ABOUT THE PUBLIC FUND SURVEY

The Public Fund Survey is an online compendium of key characteristics and trends affecting most of the nation’s largest public retirement systems. The Survey is provided by the National Association of State Retirement Administrators.

First published in 2003 based on FY 02 findings including comparatives from FY 01, this marks the 20th edition of the Public Fund Survey Summary of Findings. The Survey contains data on public retirement systems that provide pension and other benefits for 13.2 million active (working) members and 10.3 million annuitants (those receiving a regular benefit, including retirees, disabilitants and surviving beneficiaries). At the end of fiscal year 2021, systems in the Survey held combined defined benefit plan assets of $4.82 trillion. The membership and assets of systems included in the Survey comprise approximately 88 percent of the entire state and local government defined benefit plan community. Since FY 13, much of the survey data has been compiled by the Center for Retirement Research at Boston College as part of Public Plans Data (PPD), an online, interactive resource containing public retirement system information culled chiefly from public retirement system annual financial reports and actuarial valuations. In addition to the Center for Retirement Research at Boston College, the PPD is sponsored also by NASRA, MissionSquare Research Institute, and the Government Finance Officers Association. This report, focusing on FY 21, uses graphs and narrative to illustrate and describe changes in selected elements of public retirement systems and the pension plans and funds they oversee.

Some of the information in this report is presented in the context of changes to median, or midpoint, data. Presenting changes based on a median, rather than aggregate (total) basis, reduces the effects of very large plans and plans with extreme or exceptional results, enabling readers to focus on the experience of a more typical plan instead of results that could be skewed by the experience of one or a few outliers.

NEW SYSTEMS AND PLANS

Retirement systems are the entities created in law by states and local government to administer retirement and other benefits for employees of state and local government. Systems fulfill these statutory directives by performing such functions as collecting contributions from employers and employees; managing assets; paying benefits; procuring professional services, such as asset managers, actuaries, auditors, information technology consultants; legal counsel, and others. Retirement systems administer pension plans and a majority of statewide systems manage pension assets; for those that do not manage assets, an external entity, such as a state investment board, perform that function.

The Public Fund Survey monitors and reports on system data such as the market value of assets; asset allocation; dollar values of contributions collected, benefits paid, and investment earnings; and number of system participants.

Public pension plans are administered by retirement systems and are the framework of a retirement benefit, defined by such characteristics as participation requirements (mandatory or optional); required contributions by employers and employees; vesting requirements; benefit levels; methods of
benefit distribution; and others. Some retirement systems administer multiple plans, typically for different groups or classes of workers. The Public Fund Survey reports data for plans such as the actuarial value of assets and liabilities; funding ratio; and investment return assumption.

For the first time since its inception, systems and plans have been added this year to the Public Fund Survey. The six systems that are new this year are:

- Arkansas State Highway Employees' Retirement System
- Los Angeles City Employees' Retirement System
- Orange County Employees Retirement System
- University of California Retirement System
- Municipal Fire & Police Retirement System of Iowa
- Louisiana Parochial Employees' Retirement System

Each of these systems has one plan that is included in the Public Fund Survey. In addition, two plans from the Nebraska Public Employees’ Retirement System have been added: the Nebraska State Employees Pension Plan and the Nebraska County Employees Pension Plan. The Nebraska Public Employees’ Retirement System and its Schools Plan, for public school teachers in Nebraska, has been part of the Survey since its inception.

The addition of these systems and plans increases the combined market value of assets among systems in the Public Fund Survey by approximately $140 billion, or 3.0 percent; the number of active members by some 220,000, or 2.0 percent; and the number of annuitants by approximately 145,000, or 1.5 percent.

**NEW CHARTS**

Several new charts have been introduced to this year’s Summary of Finding report, as follows:

- Figure H presents the rate of change in combined payrolls from FY 20 to FY 21 for the 122 plans in the Survey that remain open to new hires
- Figures L and M display the range of employer contribution rates paid in FY 21 for plans whose members participate in Social Security, and whose members do not participate in Social Security, respectively. These charts complement Figures J and K, that plot the median employee and employer contribution rates for each year since the Survey’s inception.
- Figure N presents the cumulative sources of revenue into public pension funds for the 30 years ended in 2021.
- Figure S shows the FY 21 asset allocation weighted by the market value of assets of funds in the Survey. This chart complements Figure R, which illustrates average asset allocations for Systems in the Survey beginning in FY 05.
A PROSPECTIVE LOOK

Although this Summary of Findings is, by definition, retrospective, volatility in capital markets since the end of FY 21, which is the focus of this report, is likely to have a material effect on public pension funding conditions. For this reason, we will briefly address this volatility and its possible effects.

Following the onset of the COVID-19 pandemic in early 2020, the US economy and US and global capital markets began a period of unusual volatility which has largely continued through the date of this writing in October 2022. Because public equities are the single largest asset class in which public pension funds are invested, and because some other asset classes are highly correlated with the S&P 500, we will use the experience of that index to illustrate the changes public pension funds have faced since early 2020.

After dropping by more than one-third from February to March, the S&P 500 rose from its low point in March 2020 by more than 65 percent at year’s end. For the year ended June 30, 2021, which is the end of fiscal year 2021 for a majority of plans in the Public Fund Survey (and the fiscal year that is the focus of this report), the median public pension fund investment return was 25.8 percent, according to Callan. Public equity and bond markets continued their rise through calendar 2021, as shown by the one-year median return in Figure O, below. These robust returns are the leading factor in the higher aggregate funding level shown in Figure A. Figure F plots the investment earnings generated in FY 21 by systems in the Survey.

US and global equity and bond markets then declined sharply beginning in January 2022. As of October 2022, the S&P 500 is lower for the year to-date by more than 20 percent, and major fixed income indices are lower by more than 10 percent. Evidence suggests that returns on private equity investments this year also are sharply lower. The median public pension fund return (-9.6 percent, per Callan) for the year ended June 30, 2022 was low enough to negate all or most of the extraordinary gains produced by the median return for the year ended 6/30/21. As a result, absent a dramatic improvement in capital markets in the final weeks of 2022, this Summary of Findings next year is likely to report a decline in both the aggregate public pension funding level and aggregate asset values held by retirement systems in this Survey.

SUMMARY OF FINDINGS

Figure A plots the aggregate actuarial funding level among plans in the Survey since its inception in FY 2001, with the total actuarial values of assets and liabilities. The aggregate funding level in FY 21 was 74.9 percent, up from 72.6 percent in FY 20. This improvement marks the largest single-year increase in the aggregate funding level in the 20-year history of the Public Fund Survey and was enabled chiefly by strong investment returns (discussed above and below). These returns produced growth of 7.1 percent in the aggregate actuarial value of assets, from $3.86 trillion to $4.13 trillion. The actuarial value of assets reflects changes based on the periods pension plans use to phase in investment gains and losses, a calculation also known as smoothing. Smoothing reduces year-to-year volatility in a plan’s funding level and required cost. (A few plans use their market value of assets and do not phase in investment gains and losses.) Combined liabilities of plans in the Survey grew by 3.7 percent, from $5.32 trillion to $5.51 trillion. Liabilities fluctuate as a result of four factors: a) because liabilities are a present value, they increase at a rate of interest equal to the prior year’s discount rate; b) new benefit accruals resulting from active participants accruing an additional year of service credit.
c) payment of benefits to retired participants (which reduces liabilities); and d) changes in actuarial assumptions and actuarial experience that differs from assumptions.

The improvement in the aggregate funding level breaks this measure out of a narrow range—between 71.8 and 73.7 percent—in which the aggregate funding level had remained for nine consecutive years. Although many factors combine to affect a plan's funding ratio, the predominant factor driving funding levels higher in FY 21 was strong investment returns. As shown in Figure O below, strong FY 21 investment returns also helped to raise annualized public pension fund returns for the 10 years ended 6/30/21, which were 8.6 percent, and 9.6 percent for the decade ended 12/31/21.

The gently sloping line plotting the change in the aggregate funding level masks considerable variety in the experience of the plans in the Survey: funding levels for many individual plans vary considerably from this pattern, especially since the Great Financial Crisis.

In addition to investment performance, other major contributors to changes in a plan's funding level include adjustments in actuarial assumptions and actuarial experience that varies from assumptions. Since the market decline of 2008-09 and the Great Recession, every plan in the Public Fund Survey has reduced its most consequential actuarial assumption—the rate of expected investment return. These lower investment return assumptions have created a strong headwind to efforts made by public retirement systems and their plan sponsors to improve funding levels. Many plans also have adjusted other actuarial assumptions, including mortality assumptions to reflect expected longer lives. Like a lower investment return assumption, improved mortality assumptions result in a reduced plan funding level and higher cost, as plan participants are projected to receive benefits for a longer period of time. See the NASRA issue brief on investment return assumptions.

![Figure A](image-url)
FY 21 funding levels of the 128 plans in the Survey are depicted in Figure B. The size of each circle is roughly proportionate to the size of each plan's actuarial liabilities—larger bubbles reflect larger plans and smaller bubbles reflect smaller plans. The median funding level is 76.5 percent, and the range is 20.0 percent to 117.9 percent. This chart illustrates the wide distribution of funding conditions among public pension plans.

Figure C plots the median annual change since FY 02 among plans in the Survey in the actuarial value of assets and liabilities. For a pension plan's funding level to improve, its actuarial value of assets must grow faster than its liabilities. At a median rate below 4.0 percent for the fourth consecutive year, liability growth remains below historical rates and extends a trend of lower rates of liability growth that began following the Great Recession. Low liability growth generally is due to several factors that vary by plan, but typically include actual inflation below expectations, plan maturity (i.e., fewer active (working) participants relative to the number of annuitants), slower rates of employment (and payroll) growth, and the effects of many reforms (predominantly reductions) in pension benefits enacted in recent years. Rates of liability growth would be even lower were many plans not also reducing their investment return assumptions (see Figure P), and adjusting mortality assumptions to reflect longer lives, changes that increase a plan’s liabilities.

As with most individual plans, the volatility in rates of change in aggregate actuarial asset values also is muted compared to changes in market values of assets, as most plans phase in investment gains and losses over several years, a process designed to smooth out the effects of market fluctuations. Approximately two-thirds of plans in the survey smooth their investment gains and losses over five years, and another 17 percent smooth over four years. The remaining plans phase in gains and losses over periods that range from zero (meaning no smoothing and using only the market value of assets), to 10 years.
Because five years is the predominant period used by plans to recognize investment gains and losses, a five-year investment return measure (as shown in Figure O) can be instructive in understanding the effect of recent market performance on a plan’s funding level. This is because a plan’s actual investment performance can have a relatively large impact on its funding condition, particularly if the plan’s return is significantly higher or lower than the plan’s assumed rate of investment return. In the case of a theoretical plan with an investment return assumption of 7.0% and an actual annualized five-year investment return of 6.0%, assuming the plan achieved its other actuarial assumptions, that plan’s funding level is likely to be lower because of its actual investment return underperforming its assumed investment return.

The Survey measures two types of retirement system members: actives and annuitants. Actives are those who currently are working and earning retirement service credits; nearly all actives also make contributions toward the cost of their pension benefit. Figure J and K show changes in median contribution rates for employees and employers. Annuitants are those who receive a regular benefit from a public retirement system; these are predominantly retired members, but also include those who receive a disability benefit (disabilitants), and survivors of deceased retired members.

As shown in Figure D, the median rate of increase in annuitants among systems in the Survey continued its slower trend, declining in FY 21 to its lowest level in the measurement period. Each year since FY 16, median growth in the number of annuitants has been below 3.5 percent, following a six-year period of growth above 3.5 percent. The number of active members declined sharply in FY 21, reversing a pattern of six years of marginal growth. This pattern of change in the number of active members is consistent with US Census Bureau reports showing an increase in the number of state and local government employees, a trend Census data shows began in FY 14 and continued through
The difference between the continued increase in annuitants and a declining or slowly rising number of active members is driving a long-term reduction in the overall ratio of actives to annuitants. In FY 21, this ratio dropped to 1.26, which marks a rate of decline once again above three percent, following six consecutive years of more modest decline below three percent. A low or declining ratio of actives to annuitants is not necessarily problematic for a public pension plan. This is because the typical public pension funding model features accumulation, during plan participants’ working years, of assets needed to fund retirement benefits, in anticipation of higher rates of payout as members retire.

When combined with an unfunded liability, however, a low or declining ratio of actives to annuitants can cause financial distress for a pension plan sponsor. An unfunded liability represents a shortfall in accumulated assets and results in a cost of the plan above the normal cost, (the cost of benefits earned each year); this additional cost is required to amortize or eliminate the unfunded liability over a period of years. A lower ratio of actives to annuitants results in applying costs to amortize a plan’s unfunded liability over a relatively smaller payroll base, which increases the cost of the plan as a percentage of employee payroll. Thus, although a declining active-annuitant ratio does not, by itself, pose an actuarial or financial problem, when combined with a poorly-funded plan, a low or declining ratio of actives to annuitants can result in higher required pension costs.

**Figure D**

On a market value basis, as of FY 21, systems in the Survey held a combined $4.89 trillion in assets, an increase of 22.9 percent from FY 20. Figure E, which plots the fiscal year-end value of public pension funds in the Survey, reflects the result of market volatility in recent years, including the strong asset gains in most years since 2009, and the exceptional FY 21 investment return. As the
aggregate market value of funds in the Public Fund Survey has grown by roughly $2.2 trillion over the past decade, these same plans also have paid out approximately $2.6 trillion in benefits. Collectively, the portion of assets held by the systems in the Survey represents nearly 88 percent of the total FY 21 public pension assets identified by the U.S. Census Bureau.

Figure E

Figure F plots the combined revenues and expenditures of the systems in the Public Fund Survey. The green line reflects investment gains and losses, which vacillate as investment markets fluctuate. Blue bars indicate contributions, from employees and employers, and red bars show benefit payments. Contributions and benefit payments grow at mostly steady and predictable rates, while growth or decline in investment earnings is much more volatile, corresponding with volatility in global capital markets. Because most plans pay out more each year in benefits than they receive in contributions, contributions are used to pay current benefits (as shown in Figure I), while most investment earnings accrue to pension trust funds. Pension trust funds are established for the sole purpose of paying benefits and funding administrative costs. The benefits paid by public retirement systems are paid from these trust funds, not from state and local government operating budgets or general funds.

Growth in levels of contributions and benefits is mostly stable and predictable over time. Investment
earnings, which comprise over 60 percent of public pension revenues over the past thirty years, vacillate, often appreciably, depending on market performance (see Figure N).

Figure F

Figure G plots the distribution of the median annual change in payroll from FY 02 to FY 21 among plans in the Survey for which this data is available. (The chart excludes plans in the Survey that are closed to new hires. Closed plans have no new, active members joining, and the number of annuitants grows each year as active members retire or terminate.)

As Figure G shows, the median change in payroll was either negative or in decline from the prior year from FY 08 to FY 12, and has increased slowly but steadily since, before reaching the lower end of a more typical range in FY 19 and FY 20. Slower state and local employee wage growth in FY 21 resulted in a sharp decline in the median change in payroll, to below two percent in FY 21, which is the lowest level since FY 13. Negative or slow payroll growth reflects one or both of two basic factors: stagnant or declining employment levels, and modest salary growth among employees of state and local government. The payroll experience pattern of public pension plans following the Great Recession is corroborated by information provided by the U.S. Bureau of Labor Statistics, indicating that state and local employment levels stagnated before accelerating since FY 14, while annual growth in wages and salaries for employees of state and local government increased at a slower pace, remaining below two percent for seven years until FY 16. FY 19 saw the highest level of state and local employment growth since FY 07, and annualized state and local employee wage growth reached 2.5 percent in FY 19, which corresponds to median FY 19 public pension payroll growth above three percent for the first time since FY 09. Slow growth in state and local employment and employee wages during the pandemic resulted in a sharp decline in median payroll growth in FY 21.
Payroll growth affects a pension plan actuarially because the long-term funding of a typical pension plan is based partly on expected growth in a pension plan's payroll base. When a plan's payroll grows at a rate less than expected, the base that is used to amortize the plan's unfunded liability is smaller, meaning that the cost as a percentage of payroll of amortizing the unfunded liability is larger. This situation is analogous to a mortgage, in which the mortgage-holder anticipates a growing salary to make her or his monthly mortgage payment. When salary growth does not materialize as anticipated, the cost of the mortgage payment as a percentage of expected income is higher.

Many pension plans in recent years have reduced their payroll growth assumption to reflect changing economic realities and expectations. As a result, higher payroll growth experience and assumptions for future payroll growth are converging.

Figure G presents the distribution of change in payroll from FY 20 to FY 21, and the median payroll growth, for the 122 plans in the Survey that are open to new hires. The individual plan experience ranged from a decline of 7.8 percent to an increase of 8.8 percent, creating a wide range of outcomes between those two extremes.

Figure H presents the distribution of change in payroll from FY 20 to FY 21, and the median payroll growth, for the 122 plans in the Survey that are open to new hires. The individual plan experience ranged from a decline of 7.8 percent to an increase of 8.8 percent, creating a wide range of outcomes between those two extremes.
Figure I plots the median external cash flow as a percentage of assets since FY 01. External cash flow is the difference between a system's revenue from contributions, and payouts for benefits and administrative expenses. External cash flow excludes investment gains and losses. Dividing a system's cash flow into the market value of the system's assets produces the measure of cash flow as a percentage of assets. A growing number of annuitants, combined with slow or negative growth in active members, will result in a reduction in a retirement system's external cash flow. Conversely, a growing asset base will offset a rate of negative cash flow. Contributions made below the actuarially recommended rate can also contribute to a plan's negative cash flow.

Nearly all systems in the survey have an external cash flow that is negative, meaning they pay out each year more in benefits and administrative expenses than they collect in contributions. Negative cash flow is not, by itself, an indication of financial or actuarial distress: the purpose of accumulating assets is to eventually pay them out as benefits. As a system matures, i.e., as its members age, and ultimately retire, the system will inevitably pay out in benefits relatively more compared to a less mature, younger system with fewer retirees. A lower (more negative) cash flow may require the system's assets to be managed more conservatively, with a larger allocation to more liquid assets to meet current benefit payroll requirements. For example, in 2018, the Kentucky Public Pensions Authority reduced the investment return assumption of one of its plans—the Kentucky Employees' Retirement System—to 5.25 percent, because the plan’s funding level (then below 20 percent) requires the fund to maintain a relatively large portion of its assets in more liquid securities that do not generate a significant investment return.

The median external cash flow in FY 21 is -2.2 percent, the highest rate since FY 14. This increase is most likely a result of a) higher levels of pension contributions received by many plans, and b) the significant increase in public pension assets in FY 21.
Figures J and K reflect changes in median employee and employer contribution rates. Figure J includes active members and employers for participants who also participate in Social Security; Figure K includes those participants and their employers who do not participate in Social Security. These contribution rates apply predominantly to general employees and public school teachers and do not reflect those for public safety workers and narrow employee groups, such as legislators, judges, etc.

Approximately one-quarter of employees of state and local government do not participate in Social Security, including approximately 40 percent of all public school teachers, and a majority to substantially all state and local government workers in seven states: Alaska, Colorado, Louisiana, Maine, Massachusetts, Nevada, and Ohio.

Nearly every state has made changes to its pension plan(s) design or financing arrangement, or both, since 2009; the most common change has been an increase in required employee contribution rates. This trend is reflected in Figures J and K. Figure J shows the median employee contribution rate for employees participating in Social Security increasing to 6.30 percent in FY 21, after several years at 6.0 percent and preceded by a lengthy period of 5.0 percent. Median contribution rates for non-Social Security-participating employees remained steady in FY 21 after reaching 9.0 percent in FY 20 following many years at 8.0 percent.

Contribution rates among employers both in and out of Social Security have increased considerably since the inception of the Survey. This increase reflects several factors but is due primarily to the increase in unfunded pension liabilities and, more recently, also a strengthened effort among many employers to increase their contribution effort to pay a greater share of the actuarially determined contribution. FY 02, the first year of the contribution rates measurement period, was at or near the all-time low point for employer contribution rates. These low rates were a result partly of strong investment earnings in the late 1990s, as aggregate unfunded liabilities for the public pension community were around zero.
Figure L displays the range of employer contribution rates paid in FY 21 for plans whose members participate in Social Security. The lowest rate is 6.0 percent and the highest is 78.69 percent.

Figure M displays the range of employer contribution rates paid in FY 21 for plans whose members do not participate in Social Security. The lowest rate is 8.55 percent and the highest is 55.5 percent.

Figure N presents the cumulative sources of revenue into public pension funds for the 30 years ended in 2021. Over time, investment earnings consistently have accounted for between 60 percent and 65 percent of public pension fund revenue. This chart illustrates the important role that investment earnings play in funding public pension benefits. The large portion of revenue from investment earnings also helps to show why even a relatively small change in a plan’s investment return assumption can have a large effect on the plan’s funding level and required cost.
As shown in Figure O, according to investment consultant Callan, the median investment return for plans with a FY-end date of June 30, 2021, (the FY-end date used by approximately three-fourths of the funds in the survey), was an exceptionally strong 25.8 percent; the return for plans whose fiscal year-end is 12/31 (used by most other plans) was 13.7 percent. As discussed in the narrative accompanying Figure C, because most plans phase in, or smooth, their investment gains and losses over several years (five years for most plans), returns over periods of four or five years are more consequential to funding levels than the return of any single year.

As discussed above under "A Prospective Look," investment returns declined sharply beginning in January 2022, after the measurement period covered by this update. Through October 2022, public equities and fixed income holdings are low enough to negate the effects on plan funding levels of the robust returns seen in FY 21.
Of all actuarial assumptions, a public pension plan’s investment return assumption has the greatest effect on the plan’s funding level and its projected long-term cost. This is because, as shown in Figure N (above), over time, a majority of revenues of a typical public pension fund come from investment earnings.

As shown in Figures P and Q, from the beginning of this survey (and for several years preceding), until FY 11, the median investment return assumption used by public pension plans was 8.0 percent. Following the sharp decline in global capital markets in 2008-09 and the decline in interest rates and projected returns on most major asset classes that followed the Great Financial Crisis, every plan in the Survey reduced its assumed investment return, some more than once. This trend resulted in a reduction to the median return assumption to 7.0 percent in FY 21. Figure P compares the distribution of investment return assumptions for each fiscal year since the inception of the Survey, and Figure Q illustrates the steady reduction in assumed rates of return, particularly since 2009.

Reducing a plan’s investment return assumption increases its projected liabilities and the plan’s cost. The extended period of reductions in the investment return assumption has created a strong headwind to pension plans’ efforts to improve their funding level: even as benefit levels have been reduced and contribution rates increased, funding levels for many plans have struggled to improve due partly to lower investment return assumptions.

![Figure P](image_url)

**Figure P**

**Distribution of Investment Return Assumptions, FY 01 to present**

- >8.5%
- 8.5%
- >8.0% - <8.5%
- 8.0%
- >7.5% - <8.0%
- 7.5%
- >7.0% - <7.5%
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- >0.0% - <0.5%
- 0.0%
- <0.5% - <0.0%
- -0.5%
- <0.0% - <0.5%

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Figure Q reflects the investment return data shown in Figure P (above) after distilling the information into an average and median.

![Figure Q](image)

Figure R plots the average asset allocation of 90+ funds in the Public Fund Survey since FY 05. The average allocation to public equities has steadily declined since the major drop in global capital markets in 2008-09. At 47.0 percent in FY 21, the average allocation to equities continues to be noticeably lower compared to the beginning of the measurement period, while the average allocation to Fixed Income declined marginally in FY 21 to 21.2 percent. Sustained low interest rates have contributed to a long-term trend toward more diversified portfolios featuring lower allocations to fixed income in lieu of asset classes expected to produce higher returns, such as Real Estate and other types of Alternative investments. The average allocation to Real Estate in FY 21 declined marginally to 6.8 percent, and the allocation to other types of Alternatives, chiefly private equity and hedge funds, was 22.6 percent (which marks the highest allocation ever to Alternatives), and marks the second consecutive year in which the average allocation was above 20 percent.
Figure S presents the FY 21 asset allocation weighted by the market value of assets of funds in the Survey. The weighted asset allocation closely matches the non-weighted average allocation, with the weighted allocation reflecting a slightly higher allocation to real estate and a slightly lower allocation to fixed income compared to the non-weighted average.
See Also

- Public Plans Data
- NASRA Issue Briefs, Papers & Analysis

Prepared by:

Keith Brainard and Alex Brown
keith@nasra.org  alex@nasra.org
202-624-8464  202-624-8461