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Should They Pay, or Should I Go?
Differential Responses to Base Salary Increases

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Abstract

This study uses administrative data from Oregon to estimate the extent to which base salary increases reduce teacher turnover and to investigate whether these effects are heterogeneous by teacher characteristics. Using multiple sets of fixed effects to isolate plausibly exogenous variation in salaries across experience bands within a district, we find that increases in salary are associated with decreases in teacher turnover. In our fully specified model, we estimate that a 1 percent increase in current and future base salary is associated with a 0.15 percentage point decline in turnover. This relationship appears to attenuate for mid-career teachers. While increasing salary reduces turnover among BA and MA degree teachers, these effects are not statistically different from each other. We also find that teachers in special education positions are more responsive to salary increases than those only assigned general education classes. Together, our results indicate the varied impact salaries may have in ameliorating teacher staffing challenges across different teacher characteristics.

Keywords: Teacher Labor Markets; Teacher Turnover

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1 Introduction

Because dissatisfaction with low salaries contributes to teacher mobility and exit from the profession (Beckwith, 2019; Loeb et al., 2006), several studies have examined the extent to which increasing teacher pay reduces turnover (Nguyen et al., 2020). While these studies provide insight into the overall relationship between salary and turnover, they do not examine how the relationship varies by years of experience and other professional characteristics such as educational attainment and specialization area. For example, although teachers often receive higher compensation for additional degrees and certifications, limited research has been conducted on whether teachers with master's degrees respond differently to salary increases compared to those with bachelor's degrees. In addition, despite persistent challenges in staffing special education classrooms, there are few studies that examine the impact of salary increases in special education settings relative to general education settings (Billingsley & Bettini, 2019). Understanding these differential responses to salary could enable policymakers to pursue compensation strategies that more effectively minimize turnover and improve stability in the teacher labor force.

In this study, we use administrative data from Oregon, a mid-size western state, to assess the relationship between teachers' base salary and teacher turnover. To establish a benchmark, we first examine how changes in base salaries affect teacher turnover among all teachers in the state. Then we examine the extent to which salary affects turnover across the experience distribution, recognizing that novice, mid-career, and veteran teachers may have differential responses to salary. Finally, we assess how teachers' responses to base salary vary depending on whether they hold a bachelor's or master's degree and whether they teach in general education or special education classrooms. This comprehensive approach allows us to understand the nuanced ways in which salary influences teacher retention.

To conduct our analyses, we first construct a pseudo-salary schedule by computing the median salary for each experience level in each district in each year. Second, we compute teacher turnover rates in each of the experience by district by year cells by calculating the proportion of teachers who move to a different district in the same state or who have exited the public education workforce in the state entirely. Third, we estimate a model in which turnover is a function of salary, while controlling for unobservable labor market conditions and district characteristics using fixed effects (Hendricks, 2014). We assess heterogeneous relationships between salary and turnover by interacting salary with experience, degree, and instructional position.

Using our analytic approach, we find that a 1 percent increase in base salary—defined as the combination of current pay and the next level of pay according to the existing salary contract—is associated with a 0.15 percentage point reduction in overall teacher turnover. The response to salary adjustments appears U-shaped across different experience levels, with early and late-career teachers showing the highest responsiveness. While teachers holding bachelor's and master's degrees both respond to salary increases, the differences between these groups are not statistically significant. However, notable differences emerge between general education and special education teachers. For special educators, a 1 percent pay increase is associated with a 0.36 percentage point decrease in turnover, more than double the effect observed in general education teachers, which is 0.13 percentage points. By focusing on key salary determinants—experience, degree, and position type—our study offers valuable insights for policymakers on leveraging pay structures to enhance retention among specific teacher groups.

2 Background Literature

For nearly a century, researchers have been exploring the relationship between salary and teacher turnover. One early study referred to salary as "one of the most important single factors producing turnover" (Elsbree, 1928). Although subsequent studies have argued that turnover decisions involve other factors besides pay (Charters, 1956;

Grissom et al., 2015; Guarino et al., 2006; Harris & Adams, 2007; Ingersoll, 2001; Lovison & Mo, 2022), teachers' salary still remains a key policy lever that districts can use in an effort to retain teachers (Sun et al., 2024). In this section, we provide a brief overview of the salary-turnover relationship. We first examine how this relationship has been studied based on district salaries and teacher incentive pay. Next, to align with our heterogeneity analyses, we provide a brief overview of the literature that examines how the association between pay and turnover varies by experience, education level, and teacher position. Finally, we situate our article among two studies that examine how the base salary affects turnover and how it varies by the characteristics of the teacher.

2.1 Examining the Relationship between Salary and Turnover

2.1.1 District Salary and Turnover

Across several studies, researchers have explored how district salaries influence teacher turnover by analyzing data from national surveys and state-specific longitudinal administrative databases. Studies that use data from national surveys such as the Schools and Staffing Survey (National Center for Education Statistics, n.d.) highlight how dissatisfaction with pay contributes to teacher exit and mobility across the United States (Carver-Thomas & Darling-Hammond, 2017; Ingersoll, 2001; Ingersoll & May, 2012). Research studies leveraging longitudinal administrative records have examined intrastate mobility in response to salary differences across districts. For example, in Texas, Hanushek et al. (2004) identified a modest relationship between salary differences and teacher mobility between districts, but the authors highlight that other characteristics of the job have an even stronger relationship with turnover. And in Wisconsin, Imazeki (2005) finds that increasing salaries relative to nearby districts can reduce between-district transfer among public school teachers.

2.1.2 Incentive Pay and Turnover

Using quasi-experimental methods, researchers have estimated the causal impact of incentive pay (Cohodes et al., 2023; Fulbeck, 2014; Hanushek et al., 2023; Shin, 1995;

Springer et al., 2016; Springer & Taylor, 2021), selective recruitment and retention bonuses for hard-to-staff schools (Cowan & Goldhaber, 2018; Glazerman et al., 2013; Swain et al., 2019), and differential pay for high-needs subjects (Bueno & Sass, 2018; Clotfelter et al., 2008; Falch, 2011; Feng & Sass, 2018) on turnover. The results are mixed among these studies.

Evidence suggests that performance-based incentive pay can increase or decrease retention (Adnot et al., 2017; Cohodes et al., 2023; Hanushek et al., 2023; Ryu & Jinnai, 2021); ultimately, the direction of the effects depends on the policy design and objectives. Despite these varying effects, incentive policies tied to student achievement do not represent the typical pay incentives included in salary schedules across the country; only 5 percent of teachers nationally report receiving additional compensation based on student performance (Taie & Lewis, 2022). Similarly, bonuses linked to the retention of highly-qualified educators in hard-to-staff schools can increase retention, but sometimes only if such incentives persist (Cowan & Goldhaber, 2018; Glazerman et al., 2013; Swain et al., 2019). Moreover, targeted bonuses for hard-to-staff subjects, such as math and science, can decrease turnover in focal areas (Bueno & Sass, 2018) but not uniformly across all subjects. While subject-specific incentives are more common than school-linked and achievement-linked incentives—some type of school-based incentive was available in 45 percent of 148 large districts across the United States surveyed by the NCTQ whereas 73 percent of surveyed schools used some type of subject-area incentive (Saenz-Armstrong, 2022)—such programs are typically narrowly targeted. Incentive pay is an important policy use case, but it provides less insight into teachers' responsiveness to broad-based salary increases through updates to district salary schedules.

2.2 Heterogeneity in Turnover as Response to Salary Change

While evidence demonstrates that teachers are, in some circumstances, responsive to salary, evidence is less clear about whether teachers with different characteristics respond similarly to broad-based salary changes. In general, turnover rates vary by teacher experience level, education level, and instructional position (Nguyen et al., 2020), but less is known about whether these teachers differentially respond to salary schedule changes. Understanding this heterogeneity is important because schools and districts might hope to use salary as a tool to retain teachers in high-need areas (e.g., special education) or at potentially sensitive periods when teachers may be most at risk of attriting (e.g., teachers just entering the profession or at the cusp of retiring). Knowing whether these teachers are indeed more responsive to salary can help inform the structuring of salary schedules or targeting of financial incentives to optimally promote teacher retention and the development of an effective educator workforce.

2.2.1 Teacher Experience

Experience is one characteristic that might shape a teacher's response to salary. Not only does experience play a central role in determining placement on a salary schedule, it also conditions many other aspects of a teacher's job including their ability to be effective with students and their working conditions. For example, less experienced teachers are often assigned to classrooms with greater student needs (Grissom et al., 2015).

Given the links between pay, working conditions, and effectiveness to turnover (Adnot et al., 2017; Feng & Sass, 2017; Hanushek et al., 2004; Ingersoll, 2001; Kraft et al., 2016), it is unsurprising that novice teachers have the highest turnover rates (Smith & Ingersoll, 2004). Thus, salary may be particularly important for offsetting the challenges teachers face in this early period, potentially leading novices to be especially responsive to salary increases (Clotfelter et al., 2011; Hanushek et al., 2004). Furthermore, novice teachers may face fundamentally different economic circumstances and opportunity costs than their more experienced peers. For one, teachers with less experience may find switching districts or professions easier, having invested less time acquiring steps on the pay ladder or contributing to a retirement plan (Fuchsman et al., 2023). Evidence also suggests that novice teachers face greater opportunity costs by remaining in education, with younger or less experienced teachers realizing larger salary increases when leaving teaching for other jobs compared to their more experienced peers who leave (Brummet et al., 2024; Han, 2021; Murnane & Olsen, 1989, 1990). Additionally, as teacher salaries have not kept pace with the escalating cost of living in many districts (Allegretto, 2022), novice teachers may acutely experience the pressures of housing unaffordability given their lower pay. Indeed, novice teachers express higher levels of anxiety about their economic circumstances which is correlated with turnover (Dizon-Ross et al., 2019).

Together, these factors suggest that less experienced teachers may be more responsive to salary increases, but limited research has examined teacher responses to salary changes across the experience continuum. In one of the few studies that examines varied responses to salary differentials between neighboring districts, Imazeki (2005) examined exits among new-to-Wisconsin teachers in the mid-1990s. She finds that teachers from districts offering higher wages for more experienced teachers had lower rates of exiting the state teaching force, but that higher relative salaries for more experienced teachers between districts also contribute to turnover (transfers and exits), particularly for female teachers. However, it is unclear how teachers with higher levels of experience may respond to similar between-district salary differentials. Hendricks (2014) investigates heterogeneity in the responsiveness of teachers to differences in base pay between districts in Texas and concludes that the effect of pay varies by experience (with novice teachers being most responsive). This study provides an important indication of the impact of salary variation under business as usual conditions, but the inclusion criteria also ultimately exclude a high proportion of districts from the analysis leading to many between district comparisons that are well beyond typical commute times. Sun et al. (2024) examine variation in teachers' responses to legislatively-induced salary funding increases in Washington State. The passage of the McCleary Act led districts to adopt salary schedule increases of varying amounts and differential front- or back-weighting. Results indicate that these salary increases reduced turnover overall, and particularly decreased mid-career cross-district mobility and late-career exit from teaching. This study provides a useful indication of how teachers differentially respond to relatively large shifts in salaries and, while informative, this is somewhat distinct from the magnitude of salary differences that teachers can often elect between when considering different district contexts within their state or region.

Findings from studies of bonus programs and incentive pay provide additional suggestive evidence that experience may differentially impact the relationship between salary and turnover decisions. Studies of bonus or loan forgiveness programs have demonstrated effectiveness when the target population is novices (Bueno & Sass, 2018; Feng & Sass, 2018), although this does not provide evidence of whether novices are differentially responsive to financial incentives. Clotfelter et al. (2008), in contrast, study a bonus program for teachers in hard-to-staff schools and find that more experienced teachers (10-19 years) had lower turnover as a result of the bonus but not other teachers. These studies, however, do not speak to the impact of the type of salary changes that might occur during regular contract renegotiations.

2.2.2 Education Level

Besides experience, the other major determinant of salary is the level of education. About half of teachers in the U.S. have a master's degree (Taie & Lewis, 2022). Although the impact of these degrees on teacher effectiveness has not been settled (Clotfelter et al., 2007; Ladd & Sorensen, 2015), they are a common feature of salary schedules for teachers across states (Roza & Miller, 2009) and are used in 90 percent of large U.S. school districts surveyed by the NCTQ (Saenz-Armstrong, 2022). Responsiveness to salary changes may vary for master's versus bachelor's degree holders, though the direction is theoretically ambiguous. Teachers with master's degrees may be in greater demand if the degree is seen as a signal of quality, facilitating cross-district movement for pay reasons. Master's degrees are also a major investment both financially and time-wise. On the one hand, teachers with master's may have more financial anxiety due to student loans that could make them more responsive to seeking out higher pay in order to pay back their debts (Dizon-Ross et al., 2019). On the other hand, an education master's may have little value outside the field, leading teachers to be more committed to the education sector and less likely to attrit even in response to salary changes (Nguyen et al., 2020). Teachers with just a bachelor's degree are paid less in general and, thus, may be more responsive to salary changes. Furthermore, master's holders have higher salaries in general and, thus, may be less responsive to salary compared to their lower paid peers with bachelor's degrees.

Previous work has examined turnover by degree status but has not reported on differences in responsiveness to salary directly by degree. However, some analyses have noted that teachers with other advanced qualifications appear to be less responsive to salary than less qualified teachers for whom salary is more highly correlated with turnover decisions (Clotfelter et al., 2011).

2.2.3 Teacher Position

Another characteristic related to both pay and turnover is whether a teacher works in general education or special education. Special education is the subject area that districts most commonly struggle to fill (Billingsley & Bettini, 2019; Goldhaber & Gratz, 2022; McVey & Trinidad, 2019; Saenz-Armstrong, 2022), and it has specific certification requirements that often require alternate or additional certifications beyond those of other subject areas (Blanton et al., 2017). An analysis of large school districts in the U.S. found that 43 percent offered financial incentives to special educators, including higher base salaries (Putnam & Gerber, 2022). Special educators often face particularly challenging working conditions, which may make salary-based incentives uniquely effective for influencing these teachers' career decisions (Billingsley & Bettini, 2019; Gilmour et al., 2024). Indeed, special educators are more likely to report dissatisfaction with working conditions than other teachers and are substantially more likely to move schools or positions (Bettini et al., 2017; Penner et al., 2023).

Thus, for this high mobility group, salary increases may matter more than for general education teachers in reducing turnover. Evidence is limited, however. Correlational analyses of salary and turnover by Boe et al. (1997) suggest a strong link between salary and turnover among special educators, but we were unable to find more recent studies on the effect of salary schedule changes on special education teachers.

As with other teacher characteristics, findings from studies of bonus programs and incentive pay provide additional suggestive evidence that special education teachers may respond differently to salary changes than general education teachers. Research on bonus programs for these teachers is mixed, with some bonus programs failing to detect significant differences for special educators (Clotfelter et al., 2008) and others suggesting special educators respond well to such incentives (Feng & Sass, 2018). A recent study of Hawai'i Public Schools' bonus program allocating annual payments of $10,000 to special educators did not reduce turnover, although it did reduce vacancies by inducing more general education teachers to move positions (Theobald et al., 2023). Thus, whether special educators respond differently to salary than their general education colleagues is an open question of relevance to policymakers.

2.3 Current Study's Contribution

Overall, while studies suggest several potential sources of heterogeneity in teachers' retention responses to salary, their contradictions and non-overlapping analyses highlight the need for systematic evidence about differences based on a variety of teachers' professional characteristics relevant to salary. In this study, we use administrative data from Oregon to estimate the extent to which base salary changes reduce teacher turnover and to investigate whether these effects are heterogeneous by teacher characteristics relevant to the structure of salary schedules.

Our study builds upon two studies mentioned previously that leverage plausibly exogenous variation to examine the relationship between base salary and turnover and how this relationship varies by teacher characteristics: Hendricks (2014) and Sun et al. (2024). Hendricks (2014) investigates heterogeneity in the responsiveness of teachers to base pay in Texas. The author finds that the effect of pay varies by experience and that teacher responsiveness to salary is uniform across subjects. However, given that these results are from Texas, where teacher turnover is higher in general (Carver-Thomas & Darling-Hammond, 2017) and teachers are unlikely to have as reliable information about future salaries due to the lack of collective bargaining rights (Northern et al., 2012), the generalizability of these results to other contexts is less clear. In contrast, Oregon is a strong-union state, in which teachers may have differential access to future salary information upon which they could make career decisions. Sun et al. (2024) examine variation in teachers' responses to legislatively-induced salary funding increases in Washington State and find that these salary increases reduced turnover overall, with a so-called U-shaped pattern across the experience spectrum: more novice and more experienced teachers were more responsive to these changes.

Importantly, neither of these studies looked at differences for special education teachers. Moreover, these studies did not investigate differences across teachers with different educational levels (i.e., BA degrees versus MA degrees). Given that these two factors are critical to how most teachers are paid, understanding whether they matter for responses to pay changes is particularly informative and a contribution the current paper seeks to make.

3 Conceptual Framework

The Burdett (1978) on-the-job-search model theorizes that employees consider both their current and future pay when making the decision to remain in a position or quit and find another, which means that teachers are hypothesized to be responsive to both their current salary and some compensation amount in the future. In the context of this study, future pay is defined as salary based on the current salary contract at the next level of experience. Unlike the actual salary these teachers would receive in the next period, future pay based on the current contract is known to teachers when they make decisions to stay or leave. Based on data from Texas, Hendricks (2014) finds that teachers are responsive to both current and future pay on the same salary schedule. Following Hendricks (2014), we also report the sum of current and future salary's effect on turnover, reflecting the Burdett

(1978) model.

Beyond the direct effect that salary has on retention, we also draw upon efficiency wage theory, which suggests that higher salaries encourage employees to enhance their effort on the job (Akerlof & Yellen, 1986; Sun et al., 2024). Given that high-quality teachers are one of the most important resources for academic outcomes (Chetty et al., 2014), a higher salary can induce teachers to improve their performance in the classroom (Biasi, 2021). While this study does not formally assess teacher quality, we acknowledge the dual benefit of increased salaries: stability (i.e., reductions in turnover) and quality. Moreover, salary increases may attract new, highly-skilled teachers to the profession (Roy, 1951).

4 Data and Measures

4.1 Analytic Dataset

This study uses administrative records from Oregon, containing all public school teachers from the 2006-07 to 2016-17 school years. The dataset is a teacher-level file that identifies teachers' years of experience, education level, full-time equivalent (FTE), base pay, district, and school affiliation, and whether they serve as a special education teacher in a given year.

We bin the data into district-by-year experience cells using the median base salary in each of these cells to construct a pseudo-salary schedule for each district in each year. We create 21 bins—one for each year of experience, ranging from the 0th (first year teaching) to the 20th year.

Because some districts in the state are relatively small, not all experience bins contain teachers each year. If we restrict our sample to districts with teachers in all experience bins in all years, we are left with a sample that represents 29 districts. Alternatively, if we leverage all the data and ignore missingness, the analytic approach we use, which we discuss in the methodology section, would be driven by extrapolated comparisons facilitated by regression adjustment rather than comparisons based on the common support of the data.

To address this missing data issue, we construct five data samples that include (or exclude) districts based on the number of experience bins that each district consistently has across all years of data. We define our samples as a percentage of the 21 bins we use to construct our measures. Specifically, the 10 percent non-missing sample requires districts to have more than two experience bins—any two experience bins—across all years of data; the 90 percent non-missing sample requires that districts have more than 18 bins across all years. We also create 25, 50, and 75 percent non-missing samples, requiring districts to have more than 5, 10, and 15 bins, respectively. Appendix Table A1 shows the representativeness of each of these samples according to enrollment and the total number of schools and districts. Ultimately, we choose the 50 percent cut sample as the base-level data set for our analysis. While the state as a whole has 196 districts, and this sample only covers 111 of those districts, it covers 97 percent of all enrolled students in the state and 90 percent of all schools.

For analyses that examine differential salary responses by degree type (i.e., BA versus MA degree) and position type (i.e., general education classroom versus special education classroom), we also construct five data samples to address missing data. However, we impose our non-missing experience bin criterion on the teacher groups that have smaller representation in the state: teachers with BA degrees and teachers in special education classrooms. We continue to privilege a 50 percent non-missing threshold. Appendix Table A2 shows that the BA versus MA 50 percent sample captures about 30 percent of all districts; however, it reflects approximately 83 percent of total enrollment. As Appendix Table A3 shows, among teachers in the general versus special education classroom sample, the 50 percent non-missing sample only represents 19 districts and 46 percent of students. Given this limitation, we acknowledge that the results for general versus special education positions generalize only to larger districts.

4.2 Measures

We define **year-over-year turnover** as the number of teachers in a district who, in the next academic year, either work in a different district in the same state or have stopped teaching in public schools in the state. Our measure does not differentiate between teachers who take non-teaching jobs in the next year and those who remain in teaching positions, as we are interested in a measure of total turnover from the district's perspective. In addition, we only use experience years 0 to 19 in our analyses, as the turnover measure requires data for years t and $t+1$; the bin for the 20th year is only used to compute next year's salary for teachers with 19 years of experience. As shown in Table 1, among teachers who leave their districts, a higher proportion exit the state rather than switch districts. And among those who switch districts, a very small percentage take a non-teaching job in their new district. This is true for the whole sample, as well as for teachers with different education levels and instructional positions; see Appendix B for descriptive statistics of the subgroups.

[Insert Table 1 about here.]

We calculate the **median salary** for each experience bin in each academic year, and convert it into real dollars based on the fiscal year 2021-22. In Table 1, we also show the median base pay for each experience year across the analysis years, as well as the turnover rate and the average number of full-time equivalent teachers in each experience-year cell across all the districts. As expected, base salary increases as experience increases, while turnover decreases with experience. As shown in Appendix Table B2 and Appendix Table B4, teachers with a master's degree have higher median earnings across the experience continuum, as do teachers in special education classrooms.

We also compute two additional salary measures for our main analyses. First, we include the **median salary for the current contract at the next experience level** to incorporate the Burdett (1978) on-the-job-search model. Second, because teachers may not only consider their salary prospects in their current districts but also salaries in neighboring districts when deciding whether to move (Hendricks, 2014; Imazeki, 2005), we elect to explicitly account for **neighboring salaries** by focusing on the closest option to their current district. To estimate the neighboring salary, we calculate the distance between each district's central office, as listed in the NCES, and every other district's central office, then assign each district a nearest neighbor. The average distance between districts is 9.91 miles; see Appendix Table C1.

5 Methodology

To address our research questions, we build upon Hendricks (2014) and estimate models where the turnover rate is a function of three salary variables: (1) the base salary in the current district, year, and experience level; (2) the base salary in the next experience bin, but in the same district and year (i.e., based on the current contract); and (3) the base salary in a neighboring district but in the same year and experience bin. We also include multiple sets of fixed effects to account for confounding factors that could bias the salary-turnover relationship. In what follows, we discuss our estimation equations for each of our analyses.

5.1 Examining the Relationship Between Salary and Turnover

To examine how changes in base salaries affect teacher turnover, we estimate the following equation:

$$T_{jte} = \beta_1 basepay_{jte} + \beta_2 basepay_{jt,e+1} + \beta_3 basepay_{ote} + \theta_{jt} + \alpha_{et} + \gamma_{je} + \epsilon_{jte}. \quad (1)$$

In Equation (1), T_{jte} is the turnover rate in district j, year t, among teachers with experience level e. The salary variables are the natural logarithm of the median current base salary, $basepay_{jte}$, and the natural logarithm of the median base salary at the next level of experience $(e + 1)$ in year t, $basepay_{jt,e+1}$. We also include a control for the natural logarithm of the median base salary in the nearest neighboring district, $basepay_{ote}$. To adjust for time-varying factors in the local labor market that affect teachers of all experience levels, we include district-by-year fixed effects, θ_{jt}. Experience-by-year fixed effects, α_{et}, adjust for experience-specific factors that vary over time and are common to all districts. Finally, we include district-by-experience fixed effects to adjust district-specific policies that apply to each experience group but are time-invariant. Throughout the analysis, we are interested in the combined effect of the parameters β_1 and β_2, corresponding to the Burdett (1978) framework.

Figure 1 provides a visual representation of the identifying variation that we use to estimate the parameters in Equation (1). Similar to Hendricks (2014), we conceptualize parameter estimation as a series of differences in conditional expectations based on the sets of fixed effects in the model.[1] In Figure 1, the vertical axis reflects one set of difference-in-differences with respect to turnover. The first set of differences reflects the change in turnover from year to the next for different experience groups—the figure shows experience groups 1 and 6 as an example. The second difference is the difference in turnover changes between teachers with 6 years of experience and 1 year of experience. On the horizontal axis we show the difference-in-differences with respect to base salary, which we show in levels—not natural logarithms—for illustrative purposes. Here, the first set of differences is the change in base salary from one year to the next for different experience groups—again, groups 1 and 6. And the second difference is the difference in salary changes between these different experience groups.

The data we plot in Figure 1 are weighted based on the sum of the number of teachers in a given experience bin across the years. Panel A shows variation between academic years 2006–07 and 2007–08—the beginning of our sample period—and Panel B shows variation between academic years 2014–15 and 2015–16—the end of our sample period. Based on the fitted line in Figure 1, we have suggestive evidence that there is a negative relationship between changes in base salary and teacher turnover; this relationship appears in both panels. The equation we actually estimate incorporates all relevant experience contrasts and adds additional salary control variables.

[1] Hendricks (2014) produces a similar figure and refers to it as a 4-diff model.

[Insert Figure 1 about here.]

5.2 Assessing Heterogeneity Between Salary and Turnover by Experience

We estimate the relationship between turnover and experience by interacting our salary variables in Equation (1), which we denote by the vector $\mathbf{salary}_{jte}$, with a vector of experience-bin indicator variables, $\mathbf{experience}_e$:

$$T_{jte} = (\mathbf{salary}_{jte} \times \mathbf{experience}_e)'\delta + \theta_{jt} + \alpha_{et} + \gamma_{je} + \epsilon_{jte}. \tag{2}$$

In Equation (2), the vector $\mathbf{salary}_{jte} \times \mathbf{experience}_e$ includes main effects and interactions between the salary variables and experience bin indicators. Because experience is co-linear with our fixed effects, we define experience bin intervals using two approaches. First, we define experience bins as three-year intervals, resulting in six bins: an interval for 0 to 2 years, 3 to 5 years, and so on, to the last bin, 16 to 19 years. Second, we define the bins in two-year intervals (e.g., 0 to 1 years) for a total of 10 experience bins.

We also use a complementary parametric approach to understand the relationship between turnover and experience. In the parametric model, we define $\mathbf{salary}_{jte} \times \mathbf{experience}_e$ as linear experience interacted with the base salary measures. The main effects of the salary measures are included, although linear experience is excluded as it is colinear with the inclusion of experience fixed effects. To adjust for the possibility of diminishing marginal returns of experience to salary, we also estimate a model that includes a quadratic term in experience.

5.3 Estimating Salary and Turnover Responses by Teacher Characteristics

For our final set of analyses, we estimate the differential base salary relationships between teacher characteristics—education level or position type—and turnover by specifying the following variation of Equation (1):

$$T_{jteg} = (\mathbf{salary}_{jteg} \times G_{jteg})'\psi + \theta_{jt} + \alpha_{et} + \gamma_{je} + \eta_{jg} + \tau_{tg} + \rho_{eg} + \epsilon_{jteg}. \tag{3}$$

In Equation (3), G_{jteg} is an indicator variable that reflects either (1) BA degree, where the reference category is MA degree or (2) special education position, where the reference category is general education for group g. Because the unit of observation includes group g, we calculate our median salary variables by group g in district j, year t, and experience group e. We also adjust for district, year, and experience factors that are specific to each group by including the following fixed effects: η_{jg}, which adjusts for time-invariant group-specific district policies; τ_{tg}, which adjusts for time-varying group-specific state policies; and ρ_{eg}, which adjusts for time-invariant group-specific state policies for experience groups.

5.4 Standard Errors and Weighting

Across each of our specifications, we estimate cluster-robust standard errors, and we weight the regressions by the number of teachers in each district-year-experience bin cell. We cluster standard errors at the district level to account for arbitrary forms of within-district serial correlation (Bertrand et al., 2004). We weight our regressions by the number of teachers in each cell for two reasons. First, we want to adjust for potential cell-size heteroskedasticity, aligning with the traditional applications of weighted least squares. Second, the weights help us identify the relationship for the average teacher in the state. If we do not weight the regression, the OLS estimator does not distinguish between large and small districts (Solon et al., 2015).

6 Results

6.1 Examining the Relationship Between Salary and Turnover

We report results that associate salary with teacher turnover in Table 2. In the table, each column reflects a different combination of fixed effects, ranging from a model that includes district, year, and experience fixed effects (column 1) to a fully saturated model that includes experience-by-year, district-by-experience, and district-by-year fixed effects (column 5), which is our preferred model and corresponds to Equation (1). Each specification includes 111 districts and 17,116 district-by-year-by-experience observations.

[Insert Table 2 about here.]

Across the five specifications in Table 2, we find that a 1 percent increase in base salary for the current year and experience level is associated with a decrease in turnover ranging from 0.14 to 0.15 percentage points. We also find no evidence that base salaries at the next experience level or in neighboring districts significantly impact turnover, after accounting for other covariates. Our preferred model in column (5) indicates a 0.14 percentage point reduction in turnover for a 1 percent increase in base salary at the same year and experience level. Despite the point estimates being relatively stable across various fixed effects models, we prefer the fully saturated model in column (5) due to its comprehensive adjustment for unobserved factors that could introduce bias.

Aligning with the Burdett (1978) on-the-job search model, we next examine the following linear combination of base salaries: $basepay_{jte} + basepay_{jt,e+1}$. In column (5), we find that a 1 percent increase in the current base salary and salary in the next experience level (but on the current contract in year t) is associated with a decrease in turnover of 0.15 percentage points. While the individual coefficient on $basepay_{jt,e+1}$ is not statistically significant alone, the combined effect is meaningfully different from zero at the 1 percent level. We privilege this combined effect, given its theoretical basis and precedent in prior work (Hendricks, 2014).

6.2 Assessing Heterogeneity Between Salary and Turnover by Experience

We report the differential response to salary changes across the experience distribution in Table 3. One notable feature of the results in Panel A and Panel B is that teachers are most responsive to salary increases in the earliest and latest stages of their careers. For example, among teachers with 0 to 2 years of experience, a 1 percent increase in base salary (i.e., the combined effect) is associated with a 0.28 percentage point reduction in turnover. At the other end of the experience distribution, a 1 percent salary increase is associated with a 0.19 percentage point reduction in turnover for teachers with 16 to 19 years of experience. Towards the middle of the distribution, however, teachers with between 12 to 15 years of experience did not appear to respond to increases in salary.

These results are consistent with previous work documenting the strong correlation between experience and teacher turnover. Scholars generally find that turnover rates display a U-shaped pattern: the highest rates are observed among both novice and highly experienced teachers (Grissom et al., 2016; Papay et al., 2017; Redding & Henry, 2019; Sullivan et al., 2017). The fact that we find a similar pattern with *responsiveness* to pay across the experience distribution suggests that the U-shape in turnover rates by experience may, in part, be due to the increased responsiveness to pay that both novice and veteran teachers evidence.

We also estimate flexible linear specifications of the relationship between salary and turnover, moderated by experience, in Table 3. In Model 2, we find that a 1 percent increase in base pay is associated with a 0.27 percentage point decrease in turnover among the most novice teachers. This effect size is similar in magnitude to those reported for novice teachers in panels A and B. Qualitatively, these results also align with the observed U-shaped pattern of turnover responsiveness in the experience bin models. The turning point of the linear specification occurs at 12.4 years of experience.

[Insert Table 3 about here.]

6.3 Estimating Salary and Turnover Responses by Teacher Characteristics

We present turnover by teacher characteristics in Table 4. As discussed in the data section, we restricted our sample to districts that had at least 10 experience bins among BA and MA degree teachers (Model 1) and among teachers in general education and special education classrooms (Model 2). The BA versus MA contrast consists of 57 districts and the comparison between general education and special education teachers consists of only 18 districts. The districts we include in this heterogeneity analysis reflect some of the largest districts in the state.

Our analysis reveals that teachers with BA and MA degrees respond similarly to salary increases. Among BA teachers, a 1 percent increase in the combined effect of base salary is associated with a turnover reduction of 0.17 percentage points. The corresponding turnover reduction point estimate among MA teachers is 0.20 percentage points. When we tested the equality of the coefficients, we found no evidence that they were statistically different from each other at conventional levels.

Unlike teachers with BA and MA degrees, we find differential responses to salary increases among teachers in general education classrooms and special education classrooms. We find that a 1 percent increase in the combined effect of base salary is associated with a turnover reduction of 0.13 percentage points in general education classrooms, although this point estimate is not statistically significant. Among teachers in special education classrooms, we observe a more substantial decrease of 0.36 percentage points. These combined effect coefficients are statistically different from each other at the 5 percent significance level.

[Insert Table 4 about here.]

7 Robustness Checks

In this section, we discuss the robustness of our results to teachers' political influence, alternative sample restrictions, measurement error, and weighting. We report all tables in Appendix D: Robustness Checks.

7.1 Assessing teachers' political influence

Because Oregon allows collective bargaining, it is possible that teachers with substantial representation in a given experience bin might influence salary negotiations. If this were to occur, our salary variables would be endogenous to teachers' political influence, and our estimates would reflect a spurious negative relationship. To address this concern, we include a variable that represents the share of teachers in each experience bin by district and year, as suggested by Hendricks (2014). If teachers have influence over salary negotiations, we would expect our estimates to change. As we show in Appendix Table D1, we find that the share of teachers in the district-year-experience bin is statistically insignificant. In addition, our point estimates are qualitatively similar. The coefficient on the combined salary effect with the political influence regressor is -14.3 and without the regressor is -14.4.

7.2 Sample restrictions based on experience bins

As discussed in the data section, we privilege data files that consistently have teachers' salary data available in more than half of the experience bins across all the years of data in our sample (i.e., the 50 percent cut sample). In Appendix Table D2, we assess how our results change when applying different sample restrictions. We show results for 10, 25, 50, 75, and 90 percent sample cuts. Column 3 provides the benchmark 50 percent cut that we use in Table 2.

Across all sample restrictions, the combined effect of teacher pay remains statistically significant, ranging from -0.12 to -0.21 percentage point decreases in turnover for a 1 percent increase in salary. Column 3 reflects the median estimate. What we observe is that requiring more experience bins is associated with larger point estimates. However, this pattern is not surprising. For example, requiring that 90 percent of experience bins across all years represents only 60 districts, or 30 percent of all districts in the state. The larger point estimates suggest that teachers in larger districts are more responsive to salary increases than teachers from a sample in which more districts and smaller districts are included.

7.3 Assessing measurement error

Because we use the median salary in each experience bin, there may be some cells in which this median is based on few teachers. Salary based on small cell sizes warrants a discussion of measurement error. If we assume classical measurement error, our estimates would be biased toward zero. To assess attenuation bias, we place cell size restrictions on the experience bins from the 50 percent cut sample based on all teachers. Appendix Table D3 shows that our combined effect of salary on turnover is stable across two restrictions: requiring a minimum of 5 teachers (column 2) and a minimum of 10 teachers (column 3). We find that a 1 percent increase in salary is associated with a 0.146 percentage point decrease in turnover. This combined effect is marginally smaller in absolute value than our benchmark result in column (1), which is the opposite of what we would expect if measurement error was biasing the results. Notably, these restrictions shrink our estimation sample. Requiring a minimum of 5 teachers in each experience bin reduces our estimation by 47 percent; requiring at least 10 teachers reduces the sample by 73 percent.

7.4 Assessing the role of weighting

In order to improve the precision of our estimates, we weight all our regressions by the number of teachers in each cell. As described in the data section, this not only adjusts for potential cell-size heteroskedasticity but also helps us identify the relationship between salary and turnover for the average teacher in the state because of differences in district size. In Appendix Table D4 we assess how our results change when we do not weight our regression in Equation (1). As shown in column 2, we obtain a smaller point estimate in absolute value and the standard error is also larger. We hypothesize that the lack of statistical significance is likely due to cell-size heteroskedasticity. Moreover, the smaller point estimate reflects that larger districts and smaller districts receive equal weight in the regression, no longer reflecting a point estimate for the average teacher in the state.

Appendix Table D5 shows the unweighted results of the regression described in Equation (2), which describes the differential response to salary changes across the experience distribution. These results follow a similar pattern to the weighted results presented in Table 3. The results in Panel A and Panel B indicate that teachers are most responsive to salary increases in the early stages of their careers and in the later stages. Towards the middle of the distribution, however, teachers with between 12 to 15 years of experience did not appear to respond to increases in salary in both the weighted and unweighted regressions. One important difference is that teachers with 3 to 5 years of experience were statistically significantly responsive to salary changes in the weighted regression results, but the unweighted results for this group showed no statistically significant evidence of responsiveness.

Appendix Table D6 provides the unweighted results of the regression described in Equation (3). Similar to the weighted results presented in Table 4, we find that turnover rates between teachers with BA and MA degrees are not statistically different from each other at conventional statistical levels, but that special education teachers are more responsive to salary increases than general education teachers.

8 Discussion

Similar to Hendricks (2014), we find that teacher pay significantly reduces turnover. In full-sample results, Hendricks (2014) estimates that a 1 percent increase in teacher pay leads to a 0.16 percentage point reduction in turnover, while we predict a reduction of 1.4 percentage points. One notable difference between the two studies is that we do not find that future pay at the next experience level based on the current contract predicts a reduction in turnover. This suggests that teachers in Oregon exhibit a present-oriented bias when it comes to their pay. They rely more on current salaries when making decisions to either stay in the profession or move to another district.

While much previous work documents the effect of pay incentives, like performance pay (Adnot et al., 2017; Cohodes et al., 2023; Hanushek et al., 2023), on turnover, these kinds of incentives are not the predominant factor structuring how teachers are paid across the country (Taie & Lewis, 2022). Years of experience, levels of education and, increasingly, whether a teacher works in special education (Sheehy, 2024), largely determine how much money teachers will make in a given district. By analyzing heterogeneity in responsiveness to salary based on these factors, our results have implications for how policymakers might seek to target pay *within* existing structures to better retain teachers. Moreover, how many years of experience to acquire in a given district, whether to pursue an advanced degree, and whether to teach in special education, are all within a teacher's control, meaning salary schedules that incentivize these factors might stand to influence teacher behavior.

Based on our results that examine turnover across the experience distribution, we find that salary increases are most effective for novice and highly experienced teachers. The U-shaped pattern in responsiveness to pay that we observe is similar to the U-shaped pattern in overall turnover rates documented across many previous studies with the highest turnover rates observed among novice and late-career educators (Grissom et al., 2016; Papay et al., 2017; Redding & Henry, 2019; Sullivan et al., 2017). That the highest turnover groups are also the most responsive to pay suggests that salary may be better able to influence the marginal teacher in these groups with excess turnover. As previous literature demonstrates, higher turnover rates among novice teachers are attributed to factors like assignment to more challenging classrooms, fewer job protections, and a lack of professional support (Bruno et al., 2020; Goldhaber & Theobald, 2013; Kraft et al., 2016; Rogers & Doan, 2019). Among more experienced teachers, pension rules that make teachers eligible for retirement at a relatively young age and offer incentives for early retirement are often cited as reasons for turnover among veteran teachers (Costrell & Podgursky, 2009; Furgeson et al., 2006). Strategically targeting additional pay to novice teachers may offset some of the challenging aspects of being an early career teacher, and targeting additional pay to more veteran teachers may incentivize them to stay in the workforce longer, depending on pension rules, reducing turnover among the marginal teacher in these groups. Furthermore, to the extent that teachers of color and more experienced teachers have an outsized effect on student outcomes (Chetty et al., 2011; Gershenson et al., 2022), targeting pay to improve retention among novices, who are more racially diverse, and experienced teachers may positively impact students.

Our work adds to a body of literature that examines the relationship between teachers' educational background and their turnover, providing to our knowledge the first examination of responsiveness to pay by education level. In certain contexts, studies have found that teachers with graduate degrees exhibit marginally higher turnover rates than their counterparts with bachelor's degrees (Marinell & Coca, 2013; Rockoff et al., 2011), suggesting that teachers with advanced degrees may have greater opportunities for employment outside of teaching. Nonetheless, a recent meta-analysis synthesizing these studies found no substantial differences in turnover rates between teachers with graduate and bachelor's degrees (Nguyen et al., 2020). Here, too, we do not find differences between teachers holding different degrees, suggesting that the similarity in turnover rates between groups may, in part, be due to the fact that neither is more responsive to salary changes than the other.

Importantly, we provide evidence on the responsiveness of special educators to pay in particular. Since the passage of IDEA in 1975, schools have persistently struggled to staff special education roles, in part due to high levels of turnover among these educators (Billingsley & Bettini, 2019; Cowan et al., 2016; Goldhaber et al., 2022). In Oregon, for example, Penner et al. (2023) document that in the same time period as the panel in this study (2007-2017), the turnover rate for special education teachers was on average 27 percent annually while it was 18 percent for general education teachers. Similar dynamics elsewhere have prompted schools in other parts of the country to respond with increased pay in order to reduce attrition and alleviate shortages (Sheehy, 2024; Theobald et al., 2023). Our results suggest that these strategies may prove successful at influencing special educator turnover (e.g., Gilmour et al., 2024).

As noted previously, however, in studying a $10,000 bonus program in Hawai'i Public Schools, Theobald et al. (2023) did not find reductions in special educator turnover despite a substantial incentive (an approximately 20% increase on beginning teacher salaries). In contrast, our results suggest that a 10% increase in salary reduces special educator turnover by 4.1 percentage points. One possible reason could be that Theobald et al. (2023) consider whether or not teachers exit the state's teaching workforce whereas we consider both exit and movement between districts. In Oregon, special education teachers and general education teachers have similar exit rates, with the increased turnover among special educators driven by higher mobility between schools (Penner et al., 2023).

This suggests that there might be a greater margin for salaries to make a difference on movement between districts in Oregon in a way that is not the case in Hawai'i where there is a singular state education system. Furthermore, in our analytic approach, we compare special education teachers at different experience levels within a district whereas Theobald et al. (2023) utilize general education teachers as the comparison group which could lead to differences in estimated effects. The findings here add to an overall mixed picture about the effect of pay on special educator retention (Clotfelter et al., 2008; Feng & Sass, 2018). An important task for future research is to clarify the conditions under which compensation is likely to influence turnover rates for special education teachers while paying attention to how different analytic approaches might influence these estimates.

While the present study makes several contributions, there are also some limitations to note. For one, even though the series of fixed effects we include eliminate many sources of confounding that could bias the salary-turnover relationships we estimate, there is not random assignment of salaries to allow for purely causal estimates. Specifically, inference here could be threatened by other unobserved changes that occur at a specific experience bin within a district at the exact same time that salary changes occur at that experience level. For example, this correlation could arise if a district newly adopts a policy of giving teachers with 19 years of experience more desirable classroom assignments at the same time that they increase pay for that experience group. Though such unobserved correlations are possible, we do not believe them likely to drive the results.

Another limitation is the representativeness of the results. By the nature of the analysis we exclude smaller, more rural districts with fewer teachers because they do not fill up the experience bins, meaning the results may not generalize to these contexts. This is particularly the case for special education teachers where the number of districts in our estimation sample is much smaller. Further, given that the study occurs in a single state, the findings may not completely represent dynamics occurring across the country, though encouragingly the results are similar to Texas which is a very different state context

(Hendricks, 2014).

Finally, the results here leverage idiosyncratic changes to pay at different experience levels to estimate the effect of salary on turnover. As such, if districts were to announce broader changes to salary schedules, like making the schedule more flat overall to recruit and retain more novices, it is unclear whether the effects would be the same. Future research should examine how specific changes to the structure of salary schedules targeted towards certain teachers affect turnover.

9 Conclusion

Amidst historic declines in teacher satisfaction and retention (Goldhaber & Theobald, 2023; Kraft & Lyon, 2022), renewed attention has been brought to teacher salaries, culminating in calls for the federal government to guarantee a $60,000 starting salary across the country (Stanford, 2023). Thus, understanding the influence of salary on teachers' career decisions is critical for evaluating the likely efficacy of such proposals. While some have questioned the centrality of teacher salaries in labor supply decisions (Lovison & Mo, 2022), research in a variety of contexts has demonstrated a link between salary and retention (Hendricks, 2014; Nguyen et al., 2020; Sun et al., 2024).

To this literature, we provide additional evidence that district salary increases—not nearby district increases—lead to meaningful reductions in turnover in Oregon. We find that a 10 percent increase in salary is associated with a 1.5 percentage point decrease in turnover. However, this relationship between salary and turnover is not the same at all experience levels. Novice teachers and teachers with 16 to 19 years of experience are more responsive to salary increases than teachers in the middle of the experience distribution.

In our restrictive analyses, we also examined turnover heterogeneity by factors that are not only central to salary schedule construction across districts but also squarely under teachers' control should they seek higher pay: educational attainment (BA versus MA) and instructional position (general education versus special education). We find that a 1 percent increase in salary is associated with a 0.17 percentage point decrease in turnover among BA teachers and a 0.2 percentage point decrease among MA teachers. These point estimates are not statistically different from each other. In our most restrictive sample, we found that special education teachers respond more to salary increases than general education teachers. A 1 percent increase in salary is associated with a 0.36 percentage point decrease in turnover among special education teachers and a 0.13 percentage point decrease (not statistically significant) among general education teachers. This difference between these two point estimates is statistically significant. Together with the experience analysis, these findings suggest, encouragingly, that the highest turnover groups that districts might hope to influence through compensation (novices and special educators) are likely the most responsive to efforts to increase their salaries.

These analyses provide evidence that year-to-year salary increases within regular salary schedules stand to meaningfully influence the turnover decisions of teachers. This is particularly important given that many studies of pay and turnover examine contexts where major policy reforms occurred to result in compensation changes (Biasi, 2021; Hanushek et al., 2023; Sun et al., 2024; Theobald et al., 2023). By relying on variation that occurs across districts over time, however, we provide evidence on how salary changes pursued by districts under more "business-as-usual" conditions influence teacher turnover. Further, we extend the work of Hendricks (2014) by studying a more strongly unionized state where teachers are more likely to have information about their current and future salaries. Despite being different contexts with dramatically different educational policy environments, teacher workforces, and student demographics, we estimate a remarkably similar relationship between salary changes and turnover in Oregon as Hendricks (2014) finds in Texas. Thus, our work affirms a long line of past research demonstrating the centrality of pay to teacher turnover and, by highlighting which teachers are most responsive to pay, has implications for policymakers seeking to use salary as a tool to retain the educators schools may struggle most to keep.

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Tables

Table 1

Descriptive statistics

Experience	Total Turnover (%)	Exit OR (%)	Switch District (%)	Take Non-Teaching Job in Other District (%)	Real Base Pay (FY22=100)	Number of Teachers (FTE)
0	24.54	16.64	7.90	0.37	45,865	9.54
1	19.72	12.80	6.93	0.43	47,652	9.61
2	15.45	9.19	6.25	0.11	49,484	9.79
3	14.01	8.94	5.06	0.29	51,609	9.98
4	13.03	8.58	4.45	0.22	53,337	9.82
5	11.56	7.37	4.20	0.56	55,391	9.85
6	11.42	7.51	3.91	0.55	57,258	9.79
7	10.08	6.59	3.50	0.48	59,406	9.92
8	9.35	5.95	3.39	0.49	61,470	9.75
9	9.51	5.68	3.83	0.63	63,477	9.28
10	9.37	6.05	3.32	0.39	65,234	8.81
11	7.54	4.58	2.95	0.49	67,414	8.21
12	7.89	5.19	2.69	0.56	69,198	7.68
13	6.73	4.28	2.45	0.42	71,249	7.16
14	7.28	5.14	2.14	0.46	72,845	6.95
15	6.72	5.02	1.70	0.21	74,138	6.62
16	6.65	4.97	1.68	0.42	74,951	6.34
17	5.08	4.19	0.88	0.09	75,573	5.94
18	7.12	5.96	1.17	0.36	76,061	5.62
19	6.84	6.01	0.84	0.20	76,238	5.19
20					76,191	5.01

Notes: Descriptive statistics in this table are based on the analytic sample that requires more than 10 experience bins in each district across all years (that is, the 50 percent cut-off sample). Total turnover is defined as the percentage of teachers exiting the state or switching districts. Within the total turnover category, some teachers exit the state and others switch districts. Within the group that switch districts, a small percent switch to non-teaching jobs, as shown in column 5. Column 6 reports the median base pay across all teachers in this experience group across all years. Column 7 reports the mean number of teachers in the experience bin across all districts and years.

Table 2

Association Between Turnover Rates and Salary, All Teachers

	(1)	(2)	(3)	(4)	(5)
$basepay_{jte}$	-14.4***	-13.5***	-15.0**	-14.7***	-14.4**
	(3.71)	(3.62)	(4.68)	(3.90)	(5.18)
$basepay_{jt,e+1}$	0.91	1.04	0.0061	0.42	-0.80
	(1.43)	(1.47)	(1.22)	(1.39)	(1.15)
$basepay_{ote}$	0.93	1.70	0.52	1.28	2.03
	(1.44)	(1.51)	(1.38)	(1.30)	(1.24)
Combined Effect:					
$basepay_{jte} + basepay_{jt,e+1}$	-13.5***	-12.5***	-15.0**	-14.3***	-15.2**
	(2.99)	(2.90)	(4.55)	(3.10)	(5.45)
District FEs	X	X			
Year FEs	X		X		
Experience FEs	X			X	
Exper. by year FEs		X			X
Dist. by Exper. FEs			X		X
Dist. by year FEs				X	X
R^2	0.21	0.22	0.30	0.31	0.42
N. Districts	111	111	111	111	111
N. Obs	17116	17116	17116	17116	17116

Notes: This table reports estimates of Equation (1), allowing for different combinations of fixed effects. The preferred specification is model (5). The combined effect is the sum of the coefficients on $basepay_{jte}$ and $basepay_{jt,e+1}$. Standard errors, reported in parentheses, are clustered at the district level. The number of observations is the number of district-by-year-by-experience observations. The results are weighted by the number of teachers in each district-by-year-by-experience cell. The sample is restricted to districts that have at least 10 of 20 experience bins across all years in the sample. Statistical significance: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3

Turnover and teacher pay, heterogeneity by experience

Experience Bin Models	$basepay_{jte} + basepay_{jt,e+1}$	$basepay_{ote}$
A. Specification 1: 6 Experience Bins		
0 to 2	-28.1***	1.52
	(7.86)	(4.25)
3 to 5	-21.0**	4.80
	(7.45)	(6.79)
6 to 8	-26.5***	-3.17
	(7.94)	(7.63)
9 to 11	-17.1*	7.51
	(7.24)	(5.81)
12 to 15	-1.25	-0.22
	(2.86)	(4.44)
16 to 19	-18.5**	3.86
	(6.81)	(6.09)
B. Specification 2: 10 Experience Bins		
0 to 1	-26.0**	2.76
	(9.71)	(4.55)
2 to 3	-32.9**	-1.27
	(10.5)	(7.85)
4 to 5	-17.3+	1.76
	(9.37)	(7.82)
6 to 7	-27.3***	-8.24
	(7.51)	(8.01)
8 to 9	-30.3**	-2.47
	(9.74)	(8.59)
10 to 11	-10.5	12.6+
	(8.42)	(6.52)
12 to 13	0.074	-1.80
	(1.87)	(4.61)
14 to 15	-8.62	2.43
	(8.66)	(7.66)
16 to 17	-14.5+	5.36
	(7.85)	(7.19)
18 to 19	-20.9*	0.023
	(8.95)	(7.21)
Flexible Experience Models	Model 1	Model 2
C. Linear and Quadratic Experience		
$basepay_{jte} + basepay_{jt,e+1}$	-24.0***	-27.4**
	(6.01)	(8.43)
$(basepay_{jte} + basepay_{jt,e+1}) \times experience_e$	1.14*	3.24+
	(0.58)	(1.88)
$(basepay_{jte} + basepay_{jt,e+1}) \times experience_e^2$		-0.13
		(0.095)
N. Observations: All Specifications	17116	

Notes: The dependent variable is the teacher turnover rate for teachers with experience e in district j in year t. All models include district-by-year FEs, experience-by-year FEs, and experience-by-district FEs. Panels A and B interact $basepay_{jte}$, $basepay_{jt,e+1}$, and $basepay_{ote}$ with experience bin dummy variables. We report the combined effect: $basepay_{jte} + basepay_{jt,e+1}$. Standard errors, reported in parentheses, are clustered at the district level. The results are weighted by the number of teachers in each district-by-year-by-experience cell. The sample is restricted to districts that have at least 10 of 20 experience bins across all years in the sample. Statistical significance: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 4

Teacher Characteristics

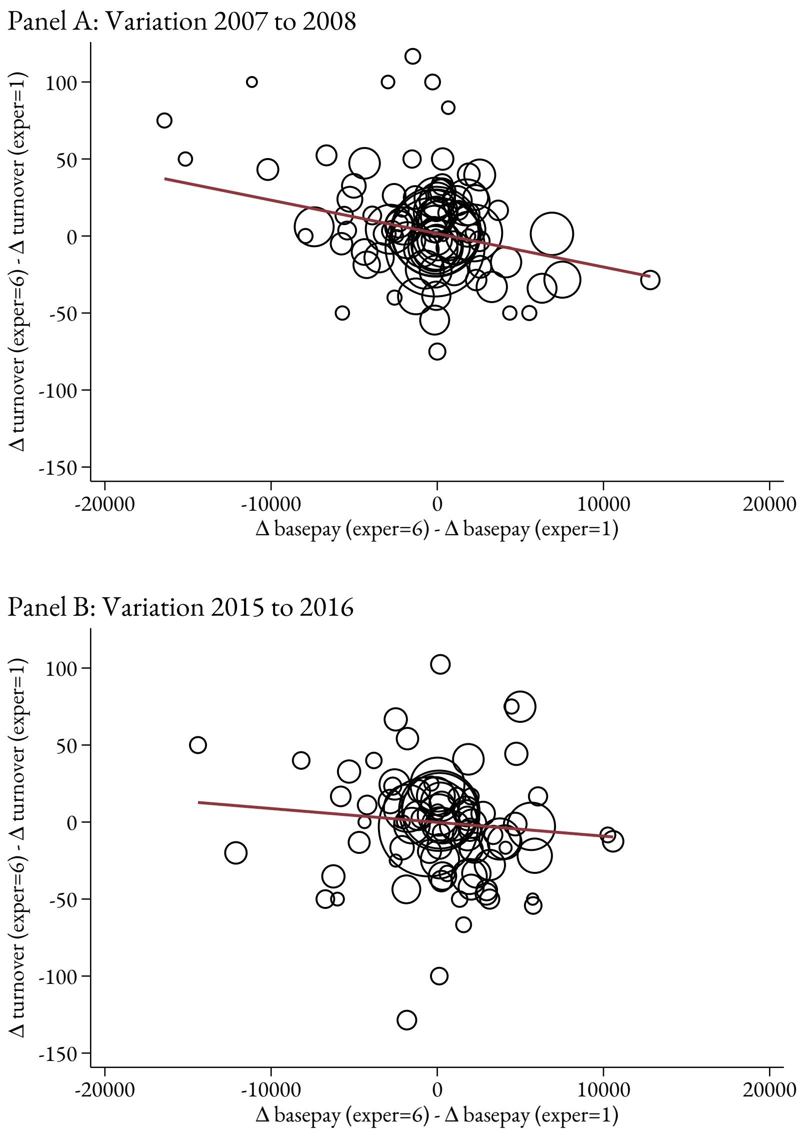
	Model 1: Degree		Model 2: Position	
	BA	MA	General Ed.	Special Ed.
$basepay_{jte}$	-16.1***	-22.4***	-19.4**	-40.7***
	(2.66)	(4.48)	(6.65)	(8.19)
$basepay_{jt,e+1}$	-0.61	2.25	6.44	5.14
	(2.21)	(3.66)	(4.49)	(5.84)
$basepay_{ote}$	0.42	5.92+	0.56	-1.13
	(1.65)	(3.45)	(5.63)	(2.80)
Combined Effect:				
$basepay_{jte} + basepay_{jt,e+1}$	-16.7***	-20.2***	-13.0	-35.6***
	(3.21)	(5.65)	(9.25)	(10.4)
p-value: Combined effects equal	0.50		0.03	
p-value: Outside dist. effects equal	0.12		0.80	
R^2	0.31		0.39	
N. Districts	57		18	
N. Obs.	17727		5566	

Notes: The dependent variable is the teacher turnover rate for teachers with experience e in district j in year t. All models include district-by-year FEs, experience-by-year FEs, experience-by-district FEs, characteristic-by-year FEs, characteristic-by-district FEs, and characteristic-by-experience FEs. We report the combined effect: $basepay_{jte} + basepay_{jt,e+1}$. Standard errors, reported in parentheses, are clustered at the district level. The results are weighted by the number of teachers in each district-by-year-by-experience cell. The sample is restricted to districts that have at least 10 of 20 experience bins across all years in the sample. Statistical significance: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figures

Figure 1

Illustrating Identifying Variation in Turnover and Salary to Estimate Model Parameters



Appendix A

Non-Missingness Statistics based on Sample Cuts

We report non-missingness for the the all teachers sample in Appendix Table A1. If we were to require that all experience bins are defined across all years (see the "No Missingness" column), then we would only capture about 57 percent of enrollment, on average, across all districts and years. Moreover, we would only represent less than 15 percent of all districts. By leveraging the 50 percent cut, we capture almost 97 percent of enrollment in the state and close to 57 percent of school districts (110 of 196 total districts), on average. In terms of generalizability, this suggests that the 85 districts we are not capturing are small districts with low enrollment.

When we impose the 50 percent cut rule to our BA versus MA sample (Appendix Table A2) and the general education teacher versus special education teacher sample (Appendix Table A3), we note that there is lower coverage in terms of enrollment and the number of districts. As Appendix Table A2 shows, we have slightly fewer students, on average, and two fewer districts for the BA versus MA sample. We capture about 83 percent of enrollment and 29 percent of districts. The general education versus special education data sample result in an even smaller count. We obtain about 46 percent of enrollment and 11 percent of the 166 districts in this sample (or 18 districts).

Table A1

All Teachers Data File: Non-Missingness Statistics by Enrollment, Schools, and Districts

	Mean Count	Percent of non-missingness relative to count across all years					
	Across All Years	10% cut	25% cut	50% cut	75% cut	90% cut	No Missingness
Enrollment	557,555	99.6	98.9	96.5	91.1	84.0	57.3
Schools	1,450	97.4	94.9	89.8	82.5	73.8	48.8
Districts	196	84.7	74.5	56.6	41.3	30.6	14.8

Notes: The mean count across all years reports the average count of enrollment, the average number of schools, and the average number of districts across all sample years, 2007 to 2017. The remaining columns report shares of these counts for each of the sample cuts. The 10 percent cut requires that districts have more than 2 experience bins across all years. The 25, 50, 75, and 90 percent cuts require that districts have more than 5, 10, 15, and 18 experience bins, respectively. The no missingness columns require that all experience bins are defined across all years.

Table A2

BA vs. MA Data File: Non-Missingness Statistics by Enrollment, Schools, and Districts

	Mean Count	Percent of non-missingness relative to count across all years					
	Across All Years	10% cut	25% cut	50% cut	75% cut	90% cut	No Missingness
Enrollment	557,527	96.9	91.5	82.9	65.1	41.1	15.3
Schools	1,448	91.2	83.9	72.6	53.2	32.1	12.9
Districts	194	63.4	45.9	29.4	15.5	5.7	1.0

Notes: The mean count across all years reports the average count of enrollment, the average number of schools, and the average number of districts across all sample years, 2007 to 2017. The remaining columns report shares of these counts for each of the sample cuts. The 10 percent cut requires that districts have more than 2 experience bins across all years. The 25, 50, 75, and 90 percent cuts require that districts have more than 5, 10, 15, and 18 experience bins, respectively. The no missingness columns require that all experience bins are defined across all years.

Table A3

General Education vs. Special Education Teacher Data File: Non-Missingness Statistics by Enrollment, Schools, and Districts

	Mean Count	Percent of non-missingness relative to count across all years					
	Across All Years	10% cut	25% cut	50% cut	75% cut	90% cut	No Missingness
Enrollment	555,107	89.5	71.3	46.2	31.8	18.9	8.2
Schools	1,412	82.5	65.5	40.2	26.2	15.1	8.4
Districts	166	45.8	30.1	10.8	4.8	1.8	0.6

Notes: The mean count across all years reports the average count of enrollment, the average number of schools, and the average number of districts across all sample years, 2007 to 2017. The remaining columns report shares of these counts for each of the sample cuts. The 10 percent cut requires that districts have more than 2 experience bins across all years. The 25, 50, 75, and 90 percent cuts require that districts have more than 5, 10, 15, and 18 experience bins, respectively. The no missingness columns require that all experience bins are defined across all years.

Appendix B

Descriptive Statistics for Subsamples

In this appendix, we provide summary statistics for each of the subsamples on which we conduct our analyses. Table B1 and Table B2 describe the BA-degree and the MA-degree subsamples, respectively. Table B3 and Table B4 describe teachers that have general education positions and special education positions, respectively.

Table B1

Descriptive statistics for BA-degree subsample

Experience	Total Turnover (%)	Exit OR (%)	Switch District (%)	Take Non-Teaching Job in Other District (%)	Real Base Pay (FY22=100)	Number of Teachers (FTE)
0	24.17	17.06	7.11	0.34	43,274	5.51
1	17.17	12.13	5.04	0.13	44,989	4.69
2	15.93	11.43	4.50	0.04	46,990	4.56
3	12.87	9.15	3.71	0.25	49,243	4.26
4	13.71	9.85	3.86	0.25	51,249	3.80
5	10.80	8.12	2.68	0.06	53,241	3.61
6	11.05	8.62	2.43	0.14	55,701	3.42
7	10.53	8.17	2.35	0.34	58,117	3.40
8	8.69	6.19	2.50	0.25	60,348	3.36
9	6.96	5.05	1.90	0.10	62,622	3.32
10	7.59	5.78	1.81	0.17	64,417	3.31
11	6.10	4.98	1.12	0.08	66,576	3.41
12	6.19	5.12	1.07	0.21	68,890	3.41
13	5.12	4.33	0.79	0.03	69,927	3.39
14	6.83	5.90	0.93	0.30	71,604	3.51
15	7.11	6.37	0.74	0.13	72,674	3.68
16	6.82	5.79	1.03	0.33	74,323	3.86
17	4.28	3.75	0.53	0.08	75,165	3.86
18	5.99	5.20	0.79	0.25	75,512	3.84
19	6.44	5.67	0.77	0.25	75,541	3.71
20					75,636	3.68

Notes: Descriptive statistics in this table are based on the analytic sample that requires more than 10 experience bins in each district across all years (that is, the 50 percent cut-off sample). Total turnover is defined as the percentage of teachers exiting the state or switching districts. Within the total turnover category, some teachers exit the state and others switch districts. Within the group that switch districts, a small percent switch to non-teaching jobs, as shown in column 5. Column 6 reports the median base pay across all teachers in this experience group across all years. Column 7 reports the mean number of teachers in the experience bin across all districts and years.

Table B2

Descriptive statistics for MA-degree subsample

Experience	Total Turnover (%)	Exit OR (%)	Switch District (%)	Take Non-Teaching Job in Other District (%)	Real Base Pay (FY22=100)	Number of Teachers (FTE)
0	24.39	16.49	7.90	0.27	48,113	10.26
1	17.95	11.27	6.68	0.42	49,813	11.07
2	14.80	8.66	6.14	0.18	51,606	11.66
3	12.25	7.87	4.38	0.35	53,389	12.35
4	12.85	8.26	4.58	0.32	55,370	12.61
5	11.06	7.37	3.69	0.50	57,444	12.89
6	10.61	6.96	3.66	0.48	59,581	12.95
7	9.53	6.35	3.19	0.46	61,562	13.25
8	8.74	5.48	3.26	0.56	63,830	13.07
9	7.94	5.09	2.86	0.50	65,694	12.34
10	7.50	5.10	2.40	0.47	68,002	11.53
11	7.51	4.79	2.71	0.80	70,142	10.53
12	6.26	4.15	2.11	0.52	72,519	9.60
13	6.22	4.21	2.01	0.54	74,834	8.74
14	7.10	4.79	2.31	0.42	76,715	8.17
15	6.80	4.73	2.07	0.26	78,567	7.48
16	6.17	4.56	1.60	0.51	79,961	6.72
17	4.54	3.43	1.11	0.27	80,500	6.10
18	6.78	5.35	1.43	0.54	80,718	5.49
19	5.85	5.02	0.82	0.19	80,820	4.85
20					81,582	4.59

Notes: Descriptive statistics in this table are based on the analytic sample that requires more than 10 experience bins in each district across all years (that is, the 50 percent cut-off sample). Total turnover is defined as the percentage of teachers exiting the state or switching districts. Within the total turnover category, some teachers exit the state and others switch districts. Within the group that switch districts, a small percent switch to non-teaching jobs, as shown in column 5. Column 6 reports the median base pay across all teachers in this experience group across all years. Column 7 reports the mean number of teachers in the experience bin across all districts and years.

Table B3

Descriptive statistics for general education teacher position subsample

Experience	Total Turnover (%)	Exit OR (%)	Switch District (%)	Take Non-Teaching Job in Other District (%)	Real Base Pay (FY22=100)	Number of Teachers (FTE)
0	24.49	18.38	6.11	0.32	48,813	22.51
1	17.32	11.98	5.34	0.43	50,962	22.06
2	14.13	8.66	5.47	0.15	52,902	23.33
3	11.19	8.04	3.15	0.34	55,012	24.66
4	10.25	7.61	2.64	0.25	56,718	24.73
5	9.27	7.02	2.25	0.33	59,261	25.52
6	9.04	6.30	2.73	0.56	61,405	25.29
7	7.20	5.61	1.60	0.50	63,566	26.43
8	6.42	4.89	1.52	0.26	66,078	26.27
9	6.40	4.71	1.69	0.51	68,133	25.35
10	5.80	4.10	1.70	0.29	70,531	24.01
11	4.49	3.30	1.19	0.29	73,108	22.81
12	6.02	4.57	1.45	0.19	75,673	21.26
13	4.49	3.44	1.05	0.44	78,589	19.62
14	5.68	4.80	0.88	0.40	81,006	18.95
15	5.51	4.24	1.27	0.18	82,301	18.52
16	5.29	4.30	0.99	0.13	82,018	17.23
17	4.07	3.52	0.55	0.22	83,023	16.11
18	5.85	5.09	0.76	0.39	83,330	14.94
19	5.75	5.24	0.51	0.10	83,276	13.79
20					83,594	13.29

Notes: Descriptive statistics in this table are based on the analytic sample that requires more than 10 experience bins in each district across all years (that is, the 50 percent cut-off sample). Total turnover is defined as the percentage of teachers exiting the state or switching districts. Within the total turnover category, some teachers exit the state and others switch districts. Within the group that switch districts, a small percent switch to non-teaching jobs, as shown in column 5. Column 6 reports the median base pay across all teachers in this experience group across all years. Column 7 reports the mean number of teachers in the experience bin across all districts and years.

Table B4

Descriptive statistics for special education teacher position subsample

Experience	Total Turnover (%)	Exit OR (%)	Switch District (%)	Take Non-Teaching Job in Other District (%)	Real Base Pay (FY22=100)	Number of Teachers (FTE)
0	20.12	10.08	10.03	0.89	48,688	3.29
1	13.76	8.01	5.75	0.28	51,568	3.73
2	13.19	8.44	4.74	0.00	53,679	3.89
3	12.15	7.69	4.46	0.85	55,674	4.08
4	11.45	6.90	4.55	0.72	57,671	4.06
5	8.40	5.82	2.58	0.40	59,307	4.03
6	9.62	6.33	3.29	1.12	61,943	3.81
7	10.38	7.67	2.70	0.79	63,238	3.66
8	8.06	5.99	2.07	0.79	66,191	3.63
9	11.12	6.56	4.56	1.63	68,263	3.32
10	12.49	9.51	2.98	0.49	70,662	3.12
11	8.90	4.90	4.00	0.93	72,731	2.77
12	6.31	4.39	1.92	0.00	75,159	2.41
13	12.48	8.66	3.82	0.21	78,292	2.37
14	9.74	8.19	1.55	0.00	80,367	2.18
15	8.28	6.62	1.66	0.07	80,679	1.90
16	6.03	5.87	0.16	0.00	81,501	1.73
17	10.26	7.38	2.89	0.28	82,934	1.59
18	6.58	5.25	1.33	0.00	83,180	1.47
19	9.40	8.05	1.35	0.00	84,114	1.26
20					83,276	1.17

Notes: Descriptive statistics in this table are based on the analytic sample that requires more than 10 experience bins in each district across all years (that is, the 50 percent cut-off sample). Total turnover is defined as the percentage of teachers exiting the state or switching districts. Within the total turnover category, some teachers exit the state and others switch districts. Within the group that switch districts, a small percent switch to non-teaching jobs, as shown in column 5. Column 6 reports the median base pay across all teachers in this experience group across all years. Column 7 reports the mean number of teachers in the experience bin across all districts and years.

Appendix C

Descriptive Statistics: Nearest Neighbor Distance

Across our three analytical samples—(1) all teachers (full sample); (2) BA versus MA sample; (3) general education versus special education instructor position sample—we control for salary in the neighboring district. Across all three samples, the average distance to the neighboring district is between 9.9 and 11.2 miles. The largest distance is among the all teachers sample, with a distance of approximately 56.3 miles.

Table C1

Distances to Nearest Neighbor By Analytic Sample

	Mean	Median	Max	Min
All Teachers Sample	9.91	7.26	56.29	1.60
BA vs. MA Sample	10.97	7.42	43.90	1.60
General Ed. vs. SPED Instructor Sample	11.21	5.75	46.66	1.99

Notes: This table reports the mean, median, max and min distances between each district and it's nearest neighbor for the preferred analytic sample for each analysis - the 50 percent cut sample.

Appendix D

Robustness Checks

9.1 Assessing Teachers' Political Influence

Table D1

Assessing Teachers' Political Influence

	(1)	(2)
$basepay_{jte}$	-14.4**	-14.3**
	(5.18)	(5.19)
$basepay_{jt,e+1}$	-0.80	-0.83
	(1.15)	(1.14)
$basepay_{ote}$	2.03	2.01
	(1.24)	(1.23)
Share of teachers in District-Year-Experience Bin		-5.44
		(4.48)
Combined Effect:		
$basepay_{jte} + basepay_{jt,e+1}$	-15.2**	-15.1**
	(5.45)	(5.48)
District FEs		
Year FEs		
Experience FEs		
Exper. by year FEs	X	X
Dist. by Exper. FEs	X	X
Dist. by year FEs	X	X
R^2	0.42	0.42
N. Districts	111	111
N. Obs	17116	17116

Notes: This table reports estimates of Equation (1), allowing for different combinations of fixed effects. The preferred specification is model (5). The combined effect is the sum of the coefficients on $basepay_{jte}$ and $basepay_{jt,e+1}$. Standard errors, reported in parentheses, are clustered at the district level. The number of observations is the number of district-by-year-by-experience observations. The results are weighted by the number of teachers in each district-by-year-by-experience cell. The sample is restricted to districts that have at least 10 of 20 experience bins across all years in the sample. Statistical significance: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

9.2 Differences in Sample Trimming Thresholds

Table D2

Association Between Turnover Rates and Salary, All Teachers

	(1) Cut: 10	(2) Cut 25	(3) Cut: 50	(4) Cut: 75	(5) Cut:90
$basepay_{jte}$	-11.9**	-12.1**	-14.4**	-19.5***	-21.0***
	(4.42)	(4.39)	(5.18)	(2.90)	(2.10)
$basepay_{jt,e+1}$	-0.97	-1.25	-0.80	-2.16	-0.21
	(1.12)	(1.18)	(1.15)	(2.61)	(2.47)
$basepay_{ote}$	2.94***	2.78***	2.03	0.88	2.28
	(0.81)	(0.81)	(1.24)	(2.99)	(2.32)
Combined Effect:					
$basepay_{jte} + basepay_{jt,e+1}$	-12.9**	-13.3**	-15.2**	-21.7***	-21.2***
	(4.79)	(4.88)	(5.45)	(4.30)	(3.81)
Exper. by year FEs	X	X	X	X	X
Dist. by Exper. FEs	X	X	X	X	X
Dist. by year FEs	X	X	X	X	X
R^2	0.44	0.43	0.42	0.40	0.42
N. Districts	143	139	111	81	60
N. Obs	16736	17143	17116	14819	11678

Notes: This table reports estimates of Equation (1), allowing for different combinations of fixed effects. The preferred specification is model (5). The combined effect is the sum of the coefficients on $basepay_{jte}$ and $basepay_{jt,e+1}$. Standard errors, reported in parentheses, are clustered at the district level. The number of observations is the number of district-by-year-by-experience observations. The results are weighted by the number of teachers in each district-by-year-by-experience cell. The sample is restricted to districts that have at least 10 of 20 experience bins across all years in the sample. Statistical significance: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

9.3 Assessing the Role of Measurement Error

Table D3

Robustness to Number of Teachers in Each Cell

	(1) Benchmark	(2) Min 5 Teachers	(3) Min 10 Teachers
Combined Effect:			
$basepay_{jte} + basepay_{jt,e+1}$	-15.2**	-14.6**	-14.6
	(5.45)	(5.32)	(8.90)
Exper. by year FEs	X	X	X
Dist. by Exper. FEs	X	X	X
Dist. by year FEs	X	X	X
R^2	0.42	0.53	0.61
N. Districts	111	81	49
N. Obs	17116	9138	4633

Notes: This table reports estimates of Equation (1). The combined effect is the sum of the coefficients on $basepay_{jte}$ and $basepay_{jt,e+1}$. Standard errors, reported in parentheses, are clustered at the district level. The number of observations is the number of district-by-year-by-experience observations. The results are weighted by the number of teachers in each district-by-year-by-experience cell. The sample is restricted to districts that have at least 10 of 20 experience bins across all years in the sample. Statistical significance: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

9.4 Results for Un-Weighted Regressions

Table D4

Association Between Turnover Rates and Salary, All Teachers

	(1) Benchmark (Weighted)	(2) Non-Weighted
$basepay_{jte}$	-14.4**	-9.45
	(5.18)	(7.01)
$basepay_{jt,e+1}$	-0.80	-0.39
	(1.15)	(0.87)
$basepay_{ote}$	2.03	0.59
	(1.24)	(1.01)
Combined Effect:		
$basepay_{jte} + basepay_{jt,e+1}$	-15.2**	-9.84
	(5.45)	(7.29)
Exper. by year FEs	X	X
Dist. by Exper. FEs	X	X
Dist. by year FEs	X	X
R^2	0.42	0.32
N. Districts	111	111
N. Obs	17116	17116

Notes: This table reports estimates of Equation (1). The combined effect is the sum of the coefficients on $basepay_{jte}$ and $basepay_{jt,e+1}$. Standard errors, reported in parentheses, are clustered at the district level. The number of observations is the number of district-by-year-by-experience observations. Weighted results are weighted by the number of teachers in each district-by-year-by-experience cell. The sample is restricted to districts that have at least 10 of 20 experience bins across all years in the sample. Statistical significance: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table D5

Experience Distribution

Experience Bin Models	$basepay_{jte} + basepay_{jt,e+1}$	$basepay_{ote}$
A. Specification 1: 6 Experience Bins		
0 to 2	-34.5***	-3.14
	(10.3)	(5.81)
3 to 5	-11.6	4.95
	(9.83)	(11.1)
6 to 8	-45.5**	-9.74
	(15.9)	(9.37)
9 to 11	-23.4+	6.04
	(12.1)	(9.76)
12 to 15	1.50	4.31
	(1.84)	(5.83)
16 to 19	-27.6***	10.2
	(6.52)	(8.41)
B. Specification 2: 10 Experience Bins		
0 to 1	-26.1*	-3.04
	(11.1)	(6.58)
2 to 3	-45.1*	-2.59
	(17.9)	(12.5)
4 to 5	-4.42	10.2
	(10.3)	(12.4)
6 to 7	-43.4**	-13.3
	(15.7)	(9.66)
8 to 9	-38.1*	-6.48
	(15.9)	(13.5)
10 to 11	-26.3+	12.4
	(15.9)	(11.1)
12 to 13	2.50*	4.31
	(1.02)	(6.57)
14 to 15	-18.1	3.13
	(15.8)	(9.63)
16 to 17	-31.0**	12.9
	(11.0)	(10.4)
18 to 19	-25.7**	7.47
	(9.89)	(11.3)
Flexible Experience Models	Model 1	Model 2
C. Linear and Quadratic Experience		
$basepay_{jte} + basepay_{jt,e+1}$	-21.3**	-31.0**
	(7.92)	(10.6)
$(basepay_{jte} + basepay_{jt,e+1}) \times experience_e$	1.05	5.37*
	(0.76)	(2.20)
$(basepay_{jte} + basepay_{jt,e+1}) \times experience_e^2$		-0.25*
		(0.11)
N. Observations: All Specifications	17116	

Notes: The dependent variable is the teacher turnover rate for teachers with experience e in district j in year t. All models include district-by-year FEs, experience-by-year FEs, and experience-by-district FEs. Panels A and B interact $basepay_{jte}$, $basepay_{jt,e+1}$, and $basepay_{ote}$ with experience bin dummy variables. We report the combined effect: $basepay_{jte}+basepay_{jt,e+1}$. Standard errors, reported in parentheses, are clustered at the district level. The sample is restricted to districts that have at least 10 of 20 experience bins across all years in the sample. Statistical significance: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table D6

Teacher Characteristics

	Model 1: Degree		Model 2: Position	
	BA	MA	General Ed.	Special Ed.
$basepay_{jte}$	-17.0***	-28.8***	-23.9**	-46.1***
	(3.37)	(6.25)	(9.04)	(5.91)
$basepay_{jt,e+1}$	1.12	3.38	2.80	1.18
	(2.12)	(4.98)	(8.89)	(6.02)
$basepay_{ote}$	-0.46	8.62+	4.62	-4.66
	(2.03)	(4.57)	(10.7)	(6.15)
Combined Effect:				
$basepay_{jte} + basepay_{jt,e+1}$	-15.8***	-25.4***	-21.1*	-45.0***
	(3.85)	(7.20)	(8.84)	(8.69)
p-value: Combined effects equal	0.18		0.07	
p-value: Outside dist. effects equal	0.04		0.47	
R^2	0.22		0.26	
N. Districts	57		18	
N. Obs.	17727		5566	

Notes: The dependent variable is the teacher turnover rate for teachers with experience e in district j in year t. All models include district-by-year FEs, experience-by-year FEs, experience-by-district FEs, characteristic-by-year FEs, characteristic-by-district FEs, and characteristic-by-experience FEs. We report the combined effect: $basepay_{jte} + basepay_{jt,e+1}$. Standard errors, reported in parentheses, are clustered at the district level. The sample is restricted to districts that have at least 10 of 20 experience bins across all years in the sample. Statistical significance: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.