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Benefit Enhancement in Public Employee Defined Benefit Pension Plans: Evidence from Three Sources

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Abstract: This study examines the prevalence, costs, and deferred compensation levels associated with pension plan benefit enhancement provisions often referred to as pension padding or spiking. Due to the difficulty to obtain data, three diverse sources of evidence are used: (1) an examination of reports on pension benefit enhancement presented in the financial press; (2) a survey of managers of state and local public employee pension plans; and (3) an empirical evaluation of two unique datasets of retiree characteristics and salary histories. We find evidence of excessive costs in the financial press, prevalence of overtime inclusion and loose limits on salary growth in the survey, and excessive near-retirement salary growth in the retiree data sets. This evidence suggests a strong principal-agent conflict circumventing a primary advantage of defined benefit pension plans, the ability to retain personnel with low costs during the near retirement period.

Key Words: Defined Benefit Plans, Public Pensions, Retirement Policies, Compensation Packages, Public Employees, Pension Padding

JEL : H55: J26: J33

1. Introduction

In the late 1990s, with healthy returns for financial markets, state and local public employee defined benefit (DB) pension plans experienced large funding surpluses, encouraging legislators in the U.S. to pass on the surplus to public employees by enacting special pension benefit enhancement provisions, at times negotiated between elected officials and politically powerful employee groups (Koedel, Ni, and Podgursky, 2012; Smiley and Chang, 2011).

Special benefit provisions often include non-reoccurring benefits (bonuses, accumulated sick leave or vacation pay, car allowances, overtime pay, near retirement wage increases, among others) that can be added to base salaries for calculating pension benefits. Principal-agent conflicts exist whereby opportunistic employees near retirement attempt to maximize benefits to inflate future pension benefits at the expense of other plan participants (see Pension Padding, 2010). Hopkins (2009) points out, for instance, that widespread pension spiking by retirees contributed to the underfunding of the Nevada Public Employee Retirement System resulting in higher employee and employer contributions to cover this deficit. In response to state and local public pension fund underfunding problems,[1] many state and local governments are considering reforms placing limits on benefit enhancements used for pension benefits.

From a principal-agent perspective, public pension plans are ripe for moral hazard incentives with pension plan agencies often operating independently and with information asymmetries resulting in monitoring difficulties for principals. Hess and Impavido (2004) point out that in the U.S. the three key stakeholder groups for public pension plans are the plan participants, the government, and taxpayers. Yet decisions are often made by agents who are either politically appointed or are ex officio trustees, who may act in their own interests or be under political pressure to make decisions at the expense of other stakeholders. This situation exists particularly if agents (such as legislators or administrators) are also participants, and beneficiaries for the same pension plan that they manage, with taxpayers, lacking a champion (Hurst 2012; Smiley and Chang, 2011).

Lazear (1985, 1990) in his theory of deferred compensation points out that the back-ended component of DB pension plans is designed to encourage employees to stay with a firm, reducing turnover and shirking behavior in later years, benefitting employers by reducing switching, training, and replacement costs (Childs et al., 2002 a, b). Special pension enhancement benefit stipulations can offset these advantages by increasing: (1) occupational risks for older employees by creating incentives for taking on excessive overtime (Lazear, 1985, 1990); (2) retirement rates for career employees in peak years, with enhanced benefits increasing the opportunity cost for remaining on the job (Costrell and Podgursky, 2007a,b); (3) future employee contribution rates to cover higher benefits, making public service jobs less attractive for younger workers; and (4) redundant retention costs with DB plans already encouraging career employees to remain in public service (Koedel, Ni, and Podgursky, 2012).

Few empirical studies have examined this issue, since it is difficult to obtain confidential data on salaries and pension benefits for retirees. We examine the existence and costs of benefit enhancement provisions in public employee defined benefit pension plans, using evidence from three different sources: (1) a summary of investigative reports providing data on pension padding abuses in the financial press for 2005-2012; (2) a survey of state and local public employee

[1] The overall estimated deficit for state and local DB plans is between $2 to $3 trillion in 2011-2012 (Russek, 2011; Williams and Hakim, 2012).

pension plan managers for benefit enhancement practices for both state and local government pension plans; and (3) an empirical examination using two unique data sets of salary histories for K-12 retirees during 2001 to 2006 of the Denver Public School Retirement System (DPRS) and university retirees in the Colorado Public Employees Retirement Association (PERA).

The empirical results support the hypothesis of substantial pension padding abuses consistent with an intransigent principal/agent conflict for public employment pension plans. We find a growing base of investigative reports, providing evidence of pension padding abuses focusing on states that have had pension underfunding problems, particularly at the local level. The survey results reveal the most common pension enhancements are overtime added to base salaries and loose limits on the inclusion of near retirement salary increases. The analysis of retiree data sets demonstrated strong near-retirement salary growth for all job classes especially the administrative class. However, the most surprising empirical result is the dominance of professional and non-professional retirees among the outliers on salary growth near retirement.

The paper is organized as follows. Section 2 provides background and related work, followed in Section 3 by an overview of data provided in the financial press on pension spiking. Section 4 provides results of a survey of public employee pension managers on pension benefit enhancement provisions. Section 5 presents the data, hypotheses, research methodology, and results of the empirical evaluation of the retiree data sets. Section 6 summarizes the study and suggests future research directions.

2. Background and Related Work

2.1 Background

State and local public employee defined benefit plans are administered at the state and local level, and annual pension benefits in retirement (pensionable wages) depend on formulas that include service years, highest average salary (HAS), usually based on a 3 to 5 year period before retirement for most plans (see Mendel, 2010). Other pension benefit plan stipulations allow adjustments to the base salary that boost HAS, and plan stipulations can be complex for different separation ages, years of service, and the percentage of benefit per year of service. Generally, the formula used to calculate the annual benefit is equal to the highest average salary (HAS) times a standard benefit rate per service year, times the number of years in service. Employees must also meet rules for full retirement benefits, such as meeting a combined age plus service year requirement (Mannino and Cooperman 2009, 2011).

As an illustration, the Colorado Public Employees Retirement Association (PERA) uses a three-year window for calculating a retiree's highest average salary (HAS). For employees hired before July 2005 and retiring before 2010, retirees received a standard benefit rate of 2.5% per service year of that HAS, as long as the minimum rule of 80 (sum of the retiree's service years and retirement age is reached), with a minimum retirement age of 50. If a retiree retired at age 55 with 25 years of service, that retiree would receive 62.5% of his/her HAS, and a retiree at the age of 50 with 30 years of service would receive 75%. In 2010 Colorado PERA changed its rule of 80 to a rule of 85 and minimum retirement age to 55, along with a lower cost of living allowance, to make the plan more sustainable. Schmidt (2010) in a study of 87 major U.S. public employee retirement systems found 55 percent of plans had no maximum benefit limitation on pension benefits. About 63 percent of the plans used a 3-year HAS period, 21 percent a 5-year period, and 16 percent another HAS calculation period, such as California's allowing a 1-year period.

Many public employee pension plans include benefit enhancement stipulations that allow an employee near retirement to include non-reoccurring items in base pay for calculating HAS. Non-reoccurring items include: overtime, cashing out accrued unused sick days, accrued leave pay or unused vacation days, supplement pay earned in previous years, bonuses for earning an extra degree or certification, extra pay for night shifts, bilingual, and other types of "singularly ongoing pay" contributions, such as special assignment and temporary assignment pay, extra pay for grilling work schedules, (such as 24-hours on, 48-hours off work schedules), callback pay, loyalty pay, holiday and other differential pay, recurring longevity payments, and for teachers, extra payments for summer school and after-school work. Other ways to enhance salary include large pay increases prior to retirement, such as administrative pay for taking on a temporary administrative position; and retiring but coming back to work in a different government job, allowing additional pay and service time to augment a retiree's annual pension benefit (see Citizens Budget Committee, 2005; Pension Padding, 2010).

2. Related Studies

Only a few academic studies examine the effects of pension benefit enhancements on pension wealth. Costrell and Podgursky (2007a,b) estimated the value of pension wealth over the life of a K-12 public teacher's work history. They found that back-loaded provisions, including pension enhancements, encourage earlier retirements, with pension wealth peaking at the point where the minimum age/service years a retiree is eligible for full pension benefits, and declining thereafter in terms of "forgone pension benefits." Koedel and Podgursky (2012) estimated the counter effects on productivity and retention with "push" and "pull" incentives incorporated in teacher pension plans, finding no evidence that a back-loaded benefit structure benefits teacher quality. Ni and Podgursky (2011) used an options-based simulation model of individual teacher retirement to simulate the retirement behavior of teachers under different pension rules. Using data for Missouri teachers, they found that net pension enhancement benefits passed in Missouri in the 1990's lowered the average retirement age for teachers.

Fitzpatrick (2011) studied the valuation of service credit purchases by public school employees in Illinois as enhanced retirement benefits. Using a simulation, she finds the average cost of increased benefits was $110,000 more than the willingness of employees to pay for an upgrade. She suggests that enhanced deferred compensation is a costly tool for attracting quality teachers relative to other methods, such as higher current wages and better working conditions.

Koedel, Ni, and Podgursky (2012) examined the effect of pension enhancements on the distribution of pension wealth focusing on benefit enhancements provided to teachers in Missouri in the late 1990's. They found the estimated value of future pension benefit enhancements to be $1.6 billion (over $3 billion with promised future benefits included), a windfall gains for retiring teachers of about $25,000 per teacher (doubled including promised benefits). Young teachers and novice teachers not yet entering the labor force were much worse off with the changes, with a rise in contribution rates to cover the higher retiree enhancement costs, making teaching jobs less attractive, an overlooked intergenerational risk for public employee DB pension plans.

3. Pension Padding Evidence in Investigative Reports

Investigative reporters, motivated by difficult financial positions of public pension plans in many U.S. states, have uncovered numerous examples of abusive pension padding practices in recent years. Since they focus on newsworthy findings, investigations often provide anecdotes and selected statistics. Due to statutory confidentiality restrictions, it is difficult to obtain data on pension padding practices for empirical, scholarly work. Thus, a summary of news and investigative reports provides a reasonable window on flagrant abusive practices. In this section, we summarize news articles and reports with original data included investigating pension abuse in the period 2005 to 2012. Our final sample includes 57 articles. Figures 1 to 6 below summarize article counts by state, publication year, governmental unit, types of abuses, types of employment, and high or low wage level by employment area.

Figure 1 provides an article count by U.S. state, showing a larger number of reports for states with severe pension underfunding problems (California, followed by Illinois, Nevada and New York). California is unique with a 1-year HAS period, making pension padding easier.

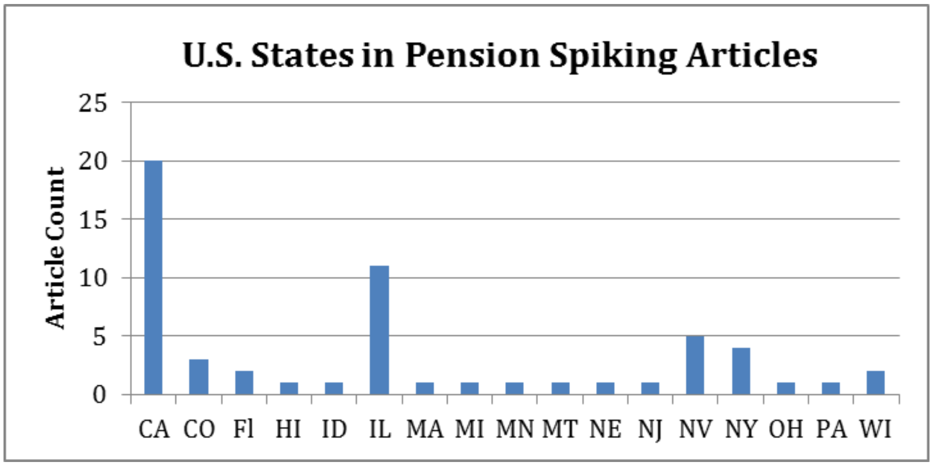

Figure 1: Article Counts by U.S. State

Figure 2 shows article count by year, with a larger number of articles after the U.S. Subprime Crisis of 2008 and rising in dramatically in 2011 and 2012, consistent with budget problems for state and local/city governments at this time.

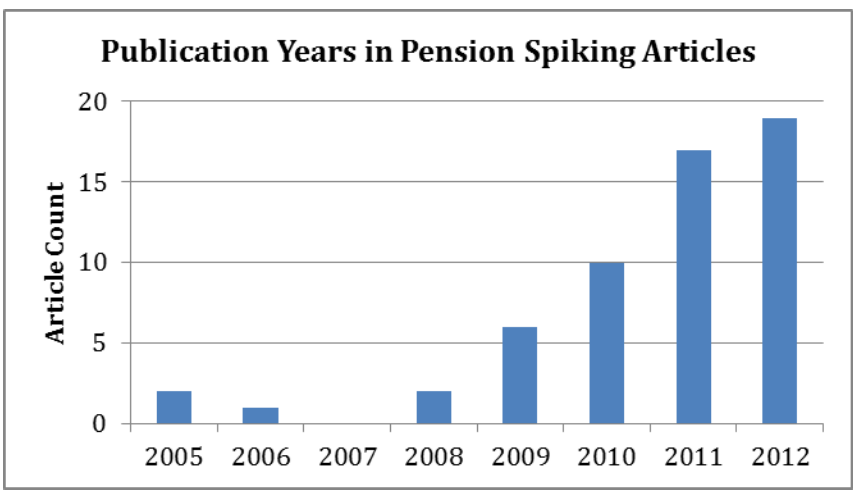

Figure 2: Article Counts by Publication Year

In terms of article count by type of government pension plan, Figure 3 shows the largest number appeared for city plans, with a fairly equal number on abuses for county and state plans, suggesting greater abuse at the local level, and only a few articles for school

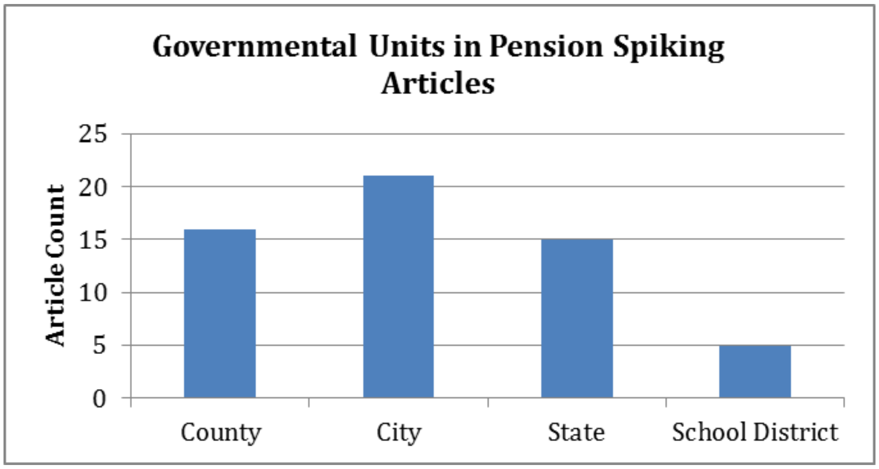

Figure 3: Article Counts by Type of Governmental Unit

Types of abuse practices by article count are shown in Figure 4. The largest number are on multiple types of pension padding abuses (bonuses, usused vacation time, education bonuses, car allowances, others), followed closedly by excessive overtime, and salary increases near retirement. Several articles discussed post retirement work to augment annual pension benefits and cash payments for accumulated unused sick leave.

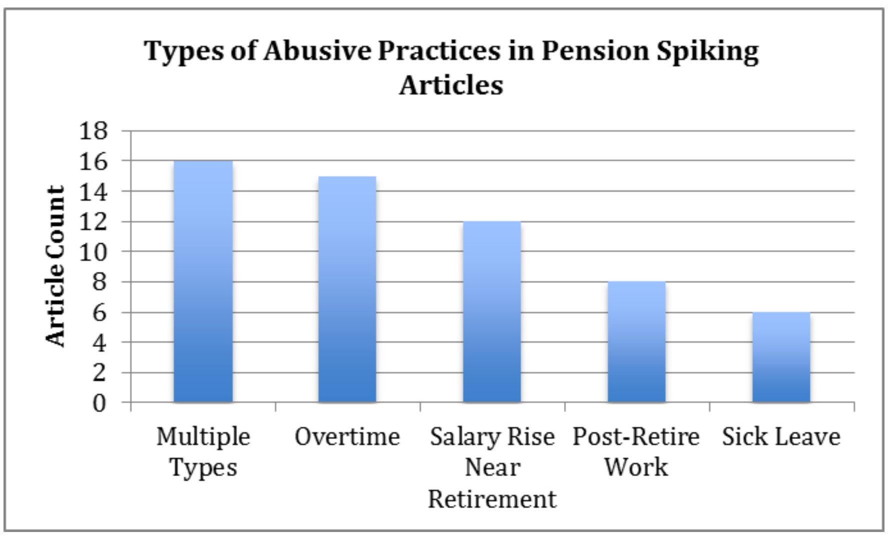

Figure 4: Article Counts by Type of Pension Spiking Abuse

Figure 5 shows the article count by employment type, with pension padding practices more frequently cited for public safety employees (police, fire and judiciary), followed by general public/government employees, with fewer reports on K-12 and university employees.

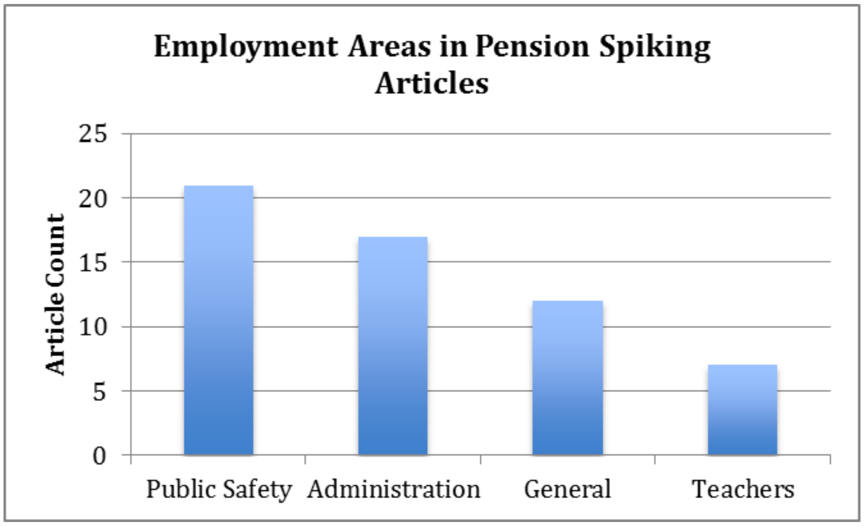

Figure 5: Article Counts by Employment Areas

Figure 6 summarizes the articles by job type and high versus low wage levels. Most articles covered lower-base pay employees (base pay about $70,000 or less) who received annual pension benefits in six figures with spiking. For the administrators (legislators, superintendents, and other administrative workers) articles focused on high-wage workers paid $100,000 or more.

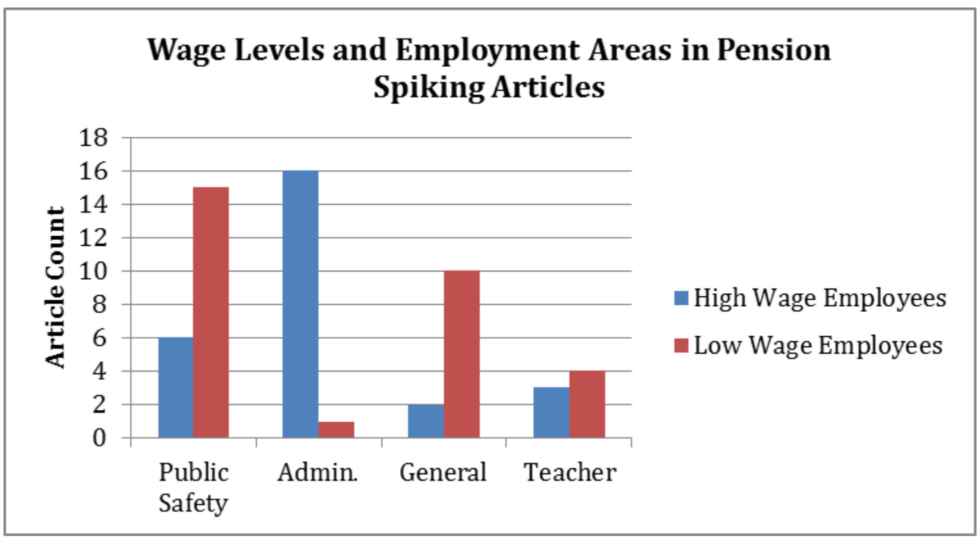

Figure 6: Article Counts by Employment Areas and Wage Levels

Of the 57 articles, 79 percent discussed system-wide abuses involving special benefit enhancement provisions. Of these, 21 reported system-wide abuse, and 24 provided system-wide abuses with examples of individual abuses, and 12 articles focused solely on particular abuses by individuals. System-wide abuse reports appeared for ten different states including California, Illinois, Wisconsin, Nevada, Hawaii, Florida, Minnesota, Pennsylvania, Massachusetts, and Colorado.

An example article including both system-wide and excessive individual abuse involves a comprehensive investigative report by Bloomberg (2012) that used compensation data in 2011 for 1.4 million employees in the 12 most populated U.S. states. The study found more than

111,000 employees leaving jobs collected $711 million in unused leave, with an egregious example of a $608,821 check for 30 years of unused leave paid to a retiring state mental hospital psychiatrist in Napa, California.

Table 1 presents examples of pension spiking for different states/cites of pension spiking by employment type by individuals, and Table 2 presents examples for system-wide abuses.

Table 1: Individual Examples of Pension Spiking by Job Type

Public Safety: **Henderson, Nevada**: A former Henderson, Nevada police chief received a one-time separation check that included **$191,456 of accrued sick leave** and **$44,165 of accrued vacation leave**. Retiring at age 47 after 25 years of service, the chief had an **ending adjusted salary of almost $450,000**, allowing him to draw over $3 million over his expected 30-year life in retirement (Geary, 2009, 2012). **Las Vegas, Nevada**: A Fire Engineer with a base pay **of $44,000 added $99,000 in overtime, $3,000 in callback, and $33,000 for sick leave, plus other benefits to earn $232,187**, working 92 overtime/callback shifts and receiving sick pay for 48 days (never calling in for 4 days in a row, so no certification of illness was required (Schoenmann, 2011). **Miami Beach** 911 Call Center Worker with an average **annual wage of $60,000** took on a extra overtime, with an extra 50 hours of work a week for final 2-years on the job, which was used for her HAS resulting in an **annual pension benefit of $150,000** (later with CPI index increases $182,000), with an expected retirement payout by the time she reaches her 70's by the city of $4,074,000 (Smiley and Chang, 2011). **Administrative:** **Ventura County, CA:** A County Chief Executive, with a final **base salary of $228,000,** received an **annual pension benefit of $272,000**, as the result of additions of $34,000 in unused vacation pay, an $11,000 bonus for earning a graduate degree, and over $24,000 in extra special benefits to her base pay for the annual pension benefit calculation (Saillant, Moore, and Smith, 2012). **Springfield, Illinois**: a retired legislator who retired but didn't start taking benefits took on a one-month government part-time job post-retirement examining the city's pensions for the Chicago City Council's Finance Committee for $12,000. **Pension benefit stipulations allowed monthly salaries to be annualized, resulting in a much higher base salary of $144,000 to include for HAS, resulting in the annual pension benefit rising from $75,000 to $120,000** (Grotto and Long, 2011). **Colorado:** A former Colorado governor took a privately funded $300,000 a year job to head a renewable energy center at a university and with his prior state service could retire in five years and receive annual benefits equal to 50 percent of his current salary of $150,000, despite the new position being privately funded (Hoover, 2011). **General State/City Employees** **Chicago:** A Chicago Transit Authority Worker had 34 hours of overtime over a 40-hour week, resulting in her base salary of $66,231 being supplemented by $84,566 in overtime pay, resulting in an annual pension of $87,310 instead of a $40,459 pension that would be based on her base salary (Hilkevitch, 2012) **New York**: A train car repairman for the Long Island Rail Road earned nearly $203,000 more than the New York Transportation Authority's chief operating officer, boosting his pension benefits as the result of overtime bonuses (Chuck, 2012). **California**: A psychiatrist retiring from a state mental hospital in Napa, California received a $608,821 check for unused sick leave over a 30-year career (Bloomberg 2012).
Teachers/University Professors **Minnesota:** Between January 2008 and June 30, the state paid out $57 million in unused sick time to about 5,600 for state severance. One retiree, president of a state university received a payout of $126,500 for 30 years of accumulated sick leave (Webster, 2011, 2012).

Table 2: System-Wide Examples of Pension Spiking by Job Type

Public Safety: **New York**: An on-going investigation by the State Attorney General's Office in New York for 64 state and local agencies and authorities found significant evidence of pension-padding particularly using excessive overtime with decentralized monitoring systems and seniority system facilitating greater overtime near retirement (Pension Padding, 2010). **San Francisco**: The practice of inflating pay in the final years of employment to boost retirement income was so prevalent in San Francisco that a grand jury determined in 2009 that one in four retiring police officers and firefighters over the previous decade received raises of 10% or more their final year on the job, increasing pension costs by more than $132 million (Nash, 2012). **EL Monte, California** Unused sick and vacation time payouts were found for more than half of the city's 23 employees who made more than $400,000 in 2009 or 2010 (Allen, 2012).
Administrative: **San Diego**: County paid employees greater than $100 million during the past 5 years for car and uniform allowances with add-ons counting for retirement pay and performance bonuses for 80 categories of special pay allowed from 2007 to 2010. (Crowe and Thornton, 2011). **Ventura County, CA**: An investigative report found that 84% of retirees receiving more than $100,000 a year are receiving more than they did on the job in retirement for a county where the pension system is underfunding by $761 million (Saillant, Moore, and Smith, 2012) **Chicago, Illinois:** 21 alderman who retired under city pension plan took on other state positions and are expected to receive nearly $58 million during their expected lifetimes, with special perks allowing a higher % benefit calculation for a lower number of service years) (Grotto and Dardick, 2012).
General State/City Employees **New York**: Attorney General Andrew Cuomo announced findings that 28 of 50 public employees showed a boost in overtime for employees' final year of work, many of which had not had overtime in previous years (Brown, 2010). **Madison, WI:** Data from the Wisconsin Department of Employee Trust Funds showed an average of 1,716.65 sick hours banked, with a total cash value of $263.91 for accumulated unused sick leave for 2,699 retirees who left state service from January 1 to September 25 in 2011. (Maciver Institute, 2011). **Hawaii:** Of 5,000 state and county employees retiring since 2009, 674 substantially boosted their pension benefits engaging in pension spiking, including working excessive overtime over the last three years of service to boost pensions at retirement. When earnings spike at the end of an employee's career, there are insufficient matching contributions to cover the pension increase (Dooley, 2012). **Florida:** "Scores" of South Florida city employees, especially police and firefighters recently retired in their mid to late 40s or early 50s with six-figure pensions as the result of large pay and benefits packages negotiated with elected officials with powerful employee unions during the real estate boon when there was ample funds for raising pay and granting perks. As a result generous retiree benefits are costing taxpayers "tens of millions of dollars a year" (Smiley and Chang, 2011). **California and 12 Other Populous states**: More than 111,000 employees received $711 million for unused leave in 2011 (Bloomberg, 2012).
Teachers/University Professors **Sacramento, CA**: Nearly half of the 225 Sacramento-area retirees with six-figure pensions from the California State Teacher' Retirement System received a 10% pay raise in one of their final years before retirement, with the average yearly increase of $18,000 resulting in $30 million in additional pension benefits over 20 years (Gutierrez, 2011).

4. Evidence from a Survey of Local and State Public Pension Managers

To examine the perceptions of pension plan managers on the prevalence of pension benefit enhancements and efforts that have been made for reforms, a survey was distributed on SurveyMonkey.com to administrators of 110 state and local public employment DB pension plans in the U.S. The survey covered plan background (scope and size of plan and types of employee groups covered) and benefit enhancing provisions, their existence and policy changes. For benefit enhancement provisions, plan administrators were asked about limits on salary increases, overtime, unused sick time/personal days, unused vacation time, post-tax contributions for fringe benefits, bonuses for educational credentials, pay differentials, and non-salary compensation.

The survey request yielded 55 total respondents, 28 responding for state plans and 27 for city/county plans. Some agencies sent emails noting that they could not complete the survey because of insufficient staff or confidentiality of data, or did not wish to complete the survey or did not have any pension benefit enhancement abuses. Although some plan administrators managed multiple plans (including state, city, county, and school district plans), each responder was asked to choose one plan for detailed responses about benefit enhancing provisions.

Table 3 summarizes answers to the pension plan background part of the survey. As expected, state plans were much larger than local plans in the number of members and market value of assets. The responses for both state and local plans demonstrated reasonable diversity with state plans from 24 different states and the local plans from 24 different cities/counties in 19 different states. The employee group focus was similar in state and local plans with about half of the responses focused on general employees. For the remainder of the responses, state plans were about evenly split between K-12 and law enforcement, while local plans had about a 3 to 1 ratio between law enforcement and K-12.

Table 3: Summary of Responses to Background Questions

Item	State Plans	City/County Plans
Number of Members	*N* = 27	*N* = 27
10,000 or less	0.00%	51.85%
> 10,000 to 50,000	11.11%	37.04%
> 50,000 to 100,000	18.52%	7.41%
>100,000 to 250,000	25.93%	0.00%
> 250,000	44.44%	3.70%
Market Value Plan Assets	*N* = 27	*N* = 25
$100 million or less	0.00%	12.00%
>$100 mil. to $500 mil.	0.00%	20.00%
>$500 mil. to $1 bil.	0.00%	8.00%
>$1 bil. to $5 bil.	7.41%	52.00%
>$5 bil. to $15 bil.	33.33%	4.00%
>$15 bil. to $30 bil.	33.33%	0.00%
> $30 billion	25.93%	4.00%
Groups Covered (note: includes selection of all groups covered in DB plan)	*N* = 27	*N* = 27
K-12 Employees	66.67%	22.20%
Public Safety & Judicial	66.67%	59.30%
University Employees	44.44%	0.00%
State Gov. Employees	59.26%	0.00%
Local Gov. Employees	51.85%	55.60%
Group Selected for Survey	*N* = 26	*N* = 27
K-12 Employees	23.08%	11.10%
Public Safety & Judicial	19.23%	37.00%
University Employees	0.00%	0.00%
State Gov. Employees	50.00%	0.00%
Local Gov. Employees	7.69%	51.90%

Table 4 summarizes survey responses about the prevalence of benefit enhancement provisions. The responses indicate that base salary increases and overtime are the most prevalent provisions to enhance pension benefits. The majority of respondents for both types of plans did not allow the use of unused sick/personal days, unused vacation time, or non-salary compensation for HAS. Educational bonuses and differential pay increases were the next most utilized special pension benefit enhancement, although the value of these provisions seems limited compared to salary increases and overtime. The responses indicating few benefit enhancement provisions may reflect a respondent selection bias, since respondents with few problems concerning pension padding may have been more willing to complete the survey versus non-respondents who may have been experiencing more problems.

Table 4: Summary of Responses about Prevalence of Benefit Enhancement Provisions

Item	State Plans	Local Plans
Base salary limits	*N* [2]= 26	*N* = 27
No limits	53.85%	62.96%
> 15% to 25%	7.69%	3.70%
> 10% to 15%	3.85%	11.11%
> 5% to 10%	23.08%	11.11%
< or = to 5%	11.54%	11.11%
Overtime inclusion in HAS	*N*=25	*N*=26
Yes, no limits	44.00%	18.50%
Yes with limits	16.00%	11.10%
No	40.00%	70.40%
Unused sick/personal time	*N*=25	*N*=26
Yes, No Limits	0.00%	7.69%
Yes with limits	16.00%	3.85%
No	84.00%	88.46%
Unused Vacation Time	*N*=24	*N*=26
Yes, No Limits	8.33%	11.54%
Yes with limits	8.33%	7.69%
No	83.33%	80.77%
Post tax election of benefits	*N*=26	*N*=27
Yes, No Limits	7.69%	7.40%
Yes with limits	0.00%	0.00%
No	92.31%	92.60%
Education bonuses	*N*=24	*N*=27
Yes, No Limits	20.83%	14.88%
Yes with limits	12.50%	7.40%
No	66.67%	77.80%
Pay differentials	*N*=23	*N*=27
Yes, No Limits	21.74%	33.30%
Yes with limits	26.09%	14.82%
No	52.17%	51.85%
Non salary compensation	*N*=25	*N*=27
Yes, No Limits	12.00%	0.00%
Yes with limits	12.00%	0.00%
No	76.00%	100.00%

Table 5 summarizes the survey results about policy changes for each type of benefit enhancement. Benefit enhancement provisions had few changes in policies with the exception of state plan respondents having policy changes over the past five years to limit salary growth near retirement. The policy changes for state versus local plans to limit salary growth close to retirement is consistent with news reports of greater policy changes to limit pension padding by state plans in recent years.

[2] *N* denotes the number of respondents

Table 5: Summary of Responses about Policy Changes in Last Five Years

Item	State Plans	Local Plans
Base salary limits	*N* = 25	*N* = 27
Increase	8.00%	11.11%
Decrease	36.00%	7.41%
No change	56.00%	81.48%
Overtime	*N*=25	*N*=26
Increase	4.00%	3.85%
Decrease	8.00%	7.41%
No change	88.00%	84.61%
Unused sick/personal time	*N*=26	*N*=26
Increase	7.69%	0.00%
Decrease	0.00%	7.41%
No change	92.31%	92.59%
Unused Vacation Time	*N*=26	*N*=26
Increase	7.69%	0.00%
Decrease	3.85%	7.41%
No change	88.46%	92.59%
Post tax election of benefits	*N*=25	*N*=27
Increase	0.00%	0.00%
Decrease	0.00%	0.00%
No change	100.00%	100.00%
Education bonuses	*N*=24	*N*=27
Increase	0.00%	0.00%
Decrease	4.17%	0.00%
No change	95.83%	100.00%
Pay differentials	*N*=25	*N*=27
Increase	0.00%	0.00%
Decrease	4.00%	0.00%
No change	96.00%	100.00%
Non salary compensation	*N*=25	*N*=27
Increase	0.00%	0.00%
Decrease	7.69%	0.00%
No change	92.31%	100.00%

5. Empirical Examination of Salary Growth near Retirement

To examine evidence of pension enhancement through salary growth near retirement, we performed an empirical analysis using a large sample of recent Colorado retirees and their salary histories including different job classes (administrative, professional, and non-professional). One of the major advantages of DB pension plans is the ability to retain a qualified workforce with moderate salary growth especially near retirement. DB pension plans provide deferred compensation dependent on years of service, so switching employment near retirement can sharply reduce pension benefits. Large salary growth near retirement indicates manipulation of pension benefits negating a major advantage of defined benefit pension plans.

We performed three types of analysis for the sample: (1) a comparison of salary growth near retirement relative to standard indexes of salary growth for the general U.S. population; (2) a detailed characterization of salary growth using the distribution of salary growth near retirement; and (3) an analysis of the impact of the HAS period and salary growth limits on the value of surplus deferred retirement compensation, providing insights for policy changes.

Due to the principal-agent conflicts between taxpayers, politicians, and government workers, we tested the hypothesis that near retirement salary growth for government workers exceeded growth based on standard indexes. The difference is hypothesized to be larger for administrative and professional employees who have more opportunity to increase salaries than non-professional employees.

The difference is also hypothesized to be larger for periods near but prior to the periods used for the calculation of HAS as both the DPRS and PERA plans imposed limits on salary increases in the HAS period. To compensate, employees would be expected to obtain larger increases just outside of the HAS calculation period window.

In addition to salary growth, we tested the hypothesis that the value of surplus deferred compensation will be larger if based on HAS using actual salary growth versus HAS based on salary growth according to standard indexes. Background on the sample and associated retirement plans, and definitions for the variables and the measure used for surplus deferred compensation are presented in the following sections, followed by the empirical analysis results.

5.1 Samples of Career Retirees

Two large samples of retirees are used to empirically evaluate the impact of salary increases near and within HAS calculation period. These samples were collected in previous research on retirement compensation for university (Mannino and Cooperman, 2009) and K-12 retirees (Mannino and Cooperman, 2011) in Colorado. Each sample contained retiree characteristics (hire year, retirement year, service years, and job title) and salary history.

The university data set contains retiree characteristics and salary histories of 278 non-faculty retirees in the period 1999 to 2006 from three Colorado universities and excludes faculty members since almost all participate in a defined contribution plan instead. This data set was collected from university budget offices for retiree characteristics and university library archives for salary histories. Most retirees (95%) had at least 20 years of service with an average of only 3 years of missing salary history. The Denver Public Schools Retirement System (DPSRS) provided the K-12 data set as a result of an open records request. This data set contains similar retiree characteristics and salary histories for 846 retirees in the period 2001 to 2006. The retirees had a minimum of 25 years of service, with an average of 30 years of earned service, 13 years of salary history, and 17 years of backcasted salary history at the early stages of each retiree's career.

For both data sets, missing salary history was backcasted using the Average Wage Index (AWI) and Scaled Factors (SFs) developed by the U.S. Social Security Administration (SSA) (Mannino and Cooperman, 2009). Earnings were backcast for a retiree in year y at age a ($E_{a,y}$) utilizing the earnings for the next higher year ($E_{a+1,y+1}$) together with the AWI and SF, respectively for years y and $y+1$ and the ages a and $a+1$ shown in (1), consistent with Spriggs and Ratner (2005). To remove the effects of part-time employment, we scaled for the last year of known salary history to its full-time equivalent.

$$E_{a,y} = E_{a+1,y+1}\left(\frac{SF_{a+1}}{SF_a}\right)\left(\frac{AWI_{y+1}}{AWI_y}\right) \quad (1)$$

We divided the sample into three job classes based on supervisory responsibilities and educational requirements: (1) administrators with significant supervisory responsibility and university degree requirements; (2) professionals with university degree requirements without substantial supervisory responsibilities, such as information system services, librarians, K-12 teachers, and general professionals, and (3) non-professionals with only post-secondary education or training requirements required, such as clerical, custodian, dining and other services. The combined sample contains 1,124 retirees including 130 retirees in the administrative class, 732 in the professional class, and 262 in the non-professional class.

5.2 Deferred Compensation Measure and Input Variables

We examine the impact of policy variables including the length of the HAS calculation period and salary growth limits on the value of deferred compensation, by estimating levels of lump-sum surplus deferred compensation (*LSDC*) for each retiree. *LSDC*, as used by Mannino and Cooperman (2009, 2011), equals the expected present discounted value of a retiree's benefit stream (*EPDV*) minus the historical account balance (*AcctBal*) at retirement based on historical employee and employer contributions and historical returns on contributions over the retiree's salary history. LSDC measures the additional amount above a retiree's account balance necessary to purchase an equivalent lifetime retirement annuity benefit in the private sector:

$$\boldsymbol{LSDC = EPDV - AcctBal} \quad (2)$$

The expected presented discounted value (*EPDV*) of the retirement benefit stream, consistent with the definition provided by Mitchell et al. (1999) is:

$$EPDV = \sum_{j=1}^{120-a_r} \frac{B*(1+r)^{j-1}*P_j}{(1+i)^j} \text{ where,} \quad (3)$$

- a_r is the age at retirement to the nearest whole year
- B is the initial annual benefit
- r is the benefit inflation factor (varies by plan)
- P_j is the probability that an individual survives for at least j years past retirement age a_r. A retiree's cohort mortality table was used to calculate P_j as indicated in Mitchell et al. (1999).
- i is the net interest rate determined using the Aegon sample of net interest rates

Calculation of *EPDV* and *AcctBal* for each retiree in the sample involves different input variables including interest rates on single premium immediate annuities (SPIA), interest rates on retirement account balances, mortality tables, and plan benefit rates, summarized in Table 6.

Table 6: Summary of Input Variable Characteristics

Variable	Source	Comments
Contribution rates	Each plan	Historical employee and employer rates less health care, disability, and survivorship portions
Benefit rates	PERA, DPSRS	Rate tables for each plan based on years of service
Mortality table	PERA, DPSRS	Cohort adjustments made using Society of Actuaries methodology
SPIA interest rates	Aegon Corporation and Moody's AAA daily rates	Sample of 178 SPIA contract rates along with regression using Moody AAA rates for poorly matching interest rates

Each retiree's hypothetical account balance (*AcctBal*) was calculated using the historical employee/employer contribution rates for each plan and the historical PERA guaranteed interest rates. PERA and DPSRS provided account balances for retirement contributions with the ability to choose a lump sum withdrawal at retirement time in place of annuitized benefits (see Hansen 2008, p. 31). Although DPSRS historically had lower interest rates, we used the PERA guaranteed rates as DPSRS merged with PERA in 2009. PERA used higher interest rates than most other public pension plans, with the historical annualized geometric mean of the PERA rates (6.74 percent) falling about midway between the annualized three-month T-bill rate (5.93 percent)[3] and the annualized nominal bond rates (7.57 percent)[4] for 1970 to 2006. Interest is credited to the combined employer/employee contributions, not just the employee's contribution as the practice for these plans. Thus, the account balance provides an estimate of conservative investment of contributions as a lump sum alternative to monthly benefits at retirement.

The contribution rates and benefit levels were determined from tables provided by each plan, Colorado PERA and DPSRS. During the employment and retirement years of all retirees in the combined data set, PERA and DPSRS were separate plans. The benefit rates, service year (SY) requirements, HAS calculation period, and inflation adjustment were similar for PERA and DPSRS as summarized in Table 7. The contribution rates were somewhat higher for PERA retirees (university data set) than DPSRS retirees (K-12 data set). The *EPDV* calculations shown in subsequent sections use a lower inflation adjustment of a maximum of 2%, as the Colorado state legislature reduced the level even for existing retirees. The reduced adjustment is currently in litigation so the outcome of the legislation is uncertain.

[3] See Federal Reserve website: www.federalreserve.gov/releases/h15/data.htm.
[4] Source Shiller (2005) for annualized nominal bond rates.

Table 7: Summary of Plan Characteristics

Plan	HAS	Contr. rates (Employee/ Employer)[5]	Benefit rate[6]	Inflation adjustment	Early Ret. Age/SY	Normal Ret. Age/SY
DPSRS	Consecutive 36 months	6.53%/7.64%	2.5%	Automatic 3.25%	Any/25, 55/15	65/5, 55/25, 50/30
PERA	Highest 3 years	7.86%/8.50%	2.5%	Automatic 3.5%	50/25, 55/20	50/30, Rule of 80 at age 55, 65/5

Source: Plan descriptions for DPSRS and PERA and Hansen (2008, Appendix Table A-1 and A-2), and detailed benefit tables and formulas for each plan

A sample of net interest rates on SPIA contracts was provided by Mr. Richard Greer, F.S.A. and M.A.A.A. of Aegon Corporation, net of profit commission, safety margin, and other factors, and rates varying by retirement date, retirement age, and gender. Each retiree was matched to the closest contract date for the net interest rate sample using a nearest neighbor search. Most observations (802) had a reasonable match yielding an average date difference of 7.3 days and average retirement age difference of 4.5 years. For the remaining 322 observations, we developed a regression using the historical Moody's industrial AAA daily rate as the predictor variable and the known contract rate as the predicted variable yielding an adjusted R^2 of 0.922 and *P-value* of 0.000. The matching AAA rate and regression coefficient was used to compute the net interest rates for the remaining 322 observations in the combined sample.

The period mortality tables provided by PERA and DPSRS were used as they reflect the mortality of the university and K-12 retiree populations. We generated a dynamic, cohort mortality table for each retiree in our sample using the Mortality Projection Scale AA (RP-2000 Table 7-3) following the methodology described by the Society of Actuaries Group Annuity Valuation Table Task Force (1995).

5.3 Comparison of Actual Salary Growth to Index Growth

To compare actual salary growth near retirement for the retirees in our sample to standard indexes of salary growth for the general U.S. population, we used a five-year window of near retirement salary growth surrounding five respective calculation periods from 3- years (used by both DPSRS and PERA) to seven years. A large amount of growth in deferred compensation occurs for employees in this window near retirement as shown by Costrell and Podgursky (2007a,b).

The growth in actual salaries in these windows is compared to hypothetical growth according to standard indexes developed by the U.S. Social Security Administration: (Average Wage Index (AWI) and related Scaled Factors (SF)), and the U.S. Bureau of Labor Statistics (Consumer Price Index for urban workers (CPI-U)). The AWI is based on compensation as reported by employers for federal income tax on Form W-2 on wages, tips, and other compensation as published from 1951 on (www.ssa.gov). The SFs adjust earnings to levels relative to the AWI by age, reflecting typical patterns of earnings over a career. The SFs were developed utilizing the SSA's Continuous Work History Sample (Clingman and Nichols, 2004).

[5] Geometric mean of annual contribution rate computed over the period 1970 to 2006
[6] Benefit rate for non-reduced retirement benefits

According to www.bls.gov, the CPI-U measures expenditures by "by urban wage earners and clerical workers, professional, managerial, and technical workers, the self-employed, short-term workers, the unemployed, retirees and others not in the labor force."

To test the hypothesis of higher actual salary growth rates for the public employees in the sample versus growth rates based on standard indexes, we tested 15 models, one model per salary backcast period (3 to 7 years) for each of the employee classes (administrative, professional, and non-professional). The salary backcast period indicates the number of years in which the actual salary was replaced by the index-increased salary using an index (AWISF, AWISF+, or CPIU). For instance, for a salary backcast period of 3, the final three years of actual salary were replaced by index-increased salaries, with the fourth most-recent salary used as the base period for the index.

Table 8 summarizes the models for a single salary backcast period. The cells in each of the columns (2 to 3) of the table show the outcome measures (LSDC and HAS) and sample size for a single backcast period using a 3-year HAS calculation window with the associated salary history, actual or index computed. Column 1 shows the difference between actual salary growth and backcasted salary growth using a particular index. AWISF indicates the combination of AWI moderated by the SFs based on employee age. AWISF+ uses SFs accelerated to normal retirement age (62). For the typical retiree in these data sets, the SFs would be increased by 5 years from the average retirement age of 57 to the normal retirement age of 62. Thus, the AWI-SF+ index moderates salary growth by proximity to retirement age rather than actual age.

Table 8: Salary Backcast Models for One Salary Growth Period

	Job Classification		
Salary Difference	*Administrative*	*Professional*	*Non Professional*
Actual – AWISF	LSDC / HAS (130)	LSDC / HAS (732)	LSDC / HAS (262)
Actual - AWISF+	LSDC / HAS (130)	LSDC / HAS (732)	LSDC / HAS (262)
Actual – CPIU	LSDC / HAS (130)	LSDC / HAS (732)	LSDC / HAS (262)

For each model, we tested the following null and alternative hypotheses. The subscript *M* denotes a measure, either LSDC or HAS. These hypotheses correspond to a one-tailed test.

$$H_0: Actual_M - Index_M \leq 0$$

$$H_1: Actual_M - Index_M > 0$$

Paired t-tests were used to test the null hypothesis associated with each model. Cohen's (1977) d-tests[7] statistics were used to test the strength of effects [small (S), medium (M), and large (L)] with test results shown in Tables 9 to 11 for each job class for the two outcome variables (HAS and LSDC). All *p*-values were less than 0.001 so the *p*-values are not shown in these tables. Effect sizes were mostly small or less than the small threshold for backcasting periods of 3 and 4 years. For backcasting periods of 5 or larger, the administrative class had large and near large effect sizes, with smaller effect sizes for the other job classes including a mix of effect sizes for the professional class, and mostly small effect sizes for the non-professional class.

[7] Cohen's *d* test statistic interpretation: Small effect (> 0.2 to 0.5), Medium effect (> 0.5 to 0.8), and Large effect size (> 0.8). Effect sizes less than 0.2 are not labeled in Tables 9 to 11.

Table 9: Effect Sizes for Administrative Retirees

Outcome Variable Differences	Salary Backcast Period				
	3	*4*	*5*	*6*	*7*
HAS(Actual) − HAS(AWISF)	0.346 (S)	0.580 (M)	0.823 (L)	0.976 (L)	0.957 (L)
LSDC(Actual) − LSDC(AWISF)	0.249(S)	0.425(S)	0.618 (M)	0.728 (M)	0.729(M)
HAS(Actual) − HAS(AWISF+)	0.497 (S)	0.771 (M)	1.094 (L)	1.323 (L)	1.430 (L)
LSDC(Actual) − LSDC(AWISF+)	0.367 (S)	0.599 (M)	0.838 (L)	1.009 (L)	1.120 (L)
(HAS(Actual) − HAS(CPIU)	0.232(S)	0.442(S)	0.710 (M)	0.920 (L)	0.984 (L)
LSDC(Actual) − LSDC(CPIU)	0.167	0.338 (S)	0.539 (M)	0.702 (M)	0.781(M)

Table 10: Effect Sizes for Professional Retirees

Outcome Variable Differences	Salary Backcast Period				
	3	*4*	*5*	*6*	*7*
HAS(Actual) − HAS(AWISF)	0.215 (S)	0.367 (S)	0.442 (S)	0.470 (S)	0.469 (S)
LSDC(Actual) − LSDC(AWISF)	0.155	0.275 (S)	0.336 (S)	0.355 (S)	0.358 (S)
HAS(Actual) − HAS(AWISF+)	0.374 (S)	0.586 (M)	0.765 (M)	0.908 (L)	1.039 (L)
LSDC(Actual) − LSDC(AWISF+)	0.275 (S)	0.437 (S)	0.576 (M)	0.684 (M)	0.801 (L)
HAS(Actual) − HAS(CPIU)	0.109	0.260 (S)	0.384 (S)	0.488 (S)	0.569 (M)
LSDC(Actual) − LSDC(CPIU)	0.079	0.191	0.357 (S)	0.364 (S)	0.436 (S)

Table 11: Test Effect Sizes for Non-Professional Retirees

Outcome Variable Differences	Salary Backcast Period				
	3	*4*	*5*	*6*	*7*
HAS(Actual) − HAS(AWISF)	0.138	0.209 (S)	0.292 (S)	0.307 (S)	0.300 (S)
LSDC(Actual) − LSDC(AWISF)	0.116	0.184	0.258 (S)	0.262 (S)	0.254 (S)
HAS(Actual) − HAS(AWISF+)	0.253 (S)	0.368 (S)	0.514 (M)	0.600 (M)	0.696 (M)
LSDC(Actual) − LSDC(AWISF+)	0.219 (S)	0.327 (S)	0.459 (S)	0.526 (M)	1.707 (L)
HAS(Actual) − HAS(CPIU)	0.072	0.145	0.253 (S)	0.311 (S)	0.350 (S)
LSDC(Actual) − LSDC(CPIU)	0.059	0.127	0.220 (S)	0.270(S)	0.481 (S)

Tables 12 to 14 elaborate on the test results with means, confidence intervals and percentage increases for each model. The statistics indicate the ability of administrative employees to manipulate salaries near retirement. As shown for the 7-year salary backcast period, the administrative class increased its LSDC 33.3% over the CPIU and 52.4% over the AWISF+ computed LSDC. The levels for the other classes were smaller, but substantial.

Table 12: Selected Statistics for Administrative Retirees

Outcome Variable Mean; 95% C.I.	Salary Backcast Period				
	3	*4*	*5*	*6*	*7*
HAS(Actual)	$80,304 ±$2,575	$80,304 ±$2,575	$80,304 ±$2,575	$80,304 ±$2,575	$80,304 ±$2,575
HAS(AWISF)	$75,323 ±$2,413	$72,026 ±$2,277	$68,745 ±$2,289	$66,723 ±$2,240	$66,241 ±$2,526
%HAS increase	6.6%	11.5%	16.8%	20.4%	21.2%
HAS(AWISF+)	$73,210 ±$2,376	$69,380 ±$2,335	$65,133 ±$2,223	$62,206 ±$2,154	$60,177 ±$2,302
%HAS increase	9.7%	15.7%	23.3%	29.1%	33.4%
HAS(CPIU)	$76,867 ±$2,561	$73,741 ±$2,577	$69,964 ±$2,475	$67,169 ±$2,374	$65,789 ±$2,545
%HAS increase	4.5%	8.9%	14.8%	19.6%	22.1%
LSDC(Actual)	$901,261 ±$55,296	$901,261 ±$55,296	$901,261 ±$55,296	$901,261 ±$55,296	$901,261 ±$55,296
LSDC(AWISF)	$824,242 ±$51,967	$772,838 ±$49,336	$721,430 ±$45,200	$691,985 ±$43,745	$685,619 ±$47,093
%LSDC increase	9.3%	16.6%	24.9%	30.2%	31.5%
LSDC(AWISF+)	$790,447 ±$49,356	$731,141 ±$46,459	$665,090 ±$41,540	$622,162 ±$39,375	$591,225 ±$39,435
%LSDC increase	14.0%	23.3%	35.5%	44.9%	52.4%
LSDC(CPIU)	$848,524 ±$54,020	$799,900 ±$52,137	$740,727 ±$47,717	$698,362 ±$44,439	$676,188 ±$44,095
%LSDC increase.	6.2%	12.7%	21.7%	29.1%	33.3%

Table 13: Selected Statistics for Professional Retirees

Outcome Variable Mean; 95% C.I.	**Salary Backcast Period**				
	3	*4*	*5*	*6*	*7*
HAS(Actual)	$54,044 ±$665	$54,044 ±$665	$54,044 ±$665	$54,044 ±$665	$54,044 ±$665
HAS(AWISF) *%HAS increase*	$52,113 ±$639 3.7%	$50,775 ±$626 6.4%	$50,091 ±$632 7.9%	$49,818 ±$641 8.5%	$49,717 ±$674 8.7%
HAS(AWISF+) *%HAS increase*	$50,729 $1,796 6.5%	$48,935 $599 10.4%	$47,425 $2,201 14.0%	$46,271 $616 16.8%	$45,087 $1,334 19.9%
HAS(CPIU) *%HAS increase*	$53,049 ±$654 1.9%	$51,702 ±$641 4.5%	$50,602 ±$636 6.8%	$49,731 ±$616 8.7%	$48,967 ±$629 10.4%
LSDC(Actual)	$575,877 $14,359	$575,877 $14,359	$575,877 $14,359	$575,877 $14,359	$575,877 $14,359
LSDC(AWISF) *%LSDC increase*	$545,714 ±$13,851 5.5%	$524,056 ±$12,998 9.9%	$512,989 ±$12,742 12.3%	$509,238 ±$12,842 13.1%	$507,967 ±$13,151 13.4%
LSDC(AWISF+) *%LSDC increase*	$523,828 ±$13,108 9.9%	$495,681 ±$12,203 16.2%	$472,119 ±$11,612 22.0%	$454,690 ±$11,155 26.7%	$436,779 ±$10,805 31.8%
LSDC(CPIU) *%LSDC increase*	$560,369 ±$14,159 2.8%	$539,136 ±$13,505 6.8%	$521,815 ±$13,093 10.4%	$508,274 ±$12,555 13.3%	$496,004 ±$12,147 16.1%

Table 14: Selected Statistics for Non-Professional Retirees

Outcome Variable Mean; 95% C.I.	Salary Backcast Period				
	3	*4*	*5*	*6*	*7*
HAS(Actual)	$34,397 ±$1,073	$34,397 ±$1,073	$34,397 ±$1,073	$34,397 ±$1,073	$34,397 ±$1,073
HAS(AWISF)	$33,211 ±$1,018	$32,598 ±$1,017	$31,937 ±$974	$31,788 ±$994	$31,844 ±$997
%HAS increase	3.6%	5.5%	7.7%	8.2%	8.0%
HAS(AWISF+)	$32,267 ±$973	$31,320 ±$958	$30,211 ±$899	$29,542 ±$886	$28,836 ±$859
%HAS increase	6.6%	9.8%	13.9%	16.4%	19.3%
HAS(CPIU)	$33,772 ±$1,037	$33,135 ±$1,038	$32,256 ±$986	$31,771 ±$976	$31,469 ±$962
%HAS increase	1.9%	3.8%	6.6%	8.3%	9.3%
LSDC(Actual)	$356,675 ±$19,544	$356,675 ±$19,544	$356,675 ±$19,544	$356,675 ±$19,544	$356,675 ±$19,544
LSDC(AWISF)	$338,395 ±$18,868	$328,113 ±$18,135	$317,779 ±$17,120	$316,220 ±$17,950	$317,555 ±$17,800
%LSDC increase	5.4%	8.7%	12.2%	12.8%	12.3%
LSDC(AWISF+)	$323,128 ±$17,569	$307,946 ±$16,619	$290,748 ±$15,152	$281,026 ±$15,143	$270,431 ±$14,220
%LSDC increase	10.4%	15.8%	22.7%	26.9%	31.9%
LSDC(CPIU)	$347,187 ±$19,183	$336,768 ±$18,574	$323,213 ±$17,360	$315,775 ±$17,238	$310,803 ±$16,363
%LSDC increase	2.7%	5.9%	10.4%	13.0%	14.8%

These results provide strong evidence supporting the hypothesis of higher salary growth just outside HAS calculation windows than expected based on standard indexes, consistent with the use of special pension enhancement provisions to enhance salaries near retirement and future pension benefits. Job classification also impacts near-retirement salary growth with administrative employees having more ability to manipulate their salaries. However, all job classifications experienced above normal salary growth so the principal-agent conflict is widespread, not only limited to administrative employees.

5.4 Distribution of Salary Growth

To examine salary growth in more detail, Figures 7 to 9 show histograms of five-year salary growth for each job classification. The administrative class clearly dominates the other two classes with a larger part of the distribution clustered around 7 percent (mean 6.9 percent). The professional and non-professional classes have similar distributions, but the professional class mean is slightly larger (4.7 percent versus 4.4 percent). The box (25^{th} to 75^{th} percentiles) is also much wider for the administrative class (0.054 to 0.080) than the boxes for the professional (0.032 to 0.053) and non-professional classes (0.032 to 0.051).

Table 15 summarizes characteristics about the salary growth outliers for the five-year period providing insights about retirees with very high salary growth. The range of the extreme outliers was 0.136 to 0.52, while the range of the mild outliers was 0.97 to 0.129[8]. Somewhat surprisingly, the professional class dominated the administrative class for both the extreme and mild outliers. The top 10 outliers (0.196 to 0.520) contained only professional and non-professional retirees. In addition, the non-professional class contributed a reasonable number of extreme and mild outlier. Thus, the results from the distribution of salary growth and outliers indicate a widespread principal agent conflict, not limited to administrative employees.

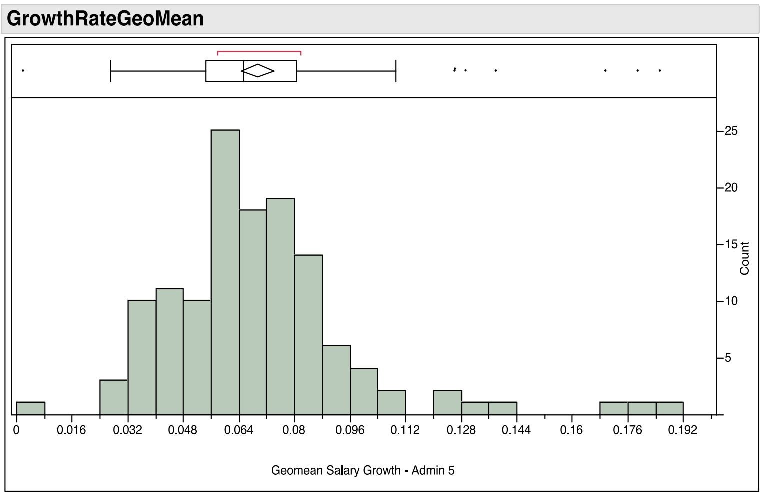

Figure 7: Histogram and Box Plot9 for 5-Year Salary Growth of the Administrative Class

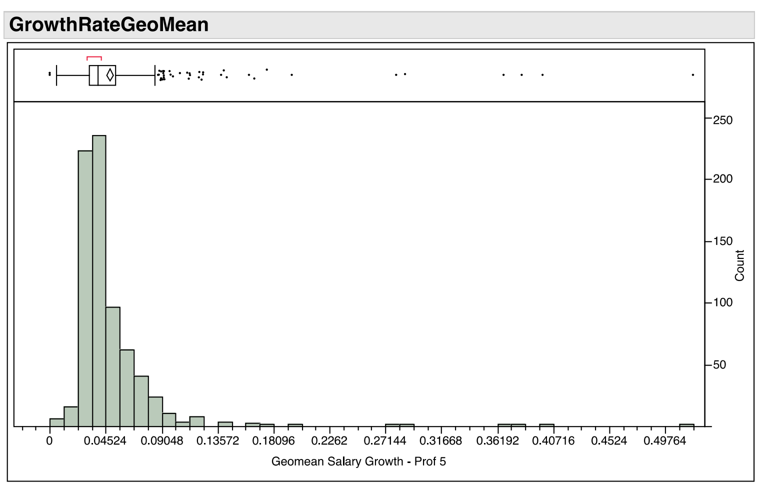

Figure 8: Histogram and Box Plot for 5-Year Salary Growth of the Professional Class

[8] An extreme outlier is greater than the 3rd quartile plus 3 times the interquartile range. A mild outlier is greater than the 3rd quartile plus 1.5 times the interquartile range but less than the extreme range.
[9] The box encloses the 25th and 75th quartiles. The line across the middle of the box identifies the median sample value and the diamond indicates the sample mean and 95% confidence interval. The red bracket above the box identifies the shortest half, the densest 50% of the observations.

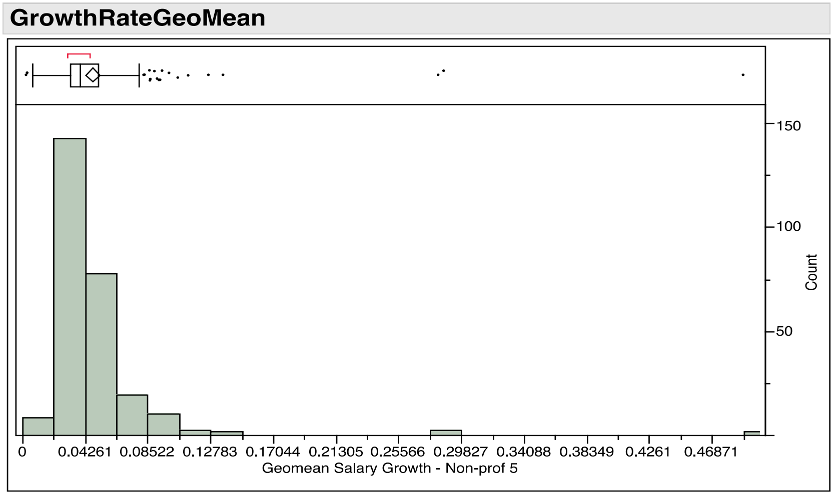

Figure 9: Histogram and Box Plot for 5-Year Salary Growth of the Non-Professional Class

Table 15: Summary of Salary Growth Outliers

RetGroup	Outlier Type	Count	Avg LSDC	Avg HAS	Avg Ret Age	Avg Sal Growth[10]
Admin	Extreme	4	$626,222	$84,006	58.4	0.168
Prof	Extreme	13	$536,937	$50,329	55.8	0.258
Non prof	Extreme	4	$205,426	$31,882	54.6	0.299
Admin	Mild	9	$953,204	$87,224	55.4	0.110
Prof	Mild	12	$574,329	$54,017	59.3	0.112
Non prof	Mild	4	$588,062	$46,049	52.0	0.111

5.5 Analysis of Policies to Limit Impact of Salary Growth on HAS

In a final analysis, we examined the effect of salary growth limits on surplus deferred compensation (LSDC). To target only LSDC, the limits are imposed just on the HAS calculation rather than the actual salary. Figures 10 to 14 depict extensions of the HAS calculation window (3 to 7 years) and annual salary growth limits (3 percent to 15 percent) in the HAS calculation.

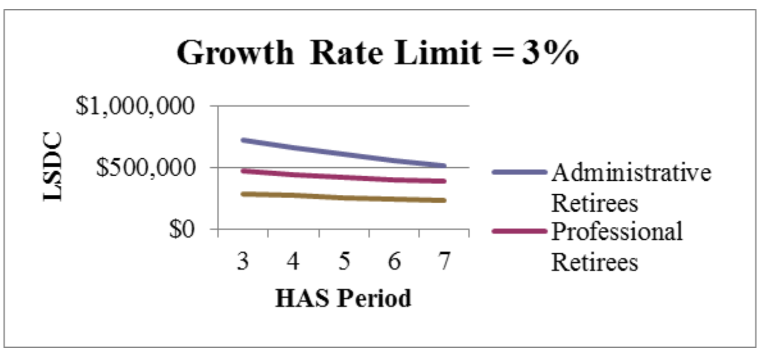

Figure 10: Annual Salary Growth of 3%

[10] Average of the geometric mean of the 5-year salary growth.

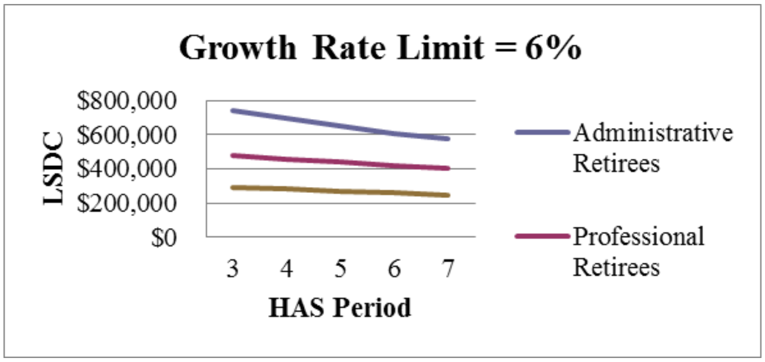

Figure 11: Annual Salary Growth of 6%

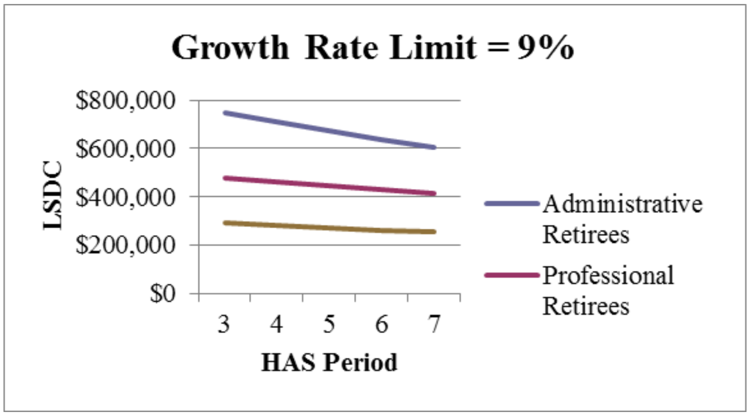

Figure 12: Annual Salary Growth of 9%

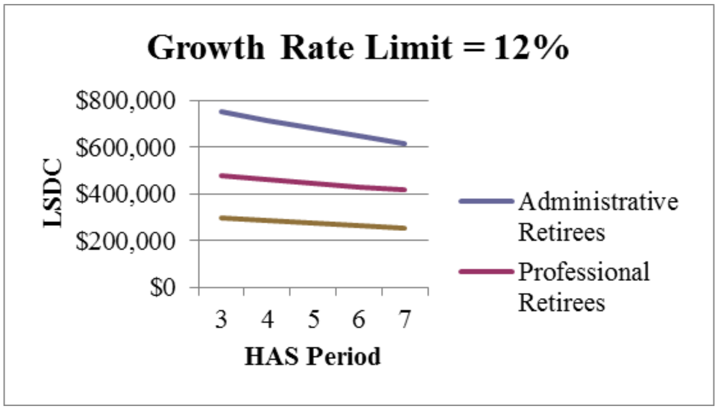

Figure 13: Annual Salary Growth of 12%

As shown in Figures 10 to 14, LSDC falls for each job class, and particularly for the administrative job class. This result indicates that limits on HAS growth would have a substantial impact on reducing future pension costs. LSDC for the administrative class is about 31% lower for a 7-year period under a 3% annual salary growth limit compared to a 3-year period under a 15% growth limit. In contrast, the corresponding decline for the professional and non-professional classes is about 21%. The HAS calculation window has more impact than the annual salary growth limits. For example, increasing the HAS window from 3 to 7 years reduces LSDC by about 18% for the administrative class. In contrast, reducing salary growth in the 3-year HAS period to 3% only reduces LSDC by about 4.5% for the administrative class.

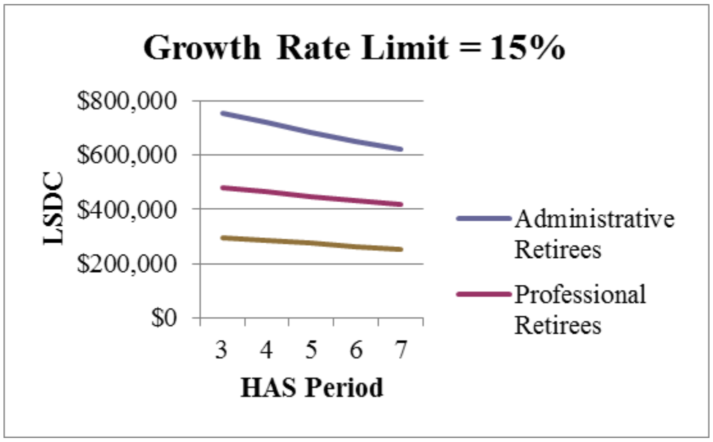

Figure 14: Annual Salary Growth of 15%

6. Concluding Remarks

This paper examines the misuse of benefit enhancement provisions, commonly referred to as pension padding, for defined benefit (DB) public employment pension plans. Three diverse sources of evidence about pension plan practices were utilized due to the difficulty of collecting data: (1) investigative reports from the financial press; (2) a survey of pension fund administrators; and (3) and a unique data set of retiree characteristics and salary history for retirees in the Denver Public School Retirement System and Colorado Public Employees Retirement Association.

The findings of the study provide evidence of pension padding activity in all three data sources. The review of financial press reports indicate spectacular levels of pension padding especially in some states and local government units. The survey results revealed the prevalence of overtime inclusion in pensionable wages and the lack of restrictions on base salary growth during the HAS period. The empirical analysis of retiree data sets demonstrated that actual salary growth rates and lump-sum surplus deferred compensation (LSDC) were always greater than forecasts based on indexed wage increases, particularly for the administrative job class. The analysis of policies to reduce pension padding through salary manipulation suggested increasing the HAS calculation period could reduce long-term costs for public employment pension plans facing financial difficulties.

Overall, the results demonstrated a substantial principal-agent conflict for defined benefit pension plans. This conflict undermines an important advantage of defined benefit pensions to employers, the ability to retain personnel with modest cost in the near retirement period, an advantage that appears to be offset by the moral hazard in many pension benefit enhancement provisions.

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