts of a centralized governing authority on these expenditure areas, a robust body of work has linked these spending categories to institutional “striving” for additional resources and competitive advantages (McClure & Titus, 2018; Ehrenberg et al., 2007; Leslie et al., 2012; O’Meara, 2007, p. 122). Monks (2007) and Tang et al. (1996) found presidential pay rates to be associated with institutional rankings and prestige, and Pfeffer and Ross (1988) argued that presidential pay rates “reflect the practices and

premises that pervade the organization” given the heightened visibility of a president (p. 79). If institutions seek to reflect power and success, highly compensating a chief executive has shown to be a viable strategy. Pfeffer and Ross (1988) underscored this signaling effect of high-wage presidents (i.e., having a “valuable” president), noting that a clear measure of leader effectiveness is the organizational accumulation of resources. Given that prestigious institutions have accumulated, among others, wealth and power, they may signal the success of their president with higher compensation packages. Other works have also observed that presidents of higher-ranked and better-resourced institutions (i.e., land-grant and R1 [very high research activity] institutions) earn more on average than the chief executives of less prestigious institutions (Bartlett & Sorokina, 2005; Ehrenberg et al., 2001; Hunt et al., 2019). In the Tennessee context, the newly independent boards now have full control over the compensation of their president/chancellor, which was previously set by TBR. As institutional complexity and competition increase in the deregulated market, the role of a president/chancellor may more closely resemble that of a private Chief Executive Officer, providing upward pressure on their compensation while more closely tying that compensation to institutional success (Cheng, 2014; Huang & Chen, 2013). Indeed, this appears to have occurred in Tennessee shortly following the FOCUS Act as shown by large descriptive changes in the compensation of two FOCUS universities’ presidents as reported by *The Chronicle of Higher Education*.

After observing that institutions invest their scarce resources on areas that yield competitive advantages, Eckel (2008) noted that institutions are also rewarded by “focusing on...star faculty [and] externally funded research” (p. 184). Characteristics of the faculty are strong predictors of institutional productivity and resource acquisition, including the number of citations, level of external funding, educational experiences (i.e., highest-degree and doctoral-

granting institution), and publication counts (Volkwein & Sweitzer, 2006). The payment of the faculty is no exception. In fact, Melguizo and Strober (2007) observed that faculty members are financially rewarded for succeeding at many activities that enhance institutional quality and prestige, including by attracting other faculty, securing large research grants, recruiting strong undergraduate and graduate students, and securing donors who want to be associated with institutions that are “winners” (p. 638). Competition for such faculty has led to a “silent crisis” for public institutions as they work to recruit and retain star faculty within their fiscal constraints (Alexander, 2001). Furthermore, in a mechanical sense, faculty salaries increase prestige and rankings—both strong predictors of competition and subsequent resource acquisition (Bastedo & Bowman, 2010; Monks & Ehrenberg, 1999; Pike, 2004)—by directly influencing the *U.S. News & World Report* scores (Morse et al., 2019). In Tennessee, the new governing boards now not only set academic policies and confer tenure, but also directly approve institutional operating budgets, including salary changes that were, as noted by the University of Memphis, limited by TBR. Under increased competition for high-quality faculty that can in turn confer prestige and acquire resources for the institution, it could be expected that the six FOCUS universities may feel pressure to increase faculty compensation, particularly if faculty are expected to increase productivity in light of an institutions’ heightened research agenda (e.g., the University of Memphis’ new Carnegie goal or Austin Peay State University’s new doctoral program). This upward pressure on salaries is also likely given the fact that TBR no longer serves as a “buffer” between these institutions to regulate activities like poaching or academic program duplication, increasing the need for institutions to compete for and retain faculty.

Similar to achieving a higher ranking in part by increasing faculty pay, achieving Carnegie R1 (very high research activity) status through increased spending on research

activities can also bring prestige and heighten institutions' competitive advantage. McClure and Titus (2018) note that achieving R1 status, an explicit goal of the newly independent University of Memphis, "represents an honorific in higher education that carries certain benefits" (p. 969), where others have suggested such an honorific can have positive effects on applications and selectivity, media and press coverage, and subsequent financial earnings (Bowman & Bastedo, 2009; Hearn & Rosinger, 2014; O'Meara, 2007). In Tennessee specifically, even if institutions are not pursuing R1 status, any spending on research activities is directly tied to the state's outcomes-based funding model that distributes 100% of state appropriations (THEC, 2020). Here, institutions' spending on research, service, and sponsored programs represents 10-15% of the outcomes upon which the state bases its annual allocation of nearly \$2 billion in funding. Thus, increasing expenditures on research represents an opportune area to not only invest in activities associated with other positive outcomes, but also an area that is likely to yield a strong return on investment. The newly formed FOCUS governing boards now control institutional operating budgets and set institutional priorities, including the pursuit of augmented research goals, thus streamlining their ability and agility to increase expenditures in this area highly associated with prestige, rankings, and the accumulation of additional campus resources.

While I hypothesize that the removal of TBR's oversight from the six FOCUS universities may enable and encourage altered expenditure patterns in light of heightened competition for students, faculty, and other scarce resources, it should be noted that not all activities of states necessarily reduce institutions' abilities to compete. For example, many states play increasing roles in the university research enterprise, providing support by way of funding general enrollment subsidies to research universities; making direct, large-scale investments in research as a mechanism to increase economic development; passing state tax incentives for

public-private research partnerships or research collaborations; or taking similar actions that can centrally support institutions' research competitiveness (Feldman & Desrochers, 2003; Feller, 2004; Hearn & Lacy, 2009; Mowery et al., 2001; Plosila, 2004). Similarly, on the faculty front, many states now support "eminent scholars" programs with taxpayer funds—programs that provide funding for the recruitment of accomplished scientists to fulfill endowed chairs and professorships (Hearn et al., 2013). Activities like these suggest that states can use their centralized authority and resources to support the pursuits of individual institutions. However, it is also important to recognize that such programs may exist alongside the presence of a centralized governing board to mediate or "condition" this competition and work to ensure universities leverage these resources to compete regionally or nationally—rather than intra-state against one another (Tandberg, 2013, p. 509). Without such an actor, like TBR in Tennessee, such state programs may have varied impacts. On one hand, they may continue to support institutions striving to achieve higher levels of research activity by providing them with necessary capital. On the other, they may exacerbate existing inequalities between institutions by increasing the competitive advantage of already-well-resourced institutions—particularly for programs that leverage state-university matching funds—which could ultimately increase inefficiency and disadvantage emerging universities in the new competitive arena. In all, state oversight does not limit institutions' competitive abilities *per se*, but such programs may be best suited in the presence of a centralized governing board to mitigate any unintended consequences.

Drawing upon these conceptual foundations and prior works, I leverage the FOCUS Act as a natural experiment to assess how increased this institutional autonomy impacted executive compensation, faculty salaries, and spending on research activities. In what follows, I review the data for the study and the complementary causal inference techniques I employ to answer this

question. In doing so, I not only seek to advance the nascent literature on how state governance structures influence institutional behaviors but also seek to provide useful evidence for policymakers considering the intended (and potentially unintended) consequences of similar governance reorganizations.

Data

Data for this study are drawn from three primary sources: *The Chronicle of Higher Education's* Executive Compensation at Public and Private Colleges survey, THEC administrative records on president/chancellor compensation and benefits, and the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS). I derive executive compensation information for the six public universities in Tennessee and several comparison institutions from the former two sources, while I pull faculty salaries, research expenditures, and institution-level covariate controls from the latter.

The Chronicle maintains a website and dataset with results from its annual executive compensation survey, which covered the compensation of chief executives at more than 600 private institutions and nearly 270 public institution and systems in 2019 (Bauman et al., 2020). These data were graciously provided by *The Chronicle* for this project. This is, to my knowledge, the largest source of executive compensation information on higher education leaders since IPEDS does not report these data. Given that the FOCUS Act applied only to public institutions in Tennessee, I focus only on those public institutions included in *The Chronicle's* survey to assemble an initial comparison group. After excluding any leaders that represent systems (e.g., University of Texas or University of North Carolina systems), I collected the base pay rates for each remaining institution from academic/fiscal years 2010-11 through 2016-17 so long as the institution was represented in the survey for at least four years ($n=160$). For years after 2016-17,

The Chronicle moved its reporting window to focus on calendar year (e.g., 2018) rather than academic/fiscal year (e.g., 2017-18) compensation to mirror that of its private college data. I collected the same campus-by-year compensation for these leaders in the 2018 and 2019 calendar years (the most recent available). For institutions with mid-year changes in leadership (e.g., two or more presidents/chancellors in a given year), I averaged each pay rate to arrive at one executive compensation rate by campus by year, and for any campus reporting less than the full nine years of data ($n=25$), I linearly interpolated these values. The final *Chronicle* dataset represents the base compensation rates of presidents/chancellors of 160 public institutions (not including any in Tennessee), covering academic/fiscal years 2010-11 through 2016-17, calendar year 2018 (spanning academic/fiscal years 2017-18 and 2018-19), and calendar year 2019 (spanning 2018-19 and 2019-20).

Among the 6 institutions impacted by Tennessee's FOCUS Act, only 5 have ever reported compensation information to *The Chronicle*, and only 3 have done so at least half of the survey's duration. Upon request and agreement, THEC provided executive compensation information for all public institutions in the state from academic/fiscal year 2009-10 through 2019-20, including current salary levels for the chief executive. These are public data collected annually by THEC as part of institutional operating budgets. None of the six universities experienced a change in president/chancellor following the FOCUS Act, and none had mid-year leadership changes. Given these are administrative records, there were also no missing values in the current salary variable, which is akin to *The Chronicle*'s base pay rate which excludes bonuses or other compensation.⁵ To bridge *The Chronicle*'s 2018 calendar year

⁵ I cross-validated this by comparing the THEC-reported current salary level to *The Chronicle*'s base pay level for those of the six FOCUS institutions that reported in the most recent academic/fiscal year (2016-17, $n=4$), and all values matched exactly except for one institution that was reported at \$9,000 higher in *The Chronicle*.

reporting change, I averaged the THEC-reported salaries for 2017-18 and 2018-19 given that the 2018 calendar year spans both periods and did the same for 2019 (averaging 2018-19 and 2019-20).⁶ In all, the combined compensation file includes base salaries for institutional chief executives from 2010-11 through 2018-19/2019 for 160 public institutions across the nation and 9 public institutions in Tennessee (the six former TBR universities and three other public universities in the state).

Finally, I construct an institution-level panel from IPEDS covering my remaining two outcome variables of interest, the average, 9-month-equivalent salary of a full professor and current year total expenditures on research activities, as well as covariate controls from academic/fiscal year 2010-11 through 2018-19. These data cover the 169 public universities available within *The Chronicle* and THEC datasets. Control variables include fall full-time equivalent (FTE) enrollment; the six-year Bachelor's degree graduation rate; the percent of first-time full-time students who receive Pell grants; the percent of students who are a racial minority;⁷ the current tuition and mandatory fee rate; the institution's total annual operating revenues, endowment balance, and admissions rate; the Carnegie classification designation by year (defined as 1 for doctoral universities and 0 otherwise); and the 75th percentile score of the ACT composite for the admitted class. Prior research guided the selection of these controls related to entrepreneurialism, competition, and prestige, and previous works have found these factors to be predictive of executive compensation, faculty salaries, and research expenditures

⁶ Comparing this average to the subset of those six Tennessee institutions who reported to *The Chronicle* for 2018 ($n=4$), 1 value matched exactly and the remaining 3 had a cumulative *Chronicle*-THEC difference of \$32,672, where the *Chronicle*-reported salary was again higher than the average-computed salary.

⁷ Here, percent racial minority represents the proportion of undergraduate students who are not white. I greatly appreciate the implications of this choice and recognize the benefit of disaggregating racial/ethnic counts into discrete categories but am limited by the demographic realities of the state. THEC reports enrollment counts in this manner (e.g., THEC, 2016a) given that as little as 13.2% of total headcount in some universities is comprised of non-white students and that approximately 73% of all public institutional enrollees in fall 2015 were white. My interest is in capturing the relative composition of institutions, not in predicting changes in discrete categories.

(Bartlett & Sorokina, 2005; Boudreau et al., 1997; Ehrenberg et al., 2001; Hearn, 1999; Hunt et al., 2019; Johnson et al., 1987; Monks, 2007; Riggs et al., 1986). For each of these outcomes and controls, I again linearly interpolate missing values; seven institutions were dropped for not reporting at least two years of data for an outcome or covariates to be interpolated. For one treated institution in Tennessee, neither the admission rate nor the ACT composite were ever reported, so these values were imputed with the grand mean.

In all, the final dataset covers the expenditures of interest and multiple covariate controls from 2010-11 through 2018-19/2019 for 162 public universities. This represents 6 years of observations prior to FOCUS and 3 years after (the most recent available). All financial figures were adjusted for inflation using the 2019 Consumer Price Index. Descriptive statistics for the three outcomes of interest and 10 covariate controls across the six FOCUS universities, the 156 comparison institutions, and the total sample for the 2015-16 academic/fiscal year (immediately prior to the FOCUS Act) are presented in Table 1.

Methods

In this study, I leverage two complementary strategies to estimate causal impacts of the FOCUS Act on institutions' executive compensation, faculty salary, and research activity spending. I first implement a traditional difference-in-differences design and then supplement this strategy with a synthetic control approach. Both strategies yield valid causal inferences under the assumptions discussed below, yet the latter allows the difference-in-differences' parallel-trend assumption to be empirically relaxed.

Difference-in-Differences

Given that TBR's oversight was removed beginning July 1, 2016 for all FOCUS universities, I first employ a difference-in-differences (DID) empirical strategy to estimate the

causal effect of this change on institutions' expenditures. DID is a common quasi-experimental technique that exploits across-unit and inter-temporal variation and is a preferred estimation strategy when assessing the effects of fixed-time policy adoptions because its ability to address concerns of selection and omitted variable bias (Angrist & Pischke, 2009, 2015; Cellini, 2008; Imbens & Wooldridge, 2009). Here, I seek to compare the six universities in Tennessee (i.e., treatment) to a counterfactual group of all other colleges that were not affected by this policy change (i.e., control) by examining differences in the outcomes of interest both before and after the 2016 FOCUS Act. Formally, I estimate:

$$(1) \quad \log(y_{it}) = \alpha_0 + \beta \text{FOCUS}_{it} + \mathbf{X}'_{it} \delta + \pi_i + \rho_t + \varepsilon_{it} ,$$

where y_{it} is one of three prestige-seeking outcomes of interest for institution i in year t ; FOCUS_{it} is a binary indicator identifying treatment (i.e., the FOCUS Act), which takes the value of 1 in 2016-17 and later for the six formerly-TBR universities or 0 otherwise; and \mathbf{X}_{it} is a vector of institution-specific, time-varying controls described earlier. For the 2018 (or 2019) calendar year compensation rate, I use 2017-18 (or 2018-19) academic/fiscal year predictors (the most recent available). The specification is also conditioned on unit (π_i) and year (ρ_t) fixed effects to absorb unobserved unit-specific, time-invariant and across-unit, year-specific factors. Here, β is the parameter of interest, or the causal effect of the FOCUS Act on an institution's given y_{it} expenditures. Each model is weighted by FTE enrollment. I estimate heteroscedastic-robust standard errors and clustered at the state level (i.e., highest level and the level of treatment) to account for serial correlation in outcomes (Abadie et al., 2017; Bertrand et al., 2004; Cameron & Miller, 2015). I also log each outcome and financial control given skewed distributions.

The primary assumption embedded in DID is that the treatment and control group would exhibit a constant difference in outcome trends in absence of treatment (Angrist & Pischke,

2009, 2015). While this parallel-trends assumption is untestable in the potential-outcomes framework (Rubin, 2005), I plot outcome trends for the six FOCUS universities and controls in the top row of Figure 1. In aggregate, the parallel-trends assumption is plausible in the pre-treatment period (2010-11 through 2015-16) for each outcome of interest, where both groups follow similar outcome trajectories in the pre-treatment period. In the post-treatment period (2016-17 and later), increases in each outcome are noted for the treatment group which may be attributable to impacts from the FOCUS Act. Though parallel trends are strongly plausible here, it is possible that the six universities in Tennessee systematically varied on these outcomes in such a way that significant estimates could be produced even in the absence of treatment. If these universities varied from the counterfactual group in the pre-treatment period, then any estimated post-treatment differences could be due to these systematic differences rather than being representative of a FOCUS Act treatment effect. To assess this possibility, I conduct an event study analysis to test for effects pre-treatment years (i.e., similar to multiple placebo tests) and to assess the magnitude of differences in the post-treatment period. This further assesses the appropriateness of DID in this setting. Formally, I estimate:

$$(2) \quad \log(y_{it}) = \alpha_0 + \beta \sum_{t=2010}^{18, \neq 15} (\text{FOCUS}_i \times \rho_t)_{it} + \mathbf{X}'_{it} \delta + \pi_i + \rho_t + \varepsilon_{it},$$

where the specification is the same as Equation 1, but I now interact a dummy indicator equal to 1 for the FOCUS institutions (FOCUS_i ; 0 otherwise) with each year factor (ρ_t) from 2010-11 through 2018-19, omitting the year immediately prior to the FOCUS Act (2015-16) as reference. For underlying model assumptions to be met, I expect significant differences to be absent across the 2010-11 through 2014-15 horizon, or for effects to be in the opposite direction as hypothesized (i.e., where Tennessee institutions expended *less* funds on each outcome of interest), but for significant effects to be estimated following the governance change (2016-17

and later). Results of this specification are plotted in the bottom row of Figure 1, where each annual estimate (compared to 2015-16) is plotted and bounded by a 95% confidence interval.

The president/chancellor compensation outcomes meet these assumptions, with no statistically significant outcome differences between the FOCUS institutions and the controls in the pre-treatment period, suggesting DID is an appropriate strategy. The research expenditures outcome also meets this assumption for all but 1 pre-treatment year (2013-14), where the 95% interval barely crosses 0 (0.0018). This is the only pre-treatment year where significant impacts would be expected, which is (1) not nominally similar to the magnitude of post-treatment effects estimated (i.e., 0.0655 in 2013-14 compared to 0.1704 in 2016-17) and (2) not suggestive evidence of sustained systematic differences between the treatment and control groups. For the average professor salary outcome, however, there are sustained and time-variant differences between the six FOCUS institutions and the control group (i.e., 2012-13 and 2013-14), suggesting a violation of the parallel-trends assumption for this outcome. While DID appears to be an appropriate strategy for assessing impacts on president/chancellor compensation and research expenditures—and all event-study plots point to large and statistically significant increases following the FOCUS Act for each outcome of interest—these differences in the average professor salary urge caution when interpreting their results and motivate the complementary use of an identification strategy which overcomes this issue by empirically relaxing this parallel-trends assumption: synthetic control.

Synthetic Control

Pioneered by Abadie and Gardeazabal (2003) and Abadie et al. (2010, 2015), synthetic control methods (like DID estimators) are used to compare outcomes among treatment and control groups before and after a policy change, with observed outcome differences following a

policy's implementation attributable to the effect of the policy. Referred to as a generalized extension of DID, GSCM uses all available treatment-control comparison points and weights units to create a comparison group that is nearly identical to the treatment group on outcomes in the pre-treatment period, allowing DID's strict parallel-trends assumption to be relaxed (Cunningham, 2021). By generating a synthetic control unit whose outcomes mirror that of the treatment group conditioned on observable characteristics prior to the policy change (i.e., by shrinking pre-treatment differences between treatment and control groups toward zero), concerns regarding the selection of an optimal comparison group are reduced, and the synthetic unit can be considered a suitable comparison given its statistically indistinguishable difference from the treatment group (Abadie et al., 2010, 2015). The application of synthetic control methods to education is emerging yet remains underutilized (Jaquette et al., 2018; Rubin & González Canché, 2019; Ward & Ost, 2021).

Unlike a DID application, where researchers guide the selection of a control group which could violate its parallel-trends assumption, synthetic control methods create a suitable counterfactual from all available control units such that

$$(3) \quad y_{i,t=0}^{\text{FOCUS}} - \sum w_i \bar{Y}_{t=0}^{\text{Control}} \approx 0 .$$

Here, in the pre-treatment period ($t = 0$), the average outcome (\bar{Y}) for all universities not impacted by the FOCUS Act (i.e., controls) are weighted to equal those of a FOCUS institution (y_{it}). By considering each control unit i 's outcome as a linear function of observable covariates in the pre-treatment period, an optimization algorithm identifies a weight w for each control unit i such that the w_i optimal weight for control unit i that ensures $y_{i,t=0}^{\text{FOCUS}}$ and $\sum w_i \bar{Y}_{t=0}^{\text{Control}}$ are as mathematically close as possible. Knowing that the mean outcome difference between treatment

and control units in the pre-treatment period is as mathematically as close to zero as possible, $\sum w_i \bar{Y}_{t=0}^{\text{Control}}$ becomes a suitable counterfactual, eliminating parallel-trend concerns.⁸

The generalized synthetic control method (GSCM) follows the same intuition but allows for multiple treatment units (i.e., six FOCUS universities) by aggregating separate synthetic units for each treated unit with a linear interactive fixed effects model (Kreif et al., 2016; Xu, 2017; Xu & Liu, 2018, 2020). When predicting outcomes, interactive fixed effects models interact unit-specific intercepts (“factor loadings”) with time-varying coefficients (“factors”) such that

$$(4) \quad \log(y_{it}) = \beta_{it} \text{FOCUS}_{it} + \mathbf{X}'_{it} \delta + \lambda'_i f_t + \pi_i + \rho_t + \varepsilon_{it} ,$$

where y_{it} is the outcome for unit i in year t , conditioned on unit (π_i) and year (ρ_t) fixed effects; FOCUS_{it} is a time-varying treatment indicator equal to 1 for the FOCUS universities in the post-treatment period (0 otherwise); and \mathbf{X}_{it} is the vector of controls. Here, λ'_i are unit factor loadings interacted with time-varying factors f_t , and β_{it} is the heterogenous average treatment effect on the treated (ATT) estimate for unit i at time t . The number of factors and their factor loadings are derived by an optimization procedure that performs the equivalent function of the w_i weights in equation (3) to optimally weight control units (Xu, 2017).⁹ Aggregating these β_{it} impacts for N units in treatment group T produces the overall ATT of exposure to the FOCUS Act, shown by

$$(5) \quad \text{ATT} = \frac{1}{N_{Y(1)}} \sum_{i \in T, t=1} \{\log[Y_{it}(1)] - \log[Y_{it}(0)]\} = \frac{1}{N_{Y(1)}} \sum_{i \in T, t=1} \beta_{it} ,$$

which is the average annual difference between treatment units ($Y(1)$) and their synthetic control units not exposed to FOCUS ($Y(0)$) in the post-treatment period.

I implement GSCM by estimating equation (4) above for each expenditure outcome of interest and allow the optimal weighting algorithm to pull from all available control institutions

⁸ For more information on synthetic control methods generally, see Abadie (2019), Abadie et al. (2010, 2015), and Cunningham (2021).

⁹ For more information on the GSCM and linear interactive fixed effects, see Xu (2017) and Bai (2009).

in the *Chronicle* universe to construct a suitable counterfactual unit.¹⁰ The GSCM equivalent to the DID parallel-trend plots are presented in Figure 2. These figures show the superior control of GSCM over parallel trends and exhibit the respective outcome deviations between the six FOCUS universities (“Treated Average”) and their aggregated synthetic control unit (“Estimated $Y(0)$ Average”). Here, the optimal weighting process achieved strong alignment between the treatment and synthetic control unit(s) evidenced by the minimal-to-zero differences between each line in the pre-treatment period, suggesting GSCM is an appropriate strategy in this context and should complement the DID estimates. In the post-treatment (shaded) period, like the DID event-study plots, these figures also show increases in the FOCUS universities’ institutional expenditures in each of these categories (observed by gaps between their raw outcomes and the weighted counterfactuals).

Results

Difference-in-differences and synthetic control estimates of the effect of institutional autonomy on expenditure category are presented in Table 2 by outcome and estimation strategy. For the executive compensation outcome, the DID model with full covariate controls and both institution and year fixed effects suggests the six FOCUS universities increased the base pay rate of their president/chancellor by approximately 6.17% ($[\exp(0.0598) - 1] \times 100$). Given a baseline (cumulative pre-treatment) mean of approximately \$305,130, this increase is equivalent to an increase of over \$18,830. The GSCM estimator produces a similar finding, suggesting institutions increased executive compensation by roughly 6.21%, or \$18,950. For the professor salary outcome, both estimates also point to consistent increases in faculty compensation,

¹⁰ Synthetic control models were generated with `gsynth` in R. I leverage the Gobillon and Magnac (2016) Expectation-Maximization estimator to improve precision of standard errors, allow the optimization process to execute 1,000 bootstrap samples for cross validation, and cluster robust standard errors at the state level.

ranging from 1.59% (\$1,440) in the DID model to 2.19% (\$1,980) in the GSCM model. As noted, while the DID estimator likely fails to meet the parallel-trends assumption for this outcome, the qualitatively similar GSCM estimate provides additional and plausible evidence of increases in faculty compensation. Finally, concerning research expenditures, both models again point to consistent and statistically significant increases in spending, ranging from approximately to \$1.59M (9.41%) in the GSCM model to \$2.0M (11.8%) in the DID model. In all, these results provide consistent evidence to suggest that the removal of a centralized governing board from the six universities and installment of individual and independent boards provided an opportunity and environment for institutions to increase spending in on entrepreneurial, competitive, prestige-seeking activities.

Robustness

This study is not without notable limitations in design or data quality. Here, I detail two main points and conduct a series of robustness checks to further consider underlying assumptions of the analysis and to test the stability of the main findings to altered specifications.

Treatment Period

A primary limitation could concern identification of the post-treatment period. As noted, the FOCUS Act was passed during the 2016 legislative session, taking effect July 1, 2016. This meant the six public universities were autonomous beginning in the 2016-17 academic/fiscal year, and the primary models in Equations (1) and (4) treat 2016-17 as the first year of treatment. However, as previously noted, these institutions' new governing boards did not sit for the first time until March 2017. While institutions had autonomy from TBR during the 2016-17 academic/fiscal year, it is possible the full effect of a new governance structure could not be detected until the 2017-18 academic/fiscal year (or, for compensation, the 2018 calendar year)

when the new governing board could consider or alter institutions' expenditures, such as setting new compensation rates for the president/chancellor. To consider this possibility, I re-estimate the main models but lag the treatment indicator so that the pre-treatment period covers academic/fiscal years 2010-11 through 2016-17 and the post-treatment period is defined as 2017-18/2018 and 2018-19/2019 only. Comparing these two specifications allows me to consider the earliest possible effects of the FOCUS Act on institutions' expenditures (2016-17 and later) and possible effects after full implementation (2017-18/2018 and later).

Results from this lagged treatment specification are presented in Table 3. As expected, outcome estimates are larger and more statistically significant, suggesting that either the seating of the independent governing board could have propelled spending or that the full effect of the FOCUS Act would not be experienced until the academic/fiscal (or calendar) year after the full governance transition was complete. Estimates here are again consistent across strategies and suggest statistically significant increases in executive compensation, professor salaries, and research expenditures. Results suggests the six FOCUS universities increased executive compensation by approximately 8.15-8.86% (\$25,180-27,370), increased professor salaries by 2.80-2.89% (\$2,540-2,620), and increased research spending by 9.79-13.17% (\$1.67-2.24M). These lagged increases are also supported by the raw and weighted outcome plots shown in Figures 1 (row 2) and 2. Taken together with the primary 2016-17 academic/fiscal year treatment specification, these results provide additional and consistent evidence of increases in institutions' president/chancellor compensation, faculty salaries, and research expenditures following the governance change.

Executive Compensation

A second concern is a data limitation brought about by *The Chronicle*'s change from academic/fiscal year compensation reporting to calendar year reporting in 2018. As shown in the Figure 1's parallel trends, there is an increase for all groups in the 2017-18/2018 year, likely due to this mechanical change. While this is a concern, it is important to note that this change applied to all institutions, and the means-based DID and GSCM estimators are agnostic to this difference given that all institutions' compensation rates were shifted upward. That is, there is no evidence to suggest that institutions in one state or system would benefit over another by such a reporting change. It is also important to note here that using the THEC salary data for all public institutions in Tennessee (which is used in each model) represents a conservative salary estimate given that THEC data match almost exactly to *The Chronicle* in 2016-17 yet underestimate the 2018 calendar year salary (as discussed in the Data section). Detecting any significant increase between these years for the treated institutions should therefore be regarded as particularly substantial. While I cannot formally overcome this data limitation, I do test the robustness of these findings in two ways. First, I shorten the post-period window to only include 2016-17 when there was no change in reporting for institutions. While the previous section (Treatment Period) may suggest this is too early to detect full effects of the FOCUS Act, any significant changes in the executive compensation outcome detected would be based only on a constantly measured comparison of president/chancellor salaries and could represent a lower-bound of the full effect given that it only considers the first year of treatment. Second, I limit the treated sample to those three FOCUS universities that responded to *The Chronicle*'s compensation survey for at least four years and replace their THEC-computed 2018 and 2019 calendar year salaries with *The Chronicle*'s reported salary, allowing their mechanical change to exactly mirror

that of the other comparison institutions. Results for these specifications are presented in Tables 4 and 5.

For the shortened 2016-17 post-treatment window (Table 4), estimated impacts are smaller yet less-precisely-estimated than the main models, suggesting an increase in president/chancellor salaries for the six universities of 1.60% (\$4,880) in the DID model and 3.07% (\$9,370) in the GSCM model, though neither are statistically significant. This reduced precision is likely due to the limitations imposed with only one year of post-treatment data and the prior-observed and possible lagged impacts of the FOCUS Act. However, for the subset of three universities who reported to *The Chronicle*, where I observe a constant transition from academic/fiscal to calendar year reporting, the models suggest larger effects given the conservative nature of the THEC data (Table 5). Estimates range from an approximately \$75,450 (23.58%) increase in the DID model to \$76,340 (23.86%) increase in the GSCM model. Each of these specifications again provides further confidence in the main findings of a significant increase in executive compensation following institutional autonomy.

In all, results from the main DID and GSCM models and those across several robustness checks provide early yet consistent results suggesting that the removal of a centralized governing board from the six universities and installment of individual and independent boards provided an opportunity and environment for institutions to increase spending on executive compensation, professor salaries, and research. These robustness tests also underscore the likelihood that the full impacts of such a governance change may not be felt until a few years after the transition.

Discussion

As regulators and protectors, system governing boards exercise broad authority to administratively oversee their colleges and universities and to serve as intermediaries between

these institutions, one another, and the external environment (Knott & Payne, 2004; McGuiness, 1997; Morgan et al., 2020). While these protective activities shield institutions to a large degree from external political influence and undue intra-system competition, the corresponding regulatory activities may limit the ability of individual campuses to pursue altered missions, fully compete, and spend according to individual rather than collective priorities (Berdahl, 1971; Geiger, 2004; Kezar, 2006; Rippner, 2015). These regulations may manifest through direct public policymaking, private internal negotiation, and other centralized activities (Tandberg, 2013). Yet despite research to date on state and system higher education governance structures, no work has considered how the removal of a centralized governing board impacts subsequent institutional behavior. To explore this question, I leveraged a natural experiment where Tennessee “freed” six of its public universities in 2016 by removing the oversight of a centralized board and investing this power in six new boards with a singular focus on their own institution. Given a novel opportunity to assess how institutions respond to a new intra-state market characterized by deregulation and increased competition for faculty, students, and other scarce resources given newly autonomous actors, I focused on changes in three institutional expenditure areas closely tied to entrepreneurship, competition, and prestige-seeking: executive compensation, faculty salaries, and spending on research activities.

With a primary goal to provide “greater autonomy” for the six universities to pursue “innovation and differentiation” by employing “nimble approach[es]” with heightened “agility” (THEC, 2016b, p. 1), the FOCUS Act yielded a new higher education market in Tennessee. At a fundamental level, six universities were no longer members of one postsecondary system, a reality meaning that they must not only increasingly compete but must also do so under two additional realities: They no longer benefit from the protection of a system that concentrated

power and shielded them from external pressures, but they are also no longer subject to many of the corresponding regulations that limited their entrepreneurial, competitive, prestige-seeking, and other efforts. Thus, considering the control of a new governing board, I drew from principal-agent theory to hypothesize that these institutions should not only be freer to pursue an altered mission and fully compete—including the ability to alter spending in areas that support entrepreneurialism, competition, and the maximization of prestige or other resources—but should also have greater flexibility of tools with which to do so. In this light, I believe independent boards with foci on singular institutions are likely to permit or encourage institutional behaviors which benefit the institution's pursuits and are unlikely to exercise Tandberg's (2013) conditioning behaviors to mitigate their effects on others—unlike that of a centralized board. Thus, the removal of TBR was not only the removal of a barrier to set and pursue new goals, but it was also the removal of an external body that defined the ways in which those goals could be pursued. While certain activities of the former system were observable limiters on these behaviors (e.g., the TBR policy referenced by the University of Memphis that limited faculty pay), the immediate changes in executive compensation, the establishment of new doctoral programs, and the alteration of faculty pay policies across many campuses suggest there were other centralized activities that previously constrained the FOCUS institutions.

As the target area for these increased entrepreneurial, competitive, and prestige-seeking behaviors, I drew from institutional notions of academic capitalism, entrepreneurialism, and revenue theory of costs, as well as from prior works on institutional expenditures, to identify three areas of spending that institutions were likely to alter. While many actions may improve institutions' position within the higher education market, governing boards and campus administrators have the most immediate control over expenditures (Ryan, 2004; Webber &

Ehrenberg, 2010). In this scenario, I hypothesized that the six universities would not only spend differently under decentralized versus centralized control, but that these altered expenditures would be focused in areas that can provide a competitive advantage by maximizing power, prestige, and the accumulation of other resources—and that may have been previously limited or conditioned by a centralized authority. Using complementary difference-in-differences and synthetic control approaches, I found robust evidence suggesting that newly independent universities increased the salary of their president/chancellor by approximately 6.2% (or \$19,000), increased the average full professor salary by 2.2% (nearly \$2,000), and increased research expenditures by an average of 12% (or \$2 million). These findings support the primary hypotheses and suggest that the deregulation of Tennessee’s higher education market produced a structure that not only *allowed* the six universities to alter their expenditures to higher levels than before but one that also *encouraged* such behaviors given a greater need to compete in an increasingly complex intra-state market. Whether expenditures or activities in these areas were directly or indirectly prohibited by TBR, it is undoubtable that the FOCUS Act signaled an opportunity for institutions to alter spending and resulted in large and significant increases in their expenditures across these areas.

The results of this study have important implications for public policy and future research. Fundamentally, I asked whether institutions increased expenditures in three areas following a governance change, and robust evidence suggests the answer is yes. A host of prior works have considered institutions’ administrative expenditures or resource allocation in pursuit of power, prestige, and resources in these and other areas of campus operations (e.g., Hunt et al., 2019; Marginson, 2004; McClure & Titus, 2018; Mophew & Baker, 2004; O’Meara, 2007; Sam & van der Sijde, 2014; Santos, 2007; Volkwein & Sweitzer, 2006). While the FOCUS

universities still have governing boards, it would be irrational for a board to prohibit behaviors of the institution that, *ceteris paribus*, benefit its ability to compete and accumulate additional tangible and intangible resources. Being home to institutions (and, particularly, public ones) that increasingly spend, compete, and move up the prestige ladder can be two sided for states. On one hand, stronger institutions can increase enrollment levels, increase the price elasticity of demand for college (i.e., allowing institutions to raise tuition, freeing demand for state appropriations), increase other revenues for higher education (e.g., philanthropy or external research support), or impact a variety of state-related outcomes (e.g., in and out migration or workforce development). On the other hand, supporting increasingly complex and successful institutions, particularly those developed through increased expenditures, requires resources to maintain such quality and standing (McClure & Titus, 2018; Morpew & Baker, 2004). Likewise, this may introduce additional issues brought about through increased competition that may, in tandem, promote inefficiency (e.g., academic program duplication or increased demand on state appropriations to support research activities; Dill, 2001; Volkwein & Sweitzer, 2006). Indeed, policymakers and the public alike may not find increased executive compensation to be a prudent use of scarce public resources. Policymakers should carefully consider these as intended (and potentially unintended) consequences of such a governance reorganization insofar as it may affect institutions' spending patterns. Furthermore, policymakers should also be aware that some state-sponsored programs to support institutional competition (e.g., research investments, eminent scholars) could have varied impacts in the absence of a centralized governing board. Such activities could be used to help mitigate negative consequences of increased competition (e.g., by supporting developing research universities) but could also exacerbate existing resource

inequities between universities if not closely monitored. To further aid these considerations, future work in this area is needed.

To my knowledge, this is the first study to consider the effect of increased institutional autonomy on expenditures and one of few to study the effects of a large-scale reorganization of a state's higher education sector on spending behaviors. In this light, my work builds upon a strong foundation of prior literature on governance and institutional expenditures while working to connect the two given a novel opportunity to assess how institutions respond to increased autonomy to pursue augmented missions, fully compete, and alter spending. In doing so, my findings reinforce existing conceptual foundations regarding the nature and function of system governing boards and extends these prior works to more fully consider how system governing boards' roles as regulators and protectors condition these institutional behaviors. Future work should consider other possible impacts of such a reorganization on institutional behavior, including possible changes to admissions, tuition and financial aid, athletics and auxiliary enterprises, spending on student services, and more. While the current study narrowly focused on outcomes that have been empirically associated with entrepreneurialism, competition, and prestige, future studies should consider other expenditure activities or behaviors that could promote or inhibit student success (Gansemer-Topf & Schuh, 2006; Pike et al., 2006), fuel greater competition (Brewer et al., 2009; Ehrenberg, 2003), or increase academic and economic stratification within the higher education sector (O'Meara, 2007; Taylor, 2016). Indeed, while such higher education governance reforms can appear rational or efficient, existing work finds generally null impacts of them on subsequent state higher education performance but does find that such reorganizations can actually leave states with increased costs to support and sustain the governance changes in practice (Conner & Rabovsky, 2011; Heller, 2003; Volkwein, 1986;

Volkwein & Tandberg, 2008). The costs and benefits of these possible intended (and unintended) consequences must be further explored by future research and fully considered by state policymakers.

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Table 1. *Descriptive statistics for expenditures and covariate controls by group.*

	Treatment	Control	Total
Outcome Expenditures			
President/Chancellor Salary	\$333,600.10 (44,456.10)	\$461,937.85 (168,100.68)	\$457,184.60 (166,904.78)
Average Professor Salary	\$92,361.43 (13,654.67)	\$123,636.40 (22,341.69)	\$122,478.07 (22,835.09)
Research Expenditures ¹	\$16.70 (18.23)	\$182.14 (231.44)	\$176.01 (229.26)
Covariate Controls			
FTE Enrollment	12,319.67 (4,671.86)	22,147.80 (11,502.48)	21,783.80 (11,468.25)
Graduation Rate	43.50 (5.68)	60.58 (16.28)	59.94 (16.33)
Percent Pell	50.67 (11.22)	32.73 (13.35)	33.40 (13.67)
Percent Minority	41.00 (24.90)	42.47 (20.60)	42.42 (20.68)
Tuition & Fee Rate	\$8,447.19 (649.56)	\$10,477.04 (3,001.38)	\$10,401.86 (2,972.13)
Operating Revenues ¹	\$155.14 (62.94)	\$870.87 (1,112.13)	\$844.36 (1,099.66)
Total Endowment ¹	\$91.79 (63.87)	\$704.22 (1,400.33)	\$681.54 (1,378.93)
Admission Rate	69.24 (16.25)	67.48 (17.82)	67.55 (17.72)
Carnegie Classification	0.83 (0.41)	0.98 (0.14)	0.98 (0.16)
Average ACT	25.67 (1.22)	27.28 (2.96)	27.22 (2.93)
Institutions	6	156	162

Sources: The Chronicle of Higher Education, Tennessee Higher Education Commission, and U.S. Department of Education.

Notes: ¹ Millions; Table reports means and standard deviations (in parentheses) for 2015-16, the year immediately prior to treatment;; Figures rounded; All financial figures adjusted for inflation to 2019 CPI; Carnegie is a binary indicator equal to 1 for any doctoral university classification.

Table 2. DID and GSCM estimates of effect of institutional autonomy on expenditures by category.

	President/Chancellor Salary ¹		Average Professor Salary ¹		Research Expenditures ¹	
	DID	GSCM	DID	GSCM	DID	GSCM
Treat × Post (FOCUS)	0.0598+ (0.0304)	0.0602** (0.0224)	0.0158* (0.0071)	0.0216*** (0.0052)	0.1116** (0.0331)	0.0899* (0.0395)
FTE Enrollment	0.00001 (0.00001)	0.00001*** (0.000002)	0.000003 (0.000002)	0.000004*** (0.0000002)	0.00001 (0.000003)	0.000002* (0.000001)
Graduation Rate	0.0021 (0.0033)	0.0045*** (0.0011)	0.0010 (0.0008)	0.0007*** (0.0001)	0.0070** (0.0022)	0.0036*** (0.0008)
Percent Pell	0.0020 (0.0034)	0.0047*** (0.0014)	-0.0026*** (0.0007)	-0.0022*** (0.0002)	-0.0003 (0.0026)	-0.0021* (0.0008)
Percent Minority	0.0079 (0.0050)	0.0059*** (0.0011)	0.0028*** (0.0008)	0.0027*** (0.0001)	0.0041 (0.0037)	0.0068*** (0.0006)
Tuition & Fee Rate ¹	0.4588* (0.1996)	0.3465*** (0.0392)	-0.0537 (0.0482)	-0.0548*** (0.0040)	-0.1182 (0.1853)	-0.1620*** (0.0215)
Operating Revenues ¹	-0.0792 (0.0966)	-0.0880*** (0.0234)	0.0208 (0.0270)	0.0127*** (0.0025)	0.7060** (0.2046)	0.7807*** (0.0136)
Total Endowment ¹	0.0530+ (0.0283)	0.0575*** (0.0077)	-0.0037 (0.0049)	-0.0038*** (0.0008)	0.0149 (0.0199)	0.0156** (0.0048)
Admission Rate	-0.0012 (0.0014)	-0.0004 (0.0005)	-0.0007** (0.0002)	-0.0006*** (0.0001)	-0.0007 (0.0010)	-0.0020*** (0.0003)
Carnegie Classification	0.0038 (0.0657)	0.0586 (0.0512)	0.0011 (0.0119)	-0.0059 (0.0084)	0.0705 (0.1209)	0.1486*** (0.0354)
Average ACT	0.0145 (0.0134)	0.0206*** (0.0062)	0.0127** (0.0044)	0.0110*** (0.0008)	-0.0100 (0.0105)	-0.0045 (0.0040)
Institution Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Treatment Baseline Mean	\$305,134.25		\$90,363.02		\$16,948,371.91	

⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Sources: The Chronicle of Higher Education, Tennessee Higher Education Commission, and U.S. Department of Education.

Notes: ¹ Logged; *N* (Campus-by-Year): 1,458; Table reports coefficients and heteroscedastic-robust standard errors (in parentheses) clustered at the state level; DID models weighted by institutional full-time equivalent enrollment; Post-treatment is defined as 2016-17 and later; Figures rounded; All financial figures adjusted for inflation to 2019 CPI; Carnegie is a binary indicator equal to 1 for any doctoral university classification; Treatment Baseline Mean shows unweighted pre-treatment (2010-11 through 2015-16) average for treatment group for effect comparison.

Table 3. Lagged treatment (2017-18): DID and GSCM estimates of effect on expenditures by category.

	President/Chancellor Salary ¹		Average Professor Salary ¹		Research Expenditures ¹	
	DID	GSCM	DID	GSCM	DID	GSCM
Treat × Post (FOCUS)	0.0849** (0.0296)	0.0784*** (0.0205)	0.0276*** (0.0070)	0.0285*** (0.0067)	0.1237*** (0.0293)	0.0934+ (0.0479)
FTE Enrollment	0.00001 (0.00001)	0.00001*** (0.00001)	0.000003 (0.000002)	0.000004*** (0.000002)	0.00001 (0.000003)	0.000002* (0.000001)
Graduation Rate	0.0021 (0.0033)	0.0045*** (0.0009)	0.0010 (0.0008)	0.0007*** (0.0001)	0.0070** (0.0022)	0.0035*** (0.0008)
Percent Pell	0.0020 (0.0034)	0.0048*** (0.0013)	-0.0026*** (0.0007)	-0.0021*** (0.0002)	-0.0002 (0.0026)	-0.0020* (0.0008)
Percent Minority	0.0079 (0.0050)	0.0059*** (0.0010)	0.0028*** (0.0008)	0.0027*** (0.0001)	0.0041 (0.0037)	0.0068*** (0.0006)
Tuition & Fee Rate ¹	0.4585* (0.1998)	0.3455*** (0.0364)	-0.0540 (0.0481)	-0.0550*** (0.0040)	-0.1173 (0.1854)	-0.1627*** (0.0219)
Operating Revenues ¹	-0.0790 (0.0964)	-0.0890*** (0.0153)	0.0210 (0.0269)	0.0129*** (0.0025)	0.7053** (0.2043)	0.7798*** (0.0134)
Total Endowment ¹	0.0530+ (0.0283)	0.0574*** (0.0066)	-0.0037 (0.0049)	-0.0038*** (0.0008)	0.0148 (0.0199)	0.0153** (0.0048)
Admission Rate	-0.0012 (0.0015)	-0.0004 (0.0004)	-0.0007** (0.0002)	-0.0006*** (0.0001)	-0.0008 (0.0010)	-0.0020*** (0.0003)
Carnegie Classification	0.0050 (0.0652)	0.0528 (0.0440)	-0.00001 (0.0116)	-0.0038 (0.0077)	0.0823 (0.1147)	0.1414*** (0.0277)
Average ACT	0.0144 (0.0134)	0.0211*** (0.0052)	0.0127** (0.0044)	0.0110*** (0.0008)	-0.0101 (0.0104)	-0.0045 (0.0041)
Institution Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Treatment Baseline Mean	\$308,929.71		\$90,579.89		\$17,020,017.38	

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Sources: The Chronicle of Higher Education, Tennessee Higher Education Commission, and U.S. Department of Education.

Notes: ¹ Logged; *N* (Campus-by-Year): 1,458; Table reports coefficients and heteroscedastic-robust standard errors (in parentheses) clustered at the state level; DID models weighted by institutional full-time equivalent enrollment; Post-treatment is defined as 2017-18 and later; Figures rounded; All financial figures adjusted for inflation to 2019 CPI; Carnegie is a binary indicator equal to 1 for any doctoral university classification; Treatment Baseline Mean shows unweighted pre-treatment (2010-11 through 2016-17) average for treatment group for effect comparison.

Table 4. Shortened post-period (2016-17): DID and GSCM estimates of effect on president/chancellor salary.

	President/Chancellor Salary ¹	
	DID	GSCM
Treat × Post (FOCUS)	0.0159 (0.0338)	0.0302 (0.0258)
FTE Enrollment	0.00001 (0.00001)	0.00001*** (0.000001)
Graduation Rate	0.0045 (0.0044)	0.0080*** (0.0012)
Percent Pell	-0.0021 (0.0037)	0.0031+ (0.0017)
Percent Minority	0.0091+ (0.0048)	0.0053*** (0.0014)
Tuition & Fee Rate ¹	0.5876** (0.2060)	0.4167*** (0.0479)
Operating Revenues ¹	-0.0605 (0.1009)	-0.0800*** (0.0158)
Total Endowment ¹	0.0070 (0.0163)	0.0083 (0.0079)
Admission Rate	-0.0021 (0.0018)	-0.0014** (0.0005)
Carnegie Classification	-0.0647 (0.0465)	-0.0105 (0.0582)
Average ACT	0.0127 (0.0181)	0.0218*** (0.0062)
Institution Fixed Effects	Y	Y
Year Fixed Effects	Y	Y
Treatment Baseline Mean	\$305,134.25	

⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Sources: The Chronicle of Higher Education, Tennessee Higher Education Commission, and U.S. Department of Education.

Notes: ¹ Logged; N (Campus-by-Year): 1,134; Table reports coefficients and heteroscedastic-robust standard errors (in parentheses) clustered at the state level; DID models weighted by institutional full-time equivalent enrollment; Post-treatment is defined as 2016-17 only; Figures rounded; All financial figures adjusted for inflation to 2019 CPI; Carnegie is a binary indicator equal to 1 for any doctoral university classification; Treatment Baseline Mean shows unweighted pre-treatment (2010-11 through 2015-16) average for treatment group for effect comparison.

Table 5. Chronicle-reported compensations for subset of FOCUS institutions:
DID and GSCM estimates of effect on president/chancellor salary.

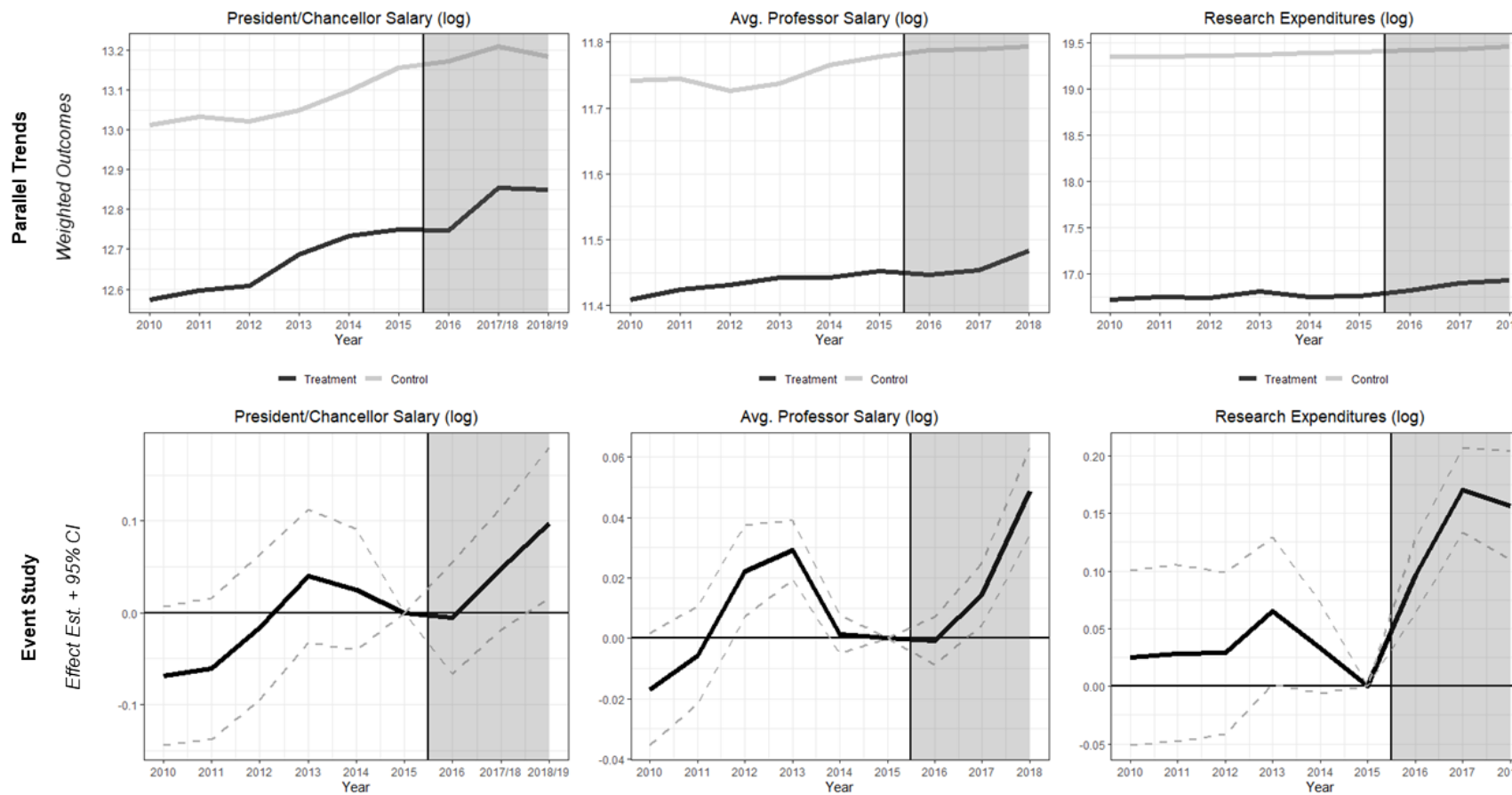
	President/Chancellor Salary ¹	
	DID	GSCM
Treat × Post (FOCUS)	0.2117*** (0.0319)	0.2140+ (0.1189)
FTE Enrollment	0.00001 (0.00001)	0.00001+ (0.00001)
Graduation Rate	0.0021 (0.0033)	0.0039 (0.0030)
Percent Pell	0.0026 (0.0035)	0.0054+ (0.0031)
Percent Minority	0.0082 (0.0050)	0.0063+ (0.0036)
Tuition & Fee Rate ¹	0.4497* (0.1981)	0.3392** (0.1313)
Operating Revenues ¹	-0.0796 (0.0962)	-0.0899 (0.0762)
Total Endowment ¹	0.0551+ (0.0284)	0.0606* (0.0242)
Admission Rate	-0.0014 (0.0015)	-0.0007 (0.0010)
Carnegie Classification	0.0651 (0.1070)	0.0770 (0.1546)
Average ACT	0.0139 (0.0135)	0.0212 (0.0138)
Institution Fixed Effects	Y	Y
Year Fixed Effects	Y	Y
Treatment Baseline Mean	\$319,969.87	

⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Sources: The Chronicle of Higher Education, Tennessee Higher Education Commission, and U.S. Department of Education.

Notes: ¹ Logged; N (Campus-by-Year): 1,431; Table reports coefficients and heteroscedastic-robust standard errors (in parentheses) clustered at the state level; DID models weighted by institutional full-time equivalent enrollment; Post-treatment is defined as 2016-17 and later; Figures rounded; All financial figures adjusted for inflation to 2019 CPI; Carnegie is a binary indicator equal to 1 for any doctoral university classification; Treatment Baseline Mean shows unweighted pre-treatment (2010-11 through 2015-16) average for subset of treatment group ($n=3$) for effect comparison.

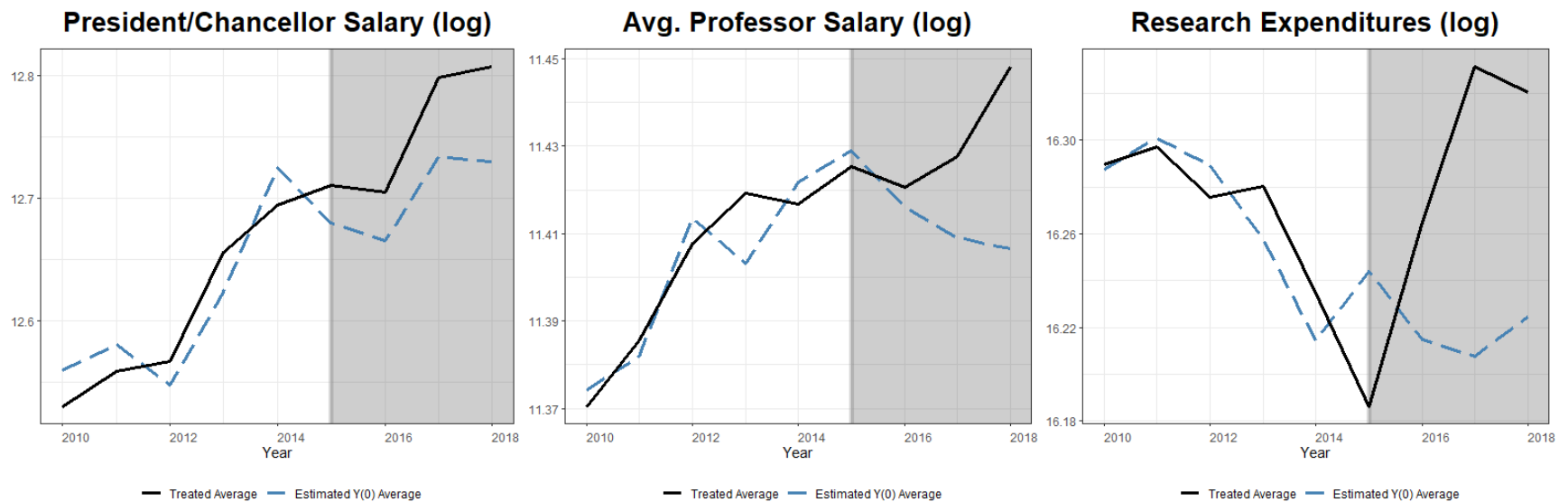
Figure 1. Parallel-trend and event-study plots for expenditures by category.



Sources: The Chronicle of Higher Education, Tennessee Higher Education Commission, and U.S. Department of Education.

Notes: First row of figure shows parallel trends of full-time-equivalent-enrollment weighted mean outcome (logged) by year for the treatment and control groups; Second row shows event-study design estimates and 95% confidence intervals for each year estimate from Equation 2 comparing treatment unit outcomes (logged) to controls; 2010 identifies the 2010-11 academic/fiscal year and so forth; Line and shading after 2015 identify the post-treatment period; All figures adjusted for inflation to 2019 CPI.

Figure 2. GSCM plots of treatment and synthetic control unit expenditures by category.



Sources: The Chronicle of Higher Education, Tennessee Higher Education Commission, and U.S. Department of Education.

Notes: Figures show mean outcomes by year for treatment institutions (“Treated Average”, solid black line) and the weighted synthetic unit’s outcomes (“Estimated Y(0)”, dashed blue line), with the estimated effect of FOCUS derived by the difference in lines in the post-treatment (shaded) period. 2010 identifies the 2010-11 academic/fiscal year and so forth. All figures adjusted for inflation to 2019 CPI.