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ACCOUNTABILITY, ELECTIONS, AND FRICTIONS: THE EFFECTS OF INSTITUTIONAL CONSTRAINTS ON THE PROVISION AND EFFICACY OF SCHOOL RESOURCES[‡]

Union Reform, Performance Pay, and New Teacher Supply: Evidence from Wisconsin's Act 10[†]

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There is a growing consensus among economists that increases in public school funding generally improve student outcomes. Specifically, recent studies relying on quasi-experimental variation have shown that additional school resources can improve outcomes such as test scores, educational attainment, wages, employment, and income mobility (Jackson 2018).

While all of these recent studies find that "money matters" in public schools, the interaction between school funding effectiveness and the incentives in place in the school district remains understudied.[1] In other words, it remains unclear how the effectiveness of additional funding to a school district varies by factors such as the type of teacher compensation scheme in place in the district, the amount of teacher and principal accountability, and the level of school choice and competition that the district faces.

To illustrate how the effectiveness of school funding increases may depend on the incentives in place in the district, consider the example of increasing teacher salaries. More attractive compensation packages are often proposed as a tool to attract and retain high-quality teachers to the profession. However, teacher pay in most public school districts in the United States is rigid and solely based on seniority and educational attainment. Collective bargaining agreements (CBAs) between teachers' unions and local school boards usually oppose performance pay and prohibit school districts from individually negotiating pay with teachers. Therefore, by itself, it is unclear whether such an undifferentiated pay raise would improve the quality of the teacher workforce in the district, as it would incentivize both high- and low-quality teachers to remain in the profession. Furthermore, any particular shortages—such as that of high-quality teachers or teachers in high-demand subjects—would not be addressed unless the increase in salaries could be targeted (Hanushek 2003).

This simple example raises the question of whether school districts could improve the quality of their teacher workforce by increasing teacher salaries in a more flexible way.[2] This

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[1] Three recent studies have started to extend the literature that examines whether money matters on average. Two papers examine whether the effectiveness of school finance reforms depends on the strength of teachers' unions (Brunner, Hyman, and Ju 2020) or teacher accountability policies (Buerger, Lee, and Singleton 2020). Similarly, Baron (forthcoming) examines the relative effectiveness of distinct types of school spending.

[2] Despite its importance, an empirical examination of this relationship has been difficult to conduct. CBAs between teachers' unions and local school boards expanded dramatically during the 1960s when various states passed favorable collective bargaining legislation for government workers

paper examines this question by exploiting a recent shift toward flexible pay in Wisconsin. In 2011, in an effort to address a looming state budget deficit resulting from the Great Recession, Wisconsin enacted the Budget Repair Bill (or Act 10). This landmark law severely reduced the influence of public sector unions in the state by limiting the scope of union negotiations and restricting their fundraising abilities. As a result, school districts in Wisconsin were given full autonomy to redesign their compensation schemes.

Roughly half of school districts eliminated rigid salary schedule schemes and moved to negotiate salaries with individual teachers in the years following the law. Although a lot of variation arose in the way districts designed their new compensation schemes, most districts sought to tie pay to performance. Heneman et al. (2018) document a substantial shift toward performance-based salary raises, with performance being measured mainly by teacher performance evaluation ratings rather than student test scores. Competitive pay for teacher recruitment also emerged as a widespread practice following the enactment of Act 10.[3]

Previous studies have shown that after Act 10, in school districts that switched to flexible compensation, the compensation of teachers with high value added prior to the reform rose more relative to the compensation of low value added teachers. This led to high value added incumbent teachers flowing into school districts that adopted flexible pay and low value added teachers flowing in the opposite direction (Biasi forthcoming).[4] This evidence alone suggests that districts can in fact attract high-quality incumbent teachers by tying compensation to performance and raising the salaries of high value added teachers.

While these findings credibly show that the introduction of flexible pay in a subset of Wisconsin school districts led to an improvement in the quality of the teaching workforce in those districts relative to districts that retained rigid compensation schemes, if *all* districts switched to flexible pay, incumbent teachers would have fewer incentives to sort across school districts, and any compositional improvements would be driven by either the exit of low-quality teachers or the entry of high-quality teachers (Biasi forthcoming). Yet the effects of Act 10 on the quantity and the quality of *prospective* teachers remains unexplored. This paper fills this gap in the literature.

I. Empirical Strategy

The changes in compensation induced by Act 10 could fundamentally alter both the quantity and quality of new individuals entering the teaching profession. On the one hand, a Roy model of occupational choice predicts that high-aptitude workers will be pushed out of a profession that compresses pay for aptitude (Roy 1951). The intuition for this result is that rigid compensation schemes overcompensate low-quality teachers and undercompensate high-quality ones. Therefore, as more districts in Wisconsin continue to enact merit-based compensation schemes, new high-quality individuals may be lured into the profession.

On the other hand, previous studies have shown that individuals who select into teaching are more risk averse and place a larger premium on job security than similar college graduates (Bowen et al. 2015). Given imperfect information regarding an individual's own ability to teach as well as the perceived inability of school administrators to accurately measure teacher quality, increased uncertainty over the stream of future earnings may discourage risk-averse, highly qualified individuals from joining the profession.

The net effect of Act 10 on both the quantity and quality of prospective teachers will depend on which of these mechanisms dominates. These theoretical ambiguities highlight that the net effect of Act 10 is largely an empirical question.

The empirical approach in this study compares the change in the number of teacher preparation

and remained stable until recently. Stable collective bargaining patterns have resulted in a lack of variation in pay practices among school districts, which has impeded an empirical analysis of the effects of flexible pay.

[3] Specifically, bonuses and other monetary incentives are now used to attract high-quality recruits to fill positions in high-skill and critical-shortage areas.

[4] Consistent with Biasi's findings, Litten (2016) documents a reduction in the return to tenure following Act 10. Given the ability of districts to link compensation to performance rather than to seniority and educational attainment alone, younger teachers with relatively higher value added experienced wage increases after Act 10, while older teachers with relatively lower value added suffered declines in compensation.

program (TPP) completers in Wisconsin higher education institutions before and after Act 10 and relative to institutions in control states.[5] I use institutions in states bordering Wisconsin (Illinois and Minnesota) as a control group.[6] Using local controls has been used in many other settings. The intuition behind this approach is that nearby states ought to have a more similar higher education sector to Wisconsin than states in other regions of the country and thus may follow similar trends in prospective teacher supply prior to the enactment of Act 10.

I collect institution-level information from the Integrated Postsecondary Education Data System (IPEDS) on the number of graduates from university-based TPPs. I restrict the sample to all degree-granting public and private universities located in Wisconsin and the control states and calculate the number of awarded teaching degrees at each institution as the total number of students who graduated with a bachelor's degree (first or second major) in teaching.[7] IPEDS additionally provides information on the total number of bachelor's degrees awarded at each institution, which allows me to compute the share of graduates in a given institution who were awarded a teaching degree. The final sample contains a balanced panel of higher education institutions in Wisconsin and each of the control states for the years 2004–2005 through 2016–2017.

In order to obtain an estimate of the causal impact of Act 10 on the supply of prospective teachers, I estimate equation (1). This specification compares the share of teaching degrees in Wisconsin institutions before and after Act 10 and relative to institutions in control states in an event study framework:

$$(1)\quad Y_{ist} = \sum_{j \neq -1} \gamma_j D(t - 2012 = j) + \mu_i + \tau_t + \varepsilon_{ist},$$

where Y_{ist} is the share of bachelor's degrees awarded in teaching at institution i in state s at time t, μ_i and τ_t represent institution and year fixed effects, and $D(t - 2012 = j)$ is a dummy variable that equals 1 when the institution is in Wisconsin and is j years from 2011–2012, the academic year following the enactment of Act 10. I include six leads and six lags of the treatment effect so that γ_j represents the coefficient on the jth lead or lag, and I omit the year prior to treatment so that all estimates are relative to this year.

II. Results

Figure 1 presents point estimates and 95 percent confidence intervals of the γ_j coefficients for each period leading to and immediately after Act 10. Prior to the enactment of Act 10, all treatment estimates are statistically insignificant at the 5 percent level. This suggests that institutions in Wisconsin and those in the control states had similar trajectories in the share of teaching degrees prior to the law. As expected, there appears to be a lag in the effect of Act 10 on the share of teaching degrees in Wisconsin institutions. The effect of the law is small and statistically insignificant for the first two years after its enactment, which reflects the short-run inelastic responses of older cohorts of students.

When individuals in earlier years of their college careers at the time of Act 10's enactment—who had more time to respond to the increase in compensation and the enactment of performance pay schemes—begin to graduate, the effects of Act 10 become larger and statistically significant. On average, across all post-Act 10 years, the magnitude of the estimates indicates that the act led to an increase in the share of awarded teaching degrees at Wisconsin institutions of roughly 1.5 percentage points. This effect corresponds to an increase of approximately 20 additional teaching degrees, or roughly a 20 percent increase relative to the average number of annual teaching degrees awarded at a given Wisconsin institution prior to Act 10.

While an analysis of the impacts of Act 10 on the number of prospective teachers is important

[5] A TPP is a state-approved course of study whose completion signifies that a student has met all educational requirements for initial certification to teach in the state's K–12 system.

[6] I exclude the two other bordering states, Iowa and Michigan, since these states experienced changes in the influence of their teachers' unions during the sample period (Roth 2019). However, the results are robust to including these states in the analysis. Similarly, all results in the paper are robust to the choice of control group. Using institutions in all states in the Midwest, for example, yields extremely similar results.

[7] To isolate teaching degrees, I use the Classification of Instructional Programs codes used by Kraft et al. (2020): 13.01, 13.02, 13.03, 13.10, 13.12, 13.13, 13.14, and 13.99.

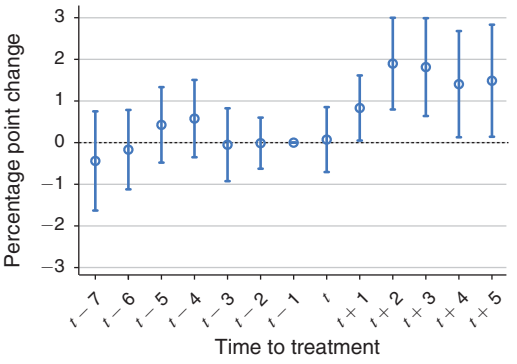

FIGURE 1. EVENT STUDY RESULTS

Notes: The figure presents point estimates and 95 percent confidence intervals of the γ_j coefficients for each period leading to and immediately after treatment. The year prior to treatment is omitted so that all estimates are relative to this year. Standard errors used in the construction of the confidence intervals are clustered at the institution level. The specification is weighted by the institution's total number of awarded degrees.

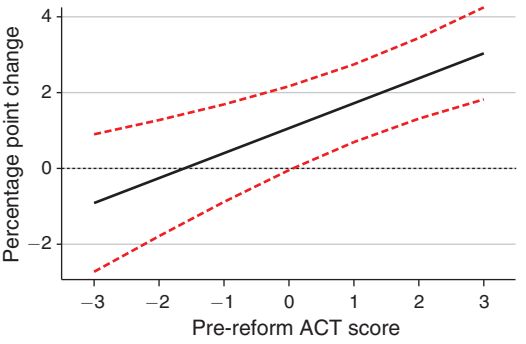

FIGURE 2. HETEROGENEITY BY QUALITY (ACT SEVENTY-FIFTH PERCENTILE)

Notes: The figure plots estimates of $\beta + \delta ACT_{is}$ obtained from the estimation of equation (2) for distinct values of ACT_{is}. The figure traces out estimates of the effect of Act 10 on the share of awarded teaching degrees, $\beta + \delta ACT_{is}$ for values of ACT_{is} between three standard deviations below and above the mean. The specification is weighted by the institution's total number of awarded degrees. Standard errors used in the construction of the confidence intervals are clustered at the institution level.

due to the current wave of teacher shortages throughout the United States, the question of first-order importance is how compensation reform impacts the quality of the teacher pipeline. To shed light on this question, I examine heterogeneity in the effects of Act 10 by institutional selectivity.[8] Specifically, I estimate the following equation:

$$(2) \quad Y_{ist} = \beta Act\,10_{st} + \delta\left(Act\,10_{st} \times ACT_{is}\right) + \mu_i + \tau_t + \nu_{ist},$$

where Y_{ist}, μ_i, and τ_t are defined as in equation (1); $Act\,10_{st}$ is a dummy variable equal to 1 if the institution is in Wisconsin and the time period is after the enactment of Act 10 (2011–2012 to 2016–2017); and ACT_{is} is the institution's 2010–2011 seventy-fifth percentile of freshmen American College Testing (ACT) scores.[9] I standardize the seventy-fifth percentile scores to a mean of 0 and a standard deviation of 1 using the distribution of scores of the control group.

In this specification, the effect of Act 10 on the institution's share of teaching degrees depends on ACT_{is} linearly and is represented by the expression $\beta + \delta ACT_{is}$. Therefore, β measures the impact of Act 10 at institutions with an ACT score in the middle of the distribution. The δ term measures how the effect of Act 10 changes with institutional selectivity. A positive estimate of δ indicates that the effect of Act 10 on new teacher supply is more positive for institutions with higher freshmen ACT scores.

Figure 2 plots estimates of $\beta + \delta ACT_{is}$ for a range of values of ACT_{is}. The figure traces out estimates of the effect of Act 10 on the share of awarded teaching degrees, $\beta + \delta ACT_{is}$, for values of ACT_{is} between three standard deviations below and above the mean. For instance, the leftmost point of the line shows estimates

[8] While work attempting to link observable characteristics at the time of hire to future teacher effectiveness is still ongoing, proxies for the selectivity of an individual's undergraduate institution are correlated with future teaching performance and have been widely used in the literature (Kraft et al. 2020, Jacob et al. 2018).

[9] The results are robust to (i) choosing other pre-Act 10 ACT reporting years, (ii) measuring institutional selectivity as the twenty-fifth percentile of freshmen ACT scores, and (iii) using the institution's acceptance rate rather than freshmen ACT scores as a proxy for quality.

of $\beta - 3\delta$, the effect of Act 10 on the share of teaching degrees at institutions with freshmen ACT scores three standard deviations below the mean. The solid line traces out the point estimates, while the dashed line delineates the corresponding 95 percent confidence intervals.

The figure shows that the increase in teaching degrees brought about by Act 10 was entirely driven by relatively more selective institutions. For instance, the figure provides no evidence that institutions with less than average pre-reform ACT scores experienced a change in the share of teaching degrees as a result of the reform. While most of the coefficient estimates are negative, they are not statistically significant. However, the figure shows that institutions with freshmen ACT scores of one or more standard deviations above the mean experienced increases in the share of teaching degrees of roughly 2 to 3 percentage points.

III. Conclusion

The goal of this paper is to start considering the interaction between increases in school resources and the incentives in place in school districts. Similar to the findings of Biasi (forthcoming) for incumbent teachers, the results here indicate that new high-quality individuals can be lured into school districts with compensation increases that reward performance rather than seniority and educational attainment alone.

While the existing school-spending literature has shown that money matters in public schools, continuing to explore the interaction between the effectiveness of school funding increases and various incentive schemes represents an important topic for future research. For instance, it remains unclear whether the effectiveness of additional funding depends on the amount of competition that the school district faces or on the amount of teacher and principal accountability in the district. In an era in which policymakers grapple with tight budget constraints and question the returns to investments in public schools, answering these questions can be significant for economic policy.

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