



# No Pay? No Way! Teacher Compensation Reforms and the Market for Graduate Degrees

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# No Pay? No Way! Teacher Compensation Reforms and the Market for Graduate Degrees

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## Abstract

Graduate degrees in education serve as both a salary-boosting credential for teachers and a vital revenue source for institutions. But given a lack of evidence of their effectiveness, reformers have sought to decouple teacher pay from these credentials. Without a wage premium, educators may skip advanced study, reducing enrollment at nearby universities. Using a natural experiment in Tennessee, we show that eliminating an advanced degree wage premium for teachers led to a 21% enrollment decline in education fields alone across the state, with larger effects at public and non-research-intensive universities. This drop subsequently reduced institutional tuition revenue and related state funding. We discuss implications for universities, the teacher pipeline, and policy interplay across the P-20 policy environment.

*Keywords:* compensation reform; difference-in-differences; education policy; graduate education; higher education; Race to the Top; teacher preparation; Tennessee

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## NO PAY? NO WAY! TEACHER COMPENSATION REFORMS AND THE MARKET FOR GRADUATE DEGREES

### **Introduction**

Universities are increasingly reliant on enrollment and tuition for revenue (Fowles, 2013; Odle & Otero, 2026). Master's degree programs are particularly lucrative (Jaquette, 2013, 2019) and are an increasingly sizable proportion of institutional revenue (Blagg, 2018; Marcus, 2024). The proliferation of these programs is due in part to the higher salaries that graduates with master's degrees command on the labor market (Blagg, 2018). Yet while these programs help universities raise more revenue, they also create a pattern of resource dependence on these labor markets, exposing universities to uncertainty in them (Pfeffer & Salancik, 1978). In the teacher labor market, for example, some teachers can climb the salary ladder faster with an advanced degree, which drives universities to enroll these teachers into master's degree programs in education to increase their revenue. However, master's degrees in general do not appear to make teachers more effective (Ladd & Sorensen, 2015); while in-area master's degrees show some promise (Bastian, 2019), it is not clear that incentivizing teachers to earn any master's degree does much for students. This evidence motivates K-12 reformers to decouple teacher salary from credential attainment (ERS, 2023; Roza & Miller, 2009). Eliminating these incentives in the K-12 policy environment, however, reduces demand for master's degrees in the postsecondary market, which can be particularly destabilizing for universities that depend on this revenue.

We leverage a K-12 teacher compensation reform in Tennessee that eliminated kinks in the salary schedule for increased educational attainment as a natural experiment to measure the impacts of a shock to demand for master's degrees on universities' graduate enrollment. We show that eliminating teachers' incentives to pursue graduate degrees led to an approximately

21% reduction in enrollment in education fields—or the loss of roughly 112 students *per campus*, on average. This in turn led to an estimated \$6.5 million loss in tuition revenue across the state’s public universities alone and a subsequent reduction in state outcomes-based appropriations tied to master’s and education specialist degrees. These impacts were especially concentrated among public, regional, and non-research-intensive institutions, which are already particularly enrollment and tuition dependent. Conversely, demand for graduate education credentials at the most research-intensive (R1) universities appeared resilient, with virtually no change in enrollment, suggesting this (un)intended consequence was particularly harmful for already-less-resourced institutions.

This study contributes to two bodies of work. First, we add to research on universities’ resource dependence on credential-driven labor markets, through which K-12 policy can reshape enrollment and revenue. Second, we contribute to the teacher compensation literature by showing that credential-decoupling reforms extend beyond K-12 classrooms and into higher education, particularly at the most resource-vulnerable institutions. Together, these underscore the precariousness of this revenue model for universities and urge policymakers to carefully consider spillover effects between K-12 and higher education. Our study joins several other such examples, including school accountability policy (Deming et al., 2016), school finance reform (Jackson et al., 2016), dual enrollment (Liu & Xu, 2022), dual credit (Knight et al., 2026), and emergency credentialing (Goldhaber & Mbekeani, 2025).

### **Teacher Compensation Reforms**

Given conflicting evidence on whether post-baccalaureate education and training improve teacher performance (Bastian, 2019; Chingos & Peterson, 2011; Ladd & Sorensen, 2015; Rivkin et al., 2005), education reformers have sought to decouple teachers’ pay from

credentials (ERS, 2023; Roza & Miller, 2009). The 2009 Race to the Top grant competition provided states an opportunity to enact these very teacher compensation reforms (Edgerton, 2020). Tennessee was a first-round Race to the Top winner and used this momentum to pass the 2010 First to the Top Act. This legislation encouraged public school districts to develop their own salary schedules rather than follow the existing statewide schedule, which had increased teachers' base salaries with higher levels of educational attainment. In the region and around the same time, Florida (2011), Louisiana (2012), and North Carolina (2013) also implemented teacher compensation reforms that either gave districts discretion over whether to tie teacher pay to advanced degrees or banned the incentive entirely (ECS, n.d.).

Following the First to the Top Act, Tennessee districts began revising their salary schedules to eliminate or consolidate the premia teachers had previously earned for post-baccalaureate education—for example, eliminating the wage premium for earning post-baccalaureate credits, a master's degree, a master's degree plus additional graduate credits, or an education specialist (EdS) and/or doctorate. Some districts eliminated any premium for education entirely, advancing teachers only by years of service. Reviewing local salary schedules published by the Tennessee Department of Education (TDOE), we observe that roughly one quarter of reporting districts (37 of 148) eliminated the master's premium or reduced the number of advanced-degree lanes starting in 2012-13. These reductions cluster sharply in the 2013-14 and 2014-15 school years, when 26 of the 37 districts made their first change. Critically for our design, these district reforms cluster within a single biennial reporting cycle, so there is little meaningful variation in their timing across the state. No district reversed its compensation reform (i.e., re-introducing education steps to its salary schedule) during our study window.

These reforms coincided with a striking contraction of graduate education enrollment in Tennessee. In 2008, the year before any state reforms, Tennessee's universities collectively enrolled 10,547 students in graduate education programs. By 2018, they enrolled just 6,394, a 39% decline. This descriptive change occurred against the backdrop of a nationwide decline in teacher-preparation enrollment (Partelow, 2019), though this magnitude is particularly noteworthy. These reforms were a shock to both the demand for master's degrees and to universities' resource environments. When the first reforms went into effect in Tennessee, teachers were concerned that their districts would no longer reward them for their education (Fingerroot, 2013; Loewus, 2013), suggesting that teachers used graduate degrees as a strategy to increase their salaries. On the eve of implementing a similar reform in North Carolina, officials at both public and private universities anticipated declines in enrollment and revenue for their graduate programs in education, warning that these programs generate net revenue and that losses would be especially damaging at smaller colleges without strong state appropriations, research funding, or diversified graduate offerings to fall back on (Kiley, 2013). They also noted that graduate education programs draw predominantly from local markets, leaving few alternative pools of students to replace those lost (Kiley, 2013). Clearly, both teachers and campus administrators alike are aware of these reforms and their possible implications for individuals and institutions.

### **Conceptual Framework**

We draw on resource dependence theory to explain why Tennessee's teacher compensation reform affected institutions of higher education. Resource dependence holds that organizations depend on their external environment for survival and strategize to reduce uncertainty in that environment (Pfeffer & Salancik, 1978). For universities, one key strategy to

manage revenue uncertainty is offering credentials of value in the labor market, which creates new patterns of (1) dependence on those markets and (2) uncertainty around shocks within and across them. In our setting, universities depend on teachers enrolling in master's degree programs for revenue, exposing themselves to uncertainty in the teacher labor market. The compensation reform here thus represents a risk to institutions: the elimination of the automatic earnings premium that a master's degree commanded. In turn, the reform affects universities through their dependence on the teacher labor market, reducing the pool of prospective enrollees who bring in revenue. In this way, resource dependence establishes the chain of events through which the reform becomes a shock to universities. While we leverage resource dependence in this orienting way, we also draw on theories of individual behavior to explain how this reform likely impacts enrollment and why its effects may accrue unevenly across institutions.

We do not expect a decline in demand for graduate degrees in education to be uniform, in part because the contours of resource dependence vary across universities that depend on different kinds of students. The most research-intensive (R1) institutions offer degrees with greater signaling value that attract individuals with stronger preferences for social status and access to influential networks (Brown, 2001; Tomlinson & Watermeyer, 2022). We expect these institutions are less likely to experience an enrollment decline, because the reform eliminates only the pay incentive for a master's degree and not the other benefits that degrees from these institutions uniquely provide. Teachers who would attend an R1 program, in other words, may still value it for reasons the reform leaves intact. At the same time, R1 institutions can better manage resource dependence with more diversified revenue streams from research grant funding and a larger offering of other degree programs connected to other labor markets. Even if R1

institutions were to experience a decline in enrollment, we expect that they are more likely to weather a corresponding decline in revenue.

In contrast, less research-intensive institutions are doubly disadvantaged in this setting. First, their enrollment is the most exposed to a shock in demand because these programs likely attracted teachers primarily through the salary premium the reform eliminated—leaving little else to hold enrollment in place once it disappeared. Before the reform, less research-intensive institutions likely competed with others by offering, often, the most cost-effective path (via lower average tuition rates) for a teacher to raise their salary from a human capital perspective (Becker, 1964), even if their signal of teacher quality was weaker (Spence, 1973). After the reform, this financial incentive disappeared, and the remaining non-financial benefits may no longer outweigh its costs to the average teacher, shrinking the pool of those who would invest in a master's degree from these institutions. Second, less research-intensive institutions also have the most revenue to lose—and may feel that loss particularly deeply. These institutions historically receive less research funding, so a larger share of their revenue comes from tuition and state appropriations (NCES, 2014), which are often tied in some way to enrollment.

Taken together, these facts make two points clear: The non-pecuniary value of R1 degrees likely explains why those institutions saw little enrollment decline—and their revenue diversification explains why any decline they might have experienced would likely be less fiscally damaging. For less research-intensive institutions, however, they stand to lose more enrollment and are expectedly less able to absorb the loss. While our data do not allow us to explore fully how they adapted following the reform (e.g., through changes to expenditures, staffing, or program offerings; Odle & Monday, 2021), this framework motivates our focus on

non-research-intensive institutions as the most exposed and, therefore, most likely to need to adapt.

Resource dependence theory also helps predict what institutions do next. If organizations manage dependence by cultivating new sources of the resources they need (Pfeffer & Salancik, 1978), then institutions facing a contraction in one credential market may seek to establish others—new programs tied to labor markets less exposed to the shock—much as they built master’s programs in education to capture teacher demand in the first place. Our enrollment data cannot observe this adaptation directly, and we do not claim to test it here. Rather, we flag it as the theory’s natural next implication and a priority for future work. What our data do allow us to establish is the first-order claim on which any such adaptation rests: that a change in a labor market propagates into the enrollment and finances of the institutions who depend on it.

### **Research Questions**

We leverage Tennessee’s reform as a natural experiment to estimate the causal impact of teacher compensation changes on the demand for graduate degrees in education, and the ultimate impact on university enrollment. Specifically, we ask:

1. What was the overall impact of Tennessee’s teacher compensation reform on graduate enrollment in education programs across the state’s universities?
2. Did this impact vary across universities by sector (i.e., public versus private) or by research intensity (i.e., among R1s, other Doctorals, or baccalaureate/master’s colleges)?

We also leverage these insights to imply changes in universities’ subsequent tuition revenues and state appropriations flowing from these enrollment changes.

### **Data**

Our primary data cover university enrollment in graduate degree programs, drawn from the U.S. Department of Education’s Integrated Postsecondary Education Data System (IPEDS). We limit our sample to four-year, degree-granting universities in the U.S. Bureau of Economic Analysis Southeast (BEA-SE) region plus Missouri (contiguous to Tennessee), excluding special-focus institutions and those outside the Carnegie classification universe (n=293).<sup>1</sup> From this population, we identify all public and private universities in Tennessee as our treated group and universities in the remaining states as our comparison group. We exclude Florida, Louisiana, and North Carolina from the comparison group because each enacted its own contemporaneous reform decoupling teacher pay from graduate credentials within a few years of Tennessee’s (excluding n=82). Our units of analysis are majors nested within universities, and we focus on graduate enrollment in education majors (CIP code 13).<sup>2</sup>

Data on graduate enrollment are available biennially, so we construct a nine-year panel spanning from fall 2004 through fall 2020, observing enrollment in every even year. This provides observations four-years prior to the reform (2004, 2006, 2008, 2010), the year of the reform (2012), and four years after (2014, 2016, 2018, 2020; before the COVID-19 pandemic). Because IPEDS does not impute missing enrollment, we treat a missing institution-year as a program not offered that year and require institutions to report enrollment in every wave of the panel (excluding n=50 for non-reporting). We additionally exclude two statistical outliers—Carson-Newman University and Lipscomb University—whose graduate education enrollment expanded eight- and ten-fold over the panel, respectively, even as their undergraduate education

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<sup>1</sup> The BEA Southeast region includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. We add Missouri, which borders Tennessee.

<sup>2</sup> IPEDS reports graduate enrollment at the two-digit CIP series level (CIP 13, “Education”) only and does not disaggregate enrollment by more detailed CIP codes or by degree level, so we cannot separately observe, for example, education master’s versus doctoral enrollment or enrollment in teacher-preparation programs (e.g., elementary/secondary education) specifically. We observe all graduate enrollments in all education majors.

enrollment declined. This pattern is consistent with the launch of new graduate education programs; both verified with media coverage (Carson-Newman, 2013; Lipscomb, 2005, 2009).<sup>3</sup> Our final analytic sample includes 159 institutions (20 in Tennessee).

We define treatment at the state level, such that all Tennessee institutions are treated, and post-reform years are those from 2012 onward, coinciding with the first wave of district salary-schedule changes following the 2010 First to the Top Act. We adopt a state-level definition because the reform applied statewide and because, once private institutions are included, all but two universities are eventually exposed given proximity to (located within or adjacent to) a district that adopted a compensation reform, providing little within-state variation. For each institution, we observe sector (public or private) and Carnegie research classification, which we collapse into three tiers using the 2010 Carnegie classification: baccalaureate and master's institutions ("BA/MA Colleges"), doctoral and high-research universities short of the most research-intensive tier ("Doctoral [Other]"), and very-high-research universities ("Doctoral [R1]"). Our treated group comprises all 20 Tennessee institutions (9 public and 11 private), allowing us to estimate impacts by sector as well as by research tier.

### Empirical Strategy

We estimate the impact of Tennessee's teacher compensation reform on graduate education enrollment using a two-way fixed effects (TWFE) difference-in-differences design, given by

$$\log(y_{it}) = \alpha + \delta(\text{Treat}_i \times \text{Post}_t)_{it} + \phi_i + \tau_t + \varepsilon_{it} ,$$

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<sup>3</sup> Lipscomb added new education master's degrees in 2005 and 2009, and Carson-Newman launched EdD and EdS programs in education in fall 2013. Graduate education enrollment at the two institutions rose from 71 to 700 and from 138 to 645, respectively, over the panel. Because both expanded against national average declines, they are also highly influential: Their inclusion halves the ATT (though still negative and highly significant) and completely reverses the sign of the private institution estimate, despite representing only 2 of 20 treated institutions. All estimates for groups that do not contain them are unchanged by their exclusion.

where  $y_{it}$  is graduate education enrollment at university  $i$  in year  $t$ ,  $\text{Treat}_i$  identifies a university in Tennessee,  $\text{Post}_t$  indicates the 2012 year and later, and  $\phi_i$  and  $\tau_t$  are university and year fixed effects that absorb time-invariant differences across institutions and shared shocks across years, respectively. Because Tennessee’s reform applied statewide on a common date, treatment is not staggered—every treated institution shares the same post-reform indicator—so the treatment-timing heterogeneity that can bias TWFE estimators under staggered adoption (Goodman-Bacon, 2021) does not arise, and no heterogeneity-robust estimator is required. In this non-staggered setting,  $\delta$  represents an unbiased estimate of the average treatment effect on the treated.

We use a log transformation to address skewness in enrollment counts, allowing us to interpret  $\delta$  as an approximate percentage change in graduate education enrollment. We report exact percentage changes, calculated as  $\exp(\delta) - 1$ , throughout, alongside implied per-student effects using baseline means from pre-treatment years. Our specification is unweighted, so  $\delta$  describes the effect on an average program rather than an average student. We cluster standard errors at the state level to account for correlated outcomes among institutions within a state. Because our design includes only 10 states, we employ a bias-reduced linearization (“CR2”) cluster-robust variance estimator with Satterthwaite degrees of freedom (Pustejovsky & Tipton, 2018), which performs well with few clusters. To explore heterogeneity, we separately interact  $\text{Treat}_i \times \text{Post}_t$  with indicators for sector and research tier. Given larger sample sizes in this category, we also estimate a sector interaction within the BA/MA Colleges subsample to test whether a public-private impact gap persists once research intensity is held constant.

Like all difference-in-differences designs, ours relies on a parallel-trends assumption: that Tennessee and comparison-state institutions would have followed similar enrollment trajectories absent the reform. We assess this using an event-study specification that interacts

Treat<sub>*i*</sub> with year indicators, using 2008 as the reference year. We use 2008 rather than 2010 because the period around the law’s 2010 passage could exhibit enrollment movements consistent with policy anticipation; defining the pre-period before any plausible anticipation provides a cleaner test and allows us to model it directly. As noted, because treatment is not staggered, our event study does not face a “forbidden comparison” problem of using already-treated units as controls (Goodman-Bacon, 2021).

Figure 1 plots event-study estimates for the overall sample, as well as by sector and research tier. Pre-trends are flat and statistically indistinguishable from zero for the overall sample, for public and private institutions separately, for BA/MA Colleges, and for our sector × Carnegie subgroups. These provide strong support for the parallel-trends assumption for our primary estimates and heterogeneity analyses. Two small exceptions are (1) a single-year difference [2006] between Doctoral (R1) institutions and our comparison pool, and (2), for Doctoral (Other) institutions, whose leads are significantly positive in 2004 and 2006. However, these estimates are highly stable in 2004 and 2006 (suggesting a constant, not growing difference) and appear in the *opposite* direction to the effects we expect to observe in the post-treatment period. To remain abundantly cautious, we will interpret estimates from Doctoral (Other) subgroup descriptively. In all, however, these trends provide strong evidence for our identification strategy and do not suggest any true systematic differences between our treatment and comparison groups prior to Tennessee’s compensation reform. Moreover, following the compensation reform, our event studies show that declines persist through the end of our panel, with post-reform estimates statistically indistinguishable from one another across 2014-2020.

Flat pre-trends are also evidence against confounding due to the national decline in enrollment in educator-preparation programs following the Great Recession (Partelow, 2019).

Because institutions in Tennessee and in comparison states were similarly affected, our difference-in-differences design eliminates this national trend. However, were Tennessee on a different post-recession trajectory, we would expect to see these differences in the pre-2012 leads, but we do not.

Beyond confirming the appropriateness of our identification strategy with an event study examination of pre-trends, we conduct two additional robustness checks. First, to confirm our comparison group is valid in the sense that it is not contaminated by another state passing a similar reform, we re-run our main specification excluding one comparison state at a time, verifying that no single state is driving our results. Second, because the reform specifically eliminated the salary premium tied to graduate degrees, we re-estimate our main specification using undergraduate education enrollment in Tennessee as a placebo outcome. A comparable decline there would undermine our interpretation of the graduate result as specific to the reform.

## **Results**

Table 1 presents our main results. We show that Tennessee's teacher compensation reform caused an approximately 21% decline in graduate education enrollment, equivalent to a loss of roughly 112 students per program relative to the state's 2008 average of 527. This estimate is remarkably stable across alternative comparison groups. Because our identification rests on the assumption that no comparison state enacted a similar reform or experienced contemporaneous shocks that could bias our estimate, we probe it directly by re-estimating the overall effect after dropping each comparison state in turn through a leave-one-out analysis (Figure 2). Our point estimate is robust; every specification remains negative and statistically significant. This

provides confidence that no single state is driving our result, though any comparable reform we failed to detect would only *attenuate* our estimate, allowing us to remain conservative.

Disaggregating this overall effect, we show that impacts differ sharply by sector. Public institutions saw an approximately 30% decline (roughly 215 students per program), while private institutions saw a smaller decline of about 12% (or 45 students) that is not statistically distinguishable from zero. This pattern is consistent with public programs' heavier reliance on enrollment-linked tuition and appropriations, and this difference across sectors is marginally significant ( $p < .10$ ). Consistent with our conceptual framework, we also show that enrollment losses were concentrated among less research-intensive institutions. BA/MA Colleges saw an approximately 26% decline (roughly 123 students per program), while we fail to detect any change at Doctoral (R1) institutions. As hypothesized, teachers may enroll at BA/MA Colleges primarily for the salary premium the reform eliminated—but may enroll at R1 institutions for signaling and network benefits the reform leaves intact. A test of this gap between the two tiers (R1 v. BA/MA) is itself statistically significant at  $p < .05$ . Doctoral (Other) institutions fall in between, with an approximately 15% (or 98-student) decline. While this implied impact is nominally *smaller* than at BA/MA Colleges, their coefficients are statistically indistinguishable, suggesting Doctoral (Other) status does not provide the same policy shield R1s enjoy. However, as noted previously, we acknowledge a violation of parallel trends in the Doctoral (Other) subgroup might bias our estimate towards a larger decline and interpret this cautiously. Still, these findings clearly illustrate a gradient of effects that impact BA/MA Colleges the most and Doctoral institutions the least.

Our results ultimately show that the largest impacts appear among institutions doubly disadvantaged in this setting: public, non-research-intensive campuses. Public BA/MA Colleges

saw an approximately 38% decline (roughly 278 students per program relative to a 2008 baseline of 731). As noted, these are the institutions with both the most enrollment to lose (i.e., their degrees competed almost entirely on the eliminated salary premium) and the least capacity to absorb the loss (i.e., they depend most heavily on enrollment-linked tuition and appropriations). As observed in the overall sample, private BA/MA Colleges saw a smaller, marginally significant decline (15% or 53 students), and the public-private sector gap persists even *within* this tier, where public institutions had marginally higher enrollment losses ( $p < .10$ ). Collectively, this provides evidence that both sector and research intensity shape exposure independently rather than one standing in for the other. Both dimensions matter, showing that doubly disadvantaged, public, non-research-intensive campuses were especially negatively impacted by this reform.

As one additional check on the internal validity of our results, we re-estimate our primary specification using *undergraduate* education enrollment as the outcome. Because the compensation reform changed the salary premium attached to graduate credentials specifically, effects should only appear at the graduate level and not the undergraduate level. A comparable undergraduate decline would instead suggest a broad contraction of interest in education as a field, which our primary estimates would misattribute to the compensation reform. However, we detect no such undergraduate decline, and, in fact, observe a small, marginally significant *increase* of approximately 6 students per campus, on average (or 13%,  $p < .10$ ). This confirms that our estimated effect is specific to the credential the reform targeted, and, as hypothesized, operated as a demand shock through the salary schedule.

### *Limitations*

These results are not without limitation. First, we cannot observe whether teachers substituted into other fields of study or enrolled in online or out-of-state programs. Moreover, because we estimate impacts on graduate education enrollment specifically, our estimates are likely conservative given that they are blind to, for example, teachers pursuing an in-field master's degree (e.g., biology). Second, while we conducted policy and news scans to identify contemporaneous reforms and excluded states with known shocks, we cannot fully rule out unobserved reforms elsewhere—though our leave-one-state-out analysis helps mitigate this concern, and, as noted previously, any such reform would bias us toward zero. Third, IPEDS reports enrollment only at the two-digit CIP series level, so we cannot isolate teacher-preparation programs from other education majors. A narrower measure might reveal even larger effects. Fourth, our data only allow us to focus on institutions (not teachers or individual students), so we also cannot observe how enrollment declines may have changed the share of teachers holding advanced degrees across districts, nor did we find coverage documenting such downstream effects. Finally, we also lack the program-level data needed to observe whether universities revised their program offerings to adapt to the post-reform environment, whether they altered spending or staffing patterns as a result, or took other actions in response to this demand shock—all questions worthy of future research.

## **Discussion**

Leveraging Tennessee's teacher compensation reform as a natural experiment, we show that eliminating salary premiums for teachers holding advanced degrees caused a substantial contraction in statewide demand for those credentials. On average, graduate education enrollment declined by roughly 21% (about 112 students per program). These reductions were concentrated among regional, non-research-intensive institutions, which were already especially

enrollment and tuition dependent. By contrast, we failed to detect meaningful changes at R1s, suggesting that the non-pecuniary benefits of their degrees insulated them from the shock.

This contraction had real fiscal implications. Focusing on the public institutions where the effect is particularly concentrated, a loss of roughly 215 students per campus—even under a conservative assumption that each student was enrolled in only one three-credit course per semester—equates to a combined loss of what would be approximately \$6.5 million today in tuition revenue across the state’s nine treated public universities alone.<sup>4</sup> Because we detect no statistically significant enrollment effect at private institutions, we exclude them from this figure, making it a conservative estimate. Beyond tuition, the contraction also reduced state appropriations: Tennessee funds universities in part through an outcomes-based formula that rewards the production of graduate credentials, including master’s, doctoral, and education specialist degrees. The Tennessee Higher Education Commission reported annual appropriation reductions of up to \$1 million tied to master’s and Ed Specialist degrees specifically among some of the state’s public, non-research-intensive institutions (THEC, 2016).

Our study provides new evidence on how K-12 education policy reforms can spill over into higher education in meaningful and rarely explored ways. Using resource dependence theory, we show that universities are affected by changes in the labor markets they serve. By offering degree programs to raise revenue, they become dependent on the labor markets that trade in those credentials, exposing themselves to shocks that originate in those markets. The asymmetry in effects also reveals a structural inequality: Non-research-intensive universities, which often serve rural and less affluent regions, appear far more exposed to policy-driven shifts

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<sup>4</sup> We combine the average public-institution effect of approximately 215 students per program with each institution’s published per-three-credit-hour graduate tuition rate, summed across the nine treated public universities and assume one three-credit course per semester across two semesters. Tuition rates are as of most recently published year on each’s website (2025-26), unobservable in IPEDS.

in demand because they generally do not offer degrees whose signaling value can offset the loss of a financial benefit. These findings underscore the fragility of enrollment-dependent funding models and the importance of coordination across state policies, while maintaining viability for institutions with fewer resources to adapt.

### *Implications*

Our findings provide another indication that education policies do not operate in isolation. K-12 teacher pay reforms can generate significant spillover effects for colleges and universities, and institutions that rely heavily on advanced degree programs for revenue are especially vulnerable to shifts in labor market incentives. These effects were concentrated among institutions that depend most heavily on enrollment-linked revenue and least on research or other diversified sources. Because the underlying fragility is enrollment-based—whether revenue flows through tuition, enrollment-linked appropriations, or both—institutions dependent on steady enrollment face real risk when demand contracts. Policymakers should account for these cross-sector linkages when enacting compensation or credentialing reforms and consider offsetting supports for the institutions most affected. In the K-12 context, states have used hold-harmless provisions to buffer enrollment-driven revenue shocks (Gigliotti & Sorensen, 2018; Presume, 2021), though such provisions are not without critics (Roza & Jarmolowski, 2020). An analogous support (e.g., targeted funding for non-research-intensive institutions or limiting year-to-year appropriations reductions tied to related shocks) could soften the transition for exposed universities. For university leaders, these results also underscore the importance of revenue diversification and strategic planning. Developing programs empirically linked to positive (and stable) labor-market outcomes, partnering with local K-12 districts to offer professional development and continuing education, or investing in flexible or online models to expand the

potential pool of teachers enrolled may mitigate future shocks. State and district leaders alike should also weigh the longer-term possibility that fewer teachers pursuing advanced credentials could reduce the supply of skilled teachers and school leaders.

In all, our study underscores that reforms within one part of the education ecosystem can have unintended yet profound consequences in another. Tennessee's elimination of teacher salary incentives for graduate degrees triggered a sharp and uneven contraction in the market for those credentials, exposing the dependence of many public, non-research-intensive universities on credential-driven tuition revenue and state appropriations. These findings reveal that the boundaries between K-12 and higher education policy are far less siloed than commonly assumed. Failure to consider this reality may create significant challenges in both the short and long term.

## References

- Bastian, K. C. (2019). A degree above? The value-added estimates and evaluation ratings of teachers with a graduate degree. *Education Finance and Policy*, 14(4), 652-678.
- Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis with special reference to education*. National Bureau of Economic Research. <https://www.nber.org/books-and-chapters/human-capital-theoretical-and-empirical-analysis-special-reference-education-first-edition>
- Blagg, K. (2018). *The rise of master's degrees*. Urban Institute. [https://www.urban.org/sites/default/files/publication/99501/the\\_rise\\_of\\_masters\\_degrees\\_1.pdf](https://www.urban.org/sites/default/files/publication/99501/the_rise_of_masters_degrees_1.pdf)
- Brown, D. K. (2001). The social sources of educational credentialism: Status cultures, labor markets, and organizations. *Sociology of Education*, 74, 19-34.
- Carson-Newman University. (2013, June 25). *Carson-Newman University to offer first doctoral degree this fall*. <https://www.cn.edu/carson-newman-university-to-offer-first-doctoral-degree-this-fall/>
- Chingos, M. M., & Peterson, P. E. (2011). It's easier to pick a good teacher than to train one: Familiar and new results on the correlates of teacher effectiveness. *Economics of Education Review*, 30(3), 449-465.
- Deming, D. J., Cohodes, S., Jennings, J., & Jencks, C. (2016). School accountability, postsecondary attainment, and earnings. *The Review of Economics and Statistics*, 98(5), 848-862.
- Edgerton, A. K. (2020). Learning from standards deviations: Three dimensions for building education policies that last. *American Educational Research Journal*, 57(4), 1525-1566.
- Education Commission of the States. (n.d.). *State policy database*. <https://www.ecs.org/state-education-policy-tracking-new/>
- Education Resource Strategies. (2023). *Designing a strategic compensation model: Why salary matters to the sustainability of the teaching job*. <https://www.erstrategies.org/wp-content/uploads/2024/02/5750-teacher-compensation-paper.pdf>
- Fingerroot, L. (2013, July 7). New TN teacher pay plan is hybrid. *The Tennessean*, 1A, 4A.
- Fowles, J. (2013). Funding and focus: Resource dependence in public higher education. *Research in Higher Education*, 55, 272-287.

- Gigliotti, P., & Sorensen, L. C. (2018). Educational resources and student achievement: Evidence from the Save Harmless provision in New York State. *Economics of Education Review*, 66, 167-182.
- Goldhaber, D., & Mbekeani, P. P. (2025). *Pandemic-era licensure waivers and the supply of new teachers* (Working Paper No. 326-0825). National Center for Analysis of Longitudinal Data in Education Research. <https://caldercenter.org/publications/pandemic-era-licensure-waivers-and-supply-new-teachers>
- Goodman-Bacon, A. (2021). Difference-in-differences with variation in treatment timing. *Journal of Econometrics*, 225(2), 254-277.
- Jackson, C. K., Johnson, R. C., & Persico, C. (2016). The effects of school spending on educational and economic outcomes: Evidence from school finance reforms. *The Quarterly Journal of Economics*, 131(1), 157-218.
- Jaquette, O. (2013). Why do colleges become universities? Mission drift and the enrollment economy. *Research in Higher Education*, 54(5), 514-543.
- Jaquette, O. (2019). Do public universities replace state appropriations with master's students? *The Review of Higher Education*, 42(3), 1101-1144.
- Kiley, K. (2013, August 6). Devaluing degrees. *Inside Higher Ed*. <https://www.insidehighered.com/news/2013/08/07/nc-law-ends-pay-raises-teachers-masters-degrees-blow-college-finances>
- Knight, D. S., Duncheon, J. C., Xu, L., & Almasi, P. (2026). *Staffing and resource allocation in college access reform: How dual credit alters the cost burden of public education* (EdWorkingPaper 26-1461). Annenberg Institute at Brown University. <https://edworkingpapers.com/sites/default/files/ai26-1461.pdf>
- Ladd, H. F., & Sorensen, L. C. (2015). *Do master's degrees matter? Advanced degrees, career paths, and the effectiveness of teachers* (Working Paper No. 136). National Center for Analysis of Longitudinal Data in Education Research. <https://caldercenter.org/publications/do-masters-degrees-matter-advanced-degrees-career-paths-and-effectiveness-teachers>
- Lipscomb University. (2005, September 2). *Lipscomb offers three new degrees in Master's Education Program*. <https://lipscomb.edu/news/lipscomb-offers-three-new-degrees-masters-education-program>
- Lipscomb University. (2009, June 17). *New graduate education degrees launched, offer 50 percent tuition discount*. <https://lipscomb.edu/news/new-graduate-education-degrees-launched-offer-50-percent-tuition-discount>

- Liu, V., & Xu, D. (2022). Happy together? The peer effects of dual enrollment students on community college student outcomes. *American Educational Research Journal*, 59(1), 3-37.
- Loewus, L. (2013). Tennessee teacher-pay plan riles union. *Education Week*. <https://www.edweek.org/teaching-learning/tennessee-teacher-pay-plan-riles-union/2013/07>
- Marcus, J. (2024, June 10). Grad programs have been a cash cow; now universities are starting to fret over graduate enrollment. *The Hechinger Report*. <https://hechingerreport.org/as-undergraduate-numbers-slide-universities-start-to-fret-over-graduate-enrollment/>
- National Center for Education Statistics. (2014). *Integrated Postsecondary Education Data System (IPEDS)*. U.S. Department of Education.
- Odle, T. K., & Otero, S. (2026). Institutional responses to tuition controls: Evidence from Tennessee's tuition ranges. *The Review of Higher Education*, 49(4), 461-497.
- Partelow, L. (2019). *What to make of declining enrollment in teacher preparation programs*. Center for American Progress. <https://www.americanprogress.org/article/make-declining-enrollment-teacher-preparation-programs/>
- Pfeffer, J., & Salancik, G. R. (1978). *The external control of organizations: A resource dependence perspective*. Harper & Row.
- Presume, R. (2021). *How temporary 'hold harmless' policies could save schools and districts*. EdTrust. <https://edtrust.org/blog/how-temporary-hold-harmless-policies-could-save-schools-and-districts/>
- Pustejovsky, J. E., & Tipton, E. (2018). Small-sample methods for cluster-robust variance estimation and hypothesis testing in fixed effects models. *Journal of Business & Economic Statistics*, 36(4), 672-683.
- Rivkin, S. G., Hanushek, E. A., & Kain, J. F. (2005). Teachers, schools, and academic achievement. *Econometrica*, 73(2), 417-458.
- Roza, M., & Jarmolowski, H. (2020). When it comes to school funds, hold-harmless provisions aren't 'harmless.' *Education Next*. <https://www.educationnext.org/when-it-comes-to-school-funds-hold-harmless-provisions-arent-harmless/>
- Roza, M., & Miller, R. (2009). *Separation of degrees: State-by-state analysis of teacher compensation for master's degrees*. Center for American Progress. <https://www.americanprogress.org/article/separation-of-degrees/>
- Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics*, 87(3), 355-374.

Tennessee Higher Education Commission. (2016). *Breakdown of outcomes-based formula components impact on 2015-16 state appropriations.*

[https://www.tn.gov/content/dam/tn/thec/bureau/fiscal\\_admin/fiscal\\_pol/obff/2015-16\\_Formula\\_Component\\_Analysis\\_preliminary\\_for\\_website.pdf](https://www.tn.gov/content/dam/tn/thec/bureau/fiscal_admin/fiscal_pol/obff/2015-16_Formula_Component_Analysis_preliminary_for_website.pdf)

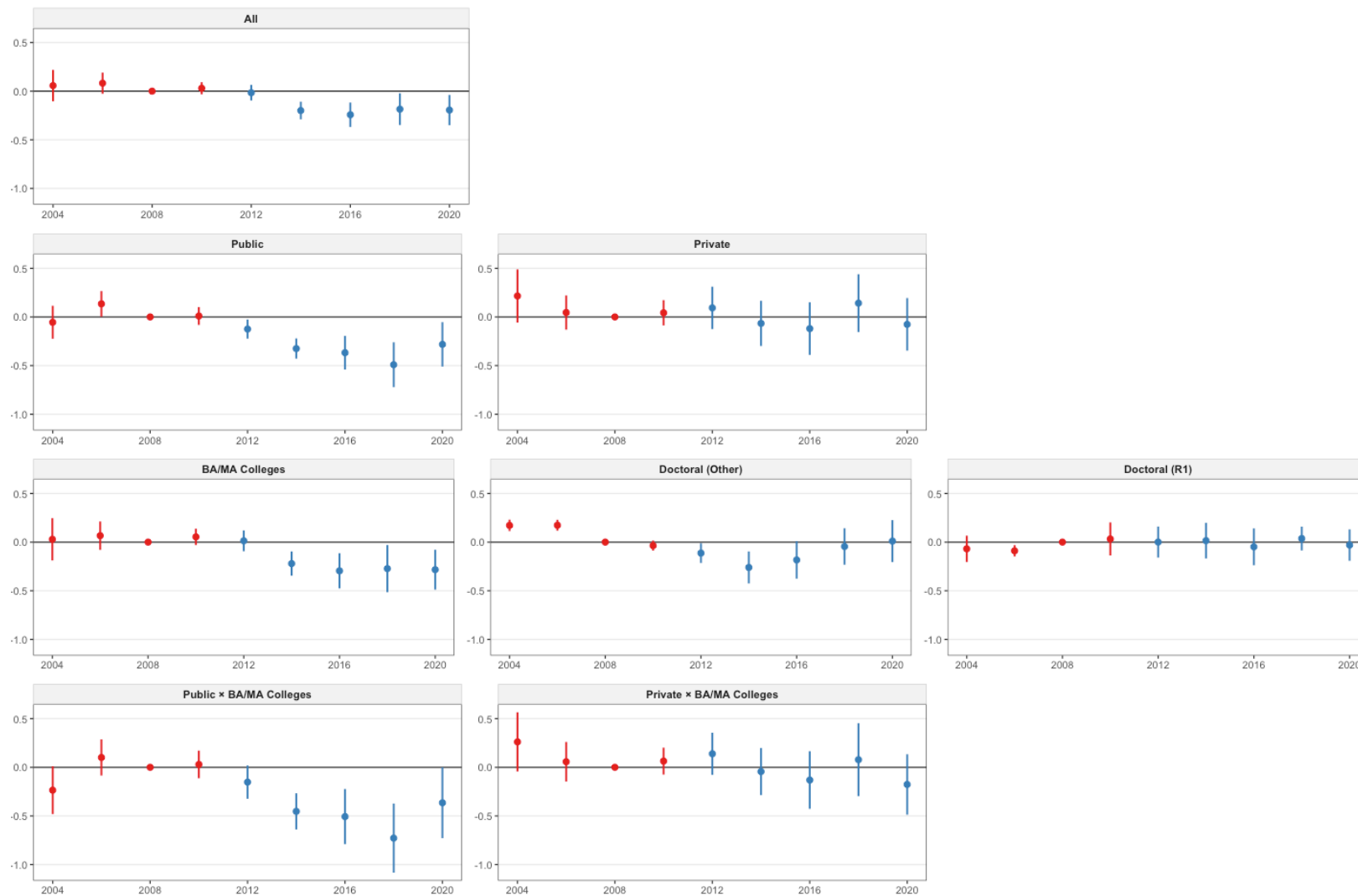
Tomlinson, M., & Watermeyer, R. (2022). When masses meet markets: Credentialism and commodification in twenty-first century higher education. *Discourse: Studies in the Cultural Politics of Education*, 43(2), 173-187.

**Table 1.** *Effect of teacher compensation reform on graduate enrollment in education.*

|                                           | N   | Estimate<br>(SE)<br>[Percent Change] | Per-Campus Impact<br>[2008 Baseline] |
|-------------------------------------------|-----|--------------------------------------|--------------------------------------|
| Overall                                   | 159 | -0.238***<br>(0.043)<br>[-21.2%]     | -112<br>[527]                        |
| Public                                    | 93  | -0.363**<br>(0.074)<br>[-30.4%]      | -215<br>[708]                        |
| Private                                   | 66  | -0.125<br>(0.066)<br>[-11.8%]        | -45<br>[379]                         |
| <i>Public v. Private</i>                  | -   | -0.237+<br>(0.115)                   | -                                    |
| BA/MA Colleges                            | 120 | -0.294**<br>(0.063)<br>[-25.5%]      | -123<br>[482]                        |
| Doctoral (Other)                          | 29  | -0.164*<br>(0.058)<br>[-15.1%]       | -98<br>[648]                         |
| Doctoral (R1)                             | 10  | 0.014<br>(0.055)<br>[1.4%]           | 8<br>[606]                           |
| <i>Doctoral (Other) v. BA/MA Colleges</i> | -   | 0.130<br>(0.107)                     | -                                    |
| <i>Doctoral (R1) v. BA/MA Colleges</i>    | -   | 0.308*<br>(0.093)                    | -                                    |
| BA/MA Colleges × Public                   | 62  | -0.479*<br>(0.117)<br>[-38.1%]       | -278<br>[731]                        |
| BA/MA Colleges × Private                  | 58  | -0.168+<br>(0.078)<br>[-15.4%]       | -53<br>[343]                         |
| <i>Public v. Private (BA/MA Colleges)</i> | -   | -0.311+<br>(0.156)                   | -                                    |
| Undergraduate Education Placebo           | 147 | 0.119+<br>(0.052)<br>[12.6%]         | 6<br>[47]                            |

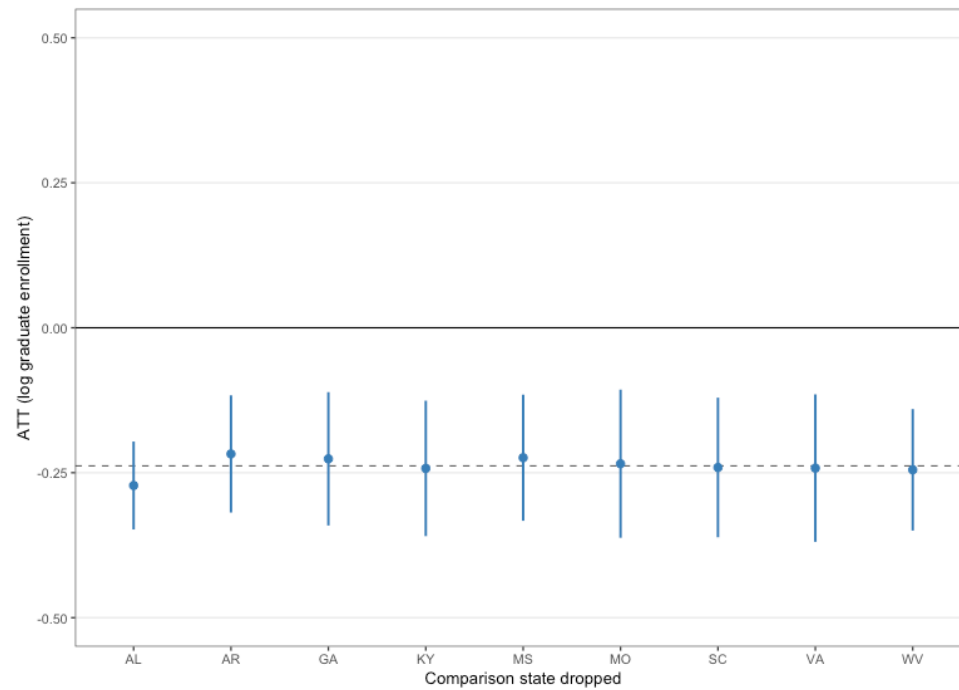
Source: Analysis of IPEDS and TDOE data from 2004-2020.

Notes: +  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ . Table presents average treatment effect on the treated on log graduate education enrollment, with cluster-robust (CR2) standard errors in parentheses and implied percentage change  $[\exp(\delta)-1]$  in brackets. Standard errors use Satterthwaite degrees of freedom and are clustered by state. Per-Campus Impact uses Tennessee's 2008 baseline means to imply campus average changes in enrollment: baseline  $\times \exp(\delta)-1$ . Indented rows are within-model differentials (e.g., *Public v. Private* tests whether two ATTs above differ). BA/MA, Doctoral (Other), and Doctoral (R1) are based on 2010 Carnegie classification.

**Figure 1.** Event-study estimates of effect of reform on graduate enrollment in education, overall and by sector and research tier.

Source: Analysis of IPEDS and TDOE data from 2004-2020.

Notes: Figure plots event-study estimates interacting  $Treat_i$  with year indicators, using 2008 as the reference year. Points represent the difference in log graduate education enrollment between Tennessee and comparison-state institutions. Bars are 95% confidence intervals from cluster-robust (CR2) standard errors clustered by state. Red identifies pre-treatment years (2004-2010); blue identifies post-treatment (2012-2020). Comparison group is the BEA Southeast region plus Missouri, excluding Florida, Louisiana, and North Carolina.

**Figure 2.** Overall effect re-estimated with each comparison state excluded (leave-one-out).

Source: Analysis of IPEDS and TDOE data from 2004-2020.

Notes: Each point is the overall average treatment effect on the treated (in log graduate education enrollment) from a model that excludes the labeled state from the comparison group. Horizontal dashed line marks the full-sample estimate (-0.238). Bars are 95% confidence intervals from cluster-robust (CR2) standard errors clustered by state.