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

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Graduate degrees in education provide financial stability for many institutions, yet 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 a graduate degree wage premium for teachers led to a 27% (140 student) enrollment decline in education fields alone, with larger effects at non-researchintensive universities. This drop subsequently reduced institutional tuition revenue and related state funding. We discuss implications for universities, the teacher pipeline, and the broader relationship between state higher education and K-12 policy.

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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 provide financial stability for many institutions, yet 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 a graduate degree wage premium for teachers led to a 27% (140 student) enrollment decline in education fields alone, with larger effects at non-research-intensive universities. This drop subsequently reduced institutional tuition revenue and related state funding. We discuss implications for universities, the teacher pipeline, and the broader relationship between state higher education and K-12 policy.

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

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

Introduction

Tuition and fees have grown to represent a vital—and often primary—source of revenue for universities. Regional comprehensive institutions, as well as those with teaching and non-research-intensive missions, are particularly tuition dependent (Fowles, 2013; Odle & Otero, 2025). Beyond this historic trend, current uncertainty around federal funding and an overall decline in state appropriations have left many universities increasingly reliant on tuition revenue. Thus, the importance and long-term viability of tuition dollars have never been greater. While most tuition dollars come from undergraduate degree programs, tuition from graduate degrees has increased substantially over the last decade (Blagg, 2018; Marcus, 2024). This growth is, in part, attributable to the proliferation of professional and master's degree programs in response to credentialism and increasing education requirements in competitive labor markets (Brown, 2001; Baker, 2011). Graduate degree programs are particularly lucrative because universities can charge more and discount less (Jaquette, 2013, 2019). Indeed, some have characterized some graduate programs as a "cash cow" for institutions (Marcus, 2024). Increasingly relying on tuition revenue from graduate degree programs achieves the aim of generating additional revenue, but, in tandem, increases the exposure of universities to shocks in demand for these credentials. A sudden contraction in demand could be damaging and destabilizing for increasingly tuition-dependent institutions with long-run implications.

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 local demand for master's degrees on university enrollment. We show that

eliminating teachers' incentives to pursue graduate degrees led to an approximately 27% reduction in enrollment in education fields alone—or the loss of roughly 140 students per campus, on average. This in turn led to an approximately $3.8 million loss in tuition revenue and an approximately $622,000 subsequent reduction in state outcomes-based appropriations related to master's and Ed Specialist degrees. These impacts were especially concentrated among regional, non-research-intensive (non-R1) institutions, which are already particularly tuition dependent. Conversely, demand for graduate education credentials at R1s appeared quite inelastic with virtually no change in enrollment, suggesting this (un)intended consequence was particularly harmful for already-less-resourced institutions.

Our work is among the first to document meaningful impacts of K-12 education policy reforms on institutions of higher education, underscoring the close interplay between these two sectors. We also contribute to a growing body of work examining teacher credentials and teacher preparation programs, including documenting how policy-induced shocks to demand alter the pipeline—and subsequent supply—of teachers with post-baccalaureate training. These together underscore the precariousness of this revenue model for universities and urge policymakers to carefully consider spillover effects of similar reforms.

Teacher Compensation Reforms

Given conflicting evidence on whether post-baccalaureate education and training improve teacher performance (Chingos & Peterson, 2011; 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 increased teachers' base salaries with higher levels of educational attainment. The Tennessee Department of Education (TDOE) reported that more than one quarter of public districts (27%, or 39 of 147) ultimately made a salary schedule modification beginning in 2011-12. Among Tennessee's nine public universities, eight were in (or adjacent to) counties where these reforms took place.

Table 1 summarizes these compensation reforms in relation to universities in Tennessee. All but one was located in or adjacent to a county where at least one district ultimately made a salary schedule change related to teacher credentials, including either the consolidation of earnings premia (e.g., no *additional* salary step from master's to doctorate) or the complete elimination of an earnings premium for any post-baccalaureate education. Some universities were near multiple districts that enacted reforms. While some districts in the state implemented reforms immediately following the First to The Top Act (in 2011-12), reforms specifically impacting nearby universities did not emerge until the 2013-14, 2014-15, and 2015-16 academic years. Reforms included eliminating the wage premium for (a) earning post-baccalaureate credits [e.g., bachelor's plus 30 credits], (b) earning a master's degree, (c) earning a master's degree and additional graduate credits [e.g., master's plus 30], and (d) earning an EdS and/or doctorate. Some reforms also included the complete elimination of any education premium (i.e., only advancing in the salary schedule by years of service) or the consolidation of higher degrees (i.e., not differentiating between an EdS and doctorate).

In the year immediately prior to any state reforms (2010-11), these eight universities collectively enrolled 8,285 students in graduate degree programs in education alone. By 2018-19,

they enrolled only 5,137, a 38% decline. This teacher compensation reform was clearly a shock to both the demand for master's degrees and to universities' resource environments.

Conceptual Framework

We draw upon two theoretical frameworks to situate this study and hypothesize both teacher and institutional behavior in context. Human capital theory suggests that individuals will invest in education so long as benefits outweigh costs (Becker, 1964). We assume that teachers are rational actors with complete information on the benefits of a master's degree (e.g., higher earnings potential, intrinsic value of education), as well as the costs (e.g., tuition and fees, time in school, other resources). We expect teachers integrate these factors when deciding whether to pursue a master's degree or other form of post-baccalaureate training. We also expect that teachers' decision-making would change with the elimination of a salient benefit: namely, a salary increase. For many teachers after the reform, the benefits of additional education and training may no longer outweigh the costs associated with attaining it. We expect that the lower value proposition of a master's degree leads teachers to reduce their demand for them.

In tandem with declining demand, resource dependence theory holds that organizations strategize to further their autonomy and interests (Pfeffer & Salancik, 1978). In this framework, universities offer graduate degrees not just to respond to labor market demand but also to raise revenue for their many pursuits. In our setting, master's degrees in education demonstrate an interdependence between universities and teachers: universities depend on teachers to enroll and pay tuition, while teachers depend on universities to offer master's degrees that lead to salary increases. We hypothesize that the shock to demand for master's degrees would change the dynamics of this interdependence, ultimately reducing both enrollment and tuition revenue.

While demand for master's degrees will decline on average, we do not expect this decline to be uniform across universities. Variation in the price elasticity of demand for undergraduate education has been well documented (Bryan & Whipple, 1995; Savoca, 1990), where prospective students are, on average, less sensitive to price changes at private and more prestigious universities. We similarly expect teachers considering graduate education at more prestigious institutions to be similarly less influenced by these compensation reforms; that demand for graduate education degrees at well-known institutions is inelastic. In this way, we hypothesize that graduate enrollment will decline faster at less prestigious institutions.

In our context, we expect R1 institutions to face a lower elasticity of demand for master's degrees if prospective students expect additional benefits from institutional prestige (e.g., better social networks, stronger signal of skills)—or that these additional benefits are, in part, substitutes for salary increases. (Additionally, R1 institutions are likely better equipped to weather shocks because of diversified revenue streams.) Conversely, teachers may not expect to receive these benefits from a graduate degree earned at a non-R1 institution, meaning demand at these institutions is substantially more elastic—or that teachers are less willing to pursue a graduate degree here (at a regional comprehensive university, for example) without a salary payoff. This is particularly complicated because non-R1 institutions are, on average, already more tuition dependent, meaning the consequences of a reduction in tuition revenue would have an outsized effect on a non-R1's bottom line.

Research Questions

We leverage Tennessee's rollout of these reforms as a natural experiment to estimate causal impacts of teacher compensation changes on the demand for graduate degrees in education—and ultimate impacts on university enrollment. Specifically, we ask:

1. What was the overall impact of Tennessee districts' teacher compensation reforms on graduate enrollment in education programs at nearby universities?
2. Did this impact, if any, vary by universities' status as an R1 or non-R1 institution?

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. These come from the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS). We limit our sample to public, 4-year, degree-granting universities in the Southeast Bureau of Economic Analysis (BEA) region and any that border Tennessee (n=143).[1] From this population, we identify universities in Tennessee (n=9), as well as those in two primary comparison groups: those elsewhere in BEA states (n=123) and those in BEA states directly contiguous to Tennessee (n=75). Data on graduate enrollments are available every other year. Our units of analysis are majors nested within universities, where we focus on graduate enrollment in "education" majors (CIP code 13.0000) at the graduate level.[2] Our data cover all enrollments from fall 2006 through fall 2020 (every other year, n=8), covering up to three years before the first compensation reform and up to three years after the last. We removed any institutions that did not have positive enrollment in graduate education programs in the first year of our panel or that did not report graduate enrollments in every other year (n=30).

[1] The U.S. Bureau of Economic Analysis Southeast region includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. Missouri borders Tennessee but is located in the BEA Plains region.

[2] IPEDS does not differentiate graduate enrollments by major (e.g., education, business) *and* degree (e.g., master's, doctoral). Therefore, it is not possible to observe how many students are enrolled in education master's programs versus education doctoral programs.

We define university exposure to treatment based on proximity to school districts that implemented compensation reforms. Specifically, a university is "treated" if it is in or adjacent to a county where a school district implemented a reform. We detect compensation reforms using district-by-year teacher salary schedules provided by TDOE. Salary schedules set teacher compensation based on different years of experience and levels of education. These data cover all public districts in the state from 2012-13 through 2020-21. Observing within-district salary schedules over time allows us to identify (a) any compensation reform implemented [i.e., a change in steps or categories from year t to t+1], (b) the type of reform [i.e., qualitatively observing the elimination or consolidation of categories], and (c) the exact year of a given reform.[3] Because some universities are nearby multiple counties with reforms (which could be implemented in different years), we identify a university as exposed using the year of *first* reform. More than a quarter (27%) of all districts implemented some reform during our panel. Figure 1 shows a map of universities in our sample by comparison group, including 8 treated universities in Tennessee and those in our two comparison groups. It also identifies the location of each institution and the nearby county (or counties) that enacted a compensation reform.

In all, these data allow us to observe our primary outcome of interest—enrollment in graduate education programs—as well as institutions' exposure to demand shocks (by year). We supplement this with directory information on institutions' Carnegie classifications as R1 (Doctoral Universities - Very High Research Activity) or non-R1.

Empirical Strategy

We exploit temporal variation in the rollout of compensation reforms across districts to identify the causal impact of Tennessee districts' teacher compensation changes on graduate

[3] No district ever *reintroduced* education steps to their salary schedule during our study window.

enrollment in education programs at nearby universities. Given our ability to observe enrollments before and after these reforms occurred, we adopt a difference-in-differences framework to estimate an average treatment effect on the treated. Our strategy leverages a two-way fixed effects (TWFE) design, given by

$$\log(y_{it}) = R_i + \mathbf{1}(t > 0)_{it} + \delta R_i \mathbf{1}(t > 0)_{it} + \boldsymbol{\mu}_i + \boldsymbol{\tau}_t + \varepsilon_{it} \ ,$$

where y_{it} is graduate degree enrollment in education majors in university i and year t; R_i is an indicator for whether a university is located in or adjacent to a district that ever adopted a compensation reform; $\mathbf{1}(t > 0)_{it}$ is an indicator for whether the academic year observed is during or after the year of exposure to a first reform; $\boldsymbol{\mu}_i$ and $\boldsymbol{\tau}_t$ are university and year fixed effects that absorb time-invariant heterogeneity within institutions and year-specific heterogeneity across them, respectively; and ε_{it} is the idiosyncratic error term.

We leverage a log transformation to handle skewness in enrollment that violates the conditional normality assumption for valid inference with OLS. This also allows us to interpret our primary coefficient of interest, δ, as an approximate percentage-point change in graduate enrollment due to Tennessee districts' teacher compensation reforms. We cluster our standard errors at the state level recognizing the correlation of outcomes among universities in the same state and leverage bootstrapping given a potentially smaller number of clusters (n=13 states; Cameron et al., 2007). In subsequent specifications, we amend equation (1) to unpack δ and estimate changes for R1 and non-R1 institutions separately.

Recall that not all districts enacted reforms in a common year across Tennessee, and, given variation in the types of reforms that were enacted, impacts may not be constant across universities. Recent works have suggested that TWFE estimators may be inconsistent under heterogeneous treatment effects and timing like this (Goodman-Bacon, 2021). Econometricians

have proposed many different estimators to accommodate this type of treatment effect heterogeneity. We assess the robustness of our results using the Callaway and Sant'Anna (2021) doubly-robust difference-in-differences estimator, which computes a weighted average of 2x2 difference-in-differences estimates for each treatment cohort and year, where either "never treated" or "not-yet-treated" units serve as controls.

While TWFE and doubly-robust designs help control omitted variable bias and net out pre-existing outcome differences between treatment and control groups, there is always the potential for unobserved confounding. For example, a reform in our setting might have coincided with a shock to general demand for graduate degrees unobservable to us (in Tennessee or elsewhere), leading us to conflate the effects of the reform with some other process. To guard against this likelihood and further assess the robustness of our estimates, we also implement a triple difference design that leverages graduate degree enrollment in business majors, which should not have been affected by teacher compensation reforms but could have been influenced by a general shock to graduate degrees. This final strategy takes the form

$$\begin{aligned}\log(y_{imt}) = R_i + \mathbf{1}(m = \text{edu})_m + \mathbf{1}(t > 0)_{it} + R_i\mathbf{1}(m = \text{edu})_m + R_i\mathbf{1}(t > 0)_{it} \\ + \mathbf{1}(m = \text{edu})_m\mathbf{1}(t > 0)_{it} + \beta R_i\mathbf{1}(m = \text{edu})_m\mathbf{1}(t > 0)_{it} + \boldsymbol{\mu}_i \\ + \boldsymbol{\tau}_t + \varepsilon_{imt}\,.\end{aligned}$$

Here, the setup is similar to our TWFE strategy described above, but y_{imt} is now graduate degree enrollment at institution i, major m, and time t, and $\mathbf{1}(m = \text{edu})_m$ is an indicator for whether the major is in education specifically (business otherwise). The coefficient β measures the percentage point change in graduate degrees in education attributable to Tennessee's compensation reforms, net of a general shock to demand for graduate degrees (proxied by business majors). This estimate is equivalent to the difference of two difference-in-differences

estimators: one on graduate enrollment in education programs (treatment versus control) and one on graduate enrollment in business programs (treatment versus control).

To recover causal estimates, each of our estimators relies on a similar assumption of strict exogeneity: that exposure to a reform in one time period has no additional effect on enrollment, conditional on current exposure and fixed effects. This assumption implies what is more commonly known as parallel trends: that enrollments in "treatment" and "control" universities would have continued along similar trajectories in the absence of a reform. While this is a fundamentally untestable assumption, we provide empirical evidence to support it through a series of event studies. The top panel of Figure 2 plots event studies that implement the Callaway & Sant'Anna (2021) doubly-robust design; the bottom panel plots event studies from two TWFE estimators (education and business, separately), representing our triple-difference strategy. To support our assumption, we would expect to detect no meaningful differences between treatment and control groups in the pre-treatment period ($t < 0, 2012$). Significant differences in the post-treatment period provide evidence of treatment effects.

As shown in Figure 2 (top row), we detect nominally small or statistically insignificant differences in the pre-treatment period, followed by large and significant declines in graduate education enrollment following compensation reforms. These are driven almost entirely by enrollment declines in non-R1 universities (third column). Additionally, we detect virtually no pre-post change in graduate business enrollments (bottom row) but similarly large and significant declines in graduate education enrollment following the year of first implementation—again, particularly at non-R1 universities. These collectively suggest that our estimates are not driven by pre-existing differences between our treatment and control groups—or by other general shocks to demand for graduate degrees (i.e., business).

Results

Table 2 presents estimates of the impact of Tennessee districts' teacher compensation reforms on enrollment in graduate education programs at nearby universities by estimation strategy (column) and comparison group (sub-column). Across specifications, we find robust evidence that K-12 districts' elimination of this wage premium for teachers significantly altered the market for graduate degrees in Tennessee. Overall, our TWFE and triple difference strategies suggest this amounted to a 21-24% decline in graduate education enrollment alone. Given average pre-reform enrollment levels across universities in Tennessee, this equates to an enrollment loss of roughly 110-125 students per campus, on average. Our doubly-robust estimates are similar but slightly larger, suggesting a 27% decline (or 140 students). These estimates are, again, consistent across comparison groups.

Table 2 also presents estimates by universities' R1 status (row). When considering how this compensation reform may have differentially impacted universities, results suggest this decline in graduate education enrollment is almost exclusively driven by declines at non-R1 institutions (bottom row). Across specifications, we detect a 21-30% (or 110-150 student) average decline in graduate education enrollment among non-R1 institutions. Conversely, we fail to detect consistent evidence of similar declines among R1s: Estimates are slightly noisy given only two R1 institutions in the state but point to the potential for a loss of 50-75 students per campus, depending on specification and comparison group. Our event-study plots (Figure 2) do not suggest any meaningful decline in enrollment at R1 Universities (middle column). While it is likely there was enrollment loss at R1 institutions as a result of this compensation reform, our results make it clear that these declines were disproportionately felt at non-R1 universities.

Discussion

Leveraging teacher compensation reforms in Tennessee as a natural experiment, we find that eliminating salary premiums for teachers holding graduate degrees produced a substantial contraction in the local market for those credentials. On average, graduate education enrollment at nearby universities declined by roughly 27%, or a loss of approximately 140 students per campus, on average. These reductions were concentrated among regional, non-research-intensive institutions, which are already especially tuition dependent. By contrast, R1 universities experienced minimal, if any, changes in enrollment, suggesting that institutional prestige and diversified revenue streams insulated them from these policy-induced shocks.

This enrollment contraction had real implications for universities in Tennessee. A loss of 140 students—even under a conservative assumption that each student was *only* enrolled in one 3-credit hour course (part-time) per semester—equates to a combined $3.8 million loss in tuition revenue alone.[4] Moreover, this contraction in demand for graduate degrees not only impacted institutions' bottom lines through reduced tuition revenue but also through reduced state appropriations. Tennessee operates an outcomes-based funding formula that funds universities, in part, on the production of graduate credentials, including master's, doctoral, and EdS degrees. The Tennessee Higher Education Commission (THEC) reported that, for the 2016 fiscal year, the state's seven non-R1 universities lost a combined $622,000 in appropriations due exclusively to declines in master's and Ed Specialist degrees (THEC, 2016).

Our study provides new evidence on how K-12 education policy reforms can spillover into higher education systems in particularly meaningful ways—including through mechanisms rarely, if ever, explored in the literature. From a human capital perspective, we show that teacher

[4] Here, we combine the average effect of 140 students (loss) with the average cost of a 3-credit hour graduate level course at the eight treated universities in Tennessee (approximately $1,700).

demand for advanced degrees responded predictably to changing incentive structures. When the return to a graduate degree disappeared, in part, fewer teachers found such an investment worthwhile. From a resource dependence perspective, universities—particularly non-R1s that increasingly rely on graduate tuition—bear the fiscal consequences of these altered incentive structures. These dual dynamics illuminate how policies aimed at increasing efficiency in one education sector can destabilize another. This asymmetry in institutional effects also reveals an important structural inequality: non-R1 universities, often serving rural and less affluent regions, appear far more exposed to fluctuations in policy-driven demand. This underscores the fragility of tuition-dependent funding models and the importance of coordination across state policies in making research-informed decisions while also maintaining institutional viability.

Limitations

While our study breaks novel ground, it is not without notable limitations. First, although our triple-difference design helps control for general shocks to demand for graduate degrees, we cannot observe whether teachers substituted into other fields of study or enrolled in online or out-of-state programs. However, given that we only estimate impacts on enrollment in graduate education programs specifically, it is likely that our estimates are conservative or represent a lower-bound on this effect (given the potential for enrollment to contract in other graduate degree programs, as well, or for teachers to enroll in universities in other regions of the state). Second, while we conducted policy and news scans to guard against this potential bias, we lack comparable data on compensation reforms in other states. Finally, while we estimate findings across universities' R1 status, it possible that impacts are heterogeneous in other dimensions or vary by the intensity of exposure to a compensation reform. That is, it is possible that a university exposed to multiple nearby reforms would have a particularly large enrollment decline

compared to a university with only one or fewer nearby reforms. Our sample size precludes us from fully investigating this potential.

Implications

Our findings suggest that education policies rarely operate in isolation. K-12 teacher pay reforms can generate significant spillover effects for colleges and universities. Policymakers should account for these cross-sector linkages when enacting compensation or credentialing reforms and consider offsetting supports for institutions most affected by declining enrollment. Such policies could include targeted funding for non-R1 or regional universities or incentives for innovation in graduate program design more closely linked to K-12 teacher effectiveness or student achievement. For university leaders, these results underscore the importance of revenue diversification and strategic planning. Institutions that rely heavily on master's and graduate tuition are especially vulnerable to shifts in labor market incentives. Developing new programmatic offerings empirically linked to positive labor-market outcomes, partnering with local K-12 districts on advanced education and training programs, and investing in flexible or online models may mitigate future shocks. Moreover, state policymakers and district leaders alike should be acutely aware of the potential for longer-term implications of effects like these, including a decline in the availability of skilled teachers and school leaders given substantially fewer pursuing advanced credentials.

Conclusion

In all, our study underscores the fact that reforms within one part of the education ecosystem can have potentially unintended yet profound consequences in another. Districts' elimination of teacher salary incentives triggered a sharp and uneven contraction in the market for graduate degrees in education, exposing the dependence of many regional, non-R1

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 by many researchers and policymakers alike. Failure to consider this reality may cause significant challenges in both the short- and long-term.

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Table 1. *Teacher compensation reforms in Tennessee, by nearby university, county/district, and year.*

University	Reform County/District	First Reform	Reform(s)
APSU	Dickson, Robertson	2015	Eliminated Master's, Eliminated Master's + *N*
ETSU	-	-	-
MTSU	Cannon, Coffee, Rutherford [+]	2014	Eliminated Master's + *N*, Eliminated Doctorate
TSU	Robertson, Rutherford	2014	Eliminated Master's + *N*, Eliminated Doctorate
TTU	Cumberland, White	2014	Eliminated Master's + *N*
UM *	Shelby [+]	2013	Eliminated Master's + *N*, Eliminated EdS, Eliminated All Degrees
UTC	Meigs, Rhea	2014	Eliminated Master's + *N*, Combined EdS and Doctorate
UTK *	Anderson, Blount, Jefferson, Loudon, Roane	2013	Eliminated BS + *N*, Eliminated Master's + *N*, Eliminated All Degrees
UTM	Gibson	2013	Eliminated Master's + *N*, Combined EdS and Doctorate

Source: Analysis of district salary schedules by year from TDOE.

Notes: * R1: Doctoral Universities – Very High Research Activity. [+] County of university (otherwise adjacent county). Table shows nine public universities in Tennessee and identifies the county/district with nearby reform(s), the year they were first exposed to a reform, and reform(s) implemented.

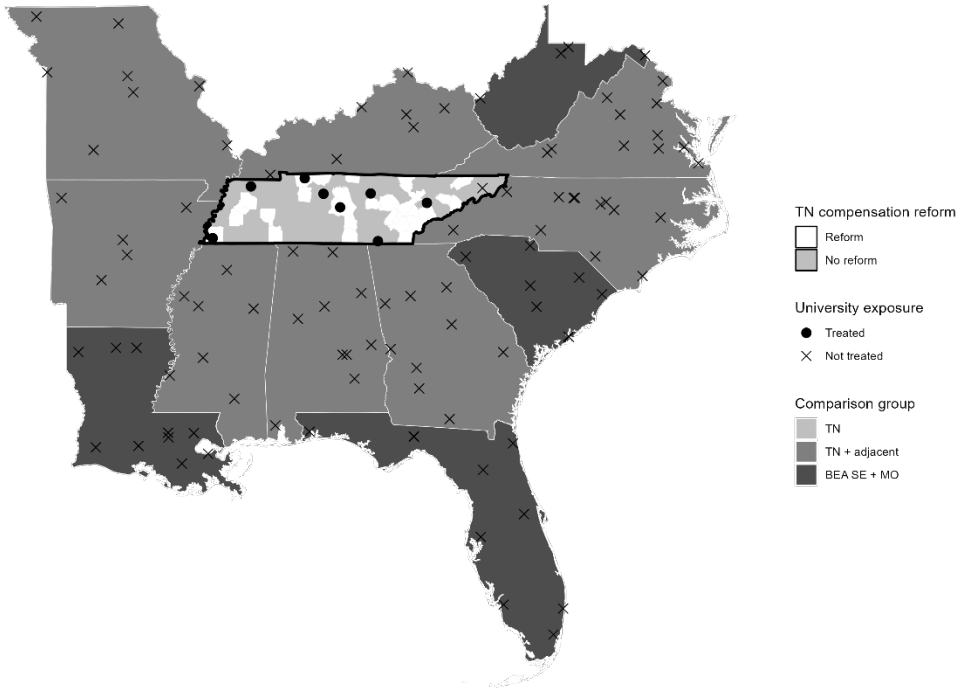
Table 2. *Impact of teacher compensation reform on graduate enrollment in education programs at nearby universities.*

	Two-Way Fixed Effects	Doubly Robust Difference-in-Differences		Triple Difference	
		BEA Region	Contiguous	BEA Region	Contiguous
All Universities	-0.242***	-0.263***	-0.270***	-0.209***	-0.207*
	(0.032)	(0.034)	(0.039)	(0.043)	(0.063)
n	880	816	568	816	568
baseline	518	518	518	518	518
R1	-0.131**	-0.083*	-0.030	-0.182+	-0.088
	(0.045)	(0.042)	(0.038)	(0.079)	(0.113)
n	112	104	64	104	64
baseline	590	590	590	590	590
Non-R1	-0.258***	-0.289***	-0.304***	-0.213***	-0.222**
	(0.036)	(0.037)	(0.037)	(0.042)	(0.059)
n	768	712	504	712	504
baseline	508	508	508	508	508

Source: Analysis of IPEDS and TDOE data from 2006-2020.

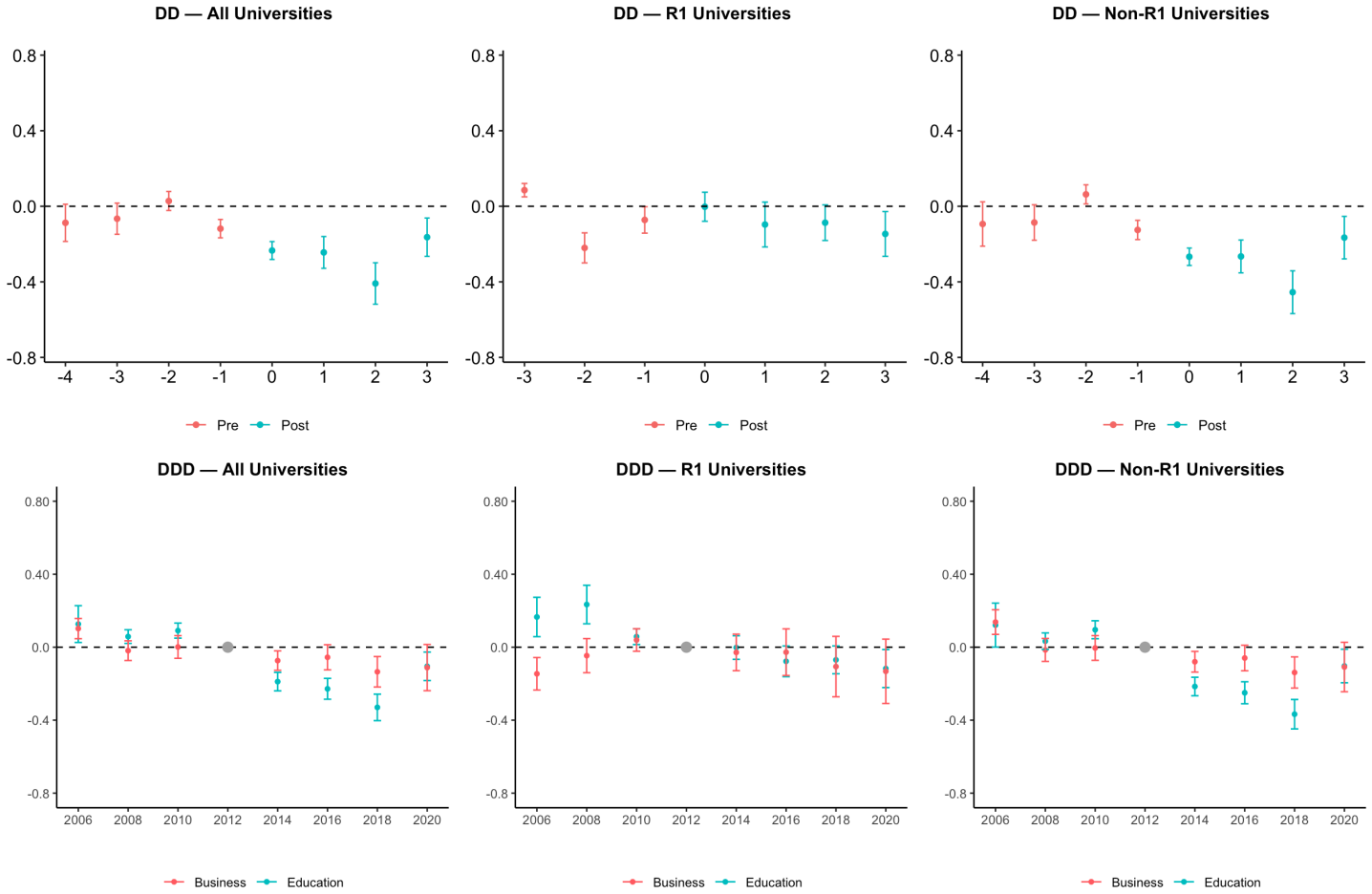
Notes: Table presents average treatment effect on the treated estimate of teacher compensation reform on nearby university's graduate enrollment in education programs by estimation strategy and comparison group. Robust standard errors with bootstrapping are presented in parentheses. Two-way fixed effects includes university and year fixed effects. Doubly-robust estimation follows Callaway & Sant'Anna (2021). Triple difference leverages universities' graduate enrollment in business programs and additionally includes major fixed effects. Each cell represents a different model. N reflects number of college-by-year observations included in each model. Baseline reports average graduate enrollment in education programs for ever-treated universities in Tennessee in 2010-11 year (immediately prior to the first state reform), by sample. R1: Doctoral Universities – Very High Research Activity as defined by Carnegie.

Figure 1. *Map of treated and untreated universities by analytic sample.*



Source: Analysis of IPEDS and TDOE data from 2006-2020.
Notes: Tennessee is outlined black. Counties in Tennessee with districts that enacted teacher compensation reform(s) are shaded in white and those that did not are shaded in light grey. We define treated universities as public four-year universities in Tennessee located in or adjacent to a county that enacted a reform. Circles and crosses mark treated and untreated universities, respectively. Light, medium, and dark grey designate increasingly larger geographies from which to draw the comparison group. TN = Tennessee; BEA SE = Bureau of Economic Analysis Southeast; MO = Missouri.

Figure 2. *Event study: Doubly-robust difference-in-differences and triple difference.*



Source: Analysis of IPEDS and TDOE data from 2006-2020.

Notes: Figure presents event study plots estimating mean difference in graduate enrollment in education programs between universities in treatment (Tennessee) and comparison (BEA Southeast states) groups. Top panel presents estimates from doubly-robust estimation following Callaway & Sant'Anna (2021). Pre/post treatment defined by each university's first exposure to a teacher compensation reform in the immediate or adjacent county/district. Bottom panel presents estimates from a triple-difference strategy leveraging universities' graduate enrollment in business programs. Pre/post defined by Tennessee's first adoption of compensation reforms (academic year 2013-14). R1: Doctoral Universities – Very High Research Activity as defined by Carnegie. All models include university and year fixed effects; triple difference additionally includes major fixed effects.