Journal of Pension Economics and Finance (2024), **23**, 152–164
doi:10.1017/S147474722300001X

CAMBRIDGE UNIVERSITY PRESS

ARTICLE

The prevalence and nature of COLAs in public sector retirement plans

Maria D. Fitzpatrick[1,2*] and Gopi Shah Goda[2,3]

[1]Department of Economics, Jeb E. Brooks School of Public Policy, Cornell University, Ithaca, NY, USA, [2]Stanford Institute for Economic Policy Research, Stanford University, Stanford, CA, USA and [3]Stanford University, Stanford, CA, USA
*Corresponding author. Email: Maria.d.fitzpatrick@cornell.edu

(Received 28 January 2022; revised 22 October 2022; accepted 21 December 2022; first published online 11 April 2023)

Abstract

State and local employees comprise a significant proportion of the workforce and are largely covered by defined benefit pensions. Many of these retirement plans have been facing funding gaps, but legal restrictions often prevent them from reducing benefits for current employees. However, retirement plans can reduce liabilities by changing cost-of-living adjustments, or COLAs, which are commonly applied to benefits each year to allow retirees to maintain purchasing power in retirement. In this study, we examine the prevalence of COLAs in public sector retirement plans through original data collection for 49 plans in 30 states, which cover approximately 52% of public sector workers overall. Among these samples, on average 45% of workers each year experienced some change in COLAs between 2005 and 2018, with more than half of these workers experiencing negative changes. We consider stylized examples of public sector workers subject to reductions in COLAs to understand how COLAs may affect workers' retirement decisions. Our analysis suggests that eliminating a 3% COLA could delay retirement of affected workers by approximately 4.5 months.

Key words: Cost-of-living adjustment; inflation; public pension

JEL codes: J26; H55; J45

1. Introduction

Approximately 13.8% of the US workforce is comprised of state and local employees who are eligible for retirement benefits from one of 299 state-administered or 5,977 locally administered plans. These plans collectively have $4.3 trillion in assets, 14.5 million active members and support 10.3 million retirees with over $280 billion in benefit distributions every year.[1] Each of these plans differs in their benefit design, funding model, and investment policy, and are subject to accounting standards set by the Governmental Accounting Standards Board (GASB).

Many of these programs have long faced a funding gap, with plan liabilities much larger than plan assets in aggregate. The aging of the population combined with market downturns, insufficient contributions, and increased benefit levels has resulted in a decline in the average aggregate funding level. In 2001, the actuarial funded ratio for state and local pensions was 101.9%, while in 2019, this ratio had declined to 71.9%. Recent market losses and increased budget pressures related to the COVID-19 pandemic are likely to reduce the funding levels for state and local pension plans even further.

Due to legal restrictions, many state governments are unable to take steps to limit their liabilities by increasing retirement eligibility ages or reducing the generosity of benefit formulas for current

[1]https://publicplansdata.org/quick-facts/national/ (accessed June 23, 2020).

employees. This is because in many states the pension promises to public employees are written into the state constitution. Pension benefits are therefore considered a component of the compensation package agreed upon at hire and cannot be reduced. Therefore, any increases in retirement eligibility ages or reductions in pension benefits can apply only to new hires after the time the new rules are adopted. Such changes to pension systems can only lower liabilities slowly since the time to retirement of these new employees is far enough into the horizon that it represents only a small part of current liabilities.

As such, to reduce the liabilities of their pension funds, many states have reduced their cost-of-living adjustments (COLAs). Some states have gone so far as to eliminate any COLAs for the foreseeable future and some have restricted future COLA increases. Given that decreases to COLAs compound each year, the effect of these adjustments on a retiree's lifetime benefits has the potential to be large. For example, based on a standard simple model, moving from a 3% annual COLA to none decreases the present value of lifetime pension benefits significantly (Munnell *et al.*, 2014). Changes to COLAs also affect retirees' exposure to inflation risk. Although many of these changes to COLAs have been challenged in state courts, to date most of those challenges have been unsuccessful. This has served to make reducing COLAs potentially an effective way to limit current liabilities because the reductions can take effect immediately for both current retirees and employees once they begin collecting benefits.

For employees close to retirement, a reduction in the nominal present value of pension benefits and potential increased exposure to inflation risk could change labor supply and Social Security claiming for several reasons. Those with positive returns to continued work may delay retirement from their public sector employer in order to increase the size of their pension benefit. Alternatively, they may seek work or increase their labor supply outside of the public pension system, since doing so can provide extra income and may increase the size of their Social Security benefit. Finally, the reduction in the value of employees' public pension benefits may lead them to delay Social Security claiming, either because they are still working or because delayed claiming increases the present discounted value of Social Security benefits. Public sector employees already collecting pension benefits may find it beneficial to increase their lifetime income by finding work outside of the public sector or delaying Social Security claiming.

Understanding how public sector employee and retiree labor supply and Social Security claiming shift with reductions in pension benefits is crucial. To date, some studies have leveraged administrative data from a specific state that experienced a change in retirement or health care benefits and examined its effect on public sector employment (Brown, 2013; Leiserson, 2013; Fitzpatrick, 2014; Ni and Podgursky, 2016; Salinas, 2017; Quinby and Wettstein, 2019). A wider literature has examined how differences in pension plan and retiree health insurance generosity relate to retirement timing using survey data (e.g., Shoven and Slavov, 2014; Morrill and Westall, 2019) and recent work examines the effects of pension freezes in the private sector (Patki, 2020). None of these studies have focused on COLAs, which, because they happen frequently and commonly and because they affect the inflation-risk-profile of benefits, may affect labor supply differently than the types of infrequent one-time comprehensive shifts to benefit plan generosity that are often the subject of the prior research.

In this paper, we aim to push forward our understanding of how COLA changes may affect retirement behavior by documenting the scope and nature of changes to COLAs over a 15-year period for a large proportion of public sector workers and retirees. We undertook an intensive data collection process during which our research team gathered data on COLAs across the country. In this study, we summarize information on the COLAs in 49 state and local pension plans that we can link to the American Community Survey (ACS) between 2005 and 2018. The data cover public employees across 30 states, covering 52% of state and local employees in the USA. Linking to the ACS samples allows us to calculate information on the number of Americans subject to COLA changes by their public employer to get a sense for the scope of the issue. We then use our COLA data to simulate the possible effects on labor supply and Social Security claiming using elasticities from other work.

We find that changes in COLAs are common among the plans in our database. Each year during the 2005–2018 period, between 27% and 57% of public sector workers covered by one of these plans

experience a change in the COLA. The direction of the change varies over time, with more positive changes during the earlier years of our data, and more negative changes in more recent years. On average over this time period, approximately 45% of workers in our sample experience a change in any one year, representing more than 60 million workers over the 14-year horizon. More than half of these workers (32 million) experience a negative change, and 23% (or 14 million) are in the 55–64 year old age group. On average, COLAs fell from 2.2% and 2.38% in 2005 and 2006, respectively, to a low of 0.96% in 2016, before rising slightly to 1.25% in 2018.

Of course, many of these COLAs are either directly or indirectly pegged to inflation, and over this period, the consumer price index (CPI) fell. We investigate how COLA changes over this period shifted relative to inflation in a couple of different ways. We find that plans were less likely to be defined directly in relation to the CPI and were more likely to be capped at fixed percentages if indexed to CPI. However, after controlling for the changes in the CPI, on average, the COLAs in our sample of pension plans increased over time. This suggests that while nominal COLAs decreased over the period, retirees and public sector employees were slightly more protected against inflation risk at the end of the period relative to the beginning. However, it is possible that these results may differ in environments where inflation is increasing rather than declining.

Whether employees respond to the changes in the size of their pension benefits in nominal terms or relative to the real dollar value is an empirical question that we do not attempt to answer in this study given the limits of the data. Instead, we use estimates from the previous literature to examine how changes in pension wealth may affect labor supply. Our analysis of stylized workers suggests that COLA changes could have substantial changes on retirement wealth and retirement timing. For a public sector worker who starts work at age 22 and continues for 30 years with average mortality for the 1950 birth cohort and a 3% discount rate, we estimate that eliminating a 3% COLA would reduce her retirement wealth by approximately 35%. When we apply elasticities of retirement probabilities with respect to retirement wealth from previous studies, this reduction translates to a delay in retirement of approximately 4.5 months. We explore the sensitivity of this result to changes in various assumptions, including mortality, discount rates, years of service, the elasticity used, and the COLA examined.

We make multiple contributions to this literature. First, we provide the first comprehensive look at COLA changes across a balanced panel of 49 state and local retirement plans covering 30 states and 14 years. This will provide a foundation for future work aimed at understanding how COLA changes affect retirement, labor supply, and benefit claiming decisions in both public sector pensions and Social Security. Second, we merge these data with large-scale nationally representative survey data for a preliminary estimate of how many workers are affected by these COLA changes. Third, we use estimates of the elasticity of labor supply with respect to pension benefits from other studies to simulate how changes to public pension benefit wealth induced by COLA changes may affect retirement decisions under a wide range of assumptions.

The rest of the paper proceeds as follows. Section 2 describes the data collected from state and local pension plans as well as the population-level data from the ACS. Section 3 describes an exercise that allows us to simulate the effects of these changes on the labor supply of public sector workers and Social Security claiming using different assumptions, and Section 4 concludes.

2. Data collection and summary

2.1 Pension plan COLA database

We start with a roster of plans from the State and Local Public Plans Database from the Center for Retirement Research at Boston College, which contains plan-level data from 2001 through 2020 for 210 pension plans (120 administered at the state level and 90 administered locally). These plans cover 95% of public pension membership and assets nationwide, and range from the California Public Employees System (CalPERS) with over 1.5 million active members and beneficiaries to the Anchorage Police and Fire Retirement System with 14 active members and 770 beneficiaries.

While summaries of COLA changes have been compiled in legislative reports provided by the National Conference of State Legislatures and National Association of State Retirement Administrators, these reports typically summarize only state pension plans (not local plans) and do not include precise details regarding the types and amounts of COLAs in effect each year. Therefore, we hand-collected specific data using a variety of sources. We started our searches for information with the legislative records of bills passed in state legislatures. These bills typically indicate the COLA rate in place each year for plans with ad hoc COLA systems that require legislature approval, as well as changes in the structure and type of COLA systems in place in such plans. Some pension plans make changes to their COLAs that do not pass through the legislative system. Therefore, we supplemented legislative record searches with data from pension program websites, plan Comprehensive Financial Reports and other plan documents, and by contacting individual offices that administer state and local pension programs. We prioritized data from the plans with the largest number of participants to increase the share of public sector workers represented in the data.

COLAs can be defined as either automatic or ad hoc (with some allowance for an 'other' category that does not fit either of these two classifications). Automatic COLAs are those that are set regularly without a legislative or other approval process. These can be fixed rate COLAs that are the same rate from year to year, CPI-linked COLAs that are set based on the annual CPI, or investment-based COLAs that are pegged in some way to the financial health of the pension fund. Alternatively, ad hoc COLAs are COLAs that change irregularly; they can also be set in any of the ways just described (fixed rates, CPI-linked, or based on financial health of the pension fund).

While many plans have clearly specified COLA rates, others are more difficult to compare across plans or over time. For example, some COLA rates specify a dollar amount cap or floor and therefore may vary across participants. In our tabulations here, we ignore these caps. Others are formulated as dollar amounts per year of credited service or just a flat dollar amount. For these rates, we convert these COLAs to a percentage by assuming that retirees have on average 30 years of service, median income of public sector workers in that state and year, and a 70% replacement rate.[2] For COLA rates that are based on the CPI, we assume that the CPI used is that from the previous year, as that is the rate that would have been available at the time the COLA decision was made. If COLAs differed for different participants (e.g., the year of retirement or the year of hire), we choose the COLA rate for the most recent retirees or the oldest hired to reflect COLAs available to participants near retirement.[3]

Our data collection efforts yielded complete data spanning each year from 2005 to 2018 for 49 plans across 30 states. This represents information on about 25% of the pension plans in the State and Local Public Plans Database. These plans cover 52% of active participants in state and local pension plans in 2018.[4] Below, we use the ACS data to describe differences in the demographic characteristics and occupation of the public sector employees in our COLA data as compared to those not in the COLA data.

In Figure 1 we present information on the fraction of the 49 plans in our sample that changed their COLA rates between 2005 and 2018. Between 2005 and 2010, between 26 and 30 plans changed their COLA rate each year, depending upon the year. After 2010, fewer plans changed their COLAs each year. In 2011–2013, 19–20 plans changed each year. Between 2014 and 2018, only 12–17 plans changed their COLAs each year, except in 2017 when 24 plans changed their COLAs.

Of interest is whether COLAs in these plans were increasing or decreasing. Since some COLAs are tied to a plan's fiscal health, either directly through their statutory formulas or indirectly through policymakers' concerns about plans' fiscal health, changes in COLAs tend to move with financial markets.

[2]Because we convert these to percent terms using annual income from the ACS, these rates could vary from year to year even if they statutorily do not change. In any year, between 0 and 3 plans have COLAs reported in dollars rather than rates. So, this has little effect on the number of changes in COLAs and the populations affected by those changes that we report below.

[3]Some systems changed COLAs only for new retirees. We have not classified those COLA changes here. Doing so would imply that more employees were affected by potential COLA changes than those we report here.

[4]Based on our calculations using the Total Membership variable in the Pension Plans Database for 2018.

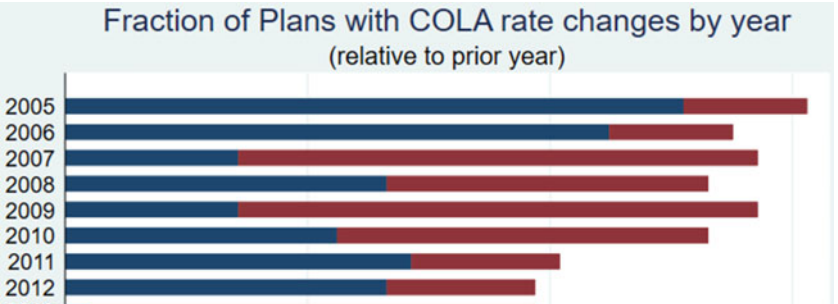

Figure 1. Fraction of public sector pension plans with COLA rate changes, 2005–2018.
Note: Based on authors' calculations using the sample of 49 pension plans in our COLA database between 2005 and 2018.

They often do so with a bit of a lag, since most plans use an average of market returns to adjust the value of their assets. In Figure 1, we can see that there were more positive increases than negative increases in 2005 and 2006, before the Great Recession. In these years, 75–80% of the changes to COLAs were increases. Similarly, there are even fewer positive changes to COLA rates across plans after 2013, when the negative returns of 2008 begin to get incorporated into pension plan asset valuation. In 2013, for example, just 1 of the 19 COLA changes was positive. By 2017 and 2018, there was again an increase in the share of pension plan COLA changes that were positive. On average over this period, the COLA fell by nearly 50% from 2.2 in 2005 to 1.25% in 2018. The average was highest in 2006, at 2.38%, and at its lowest in 2016, at 0.96%. Since the main reason to offer COLAs is to provide retirees with protection against inflation, we also explore how COLAs changed relative to inflation over this period. To do this, we present a couple of facts from the data. First, over this period, the fraction of plans directly pegged to the CPI (in the definition of how the COLA rate is calculated) fell from 31% to 25%, or 20% of its initial level (Figure 2). Also, the few plans that allowed for unlimited increases in their COLAs relative to CPI ended this practice, choosing to either move away from using the CPI to calculate their COLAs or place a cap on the level of COLAs.

Second, since we know that inflation fell over this period, we look for evidence about the change in COLAs relative to the change in the CPI. To do this, we regress the COLA for plan p in year t on the CPI in year t and a continuous variable for the number of years since 2004 (the year before our panel began). Our estimating equation is $COLA_{pt} = \beta CPI_t + \pi t + \varepsilon_{pt}$. Our estimate of β from this equation is 0.520 (standard error is 0.028) and of π is 0.033 (standard error of 0.008). These coefficients show how closely related COLAs are to the CPI (the t-statistic on β is over 22). They also suggest that, after controlling for overall decreases in inflation, the real value of COLAs has increased, on average, over this period by about 3/100ths of a percent a year. So, even while COLAs were decreasing in absolute value, over this time period, public sector pension benefits became more valuable in real terms.

Since COLA changes over this period increased the real value of pension benefits, it is likely that they also impacted pension fund balances. Because information used to calculate pension fund balances is difficult to obtain for the large set of plans in our sample, we use a stylized example to

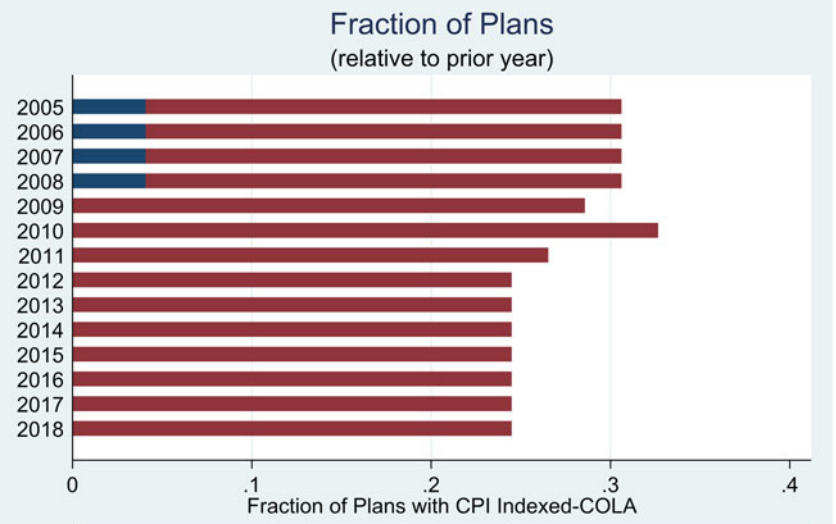

Figure 2. Fraction of public sector pension plans with COLA definitionally linked to CPI, by whether there is a limit on the COLA, 2005–2018.
Note: Based on authors' calculations using the sample of 49 pension plans in our COLA database between 2005 and 2018.

show how hypothetical changes in COLAs might affect the underfunding of pensions, *ceteris paribus*. We describe these results in Section 3.

Going forward, past and future COLA changes will continue to have an effect on pension fund balances. As in the past, such effects will likely differ depending on the structure of COLAs, i.e., whether they are ad hoc or automatic and whether they are pegged to inflation or not. In Table 1, we show how the average COLAs and inflation rate (calculated using the CPI) varied each year across plans that were either ad hoc or automatic. From looking across the columns of the table, it is clear that the automatic plans are much more closely linked to inflation, with ratios most commonly between 0.5 and 1. Ad hoc

Table 1. Average COLA by type of adjustment and year

Year (t)	(1) Ad hoc(t)	(2) Automatic(t)	(3) Total(t)	(4) Inflation rate(t)
2005	1.29 (1.37)	2.47 (0.78)	2.20 (1.05)	3.40
2006	1.86 (1.99)	2.46 (0.93)	2.38 (1.27)	3.20
2007	1.05 (1.16)	2.51 (1.11)	2.16 (1.24)	2.90
2008	1.16 (1.12)	2.40 (0.77)	2.13 (1.04)	3.80
2009	0.60 (1.01)	2.06 (1.50)	1.62 (1.53)	−0.40
2010	0.17 (0.45)	1.23 (1.15)	0.98 (1.13)	1.60
2011	0.04 (0.15)	1.55 (0.98)	1.15 (1.07)	3.20
2012	0.22 (0.40)	1.83 (1.03)	1.42 (1.17)	2.10
2013	0.05 (0.17)	1.56 (0.89)	1.16 (1.02)	1.50
2014	0.22 (0.40)	1.47 (0.88)	1.18 (0.95)	1.60
2015	0.10 (0.23)	1.42 (0.92)	1.11 (0.99)	0.10
2016	0.05 (0.16)	1.23 (1.03)	0.96 (1.03)	1.30
2017	0.30 (0.62)	1.30 (0.97)	1.08 (0.98)	2.10
2018	0.31 (0.64)	1.51 (0.96)	1.25 (1.04)	2.40

Note: Authors' tabulations. The values represent the average COLA rate for each year for ad hoc COLAs, automatic COLAs, and all plans. The last column reports the rate of inflation in the year indicated, where Inflation rate (t) = 100 × (CPI(t)/CPI($t-1$) − 1). Standard deviations are in parentheses. Note that in our analyses, we assume CPI-linked COLAs were adjusted according to the previous year's inflation rate.

COLAs, however, are almost always below half of CPI levels. This suggests that in high-inflation environments, the real liabilities of pensions will decline more in pension plans with ad hoc COLAs.

2.2 American Community Survey

In order to provide evidence of how generalizable our plan sample may be and to obtain estimates of the number of workers affected by COLA changes, we merge our plan-level data with data from the ACS. The ACS is an annual large nationally representative survey of people in the USA. It includes information about demographic characteristics (including age) and about employment and income. Income information is collected from all respondents and broken down by source (e.g., employment income, pension income). Respondents are also asked about employment. If a person is employed, or has worked within the past 5 years, the person is asked what kind of work they were doing. The Census Bureau then codes up the answer into industry and occupation categories. The ACS also includes information on the types of employers people worked for if they worked in the past 5 years, including whether it was a state or local government.[5] All of this is useful information for understanding the employment and retirement patterns of public sector workers in response to COLA changes.

The ACS provides the advantage of large sample sizes and the ability to compare public sector to private sector employees over time (Morrill, 2014). Its major disadvantage is the lack of longitudinal data on its respondents. We only observe details about one's current employer, or, for those unemployed or out of the labor force, the most recent employer. Therefore, using these data for investigation of whether one's retirement and Social Security claiming was affected by changes in COLAs for public sector workers requires strong assumptions. However, these data do allow us to estimate the proportion and composition of public sector workers likely subject to changes in COLAs.

We select a sample of ACS respondents surveyed from 2005 to 2018 from ages 25 to 80 who are state or local government employees as defined by the ACS. We link the COLAs from our data collection efforts to the ACS using information on the respondent's sector of employment, location, and occupation. We start with merging public employees to the local pension plan for their city if it is available for their occupation. If a plan does not exist for their occupation, the employees are matched to the first available plan when searching in the following order: county pension plan for their occupation, general municipal pension plan for their occupation, state pension plan for their occupation, and state general pension plan. For example, a teacher in Chicago would be matched in the first step, while a teacher in Springfield, IL would be matched to the Teachers' Retirement System of the State of Illinois.

Since we do not have COLA information for all plans in the USA or even all plans in the Public Pensions Database, we first examine whether our sample of ACS respondents with COLA information are different than those for whom we do not yet have COLA information. In Table 2, we present demographic characteristics on the sample of respondents in the 2018 wave of the ACS who report working in state or local government currently or within the past 5 years in column 1. In the second column, we present the same demographic characteristics for the sample of ACS respondents in state and local governments in the 30 states for which we have public pension COLA information for at least one plan in the state. In the final column of the table, we present demographic characteristics for the ACS workers in our sample with public pension COLA information.

We have COLA information for 52% of the public employees in the ACS. This includes coverage of 71% of the state and local workers in the 30 states for which we have pension plan COLA information on at least one plan. Comparing the characteristics across the columns, we can see that our COLA analysis sample is slightly more likely to be Black (17% versus 14%), similarly likely to be white (67%), and less likely to be Hispanic (10 versus 12%) than the entire ACS population of state and

[5]For those with multiple jobs, the questions about industry, occupation, and class of worker refer to the job at which the person worked the most hours. For those who are unemployed or are of the labor force, these questions refer to the most recent job (https://www.census.gov/topics/employment/industry-occupation/about/class-of-worker.html).

Table 2. Demographic characteristics of state and local public sector workers in the ACS and in the COLA analysis sample in 2018

	ACS public employees	ACS public employees (final 30 states)	ACS public employees in (final 49 plans with COLA info)
Percent Black	14	15	17
Percent Hispanic	12	12	10
Percent white	67	65	67
Percent female	60	59	60
Average age	48	48	48
Average income wage	$45,690	$46,364	$44,716
Percent in labor force	84	85	84
Number of people in the ACS	19,238,167	13,723,853	9,689,654

Note: Authors' tabulations using the ACS. The table presents descriptive characteristics for (1) the whole sample of people in the ACS who report working in the public sector currently or within the past 5 years, (2) the sample of those in group (1) that is in a state for which we have some COLA information, and (3) the sample of group (1) that is in our sample of 49 plans. We use population weights when measuring these characteristics and present weighted population counts in the final row of the table.

local workers. The groups are equally likely to be female (60%). The COLA sample is similarly aged as the general population of state and local workers (48 years). They have slightly lower average wage income ($44,716 versus $45,690) and are equally likely to be in the labor force (84%). This evidence of slight differences in population characteristics should be considered when interpreting how generalizable our information on COLAs is.

Table 3. Number and fraction of public sector workers affected by COLA changes each year

Year	COLA rate change (any)	COLA rate change (+)	COLA rate change (–)	Total
2005	5,267,518	4,495,076	772,442	9,571,979
	55.03	46.96	8.07	100
2006	5,026,707	4,297,707	729,000	9,623,391
	52.23	44.66	7.58	100
2007	4,863,828	848,067	4,015,761	9,720,370
	50.04	8.72	41.31	100
2008	4,418,881	2,596,069	1,822,812	9,819,286
	45	26.44	18.56	100
2009	4,881,356	1,267,453	3,613,903	9,710,800
	50.27	13.05	37.22	100
2010	4,851,573	2,317,556	2,534,017	9,740,594
	49.81	23.7	26.02	100
2011	4,501,857	2,666,145	1,835,712	9,804,777
	45.91	27.19	18.72	100
2012	3,898,910	2,249,667	1,649,243	9,701,657
	40.19	23.19	17	100
2013	4,564,034	26,398	4,537,636	9,713,044
	46.99	0.27	46.72	100
2014	3,131,099	567,230	2,563,869	9,640,832
	32.48	5.88	26.59	100
2015	3,495,251	1,359,530	2,135,721	9,547,080
	36.61	14.24	22.37	100
2016	2,643,710	209,653	2,434,057	9,703,671
	27.24	2.16	25.08	100
2017	5,598,480	4,115,862	1,482,618	9,833,221
	56.93	41.86	15.08	100
2018	3,500,641	1,571,067	1,929,574	9,689,654
	36.13	16.21	19.91	100
Total	60,643,845	28,587,480	32,056,365	135,820,356
	44.65	21.05	23.6	100

Note: Authors' tabulations using the ACS. The table shows the number of public sector employees in each year of our matched COLA data sample that are affected by each type of COLA change (at top of column) with the fraction displayed directly below each estimate. These numbers are weighted population counts.

Table 4. Number of state and local employees in sample who experienced any COLA change, by year and age group

Year	25–34 years	35–44 years	45–54 years	55–64 years	65+ years	Total
2005	1,007,917	1,337,816	1,497,609	1,085,492	338,684	5,267,518
2006	974,882	1,249,167	1,402,694	1,064,631	335,333	5,026,707
2007	922,480	1,181,630	1,350,750	1,073,279	335,689	4,863,828
2008	855,643	1,035,355	1,204,285	993,335	330,263	4,418,881
2009	933,342	1,132,169	1,337,228	1,104,206	374,411	4,881,356
2010	934,777	1,099,299	1,303,130	1,138,540	375,827	4,851,573
2011	820,431	996,701	1,195,706	1,097,772	391,247	4,501,857
2012	724,589	863,958	977,831	953,781	378,751	3,898,910
2013	846,618	997,318	1,151,998	1,102,101	465,999	4,564,034
2014	566,067	666,596	773,928	765,571	358,937	3,131,099
2015	649,034	733,665	861,887	825,092	425,573	3,495,251
2016	490,047	534,412	643,959	629,467	345,825	2,643,710
2017	1,081,155	1,179,373	1,354,667	1,316,762	666,523	5,598,480
2018	679,065	738,870	827,205	819,905	435,596	3,500,641
2005–2018	11,486,047	13,746,329	15,882,877	13,969,934	5,558,658	60,643,845

Note: Authors' tabulations using the ACS. The table shows the number of public sector employees in each age range in each year of our matched COLA data sample that are affected by each type of COLA change (at top of column) with the fraction displayed directly below each estimate. These numbers are weighted population counts.

In Table 3, we present information on the prevalence of COLA changes in our sample of ACS data across the 49 plans with COLA information. In almost every year, at least a third of people who report being state or local government workers experience COLA changes. (The exception is 2016 when only 27% did.) On average, 4.3 million people who are working in or have recently worked in the public sector experience COLA changes each year. Over the entire period, over 52 million state and local government workers experienced changes to their plans' COLA. Just over half of these employees, 32 million, experienced downward changes to their plans' COLA.

The pattern of changes over time in the changes to COLA largely mirrors what we reported earlier at the plan level. The largest number of employees experience downward adjustments to their plans' COLAs in 2007 and 2013. Increases in COLAs were most prevalent across public sector workers in 2005, 2006, and 2017.

In Table 4, we present information on the number of state and local government employees that experience COLA changes by year and age groups. The information is meant to highlight that many of the public workers affected by the COLA changes over the past two decades are those reaching retirement. In the public sector, workers are often first eligible to collect their employer provided pensions in their early 50s. As we can see in Table 4, almost 14 million public sector employees between the ages of 55 and 64 experienced COLA changes between 2005 and 2018. Another 15.9 million between ages 45 and 54 also experienced changes. This suggests that many workers nearing retirement are experiencing changes to their pension wealth. Those changes to their pension wealth may affect their retirement, labor supply, and benefit collection decisions. Of interest is whether it is the nominal decreases in pension wealth, driven by the average decreases in COLAs, or the real increases in pension wealth due to increases in the COLAs relative to CPI over this period (discussed earlier) that are most salient to workers nearing retirement. Although we cannot determine the answer to that question with available data, we now turn to a stylized example to examine how changes in the real value of pension benefits might alter labor supply.

3. Cola changes, labor supply, and funding: stylized examples

For current employees close to retirement, the reduction in the nominal present value of pension benefits and increased exposure to inflation risk from the COLA changes over this period could change labor supply and Social Security claiming for several reasons, as outlined in the Introduction. Alternatively, if employees are aware of the increases in the real value of their pension benefits

(that occurred because the COLAs rose over time relative to the CPI) they may alter their labor supply in other ways.

Understanding how public sector employee and retiree labor supply and Social Security claiming shift with reductions in pension benefits is important in determining whether the underfunding of state and local government pension plans has spillover effects on Social Security, including on the solvency of the Social Security system. However, publicly available, nationally representative survey datasets are ill-suited to exploit cross-plan, cross-state, and cross-year variation in the COLA changes on labor supply and Social Security claiming. In cross-sectional datasets, such as the ACS, we only observe details about one's current employer or employer within the last 5 years if retired. Therefore, only under certain fairly strong assumptions about how people's most recent employment connects to their lifetime employment can we identify the effects of COLA changes on retirement, labor supply, and benefit claiming. While longitudinal datasets such as the Health and Retirement Study are helpful in this regard, the sample size is significantly smaller, and would likely result in very few public sector employees.

Here, we therefore take an alternative approach and conduct an analysis using stylized examples that apply prior literature on retirement and claiming elasticities to simulate the changes in labor supply across a wide range of parameters. Take, for example, a public sector worker who begins working at age 22 and is enrolled in a plan with a benefit formula where the initial annual benefit is the product of her final average salary and a benefit factor that increases with years of service. Suppose she is eligible for benefits after completing 30 years of service or attaining age 60, whichever comes earlier, and benefits after retirement are increased annually at a rate of 3% for cost of living and are paid until she dies. Now suppose her pension plan eliminates the COLA. The present value of her future retirement benefits has declined, which may in turn lead her to respond along several margins. Her response will depend on both the magnitude of the reduction in future retirement benefits along with her elasticity with respect to benefit generosity.

The magnitude of the reduction in future retirements depends on both the discount rate and mortality assumptions used to evaluate the present value. The elasticity of labor supply with respect to benefit generosity has been estimated in the literature. One example is Coile and Gruber (2007) which estimates the impact of Social Security and pension incentives on male retirement, including retirement wealth and forward-looking incentive measures. They estimate an elasticity of labor force non-participation with respect to benefits of 0.16, suggesting that if retirement wealth increases by 10%, retirements would increase by 1.6%. Another elasticity is estimated by Quinby and Wettstein (2019) who exploit changes in benefit generosity in the Employees' Retirement System of Rhode Island and find an elasticity of labor supply with respect to deferred pension benefits of around 0.25. Note that this elasticity represents an increase in separations for non-vested workers when pension benefits reduce far into the future, a phenomenon we do not directly simulate. In our base case, we use the elasticity estimated in Coile and Gruber (2007), as it relates to the responsiveness of retirement behavior to benefit reductions, but we examine sensitivity to this elasticity to illustrate its impact.

We conduct this analysis on our stylized worker by simulating the present value of retirement benefits under a baseline and counterfactual COLA rate, and generating the percent change in retirement benefits resulting from the change in COLA. We use a 3% discount factor and mortality rates for the 1950 cohort from the Social Security Administration 2018 Trustees Report for the Alternative 2 cost scenario (averaged for males and females) as our base case. Note that because we estimate the percent change in benefits from COLA reductions, factors like the benefit factor, earnings trajectories, and final average salary calculations do not influence the calculations since they affect both the baseline and counterfactual retirement benefits proportionally.

The percent reduction in future retirement benefits together with the elasticity of non-participation with respect to retirement benefits generates a reduction in retirement hazards. We use retirement hazards implied by labor force participation rates by single year of age reported by the Bureau of Labor Statistics for 2010 and multiply the retirement hazard at each age by the percent reduction,

and calculate the expected retirement age for both the baseline COLA and the counterfactual COLA to estimate the change in retirement age implied by the reduction in COLAs.

Our results are summarized in Table 4. In the base case, a COLA reduction from 3% annually to 0% reduces the present value of retirement benefits by 35.7% for someone with average mortality and a 30-year career. With an elasticity of non-participation of 0.16, this change in future benefits translates to a delay in retirement of approximately 4.7 months. A delay in retirement of 4.7 months may come from increased labor supply in either the public or private sector and may also be accompanied by later Social Security claiming. Note that this estimate assumes that the change in COLAs does not affect the benefit accrual from continued work differently, so that the effect arises solely from changes in retirement wealth resulting from COLA reductions. As noted earlier, this also does not account for separations from public sector employers at earlier ages that may be expected if retirement benefits become less generous. There may also be changes in the intensive margin that are not accounted for here.

We also examine the sensitivity to this calculation to a number of factors in order to provide a range of possibilities that may arise from changes in COLAs. First, we calculate the change in retirement benefits from changes in COLAs under low and high mortality rates – defined as 50% and 150% of the base case mortality assumptions, respectively. Because the effects of COLAs reduce benefits by a larger share as one is further from starting benefits, people with low mortality will experience larger reductions in benefits than those with high mortality. As a result, the change in retirement age is larger (5.23 months) with a low mortality assumption and smaller (4.26 months) with a high mortality assumption. Similarly, increasing the discount rate makes later COLA-adjusted benefits worth relatively less, so higher discount rates result in a smaller change in retirement age. Holding the starting age fixed, longer years of service are associated with later retirement, and a reduction in COLAs would affect longer-service employees less, on average, resulting in a smaller change in retirement age.

Larger fluctuations in the expected change in the retirement age come from adjusting the elasticity assumptions, which imply that the same change in the present value of retirement benefits can lead to dramatically different effects on retirement age depending on the underlying responsiveness of labor supply to retirement wealth. In addition, while, in the earlier example, we model a change in COLAs from 3% to 0%, a larger (smaller) change would be expected if the reduction in COLAs was larger (smaller).

We next use our simulations to examine how hypothetical changes in COLAs might affect the underfunding of pensions, *ceteris paribus*. To do this, we first calculated the average liability per worker under the base case scenario using an 8% discount rate, which is standard in actuarial calculations to value these funds, and a 3% COLA. We next multiplied the liability per worker by the average funding level of the pension plans in our sample (77%) to create a measure of pension plan assets per worker. Finally, we calculated estimated liabilities per worker under an assumption of a 0% COLA rather than a 3% COLA, and compared that to the estimated assets per worker to obtain the estimated funding ratio with a 0% COLA. This stylized example suggests that a move from a 3% COLA to a 0% COLA could increases the funding ratio from 77% to 96%.[6] This illustrates how COLA changes can be used to improve pension underfunding, even in low inflation eras like the past two decades.

Overall, these stylized examples indicate the large potential effect of changing COLAs on retirement wealth, retirement behavior, and fund balances. Given the scale and magnitude of changes in COLAs made in public sector pension programs, our results suggest that many employees may make consequential changes in their retirement age and possibly other margins. Although the elasticities we use to model these stylized examples are from changes in pension wealth driven by benefit cuts (not COLA changes) in other settings (Social Security rather than public sector pensions), they provide some insight into how the labor supply of public sector worker might shift with changes in the COLAs of public sector pensions.

[6]The change in the funding ratio from a move from a 3% COLA to a 0% COLA is similar under various assumptions regarding the discount rate between 1% and 10%.

Table 5. Stylized examples of changes in the present value of retirement benefits and the retirement age from COLA changes

		ΔPV of ret benefits (%)	ΔRet age (months)
	Base case	−35.7	4.66
Mortality	Low mortality	−40.0	5.23
	High mortality	−32.8	4.26
Discount rate	1.50%	−39.0	5.10
	4.50%	−32.6	4.24
Years of service	25	−38.9	5.09
	35	−32.3	4.20
Elasticity	0.05	−35.7	1.42
	0.25	−35.7	7.41
COLA	5% → 0%	−54.5	7.23
	1.5% → 0%	−18.9	2.43

Note: Authors' calculations. The table shows the expected change in the present value of future retirements and the expected change in the retirement age under different scenarios. The base case represents a change in the COLA from 3% to 0%, 30 years of service, work start age of 22, average mortality, a 3% discount rate, and 01.16 elasticity of retirement with respect to retirement wealth. Mortality rates represent Alternative II mortality rates from the 2018 trustees report for the 1950 birth cohort. Labor force participation rates in 2010 used for baseline retirement hazards. See text for additional details.

4. Conclusion

Defined benefit retirement plans remain prevalent for state and local employees, but many of these plans face funding shortfalls. Because the benefits promised by these plans can be constitutionally protected, many retirement systems may look to COLAs as a way to reduce future liabilities. These COLAs could constitute significant reductions in retirement wealth for affected workers, and may influence retirement timing and Social Security claiming.

In this study, we develop a database of COLA changes for 49 plans in 30 states, covering 52% of public sector workers, to examine the prevalence and direction of COLAs in these plans over the period spanning 2005–2018. We find that each year, between 27% and 57% of public sector workers covered by one of these plans experience a change in the COLA. The direction of the change varies over time, with more positive changes prior to the Great Recession, and more negative changes in more recent years.

On average over this time period, approximately 45% of workers in our sample experience a chance in any one year, and more than half of these workers experience a negative change. Also, the average COLA rate decreased nearly 50% over this period. At the same time, inflation also decreased. The net effect was an increase in average COLA rates over time relative to inflation. The sheer number of workers affected by these changes – 60 million over the 14 years covered by our database – suggests that these changes, which have not been studied on a broad scale, could have significant changes in retirement and Social Security. However, we note that results regarding the way that COLAs move with inflation may vary in high-inflation environments given the existence of caps to COLA increases.

We quantify the effects that these changes may have by simulating how COLA changes would affect retirement wealth and retirement timing using several stylized examples. For a public sector worker who starts work at age 22 and continues for 30 years with average mortality for the 1950 birth cohort and a 3% discount rate, we estimate that eliminating a 3% COLA would reduce her retirement wealth by approximately 35%. When we apply elasticities of retirement probabilities with respect to retirement wealth from previous studies, this reduction translates to a delay in retirement by approximately 4.5 months. We explore the sensitivity of this result to changes in various assumptions, including mortality, discount rates, years of service, the elasticity used, and the COLA examined.

Acknowledgments. We would like to thank Helen Burkhardt, Rene Crespin, Fiona Qiu, Francesca Vescia, and Linda Ye for exceptional research assistance, and seminar participants at the Social Security Administration for helpful feedback. The research reported herein was performed pursuant to grant RDR18000003 from the US Social Security Administration (SSA) funded as part of the Retirement and Disability Research Consortium. The opinions and conclusions expressed are solely those of the authors and do not represent the opinions or policy of SSA, any agency of the Federal Government,

the authors' institutions, or NBER. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of the contents of this report. Reference herein to any specific commercial product, process or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply endorsement, recommendation, or favoring by the United States Government or any agency thereof.

References

Brown K (2013) The link between pensions and retirement timing: lessons from California teachers. *Journal of Public Economics* **98**, 1–14.

Coile C and Gruber J (2007) Future social security entitlements and the retirement decision. *Review of Economics and Statistics* **89**, 234–246.

Fitzpatrick M (2014) Retiree health insurance for public school employees: does it affect retirement? *Journal of Health Economics* **38**, 88–98.

Leiserson G (2013) Retiree Health Insurance and Job Separations: Evidence from Pennsylvania State Employees, Essays on the Economics of Public Sector Employment (Dissertation). MIT.

Morrill M (2014) Active and retired public employees' health insurance: potential data sources. *Journal of Health Economics* **38**, 147–152.

Morrill M and Westall J (2019) The role of social security in retirement timing: evidence from a national sample of teachers. *Journal of Pension Economics and Finance* **18**, 549–564.

Munnell A, Aubry J-P and Cafarelli M (2014) COLA Cuts in State/Local Pensions, Center for Retirement Research Issue Brief, Number 38.

Ni S and Podgursky M (2016) How teachers respond to pension system incentives: new estimates and policy applications. *Journal of Labor Economics* **34**, 1075–1104.

Patki D (2020) Breaking the Implicit Contract: Using Pension Freezes to Study Lifetime Labor Supply. Working paper, retrieved on July 20, 2020 from https://sites.google.com/umich.edu/dpatki/research?authuser=0.

Quinby L and Wettstein G (2019) Do Deferred Benefit Cuts for Current Employees Increase Separation? Center for Retirement Research Working Paper series, CRR WP 2019-3.

Salinas G (2017) Retirement Timing and Pension Incentives: Evidence from the Teachers Retirement System of Texas, unpublished manuscript.

Shoven JB and Slavov SN (2014) The role of retiree health insurance in the early retirement of public sector employees. *Journal of Health Economics* **38**, 99–108.

Cite this article: Fitzpatrick MD, Goda GS (2024). The prevalence and nature of COLAs in public sector retirement plans. *Journal of Pension Economics and Finance* **23**, 152–164. https://doi.org/10.1017/S147474722300001X