The Prevalence of COLA Adjustments in Public Sector Retirement Plans

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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 COLA adjustments in public sector retirement plans through original data collection for 43 plans in 25 states, which cover approximately 45 percent of public sector workers overall. Among this sample, on average 43 percent 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 COLA adjustments may affect workers' retirement decisions. Our analysis suggests that eliminating a 3 percent COLA could delay retirement of affected workers by approximately 4.5 months.

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I. INTRODUCTION

Approximately 13.8 percent of the U.S. 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 differ 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 percent, while in 2019, this ratio had declined to 71.9 percent. 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 employees. This is because, in many of the states with statewide pension systems, the pension promises to public employees are written into the state constitution. They 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. This means that such changes to pension

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

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. Some states have eliminated 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 can be large. For example, based on a standard simple model, moving from a 3 percent annual COLA to none decreases the present value of lifetime pension benefits by 25 percent (Munnell et al. 2014). 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 an effective way to limit current liabilities because the reductions take effect immediately for both current retirees and employees once they begin collecting benefits.

For employees close to retirement, this reduction in the present value of pension benefits 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 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. 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, Fitzpatrick 2014, Leiserson 2013, 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., Slavov and Shoven 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 COLA adjustments, which, because they happen frequently and commonly, may affect benefits 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 affect retirement behavior. We describe an intensive data collection process during which our research team gathered data on COLAs across 43 state and local pension plans between 2005 and 2018 across 25 states, covering 45 percent of state and local employees. Collection plans are still underway, so we report preliminary results on the COLA changes across these plans in the sample we have completed to date. We then merge our COLA data with population-level data on state and local workers from the American Community Survey from 2005 to 2018. This 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 one third and one half 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 43 percent of workers in our sample experience a chance in any one year, representing more than 52 million workers over the 14-year horizon. More than half of these workers (28 million) experience a negative change, and 23 percent (or 12 million) are in the 55-64 year old age group.

Our analysis of stylized workers suggest 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 percent discount rate, we estimate that eliminating a 3 percent COLA would reduce her retirement wealth by approximately 35 percent. 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 adjustment examined.

We make multiple contributions to this literature. First, we provide the first comprehensive look at COLA changes across a balanced panel of 43 state and local retirement plans covering 25 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 this data to 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. Fourth, in the next iteration of this work, we will use changes in the COLAs in a differences-in-differences framework to identify the effects of such changes in the present value of pension benefits on labor supply decisions. In future work, we aim to match our information about COLA changes on richer administrative panel data to get a more comprehensive understanding of how COLA changes in public sector pensions over the past 20 years impact retirement, labor supply, and benefit claiming.

The rest of the paper proceeds as follows. Section II describes the data collected from state and local pension plans as well as the population-level data from the American Community Survey (ACS). Section III 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 IV concludes.

II. DATA COLLECTION AND SUMMARY

A. 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 2019 for 200 pension plans (118 administered at the state level and 82 administered locally). These plans cover 95 percent 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 records 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.

We classify COLAs 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 Consumer Price Index, 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 percent 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. More details are provided in the appendix (TBD).

Our data collection efforts yielded complete data spanning 2005-2018 for 43 plans across 25 states. This represents information on about one-quarter of the pension plans in the pension plan database (169 plans). These plans cover 44 percent of active participants in state and local pension plans in 2018.[3] Since our research team started by looking for information on COLAs for the plans with the highest membership first, the plans in our sample are unlikely to be representative of all plans. As we move forward and incorporate more plan information, our

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

dataset will become more representative. In the meantime, 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 yet in the COLA data.

In Figure 1 we present information on the fraction of the 43 plans in our sample that changed their COLA rates between 2005 and 2018. Between 2005 and 2010, between 21 and 26 plans changed their COLA rate each year, depending upon the year. After 2010, fewer plans changed their COLAs each year. In 2011 to 2013, 14 to 15 plans changed each year. Between 2014 and 2018, only 8 to 12 plans changed their COLAs each year, except in 2017 when 19 plans changed their COLAs.

Of interest is whether COLAs in these plans were increasing or decreasing. Since some COLAs are tied, either directly through their statutory formulas or indirectly through policymakers' concerns about plans' fiscal health, changes in COLAs tend to move with financial markets. They often do so with a bit of a lag, since most plan 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, 80 percent 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 15 COLA changes was positive. By 2017 and 2018, there was again an increase in the share of pension plan COLA changes that were positive.

B. American Community Survey

In order to obtain estimates of the number of workers affected by COLA changes, we merge our plan-level data with data from the American Community Survey (ACS). The ACS is an annual large nationally representative survey of people in the U.S. It includes information about demographic characteristics (including age) and about employment and income. Income information is collected of 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 five 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 employer people worked for if they worked in the past five years, including whether it was a state or local government.[4] 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 the most recent employer for those out of the labor force or unemployed. Therefore, using this 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. (We are currently estimating such models, but it is unclear at this stage whether they will be useful.) However, these data do allow us to estimate the proportion and composition of public sector workers subject to changes in COLAs.

[4] 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

We select a sample of ACS respondents surveyed from 2005-2018 from ages 25-80 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 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, 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 U.S. 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 1, 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 five years in column 1. In the second column, we present the same demographic characteristics for the sample of ACS respondents in state and local government in the 25 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 45 percent of the public employees in the ACS. This includes coverage of 74 percent of the state and local workers in the 25 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 less likely to be black (11.7 versus 14.1 percent), more likely to be white (72.3 versus 66.5), and less likely to be Hispanic (9.3 versus 12.2 percent) than the entire ACS population of state and local workers. The groups are equally likely to be female (60 percent). The COLA sample is slightly older than the general population of state and local workers (49.7 versus 48.1 years). They have slightly lower average wage income ($44,345 versus $45,690) and are 3 percentage points less likely to be in the labor force (81.7 versus 84.4 percent). Comparing the second column to the other two shows that this is a matter of selection into the plans within our COLA sample, not a matter of the demographic characteristics of people in the states more generally. This evidence of selection should be taken into account when interpreting how generalizable the information on COLAs we have is. We hope that our ongoing effort to expand the COLA sample will lead to a more representative sample of public sector workers in the ACS.

In Table 2, we present information on the prevalence of COLA changes in our sample of ACS data across the 43 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 exceptions are 2014 and 2016 when only 29 and 26 percent did, respectively.) On average, 3.7 million people who are working in or have recently worked in the public sector experience COLA changes in their pension plan. Over the entire period, over 52 million state and local government workers experienced changes to their plans' COLA. Just over half of these employees, 28 million, experiences downward changes to their plans' COLA.

The pattern of changes over time in the changes to COLA largely mirror what we reported earlier at the plan level. The largest number of employees experience downwards 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 3, we present information on the number of state and local government employees that experiences 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 3, over 12 million public sector employees between the ages of 55 and 64 experienced COLA changes between 2005 and 2018. Another 13.8 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.

III. COLA CHANGES AND LABOR SUPPLY: STYLIZED EXAMPLES

For current employees close to retirement, the reduction in the present value of pension benefits 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 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 five 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 across states.

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 percent for cost of living and are paid until she dies. Now suppose her pension plan eliminates the cost of living adjustment. 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 nonparticipation with respect to benefits of 0.16, suggesting that if retirement wealth increases by 10 percent, retirements would increase by 1.6 percent. 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 percent 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 nonparticipation 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 zero reduces the present value of retirement benefits by 35.7 percent for someone with average mortality and a 30-year career. With an elasticity of nonparticipation 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 on 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 percent 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 we model a change in COLAs from 3 percent to zero, a larger (smaller) change would be expected if the reduction in COLAs was larger (smaller).

Overall, these stylized examples indicate the large potential effect of changing COLAs on retirement wealth and retirement behavior. 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.

IV. 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 COLA adjustments as a way to reduce future liabilities. These COLA adjustments 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 43 plans in 25 states, covering 45 percent of public sector workers, to examine the prevalence and direction of COLA adjustments in these plans over the period spanning 2005 to 2018. We find that each year, between one third and one half 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 43 percent of workers in our sample experience a chance in any one year, and more than half of these workers experience a negative change. The sheer number of workers affected by these changes – more than 52 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 on retirement and Social Security.

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 percent discount rate, we estimate that eliminating a 3 percent COLA would reduce her retirement wealth by approximately 35 percent. 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 adjustment examined. In future work, we aim to continue to build our database of COLA adjustments in public sector retirement plans and examine the effects of these COLA changes on labor supply and Social Security claiming using administrative panel data.

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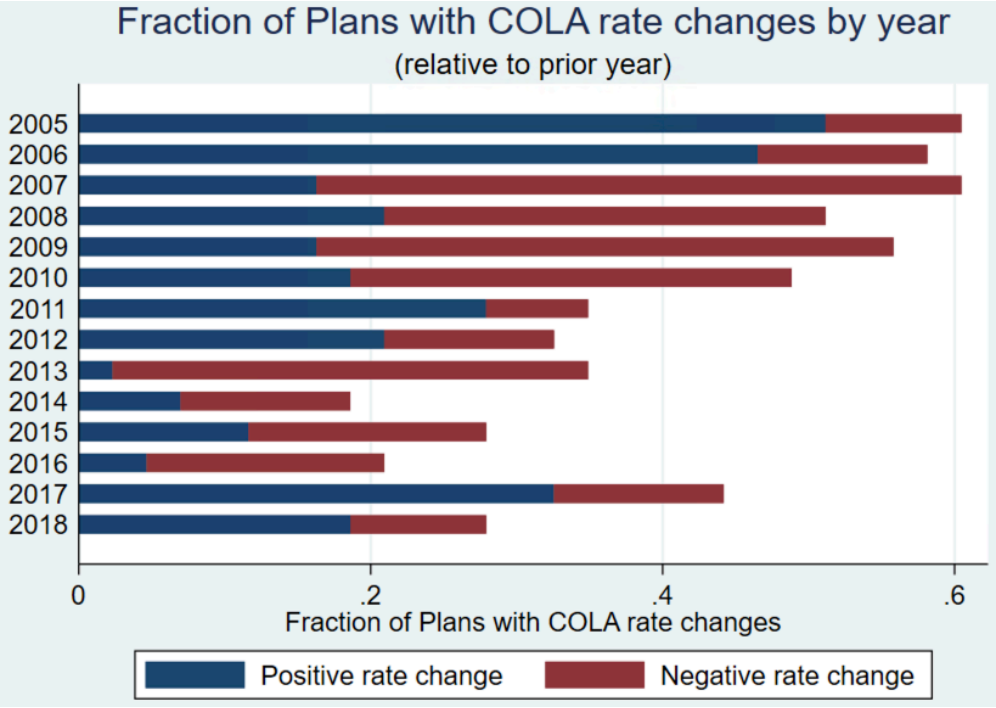
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Figure 1. Fraction of Public Sector Pension Plans with COLA Rate Changes, 2005 to 2018



Note: Based on authors' calculations using the sample of 43 pension plans in our COLA database between 2005 and 2018.

Table 1. Demographic Characteristics State and Local Public Sector Workers in the ACS and in the COLA Analysis Sample in 2018

	ACS Public Employees	ACS Public Employees (final 25 states)	ACS Public Employees in (final 43 plans with COLA info)
Percent Black	14.1	14.7	11.7
Percent Hispanic	12.2	13.2	9.3
Percent White	66.5	63.8	72.3
Percent Female	59.5	59.2	59.8
Average Age	48.12	48.12	49.69
Average Income Wage	45,690	46,807	44,345
Percent in labor force	84.4	84.5	81.7
Number of People in the ACS	19,238,167	11,792,594	8,717,534

Note: Author's tabulations using the American Community Survey. 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 five 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 43 plans. We use population weights when measuring these characteristics and present weighted population counts in the final row of the table.

Table 2. 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	4,769,873	4,055,232	714,641	8,630,843
	55.27	46.99	8.28	100
2006	4,852,241	4,123,241	729,000	8,655,655
	56.06	47.64	8.42	100
2007	4,726,673	848,067	3,878,606	8,780,295
	53.83	9.66	44.17	100
2008	3,853,865	1,882,564	1,971,301	8,828,168
	43.65	21.32	22.33	100
2009	4,322,927	1,412,316	2,910,611	8,703,655
	49.67	16.23	33.44	100
2010	4,194,339	1,665,464	2,528,875	8,764,362
	47.86	19	28.85	100
2011	3,827,406	2,627,567	1,199,839	8,804,015
	43.47	29.85	13.63	100
2012	2,875,563	1,502,163	1,373,400	8,720,904
	32.97	17.22	15.75	100
2013	3,811,124	26,398	3,784,726	8,712,381
	43.74	0.3	43.44	100
2014	2,525,244	510,135	2,015,109	8,695,159
	29.04	5.87	23.18	100
2015	2,886,079	914,807	1,971,272	8,563,805
	33.7	10.68	23.02	100
2016	2,264,632	209,653	2,054,979	8,717,434
	25.98	2.4	23.57	100
2017	4,776,747	3,353,032	1,423,715	8,828,915
	54.1	37.98	16.13	100
2018	2,858,880	1,134,679	1,724,201	8,717,534
	32.79	13.02	19.78	100
Total	52,545,593	24,265,318	28,280,275	122,123,125
	43.03	19.87	23.16	100

Note: Author's tabulations using the American Community Survey. 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 3: Number of state and local employees in sample who experienced any COLA change, by year and age group

Year	25-34yo	35-44yo	45-54yo	55-64yo	65+yo	Total
2005	898,804	1,212,188	1,363,492	981,143	314,246	4,769,873
2006	925,628	1,213,174	1,354,857	1,030,290	328,292	4,852,241
2007	883,320	1,137,282	1,318,283	1,054,225	333,563	4,726,673
2008	729,737	900,924	1,066,890	863,027	293,287	3,853,865
2009	819,337	994,839	1,188,032	982,455	338,264	4,322,927
2010	794,347	933,531	1,136,441	994,166	335,854	4,194,339
2011	681,576	833,582	1,036,691	940,209	335,348	3,827,406
2012	540,010	633,404	730,829	693,537	277,783	2,875,563
2013	701,448	830,131	966,465	927,227	385,853	3,811,124
2014	451,756	545,246	621,980	619,864	286,398	2,525,244
2015	543,154	600,719	705,441	687,652	349,113	2,886,079
2016	419,459	460,082	548,322	543,802	292,967	2,264,632
2017	921,218	1,002,919	1,163,591	1,128,376	560,643	4,776,747
2018	555,062	594,150	674,706	675,763	359,199	2,858,880
2005-2018	9,864,856	11,892,171	13,876,020	12,121,736	4,790,810	52,545,593

Note: Author's tabulations using the American Community Survey. 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.

Table 4: Stylized examples of changes in the present value of retirement benefits and the retirement age from COLA changes

		Δ PV of Ret Benefits	Δ Ret 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.