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Examining the Prevalence of Salary Spiking in Missouri's Defined Benefit Public School Retirement System

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A B S T R A C T

Salary spiking is the practice of boosting one's wages in the period just before retirement in order to reap larger retirement benefits. This may happen in Defined Benefit pension plans because they often do not base benefits on contributions, but on a formula, which takes into account a short window of time. Using two sources of data, school district salary schedules and actual teacher salaries for Missouri teachers, we estimate the prevalence of salary spiking. We do this by using seven years of actual salary data to forecast a worker's final three years then compare this forecast to the individual's actual wages. While we find evidence of salary spiking in all our samples and models, our estimates of spiking vary considerably across years. This suggests that some macro factors in the economy, possibly the lingering impacts of the great recession, may affect estimates of salary spiking.

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JEL classification: H55, J26, J33

1. Introduction

Unlike defined contribution plans, or similar 401(k) type retirement plans, defined benefit (DB) pension plans separate contributions from benefits. In other words, a worker's retirement benefits are not directly proportional to his or her contributions. Rather, in a DB pension system, a retiree's benefit payment is determined by a formula. These formulas typically multiply a final average salary (FAS) calculation, which is often based on a relatively narrow period of a worker's career, by years of service and a multiplier (which may vary depending upon length of service or other factors). The disconnect between contributions and benefits means workers may be able to take advantage of plan formulae in an effort to raise their retirement benefits.

One way this can be done is by "salary spiking." In theory, salary spiking is the act of significantly increasing pay during or just prior to the FAS period in an attempt to draw a larger retirement benefit. In practice, this might look like taking on extra duties or seeking a higher paying position within a pension system. To the individual, salary spiking may be very advantageous, resulting in significant financial gain. For example, the *St. Louis Post-Dispatch* reported a story of a superintendent leaving his school district for a one-year interim stint at another school district (Boch, 2013). This move substantially increased his pay and increased his FAS. As a result of that one extra year, his annual pension benefit increased $20,000.

Plan managers recognize that salary spiking can have deleterious impacts on a plan's financial health, as the benefits reaped may far outpace the additional contributions. These elevated payments cause a gap in the funded ratio of the pension plans, and further add to the unfunded liabilities. Underfunding of DB plans can lead to many negative outcomes, such as benefits or cost-of-living adjustments (COLAs) being held down for pensioners, increases in the mandatory contribution rates, or worse yet, plans may become insolvent.

To combat this practice of salary spiking, many plans put in place limits to the amount of wage growth an employee can have during or just prior to their FAS period. In Missouri's Public School Retirement System (PSRS) (2019), for instance, there is a 10 percent cap for calculating the FAS. However, this cap only limits extra pay earned while remaining in the same position. If a teacher changes jobs within a school district or moves to a higher paying district, the cap does not apply.

Although there appears to be widespread understanding of the potential for employees to engage in salary spiking, there is not much information about the prevalence of this practice. That is the topic of this research paper. Using two data sources, we analyze the extent to which school districts or teachers engage in salary spiking. First, we analyze the salary schedules of 490 public school districts. Teachers, by and large, are paid on a single salary schedule. These schedules indicate how much a teacher will earn for every year of experience. In this initial analysis, we examine whether school district salary schedules are designed to systematically enhance pay late in a teacher's career. Next, we use actual teacher salaries to examine whether individual retirees spike their salary. Individuals may be able to do this by moving districts, taking on extra duties, changing jobs, or a variety of other means.

To analyze whether teachers spike their salaries, we first project retiree's salaries for their three final years using various methods. We then compare their end-of-career salaries with the projected salaries. If an individual's salary is one percentage point higher than the projected salary, we call this "salary spiking." As a check, we then use this method to compare retirees to a group of non-retirees.

Our two main research questions are:

1. Do school districts systematically provide larger raises in the years just prior to retirement?
2. Do individual employees substantially increase their earnings in the years just prior to retirement.

Our results suggest there are not widespread instances of salary spiking in Missouri. School

District salary schedules tend to flatten out at the end of a teacher's career. Indeed, nearly 46 percent of the school districts in our analysis did not provide any raises in a teacher's 28th, 29th, or 30th year of teaching. These are typically the years just prior to retirement. The average annual salary increase of the salary schedules during these years is just 0.56 percent. Our initial analysis of individual retiree salaries indicates substantial numbers of teachers engage in spiking behavior. The percentage increases every year of our analysis from 2013 to 2016. However, we find a very similar pattern in our control group of non-retirees. This leads us to believe macro economy factors may have led us to misidentify individuals as spiking. We discuss this further in the sections below.

Section 2 of this paper will provide a review of the literature related to salary spiking or pension padding. Section 3 discusses our data sources and the methods used to analyze the prevalence of salary spiking. Section 4 presents the results of our analyses. Section 5 discusses our results and the difficulty in clearly estimating whether someone is engaging in salary spiking behavior.

2. Literature Review

According to the Bureau of Labor Statistics (2017), 75 percent of state and local government workers participate in a defined benefit pension plan. Ninety-eight percent of these plans calculate benefits via a final average salary formula, which takes into account a short period of their work service. Since benefits are not tied to contributions, it is possible for individuals to exploit the formula for personal financial gain. This possibility appears to be well understood by the popular media.

In 2015, the *Chicago Tribune* editorial board explained how public employees approaching retirement would "cash out for severance, unused vacation or sick days, or receive bonuses…in the months leading up to their retirements." This allowed the public employee to increase their final year salary, which is "a key factor in calculating the pensions they'll receive for the rest of their lives" (Chicago Tribune, 2015). In New York, then attorney general, Andrew Cuomo, called this practice of salary spiking fraud, "You have some people who work no overtime throughout their career and then the last year or the last couple of years, all of the sudden, do hundreds of hours of overtime just for purposes of increasing the salary and increasing the pension. That is not an agreed to cost. That is not what was fair and right" (Brown 2010).

Mannino and Cooperman (2015) systematically examined the prevalence of salary spiking and other pension enhancements in investigative news reports between the years of 2005 and 2012. They found 57 articles discussing various types of "abuses" which led to increased pension benefits. Many of the stories came from states with significant issues related to underfunding, such as California (20 stories) and Illinois (11 stories). They note the prevalence of these stories increased in the years following the great recession.

In addition to their analysis of news stories, Mannino and Cooperman (2015) also surveyed 55 pension plan managers about these practices. To varying degrees, plan managers noted the use of various ways in which employees could enhance their pension benefits. In many cases, provisions had been put in place to limit abuses of the system. These limitations may exclude some types of pay, such as bonuses, from pension calculations. Additionally, plans may cap the percent increase in salary within or just prior to the FAS window. An example of this was already mentioned in the Missouri PSRS caps of 10 percent.

Still, in some locations it appears policymakers and/or employers work together to help employees spike their salary. Beermann (2013) states that in Massachusetts, collective bargaining agreements can provide "longevity pay" for public workers just prior to retirement. He writes, "The employee informs the employer either one or three years in advance that they plan to retire and under the agreement, their

salary is boosted in recognition of their longevity" (p. 22). Other policies, such as "buybacks" allow employees to pay for years of service, but do not sufficiently cover the pension obligations also may allow employees to increase their retirement income.

While the practice of salary spiking appears to be well documented, or at least well understood, the academic literature is rather sparse in systematically examining the prevalence of salary spiking. In other words, it is not clear whether these one-off stories reported by newspapers are the exception or if they are a bellwether of a more expansive problem within the sector. It is important to better understand the extent of this problem. To date, only a handful of studies have attempted to do so.

In her analysis of pension spiking in Illinois, Fitzpatrick (2017) noted, "intergovernmental incentives embedded in the structure of earnings decisions lead to large end-of-career increases in earnings that are unlikely to be related to worker productivity" (p. 71). She notes that these end of career increases cost the Teachers' Retirement System of the State of Illinois $115 million per year. This, however, was before the implementation of a state-level pension reform policy that was intended to limit the large increases in earnings at the end of public school teachers' careers and change the distribution of earnings of the entirety of their careers without changing total compensation (Fitzpatrick 2017). Fitzpatrick found that this policy failed, since school districts were able to shift the timing of salary increases such that teachers continued to receive the same overall amount spread over more years.

Using data from 278 non-faculty retirees from three universities in Colorado and 846 retirees from Denver Public Schools, Mannino and Cooperman (2015) examine wage growth in the period prior to retirement. Since their dataset contained a short work history just prior to retirement, they "backcasted" wages for the retirees to fill in the gaps. They then compared actual salary growth to an indexed measure of salary growth for the general U.S. population. They found that the public employee retirees experienced much higher wage growth in the period prior to retirement than the indexed comparison groups.

There is, of course, a potential problem in the Mannino and Cooperman analysis. Since the wages of public employees are compared to an index, rather than to themselves, it is possible that the analysis identifies individuals as spiking their salaries when in fact they are receiving raises in proportion with their own earlier earnings trajectory. As noted by Goldhaber, Grout, and Holden (2018) this is indeed the challenge in identifying salary spiking in general. In their analysis of teachers in Washington State, they identify deviations in a teacher's end-of-career raises from his or her "own prior pattern of compensation" (p. 19).

Goldhaber, Grout, and Holden (2018) use two sources of data to estimate the prevalence of salary spiking in the Evergreen State. They find remarkably different results, 28.6 percent of teachers according to one data set and 3.2 percent in the other. They suggest this pronounced difference arises because of differences in reported salary. For instance, some administrative data sets inaccurately include earnings, which are not pensionable.

To date, these are the only three studies of salary spiking we found in the research literature. Goldhaber, Grout, and Holden (2018) note, "The difficulty of obtaining salary data of sufficient quality may be one reason that the issue of salary spiking has received relatively little attention in the academic literature" (p. 7). This paper adds to the scantly addressed academic literature on salary spiking by investigating the prevalence of salary increases at the end of careers in a plan that has already taken preventative measures to inhibit this behavior, PSRS of Missouri.

3. Data and Methods

3.1 Data Sources

Data for this analysis come from two different sources. First, we analyze the salary schedules of 490 public school districts. Teachers in these districts are paid based on a salary schedule, which specifies what a teacher will earn for each year of experience and with various levels of degrees. For instance, a beginning teacher could look at a salary schedule and determine what they would earn in each year for the rest of their career. Of course, districts periodically update their salary schedules by increasing pay at all or some points on the schedule. Thus, the salary schedule gives a snapshot of salaries for teachers at every year of experience at a single point in time. These schedules were obtained by the researchers. They came in a variety of formats, such as excel or pdf, and were entered into a single dataset. For our analysis, we assume a teacher will work for five years at the bachelor's level and then move to the master's schedule. Earning a master's degree in the first five years is very common as it is incentivized by the state's certification system and it is one way in which teachers may earn a pay raise.

Our second source of data was obtained from the Missouri Department of Elementary and Secondary Education (DESE). DESE regularly collects and updates teacher and district demographic data for their school districts through the Missouri Comprehensive Data System. For this study, a data request was submitted to the Office of Data System Management within DESE in order to obtain individual teacher and administrator salary data across the years of 2000-2017, 18 years' worth of data. Finance data and statistical summaries were provided along with demographic data for all districts within PSRS through guided inquiries within the Missouri Comprehensive Data System. These data were all aggregated for this analysis. For each teacher, the data report the employees' regular term salaries and their total salary. Regular term salary is the amount teachers are contracted to receive for their regular teaching duties, while total pay includes stipends for coaching, tutoring, or other types of extra duties. In this analysis, we focus on total pay. Table 1 provides general statistics regarding the dataset used.

Table 1: Teacher Summary Statistics

Category	Statistic
Average Total Salary at Retirement	$58,220
Average Final Average Salary at Retirement	$56,659
Percent of Participants who Changed Jobs in the Four Years Prior to Retirement	2.43%
Percent of Participants who Changed Districts in the Four Years Prior to Retirement	2.46%

Since we were interested in only full-time employees, teachers and administrators within these data were dropped if their total salary was less than or equal the state mandated minimum salary for a full-time teacher, $25,000. Additionally, teachers in special school districts and charter school districts were removed from these data. Finally, outliers were investigated, and three data points were removed due to peculiarly high levels for total salary which were likely due to entry error.

Unfortunately, these data do not indicate when a teacher or administrator retired from the field. Therefore, we had to infer retirement from the data. To do this, we identified individuals who appeared in the data with 25 years of service or more and then stopped appearing in the data. This is a noisy approximation for retirement for two reasons. First, some individuals may take a leave for a period of time and then continue working. Second, some individuals may "retire" to begin collecting benefits but keep working at a reduced rate. There are limitations on this practice, but it is possible. We attempt to address this issue in our analysis, which we detail later. Once we identified the retirees, we then

calculated their final average salary based on the worker's three highest consecutive salaries.

3.2 Research Methods

To determine whether school districts provide larger raises for teachers just prior to retirement, we analyze the salary schedules of 490 school districts. First, we calculate each district's average annual raise during years 28, 29, and 30 on the salary schedule. We then divide the districts into terciles based on end of career raises. We visually present the average salary schedules for districts in each tercile. We then examine each district's raises to determine if any districts provide sizable raises at the end of a teacher's career or raises that seem to be substantially larger than raises at earlier points in a teacher's career.

When examining individual salaries, we follow Goldhaber, Grout, and Holden (2018) and use an empirical strategy wherein each individual was investigated for salary spiking relative to his or her own work history. Whether or not a participant was spiking their salary in order to get an increased retirement benefit was determined by a salary projection that splined a curve from previous salary levels of the individual. A curve was splined for each individual, and a deviation from this splined curve by a certain amount would imply that raises in the last 3 years of their career were higher than expected based on salary increases in seven years prior. This process involved limiting our dataset to those who both retired in this timeframe and had at least 10 years of service, along with being present in these data for the 10 years prior to retirement; after this limitation, the dataset still contained over 4,000 individuals.

Due to the shape of salary schedules, where the growth in salary tends to be flat in the last few years before retirement (Shuls 2017), the initial thought was that the projection should follow a similar functional form that would account for this flattening in the latter years. However, that would force the projection to take a shape that may not be indicative of the actual growth of that individual. Since this was the case, a linear projection of the salary was used in order to grant higher salary growth projections than theoretically assumed from district salary schedules. If, then, there were indications of spiking, there could be errors, but they would be on the conservative side, underpinning just how much these participants were spiking. We identify individuals as spiking if their actual wage growth was one percentage point higher than their expected wage growth.

Additionally, we forecasted salaries using an assumed two percent annual wage growth during the retirees final three years in the field. Here again, we identified individuals as spiking if their actual wage growth was at least one percentage point higher than these forecasts (3 percent growth or more) in the final three years. Our results for this analysis were very similar to our linear projections. Therefore, we present only the linear projection results below.

Within both projection frameworks, we analyze the entire sample and two samples with further limitations. In our second sample, we removed individuals who had a downward trend in their salary in the 7 years prior to retirement. This would indicate that the participant was gradually decreasing their workload prior to retirement and could also mean that the participant had already retired and had taken on a small temporary role in retirement. This policy is allowed in Missouri with some restrictions. Participants were not removed if the downward trend was only slight, since this would mean that, in all likelihood, they are taking on fewer extra tasks to increase their salary. A downfall of this analysis is that this subgroup could have been spiking their salaries in the 7 years prior to the projection, and that would not be captured by this method.

In our third sub-sample, we narrow the sample to only individuals whose final average salary was earned during his or her final three years before retirement. This criterion is theoretically consistent with the traditional career path, in which salaries are consistently rising until retirement, and their final average salary would be the last three years of employment. If the final average salary was highest in

the last three years, we can accurately predict salary spiking by both a deviation from the linear growth trend in the first projection, and a three percent salary growth projection in the second projection.

As an additional check on our data, we conduct the same analyses on a control group of teachers who have long work careers but do not retire within our dataset. The purpose of this analysis is to examine whether our methods of determining spiking behavior are reliable or if they may reflect some broader effects. During the years covered in our data, the macro economy took a significant downturn and then began to rebound. This impacted funding for education and may have impacted our estimates of salary spiking.

4. Results

4.1 Do School Districts Spike End of Career Salaries?

Using salary schedules from 490 public school districts we calculate the average annual raise for years 28, 29, and 30 on the salary schedule. These are typically the years just prior to a teacher's retirement. In the figure below (Figure 1) we divide the school districts into terciles based on their average raises during this time period and present the average salary schedule for each tercile. As the figure makes clear, a plurality of school district salary schedules (224 of 490) do not award any raises in the final three years. As such, the earnings profile flattens out at the end of a teacher's career. The districts with the highest end of career raises, Tercile 3, appear to be providing raises in line with prior raises.

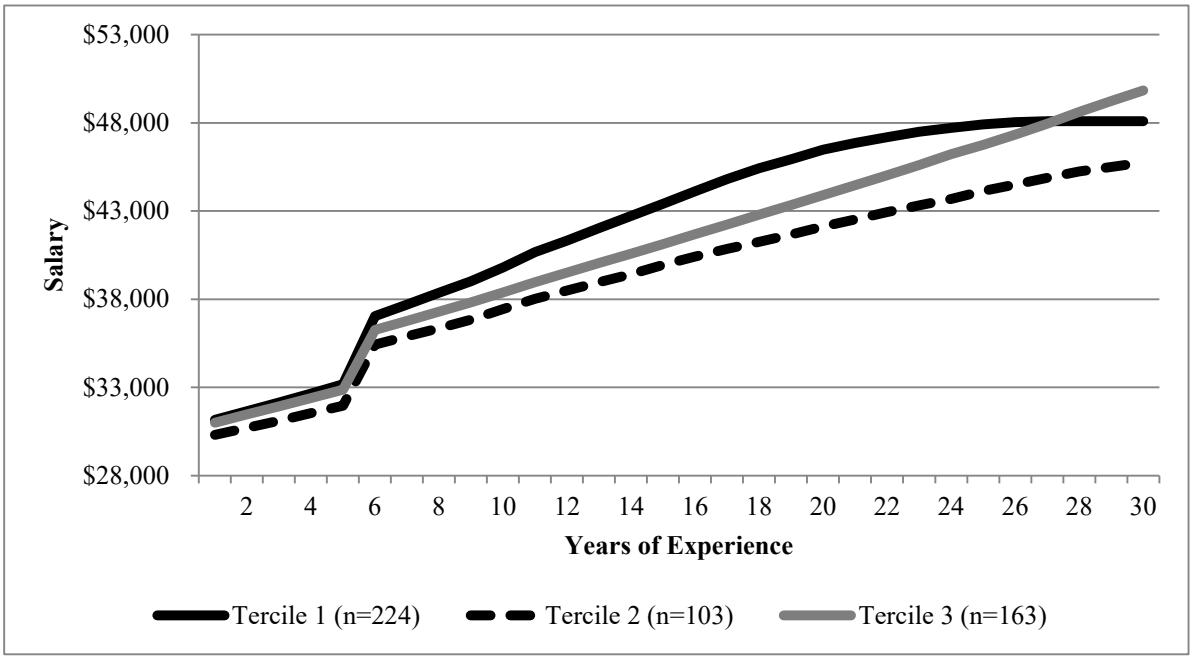

Figure 1. Average Salary Schedule Based on Average End of Career Raises (Terciles)

Relatively speaking, end of career raises, as presented on salary schedules, do not appear to be significantly larger than raises at other periods of time. Indeed, in many instances school district salary schedules appear to provide smaller end of career raises. The average annual raise for all 490 school districts during this period of time was just 0.56 percent. Only eight school districts provided annual raises higher than two percent.

Table 2: Average Percent Raise in Final Three Years

Average Percent Raise in Final 3 Years	Number of Districts
0%	224
0.1% - 0.5%	27
0.51% - 1.0%	104
1.01% - 1.5%	111
1.51% - 2.0%	16
> 2.0%	8
Total	0.56%

In short, we do not find evidence of school districts providing systematically higher end of career raises for teachers. Rather, school district raises either level off or remain in line with prior raises. It is important to note here that the school districts themselves are not liable for any pension obligations. As such, they face not financial benefit or hindrance to boosting teacher's FAS other than their regular budgetary constraints.

4.2 Do Individual Employees Spike their Salary?

Below, we present our analysis of retiree salary spiking. Using actual salaries of retirees from 2013 to 2016, we conduct a linear projection analysis (Table 3). We conduct each of these analyses using three samples of retirees. Our standard group consists of all the retirees in each year. These are the individuals for whom we have at least 10 years of consecutive work history, have at least 25 years of experience in the retirement system, and then drop out of our data and do not return. We use seven years of data to project the salary for the final three years. We then identify individuals as spiking when their actual salary is at least one percentage point higher than the projection.

We then limit our sample by removing individuals who have a downward trend in their salary during their final ten years. As we mentioned, we do not have an actual indicator of retirement and are therefore making an assumption based on when the individual disappears from our data. It is possible, however, for an individual to retire, draw their pension, and keep working in a reduced capacity. By removing the individuals with a downward trend in their salary, we separate these individuals. As a further check, we use a sample of retirees whose final three years are their three highest consecutive years. All of the individuals in our data were teachers, but some moved into administration during the time periods used in our analyses. We display the results of teachers and these administrators individually and combined.

Table 3: Identifying Salary Spiking Using a Linear Forecast of Wages

	Standard			Downward Trend Removed			Final 3 yr FAS >		
2013									
	Spike	Total	%	Spike	Total	%	Spike	Total	%
Teacher	77	1124	6.9%	75	1109	6.8%	76	755	10.1%
Admin	5	30	16.7%	5	16	31.3%	5	25	20.0%
Total	82	1154	7.1%	80	1125	7.1%	81	780	10.4%
2014									
	Spike	Total	%	Spike	Total	%	Spike	Total	%
Teacher	104	854	12.2%	102	834	12.2%	102	614	16.6%
Admin	8	82	9.8%	7	39	17.9%	7	61	11.5%
Total	112	936	12.0%	109	873	12.5%	109	675	16.1%
2015									
	Spike	Total	%	Spike	Total	%	Spike	Total	%
Teacher	209	878	23.8%	201	811	24.8%	200	691	28.9%
Admin	22	85	25.9%	21	76	27.6%	22	64	34.4%
Total	231	963	24.0%	222	887	25.0%	222	755	29.4%
2016									
	Spike	Total	%	Spike	Total	%	Spike	Total	%
Teacher	408	943	43.3%	369	809	45.6%	390	771	50.6%
Admin	36	79	45.6%	34	70	48.6%	36	68	52.9%
Total	444	1022	43.4%	403	879	45.8%	426	839	50.8%

As the table shows, varying rates of salary spiking are shown across the three samples. Interestingly, the rates of spiking appear to increase annually from 2013 to 2016. This is consistent across all three samples. We hypothesize that this effect may be due, in part, to the recession. In the years following the recession, many school districts held wages flat. Then, as the financial circumstances improved, they increased salaries. In some instances, they may have increased salaries to make up for the years of lost wage growth.

As an additional check, we compare the rates of salary spiking among our sample of retirees with a comparison group of non-retirees. The non-retirees have at least ten years of experience but less than 25 years, appear in our data for ten straight years, and do not retiree in the years 2013 to 2016. In Table 4, we present a comparison of the percentage of individuals identified as spiking using our methods. As it turns out, we see higher rates of spiking in our non-retiree group than in our group of retirees. This suggests the instances of spiking that we are identifying may not be spiking at all, but rather could reflect normal changes in salary or the effect of the broader economy on public school teacher salaries.

Table 4: Comparison of Salary Spiking Among Retirees and Non-Retirees (Standard Group)

Year	Percent of Individuals Spiking	
	Retirees	Non-Retirees
2013	7.1%	10.9%
2014	12.0%	14.8%
2015	24.0%	34.0%
2016	43.4%	50.2%

Goldhaber, Grout, and Holden (2018) note that one difficulty in assessing rates of salary spiking is the quality of data being used. Our analyses suggest broader economic realities are an additional difficulty in determining whether individuals are intentionally spiking their salary just prior to retirement. Following the great recession, teachers' salaries in Missouri stagnated for a few years and then began to tick back up. Our analyses on individual earnings profiles takes place during this time period. As such, we may be forecasting lower wages for individuals due to depressed wages and lower education funding.

5. Conclusion

In this analysis, we two sources of data to explore salary spiking in a defined benefit pension system for teachers. First, we analyze salary schedules from 490 public school districts, wherein the teachers' salaries are spelled out for each year of service on these schedules. As such, the schedule represents a snapshot of salaries for a teacher from year one to their 30th year in the classroom. We examine whether school districts provide substantially larger raises at the end of teacher's career, just prior to retirement. Using salary schedules, we do not find systemic evidence of salary spiking in Missouri public schools. Rather, most school districts tend to taper off raises as teachers approach retirement. This might be explained by other reasons. For instance, districts may choose to emphasize earlier career raises. Teachers improve the most during their first few years of experience (Papay & Kraft, 2015; Shuls & Trivitt, 2015). Thus, larger raises in the earlier part of teacher's career would better align with skill acquisition. Additionally, salaries are used as a tool to retain teachers. Few teachers move school districts after 20 years. It may be the case that teachers are comfortable at this point in their career. It is also common that school districts may not accept all a teacher's years of experience. As such, a teacher with 20 years of experience may be placed at a lower point on the salary schedule if they move to another school district.

In our second analysis, we examine individual salary spiking using individual earnings profiles of teachers in Missouri. Unfortunately, our data do not indicate whether a teacher actually retired. As such, we must make an assumption based on their work profile. To do this, we limit our sample to individuals who work 10 consecutive years and have at least 25 years of total experience at the time they disappear from our data. We further limit our analysis in two ways to potentially adjust for individuals who retire but keep working at a lower salary rate. In the first restriction, we remove individuals whose salary profile is declining in the years prior to leaving the data. In the second, we keep only individuals whose highest three consecutive years are the last three years in the data. Using these three samples, we identify spiking behavior by using seven years of data to forecast a worker's salary in his or her final three years. We then compare the worker's actual salary to the forecasted salary. If the actual salary is one percentage point higher than the forecasted amount, we count that individual as "spiking."

In all of our analyses, we find some prevalence of salary spiking. Notably, the percentage of individuals who appear to be spiking appears to grow each year. We suspect this may be due to the great recession. In other work (Shuls & Lux nd), we show that teacher salaries in Missouri essentially stagnated in the two years following the recession. Then, as school district finances rebounded, salaries began to tick upwards. To check this, we estimate "spiking behavior" among a group of non-retirees. We find similar rates of spiking among this group of non-retirees. Our analyses suggest the macro economy may create an impediment to systematically determining whether an individual is seeking to game the system through salary spiking. What we identify as spiking may simply be due to school districts freezing salaries during slow economic times and then increasing salaries as the economy improves.

This analysis does not offer conclusive evidence of salary spiking. Rather, it suggests more analysis is needed. Clearly, as newspaper accounts have shown, some instances of spiking occur. When individuals engage in this behavior with the explicit purpose of seeking larger retirement benefits, it puts a strain on the pension system and can lead to an increase in unfunded liabilities. To date, however, only a few studies have attempted to reliably estimate the prevalence of salary spiking.

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