Online Appendices

Preferences, Selection, and the Structure of Teacher Pay

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Online Appendix A: Estimation of Value-Added Measures

In the empirical analysis on separating equilibria, we divide teachers into bins based on their value-added measure (VAM). In this online Appendix, I discuss the methodology for estimating VAM for teachers in Aldine ISD.

The school district provided student-teacher linked test score records from the 2011–12 school year through to the 2015–16 school year, covering some 60,501 students and 3,559 teachers. These files contain yearly student performance on the STAAR exam (State of Texas Assessments of Academic Readiness) administered statewide by the Texas Education Agency. STAAR tests mathematics, reading, writing, science, and social studies, depending on the year. The state tests reading and mathematics in grades 3–8; writing in grades 4 and 7; science in grades 5 and 8; and social studies in grade 8. Like commonly used VA models, I estimate teacher value-added using the equation

$$A_{istm} = f\left(A_{i,t-1}\right) + \delta_{st} + \alpha_i + \gamma_m + \varepsilon_{istm}$$

I parameterize the control function for lagged test scores using a linear expression of prior-year scores in all available subjects, with indicators for whether the student lacks scores in each subject. To account for student-specific student achievement trajectories, I include student fixed effects, α_i; and control for school-year differences in achievement gains with school-year specific fixed effects, δ_{st}, to capture yearly school/neighborhood effects that are unrelated to the teacher assignment. The parameters γ_m capture average teacher-specific contributions to student achievement, holding all else constant, which I take as the measure of teacher value-added.

Online Appendix B: Cost Function of Compensation Structure

Crucial to calculating the optimal structure of compensation and working conditions is properly specifying the cost as a function of each element. In this Appendix, I provide detail on how the cost function is constructed.

Salary

Because Aldine ISD does not participate in Social Security, they pay modest payroll taxes. Both in documents from the district and in the district's financial disclosures, the district pays 1.5 percent of its payroll in payroll taxes, approximately the rate owed for Medicare taxes, 1.45 percent. Thus, the cost of an additional \$1 in salary compensation costs the district \$1.015. The cost of salary provision also interacts with the cost of salary growth and retirement, discussed below.

Health Insurance

In July 2016, three months after the survey was administered, I collected data from the Affordable Care Act (ACA) health exchange which indicated the monthly premium, deductible, cost of an office visit, and plan type (HMO, PPO, POS, PD, catastrophic) for 50 plans available in the Houston area. A hedonic pricing model revealed that the cost of office visits (the copay) had no systematic relationship with price (premia), which was most predicted by the deductible ($p < 0.001$) and HMO status ($p < 0.001$). With no deductible, a generic plan cost $385.70 (CI: $361.34 – $410.06) per month, and the cost declined by $24.40 ($20.30 – $28.49) for every $1,000 increase in the deductible. There is no evidence that the price is a quadratic function of the deductible.[1]

$$\text{Annual Cost} = 12 \times (385.7 - 24.4 \times \text{deductible})$$

In my model, I use the value of insurance subsidies, in part because we do not have enough power or variation to precisely pick out the "right" health plan. Moreover, in practice, teachers have an insignificant preference in favor of dollars paid in salary over dollars paid in health insurance, meaning that, when optimizing teacher utility, the school district shifts away from health insurance compensation, allowing teachers to privately optimize their insurance decision.

Merit Pay

The merit compensation teachers are offered in the survey is paid to "the top 25 percent of each school based on principal ratings and student growth." Because performance compensation is paid only to a quarter of teachers, the cost of providing an additional $1 in merit pay is $0.25 per teacher. This income is subject to Medicare taxes, 1.45 percent.

Defined Benefits Plan (Pension)

The explicit promise of a *defined benefits* program is that it is not subject to market risk—the benefit is guaranteed, rather than the contribution, is fixed. Marx and Rauh (2014) show that, in order to satisfy the funding requirements, pension managers assume a constant, high rate of growth (7.5–8.0 percent) with no risk in order to balance their revenues with expected demands. This leads to underfunding above and beyond the shortfall recognized under even these optimistic assumptions. The actual return of an essentially risk-free investment, like treasury bonds, is 1.57 percent in normal times (now much lower). I assume a rate of 1.57 percent and calculate what would be saved by retirement's onset if a teacher were setting aside 1 percent of her wages each year. I then take the lump sum accumulated by retirement (assumed at age 65) and annuitize it, using an annuity calculator.[2] I then take the annual annuity as a fraction of the teacher's highest

[1] When the quadratic term is included, the coefficient's p-value is 0.688.
[2] http://money.cnn.com/tools/annuities/

salary to make a mapping from what percent of salary the teacher is saving to her replacement rate. With a 1.57 percent risk-free rate of return, a one-percent saving pattern replaces two percent of the teacher's salary, meaning that teachers must save 0.559 percent of their income to finance an additional percentage point of replacement rate under a risk-free rate of return. Pensions, however, enjoy a cost saving since some teachers will pay into the pension but will not persist long enough to vest and receive an annuity. I calculate the share of those paying into the pension each year who will leave *before* the vesting period is complete. That fraction is then applied as a discount on the cost of the pension.

Defined Contributions Plan (403(b))

Nonprofit and governmental agencies can provide a retirement plan that is corollary to the 401(k), called the 403(b), which are available to all tax-exempt organizations. In 403(b) accounts, the school commits to contributing a defined amount to the worker's retirement rather than promising a defined level of benefits at retirement. While pensions take several years for a worker to vest and retirement benefits are heavily backloaded,[3] 403(b) plans accumulate retirement wealth proportional to employment and vest immediately, making retirement contribution totally portable. I follow the same calculation as described above to generate the cost of an average replacement rate through the 403(b), but use as the expected interest rate 7.5 percent, under the historical trend (ten percent) (Cowen 2011; Gordon 2016). Here from, the cost of saving enough to replace one percent of a teacher's salary (in expectation) is 0.220 percent of your salary. If one assumed an eight-percent return, the coefficient on rep would be 0.202 percent.

Class Size

One of the chief conceptual issues in structuring the cost function is how to formalize the cost of class-size choices while allowing compensation to vary flexibly. For instance, by simply using the average cost of class-size reductions from a paper, the analysis would not account for the fact that class-size changes become more and less costly based on the costliness of the compensation package itself. The fundamental problem is that reducing class size requires hiring an additional teacher, the cost of which depends on the cost of the compensation package. Moreover, the cost of additional class-size reductions increase quadratically as class size falls. To accommodate this tradeoff in optimization, I conceptualize the cost function as a joint choice of compensation structure (which determines the average cost per teacher) and class size (which determines the

[3] Vesting refers to when the employee becomes eligible for retirement payments even should they retire or quit. The granting to an employee of credits toward a pension even if separated from the job before retirement.

number of teachers needed), allowing the cost structure of teacher pay to flexibly affect the cost of class-size adjustments. To provide a smooth function for optimizing, we model teacher quantity as continuous.

Endogenous Retention

What makes the calculation of the cost of salary growth rates somewhat complicated is that providing more generous compensation reduces attrition, increasing the cost both through salaries *and* by increasing the odds that teachers are retained to be paid at higher steps of the salary schedule. Hendricks (2014) estimates the effect of additional salary on the attrition probability of teachers at different points of their experience profile and finds that compensation has significant impacts on attrition for new teachers which influence declines as teachers approach veteran status. His study uses data from Texas, and it's fortunate to have estimates on the impact of compensation on retention, throughout the teacher life cycle, from the labor market in question.

To adjust for the cost of endogenous retention, I calculate the total utility of teachers with status-quo compensation and difference it from candidate compensation structures. I multiply those differences by turnover elasticities for teachers of every experience level from Hendricks, which generates a vector describing how the new compensation structure would affect turnover at each experience point. I add these adjustments to the natural turnover rate and then calculate the steady-state distribution of teacher experience based on the affected retention patters. This allows me to construct the average compensation cost in steady state, a function of compensation and the (endogenous) distribution of teacher experience.

Cost of Turnover

A related element affecting the cost of lower retention and reduced class size is the fixed costs of employing an additional teacher, the primary of which is more frequent hiring and training. Barnes, Crowe, and Shaefer (2007) and Watlington et al. (2010) study the costs of turnover in schools in terms of recruiting, screening, and training. The authors do an in-depth accounting exercise with five school districts and find that a typical new hire costs $11,891, on average, in screening, processing, and onboarding. Because the average teacher turns over every 6.13 years (the average years of experience in Hendricks (2014)), the yearly cost of hiring is $1,938 per teacher each year under the status quo retention pattern. I allow retention patterns to evolve in response to compensation and working conditions and explicitly calculate the cost of turnover based on the share of teachers that attrit in a year multiplied by the number of teachers times the cost of replacing each.

I calculate other fixed costs of employment, but they are trivial. The wage base of unemployment insurance is smaller than the typical yearly salary, so UI taxes function effectively as a head tax of only $11 per teacher per year in this district (calculated from financial disclosures). The district also pays $167 per teacher per year for workers compensation. A final consideration is the costs for space. Throughout, I use as the benchmark a sort of steady state. If a class is made smaller, I assume that each classroom can be made smaller costlessly, either in new construction or in a one-time construction cost. It may be that teachers have their own office space in some districts, but I ignore this cost for simplicity.

Online Appendix C: Preference Heterogeneity

Here I explore how preferences vary by teacher race, sex, experience, and grade-level (online Appendix tables 13–24). A considerable body of work finds that students progress more quickly when taught by experienced teachers and those whose race or sex matches their own (Dee 2004, 2007; Bettinger and Long 2005; Clotfelter et al. 2006; Carrell et al. 2010; Kofoed and McGovney 2017; and, in particular, Gershenson et al. 2018). Understanding how preferences vary by group may help schools attract and retain a desired demogrphic.

To study how preferences differ by experience level, I divide teachers into four experience quartiles: novices, who have 0–1 years of experience; new teachers, who have 2–6 years of experience; experienced teachers, who have 7–14 years of experience; and veterans, who have 15 or more years of experience. I then interact dummies for "new," "experienced," and "veteran" with each attribute and estimate models like equation (1). The main estimate provides the preferences of novice teachers (the omitted category). The interaction coefficients show the preference differential from novice teachers for each experience category.

More experienced teachers have weaker preferences for higher salary and stronger preferences for more generous retirement plans (not presented). In working conditions, preferences are similar to those of novices in time-to-tenure, term length, and commute time, but older teachers have a higher tolerance for larger classes and a stronger demand for teaching assistance. Senior teachers also have stronger preferences in favor of high-achieving students than their less experienced colleagues. Novice, new, and experienced teachers have similar preferences for having a "supportive" principal, but veteran teachers place an additional premium on it. In principle, a district could attempt to retain veteran teachers by providing compensation options that suited the preferences of established teachers.

Black-white and male-female achievement gaps may partly be the byproduct of skewed teacher demographics (Goldhaber et al. 2019). Understanding how preferences differ by group may help districts attract and retain teachers of a particular group (for instance, to retain experienced teachers or to tilt the sex (race) distribution of teachers to mirror the distribution of students).

I follow the same course to study how preferences differ by sex, interacting male indicators with each attribute. Men have stronger preferences for salary than women and are more averse to high-deductible health plans, consistent with women being more likely to receive health insurance through a spouse. Like senior teachers, men are more willing to teach large classes, but they place a lower value on assistance with grading. Men and women have similar preferences for student demographic characteristics, but men exhibit less demand for a supportive principal. I also explore how preferences differ by race. Black teachers have weaker preferences for salary growth than white and Hispanic teachers. Black and Hispanic teachers have stronger preferences for performance pay than white teachers. Black teachers place higher value on a short tenure clock and less frequent reviews than white and Hispanic teachers. All three groups have similar preferences for commuting and assistance with grading. While white and Hispanic teachers have precisely zero preference for student race, black teachers prefer student bodies that have a higher minority share, mirroring Antos and Rosen (1975). While everyone has strong preferences for a supportive principal, black and Hispanic teachers value supportive principals 8–12 percent less than white teachers. That both male and minority teachers have weaker preferences for principal support suggests they either experience lower costs of classroom disruption or enjoy additional social capital with disruptive students.[4]

Online Appendix D: Objective Functions

Teacher Utility

As a kind of baseline, I use as the objective function the teacher-utility model estimated from the data, essentially acting as if the district's goal is to structure conditions to maximize the wellbeing of teachers, subject to the budget constraint. This may also be similar to the stated goals of a teachers' union. This model provides some of the core influence of the other optimization criteria because teacher utility affects the retention probabilities that influence, for instance,

[4] I also test whether preferences differ by grade level. In general, teachers in elementary schools, middle schools, and high schools have similar preferences for compensation, student attributes, principal affect, commuting, and assistance. Middle and high school teachers, however, express less aversion to large classes and stronger aversion to longer tenuring periods than elementary-school teachers (not presented).

achievement. I estimate the model of teacher utility (the coefficients from simply regressing teacher choices on attributes) with nonlinearities for merit pay, growth rate, replacement rate, and class size; these nonlinearities prevent compensation from loading into the attribute with the highest average return.

When the maximization is unfettered, class size balloons to pay for higher salaries. In Texas, classes can be no more than 22 students for students from kindergarten through fourth grade, but there is no statutory requirement for more advanced students, though legislation was proposed to limit class sizes to no more than 28 students for students in fifth through eighth grade (Green 2014). While the structure of other elements of compensation have little direct impact on students, class-size reductions are not intended, primarily, to appeal to teachers. For this exercise and those that follow, I limit the permissible range of class size to no more than 30 so that, should class-size reductions be an appealing improvement to teaching conditions, we can see those materialize in smaller class size, but not allow classes to explode in order to provide more generous compensation to incumbent teachers.

Teacher Retention

When teachers leave Aldine ISD, either by retirement from the profession or by transferring to another district, it opens a vacancy chain that results in the departed being replaced by a novice somewhere, which is quite costly to student achievement (Wiswall 2013). One objective that districts could pursue would be to structure compensation and working conditions to improve retention. I use the same basic structure used above to adjust for endogenous retention: retention probabilities are adjusted off a baseline based on how much the structure improves teacher utility. Using those adjusted retention probabilities, I simulate the share of teachers who will be in each experience cell in steady state. The dot product of experience shares and experience produces the average experience level (or tenure) with that structure of compensation, which is the object I maximize.

Student Achievement Production Function

What structure of pay maximizes student achievement rather than teacher satisfaction or tenure? I construct the achievement function to reflect the representative estimates of quasi-experimental domestic studies in terms of experience, class size, merit pay, and selection. I assume student achievement is a function of parent and teacher inputs, $A = g(P, T)$, where P reflects the input of parent and T reflects inputs of the teacher. The parents' impact, $P = h(t, r, k)$, is a function of the time parents allot to children (t), the resources made available to children (r), and the number of children the parents care for (k) (Price 2008; Loken, Mogstad, and Wiswall 2012; Black, Devereux, and Salvanes 2005). The teacher's role in achievement is a function of her innate teaching ability ψ, her skill σ which is influenced by experience ϵ and training τ, her effort e, and the size of her class c.

$$T = f(\psi, \sigma(\epsilon, \tau), e, c)$$

The teacher's skill increases quickly in experience ϵ before slowing its incline after the first few years. Traditional training programs have demonstrated little effect on teacher skill, though we might consider professional evaluations and mentoring programs a new generation of training (Taylor and Tyler 2012). Finally, effort is conceived as induced, unnatural effort—the increase prompted by incentive or accountability (Fryer et al. 2012; Imberman and Lovenheim 2015; Macartney 2016). In part because of limits in the literature, the achievement function I calibrate is a linearization in most arguments.

Experience

Retention affects teacher quality through two channels. First, teachers improve as they gain experience, especially at the beginning of their careers. If a given teacher turns over, the students she would have had will instead be taught by a novice who is systematically less effective. Second, early in the career, teachers with the largest positive impacts on students are the most likely to leave the profession. Thus, when increasing the retention odds, the stock of teacher quality improves both in experience and in composition because the marginal teacher to leave is, on average, of higher quality. In the basic model, we focus on the influence of additional experience improving a teacher's ability, since the effects of retention on the distribution of initial quality is somewhat unclear (Wiswall 2013; Hendricks 2018).

To quantify the influence of experience in the model, I rely on estimates from the discontinuous career model in Table 2 of Papay and Kraft (2015). I normalize average new-teacher VAM to zero and infer the typical teacher improvements in math and English (at five years, a typical teacher has improved 0.1216 in math and 0.0824 in English; by year 15, the typical teacher has improved an additional 0.1315 in math (suggesting that the typical teacher is 0.2531 better than a new teacher after having earned that much experience) and an additional 0.0831 in English (suggesting that the typical teacher with that experience is 0.1655 better than a new teacher)). Finally, the estimates suggest that teachers with 25 years of experience have improved from their 5-year experience level by an additional 0.2413 in mathematics and 0.1513 in English (0.3629 cumulatively in math and 0.1845 cumulatively in English by year 25).

To provide a general profile of experience on quality, I average the math and English returns. I fit a regression model of average VAM on experience and experience-squared using the first three experience nodes (0, 5, and 15), and a second model using the latter three points (5, 15, and 25) and use the predicted values (y-hat) from 0 through 5 in the first model and between 6 and 30 in the second model. Without the combination of these two piecewise models, the resulting experience profile either suggests convex increases in quality among veteran teachers, something never found in empirical work, or declines in quality among veteran teachers, which would contradict the estimates used to train the VAM profile in experience. The value-added profile that results from this procedure is most steeply increasing for new teachers but reflects the gains of experience throughout the life cycle of a teacher (Wiswall 2013; Papay and Kraft 2015). The resulting performance profile is presented in online Appendix figure 4.

Class Size

Analysts typically conclude that large class sizes reduce student achievement, especially for students that are young or low-income (Angrist and Lavy 1999; Krueger and Whitmore 2001; Jepsen and Rivkin 2009; Fredriksson, Ockert, Oosterbeek 2012, 2016; Schanzenbach 2014), but the literature contains a split (Hoxby 2000; Chingos 2013; Angrist, Lavy, Leder-Luis, and Shany 2019). In this paper, I incorporate domestic estimates of the influence of class size into the education production function. Krueger (1999) finds that an eight-student reduction (from 23 students to 15) increased achievement by 0.035σ per year, with larger effects in kindergarten (0.120σ), using random assignment from the Tennessee STAR experiment.[5] In contrast, Hoxby (2000) exploits natural variation arising from cohort sizes and class-size rules and finds no impact of class size on student achievement; her use of test scores after summer break may reflect rapid fadeout for class-size induced achievement gains. Dee and West (2011) use a within-student comparison for middle-school students and, similarly, find no overall impact of class size on student achievement. Cho, Glewwe, and Whitler (2012) follow Hoxby using recent data and find that a ten-student reduction in class size increases achievement by 0.04–0.05σ for students in elementary school, essentially in line with Krueger (1999). The domestic evidence tends to suggest class size does not matter as much for older grades and matters most for very young children. I take the average of these four estimates to predict that student achievement rises by 0.022σ for elementary students, with no effect of class sizes for students in middle or high school (Rivkin,

[5] The experimental setting may alter teachers' incentives, since the results of a known experiment may influence future working conditions.

Hanushek, and Kain 2005; Dee and West 2011; Chingos 2012). I use data from the National Center for Education Statistics to know what proportion of the district in question is a part of each school-type. The district serves a student body of 15.2 percent pre-school aged children, 37.6 percent elementary-school aged children, 22.5 percent middle school aged children, and 24.7 percent high-school aged children. I calculate the average effect (the dot product of the percent-in-group times the class size effect) which yields 0.012σ per ten-student change or 0.0012σ per student change.

Performance Pay

The evidence on performance pay suggests modest improvements to achievement in the presence of stronger incentives (Lavy 2002; Springer et al. 2010; Muralidharan and Sundararaman 2011; Sojourner, Fryer et al. 2011; Fryer 2013; Mykerezi, and West 2014; Dee and Wyckoff 2015; Imberman and Lovenheim 2015; Balch and Springer 2015). The settings of each study differ enough to make comparison difficult. In many programs, schools implemented the reform with other supports; in others, the incentives apply to school-wide or district-wide goals. Because of the program's similarity to the one posed to teachers in my survey and the setting is geographically proximate (from Houston, Texas), I use Imberman and Loveheim (2015) for a parameter value. They use the fact that grade-level incentives are stronger for smaller grades, and find that a $1,000 merit-pay increase induces a 0.0136σ increase in student achievement (approximately the average of the math and English effect using specifications 1 and 2 in table 4 for a 10 percentage point increase in exposure (effect divided by 10), divided by the typical payment in thousands, $1.283). This is a conservative parameter since the first 10-percent increment exposure has a much larger effect (between 0.05 and 0.09 student standard deviations).

Highly rated teachers express stronger preferences for an offer containing merit pay than other teachers. To calculate the influence of performance pay on selection in retention, I simulate the retention patterns of a cohort of 10,000 hypothetical teachers and assume that they are uniformly distributed across ten quality deciles when they begin teaching (which conservatively assumes no positive selection into the teaching environment based on performance pay). I calculate the utility each of those teachers have for the compensation bundle for teaching, using the differential estimates of the top three deciles for performance pay, and I add a random component to their utility from the empirical distribution of the errors in the empirical model to reflect that estimated preferences are not deterministic. I then rank each teacher's utility for teaching from greatest to least so that I have an ordered set of teachers with the most prone to leave the profession at the bottom of the ranked set and the least likely arranged at the top.

Using the retention model constructed from Hendricks, I calculate what fraction of new teachers will attrit based on the considered compensation structure and working conditions. To construct the set of teachers who persists into a second year, I assume that those who attrit count up to that fraction of leavers from the bottom of the ranked set of teachers. (For example, if the Hendricks model predicts that 5 percent of new teachers will attrit, I copy the list of teachers from the first year to the second year while removing the 5 percent of teachers who had the lowest utility from teaching). Because the random component is substantial, those that least prefer teaching includes a substantial share of highly rated teachers, even when considering compensation bundles including significant in performance pay. I iterate this process for each year of a teacher's career to calculate, in the end, the distribution of types (what share of teachers are in each decile bin in steady state).

I allow the model to select whether to evaluate teachers using "VAM only" or "VAM and Danielson," a distinction that is important for calculating the impact of changing retention patterns. Using the teacher data, I calculate the average VA in each decile bin, controlling for teacher experience. That is, the performance pay program compares teachers to those with similar experience to reward talent, rather than experience, which is already rewarded by the salary gradient in experience on the salary schedule. (Interestingly, VA does not have a significant experience gradient in Aldine, but Danielson scores do). When creating deciles based on VAM and Danielson together, I normalize both VAMs and Danielson scores to have a SD equal to 1 and add the two measures together before generating decile bins based on the sum. I calculate the average VA in each decile bin based on VAM + Danielson and the average VA in each decile bin based on VAM alone, using only teacher observations that have both VAM and Danielson so the samples forming the VA vectors are identical. The dot product of the decile shares and these VA vectors generates the VA produced by the selection in retention of the considered compensation structure.

Online Appendix E: The Effects of Compensation Reform in General Equilibrium

The core simulation exercise is partial equilibrium. It is useful to consider the extent to which these effects would scale in general equilibrium, if all schools adopt similar reforms. Some of the effects in this partial equilibrium calculation will directly apply in general equilibrium. For instance, the effects of class size on achievement exist no matter how many districts implement class-size adjustments. The idea is that the effect of class size is direct (not mediated by allocation) and one district implementing class size changes does not affect the productivity of another district changing its class size. The same logic applies to the effect of performance incentives on effort. These inputs do not affect achievement through the reallocation of scarce resources among districts, and therefore they have the same effect in a partial or general equilibrium framework.

The place in which partial and general equilibria depart is in the domain of district retention and selective retention. (For simplicity, we have ignored the effects of selection on entry other than to show that compensation preferences are indistinguishable for groups more and less disposed to teaching, which implies the stability of the optima.) The key is to understand to what extent compensation-induced retention at a district retains teachers who would have otherwise gone to another district, and to what extent compensation-induced retention at the district retains those who would have otherwise left public school teaching in Texas.

I collect staffing data from Texas that cover all public-school employees in the state from 1989 to 2021. The data include the base pay, education, experience, district, and a unique teacher identification code for each staffing record. I impute when a teacher leaves a district when they have stopped working for a district for at least three years and begin working at a new one. I impute that a teacher has departed public-school teaching when they have stopped working in public schools in Texas for at least three years. I recover the salary schedule of each district in each year by calculating the modal base salary for each experience cell in every district among full-time teachers for whom we have a record of them having a bachelors degree but not a masters.

When a teacher disappears from a district two outcomes are possible. One, the teacher has kept teaching but moved to another district. Two, the teacher has retired from public-school teaching in Texas. The method I pursue here is to estimate the effect of salary changes on district exit and professional exit. I follow Hendricks (2014) who implements a clever strategy exploiting changes in salary schedules that vary by district, experience level, and time. What this permits is a rich, saturated set of controls including year-district fixed-effects, year-experience fixed-effects, and district-experience fixed effects:

$$E_{idst} = \beta \times S_{dst} + \theta_{dt} + \alpha_{st} + \gamma_{ds} + \varepsilon_{idst} \quad (6)$$

Where *E* indicates the exit of a teacher *i* in district *d* at experience *s* at time *t*, and we measure two types of exit: that in which a teacher moves to another district in Texas, and that in which a teacher leaves teaching completely. θ_{dt} denotes a set of district-year fixed-effects, α_{st} denotes a set of experience-year fixed-effects, and γ_{ds} denotes a set of district-experience fixed-effects. *S* is the salary paid to teachers in district *d* at experience-level *s* at time *t*, in \$1,000s of dollars. Therefore the β captures the relationship between a \$1,000 increase in salary on the probability of exit as a percentage point. Intuitively, the strategy leverages within-district comparisons where one experience rung has a raise relative to another experience rung in the same district at the same time. To gauge the plausibility of the estimates and estimate the dynamic effects of compensation on retention, the main specification I run is a distributed lag model in which I include four leads and four lags of *S* into the model as well as the contemporaneous effect. I cluster the standard errors by teacher. The results are presented in online Appendix table 11.

The contemporary effects of compensation are largest, and smaller effects exist immediately before the raise (anticipatory effects) and immediately after the raise (satisfaction effects). To produce a simple number reflecting the impact of compensation on the two types of retention, I sum the contemporary effect with one lead effect and one lag effect and compute the standard error of the composite using the delta method. A $1,000 increase in district salary reduces exit to other districts by 0.10 percentage points (on a base of 5.29 percent; *t*-statistic of 2.98) and reduces exit from the profession by 0.21 percentage points (on a base of 11.70 percent; *t*-statistic of 10.05). In other words, 33 percent (0.10 / (0.10 + 0.21) = 0.33) of retentions induced by compensation changes in an individual district are the result of retaining teachers who would have transferred to another district, and 67 percent (0.21 / (0.10 + 0.21) = 0.67) of retentions induced by compensation changes in an individual district are the result of retaining teachers who would have left the profession completely. In practice, most of the retentions induced by higher salaries do not come at the expense of other districts since they retain teachers who would have departed teaching. To calculate what portion of the partial equilibrium effect would be seen in general equilibrium, we sum the part coming from class size and the effort effects of incentives (35 percent) plus 67 percent of the effects from retention and selection (65 percent) which yields 78.3 percent of the partial equilibrium gains would be seen in general equilibrium. The majority of the partial equilibrium effects flow through in general equilibrium because induced retention is largely not at the expense of other districts.

Online Appendix F: Online Appendix Figures

ONLINE APPENDIX FIGURE 1—SAMPLE COMPENSATION QUESTION

If two schools that were identical in every other way made the following offers, which would you prefer:

	School 1	School 2
Starting salary:	$52,850	$46,850
Health plan:	$1,400 deductible; $40 monthly premium	$1,250 deductible; $90 monthly premium
Salary growth:	2.0% each year	4.0% each year
Reward:	Teachers receive $1,000 reward if they are in the top 25% of the school based on principal ratings and student growth	Teachers receive $2,000 reward if they are in the top 25% of the school based on principal ratings and student growth
Retirement:	A pension that replaces 65% of your salary in retirement if you stay 30 years	A pension that replaces 35% of your salary in retirement if you stay 30 years
	○	○

Note: This figure presents an illustration of the questions answered by teacher respondents about compensation structure.

ONLINE APPENDIX FIGURE 2—SAMPLE WORKING-CONDITION QUESTION

If two schools that were identical in every other way made the following offers, which would you prefer:

	School 1	School 2
Starting salary:	$49,850	$52,700
Contract:	Teachers receive a renewable 3-year term contract after a 3-year probationary contract	Teachers receive a renewable 2-year term contract after a 1-year probationary contract
Distance from home:	15-minute drive	1-minute drive
Class size:	23	27
Assistance:	The school hires someone to help you with instructional support for 9 hours each week	The school hires someone to help you with instructional support for 0 hours each week
	○	○

Note: This figure presents an illustration of the questions answered by teacher respondents with respect to working conditions.

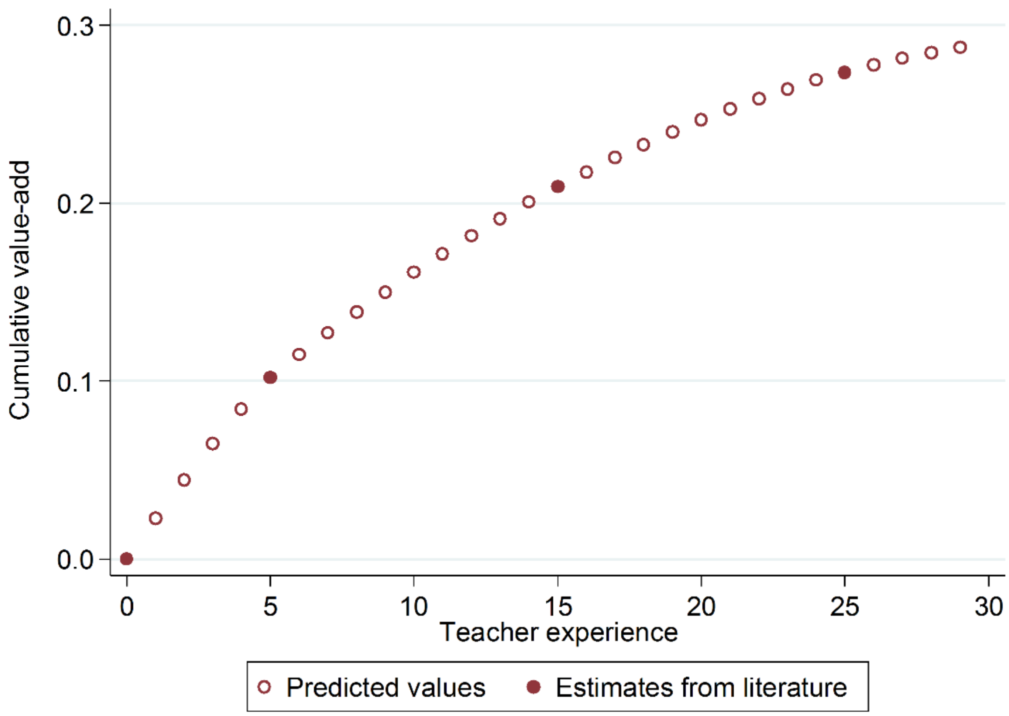
ONLINE APPENDIX FIGURE 3—SAMPLE STUDENTS-&-LEADERSHIP QUESTION

If two schools that were identical in every other way made the following offers, which would you prefer:

	School 1	**School 2**
Starting salary:	$47,150	$50,300
Percent of students in poverty:	38%	53%
Percent of students who are minority:	36%	66%
Average student achievement:	43^{rd} percentile	57^{th} percentile
Principal support:	Principals are hands-off with disruptive students	Principals are hands-off with disruptive students
School bus:	The school's buses are blue	The school's buses are not blue

Note: This figure presents an illustration of the questions answered by teacher respondents with respect to student and principal characteristics.

ONLINE APPENDIX FIGURE 4—VALUE-ADDED GROWTH WITH EXPERIENCE



Note: This figure shows the value-added estimates from Papay and Kraft (2015) in the solid dots. The open dots represent the inferred value add for each experience level that I use in the achievement production function.

ONLINE APPENDIX G: ONLINE APPENDIX TABLES

ONLINE APPENDIX TABLE 1—OFFER ATTRIBUTES FOR CONJOINT EXPERIMENTS

Attribute	**Levels**
Salary	$46,550, $46,700, $46,850, $47,000, $47,150, $47,300…$53,300, $53,450
Growth	0.2%, 0.4%, 0.6%, 0.8%, 1.0%, 1.2%, 1.4%, 1.6%, 1.8%, 2.0%, 2.2%, 2.4%, 2.6%
Deductible	$1,200, $1,250, $1,300, $1,350, $1,400, $1,450, $1,500, $1,550, $1,600...$1,800
Premium	Monthly health insurance premium: $40, $90
Co-pay	$0, $5, $10, $15, $20, $25, $45, $50, $55, $60, $65, $70, $75
Reward	$0, $1,750, $2,000, $2,250, $2,500, $2,750, $3,000, $3,250
Rating	Evaluated based on: student growth and principal evaluations, student growth only
Retirement plan	pension, 403(b) (defined contributions)
Replacement rate	33%, 35%, 37%, 39%, 41%, 43%, 45%, 48%, 50%, 52%, 54%, ...63%, 65%, 67%
Time till tenure	immediate, 1 year, 2 years, 3 years
Review term	1 year, 2 years, 3 years, 4 years, 5 years
Commute time	1 minutes, 3 minutes, 5 minutes, 7 minutes, 9 minutes, 11 minutes...19 minutes
Hired assistance	0 hours per week, 5 hours per week, 7 hours per week, 9 hours per week
Poverty rate	38%, 43%, 47%, 48%, 53%, 58%, 63%, 68%, 72%, 77%, 82%...97%, 99%
Minority share	12%, 18%, 24%, 30%, 36%, 42%, 48%, 66%, 72%, 78%, 90%, 96%, 100%
Av. achmt prctle	percentiles: 23rd, 27th, 31st, 35th, 39th, 43rd, 47th, 53rd, 57th, 61st...73rd, 77th
Principal	hands-off with disruptive students, supportive with disruptive students
Bus color	blue, not blue

Note: This table presents all the possible values presented to respondents in the estimating sample.

Online Appendix Table 2 – Teacher Demographics

	Average	Std. Dev.
Experience in years	9.03	(9.21)
Bachelor’s	0.455	(0.498)
Master’s	0.299	(0.458)
White	0.276	(0.447)
Hispanic	0.208	(0.406)
Black	0.367	(0.482)
Female	0.680	(0.467)
VAM score	0.000	(0.995)
Danielson score	12.8	(2.07)

Note: This table presents the demographic makeup of teacher respondents.

ONLINE APPENDIX TABLE 3—PREFERENCES FOR WORKING CONDITIONS BY TEACHER QUALITY

	Choice		Choice	
	Reference Group	Quality-decile interaction	Reference Group	Quality-decile interaction
	(1)	(2)	(1)	(2)
Benchmark				
Starting salary	0.119**	-0.002	0.119**	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Contract				
Probationary period	-0.063**	0.011	-0.059**	0.010
	(0.008)	(0.012)	(0.008)	(0.012)
Term length	-0.009	0.015	-0.008	0.012
	(0.009)	(0.013)	(0.009)	(0.013)
Working conditions				
Commute time	-0.007**	0.002	-0.008**	0.002
	(0.001)	(0.002)	(0.001)	(0.002)
Class size	-0.071**	0.002	-0.072**	0.002
	(0.003)	(0.004)	(0.003)	(0.004)
Assistance	0.027**	0.001	0.028**	0.001
	(0.002)	(0.004)	(0.002)	(0.004)
Experience bins	X		X	
Exp. interactions	.		X	
R-squared	0.288		0.289	
Observations	21,312		21,312	

Note: * p < 0.05, ** p < 0.001. Columns (1) and (2) represent one regression in which the main effects are displayed in column (1) and the interactions with the quality index are represented in column (2). The regression displayed in columns (3) and (4) follows a similar form, but controls with experience bins interacted with each attribute.

ONLINE APPENDIX TABLE 4—PREFERENCES FOR STUDENT AND LEADERSHIP CHARACTERISTICS BY TEACHER QUALITY

	Choice		Choice	
	Reference Group (1)	Quality-decile interaction (2)	Reference Group (1)	Quality-decile interaction (2)
Benchmark				
Starting salary	0.068**	-0.002	0.068**	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Students				
Percent low income	-0.025**	0.002	-0.025**	0.002
	(0.005)	(0.008)	(0.005)	(0.008)
Percent minority	0.001	0.006	0.001	0.006
	(0.003)	(0.005)	(0.003)	(0.005)
Ave. achievement	0.027**	0.010	0.027**	0.010
	(0.005)	(0.009)	(0.005)	(0.009)
Principal affect				
Supportive	0.588**	-0.007	0.555**	-0.026
	(0.020)	(0.034)	(0.024)	(0.034)
Placebo				
Blue bus	-0.014	0.037	-0.026	0.034
	(0.017)	(0.028)	(0.020)	(0.029)
Experience bins	X		X	
Exp. interactions	.		X	
R-squared	0.373		0.375	
Observations	15,982		15,982	

Note: * p < 0.05, ** p < 0.001. Columns (1) and (2) represent one regression in which the main effects are displayed in column (1) and the interactions with the quality index are represented in column (2). The regression displayed in columns (3) and (4) follows a similar form, but controls with experience bins interacted with each attribute.

ONLINE APPENDIX TABLE 5—ASSESSING THE INFLUENCE OF DIFFERENT QUALITY MEASURES ON DIFFERENTIAL PREFERENCES FOR PERFORMANCE PAY

	Choice (1)	Choice (2)	Choice (3)	Choice (4)	Choice (5)
Reward	0.029**	0.023*	0.018**	0.019	0.013*
	(0.003)	(0.009)	(0.007)	(0.013)	(0.007)
Reward × VAM index		0.037**		0.036*	
		(0.014)		(0.018)	
Reward × Danielson index			0.032**	0.011	
			(0.012)	(0.018)	
Reward × Quality index					0.043**
					(0.010)
Observations	31,820	12,274	17,166	7,942	21,498

Note: * $p < 0.05$, *** $p < 0.001$. This table presents the interaction of merit pay with various teacher-quality indices; the results are qualitatively similar across the measure of quality we use.

ONLINE APPENDIX TABLE 6—LEAVER HETEROGENEITY IN COMPENSATION PREFERENCES

	Linear Probability		Linear Probability	
	Teachers that stay	Marginal-teacher differential	Teachers that stay	Marginal-teacher differential
	(1)	(2)	(3)	(4)
Starting salary	0.085**	-0.002	0.087**	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Salary growth	0.186**	0.008	0.193**	0.011
	(0.010)	(0.010)	(0.010)	(0.010)
Bonus amount	0.031**	0.003	0.035**	0.004
	(0.004)	(0.006)	(0.004)	(0.006)
VAM only	-0.068**	-0.017	-0.069**	-0.009
	(0.016)	(0.015)	(0.019)	(0.016)
Replacement	0.014**	0.001	0.014**	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
401k-style	0.085**	-0.023	0.097**	-0.015
	(0.012)	(0.016)	(0.016)	(0.017)
Premium (yearly)	-0.095**	0.027	-0.088**	0.025
	(0.027)	(0.027)	(0.017)	(0.027)
Deductible	-0.252	0.006	-0.124	0.002
	(0.225)	(0.037)	(0.228)	(0.037)
Experience bins	X		X	
Exp. interactions	.		X	

*Note: * $p < 0.05$, ** $p < 0.001$.* This table presents a heterogeneity analysis by interacting each attribute with dummies identifying teachers who left shortly after the survey, while nonparametrically controlling for teaching experience in yearly bins. Standard errors clustered at the teacher level.

ONLINE APPENDIX TABLE 7—LEAVER HETEROGENEITY IN WORKING CONDITION PREFERENCES

	Linear Probability		Linear Probability	
	Teachers that stay	Marginal-teacher differential	Teachers that stay	Marginal-teacher differential
	(1)	(2)	(3)	(4)
Probationary period	-0.049**	0.009	-0.047**	0.008
	(0.004)	(0.005)	(0.005)	(0.005)
Term length	0.000	-0.006	-0.001	-0.007
	(0.005)	(0.006)	(0.005)	(0.006)
Commute time	-0.004**	-0.001	-0.005**	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Class size	-0.055**	0.004*	-0.055**	0.004*
	(0.001)	(0.002)	(0.001)	(0.002)
Assistance	0.022**	0.003*	0.022**	0.003*
	(0.001)	(0.002)	(0.001)	(0.002)
Experience bins	X		X	
Exp. interactions	.		X	

*Note: * $p < 0.05$, ** $p < 0.001$.* This table presents a heterogeneity analysis by interacting each attribute with dummies identifying teachers who left shortly after the survey, while nonparametrically controlling for teaching experience in yearly bins. Standard errors clustered at the teacher level.

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ONLINE APPENDIX TABLE 8—LEAVER HETEROGENEITY

IN STUDENT AND PRINCIPAL PREFERENCES

	Linear Probability		Linear Probability	
	Teachers that stay	Marginal-teacher differential	Teachers that stay	Marginal-teacher differential
	(1)	(2)	(1)	(2)
Percent low income	-0.028**	0.000	-0.029**	0.000
	(0.004)	(0.006)	(0.004)	(0.006)
Percent minority	0.004	0.002	0.004	0.002
	(0.002)	(0.003)	(0.002)	(0.003)
Ave. achievement	0.043**	0.011	0.043**	0.011
	(0.004)	(0.007)	(0.004)	(0.007)
Supportive principal	0.760**	0.014	0.709**	-0.018
	(0.015)	(0.024)	(0.024)	(0.026)
Blue bus	0.006	-0.007	-0.016	-0.010
	(0.013)	(0.021)	(0.019)	(0.022)
Experience bins	X		X	
Exp. interactions	.		X	

*Note: * $p < 0.05$, ** $p < 0.001$.* This table presents a heterogeneity analysis by interacting each attribute with dummies identifying teachers who left shortly after the survey, while nonparametrically controlling for teaching experience in yearly bins. Standard errors clustered at the teacher level.

ONLINE APPENDIX TABLE 9—COMPENSATION ESTIMATES WITH DIMINISHING MARGINAL RETURNS FOR SIMULATION EXERCISES

	Linear (1)	Quadratic (2)
Starting salary	0.0846**	0.2863*
	(0.0022)	(0.1376)
Starting sal. sqr.		-0.0020
		(0.0014)
Salary grth.	0.1918**	0.2225**
	(0.0091)	(0.0370)
Salary grth. sqr.		-0.0145
		(0.0136)
Performance pay	0.0293**	0.1326**
	(0.0034)	(0.0232)
Performance pay sqr.		-0.0386**
		(0.0085)
VAM only	-0.0767**	-0.0699**
	(0.0145)	(0.0175)
Retirement replcmnt.	0.0146**	0.0388**
	(0.0005)	(0.0077)
Retire. replmt. sqr.		-0.0002*
		(0.0001)
401k-style	0.0767**	0.0524**
	(0.0100)	(0.0135)
Deductible	-0.3117	-0.3003

	(0.2115)	(0.2335)
Premium	-0.0821**	-0.1000**
	(0.0141)	(0.0160)
Observations	0.193	0.195
R-squared	31,820	31,820

*Note: * p < 0.05, ** p < 0.001*. This table presents the estimated utility coefficients for the simulation exercises; standard errors clustered at the teacher level.

Online Appendix Table 10—Working Conditions Estimates with Diminishing Marginal Returns for Simulation Exercises

	Linear (1)	Quadratic (2)
Starting salary	0.0846**	0.0787**
	(0.0013)	(0.0016)
Time-to-tenure	-0.0424**	-0.0450**
	(0.0036)	(0.0037)
Review frequency	-0.0028	-0.0065
	(0.0037)	(0.0037)
Commute time (mins)	-0.0045**	-0.0026**
	(0.0005)	(0.0006)
Class size	-0.0502**	0.0916*
	(0.0011)	(0.0289)
Class size sqr.		-0.0029**
		(0.0006)
Assistance (hrs/wk)	0.0217**	0.0351**
	(0.0008)	(0.0039)
Assistance sqr.		-0.0018**
		(0.0005)
Observations	0.279	0.281
R-squared	31,574	31,574

*Note: * p < 0.05, ** p < 0.001.* This table presents the estimated utility coefficients for the simulation exercises; estimates are adjusted so that they are directly comparable to the coefficient estimates in prior table. Standard errors clustered at the teacher level.

ONLINE APPENDIX TABLE 11—ESTIMATED EFFECTS OF COMPENSATION ON RETENTION

	Transfer Districts (1)	Depart Profession (2)
Salary_{t+4}	-0.011	-0.007
	(0.009)	(0.012)
Salary_{t+3}	-0.013	-0.008
	(0.009)	(0.012)
Salary_{t+2}	-0.005	0.012
	(0.009)	(0.012)
Salary_{t-1}	-0.032***	-0.028*
	(0.009)	(0.012)
Salary_{t}	0.028*	-0.180***
	(0.012)	(0.015)
Salary_{t-1}	-0.040***	0.001
	(0.009)	(0.012)
Salary_{t-2}	-0.014	0.017
	(0.008)	(0.011)
Salary_{t-3}	0.002	-0.022*
	(0.008)	(0.011)
Salary_{t-4}	-0.016*	0.007
	(0.007)	(0.010)
District-year FE	X	X
Experience-district FE	X	X
Experience-year FE	X	X
Mean outcome	5.25	10.00
Adjusted R-squared	0.043	0.061
Observations	3,154,921	3,154,921

*Note: * $p < 0.05$, ** $p<0.01$, *** $p < 0.001$.* This table presents the relationship between teacher departures and a distributed lag model of the salary schedule. The outcome variable in column (1) is teacher departures to other school districts. The outcome variable in column (2) is teacher departures from the profession. Data from the Texas Education Agency; standard errors clustered by teacher.

ONLINE APPENDIX TABLE 12—RELATIONSHIP BETWEEN UNION INFLUENCE AND BENEFIT SHARE

	Benefit share (1)	Benefit share (2)	Benefit share (3)
Union strength	0.0260**	0.0274**	0.0278**
	(0.006)	(0.007)	(0.007)
Salary level	No	Yes	No
Salary bins	No	No	Yes
Mean DV	0.355	0.355	0.355
Observations	14,389	14,389	14,389
R-squared	0.187	0.192	0.268

*Note: * $p < 0.05$, ** $p < 0.001$.* This table presents the relationship between union strength and the share of a teacher's compensation received in benefits. Data from LEFS; standard errors clustered at the state level.

ONLINE APPENDIX TABLE 13—EXPERIENCE HETEROGENEITY IN COMPENSATION PREFERENCES

	Linear Probability			
	Novice teachers (1st quartile: 0-1 yrs)	New-teacher differential (2nd quartile: 2-6 yrs)	Experienced-teacher differential (3rd quartile: 7-14 yrs)	Veteran-teacher differential (4th quartile: 15-36 yrs)
	(1)	(2)	(3)	(4)
Starting salary	0.093**	0.001	-0.009*	-0.029**
	(0.003)	(0.004)	(0.004)	(0.004)
Salary growth	0.205**	-0.019	-0.025*	-0.02
	(0.011)	(0.012)	(0.011)	(0.012)
Bonus amount	0.026**	0.009	0.013	-0.005
	(0.005)	(0.008)	(0.007)	(0.008)
VAM only	-0.077**	0.014	0.003	-0.012
	(0.017)	(0.018)	(0.018)	(0.017)
Replacement	0.012**	0.001	0.003*	0.006**
	(0.001)	(0.001)	(0.001)	(0.001)
401k-style	0.079**	-0.012	0.011	-0.014
	(0.014)	(0.020)	(0.020)	(0.020)
Premium (yearly)	-0.064*	-0.01	-0.013	-0.057
	(0.022)	(0.037)	(0.036)	(0.036)
Deductible	-0.589*	-0.062	0.265	0.965**
	(0.221)	(0.156)	(0.149)	(0.151)

*Note: * $p < 0.05$, ** $p < 0.001$.* This table presents a heterogeneity analysis by interacting each attribute with dummies identifying different levels of teacher experience. Standard errors clustered at the teacher level.

ONLINE APPENDIX TABLE 14—EXPERIENCE HETEROGENEITY IN WORKING-CONDITION PREFERENCES

	Linear Probability			
	Novice teachers	New-teacher differential	Experienced-teacher differential	Veteran-teacher differential
	(1st quartile: 0-1 yrs)	(2nd quartile: 2-6 yrs)	(3rd quartile: 7-14 yrs)	(4th quartile: 15-36 yrs)
	(1)	(2)	(3)	(4)
Probationary period	-0.045**	-0.007	0.003	0.002
	(0.005)	(0.007)	(0.006)	(0.006)
Term length	-0.003	-0.010	0.003	0.005
	(0.005)	(0.007)	(0.007)	(0.007)
Commute time	-0.005**	0.001	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Class size	-0.054**	0.000	0.000	0.004*
	(0.002)	(0.002)	(0.002)	(0.002)
Assistance	0.021**	0.000	0.004*	0.005*
	(0.001)	(0.002)	(0.002)	(0.002)

*Note: * $p < 0.05$, ** $p < 0.001$.* This table presents a heterogeneity analysis by interacting each attribute with dummies identifying different levels of teacher experience. Standard errors clustered at the teacher level.

ONLINE APPENDIX TABLE 15—EXPERIENCE HETEROGENEITY IN STUDENT/PRINCIPAL PREFERENCES

	Linear Probability			
	Novice teachers	New-teacher differential	Experienced-teacher differential	Veteran-teacher differential
	(1st quartile: 0-1 yrs)	(2nd quartile: 2-6 yrs)	(3rd quartile: 7-14 yrs)	(4th quartile: 15-36 yrs)
	(1)	(2)	(3)	(4)
Percent low income	-0.031**	0.001	-0.001	0.010
	(0.005)	(0.007)	(0.007)	(0.007)
Percent minority	-0.001	0.003	0.006	0.009*
	(0.003)	(0.004)	(0.004)	(0.004)
Ave. achievement	0.048**	-0.006	-0.010	0.018*
	(0.005)	(0.009)	(0.008)	(0.008)
Supportive principal	0.722**	0.014	0.049	0.126**
	(0.020)	(0.032)	(0.030)	(0.029)
Blue bus	0.001	0.022	0.009	0.007
	(0.016)	(0.026)	(0.024)	(0.024)

Note: * $p < 0.05$, ** $p < 0.001$. This table presents a heterogeneity analysis by interacting each attribute with dummies identifying different levels of teacher experience. Standard errors clustered at the teacher level.

ONLINE APPENDIX TABLE 16—SEX HETEROGENEITY IN COMPENSATION PREFERENCES

	Linear Probability	
	Female teachers	Male differential
	(1)	(2)
Starting salary	0.082**	0.011**
	(0.002)	(0.003)
Salary growth	0.192**	-0.001
	(0.009)	(0.011)
Bonus amount	0.030**	-0.005
	(0.004)	(0.007)
VAM only	-0.079**	0.011
	(0.015)	(0.016)
Replacement	0.015**	0.000
	(0.001)	(0.001)
401k-style	0.084**	-0.035
	(0.011)	(0.018)
Premium (yearly)	-0.093**	0.053
	(0.016)	(0.033)
Deductible	-0.211	-0.513**
	(0.214)	(0.134)

*Note: * $p < 0.05$, ** $p < 0.001$.* This table presents a heterogeneity analysis by interacting each attribute with dummies identifying male teachers. Standard errors clustered at the teacher level.

Online Appendix Table 17—Sex Heterogeneity in Working-Condition Preferences

	Linear Probability	
	Female teachers	Male differential
	(1)	(2)
Probationary period	-0.043**	-0.008
	(0.004)	(0.006)
Term length	-0.003	0.002
	(0.004)	(0.006)
Commute time	-0.005**	0.000
	(0.001)	(0.001)
Class size	-0.055**	0.007**
	(0.001)	(0.002)
Assistance	0.025**	-0.008**
	(0.001)	(0.002)

*Note: * $p < 0.05$, ** $p < 0.001$.* This table presents a heterogeneity analysis by interacting each attribute with dummies identifying male teachers. Standard errors clustered at the teacher level.

ONLINE APPENDIX TABLE 18—SEX HETEROGENEITY IN STUDENT AND PRINCIPAL PREFERENCES

	Linear Probability	
	Female teachers	Male differential
	(1)	(2)
Percent low income	-0.027**	-0.005
	(0.003)	(0.006)
Percent minority	0.004*	-0.001
	(0.002)	(0.004)
Ave. achievement	0.048**	0.000
	(0.004)	(0.008)
Supportive principal	0.792**	-0.130**
	(0.013)	(0.027)
Blue bus	0.015	-0.028
	(0.012)	(0.022)

*Note: * p < 0.05, ** p < 0.001.* This table presents a heterogeneity analysis by interacting each attribute with dummies identifying male teachers. Standard errors clustered at the teacher level.

ONLINE APPENDIX TABLE 19—RACIAL HETEROGENEITY IN COMPENSATION PREFERENCES

	Linear Probability		
	White teachers	Black differential	Hispanic differential
	(1)	(2)	(3)
Starting salary	0.082**	0.004	0.008*
	(0.003)	(0.003)	(0.004)
Salary growth	0.213**	-0.048**	-0.017
	(0.011)	(0.010)	(0.011)
Bonus amount	0.011*	0.037**	0.023*
	(0.005)	(0.006)	(0.007)
VAM only	-0.086**	0.028	0.005
	(0.016)	(0.015)	(0.017)
Replacement	0.016**	-0.001	-0.002
	(0.001)	(0.001)	(0.001)
401k-style	0.059**	0.035*	0.024
	(0.013)	(0.016)	(0.019)
Premium (yearly)	-0.077**	-0.002	-0.02
	(0.021)	(0.030)	(0.035)
Deductible	-0.239	-0.067	-0.247
	(0.221)	(0.127)	(0.148)

*Note: * $p < 0.05$, ** $p < 0.001$.* This table presents a heterogeneity analysis by interacting each attribute with dummies identifying black teachers and Hispanic teachers. Standard errors clustered at the teacher level.

Online Appendix Table 20—Racial Heterogeneity in Working-Condition Preferences

	Linear Probability		
	White teachers	Black differential	Hispanic differential
	(1)	(2)	(3)
Probationary period	-0.037**	-0.021**	-0.003
	(0.005)	(0.005)	(0.006)
Term length	0.002	-0.014*	0.000
	(0.005)	(0.006)	(0.007)
Commute time	-0.006**	0.001	0.001
	(0.001)	(0.001)	(0.001)
Class size	-0.055**	0.007**	-0.005*
	(0.001)	(0.002)	(0.002)
Assistance	0.023**	0.001	-0.001
	(0.001)	(0.002)	(0.002)

*Note: * $p < 0.05$, ** $p < 0.001$.* This table presents a heterogeneity analysis by interacting each attribute with dummies identifying black teachers and Hispanic teachers. Standard errors clustered at the teacher level.

Online Appendix Table 21—Racial Heterogeneity in Student and Principal Preferences

	Linear Probability		
	White teachers	Black differential	Hispanic differential
	(1)	(2)	(3)
Percent low income	-0.031**	0.008	-0.002
	(0.004)	(0.006)	(0.007)
Percent minority	0.000	0.011*	-0.001
	(0.003)	(0.003)	(0.004)
Ave. achievement	0.058**	-0.021*	-0.008
	(0.005)	(0.007)	(0.008)
Supportive principal	0.809**	-0.065*	-0.099**
	(0.017)	(0.024)	(0.030)
Blue bus	0.013	-0.014	0.005
	(0.014)	(0.020)	(0.024)

*Note: * $p < 0.05$, ** $p < 0.001$.* This table presents a heterogeneity analysis by interacting each attribute with dummies identifying black teachers and Hispanic teachers. Standard errors clustered at the teacher level.

ONLINE APPENDIX TABLE 22—GRADE-LEVEL HETEROGENEITY IN COMPENSATION PREFERENCES

	Linear Probability		
	Elementary School	Middle School	High School
	(1)	(2)	(3)
Starting salary	0.090**	0.002	0.001
	(0.003)	(0.004)	(0.004)
Salary growth	0.193**	0.003	-0.007
	(0.012)	(0.012)	(0.013)
Bonus amount	0.035**	-0.001	-0.017*
	(0.006)	(0.008)	(0.008)
VAM only	-0.074**	0.010	0.011
	(0.019)	(0.018)	(0.019)
Replacement	0.014**	0.000	0.000
	(0.001)	(0.001)	(0.001)
401k-style	0.079**	-0.010	0.011
	(0.015)	(0.021)	(0.022)
Premium (yearly)	-0.061*	0.009	-0.07
	(0.025)	(0.038)	0.039
Deductible	-0.286	-0.082	0.043
	(0.167)	(0.156)	(0.167)

*Note: * p < 0.05, ** p < 0.001.* This table presents a heterogeneity analysis by interacting each attribute with dummies identifying school type. Standard errors clustered at the teacher level.

ONLINE APPENDIX TABLE 23— GRADE-LEVEL HETEROGENEITY IN WORKING-CONDITION PREFERENCES

	Linear Probability		
	Elementary School	Middle School	High School
	(1)	(2)	(3)
Probationary period	-0.038**	-0.017*	-0.022*
	(0.005)	(0.006)	(0.007)
Term length	0.006	-0.010	-0.014
	(0.006)	(0.012)	(0.007)
Commute time	-0.004**	-0.001	-0.001
	(0.001)	(0.001)	(0.001)
Class size	-0.062**	0.011**	0.016**
	(0.002)	(0.002)	(0.002)
Assistance	0.023**	0.001	-0.004
	(0.001)	(0.002)	(0.002)

*Note: * $p < 0.05$, ** $p < 0.001$.* This table presents a heterogeneity analysis by interacting each attribute with dummies identifying school type. Standard errors clustered at the teacher level.

Online Appendix Table 24— Grade-Level Heterogeneity in Student and Principal Preferences

	Linear Probability		
	Elementary School	Middle School	High School
	(1)	(2)	(3)
Percent low income	-0.029**	-0.004	-0.008
	(0.005)	(0.007)	(0.007)
Percent minority	0.000	0.006	0.008
	(0.003)	(0.004)	(0.004)
Ave. achievement	0.038**	0.004	0.012
	(0.006)	(0.008)	(0.009)
Supportive principal	0.757**	0.034	0.012
	(0.022)	(0.031)	(0.033)
Blue bus	0.023	-0.011	-0.057*
	(0.018)	(0.025)	(0.027)

*Note: * $p < 0.05$, ** $p < 0.001$.* This table presents a heterogeneity analysis by interacting each attribute with dummies identifying school type. Standard errors clustered at the teacher level.