Are Public Pensions Regressive?

Calculating Internal Rates of Return for Public School District Salary Schedules

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Abstract

In defined benefit pension systems based on final average salary calculations, benefits are not directly tied to contributions. We use the salary schedules from 490 Missouri school districts to determine the internal rate of return on contributions for a career teacher in each district. We then analyze the relationship between school district characteristics and the internal rate of return. We find that the internal rate of return varies markedly among school districts, with affluent school districts benefiting disproportionately. As such, the Missouri teacher pension system tends to be regressive.

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The popular consensus is that defined benefit (DB) pension systems for public employees provide a secure retirement for workers. There is growing concern, however, about the financial stability of these systems. Pew Charitable Trusts (2017) calculated the nation's public pension systems had as much as $1.1 trillion in unfunded liabilities in 2015. In places such as Detroit, Michigan and Stockton, California, unfunded pension liabilities have led the cities toward bankruptcy (Egan 2017). In Illinois, some are forecasting when teacher pension obligations will surpass all K-12 expenditures; and it is not that far away (Dabrowski and Klingner 2016). While investigating the funding levels of these large retirement systems is important, it is also important for policymakers to also understand how plan structure may result in inequitable outcomes for individuals. In most DB plans, individuals contribute varying amounts based upon their income and receive different benefit amounts. These benefits are not tied directly to contributions in systems which use a final average salary window that is less than the entire career worked.

In this paper, we explore how the structure of the pension system may lead to a regressive benefit structure in which high-end earners receive relatively larger returns on their pension investments compared to relatively low-end earners. Issues regarding underfunding of pensions might be addressed by increasing contributions, reducing benefits, larger investment returns, or some combination of the three. None of these, however, would address the issue outlined here in regards to the regressive nature of pension benefits.

This paper adds to the pension literature by examining the relationship between pension contributions and benefits. For our analysis, we use data from the salary schedules of 490 Missouri school districts. Using these salary schedules, we compute the internal rate of return for a career teacher in each school district and examine how the variation in IRR relates to observable school district characteristics. These data were merged with publicly available data from the Missouri Department of Elementary and Secondary Education. Similar to many other DB systems, Missouri uses a relatively short Final Average Salary (FAS) of three years to calculate pension benefits. In this system, a teacher's annual pension benefit is determined by her three highest consecutive salaries, usually her last three years working.

Our study has two main research questions:

(1). What is the internal rate of return (IRR) for a career teacher in each Missouri school district?

(2). What school district characteristics are related to a district's IRR?

Because benefits are calculated on a narrow band of time, it is possible for rates of return to vary substantially between districts, depending on the structure of their salary schedule. Using the salary schedules, we estimate the value of pension contributions and pension benefits. We then calculate an internal rate of return for each district, which indicates whether a salary schedule generates relatively large or small returns on contributions. We then analyze the relationship between observable school characteristics and the salary schedule.

Though this analysis relies on data from public school districts, conclusions can be drawn for all DB pension systems which are designed in a similar manner as that of Missouri's teacher

retirement system (See Table 1 for a summary of the plan's features). That is, our findings about variation in rates of return should generalize to all DB systems with a short FAS calculation in which workers have varying earnings profiles. In short, our findings have implications for a great many public employee retirement plans throughout the country.

Table 1 here

In the following sections, we examine the literature related to DB pension plans, especially those for teachers. We then discuss the methodology we use to analyze Missouri's largest teacher pension plan. Next, we show the results of our analyses. We follow this with a discussion about our findings and possible implications for public policy. Finally, we offer some closing comments.

Literature Review

Retirement security was one of the main justifications for the establishment of pension plans. Today, many Americans still worry about retirement security. Each year, since 2001, Gallup has polled Americans about their financial concerns and retirement security has been the number one concern every time (McCarthy 2016). For public sector workers, some of this concern has been alleviated because of DB pension plans which promise a specific payout. This is one reason the nation's two largest teachers' unions, the American Federation of Teachers (2017) and the National Education Association (2017), are strong supporters of DB plans.

It is important here to note the differences between DB plans which rely on a short FAS and other retirement plans, such as defined contribution (DC) plans which may be similar to a 401(k). In the former, benefits are based on a formula. Typically:

$$(1)\ Benefit = Years\ of\ Service \times Final\ Average\ Salary \times Multiplier$$

In the latter, benefits are largely dependent upon contributions where the value of a worker's benefits is related directly to the contributions she has made and the interest she has earned.

The literature has identified numerous differences between DB plans and DC plans. The biggest difference is in terms of risk. As Broadbent, Palumbo, and Woodman (2006) point out, the employer shoulders most of the risk in DB pension plans. This includes the risk associated with investment returns and the length of retirement. DB plans essentially guarantee a specific benefit to retirees. This benefit is constant, regardless of how investments perform or how long the individual draws from the retirement account. In many DC plans, the risk shifts from the employer to the employee. Risk is an important component when it comes to retirement security.

Another key difference between DB and DC plans is wealth accrual. DC plans typically have smooth wealth accrual (McGee & Winters 2013). In a DC plan, the benefit is worth the cumulative value of contributions and interest each year. As such, there is typically no vesting period in terms of a specified benefit (though some DC plans do have a vesting requirement for employer contributions.) DB plans with a final average salary component, on the other hand, are backloaded (Aaronson & Coronado 2005; Broadbent, Palumbo, & Woodman 2006). The benefits are worth very little early in a worker's career and increase rapidly as the individual approaches retirement.

This has important implications for worker mobility. As Broadbent, Palumbo, and Woodman (2006) note, "All else being equal, mobile workers have less of a preference for DB pensions because traditional benefit formulas are "backloaded", favoring long-tenured employees, and because DB benefits are not portable from one employer to another" (p. ii). Indeed, switching jobs before reaching a peak retirement age can significantly reduce pension benefits (Aaronson & Coronado 2005). Missouri currently has three separate teacher pension plans. The largest plan, which all of the schools in this study belong to, is the Public School Retirement System (PSRS). Separate plans exist for Kansas City and St. Louis. Koedel, et al. (2014) estimated that a teacher who splits a 30 year career between two systems would have a pension benefit worth half as much as an individual who works an entire 30 years in one system. Costrell and Podgursky (2010) suggest mobility costs for teachers can exceed hundreds of thousands of dollars.

Indeed, as Costrell and Podgursky (2009) point out, the backloaded structure of many FAS-based DB pension systems actually creates risk for the worker (p.205). A given worker may not know how long she will stay in one place when she starts her career. If she decides to work in a different retirement system or to leave the profession before her benefit values peak, her pension wealth will generally be much lower than it would have been if she had stayed in one place.

Many suggest DB retirement plans help attract and retain workers (Kimball, Heneman III, Kellor 2005), however, the research on this is mixed. The backloaded design of FAS-based DB plans acts as a "pull" towards retirement, especially for individuals who are drawing closer

to retirement (Costrell & McGee 2010). In that circumstance, DB plans seem to increase retention. Once individuals hit the peak retirement age, however, the plan pushes individuals out (Anderson & Brainard 2004; Costrell & McGee 2010). In education, most pension plans encourage retirement as a teacher approaches 25 to 30 years of experience in a single retirement system.

Anderson and Brainard (2004) suggest this pushout serves a useful purpose: "The orderly turnover of personnel" (p. 10). Indeed, Graebner (1978) noted this as one of the prime reasons for the creation of pension plans. Of course, incentivizing individuals to leave the workforce may have some unintended consequences. As Koedel, Podgursky, and Shi (2013) have shown, this policy may push some highly effective teachers out of the classroom. In contrast, DC plans do not encourage early retirement because wealth continues to grow at a smooth rate throughout a worker's career (Butrica et al. 2006).

It is clear that teachers react to the pension system as they approach retirement age (Costrell & McGee 2010). The literature, however, is sparse when it comes to assessing teachers' knowledge about their plans or about their relative support for DB plans at various stages of experience. There is some evidence to suggest teachers undervalue their retirement benefits. Fitzpatrick (2015) examined Illinois teacher retirement data. A change in policy allowed her to estimate the value teachers place on their benefit. She wrote, "This evidence suggests that, at the margin, public employees would prefer increases in current salary to increases in pension benefits of the same present discounted value" (p. 4). It may be the case, therefore, that pension benefits might be less effective at attracting teachers than higher salaries.

Although proponents of DB pension plans suggest they provide a better benefit and more secure retirement, some evidence suggests public workers value some of the benefits offered by DC plans. As such, a hybrid plan may be appealing to public workers. In a natural experiment in Washington State, Goldhaber and Grout (2016) examine the choices made by teachers when they were offered the opportunity to select into different types of retirement plans. The majority of teachers chose the hybrid plan. They conclude that pension policies, which include a DC component may not be less desirable for teachers or other public sector workers and could provide a commensurate level of retirement security.

DB plans also exist in the private sector; they are, however, becoming rare. Butrica et al. (2009) reported, "From 1980 through 2008, the proportion of private wage and salary workers participating in DB pension plans fell from 38 percent to 20 percent" (p. 1). Aaronson and Coronado (2005) explain that much of the shift from DB to DC plans in the private sector has arisen because of changes in the labor market. Jobs that used to require manual labor have largely changed because of technological advances. Moreover, workers tend to switch jobs more often. As such, some researchers suggest employees prefer DC plans because they are more portable that DB plans (Butrica et al. 2009; Broadbent, Palumbo, and Woodman 2006; Munnell & Soto 2007).

Another reason for the shift away from DB plans in the private sector may simply be the cost. Public pensions are allowed to use accounting practices that are not allowed in the private sector (Biggs 2010). This allows public pensions to undervalue the Unfunded Actuarial Accrued Liability (UAAL). In the public sector, this debt is transferred to taxpayers or future workers.

Backes et al. (2016) estimate, “On average across state plans, UAAL costs are more than 10% of current teachers’ earnings” (p. 374). They estimate that this “intergenerational resource transfer” creates a situation where many current teachers will pay more into the retirement system than they will ever get out.

Like Backes et al (2016), others have concluded that benefits teachers receive from their pension system may not be worth as much as the value of their contributions (Aldeman & Johnson 2015; Aldeman & Robson 2017; Lueken 2017). Using data on all 50 states from the Urban Institute’s State and Local Employee Pension Plan database, Aldeman and Johnson (2015) estimate when a teacher’s benefits will be worth more than their own contributions. They find the median teacher must work 25 years for this to happen. They note that teacher turnover will leave many teachers with benefits less than their own contributions. In total, they estimate three-fourths of teachers will not break even in their current DB system. Aldeman and Robson (2017) use a similar analytical strategy, but break out the percentage of teachers who will benefit in each state. In Missouri, they estimate that 58 percent of teachers will vest in the pension system and 38 percent will break even. Similarly, Lueken (2017) determined the crossover point, the point at which benefits surpass the value of the individual’s contributions, for the largest school district in each state. For the 51 districts in his analysis, the median crossover point is 25 years.

In their analyses, Aldeman and Johnson (2015) used the same hypothetical salary schedule for each state. Meanwhile, Lueken (2017) used the salary schedule for the largest district in each state. As Shuls (2017) noted, school districts within a state have markedly different salary schedules. The shape of a salary schedule may lead to different crossover point

for teachers at different school districts within a state. Using salary schedules from 464 Missouri school districts, he estimates how changing the number of years in the FAS would impact retirement benefits for career teachers in each district. He concludes the current DB system, with a three-year FAS favors school districts with a steeper salary schedule. These school districts tend to be the more affluent school districts.

Methodology

This study builds upon the recent pension research which considers the relationship between pension contributions and pension benefits and upon Shuls' (2017) work looking directly at the shape of salary schedules. For this study, teacher salary schedules for the 2014-2015 school year were obtained from each of 490 out of the 515 school districts in Missouri's Public School Retirement System (PSRS). We requested salary schedules from a total of 515 school districts. Twenty-four school districts failed to respond, despite multiple requests. One school district indicated they did not use a salary schedule. Nearly 400 schedules were obtained from the Missouri School Board Association's "Salary Schedule Bank" (2015). Additional schedules were obtained using email requests sent directly to school districts. These data were merged with publicly available data from the Missouri Department of Elementary and Secondary Education (DESE) (2017), which included data on student demographics, teacher employment, and district finances.

Descriptive statistics were used to determine if any systematic differences existed between the 490 districts for which salary schedules were obtained and the 25 districts for which salary schedules were not obtained. We employed t-tests to identify variables for which

statistically significant differences existed between the two groups. The missing districts had lower average enrollment, fewer minority students, lower administrator salaries, fewer full-time equivalent teachers, lower average teacher salaries, fewer teachers with Master's degrees, higher per pupil expenditures, and lower assessed valuation than the districts for which salary data were obtained. In many respects, these districts were similar to the districts in Quartile 1 of the analysis below. There were not significant differences in percent of students qualifying for free and reduced price lunches, math and language arts test scores, or average teacher years of experience. In 2014, less than 1% of full-time equivalent teachers covered by PSRS were in the school districts not included in our sample.

As explained above, existing literature on teacher pensions highlights inequities between the value of benefits for teachers who stay in a single pension system for an entire career and teachers who move out of a pension system before their benefit values peak (Aldeman & Johnson 2015; Aldeman & Robson 2017; Lueken 2017). This paper highlights inequities that occur between districts for teachers who remain in a single district for a 30-year career. Even for these teachers, the difference between the time period used to determine contributions (the whole 30 years of salary) and the time period which determines benefits (only the highest three years of salary) makes it nearly inevitable that teachers' returns on their contributions will vary between districts.

In order to identify these inequities empirically, each district's salary schedule was used to create lifetime contribution and benefit values for a hypothetical teacher who remains in a

single district in PSRS for 30 years. For all districts, it was assumed that the teacher works with a Bachelor's degree for five years before obtaining a Master's degree.

Benefit values were calculated using current PSRS formulas. The salary schedules were then used to generate final average salary (FAS) values for each district. PSRS calculates the FAS by averaging a teacher's three highest consecutive years of salary. Once the FAS is calculated, PSRS calculates a teacher's annual benefit using the following formula:

$$(2)\ Annual\ Benefit_i = FAS_i \times YOS_i \times Multiplier$$

That is, the annual benefit for teacher *i* is equal to the teacher's FAS times his or her years of service times a multiplier. In the current formula, the multiplier is 2.5% (PSRS 2016a).

Each teacher in PSRS contributes 14.5% of his or her salary to the system each year. This contribution is matched by the district (PSRS 2016b). This paper estimates contribution values including employer contributions because those contributions are part of the teacher's compensation package and part of the opportunity cost to the teacher of Missouri's current pension system. Under a DC plan, employer contributions would belong to the teacher after vesting.

Based on these contribution values, internal rates of return (IRRs) were generated for each district. These IRRs were calculated using following the definition from the *Encyclopedia of Education Economics and Finance*: "The IRR is the discount rate at which all negative cash flows (cash outflows) and positive cash flows (cash inflows) of a project sum to zero after being discounted back to the present time" (Internal Rate of Return). That is, the IRR for a given district is the value IRR_i that makes the sum of discounted cash flows equal to zero:

$$(3)\ \sum_{t=0}^{59} \frac{F_{it}}{(1+IRR_i)^t} = 0$$

Where F_{it} represents teacher *i*'s cash flow (contribution or benefit) in year *t*. For each IRR, a 30-year retirement (slightly longer than the average Missouri life expectancy [Missouri Department of Health and Senior Services]) was assumed.

It is important at this point to note what type of information an internal rate of return does and does not provide. Since each IRR is the nominal annual return over a career in some district, the IRRs can be used to compare returns between districts. IRRs by themselves do not include any adjustment for inflation or for the returns possible in other retirement plans.

In order to assess the sensitivity of our results to inflation-driven increases in salary schedules and to the Cost of Living Adjustment (COLA) offered under PSRS, an alternate set of IRRs was calculated. The first step in this process was to adjust salary schedules upward by an annual inflation rate of 2.25% (this is the inflation rate assumed in PSRS' 2016 Comprehensive Annual Financial Report [CAFR]: 38). Pension benefits were then adjusted to account for these higher nominal salaries and for an annual COLA of 1.5% (also in accordance with the PSRS 2016 CAFR). The adjusted IRRs were almost perfectly correlated with the original IRRs ($r > 0.99$), indicating that our analysis of the variation between districts is robust to uniform inflation adjustments and COLA.

Once internal rates of return were calculated, two approaches were used to identify the characteristics of districts which were relatively better and worse off under the current system. First, a regression model was developed to explain the variation in IRRs between districts.

Second, districts were divided into quartiles by their rates of return and *t*-tests were used to identify which district characteristics displayed statistically significant differences between quartiles. Both weighted and unweighted quartiles were used. The unweighted quartiles consisted of four groups, each containing approximately the same number of districts. Analysis of the unweighted quartiles can be thought of as a district-level comparison. The weighted quartiles were generated using weights for the number of full-time equivalent teachers in each district. Each of the weighted quartiles has approximately the same number of teachers, so the analysis of weighted quartiles can be thought of as a teacher-level comparison.

A priori, it was expected that the salary schedules in smaller, less-well-funded rural districts would result in lower IRRs than the salary schedules in the wealthier suburban and urban districts. While many districts have to give raises to teachers early in their careers in order to retain their newer teaching staff, the pension itself serves as a retention incentive in the last few years of a 30-year career. It was expected that only the wealthier districts would be able to offer the late-career raises that help teachers maximize pension value. Additionally, the state has a mandated minimum salary for beginning teachers ($25,000 in the 2016-17 school year) and those with 10 years of experience and a master's degree ($33,000 in the 2016-17 school year) (MSTA 2016: 7). This was expected to lead to less variation in pay during the early years of teachers' careers than would otherwise exist.

Results

First, we display the internal rates of return among Missouri school districts. The overall distribution of rates of return is shown in Figure 1. As the histogram shows, the IRRs varied between 3.4% and 4.8% around a mean of 3.9%.

Figure 1 here

Districts were broken into quartiles by IRR. As expected based on Shuls (2017), districts with higher IRRs had steeper salary schedules. Figure 2 shows average salary schedules for the top and bottom (unweighted) quartiles.

Figure 2 here

A regression model was created to identify which district characteristics predict the variation in IRR. A limited version of the Box-Cox process indicated that all variables which did not take on 0 values in the sample should be logged. Conventional tests suggested the presence of heteroskedasticity, so White heteroskedasticity-robust standard errors were used in all specifications.

The initial model tested included two variables which further testing suggested were irrelevant: the percent of students qualifying for free and reduced price lunches, and the percent of students scoring proficient or advanced on state math tests (Table 2). Specifications that include these two variables are listed below for the sake of completeness. Rural, town, and urban/suburban districts were identified using the National Center for Educational Statistics' Urban-Centric Locale Categories (2007).

Table 2 here

Column 1 shows the results of the final regression estimation. Four results in Column 1 are important to note. First, a one percent increase in full-time equivalent teachers was associated with a .016% increase in IRR, holding all other included variables constant. In other words, FTE employment of teachers was positively associated with rate of return, even after correcting for the other variables in the model. Second, a one percent increase in assessed valuation was associated with a .012% increase in IRR, holding all other included variables constant. In other words, after correcting for other included factors, districts with higher assessed valuation show better returns for their retired teachers. Finally, the coefficients on the rural and town dummy variables show that district locations outside of urbanized areas are negatively associated with rates of return, after correcting for the other included variables.

For both the weighted and unweighted quartiles, the first quartile was compared to the second, third and fourth quartiles with t-tests. Tables 3 and 4 present these results.

Table 3 here

Table 4 here

These results show clear patterns which appear whether weighted or unweighted quartiles are used. Districts in Quartile 4 have larger enrollment and more teachers (even using unweighted quartiles), have fewer students qualified for free or reduced price lunches, pay teachers and administrators more, have substantially more teachers with Master's degrees, and are more likely to be in urbanized areas than districts in Quartile 1.

Both the weighted and unweighted quartiles show significantly lower per pupil expenditure (PPE) in Quartile 3 than in Quartile 1, and the unweighted quartiles show

significantly lower PPE in Quartile 4 than in Quartile 1. This result may seem to contradict the results on teacher and administrator salaries; we might expect PPE to be significantly higher in the higher-return quartiles. One reason for these results may be that Missouri provides financial assistance to school districts with fewer than 350 students; these districts are overrepresented in Quartile 1 (Shuls 2012). The larger districts in the higher quartiles may also benefit from economies of scale.

These analyses show that less affluent school districts, which tend to be small, rural districts, are at a disadvantage in the current pension system. Teachers who work a full career in these districts tend to receive a lower return on their investment than their counterparts in more affluent suburban and urban districts. It is possible that these findings may undervalue the difference between groups as salary is not the only thing considered in pension calculations. In addition to pay, teacher health care benefits are counted as part of a teacher's final average salary (PSRS 2017). It is likely that school districts which can afford higher salaries could also afford more generous health care benefits. This could increase the inequity among school districts.

Conclusion

Pension plans were designed to provide a secure retirement for workers. On one hand, they are tremendously successful at this. Pensions shift risk from the worker to the employer. For public sector workers, this typically means shifting risk to states and ultimately taxpayers. As such, pensions provide a sense of security for pensioners. Benefits are guaranteed and will never run out. This may be particularly appealing to teachers. In a small experiment, Bowen et. al (2015) noted that students entering the teaching profession appear to be relatively more risk

averse than those entering other professions. At the same time, however, DB pension plans with a short FAS appear to create a regressive benefit structure. As our IRR calculations show, nominal annual returns in Missouri can be anywhere between 3.4% and 4.8%, even for teachers who work a full career in a single district. Individuals with steeper earnings trajectories will have higher IRRs. Among public school districts in Missouri, more affluent school districts tended to have higher IRRs.

Our data are focused on district salary schedules. Therefore, our analysis suggests how much an individual will benefit by working an entire career in a single school district. This, of course, does not apply to all teachers. Many leave well before working 30 years and others move school districts. Still, our analyses support the important observations made by Shuls (2017). The pension system appears to favor larger districts with better-paid teachers and administrators who see large salary increases. These individuals tend to receive better returns on their pension contributions than smaller districts with lower teacher pay. This has even more importance in Missouri, where PSRS teachers do not belong to Social Security.

There are important differences between our study and recent related studies by Aldeman and Johnson (2015) and Lueken (2017). Our study uses 490 salary schedules from districts throughout the state of Missouri. Aldeman and Johnson (2015) conducted their analyses using a hypothetical teacher salary schedule. Meanwhile, Lueken (2017) used the largest school district in each state. For Missouri, he included the Springfield School District. As we show in our paper, the structure of salary schedules is very different among school districts. It is this variation in salary schedules that causes some individuals to benefit disproportionately more than others.

Importantly, benefits appear to accrue in a manner that is considered regressive in that high-end earners tend to receive larger returns to their investment in their retirement plan compared to their less affluent peers.

While our analysis is conducted using salary schedules from school districts in Missouri, it is important to understand how these findings generalize to other pension systems. Indeed, the principles outlined here are directly applicable for any DB pension plan that fits the following conditions: (1) pay varies among workers within the system and (2) benefits are determined by a calculation which does not take into account contributions, such as a FAS. This may apply to teachers in other states, firefighters, police officers, and various other public or private employees who belong to a DB pension plan. The magnitude of the variation in IRR will depend upon the shape of the salary profile for workers in each field and the benefit formula. Nevertheless, this type of system creates variation in returns that will, in some cases, be regressive.

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Tables and figures

Table 1: Summary of Missouri's Public School Retirement System. *Source:* Author's calculations from PSRS Comprehensive Annual Financial Report (2016) and PSRS (2018).

Plan Rules	
Contribution Rates	
Individual	14.5%
Employer	14.5%
Total	29.0%
Vesting	
5 Years of Service	
Retirement Eligibility	
Full benefit (multiplier = 2.5%):	
Age 60	
Years of Service = 30	
"Rule of 80", Age + Years of Service = 80	
(If Years of Service > 30; Multiplier = 2.55%)	
Final Average Salary	
Highest 3 consecutive years	
Benefit Formula	
$\text{Benefit} = \text{Years of Service} \times \text{Final Average Salary} \times \text{Multiplier}$	
COLAs	
Determined annually	
Cannot exceed 5% per year	
Cumulative COLA cannot exceed 80% of original benefit	
Average COLA 1982-2018 = 2.725%	
2017 COLA = 0.0%	

Figure 1: Histogram of Internal Rates of Return. *Source:* Author's calculations based on Missouri School Board Association (2015), Public School Retirement System of Missouri (2016), and district salary schedules.

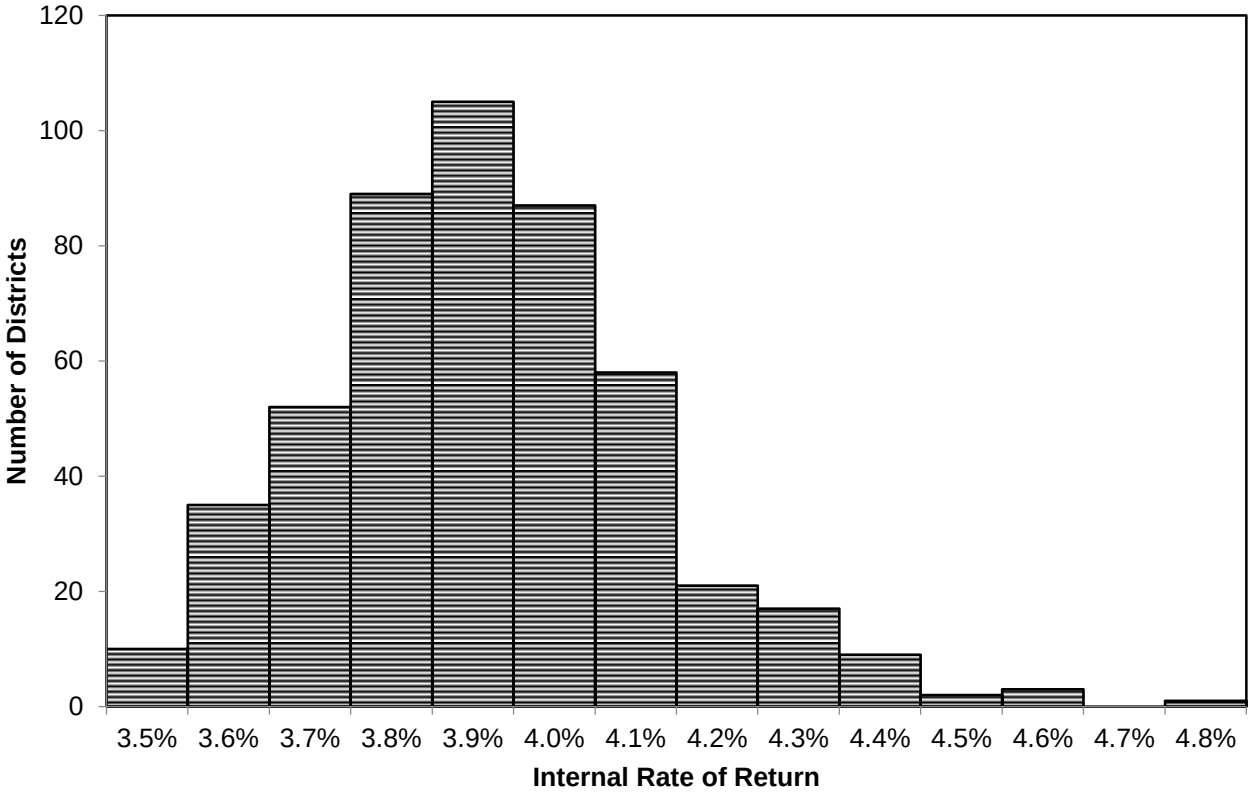

Figure 2: Top and Bottom Quartile Salary Schedules (Unweighted). *Source:* Author's calculations based on Missouri School Board Association (2015), Public School Retirement System of Missouri (2016), and district salary schedules.

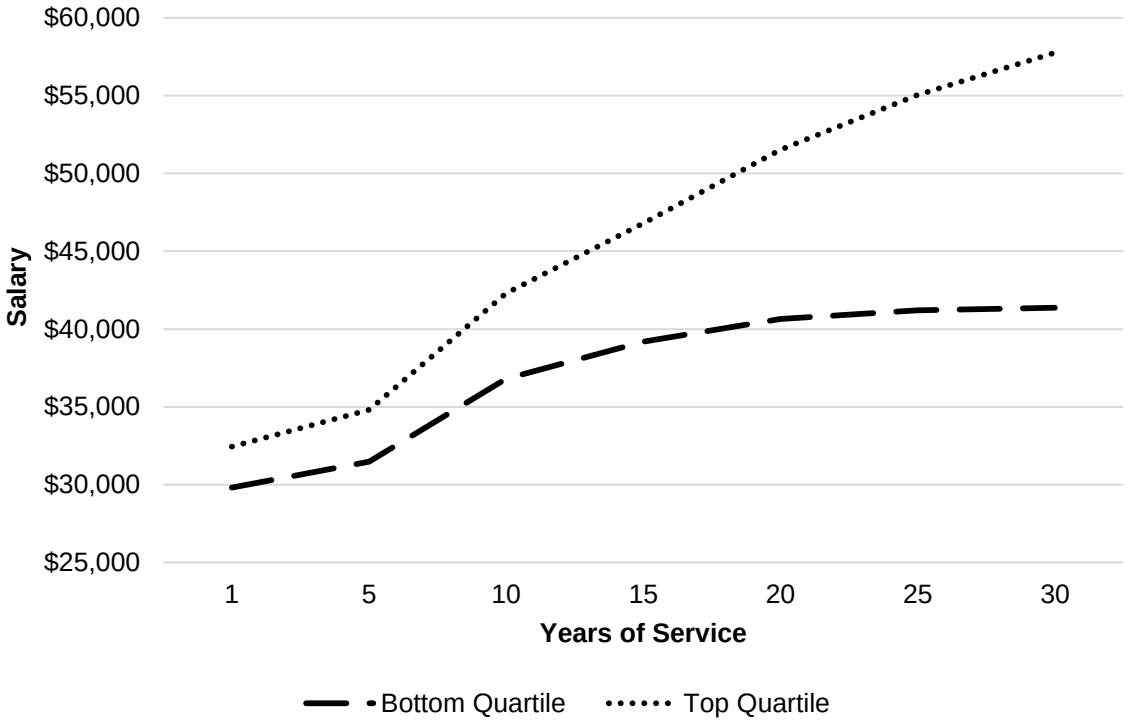

Table 2: OLS Regression Estimates (Dependent variable: natural logarithm of IRR; n=490).
Source: Author's calculations based on Missouri School Board Association (2015), Public School Retirement System of Missouri (2016), district salary schedules, and Missouri Department of Elementary and Secondary Education (2017).

Independent variable	(1)	(2)	(3)
Intercept	1.34***	1.32***	1.32***
	(0.13)	(0.13)	(0.13)
Full-Time Equivalent Teachers (2014) (Natural log)	0.016***	0.016***	0.016***
	(0.003)	(0.003)	(0.003)
Assessed Valuation per Pupil (2014) (Natural log)	0.012**	0.013**	0.013**
	(0.005)	(0.005)	(0.005)
Per Pupil Expenditure (2014) (Natural log)	-0.02	-0.02	-0.02
	(0.02)	(0.02)	(0.02)
Percent Minority Students (2015)	-0.02	-0.03	-0.03
	(0.02)	(0.02)	(0.02)
Percent of Students Proficient or Advanced in Math (2014) (Natural log)	-	-0.02	-0.02
		(0.01)	(0.01)
Percent of Students Qualified for Free or Reduced Price Lunch (2015)	-	-	-0.002
			(0.012)
Rural district	-0.02**	-0.02**	-0.02**
	(0.01)	(0.01)	(0.01)
Town district	-0.02*	-0.02*	-0.02*
	(0.01)	(0.01)	(0.01)
R^2	0.19	0.19	0.19

*p < 0.1; **p < 0.05; ***p < 0.01

Table 3: Mean Characteristics of Districts by IRR Unweighted Quartile. *Source:* Author's calculations based on Missouri School Board Association (2015), Public School Retirement System of Missouri (2016), district salary schedules, and Missouri Department of Elementary and Secondary Education (2017).

Characteristic	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Internal Rate of Return	3.6%	3.8%***	3.9%***	4.1%***
Enrollment (2015)	922	1114	1507**	3132***
Full-Time Equivalent Teachers (2014)	72	84	110**	220***
Percent of Students Qualified for Free or Reduced Price Lunches (2015)	57.4%	58.7%	57.1%	52.8%*
Percent Minority Students (2015)	9.2%	8.8%	9.4%	14.8%***
Percent of Students Proficient or Advanced in English Language Arts (2014)	52.4%	53.5%	52.9%	54.6%*
Percent of Students Proficient or Advanced in Math (2014)	53.5%	53.3%	52.7%	52.9%
Average Teacher Salary (2014)	$36,181	$36,733	$38,701***	$43,007***
Average Administrator Salary (2014)	$69,426	$71,791	$75,002***	$83,343***
Per Pupil Expenditure (2014)	$9,960	$9,566	$9,177***	$9,402***
Assessed Valuation per Pupil (2014)	$90,121	$90,379	$90,971	$105,186*
Average Teacher Years of Experience (2014)	12.0	12.1	12.0	12.4*
Percent of Teachers with Master's Degrees (2014)	44.4%	45.2%	46.0%	54.5%***
Rural District	83.7%	75.4%*	71.5%**	44.3%***
Town District	11.4%	18.9%*	18.7%*	28.7%***
City/Suburban District	4.9%	5.7%	9.8%*	27.0%***
N	123	122	123	122

*p < 0.1; **p < 0.05; ***p < 0.01

Table 4: Mean Characteristics of Districts by IRR Weighted Quartile (Weighting variable: FTE employment of teachers, 2014). *Source:* Author's calculations based on Missouri School Board Association (2015), Public School Retirement System of Missouri (2016), district salary schedules, and Missouri Department of Elementary and Secondary Education (2017).

Characteristic	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Internal Rate of Return	3.7%	3.9%***	4.0%***	4.3%***
Enrollment (2015)	964	1,335*	2,209***	4,980***
Full-Time Equivalent Teachers (2014)	75	98*	158***	344***
Percent of Students Qualified for Free or Reduced Price Lunches (2015)	59.0%	56.4%	54.8%*	48.8%***
Percent Minority Students (2015)	9.5%	8.7%	11.3%	20.8%***
Percent of Students Proficient or Advanced in English Language Arts (2014)	52.5%	53.5%	53.2%	57.1%***
Percent of Students Proficient or Advanced in Math (2014)	53.1%	53.1%	51.7%	56.6%*
Average Teacher Salary (2014)	$36,396	$37,821***	$41,058***	$46,900***
Average Administrator Salary (2014)	$70,079	$73,794***	$79,295***	$91,530***
Per Pupil Expenditure (2014)	$9,801	$9,275**	$9,278**	$9,721
Assessed Valuation per Pupil (2014)	$90,426	$90,500	$101,414*	$109,010*
Average Teacher Years of Experience (2014)	12.1	12.0	12.3	12.5*
Percent of Teachers with Master's Degrees (2014)	45.0%	45.0%	51.8%***	59.5%***
Rural District	79.8%	74.8%	53.7%***	28.6%***
Town District	15.2%	17.4%	28.4%***	26.2%*
City/Suburban District	5.1%	7.7%	17.9%***	45.2%***
N	198	155	95	42

*p < 0.1; **p < 0.05; ***p < 0.01